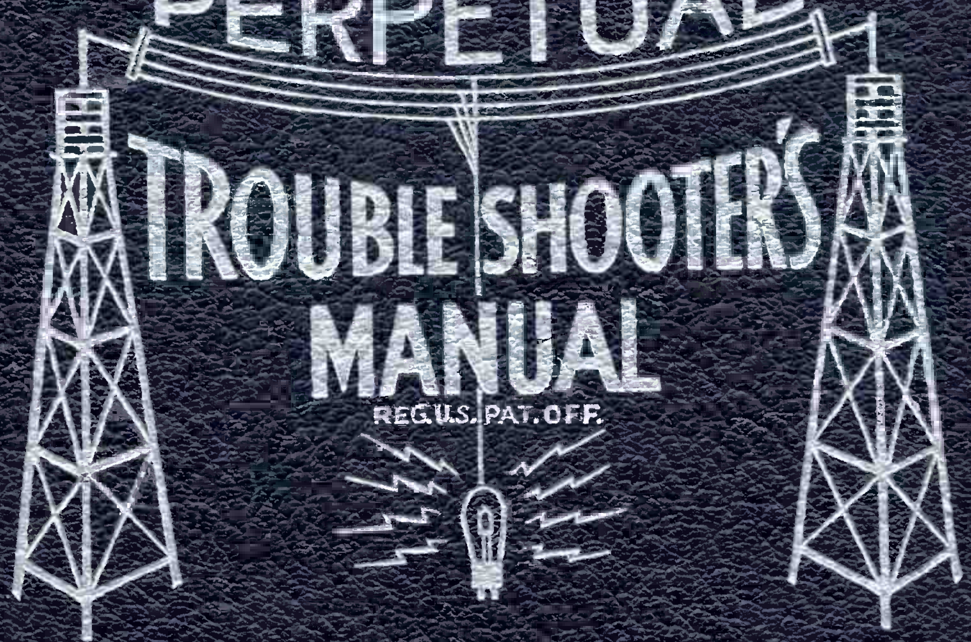
VOLUME VII

PERPETUAL TROUBLE SHOOTER'S MANUAL



REG.U.S.PAT.OFF.

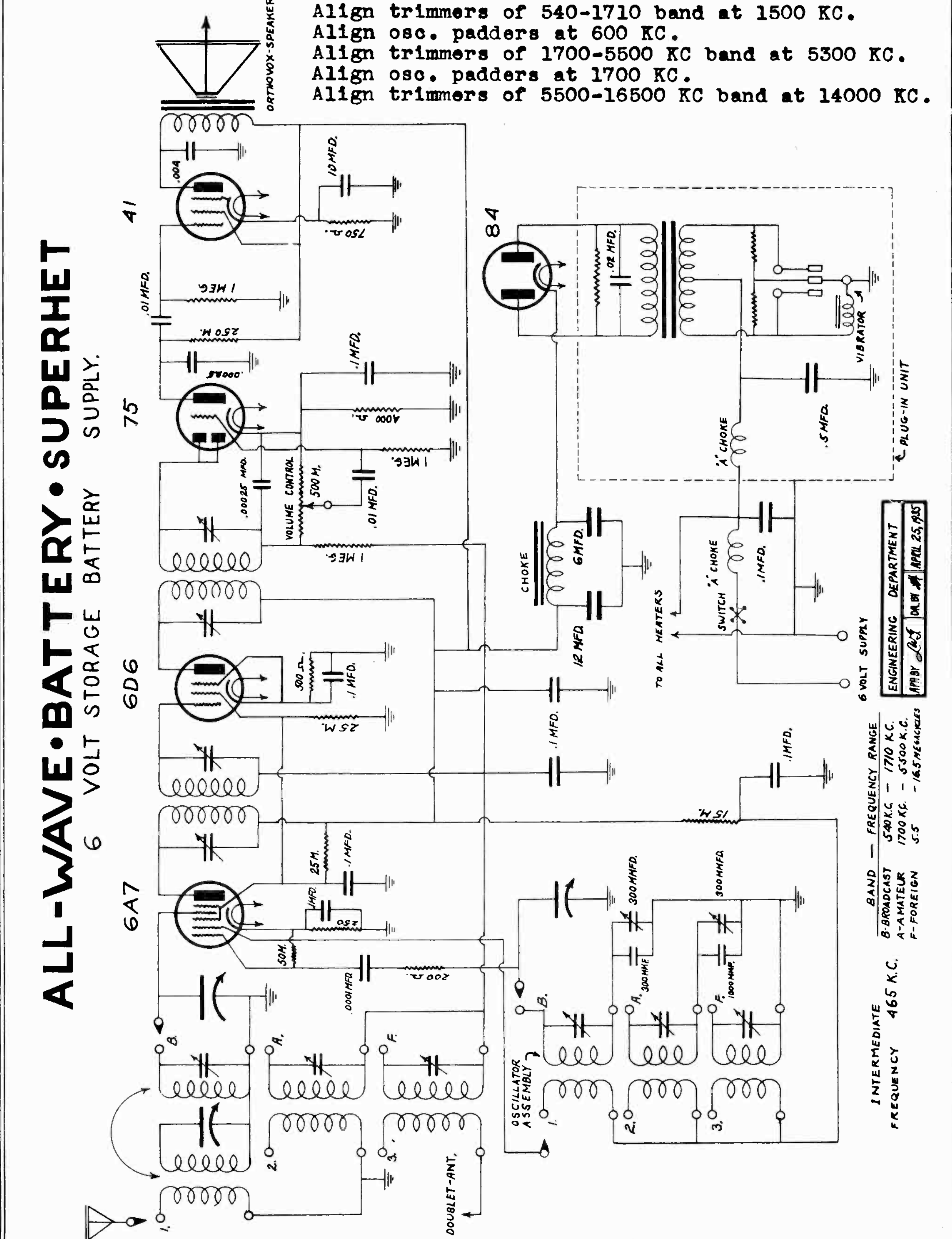
JOHN F. RIDER

MODEL 6V
Schematic
Alignment

PACIFIC RADIO CORP.

ALIGNMENT:-

IF PEAKED AT 456 KC.
Align trimmers of 540-1710 band at 1500 KC.
Align osc. padders at 600 KC.
Align trimmers of 1700-5500 KC band at 5300 KC.
Align osc. padders at 1700 KC.
Align trimmers of 5500-16500 KC band at 14000 KC.

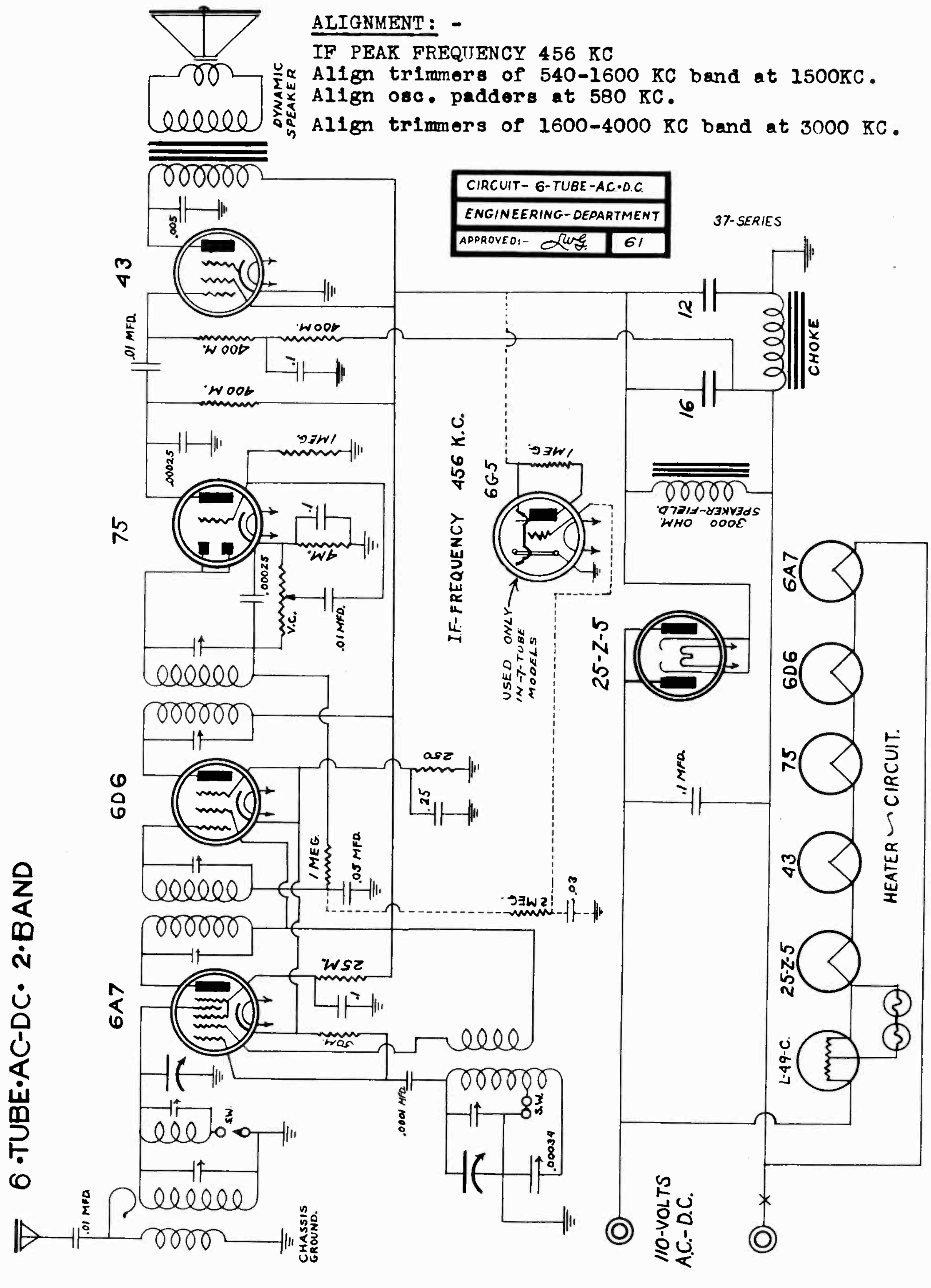


MODEL 61
Schematic
Alignment

PACIFIC RADIO CORP.

ALIGNMENT: -

IF PEAK FREQUENCY 456 KC
Align trimmers of 540-1600 KC band at 1500KC.
Align osc. padders at 580 KC.
Align trimmers of 1600-4000 KC band at 3000 KC.

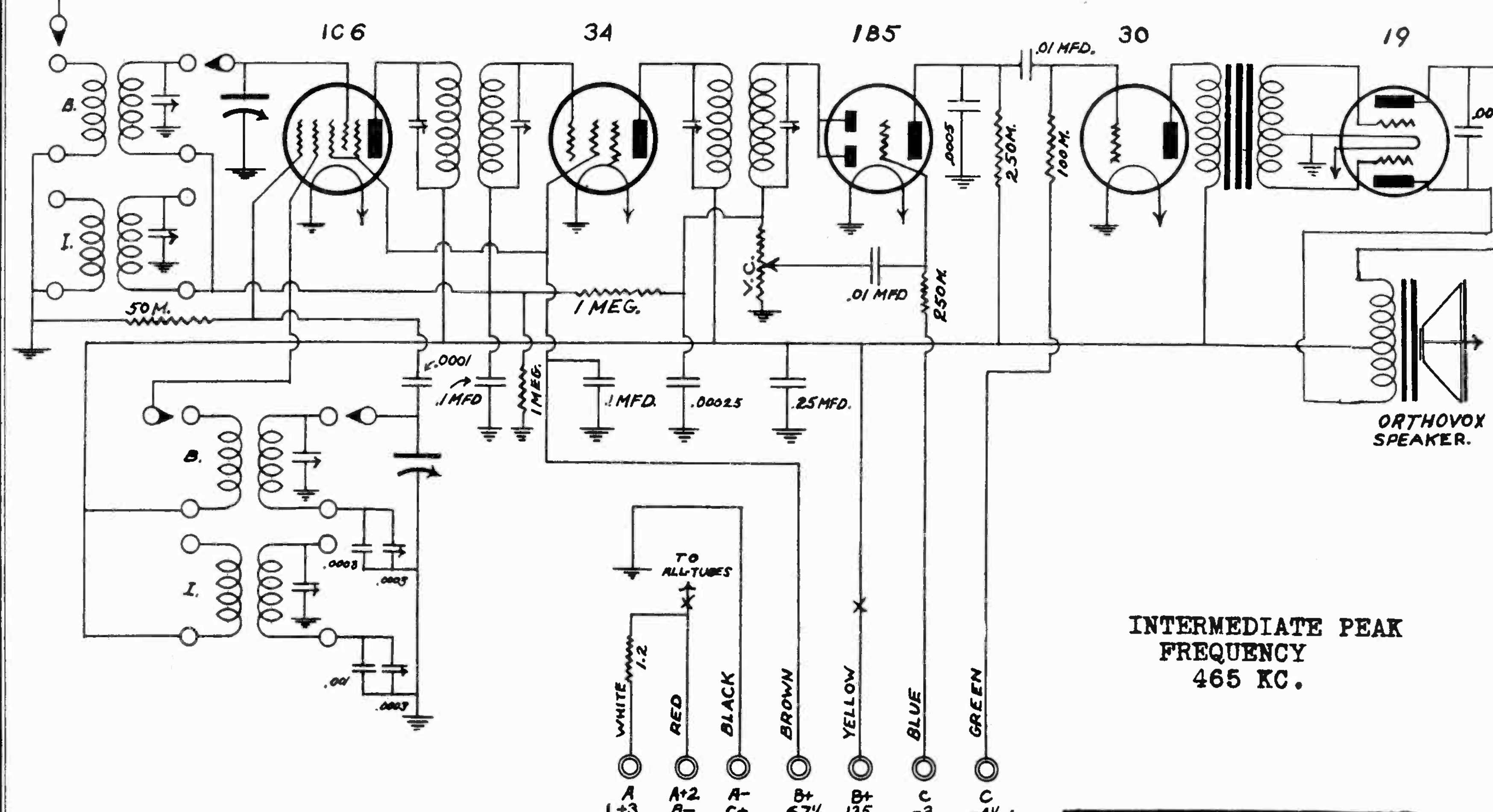


MODEL 81A
Schematic
Alignment

PACIFIC RADIO CORP.

1936 MODEL
BATTERY SUPERHET

2 BAND 55-565 METERS

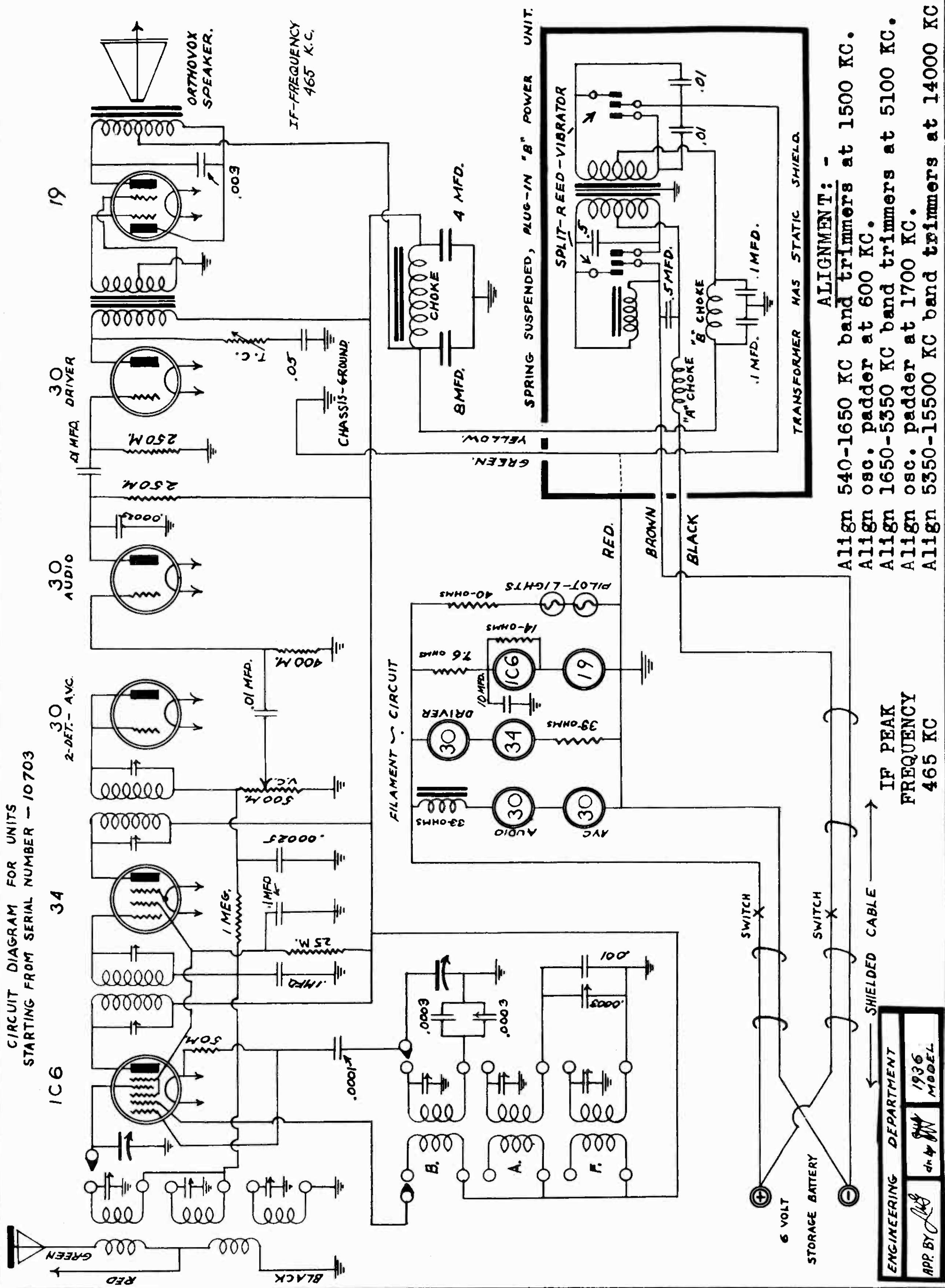


ALIGNMENT:-

Align 540-1600 KC. band trimmers at 1500 KC.
Align osc. padder at 560 KC.
Align 1600-5100 KC trimmers at 4400 KC.
Align osc. padder at 1700 KC.

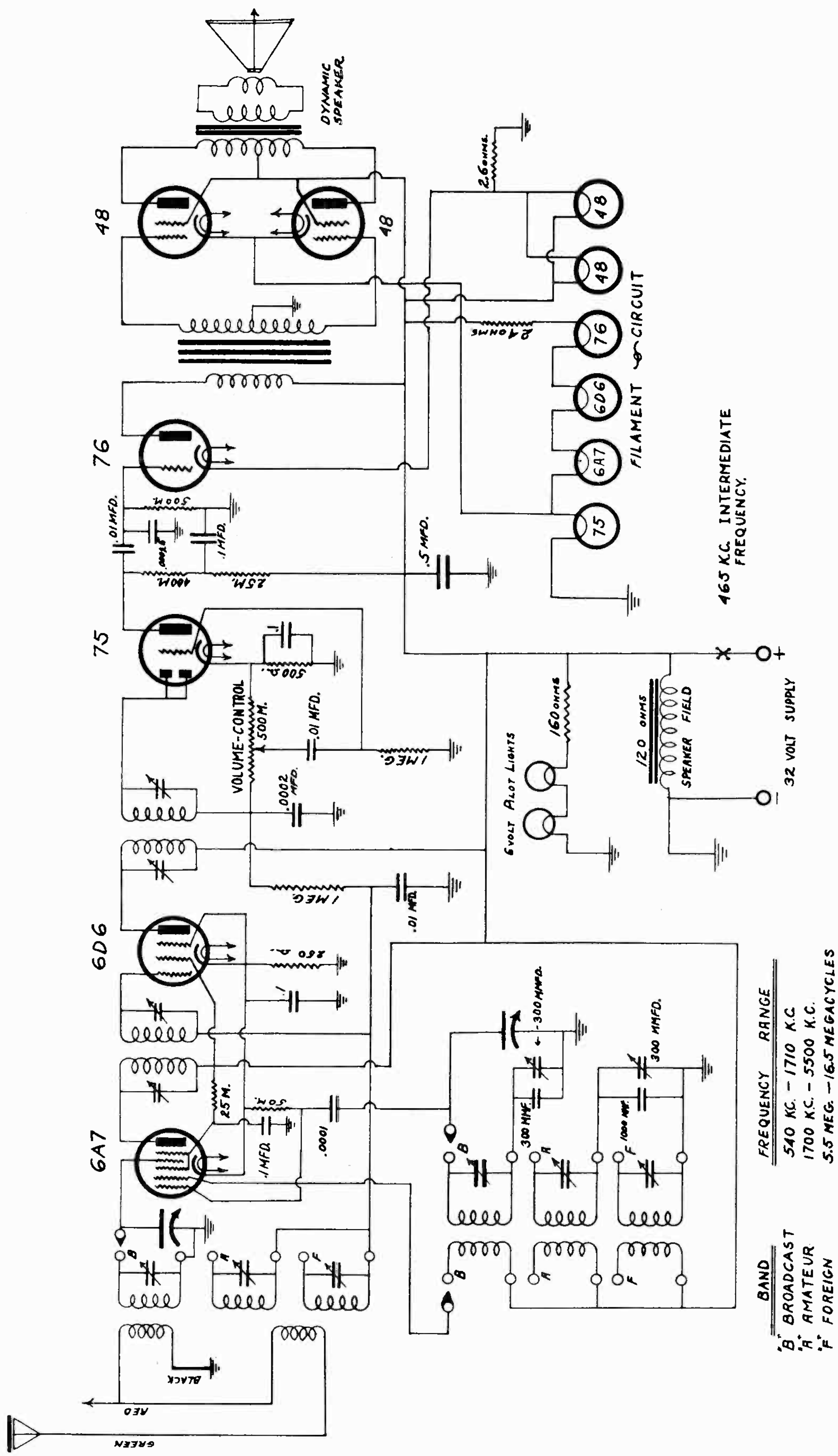
MODEL 682
Schematic
Alignment

PACIFIC RADIO CORP.



MODEL 3280
Schematic
Alignment

PACIFIC RADIO CORP.



ALIGNMENT: -

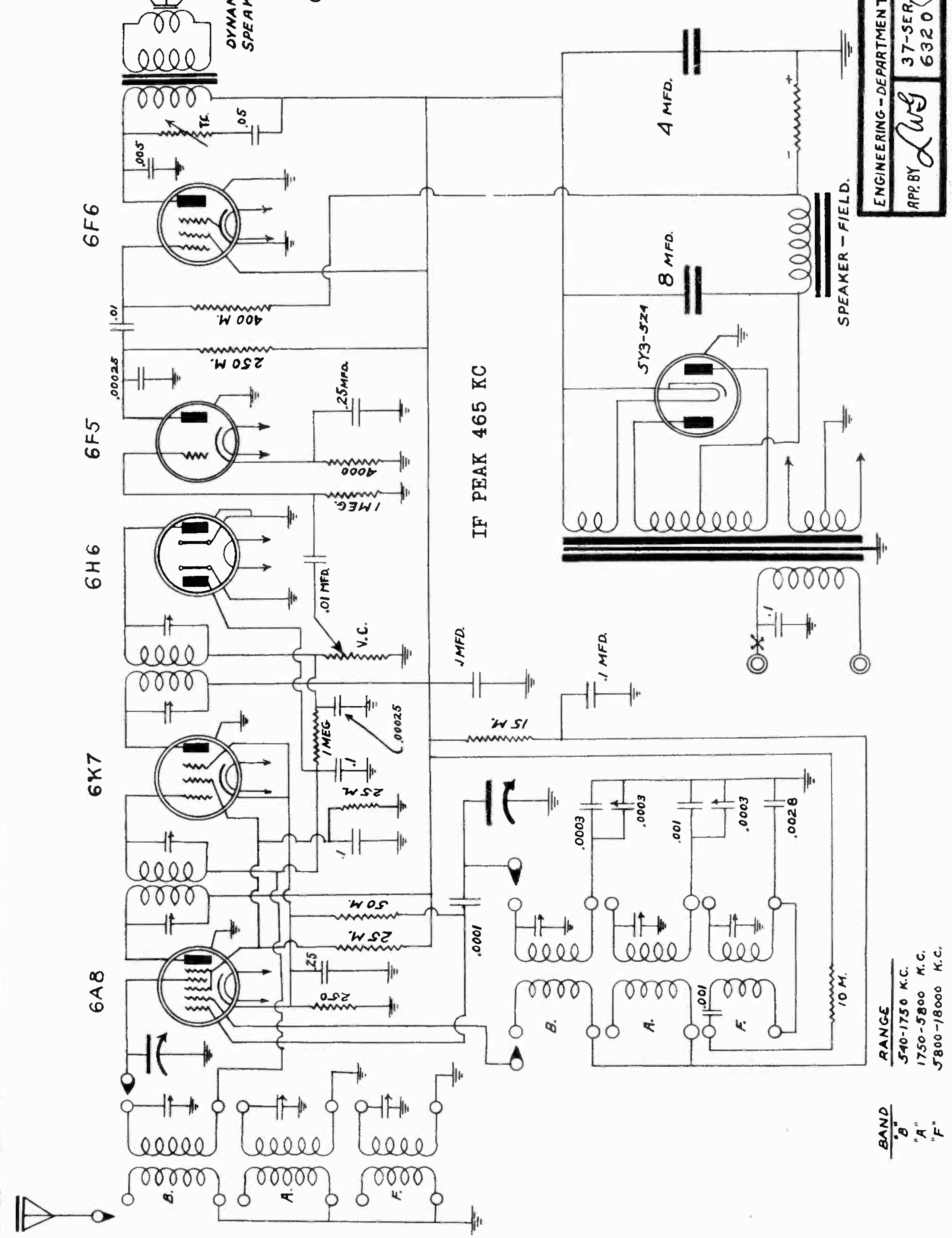
Align 540-1710 KC band trimmers at 1500 KC.
Align osc. padder at 600 KC.
Align 1700-5500 KC band trimmers at 5300 KC.
Align osc. padder at 1700 KC
Align 5500-16500 KC band trimmers at 14000 KC.

ENGINEERING DEPARTMENT
App. By | Dr. By | 1934 Model

MODEL 6320
Schematic
Alignment

PACIFIC RADIO CORP.

Align 540-1750 KC band trimmers at 1500 KC.
Align osc. padder 600 KC.
Align 1750-5800 KC trimmers at 5100 KC.
Align osc. padder at 1800 KC.
Align 5800-18000 KC. trimmers at 16000 KC.

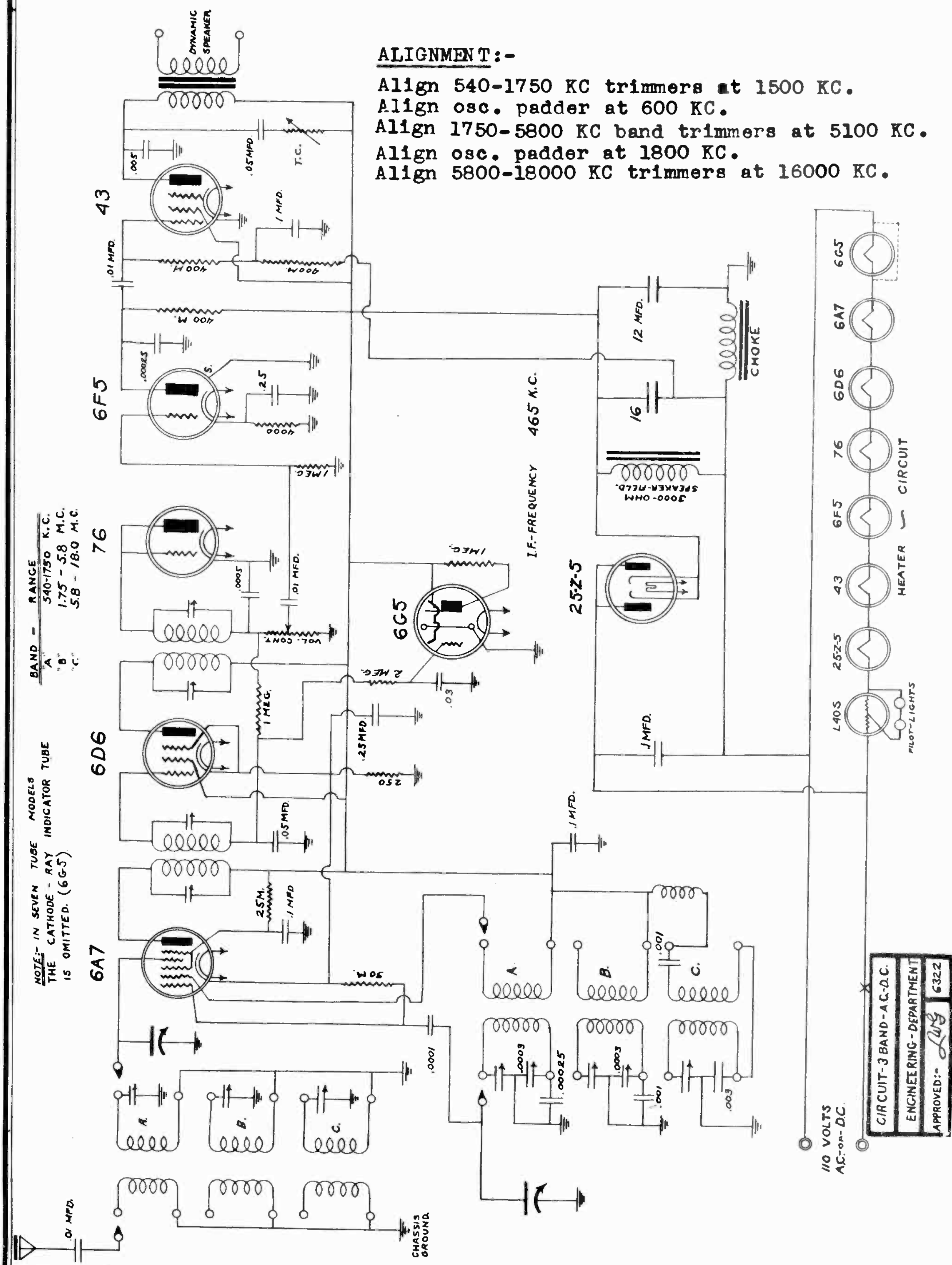


MODEL 6322
Schematic
Alignment

PACIFIC RADIO CORP.

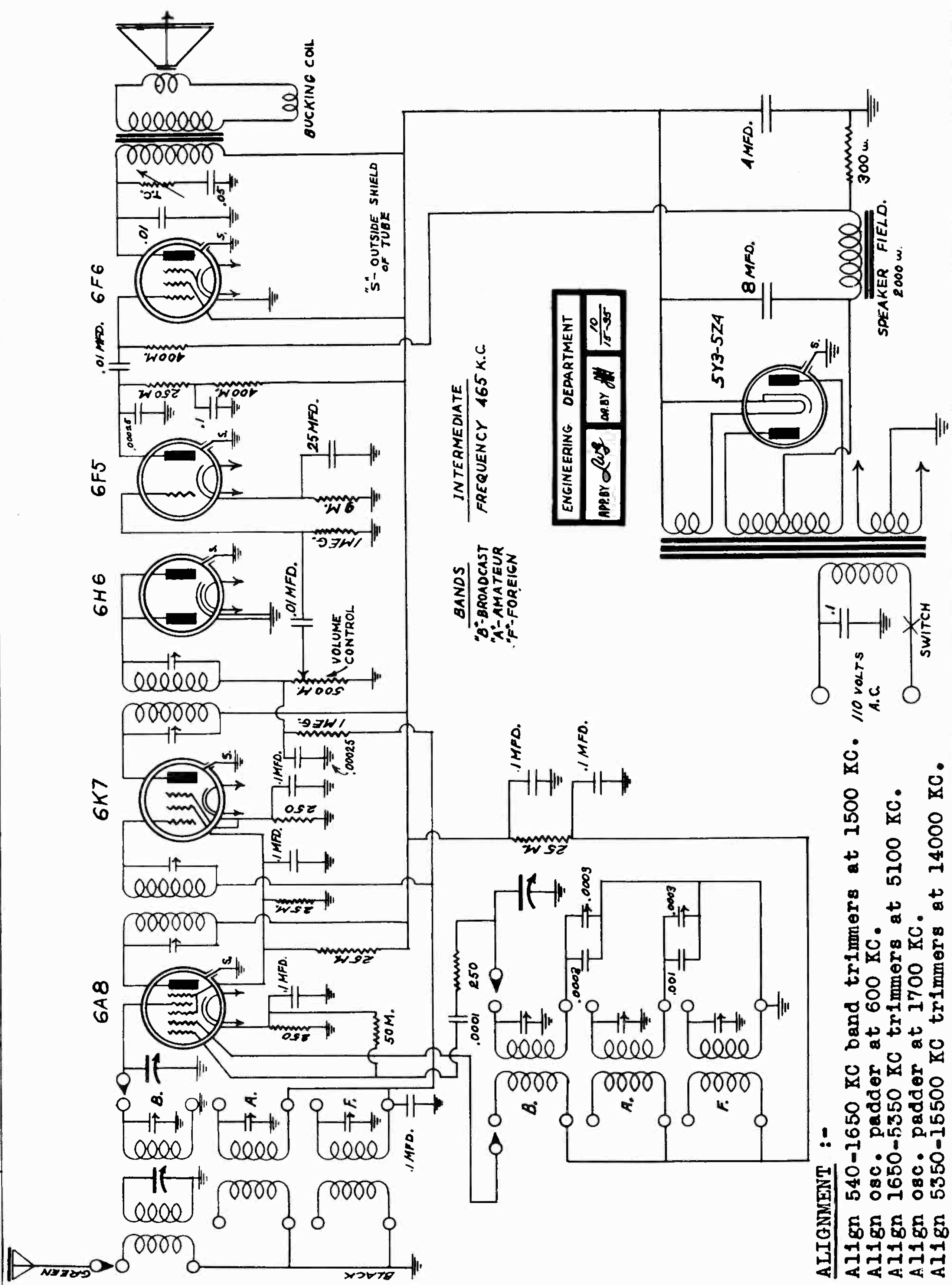
ALIGNMENT:-

Align 540-1750 KC trimmers at 1500 KC.
Align osc. padder at 600 KC.
Align 1750-5800 KC band trimmers at 5100 KC.
Align osc. padder at 1800 KC.
Align 5800-18000 KC trimmers at 16000 KC.



MODEL 6370
Schematic
Alignment

PACIFIC RADIO CORP.

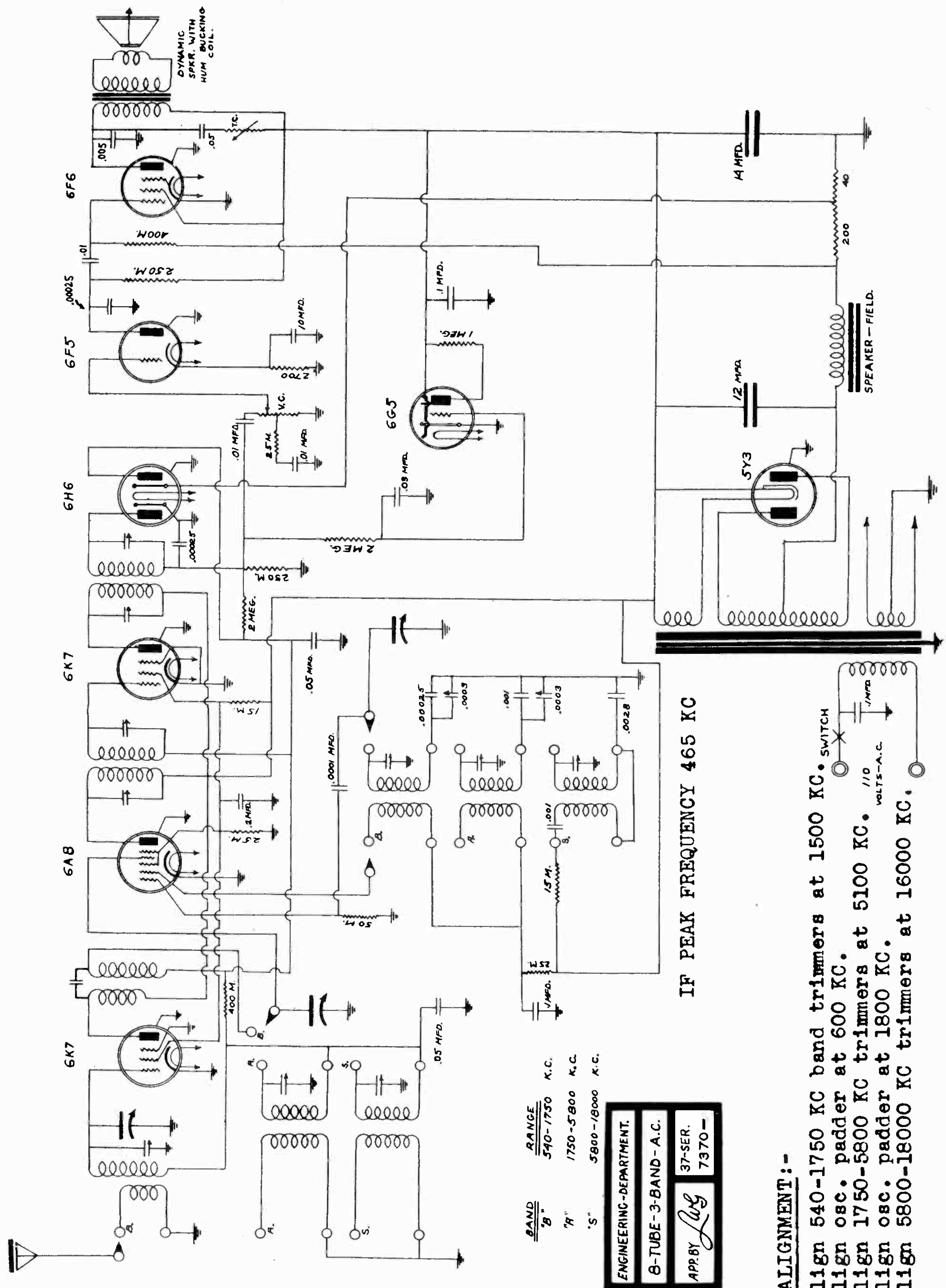


ALIGNMENT :-

Align 540-1650 KC band trimmers at 1500 KC.
Align osc. padder at 600 KC.
Align 1650-5350 KC trimmers at 5100 KC.
Align osc. padder at 1700 KC.
Align 5350-15500 KC trimmers at 14000 KC.

PACIFIC RADIO CORP.

MODEL 7370
Schematic
Alignment



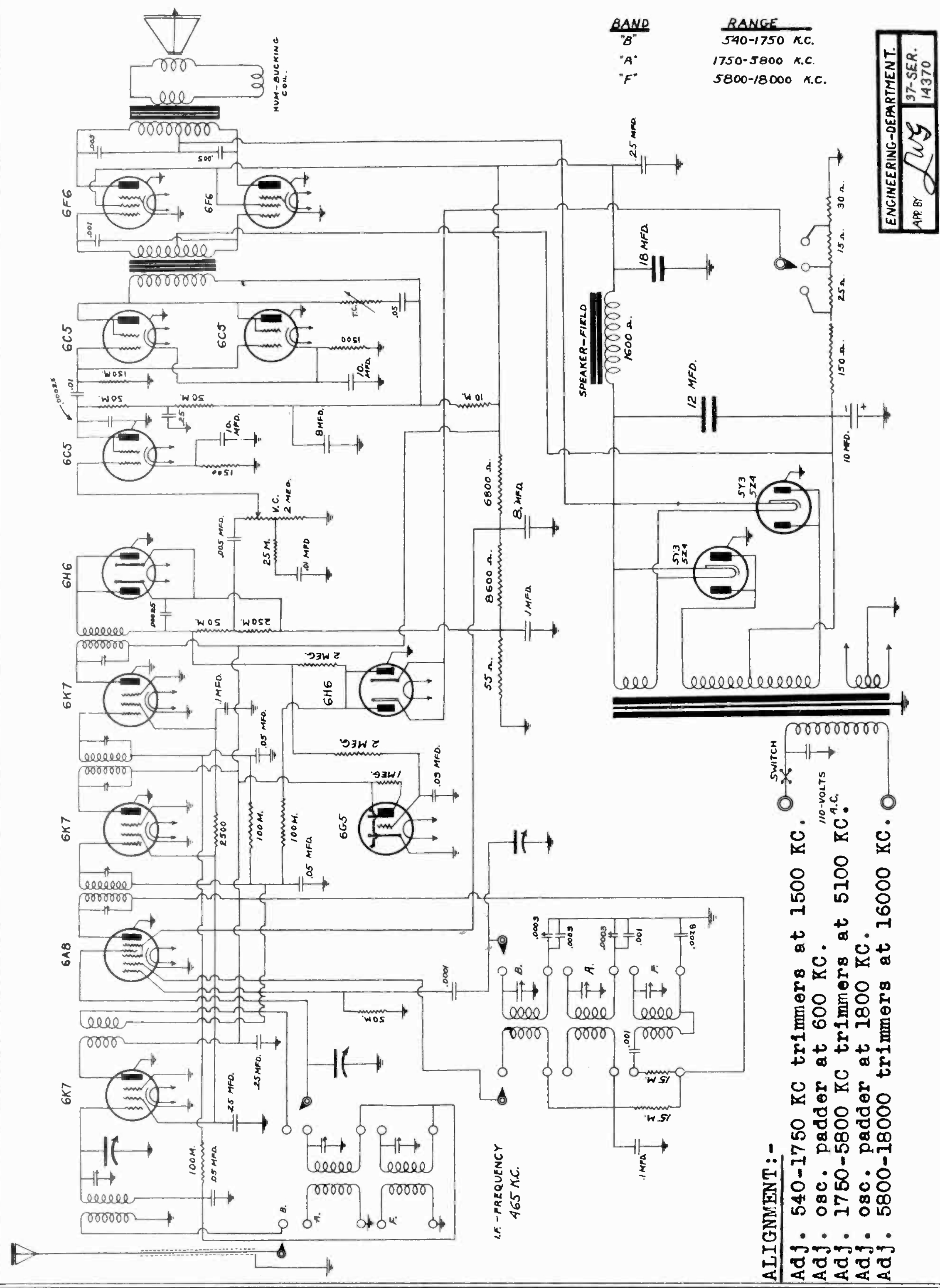
ALIGNMENT:-

Align 540-1750 KC band trimmers at 1500 KC.
Align osc. padder at 600 KC.
Align 1750-5800 KC trimmers at 5100 KC.
Align osc. padder at 1800 KC.
Align 5800-18000 KC trimmers at 16000 KC.

MODEL 14370
Schematic
Alignment

PACIFIC RADIO CORP.

BAND	RANGE
"B"	540-1750 K.C.
"A"	1750-5800 K.C.
"F"	5800-18000 K.C.

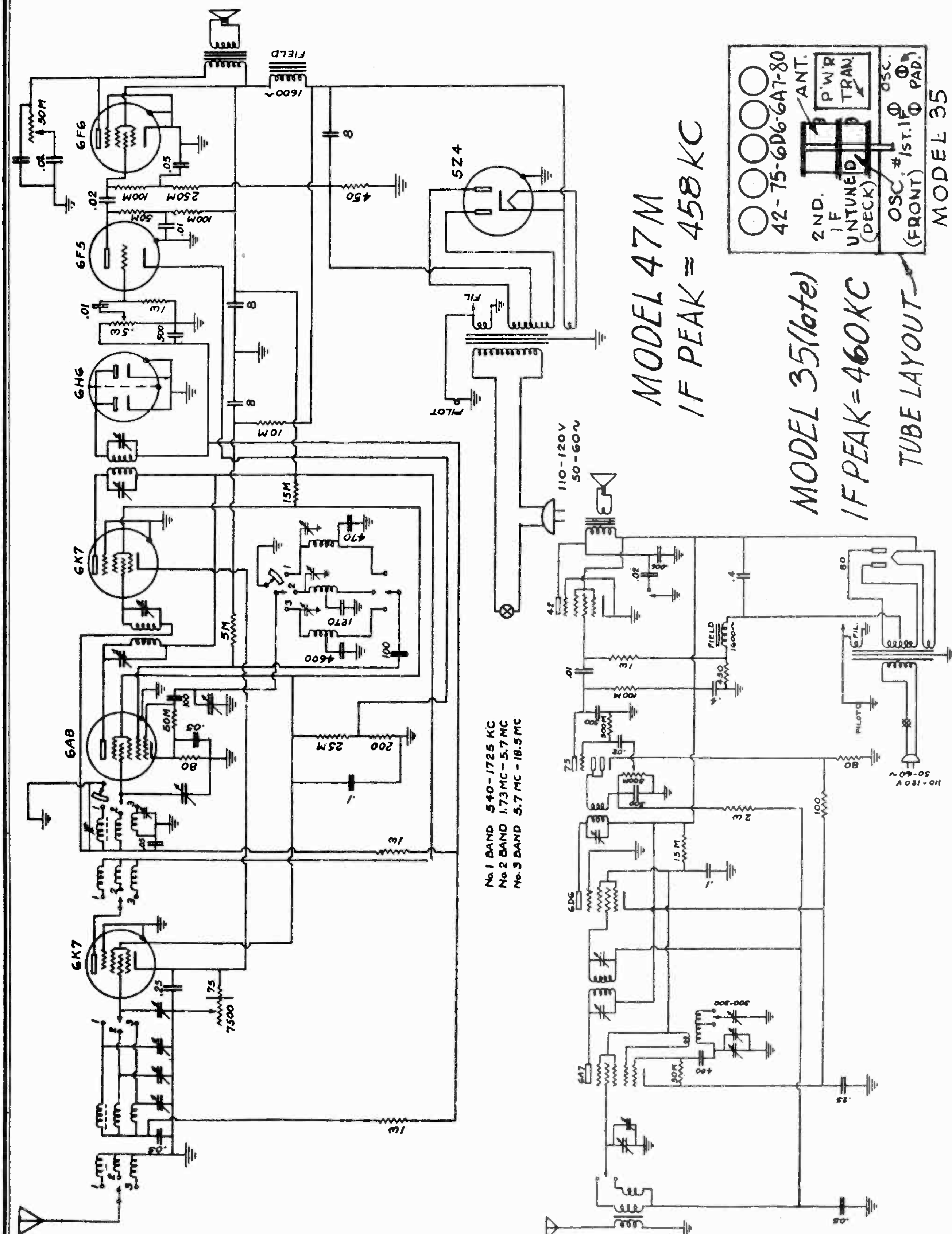


ALIGNMENT:-

Adj. 540-1750 KC trimmers at 1500 KC.
Adj. osc. padder at 600 KC.
Adj. 1750-5800 KC trimmers at 5100 KC.
Adj. osc. padder at 1800 KC.
Adj. 5800-18000 KC trimmers at 16000 KC.

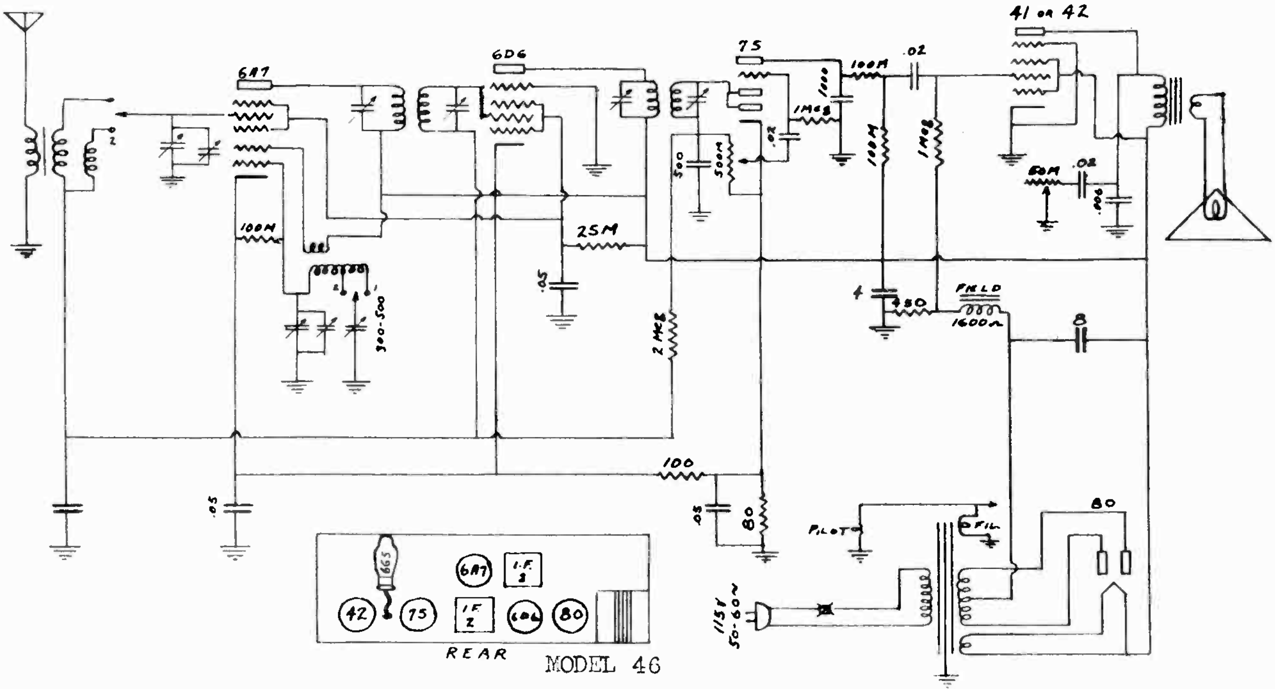
PACKARD BELL CO.

MODEL 35, Late
MODEL 47M
Schematics
Socket



MODEL 46
Schematic
Socket
Alignment

PACKARD BELL CO.



MODEL 46

Frequency Range
A - .54 to 1.7 mc.
B - 1.7 tc 5.0 mc.

IF PEAK 460 KC.

ALIGNMENT DATA

AN ALL-WAVE TEST OSCILLATOR AND VACUUM-TUBE VOLTMETER TO MEASURE A.V.C. BIAS, WILL SUFFICE TO ASSIST IN SECURING NORMAL BALANCED CONDITION OF THE COILS AND CONDENSERS. AN OUTPUT OF APPROXIMATELY 500 MICRO-VOLTS WILL BE DESIRABLE TO PROVIDE GOOD V.T.V. READINGS OF THE A. V. C. BIAS. THE SENSITIVITY CONTROL SHOULD BE FULLY ADVANCED, AND IT ALSO WILL BE NECESSARY TO USE A .006 CONDENSER IN SERIES WITH THE TEST OSCILLATOR OUTPUT AND THE 6A8 CONTROL GRID. THE DIAL SHOULD BE SET TO APPROXIMATELY 1600 KC AND THE I.F. TRIMMERS ADJUSTED FOR MAXIMUM A.V.C. BIAS AT 458 KC.

ALL SERIES PADDER CONDENSERS ARE FIXED AND DIAL TRACKING AT THE LOW FREQUENCY END OF ALL WAVE BANDS MUST BE ACCOMPLISHED BY VARYING THE OSCILLATOR COIL INDUCTANCE. THE COILS ARE DESIGNED TO PERMIT THE NECESSARY AMOUNT OF VARIATION. HOWEVER, PARALLEL TRIMMER CONDENSERS ARE PROVIDED TO LINE UP THE HIGH FREQUENCY END OF EACH BAND.

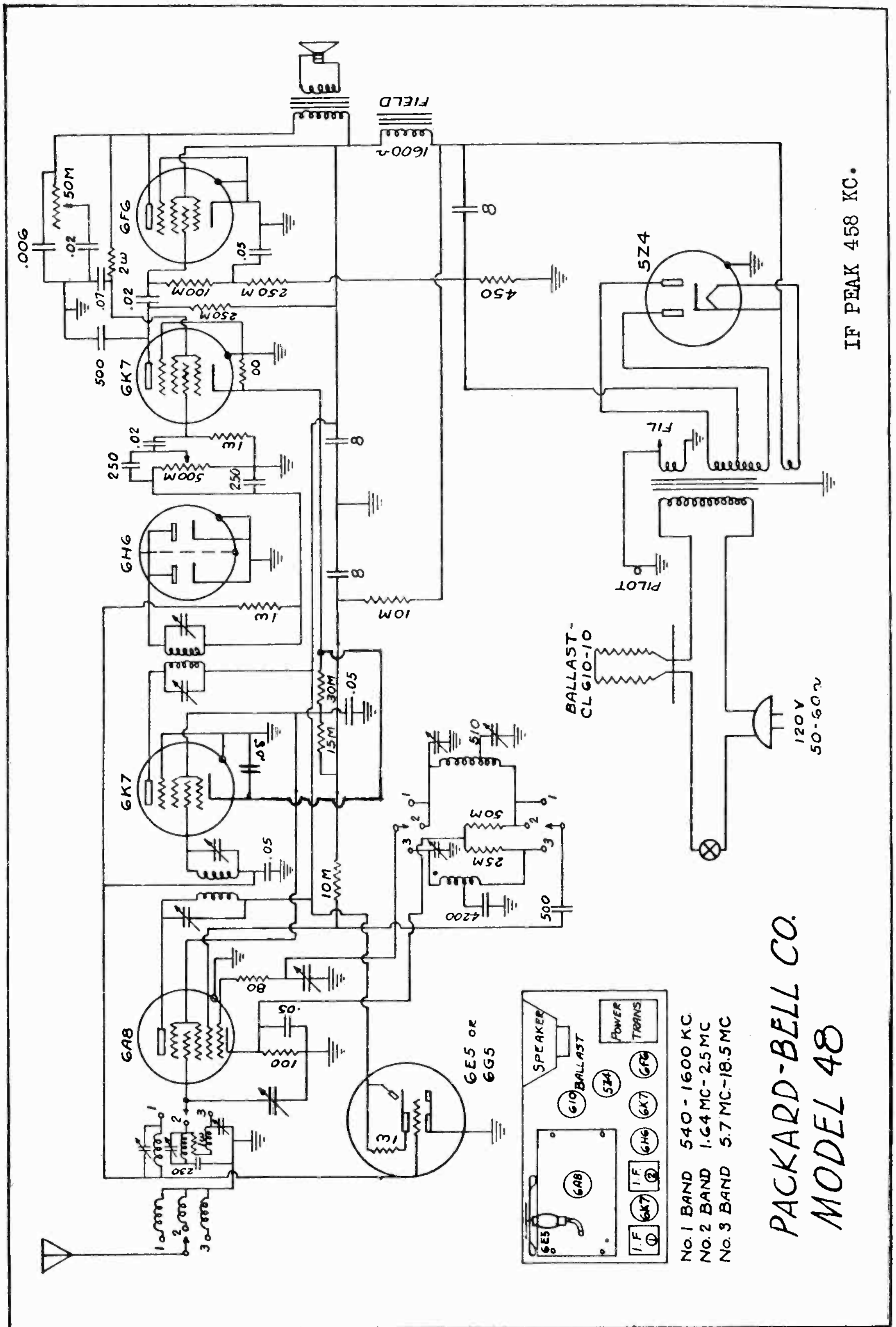
THE DIAL POINTER SHOULD BE SET PARALLEL TO THE LINE OF THE DIAL WITH THE CONDENSER PLATES FULLY MESHED. WITH THE TEST OSCILLATOR ADJUSTED TO 1400 KC, THE OSCILLATOR TRIMMER SHOULD BE ADJUSTED FOR MAXIMUM OUTPUT WITH THE DIAL POINTER AT 1400 KC. NOW SET THE TEST OSCILLATOR AT 600 KC AND TUNE THE SET TO RECEIVE 600 KC SIGNAL, IF NECESSARY VARY THE COUPLING BETWEEN THE TWO PORTIONS OF THE OSCILLATOR COIL IN ORDER THAT THE DIAL MAY TRACK. AFTER LINING UP THE DIAL AT THE LOW FREQUENCY END THE HIGH FREQUENCY TRIMMERS MAY REQUIRE SLIGHT READJUSTMENT.

THE SAME PROCEDURE SHOULD BE FOLLOWED WITH THE NUMBER 2 BAND USING TWO MC. TO SET THE OSCILLATOR INDUCTANCE AND 5 MC TO ADJUST THE OSCILLATOR AND ANTENNA TRIMMERS, SIMILARLY ON THE NUMBER 3 BAND USING 6 MC AND 16 MC. A CAREFUL EXAMINATION OF THE WAVE BAND SWITCH WILL DIFFERENTIATE THE COILS USED FOR EACH BAND.

THE DISTRIBUTED CAPACITIES IN THE R.F. COILS AND ASSOCIATED WIRING IS HELD TO EXTREMELY CLOSE TOLERANCES AND OBVIATES THE NECESSITY FOR TRIMMERS ON THE NUMBER 1 AND NUMBER 2 BANDS FOR SAID COILS.

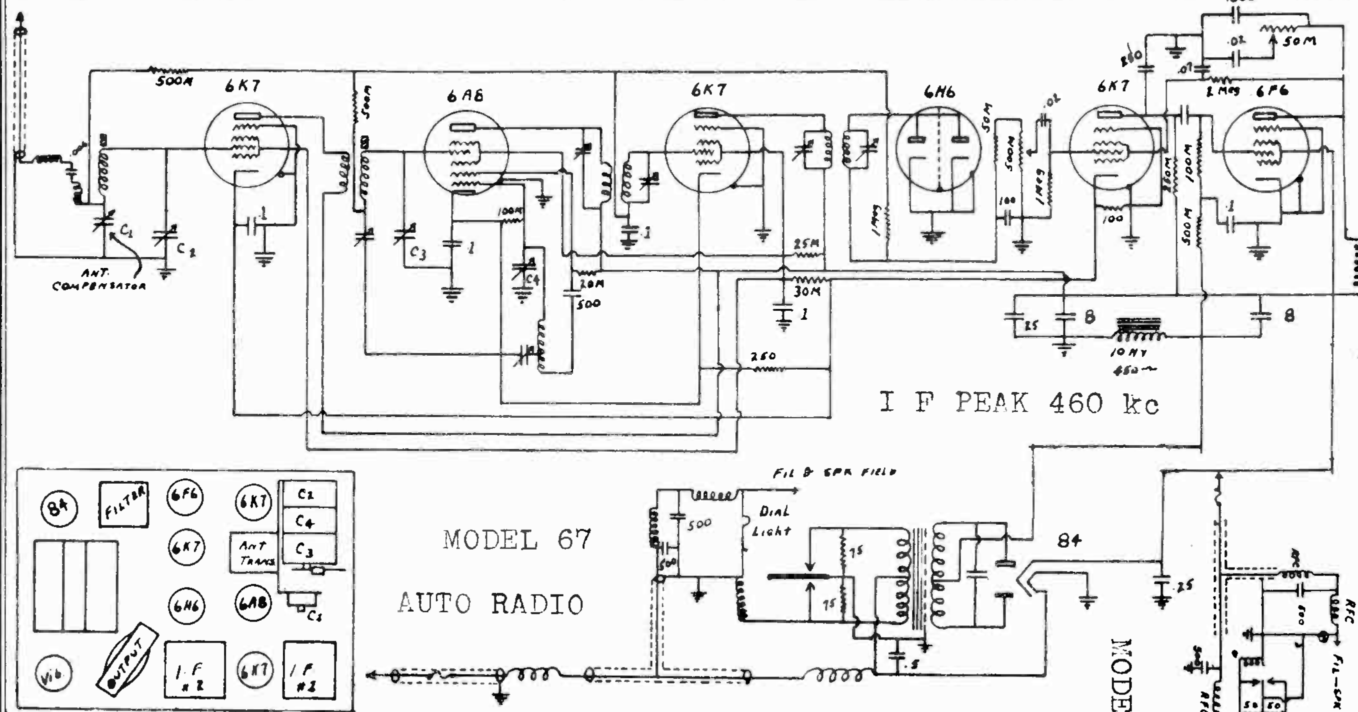
PACKARD BELL CO.

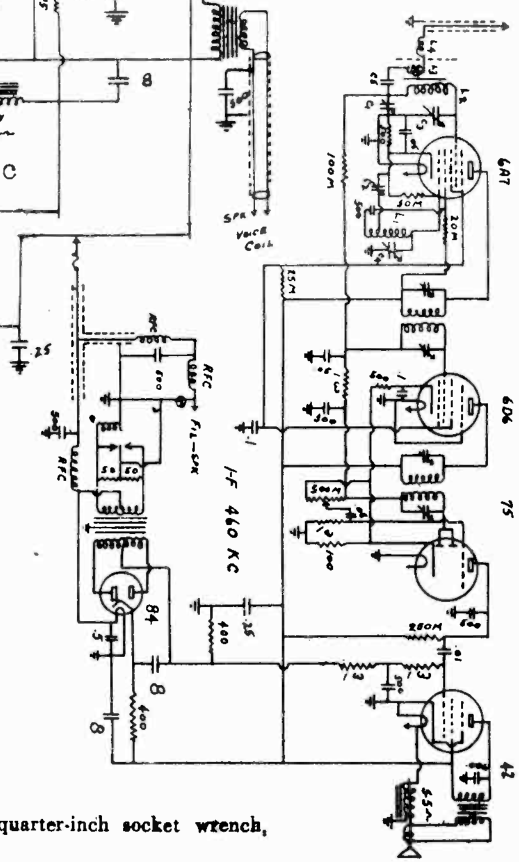
MODEL 48
Schematic
Socket



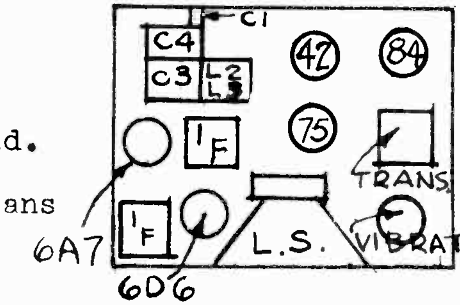
MODEL 65
MODEL 67
Schematics
Socket, Notes

PACKARD BELL CO.





MODEL 65 AUTO RADIO



C1 Ant. Compensator
C2 Osc. Padder
C3 & C4 Tuning Cond.
C5 Ant. Coupling Cond.
L1 Osc. Inductance.
L2 & L3 I.C. Ant. Trans
L4 Spark Filter

8. **ANTENNA COMPENSATOR** is located in upper left hand corner of box and may be trimmed with a quarter-inch **socket wrench**, preferably insulated.

Turn station selector knob to right until stop is reached; adjust dial pointer to right hand stop line mark on dial face. **This sets** pointer for calibration.

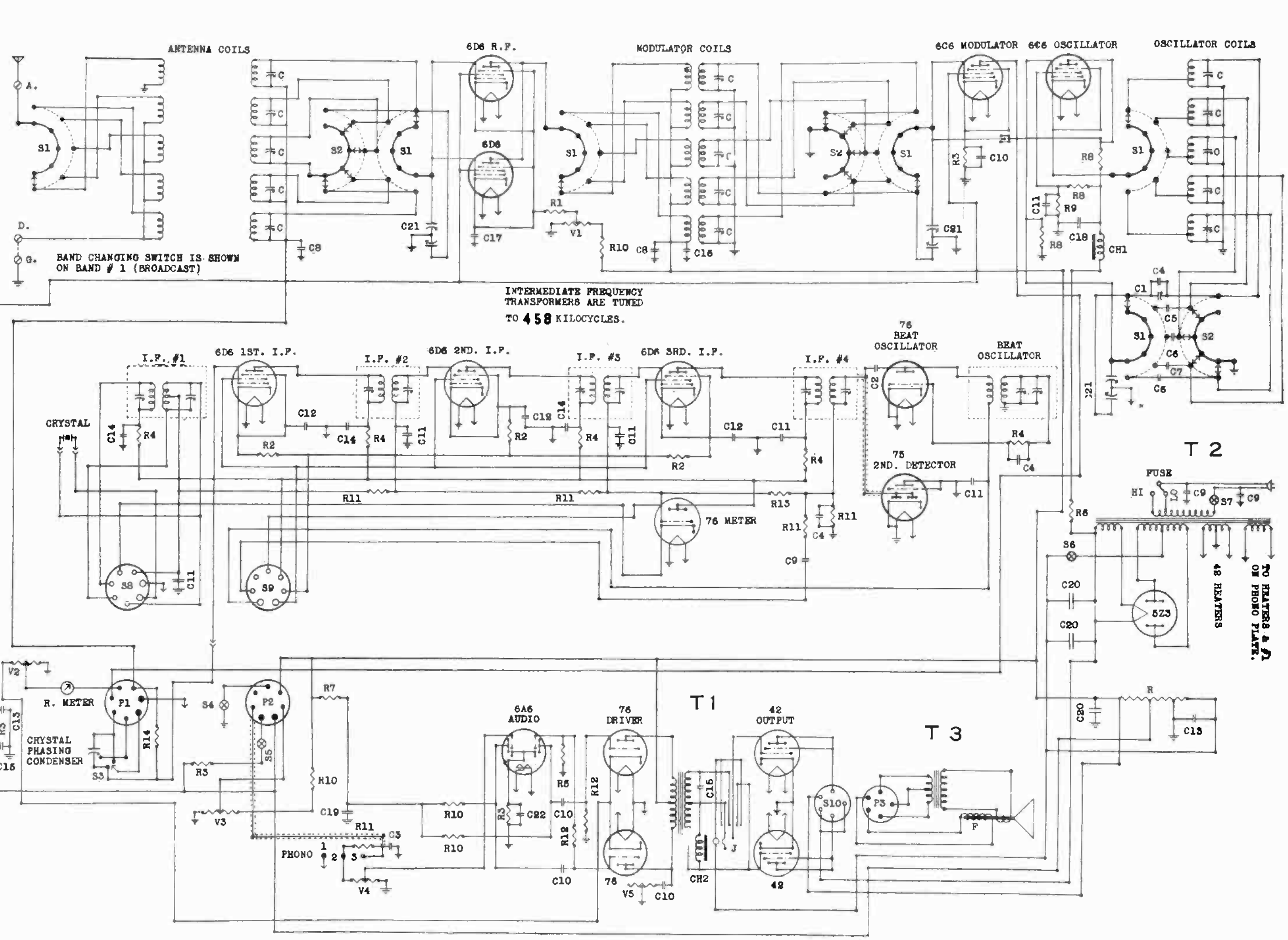
Tune in a weak signal between 550 and 650 Kcs. and adjust compensator for maximum volume . . . no other **adjustments are necessary** as radio will be perfectly matched to your antenna.

In cases where antenna or lead wire contribute excessive capacity to system a small series by-pass condenser of from 250 to 500 micro-microfarads capacity must be connected in series at the receiver and shielded.

Excessive antenna capacity may be detected by an apparent broad trimming action when adjusting compensator.

MODEL PR-16
Series C
Schematic
Notes

PATTERSON RADIO CO.



C	30 MMFD Trimmer
C1	300 MMFD Padder
C2	.00001 Mica 10%
C3	.0001 Mica 10%
C4	.00025 Mica 10%
C5	.001 Mica 3%
C6	.0022 Mica 3%
C7	.004 Mica 3%
C8	.004 Mica 10%
C9	.006—600 Volt
C10	.02—600 Volt
C11	.05—600 Volt
C12	.1—200 Volt
C13	.1—400 Volt
C14	.1—600 Volt
C15	.25—400 Volt
C16	.25—600 Volt
C17	.5—200 Volt
C18	4 MFD—450 Volt
C19	8 MFD—450 Volt
C20	16 MFD—450 Volt
C21	3 Gang, 160-220 MMFD Tun. Cond
C22	10 MFD—25 Volt
J	Phone Jack
CH1	OSC Filter Choke
CH2	High Pass—Audio Choke
V1	R.F. Gain Control— 25,000 OHM
V2	Meter Adjustment— 1,000 OHM
V3	I.F. Gain Control— 25,000 OHM
V4	Volume Control—500,000 OHM
V5	Tone Control—100,000 OHM
R	8000 OHM Voltage Divider
R1	200 OHM ½ Watt
R2	300 OHM ½ Watt
R3	5,000 OHM ½ Watt
R4	10,000 OHM ½ Watt
R5	15,000 OHM ½ Watt
R6	15,000 OHM 1 Watt
R7	25,000 OHM ½ Watt
R8	50,000 OHM ⅓ Watt
R9	100,000 OHM ⅓ Watt
R10	100,000 OHM ½ Watt
R11	250,000 OHM ⅓ Watt
R12	300,000 OHM ⅓ Watt
R13	500,000 OHM ½ Watt
R14	2 MEG OHM ½ Watt
S1	Band Change Switch
S2	Short Out Section
S3	Crystal—Series Parallel Switch
S4	A.V.C. Short Out Switch
S5	Beat Oscillator Switch
S6	Communication Switch
S7	A.C. Switch—— on Volume Control
S8	Connector Socket No. 1
S9	Connector Socket No. 2
S10	Speaker Socket
T1	Audio Transformer
T2	Power Transformer
T3	Out-put Transformer
P1	Connector Plug No. 1
P2	Connector Plug No. 2
P3	Speaker Plug
F	Field 1500 OHM

THE TUNING METER adjustment is located on the back panel just below the "Phono" Terminals. The adjustment may be made as directed above for Standard Broadcast or Phone Reception, and with automatic volume control in action. Now with dial, Band Switch and Volume Control set in any position turn Manual Control to extreme left, minimum position. Now adjust the screw marked "Tuning Set" on the back panel until the indicating vane on the Tuning Meter rests at the point on meter face marked "Set" at the extreme left of the scale. The Manual Control may now be increased toward the right for normal operation.

An auxiliary adjustment screw for the Beat Oscillator is located in the hole in the same shield can, directly back of the long adjustment handle. THIS SHOULD NEVER BE TOUCHED unless it is impossible to get a beat note by adjusting the long handle. This adjustment screw will be found to be quite critical as compared to the long handle. UNDER NO CIRCUMSTANCES should the intermediate adjustment screws within the other square shield cans be touched! To do so will result in COMPLETE FAILURE of the receiver to operate unless, of course, these adjustments are made by a competent service man who is thoroughly equipped to make such adjustments.

MODEL PR-16
Series C
Socket, Trimmers
Notes

PATTERSON RADIO CO.

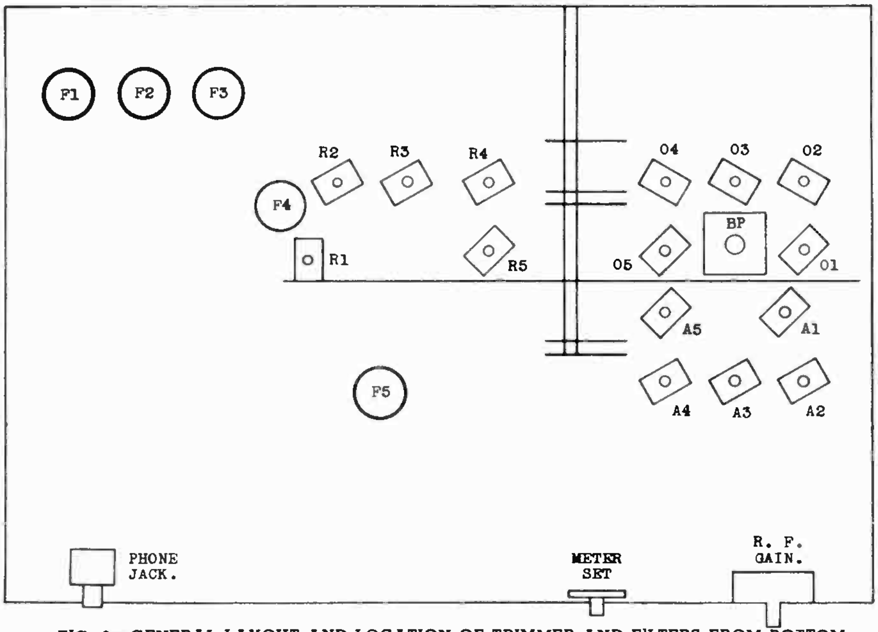


FIG. 3—GENERAL LAYOUT AND LOCATION OF TRIMMER AND FILTERS FROM BOTTOM OF CHASSIS.

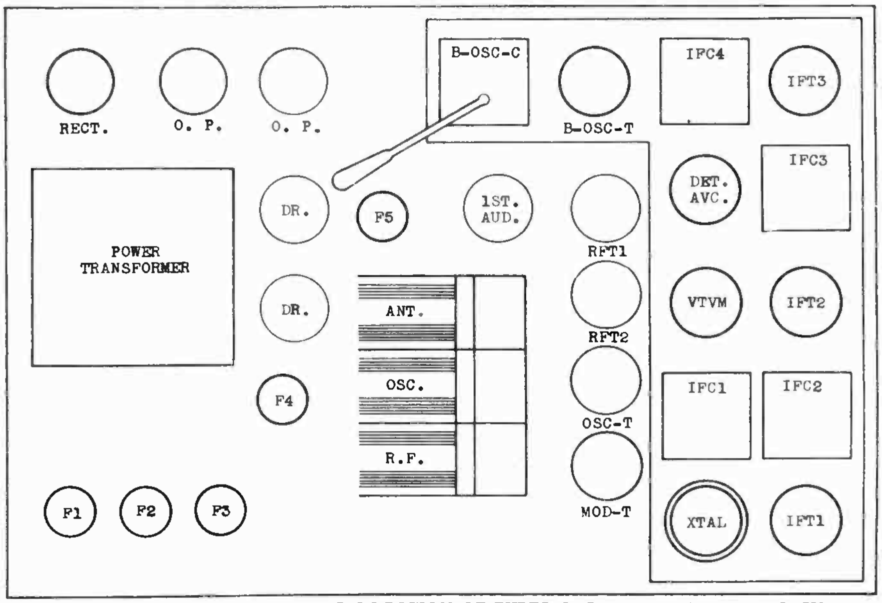


FIG. 4—GENERAL LAYOUT AND LOCATION OF TUBES AND PARTS TOP OF CHASSIS.

F1 .... Filter No. 1—16 MFD
F2 .... Filter No. 2—16 MFD
F3 .... Filter No. 3—16 MFD
F4 .... Filter No. 4— 8 MFD
F5 .... Filter No. 5— 8 MFD
A.1 .... B.C. Ant. Coil & Trimmer
A.2 .... 2 Band Ant. Coil & Trimmer
A.3 .... 3 Band Ant. Coil & Trimmer
A.4 .... 4 Band Ant. Coil & Trimmer
B.P. .... B.C. Low-Freq. Padding Cond.
A.5 .... 5 Band Ant. Coil & Trimmer
R1 .... B.C. R.F. Coil & Trimmer
R2 .... 2 Band R.F. Coil & Trimmer
R3 .... 3 Band R.F. Coil & Trimmer
R4 .... 4 Band R.F. Coil & Trimmer
R5 .... 5 Band R.F. Coil & Trimmer
01 .... B.C. Osc. Coil & Trimmer
02 .... 2 Band Osc. Coil & Trimmer
03 .... 3 Band Osc. Coil & Trimmer
04 .... 4 Band Osc. Coil & Trimmer
05 .... 5 Band Osc. Coil & Trimmer
F1 .... Filter No. 1
F2 .... Filter No. 2
F3 .... Filter No. 3
F4 .... Filter No. 4
F5 .... Filter No. 5
Rect. .... Rectifier Tube 5Z3

O.P.—Output — Power-Tubes — 42 Push-Pull. Class—A.B.

DR.—Push-Pull-Driver Tubes—Type 76.

1st Aud. — 6A6-Phase-Inverter and 1st Stage Audio.

Det. A.V.C. — Detector and Automatic Volume Control Tube—Type 75.

V.T.V.M. — Vacuum-Tube-Voltmeter or "R" Meter-Control Tube—Type 76.

I.F.T. 3—Intermediate-Frequency Tube. Third Stage—Type 6D6.

I.F.T. 2—Intermediate-Frequency Tube. Second Stage—Type 6D6.

I.F.T. 1—Intermediate-Frequency Tube. First Stage—Type 6D6.

XTAL—Quartz-Filter. Crystal.

B-OSC.C .... Beat-Oscillator-Coil

B-OSC.T....Beat-Oscillator-Tube—Type 76

I.F.C.4. Intermediate Transformer No. 4

I.F.C.3. Intermediate Transformer No. 3

I.F.C.2. Intermediate Transformer No. 2

I.F.C.1 Intermediate Transformer No. 1

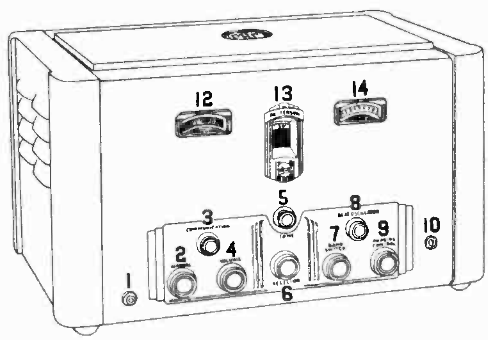
MOD .... Modulator-Tube—Type 6C6

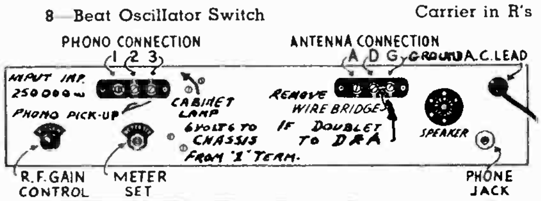
OSC-T—Heterodyne - Oscillator - Tube—Type 6C6.

R.F.T.1 & R.F.T.2 — Parallel-Radio Frequency and Pre-selector Tubes—Type 6D6.

KEY TO CONTROLS

1—A. V. C. Switch
2—Manual Volume Control
3—Communication Switch
4—Volume Control and AC Switch
5—Tone Control
6—Station Selector, 2 Speeds
7—Wave Band Switch
8—Beat Oscillator Switch
9—Crystal Phasing Control
10—Crystal Filter Series Parallel Switch
12—360-degree Illuminated Band Spread
13—Camera Shutter, Illuminated Dial, 5 Bands
14—Illuminated Meter Showing the Carrier in R's





COMMUNICATION SWITCH—The use of the Communication Switch will be found to be of most value to amateurs. It permits the operator to "kill" the receiver while transmitting without allowing the filaments to cool down or altering the setting of the receiver.

PATTERSON RADIO CO.

MODEL PR-16
Series C
Alignment
Voltage

Alignment Procedure

CRYSTAL FILTER During Broadcast or Phone reception the Crystal Filter is seldom of any value, if used in the series position. For most satisfactory results the Crystal Filter may be placed in parallel by throwing the right hand Toggle Switch down. When in this position tı. only effect noticeable will be in reduction of interference from an interfering station, particularly on the Amateur Phone Bands. By careful tuning it is possible to completely separate badly heterodyning phone signals that would otherwise be totally unreadable. The series position is intended primarily for C. W. (code) reception. It is seldom of any value for phone reception. To put the Crystal in series position it is necessary that the right hand Toggle Switch on front panel be in "Up" position, which is the normal receive position (Crystal not in use). Now turn front panel control marked "Crystal Phasing" toward the left; this control automatically puts the Crystal in the series position as well as controls the series position Crystal selectivity, maximum selectivity being reached about mid-point of the control range. It should be further noted that for either normal operation (Crystal not in use) or with Crystal Switch in parallel position the Phasing Control must be turned to and left at the extreme right end of its range for satisfactory performance.

I. F. ALIGNMENT

As explained below, the "R" meter will be found invaluable, and extremely flexible, in all line-up procedure, making it unnecessary to use any other external resonance indicating device. On all sets equipped with crystal filters it is extremely important that the intermediate be aligned *exactly* to the crystal's fundamental frequency, if satisfactory crystal performance is to be accomplished.

Few service men are equipped with a proper service oscillator designed for use with the crystal in the PR-16, and therefore, the method described below will undoubtedly be the most practical, and if carefully followed, will prove most satisfactory.

Production crystals vary as much as 2 K.C. plus or minus 458 K.C., so it is inadvisable to attempt alignment by merely setting the service oscillator at 458 K.C., without making the final adjustment described below. The variation mentioned above, while less than 1%, is sufficient to cause very poor crystal performance unless great care is exercised, and all instructions are followed exactly.

If the intermediate trimmers have been tampered with, or are badly out of line, the service oscillator should just be set at 458 K.C., and with all controls on radio set for broadcast or phone reception, manual control extreme clockwise position, phasing control extreme clockwise position, band switch on any band, crystal switch off (right hand toggle-switch handle pointing up), A.V.C. in action (left hand toggle switch handle pointing down), R.F. gain control in maximum position (extreme clockwise position facing back of radio), communication switch in clockwise position, "on", beat oscillator switch in counter-clockwise position, "off", volume control about midpoint of its range (optional).

With service oscillator in operation at 458 K.C., remove the grid cap from the third I.F. tube (tube and I.F. transformer positions indicated in Fig. 4), connect output lead from test oscillator to grid cap of this tube; if no signal is heard or if no reading is indicated, the output attenuator on service oscillator should be increased until a reading of "R6" or "R7" is indicated on "R" meter. The trimmer screws on I.F. transformer No. 4 may now be adjusted for maximum reading on "R" meter reducing service oscillator output attenuator when necessary to keep "R" meter within a readable range.

A standard bakelite or fibre screw driver should be used. After maximum setting of trimmer screws has been reached, the grid cap may be replaced on third I.F. tube, and removing grid cap on second I.F. tube connect service oscillator to the grid of this tube and continue as above, this time making adjustment of trimmer screws on I.F. transformer No. 3, continually reducing service oscillator attenuator when necessary to keep "R" meter within a readable range (about "R" 6 or 7).

The same procedure may now be followed out on first I.F. tube, replacing grid cap on second I.F. tube, removing grid cap on first I.F. tube and connecting service oscillator output lead to grid on this tube, and this time making trimmer adjustments on I.F. transformer No. 2, reducing service oscillator attenuator as neccesary. If difficulty is experienced at this point, or any point hereafter, in getting a low enough output from service oscillator to obtain a reading on "R" meter below "R" 7 or 8.

First make sure you have a good ground connection between service oscillator and radio chassis. (The usual ground or shielding on output lead from service oscillator is usually sufficient). If the ground is good and meter still reads high, you may now reduce the manual control on radio counter-clockwise until "R" meter again reads "R" 6 or 7. The trimmers on I.F. transformer No. 2 should now be adjusted for maximum reading on "R" meter, reducing manual control when necessary in line of service oscillator attenuator to obtain readable indication on "R" meter, if above difficulties are experienced; otherwise, you may continue to reduce service oscillator attenuator as necessary.

The grid cap may now be replaced on first I.F. tube, and service oscillator out-put lead moved to grid of modulator tube, removing cap before making connection. Then adjust trimmers on I.F. transformer No. 1 for maximum reading on "R" meter as before, reducing service oscillator attenuator or manual control for readable indication on "R" meter. When this is done you may now re-check all trimmers carefully for maximum reading on "R" meter, leaving service oscillator connected to modulator tube grid. If the radio is not equipped with crystal filter, the above procedure will complete the I.F. alignment.

If the set is equipped with crystal filter the instructions below should be followed closely.

If the selectivity and I.F. gain is good when set is tried, before alignment is attempted the above instructions may be omitted, following only instructions given below.

Leave service oscillator connected to grid of modulator tube in the position last described above. Service oscillator out-put attenuator set for quite low out-put and, if necessary, manual control reduced; "R" meter reading about "R" 6 or 7.

Next turn phasing control toward counter-clockwise position to about midpoint of its tuning range (crystal toggle switch handle up). Now very slowly and carefully tune the service oscillator through resonance until the maximum peak is found as indicated on maximum reading on "R" meter. This peak will be very sharp, and extreme care must be exercised to tune the service oscillator to exact peak and keep it there. This should be checked several times during the following procedure.

Now start at No. 4 I.F. transformer and carefully tune trimmers for maximum peak on "R" meter and proceed up to, and including, No. 3 and No. 2 I.F. transformers, checking and then re-checking all I.F. trimmers, except trimmers on No. 1 I.F. transformer, these should never be touched while the crystal is in series position, as indicated above. When the maximum peak has been reached the phasing control may be returned to its original extreme clockwise position, (crystal toggle switch handle up), and without touching the service oscillator tuning, the trimmers on No. 1 I.F. transformer may now be re-set for maximum peak on "R" meter.

The above completes the I.F. alignment; the crystal filter may be further checked by throwing the right hand toggle switch down, (parallel position) and tuning the radio through a broadcast station, or un-modulated signal from service oscillator set somewhere in the broadcast band; as the radio is tuned through exact resonance, a sharp dip in the "R" meter reading will be noticed, or if the dial is tuned fast through resonance, a decided "plop" will be heard in the speaker at exact center of resonance peak.

If it should be necessary at any time to remove the crystal from its holder for inspection, do not handle the crystal or its associate mounting plates any more than absolutely necessary. Wash all parts thoroughly with alcohol or carbon tetra chloride (carbona) and wipe with a clean dry rag before replacing in holder, using care not to handle parts with your bare hands after they are washed.

BROADCAST AND SHORT-WAVE ALIGNMENT

Make sure that adjustments are necessary before proceeding.

Before attempting further alignment, the diagram in Fig. 3 should be studied, particularly in reference to trimmer and padder, or locations and functions.

It is highly improbable that any adjustments will be necessary other than a slight touch-up of the various oscillator coil trimmers and broadcast padding condenser, and possibly a check on all other trimmers for alignment, although this latter is usually unnecessary because the coil design is such that resonance is reached with very little capacity in affect on all R.F. and ant. coils, so that a large change in the mechanical setting would have to take place before any noticeable capacity change or impaired performance could result, particularly so since all trimmer adjustments are sealed at the factory.

The broadcast band can be easily checked for calibration by tuning in stations of known frequency at various points on the dial, and corrections can be made without use of service oscillator, if desired, by using "R" meter to indicate exact peak, reducing manual control, (I.F. gain) where necessary to obtain a readable peak on meter. If discrepancies appear near the high frequency, end of B.C. band or all over the scale, they may be corrected, first with main tuning dial set to a frequency near 1400 K.C. where a local station of known frequency should appear, being sure first that the desired station is in operation at the time. Turn trimmer screw 01 very slowly and carefully, until the desired station is tuned to exact peak, as indicated by maximum reading of "R" meter.

Now set tuning dial to a frequency near 600 K.C., where a local station of known frequency is in operation. If the desired station appears at the proper setting no further adjustment will be necessary, but if it does not appear on exact setting, as indicated by maximum reading of "R" meter as tuning dial is tuned through the signal, it may be brought into place by setting tuning dial on exact frequency where station should appear, and carefully turning padder condenser adjustment screw "BP" until signal is peaked, as indicated by maximum reading on "R" meter.

If a large discrepancy has been corrected at this point it will be necessary to re-set tuning dial to its original position near 1400 K.C. and re-set trimmer 01 for maximum peak, as before. No further adjustment should be necessary on B.C. band, and all other stations will automatically fall on the proper reading, if the above instructions have been followed carefully.

An accurate check of calibration on all short-wave bands can be made by use of service oscillator, which is set at 1000 K.C. Extreme care should be used to set the service oscillator at exactly 1000 K.C. before continuing calibration check, the reason being that the checks below make use of harmonics as high as the 37th harmonic, and any discrepancy in the 1000 K.C. setting is multiplied by the particular harmonic where the check is being made. One sure method of arriving at exactly 1000 K.C. is, first: If a known station whose frequency is 1000 K.C. is within range, it should be tuned in on the radio, then connect the out-put lead from service oscillator to the antenna terminal on radio, leaving the antenna connected also. *Do not* connect the ground or shielded lead from service oscillator to radio chassis. Next tune the service oscillator through 1000 K.C., adjusting out-put attenuator on service oscillator until a loud whistle (Heterodyne beat note) is produced as the oscillator is tuned across the station.

Now carefully adjust the service oscillator for zero beat with the station. Zero beat is that point where the whistle (beat note) starts at a low frequency and rapidly rises in pitch as service oscillator is tuned either way from the center "quiet" spot. Now, leaving service oscillator tuning dial set at zero beat, increase oscillator attenuator to maximum out-put. Leave the out-put lead of service oscillator connected to antenna terminal of radio, but remove antenna lead from radio.

In the event that no station of 1000 K.C. is within range, or on the air, and if the service oscillator is known to have an accurate calibration, merely setting the service oscillator at 1000 K.C. should be accurate enough for all practical purposes. This can be easily checked, of course, by checking service oscillator calibration against various stations near to 1000 K.C., using the method of antenna connected to set and tuning for zero beat, as described above.

The band change switch should now be changed to No. 2 short-wave band. Next set tuning dial near 3 M.C. and tune back and forth until the 3rd harmonic of service oscillator is found; it should appear exactly on the 3 M.C. point. If it does not, it may be brought into place by carefully adjusting trimmer condenser 02. The rest of this band will then be automatically in calibration.

Next change the band switch to No. 3 short-wave band, and set tuning near 7 M.C. and tune back and forth slowly until the 7th harmonic of service oscillator is located. It should appear exactly on the 7 M. C. point; if it does not, it may be brought into place by careful adjustment of trimmer screw "03." If the signal from the service oscillator is very strong at this point, a second peak slightly higher in frequency may also be found, but it will be much weaker than the lower frequency peak on the 7 M.C. point on dial. The second weak peak is the image of the 8th harmonic and should be disregarded. This band now is automatically in line all over; it may now be checked all across, a harmonic from the service oscillator appearing on 7 M.C., 6 M.C., 5 M.C., 4 M.C.

If this is not the case, an error has been made in adjusting trimmer "03," and should be checked again until a harmonic falls on each successive 1 M.C. point on tuning dial.

However, some of the points may be weaker than others, particularly the odd harmonics. This is perfectly natural, and should cause no concern.

It would be well, at this point, to replace antenna on radio, set band switch on broadcast at 1000 K.C. and check again for zero beat with station at this frequency before continuing to No. 4 band for check. Be sure to remove antenna again, and set service oscillator out-put attenuator back to maximum position after zero beat has been checked. Then change band switch to No. 4 band and tune for the 14th harmonic at 14 M.C. point on tuning scale; if the calibration is off at this point it may now be corrected with trimmer ".04." Extreme care should be used in making this adjustment, as it is quite possible to get the 13th harmonic where the 14th should be at 14 M.C., thereby throwing the whole dial off. However, it is easy to check this by tuning over the whole scale; if the adjustment has been made properly, there will be a harmonic from service oscillator on each 1 M.C. point, namely, 14 M.C., 13 M.C., 12 M.C., 11 M.C., 10 M.C., 9 M.C., 8 M.C. As in the case of the No. 3 band, care should be used in respect to the image of 15 M. C. when making adjustments at 14 M.C., the image being weaker and higher in frequency than the desired fundamental.

In checking the 5th band the procedure should be changed somewhat, as the harmonics come so very close together on this band as to be very confusing. However, before continuing, a check may be made on this band by the present method to determine if adjustment is necessary. If a harmonic from service oscillator appears on each M.C. point throughout its range, no further adjustment or check will be necessary.

If adjustment is necessary, the following procedure should be followed:

Set the band switch to No. 3 band, and set tuning dial at exactly 7 M.C. Since this band has just been checked, or adjusted, this will be quite accurate.

Now change service oscillator to 7 M.C. band and true to 7 M.C. position; leaving radio dial set at 7 M.C. as described above, turn service oscillator slowly past 7 M.C., watching "R" meter and tuning for maximum peak. When peak has been accurately reached, the service oscillator should be left at that setting and radio band switch changed to No. 5 band. Then set the radio tuning dial to, or near, 28 M.C. and tune for the harmonic at this point from service oscillator. When it has been located, it should appear on 28 M.C. If it does not it may be brought into place by very careful adjustment of trimmer screw "05", taking care to avoid the higher frequency image as in the case of No. 3 and No. 4 band.

When this adjustment has been made properly, set the main tuning dial to 21 M.C. A service oscillator harmonic will also appear at this point.

A further check may now be made on No. 4 band, if desired, by changing radio band switch to No. 4 band and tuning the radio dial to 14 M.C. where the 7 M.C. service oscillator second harmonic should be found. If it does not appear, it is probable that an error has been made in the original adjustment. Trimmer screw "04" may be adjusted again to bring this point into line at 14 M.C.

The original adjustment can, of course, be made in this way also, and in the case of where the service oscillator harmonics are weak in this region when set at 1000 K.C., will prove the most practical method.

ALL VOLTAGES BELOW MEASURABLE WITH STANDARD A.C. VOLTMETERS

OUT-PUT TUBE FILAMENTS, Type 42
6.3 Volts A.C. Center tap ground.
RECTIFIER FILAMENT, Type 5Z3
5 Volts A.C.
RECTIFIER PLATE, Type 5Z3
No. 1 to ground — 370 Volts A.C.
RECTIFIER PLATE, Type 5Z3
No. 2 to ground — 370 Volts A.C.
All other Filaments 6.3 Volts A.C., one side grounded.

AVERAGE VOLTAGE CONDITIONS THROUGHOUT IN A NORMAL SET

All voltages below measurable under the following conditions: Set all controls for normal broadcast reception as indicated on page 2 under the heading "Operation"), antenna must be removed, Band switch on B.C. Band (no signal being received), volume control (audio) set at minimum.

All D.C. Voltage measured with standard 1000 ohm per volt VOLT meter from point indicated to chassis (ground).

Fuse on 110 V Tap	Line Voltage, 110 V	50-60 Cycles
Fuse on 120 V Tap	Line Voltage, 120 V	50-60 Cycles
Fuse on 220 V Tap	Line Voltage, 220 V	50-60 Cycles
Fuse on 240 V Tap	Line Voltage, 240 V	50-60 Cycles

R.F. TUBES, 1 and 2, Type 6D6
Grid 0 Volts — Plates 250 Volts+ — Screens 100 Volts+
Suppressors and Cathodes
1 Volt+ — R. F. Gain Control, maximum position
38 Volt+ — R. F. Gain Control, minimum position

HETERODYNE OSC. TUBE, Type 6C6
Grid 0 Volts — Plate 75 Volts+ — Screen 130 Volts+
Suppressor and Cathode
0 Volts

MODULATOR TUBE, Type 6C6
Grid 0 Volts — Plate 230 Volts+ — Screen 100 Volts+
Suppressor and Cathode
5 Volts+

I.F. TUBES, 1, 2 and 3, Type 6D6
Grids 0 Volts — Plates 180 Volts+ — Screens 115 Volts+
Suppressors and Cathodes
1 Volt+ — Manual Control, maximum position
30 Volts+ — Manual Control, minimum position

BEAT OSCILLATOR TUBE, Type 76
Grid 0 Volts — Plate 70 Volts+ — Cathode 0 Volts

V.T.V.M. METER CONTROL TUBE, Type 76
Grid 0 Volts — Plate 250 Volts+ — Cathode 8 Volts+ (Approx.)

1st AUDIO and PHASE INVERTER TUBE, Type 6A6
Grids 1 & 2, 0 Volts; Plates 1 & 2, 150 Volts+ Cathode 4 Volts+

A.V.C. and DETECTOR TUBE, Type 75
Grid 0 Volts — Plate 0 Volts — Cathode 0 Volts — Diodes 0 Volts

DRIVER TUBES, 1 and 2, Type 76, Push-Pull
Grids 0 Volts — Plates 250 Volts+ — Cathodes 12 Volts+

OUT-PUT POWER TUBES, 1 and 2, Type 42, Push-Pull, Class A.B. Triodes
Grids 45 Volts — Plates 380 Volts+ — Cathodes 0 Volts
Screen tied to plate.

Whenever a minimum control measurement is made, the control should be returned to maximum position before proceeding to other measurements.

Beat oscillator switch on front panel must be turned on before these measurements can be made. It should be turned off again before proceeding to other measurements.

ELECTROLYCIC—FILTER—CONDENSERS

(Positions in chassis indicated in Fig. 3)

F1—16 MFD—
Can insulated from chassis.
Center to ground — 380 Volts+
Can to ground — 45 Volts

F2—16 MFD—
Can grounded.
Center to ground — 250 Volts+

F3—16 MFD—
Can insulated from chassis.
Center to ground — 380 Volts+
Can to ground — 45 Volts

F4—8 MFD—
Can grounded.
Center to ground — 250 Volts+

F5—8 MFD—
Can grounded.
Center to ground — 220 Volts+

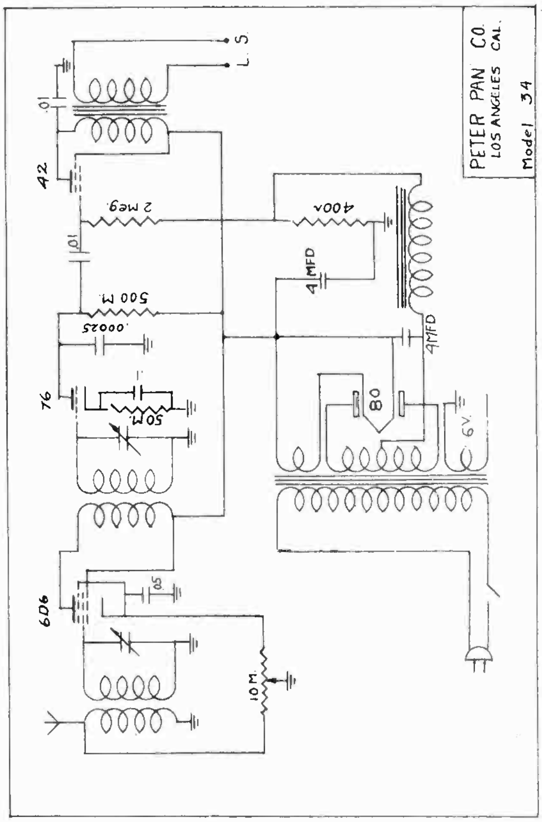
SPEAKER FIELD—
Rectifier filament, side to ground — 380 Volts+
Set, side to ground — 250 Volts+

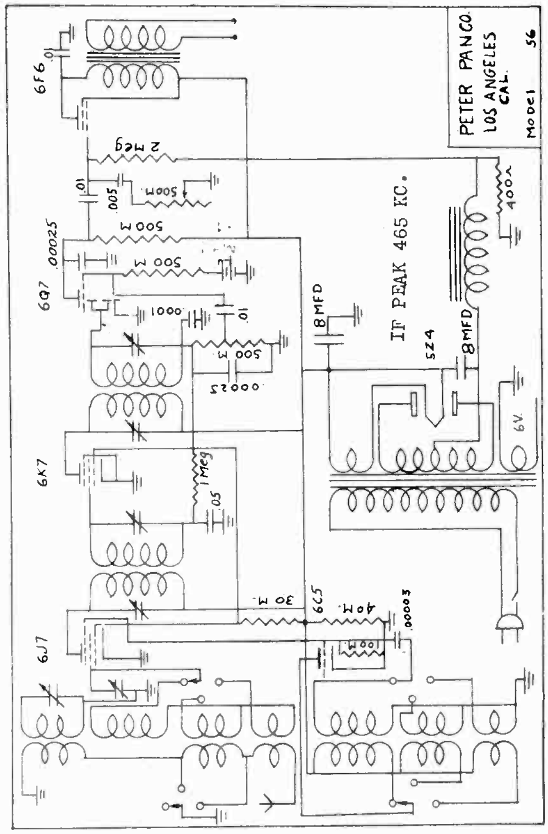
PR-16 FIVE BAND RECEIVERS
535 Kilocycles to 37 Megacycles (8 to 550 Meters)

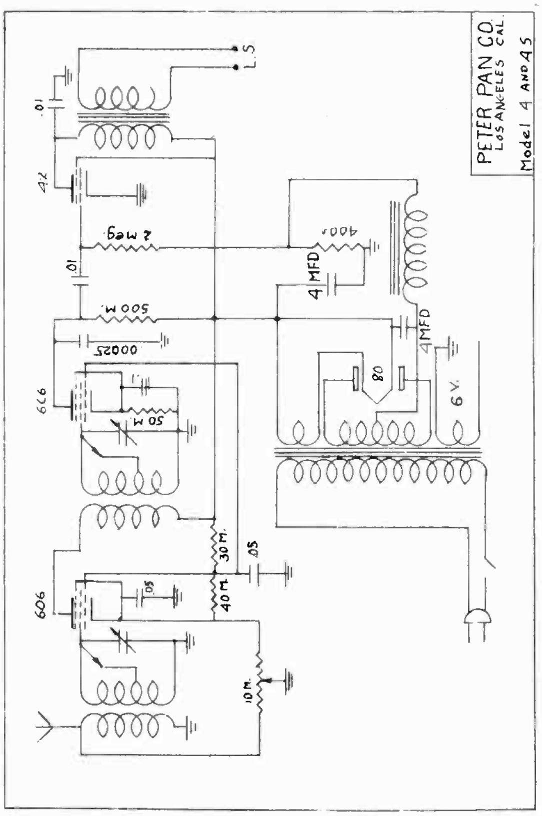
BAND No. 1
535-1550 kcs. (193-550 meters)
BAND No. 2
.500 kcs to 3.6 megacycles (83 to 200 meters)
BAND No. 3
3.2 megacycles to 7.5 megacycles (40 to 85 meters)
BAND No. 4
7.5 megacycles to 17 megacycles (18 to 40 meters)
BAND No. 5
17 megacycles to 16 megacycles (18 to 8 meters)

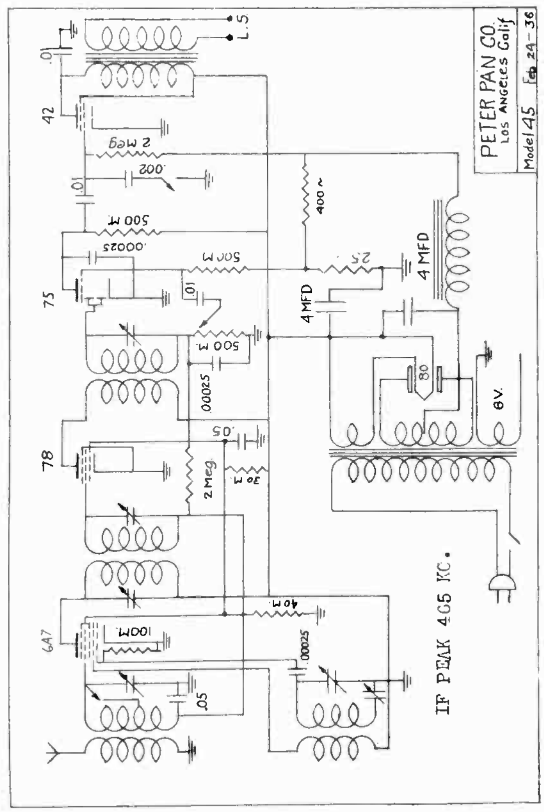
PETER PAN RADIO CO.

MODELS 4,4-S
MODEL 34
MODEL 45
MODEL 56
Schematics



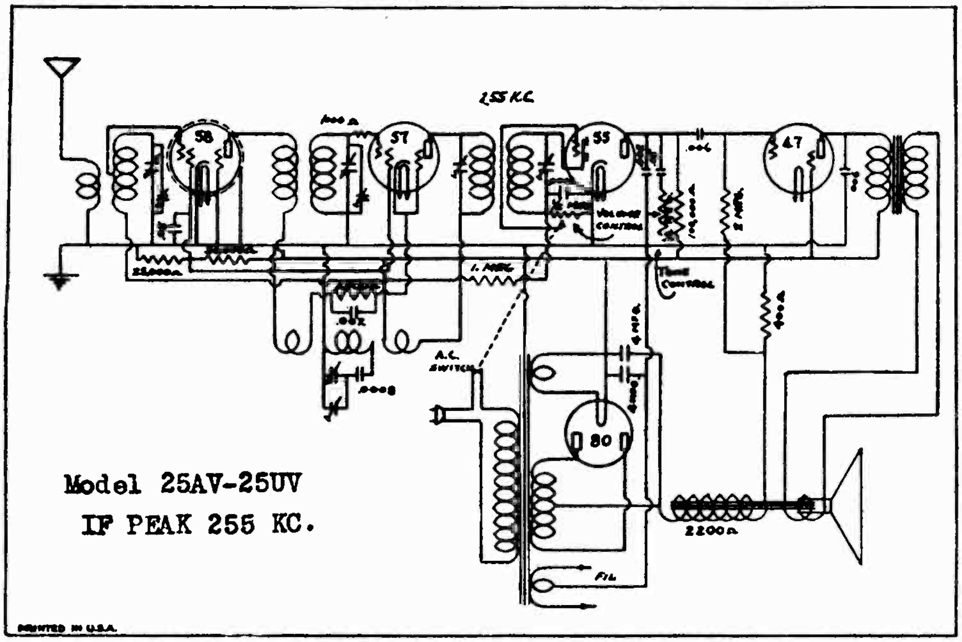




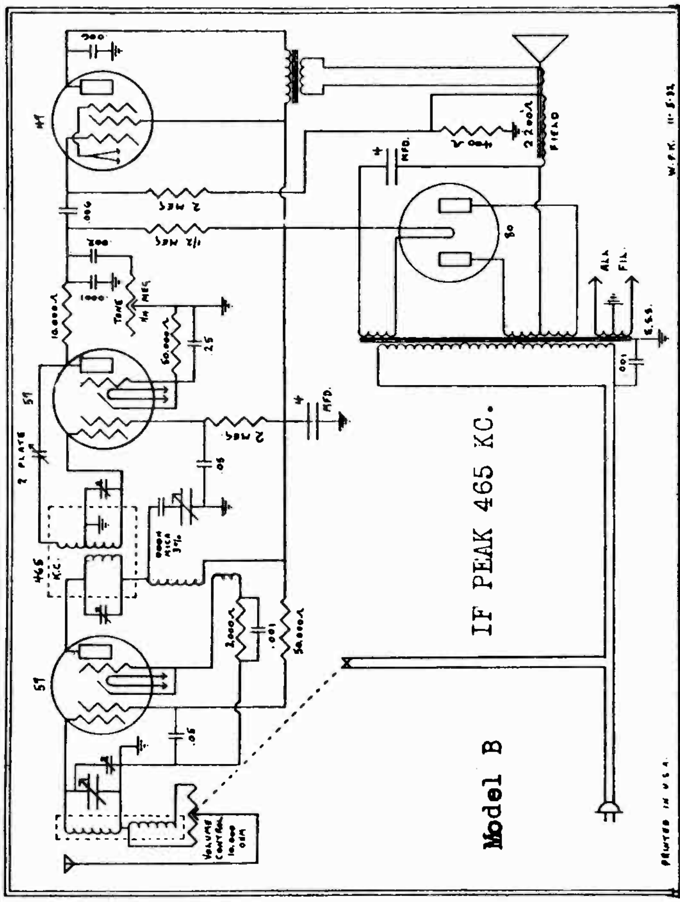


MODEL B
MODEL 4(w.Tone Cont.)
MODELS 25AV,25UV
Schematics

PETER PAN RADIO CO.

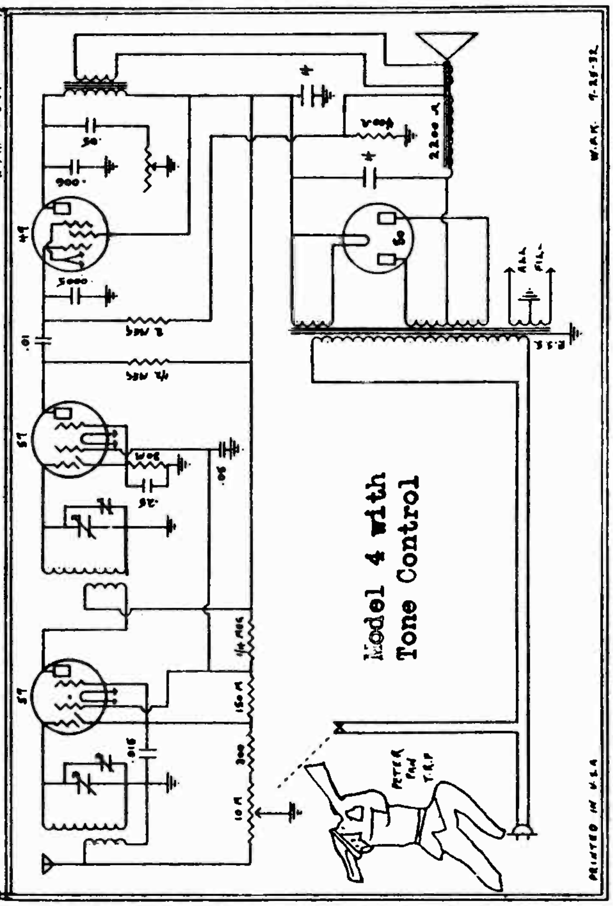


Model 25AV-25UV
IF PEAK 255 KC.



IF PEAK 465 KC.

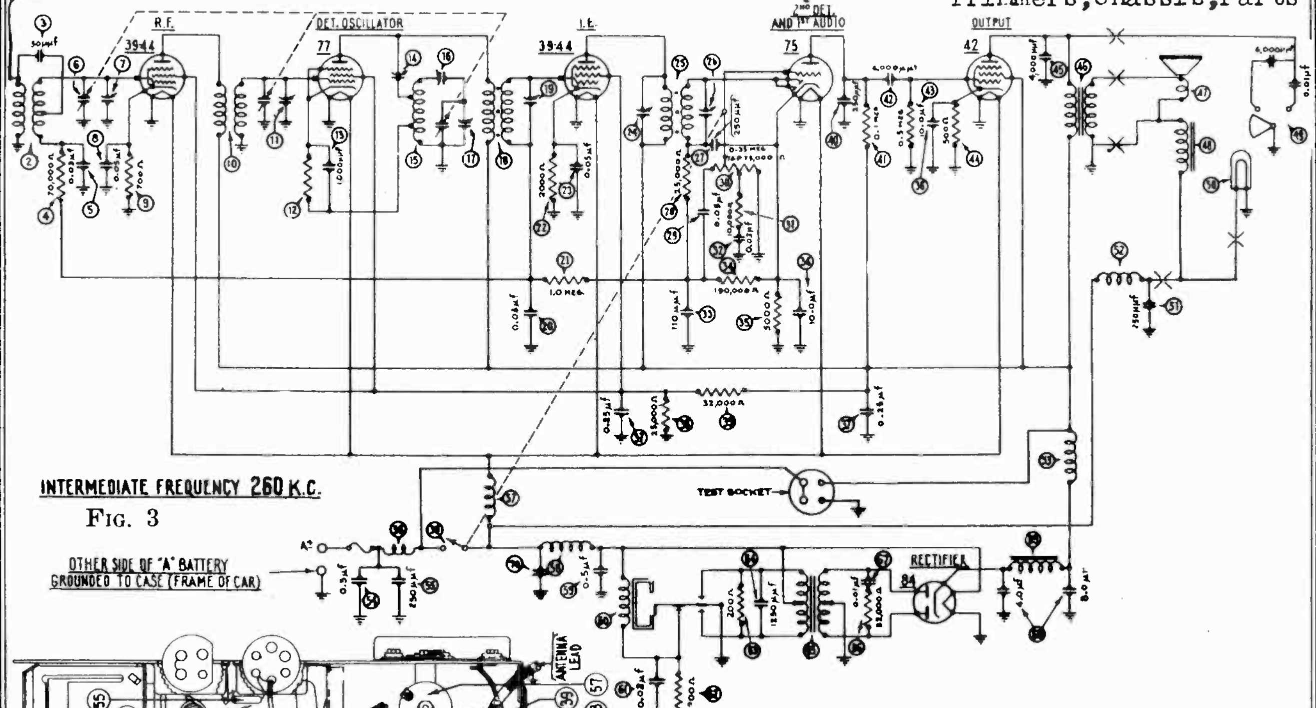
Model B



Model 4 with Tone Control

PHILCO RADIO & TELEV. CORP.

MODEL FT-6 Ford 7-1
Schematic, Socket
Trimmers, Chassis, Parts



INTERMEDIATE FREQUENCY 260 K.C.

FIG. 3

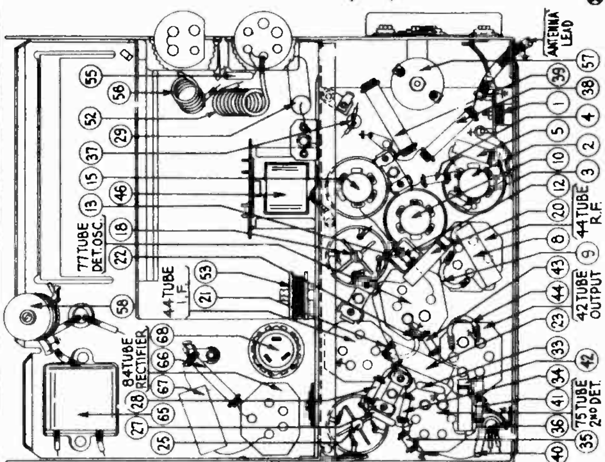


FIG. 4

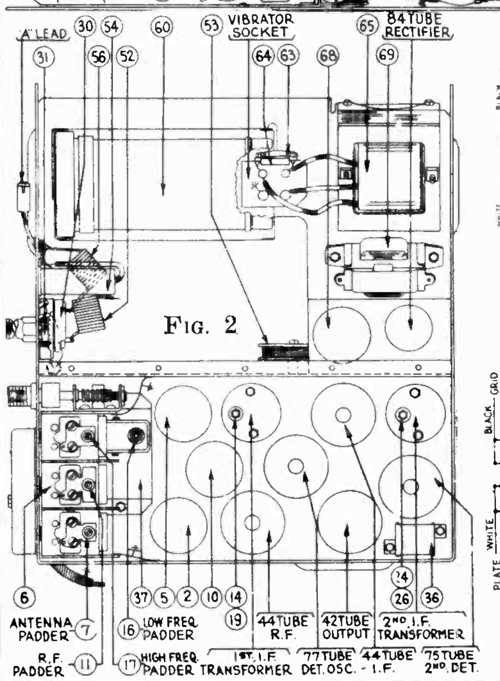
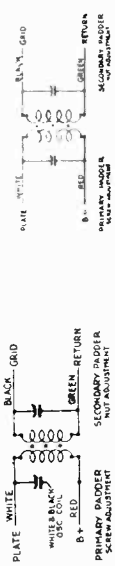


FIG. 2



2nd I. F. Transformer 32-1237

1st I. F. Transformer 32-1329

FIG. 1

MODEL FT-6 PARTS LIST

No. Shown on Schematic	Description	Part No.
1	Antenna Choke	32-1372
2	Antenna Transformer	32-1535
3	Condenser (50 mmfd.)	30-1029
4	Resistor (70,000 ohms)	33-1115
5	Condenser (.03 mfd.)	30-4025
6	Tuning Condenser	31-1459
7	1st Padder (on tun. cond.)	
8	Condenser (.05 mfd.)	30-4020
9	Resistor (700 ohms)	6443
10	R. F. Transformer	32-1536
11	2nd Padder (on tun. cond.)	
12	Resistor (11,000 ohms)	33-1194
13	Condenser (1000 mmfd.)	30-1007
14	Padder (Pri. 1st I. F. Trans.)	
15	Oscillator Transformer	32-1537
16	3rd Padder (on tun. cond.)	
17	4th Padder (on tun. cond.)	
18	First I. F. Transformer	32-1329
19	Padder (Sec. 1st I. F. Trans.)	
20	Condenser (.03 mfd.)	30-4025
21	Resistor (1.0 meg.)	33-1096
22	Resistor (2000 ohms)	33-3048
23	Condenser (.05 mfd.)	30-4020
24	Padder (Pri. 2nd I. F. Trans.)	
25	Second I. F. Transformer	32-1237
26	Padder (Sec. 2nd I. F. Trans.)	
27	Condenser (250 mmfd.)	30-1032
28	Resistor (25,000 ohms)	33-1013
29	Condenser (.05 mfd.)	30-4020
30	Vol. Con. & Switch Assm.	33-5067
31	Resistor (10,000 ohms)	33-1000
32	Condenser (.03 mfd.)	30-4025
33	Condenser (110 mmfd.)	30-1031
34	Resistor (190,000 ohms)	33-1116
35	Resistor (5000 ohms)	6096
36	Condenser (10-10 mfd.)	30-2076
37	Condenser (.25-.25 mfd.)	30-4126
38	Resistor (25,000 ohms)	3656
39	Resistor (32,000 ohms)	3525
40	Condenser (250 mmfd.)	30-1032
41	Resistor (.1 meg.)	6099
42	Condenser (6000 mmfd.)	30-4125
43	Resistor (.5 meg.)	6097
44	Resistor (500 ohms)	33-3031
45	Condenser (4000 mmfd.)	30-4185
46	Output Transformer	32-7347
47	Cone and Voice Coil	02861
48	Field Coil Assembly	36-3097
49	Tone Control	30-4243
50	Pilot Lamp	34-2039
51	Condenser (250 mmfd.)	30-1032
52	Choke	32-1374
53	R. F. Choke	32-1078
54	Condenser (.5 mfd.)	30-4018
55	Condenser (250 mmfd.)	30-1032
56	"A" Choke	32-1374
57	"A" Choke	32-1368
58	Vibrator Choke	32-1367
59	Condenser (.5 mfd.)	30-4227
60	Vibrator	38-5036
61	Condenser (.02 mfd.)	30-4039
62	Resistor (200 ohms)	7217
63	Resistor (200 ohms)	7217
64	Condenser (1250 mmfd.)	5886
65	Power Transformer	32-7232
66	Resistor (32,000 ohms)	3525
67	Condenser (.01 mfd.)	30-4051
68	Filter Condenser (4-8 mfd.)	30-2030
69	"B" Choke	32-7233
70	Condenser (110 mmfd.)	30-1031
	4-prong Socket	27-6006
	5-prong Socket	27-6014
	6-prong Socket	27-6020
	Spark Plug Resistor	33-1015
	Spark Plug Terminal	28-6179
	Interference Cond. (Gen.)	30-4181
	Interference Cond. (Dist.)	30-4176
	Face Assembly	42-5302
	Glass for Control	27-7757
	Knobs	27-4171
	Pointer	28-2605
	Flexible Shaft (Tuning)	28-8331
	Flexible Shaft (Volume)	28-8332
	Ammeter Cable	38-5749
	Fuse	7227
	Fuse Insulator	27-7131
	Antenna Lead	L1741
	"T" Bolt (set mounting)	28-8161
	Nut (set mounting)	W518A
	Speaker Cable	41-3125
	Tow Strap	36-3432
	"U" Clamp Control Mtg.	29-2609

MODEL FT-6 Ford
Alignment

PHILCO RADIO & TELEV. CORP.

I. F. TRANSFORMER AND PADDERS

The I. F. transformers are assembled complete with padding condensers.

The padders are placed in the top of the shield can one above the other.

The primary padder is adjusted by means of the screw slot, accessible through the hole in the top of the shield can. The secondary padder is adjusted by means of the small hex nut, also accessible through the hole in the top of the shield. (See Figs. 1 and 2.)

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Fig. 1.

If replacements are ever necessary, replace the entire coil assembly 32-1329 for the first I. F. stage and 32-1237 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

MODEL FT-6 RECEIVER

THE new Ford auto radio incorporates new advanced principles of circuit and tube design. A totally new idea in sound distribution and musical fidelity is built into a dynamic speaker located above the occupants' heads in the header-bar of the car. Other features of the set are two-unit construction with separate speaker, highly developed Automatic Volume Control, illuminated custom-built instrument panel control, mounting in the ash receptacle opening.

The Receiver is mounted directly above the steering column out of sight and out of the way.

MODEL FT-6 ADJUSTMENTS

All adjustments have been carefully checked at the factory. If, however, it is found necessary to re-adjust the padding condensers, this procedure must be followed carefully. Do not attempt to make any adjustments until the procedure is clearly understood or without the use of a good oscillator or signal generator and output meter. The PHILCO Set Tester 048 is highly recommended for this procedure and for all service work.

The Receiver must be connected to a six-volt storage battery and set up for operation. It is assumed that tubes have been checked and that the Receiver is in good condition except for the padding adjustments.

Remove the cover from the Receiver and disconnect the grid clip from the 77 tube. (For location see Fig. 2.)

Set up the signal generator and adjust it to exactly 260 K.C. Connect the generator lead to the grid cap of the 77 tube, and ground the shield to the Receiver housing.

Connect one lead from the output meter to the plate of the 42 tube and the other lead to the receiver housing. The Receiver volume control must be turned to approximately full volume and the attenuator in the generator set for a half-scale reading of the output meter.

The primary screw padders (24) and (14) must be screwed all the way in. (Figs. 2 and 3.) The secondary nut padders (26) and (19) must then be adjusted. These padders should be adjusted for maximum reading on the output meter.

The screw padders (24) and (14) must be adjusted next.

Adjust the screw on each padder for maximum reading on the meter. This adjustment is critical. Note the maximum reading obtainable. Turn the screw in again and readjust, just bringing the adjustment up to the maximum reading. Do not pass it and then back off.

After padding the I. F. stages, remove the generator lead from the 77 tube and reconnect the grid clip to the 77 tube. Adjust the generator to 1580 K.C. and then connect the generator lead to the antenna lead. Ground the shield to the receiver housing.

Using a piece of paper approximately .006 inch in thickness, place it under the heel of the tuning condenser between the stator and rotor plates and turn the tuning condenser until the rotor plates strike this paper.

With the tuning condenser in this position, adjust the high-frequency padder (17) until the maximum reading is obtained in the output meter. This is the true setting for 1580 K.C., 158 on the dial scale. Adjust condensers (11) and (7) in the same manner.

Remove the paper and turn the tuning condenser plates in mesh to approximately 60 on the scale, and adjust the signal generator to 600 K.C. Roll the tuning condenser and adjust the series padder (19) for the maximum meter reading.

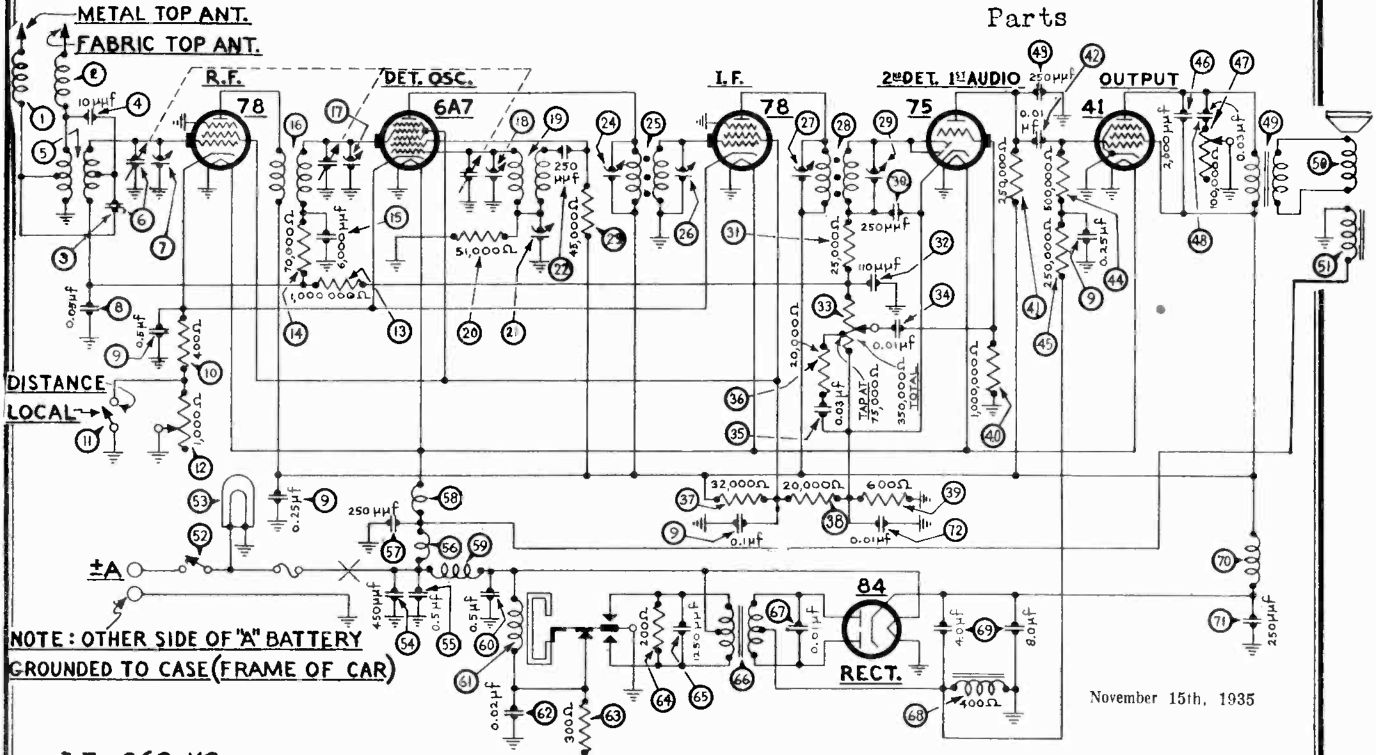
Readjust the padder (17) at 1580 K.C.

Tune the gang to 1400 K.C. and adjust padders (11) and (7) to maximum.

If this procedure has been carefully followed and an accurately calibrated oscillator or signal generator used, the receiver will be adjusted properly.

PHILCO RADIO & TELEV. CORP

MODEL CT-11 Chrysler
Schematic, Chassis
Parts



November 15th, 1935

I.F. = 260 KC.

Parts List — CT-11 Chrysler De Luxe Custom-Built Radio

No.	Description	Part No.
1	Antenna Choke	38-7210
2	Antenna Choke	38-7210
3	Condenser (70 mmfd.)	30-1068
4	Condenser (10 mmfd.)	30-1065
5	Antenna Transformer	32-1925
6	Tuning Condenser	31-1674
7	First Padder (on tun. cond.)	....
8	Condenser (.05 mfd.)	30-4020
9	Condenser (.1-.25-.25-.5 mfd.)	30-4374
10	Resistor (400 ohms)	33-1211
11	Sensitivity Control Switch	42-1140
12	Sensitivity Control	33-5129
13	Resistor (1,000,000 ohms)	33-1096
14	Resistor (70,000 ohms)	33-1115
15	Condenser (6000 mmfd.)	30-4125
16	R. F. Transformer	32-1926
17	Second Padder (on tun. cond.)	....
18	Third Padder (on tun. cond.)	....
19	Oscillator Transformer	32-1927
20	20Resistor (51,000 ohms)	6098
21	Low Frequency Padder	31-6056
22	Condenser (250 mmfd.)	30-1032
23	Resistor (45,000 ohms)	5256
24	Padder (pri. 1st I. F. trans.)	....
25	First I. F. Transformer	32-1928
26	Padder (Sec. 1st I. F. trans.)	....
27	Padder (Pri. 2nd I. F. trans.)	....
28	Second I. F. Transformer	32-1929
29	Padder (Sec. 2nd I. F. trans.)	....
30	Condenser (250 mmfd.)	30-1032
31	Resistor (25,000 ohms)	33-1013
32	Condenser (110 mmfd.)	30-1031
33	Volume Control (350,000 ohms)	33-5121
34	Condenser (.01 mfd.)	30-4124
35	Condenser (.03 mfd.)	30-4025
36	Resistor (20,000 ohms)	33-1178
37	Resistor (32,000 ohms)	3525
38	Resistor (20,000 ohms)	6650
39	Resistor (600 ohms)	33-1212
40	Resistor (1,000,000 ohms)	33-1096
41	Resistor (250,000 ohms)	33-1097
42	Condenser (.01 mfd.)	30-4145
43	Condenser (250 mmfd.)	30-1032
44	Resistor (500,000 ohms)	6097
45	Resistor (250,000 ohms)	33-1097
46	Condenser (2000 mmfd.)	30-4177
47	Tone Control	33-5141
48	Condenser (.03 mfd.)	30-4380
49	Output Transformer	2598
50	Cone & Voice Coil	36-3159
51	Field Coil Assembly	02795
52	On and Off Switch	42-5408
53	Pilot Lamp	34-2039
54	Condenser (450 mmfd.)	31-6065
55	Condenser (.5 mfd.)	30-4047
56	"A" Choke	32-1644
57	Condenser (250 mmfd.)	30-1032
58	Choke	32-1930
59	Vibrator Choke	32-1933
60	Condenser (.5 mfd.)	30-4047
61	Vibrator	38-5036
62	Condenser (.02 mfd.)	30-4039
63	Resistor (300 ohms)	33-3130
64	Resistor (200 ohms)	33-1210
65	Condenser (1250 mmfd.)	5886
66	Power Transformer	32-7482
67	Condenser (.01 mfd.)	30-4381
68	Filter Choke	32-7491
69	Filter Condenser (4-8 mfd.)	30-2134
70	R. F. Choke	32-193'
71	Condenser (250 mmfd.)	30-1032
72	Condenser (.01 mfd.)	30-4124
	Four Hole Socket	27-6044
	Five Hole Socket	27-6035
	Six Hole Socket	27-6036
	Seven Hole Socket	27-6037
	Designation Plate	28-3290
	Spark Plug Resistor	33-1015
	Distributor Resistor	33-1113
	Interference Condenser (.5 mfd.)	30-4007
	Interference Condenser (1 mfd.)	4522
	Receiver Housing	38-1568
	Carriage Bolt (Set Mtg.)	W825B
	Nut (Set Mtg.)	W98A
	Washer (Set Mtg.)	4486
	Bracket (Set Mtg.)	29-3086
	Clamp (Control Mtg.) Plymouth and DeSoto Deluxe	29-3300
	Clamp (Control Mtg.) Dodge	29-3281
	Clamp (Control Mtg.) DeSoto Custom	29-3323
	Clamp (Control Mtg.) Chrysler	29-3280
	Nut (Clamp Mtg.)	W317A
	Fuse	7227
	Fuse Insulator	27-7131
	Control Stud	28-6145
	Pilot Lamp Assembly	38-7213
	Tuning Control Shaft	28-8439
	Volume Control Shaft	28-8440
	Tone Control Shaft	28-8441
	Drum Assembly (Chrysler)	42-5437
	Drum Assembly (DeSoto DeLuxe)	42-5436

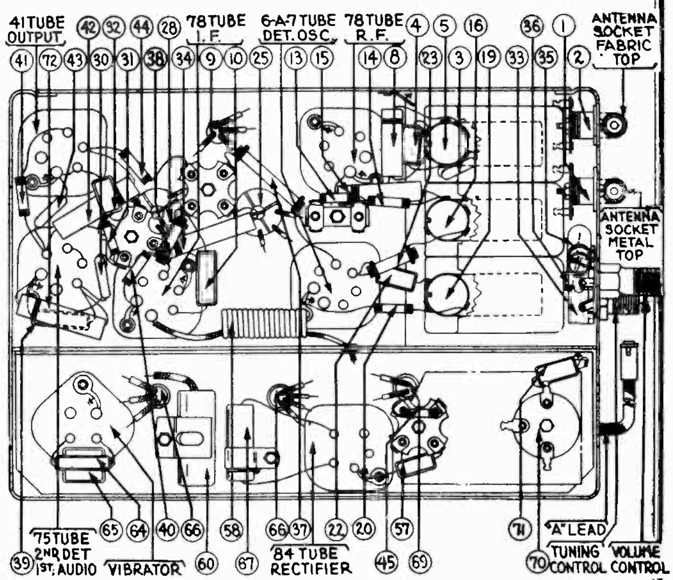


FIGURE 4

No.	Description	Part No.
	Drum Assembly DeSoto Custom	42-5505
	Drum Assembly (Dodge)	42-5435
	Drum Assembly (Plymouth)	42-5407
	Tuning and Volume Knob (Plymouth P-1)	27-4263
	Tuning and Volume Knob (Plymouth P-2)	27-4233
	Tuning and Volume Knob (Dodge)	27-4246
	Tuning and Volume Knob (Chrysler C-7)	27-4235
	Tuning and Volume Knob (Chrysler C-8)	27-4234
	Tuning and Volume Knob (DeSoto)	27-4243
	Tone Control Knob (Plymouth P-1)	27-4264
	Tone Control Knob (Plymouth P-2)	27-4227
	Tone Control Knob (Dodge)	27-4245
	Tone Control Knob (Chrysler C-7)	27-4229
	Tone Control Knob (Chrysler C-8)	27-4228
	Tone Control Knob (DeSoto)	27-4242
	Shield Loom Assembly	38-7295

MODEL CT-11 Chrysler
Socket,Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

Chrysler DeLuxe Custom Built Radio Model CT11

NOVEMBER 15th, 1935

I. F. Transformers and Padders Model CT11

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Fig. 2).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Fig. 1.

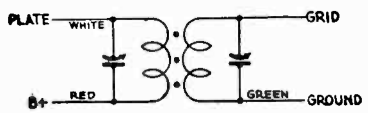


FIGURE 1

If replacements are ever necessary, replace the entire coil assembly, 32-1928 for the first I. F. stage and 32-1929 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

Model CT11 Adjustments

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments to the Model CT-11 are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

General

OUTPUT METER — The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

SIGNAL GENERATOR — With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

The sensitivity switch must be in the "distance" position. The tone control should be turned to the brilliant position.

Procedure

I. F. — Adjust the signal generator to exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser.

Adjust the secondary screw padder (29) on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (27) for maximum reading. (See Fig. 2 for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser. Adjust the secondary screw padder (26) on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (24) for maximum reading. (See Figure 2 for location of padders).

HIGH FREQUENCY AND R. F. — After padding the first I. F. stage remove the generator lead from the 6A7 tube.

Adjust the signal generator to 1600 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser.

Turn the tuning condenser plates out of mesh as far as they will go. With the tuning condenser in this position, adjust the high frequency padder (18) and the R. F. padder (17) until the maximum reading is obtained on the output meter. This is the true setting for 1600 K. C., 160 on the dial scale.

LOW FREQUENCY — Turn the tuning condenser plates in mesh to approximately 580 K. C., 58 on the dial scale and adjust the signal generator to the 580 K. C. Roll the tuning condenser and adjust the low frequency padder screw (21) for maximum reading on the output meter.

HIGH FREQUENCY RE-ADJUSTMENT — Turn the tuning condenser plates out of mesh as far as they will go and adjust the signal generator to 1600 K. C. Then adjust the high frequency padder (18) again for maximum reading on the output meter.

ANTENNA —Connect the generator lead to the antenna cable assembly (made up of Part No. L1915 loom and 40 inches of 16 strand No. 30 wire), using a 110 mmfd. condenser in series between the two leads. Plug the cable into the antenna socket marked "fabric top."

Turn the tuning condenser to 1400 K. C. and set the generator for 1400 K. C. Adjust the padders (17) and (7) for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. The signal generator output lead should be connected to a wire placed near the car antenna but not connected to it.

If this procedure has been carefully followed and an accurately calibrated oscillator or signal generator has been used, the Receiver will be adjusted properly.

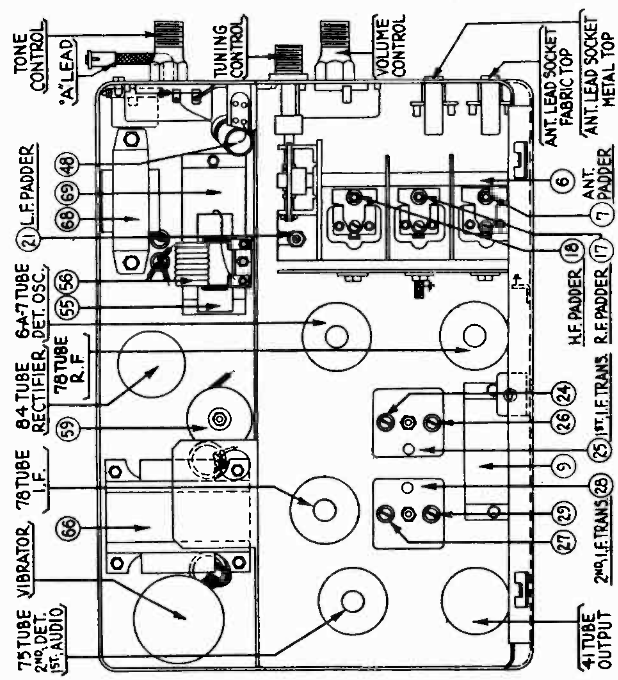


FIGURE 2

Schematic, Chassis Parts | PHILCO RADIO & TELEV. CORP. | MODELS NT12X, NT12X2 Nash, Lafayette

Nash-Philco Model NT12X and NT12X2 Two Unit Receiver

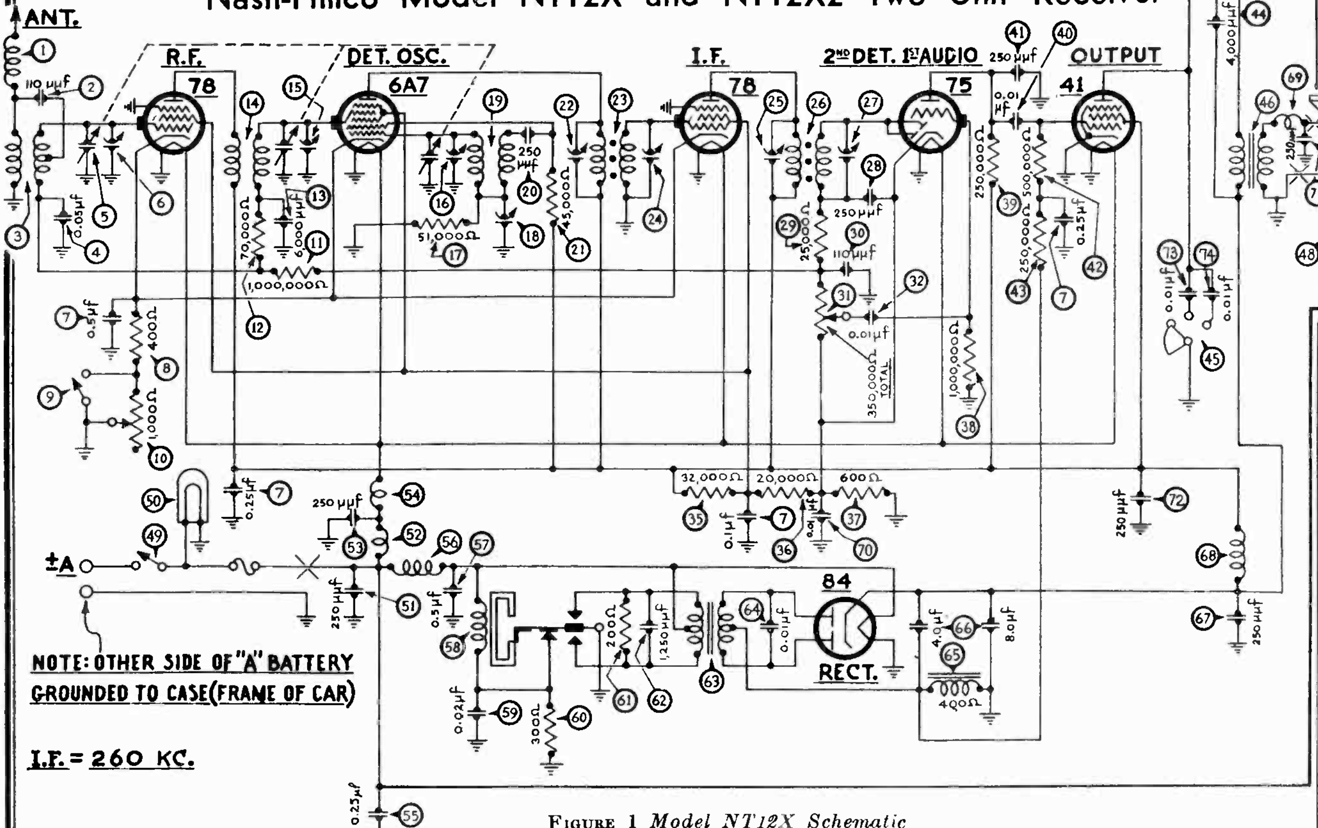


FIGURE 1 *Model NT12X Schematic*

The Model NT12X Receiver (Nash—AC-1889) is made for the Nash 400 and Lafayette 3610 cars, using the Nash under-car Ant
The Model NT12X2 Receiver (Nash—AC1789) is made for the Nash 3620—3680 cars using the insulated metal top antenna.
The Models NT12X and NT12X2 Receivers are not interchangable.

Model NT12X and NT12X2 Parts List

1 Antenna Choke 38-7210
2 Condenser (110 mmfd.) ..30-1031
3 Antenna Transformer (NT12X) 32-1934
3 Antenna Transformer (NT12X2) 32-1990
4 Condenser (.05 mfd.) 30-4020
5 Tuning Condenser (NT12X) 31-1674
5 Tuning Condenser (NT12X2) 31-1728
6 First Padder (on tun. cond.) ....
7 Condenser (.1-.25-.25-.5 mfd.) 30-4374
8 Resistor (400 ohms) 33-1211
9 Sensitivity Control Switch ..42-1145
10 Sensitivity Control 33-5129
11 Resistor (1,000,000 ohms) 33-510344
12 Resistor (70,000 ohms) ..33-370334
13 Condenser (6000 mmfd.) ..30-4125
14 R. F. Transformer 32-1926
15 Second Padder (on tun. cond.) ....
16 Third Padder (on tun. cond.) ....
17 Resistor (51,000 ohms) 33-351344
18 Low Frequency Padder 31-6056
19 Oscillator Transformer 32-1927
20 Condenser (250 mmfd.) ...30-1032
21 Resistor (45,000 ohms) ..33-345344
22 Padder (Pri. 1st I. F. Trans.) ....
23 First I. F. Transformer ...32-1928
24 Padder (Sec. 1st I. F. Trans.) ....
25 Padder (Pri. 2nd I. F. Trans.) ....
26 Second I. F. Transformer ..32-1929
27 Padder (Sec. 2nd I. F. Trans.) ....
28 Condenser (250 mmfd.) ..30-1032
29 Resistor (25,000 ohms) .33-325344
30 Condenser (110 mmfd.) ..30-1031
31 Volume Control (350,000 ohms) 33-5139
32 Condenser (.01 mfd.) 30-4124
35 Resistor (32,000 ohms) 3525
36 Resistor (20,000 ohms) .33-320334
37 Resistor (600 ohms) 33-1212
38 Resistor (1,000,000 ohms) 33-510344
39 Resistor (250,000 ohms) 33-424344
40 Condenser (.01 mfd.) 30-4145
41 Condenser (250 mmfd.) ...30-1032
42 Resistor (500,000 ohms) 38-449344
43 Resistor (250,000 ohms) 33-424844
44 Condenser (4000 mmfd.) ..30-4185
45 Tone Control Switch 42-1139
46 Output Transformer 32-7495
47 Cone and Voice Coil 36-3526
48 Field Coil 32-9236
49 On and Off Switch 42-5466
50 Pilot Lamp 34-2040
51 Condenser (250 mmfd.) 30-1032
52 "A" Choke 32-1644
53 Condenser (250 mmfd.) 30-1032
54 Choke 32-1930
55 Condenser (.25 mfd.) 30-4146
56 Vibrator Choke 32-1968
57 Condenser (.5 mfd.) 30-4047
58 Vibrator 38-5036
59 Condenser (.02 mfd.) 30-4039
60 Resistor (300 ohms) 33-3130
61 Resistor (200 ohms) 33-1210
62 Condenser (1250 mmfd.) 5886
63 Power Transformer 32-7488
64 Condenser (.01 mfd.) 30-4381
65 Filter Choke 32-7491
66 Filter Conden ser(4-8 mfd.)30-2134
67 Condenser (250 mmfd.) 30-1032
68 R. F. Choke 32-1932
69 Choke 32-1464
70 Condenser (.01 mfd.) 30-4124
71 Condenser (250 mmfd.) 30-1032
72 Condenser (250 mmfd.) ..30-1032
73 Condenser (.01 mfd.) 30-4051
74 Condenser (.01 mfd.) 30-4051
Four Hole Socket 27-6044
Five Hole Socket 27-6035
Six Hole, Socket 27-6036
Seven Hole Socket 27-6037
Distributor Resistor 4851
Interference Condenser (.5 mfd.) 30-4007
Dial 27-5152
Knob (Tun. and Vol.) 27-4258
Knob (Sensitivity Switch) .27-4261
Speaker Cable 41-3175

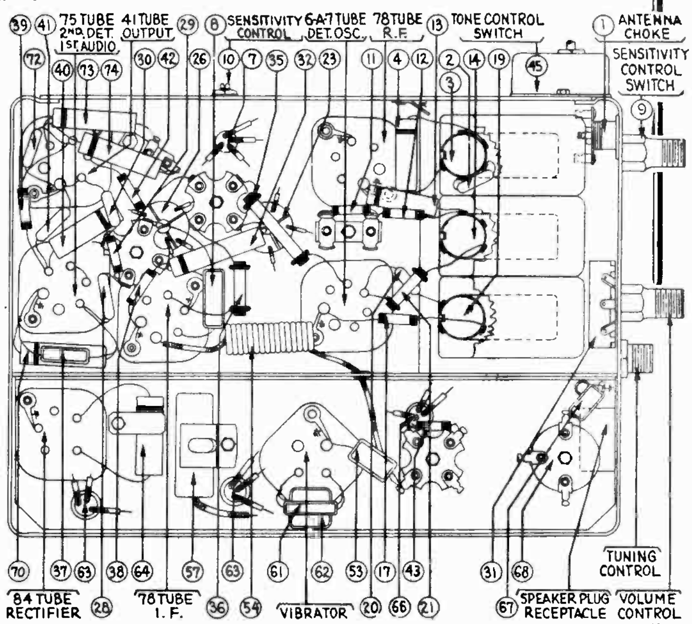


FIGURE 2 *Model NT12X and NT12X2 Base View*

Receiver Housing 38-1589
Tuning Shaft 28-8452
Volume Shaft 28-8453
Sensitivity Switch Shaft ..28-8454
Fuse 7227
Fuse Insulator 27-7729
Tee Bolt (Rec. Mtg.) 28-6161
Nut (Rec. Mtg.) W518A
Tow Strap 36-3403

MODELS NT12X,NT12X2
Socket,Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

I. F. Transformers and Padders Model NT12X and NT12X2

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Figure 8).

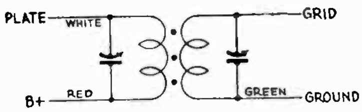


Figure 7

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure 7.

If replacements are ever necessary, replace the entire coil assembly, 32-1928 for the first I. F. stage and 32-1929 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

Model NT12X Adjustments

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments to the Model NT12X and NT12X2 are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

General

OUTPUT METER — The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

SIGNAL GENERATOR — With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

The sensitivity switch must be in the "distance" position. The tone control should be turned to the brilliant position.

Procedure

I. F. — Adjust the signal generator to exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser.

Adjust the secondary screw padder (27) on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (25) for maximum reading. (See Figure 8 for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser. Adjust the secondary screw padder (24) on the first I. F. transformer for maximum reading on the ouput meter. Then adjust the primary screw padder (22) for maximum reading. (See Figure 8 for location of padders).

HIGH FREQUENCY AND R. F. — After padding the first I. F. stage remove the generator lead from the 6A7 tube.

Adjust the signal generator to 1600 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser.

Turn the tuning condenser plates out of mesh as far as they will go. With the tuning condenser in this position, adjust the high frequency padder (16) and the R. F. padder (15) until the maximum reading is obtained on the output meter. This is the true setting for 1600 K. C., 160 on the dial scale.

LOW FREQUENCY — Turn the tuning condenser plates in mesh to approximately 580 K. C., 58 on the dial scale and adjust the signal generator to the 580 K. C. Roll the tuning condenser and adjust the low frequency padder screw (18) for maximum reading on the ouput meter.

HIGH FREQUENCY RE-ADJUSTMENT — Turn the tuning condenser plates out of mesh as far as they will go and adjust the signal generator to 1600 K. C. Then adjust the high frequency padder (16) again for maximum reading on the output meter.

ANTENNA

(NT12X only) — Connect the generator lead to the antenna cable assembly (made up of Part No. L1915 loom, 1-27-7133 terminal and 40 inches of 16 strand No. 30 wire), using a 200 mmfd. condenser in series between the two leads. Plug the cable into the antenna socket.

(NT12X2 only) — Connect the generator lead to the antenna lead using a 1250 mmfd. condenser and 50 ohms (non-inductive) as a dummy antenna. Plug the antenna lead into the antenna socket.

(NT12X and NT12X2) — Turn the tuning condenser to 1400 K. C. and set the generator for 1400 K. C. Adjust the padders (15) and (6) for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. The signal generator output lead should be connected to a wire placed near the car antenna but not connected to it.

If this procedure has been carefully followed and an accurately calibrated oscillator or signal generator has been used, the Receiver will be adjusted properly.

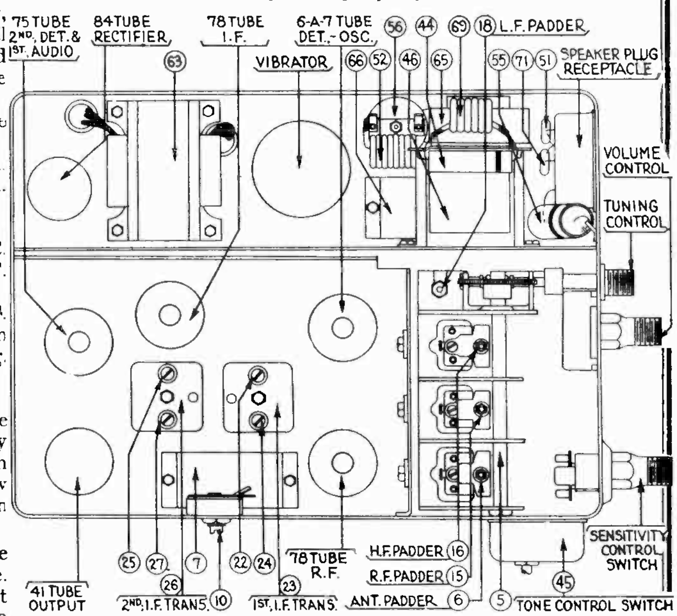


Figure 8

The Model NT12X Receiver (Nash—AC-1889) is made for the Nash 400 and Lafayette 3610 cars, using the Nash under-car Antenna. The Model NT12X2 Receiver (Nash—AC1789) is made for the Nash 3620—3680 cars, using the insulated metal top Antenna. The Models NT12X and NT12X2 Receivers are not interchangeable.

PHILCO RADIO & TELEV. CORP.

MODEL ST-12
Studebaker
Schematic
Alignment

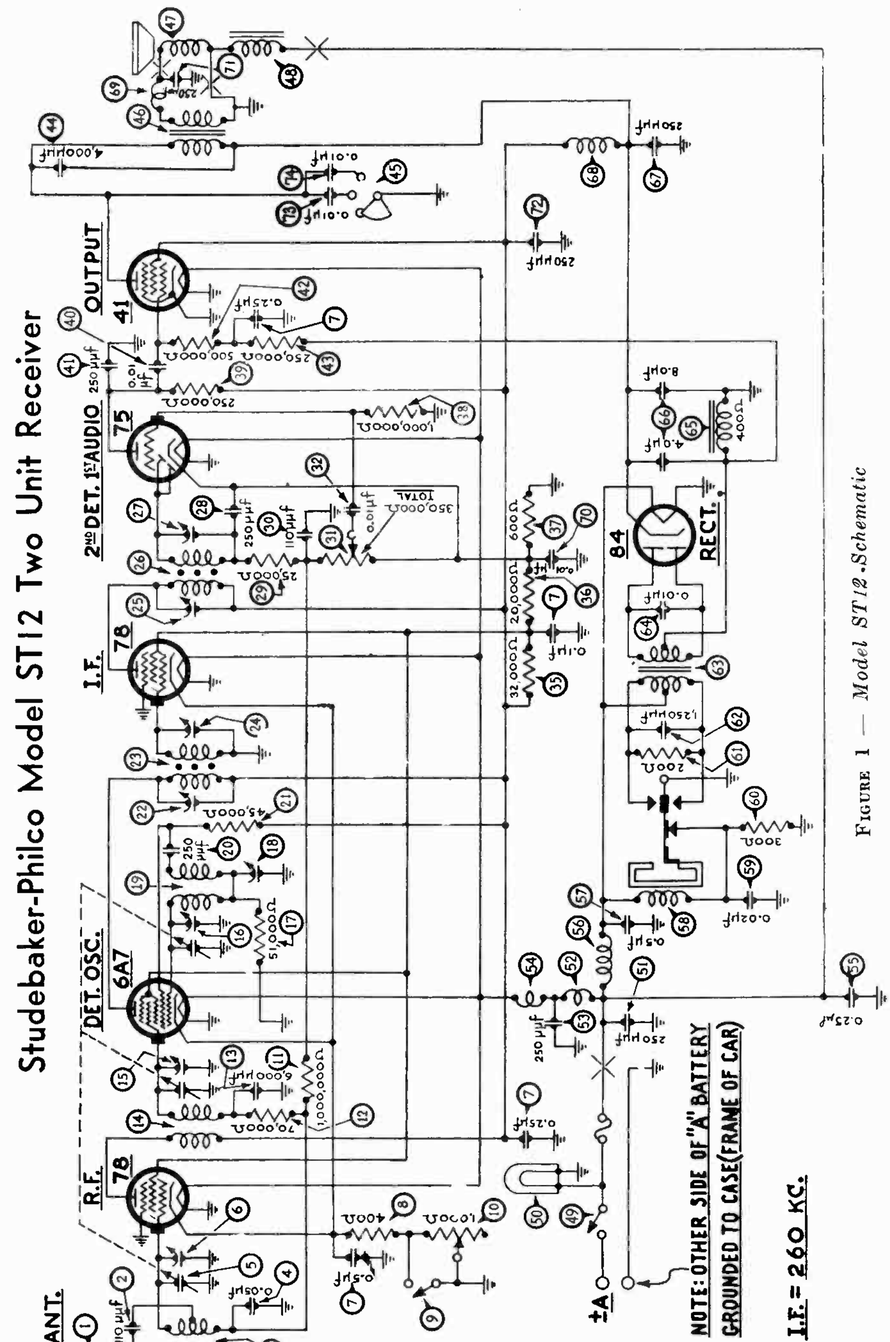


FIGURE 1 — *Model ST12 Schematic*

LOW FREQUENCY — Turn the tuning condenser plates in mesh to approximately 580 K. C., 58 on the dial scale and adjust the signal generator to the 580 K. C. Roll the tuning condenser and adjust the low frequency padder screw (18) for maximum reading on the output meter.

HIGH FREQUENCY RE-ADJUSTMENT — Turn the tuning condenser plates out of mesh as far as they will go and adjust the signal generator to 1600 K. C. Then adjust the high frequency padder (16) again for maximum reading on the output meter.

Adjust the signal generator to 1600 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser.

Turn the tuning condenser plates out of mesh as far as they will go. With the tuning condenser in this position, adjust the high frequency padder (16) and the R. F. padder (15) until the maximum reading is obtained on the output meter. This is the true setting for 1600 K. C., 160 on the dial scale.

December 15, 1935

General

OUTPUT METER — The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

SIGNAL GENERATOR — With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

The sensitivity switch must be in the "distance" position. The tone control should be turned to the brilliant position.

Procedure

I. F. — Adjust the signal generator to exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser.

Adjust the secondary screw padder (27) on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (25) for maximum reading. (See Figure 8 for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser. Adjust the secondary screw padder (24) on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (22) for maximum reading. (See Figure 8 for location of padders).

PHILCO RADIO & TELEV. CORP.

I. F. Transformers and Padders

Model ST12

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Figure 8).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure 7

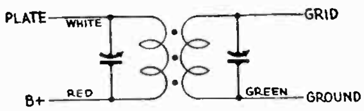


FIGURE 7

If replacements are ever necessary, replace the entire coil assembly, 32-1928 for the first I. F. stage and 32-1929 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

Model ST12 Adjustments

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments to the Model ST12 are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

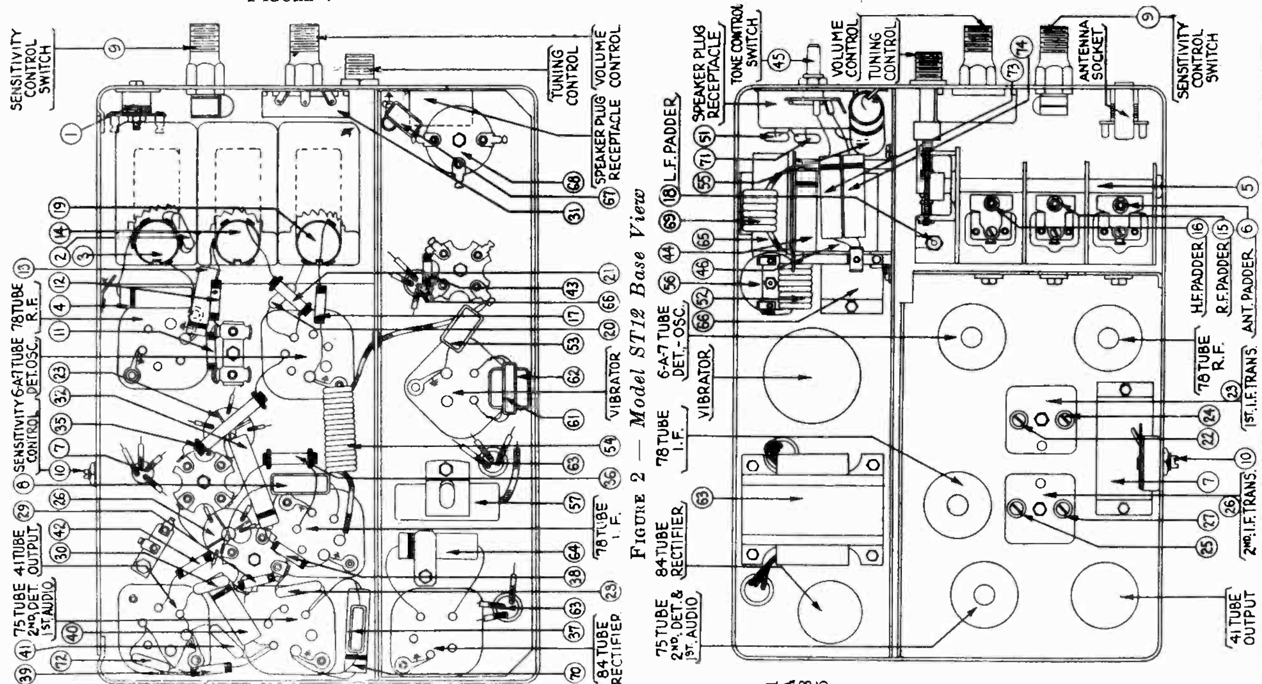


FIGURE 2 — *Model ST12 Base View*

Model ST12 Parts List

1 Antenna Choke 38-7210
2 Condenser (110 mmfd.) ..30-1031
3 Antenna Transformer 32-1934
4 Condenser (.05 mfd.) 30-4020
5 Tuning Condenser 31-1674
6 First Padder (on tun. cond.) ....
7 Condenser (.1-.25-.25-.5 mfd.) 30-4374
8 Resistor (400 ohms) 33-1211
9 Sensitivity Control Switch ..42-1140
10 Sensitivity Control 33-5129
11 Resistor (1,000,000 ohms)33-510344
12 Resistor (70,000 ohms) ..33-370334
13 Condenser (6000 mmfd.) ..30-4125
14 R. F. Transformer 32-1926
15 Second Padder (on tun. cond.) ....
16 Third Padder (on tun. cond.) ....
17 Resistor (51,000 ohms) 33-351344
18 Low Frequency Padder 31-6056
19 Oscillator Transformer 32-1927
20 Condenser (250 mmfd.) ...30-1032
21 Resistor (45,000 ohms) ..33-345344
22 Padder (Pri. 1st I. F. Trans.) ....
23 First I. F. Transformer ...32-1928
24 Padder (Sec. 1st I. F. Trans.) ....
25 Padder (Pri. 2nd I. F. Trans.) ....
26 Second I. F. Transformer ..32-1929
27 Padder (Sec. 2nd I. F. Trans.) ....
28 Condenser (250 mmfd.) ..30-1032
29 Resistor (25,000 ohms) .33-325344
30 Condenser (110 mmfd.) ..30-1031
31 Volume Control (350,000 ohms) 33-5139
32 Condenser (.01 mfd.) 30-4124
33 Resistor (32,000 ohms) .33-332434
34 Resistor (20,000 ohms) .33-320334
35 Resistor (600 ohms) 33-1212
36 Resistor (1,000,000 ohms)33-510344
37 Resistor (250,000 ohms) 33-424344
38 Condenser (.01 mfd.) 30-4145
39 Condenser (250 mmfd.) ...30-1032
40 Resistor (500,000 ohms) 33-449344
41 Resistor (250,000 ohms) 33-424344
42 Condenser (4000 mmfd.) ..30-4185
43 Tone Control Switch 42-1139
44 Output Transformer 32-7495
45 Cone and Voice Coil 36-3526
46 Field Coil 32-9236
47 On and Off Switch 42-1157
48 Pilot Lamp 34-2039
49 Condenser (250 mmfd.) 30-1032
50 "A" Choke 32-1644
51 Condenser (250 mmfd.) 30-1032
52 Choke 32-1930
53 Condenser (.25 mfd.) 30-4146
54 Vibrator Choke 32-1968
55 Condenser (.5 mfd.) 30-4047
56 Vibrator 38-5036
57 Condenser (.02 mfd.) 30-4039
58 Resistor (300 ohms) 33-3130
59 Resistor (200 ohms) 33-1210
60 Condenser (1250 mmfd.) 5886
61 Power Transformer 32-7488
62 Condenser (.01 mfd.) 30-4381
63 Filter Choke 32-7491
64 Filter Condenser (4-8 mfd.) 30-2134
65 Condenser (250 mmfd.) 30-1032
66 R. F. Choke 32-1932
67 Choke 32-1461
68 Condenser (.01 mfd.) 30-4124
69 Condenser (250 mmfd.) 30-1032
70 Condenser (250 mmfd.) ..30-1032
71 Condenser (.01 mfd.) 30-4051
72 Condenser (.01 mfd.) 30-4051
Four Hole Socket 27-6044
Five Hole Socket 27-6035
Six Hole Socket 27-6036
Seven Hole Socket 27-6037
Distributor Resistor 4851
Interference Condenser (.5 mfd.) 30-4007
Interference Condenser (1 mfd.) 4522
Scale Assembly (Dictator) ..42-5445
Scale Assembly (President) .42-5449
Knob (Sensitivity) 27-4261
Knob (Tun.&Vol.) Dictator 27-4252
Knob (Tun&Vol.) President 27-4254

Pointer Gear Shaft Assembly 42-5456
Tuning and Volume Shaft ..28-8442
Sensitivity Switch Shaft 28-8444
Fuse 7227
Fuse Insulator 27-7729
Tee Bolt (Rec. Mtg.) 28-6161
Nuts (Rec. Mtg.) W518A
Receiver Housing 38-1588
Speaker Cable 41-3175

ANTENNA — Connect the generator lead to the antenna cable assembly (made up of Part No. L1915 loom, 1-27-7133 terminal and 40 inches of 16 strand No. 30 wire), using a 200 mmfd. condenser in series between the two leads. Plug the cable into the antenna socket.

Turn the tuning condenser to 1400 K. C. and set the generator for 1400 K. C. Adjust the padders 15 and 6 for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. The signal generator output lead should be connected to a wire placed near the car antenna but not connected to it.

If this procedure has been carefully followed and an accurately calibrated oscillator or signal generator has been used, the Receiver will be adjusted properly.

PHILCO RADIO & TELEV. CORP.

MODEL LT14X3 Lincoln
Schematic, Chassis
Parts List

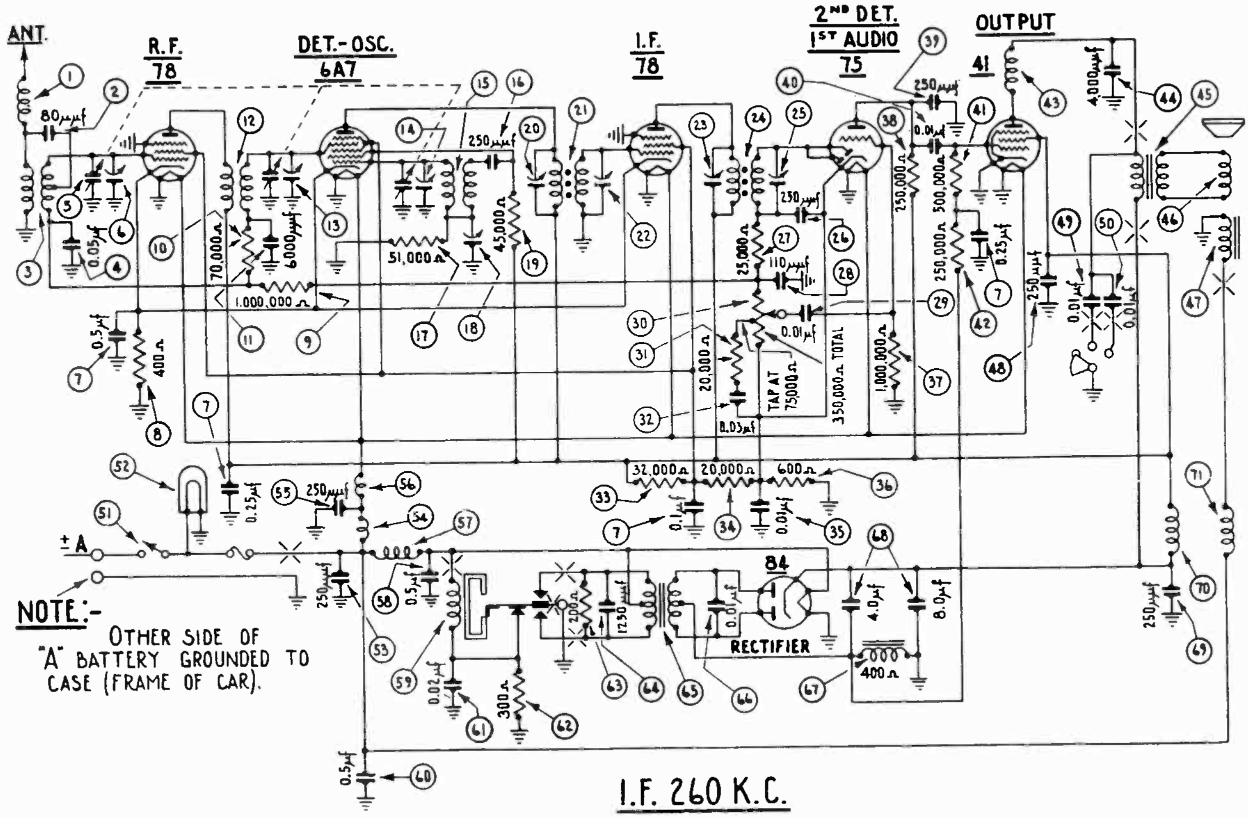


FIGURE 3

MODEL LT14X3 PARTS LIST

No.	Description	Part No.
1	Antenna Choke	38-7210
2	Condenser (80 mmfd.)	30-1066
3	Antenna Transformer	32-1975
4	Condenser (.05 mfd.)	30-4444
5	Tuning Condenser	31-1674
6	First Padder (on tun. cond.)	
7	Condenser (.1-.25-.25-.5 mfd.	30-4374
8	Resistor (400 ohms)	33-1211
9	Resistor (1,000,000 ohms)	33-510344
10	Resistor (70,000 ohms)	33-370334
11	Condenser (6000 mmfd.)	30-4445
12	R. F. Transformer	32-1926
13	Second Padder (on tun. cond).	
14	Third Padder (on tun. cond.)	
15	Oscillator Transformer	32-1927
16	Condenser (250 mmfd.)	30-1032
17	Resistor (51,000 ohms)	33-351344
18	Low Frequency Padder	31-6056
19	Resistor (45,000 ohms)	33-345344
20	Padder (Pri. 1st I.F. transf.)	
21	First I. F. Transformer	32-1928
22	Padder (Sec. 1st I. F. Transf.)	
23	Padder (Pri. 2nd I. F. Transf.)	
24	Second I. F. Transformer	32-1929
25	Padder (Sec. 2nd I. F. transf.)	
26	Condenser (250 mfd.)	30-1032
27	Resistor (25,000 ohms)	33-325344
28	Condenser (110 mmfd.)	30-1031
29	Condenser (.01 mfd.)	30-4124
30	Volume Control (350,000 ohms)	33-5139
31	Resistor (20,000 ohms)	33-320334
32	Condenser (.03 mfd.)	30-4449
33	Resistor (32,000 ohms)	33-332434
34	Resistor (20,000 ohms)	33-320334
35	Condenser (.01 mfd.)	30-4124
36	Resistor (600 ohms)	33-1212
37	Resistor (1,000,000 ohms)	33-510344
38	Resistor (250,000 ohms)	33-424344
39	Condenser (250 mmfd.)	30-1032
40	Condenser (.01 mfd.)	30-4145
41	Resistor (500,000 ohms)	33-449344
42	Resistor (250,000 ohms)	33-424344

No.	Description	Part No.
43	Choke	32-1382
44	Condenser (4000 mmfd.)	30-4185
45	Output Transformer	2598
46	Cone and Voice Coil	36-3159
47	Field Coil Assembly	02795
48	Condenser (250 mmfd.)	30-1032
49	Condenser (.01 mfd.)	30-4051
50	Condenser (.01 mfd.)	30-4051
51	On and Off Switch	42-5423
52	Pilot Lamp	34-2039
53	Condenser (250 mmfd.)	30-1032
54	"A" Choke	32-1644
55	Condenser (250 mmfd.)	30-1032
56	Filament Choke	32-1930
57	Vibrator Choke	32-1933
58	Condenser (.5 mfd.)	30-4047
59	Vibrator	38-5036
60	Condenser (.5 mfd.)	30-4047
61	Condenser (.02 mfd.)	30-4039
62	Resistor (300 ohms)	33-3130
63	Resistor (200 ohms)	33-1210
64	Condenser (1250 mmfd.)	5886
65	Power Transformer	32-7488
66	Condenser (.01 mfd.)	30-4381
67	"B" Filter Choke	32-7491
68	Condenser (4-8 mfd.)	38-7693
69	Condenser (250 mmfd.)	30-1032
70	"B" Choke	32-1932
71	"A" Choke	32-1464
	Four Prong Socket	27-6044
	Five Prong Socket	27-6035
	Six Prong Socket	27-6036
	Seven Prong Socket	27-6037
	Tone Control Knob	27-4208
	Face Assembly	28-3786
	Glass	27-7757
	Glass Gasket	27-8206
	Tuning and Volume Shaft	28-8497
	Pointer	28-3505
	Pilot Lamp Assembly	38-7217
	Antenna Shielded Loom	L-1963
	Fuse Lead	38-6595
	Interference Condenser	30-4007
	Interference Condenser	30-4381

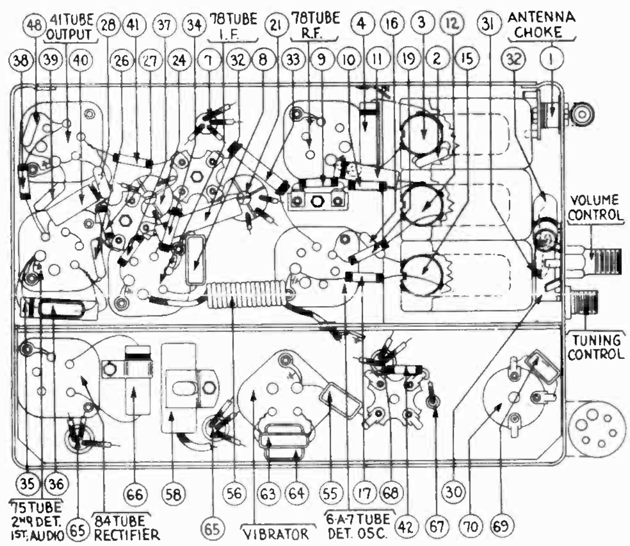


FIGURE 4

No.	Description	Part No.	No.	Description	Part No.
	Interference Condenser	30-4307		Wing Nut (control mtg.)	W-1321
	Interference Condenser	30-4387		Screw (Rec. mtg.)	W-1614
	Interference Condenser	30-4404		Plate (Rec. mtg.)	29-3734
	Fuse	7227		Stud (Speaker mtg.)	28-6037
	Fuse Insulator	27-7729		Washer (Speaker mtg.)	4486
	Clamp (control mtg.)	29-2699		Nut (Speaker mtg.)	W-55A

MODEL LT14X3 Lincoln
Socket, Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

LINCOLN CUSTOM BUILT CAR RADIO

I. F. Transformers and Padders Model LT14X3

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Fig. 2).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Fig. 1.

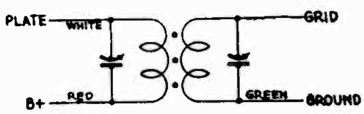


FIGURE 1

If replacements are ever necessary, replace the entire coil assembly, 32-1928 for the first I. F. stage and 32-1929 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

Model LT14X3 Adjustments

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments to the Model LT14X3 are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

General

OUTPUT METER — The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

SIGNAL GENERATOR — With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

The tone control should be turned to the brilliant position.

Remove the cover from the Receiver. The antenna lead must be disconnected.

I. F. — Adjust the signal generator to exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser.

Adjust the secondary screw padder (25) on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (23) for maximum reading. (See Fig. 2 for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser. Adjust the secondary screw padder (22) on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (20) for maximum reading. (See Figure 2 for location of padders).

HIGH FREQUENCY AND R. F. — After padding the first I. F. stage remove the generator lead from the 6A7 tube. Adjust the signal generator to 1600 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser.

Turn the tuning condenser plates out of mesh as far as they will go. With the tuning condenser in this position, adjust the high frequency padder (14) and the R. F. padder (13) until the maximum reading is obtained on the output meter. This is the true setting for 1600 K. C., 160 on the dial scale.

LOW FREQUENCY — Turn the tuning condenser plates in mesh to approximately 580 K. C., 58 on the dial scale and adjust the signal generator to 580 K. C. Roll the tuning condenser and adjust the low frequency padder (18) for maximum reading on the output meter.

HIGH FREQUENCY RE-ADJUSTMENT — Turn the tuning condenser plates out of mesh as far as they will go and adjust the signal generator to 1600 K. C. Then adjust the high frequency padder (14) again for maximum reading on the output meter.

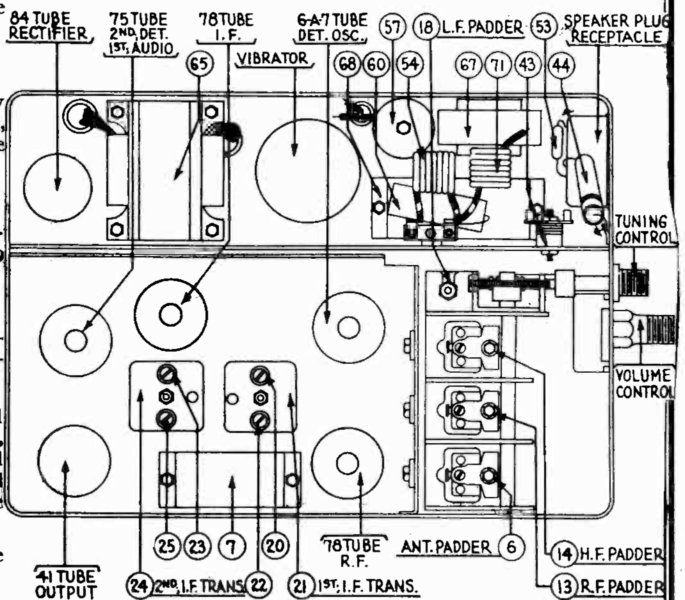


FIGURE 2

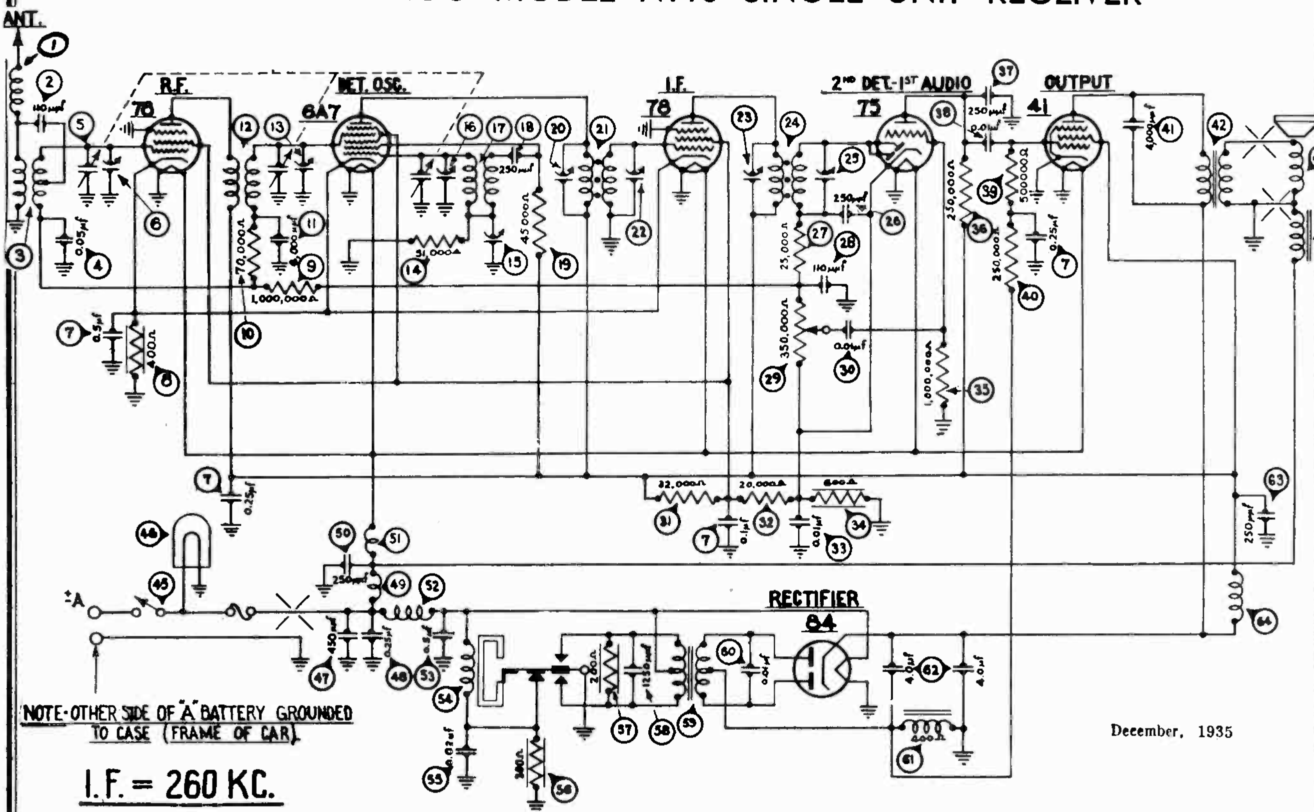
ANTENNA — Connect the generator lead to the antenna cable assembly (made up of Part No L1963 loom, 1-27-7133 terminal and 64 inches of 16 strand No. 30 wire), using a 530 mmfd. condenser in series between the two leads. Plug the cable into the antenna socket.

Turn the tuning condenser to 1400 K. C. and set the generator at 1400 K. C. Adjust the padders (13) and (6) for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. Connect the signal generator output lead to a wire placed near the car antenna but not connected to it.

If this procedure has been carefully followed and an accurately calibrated oscillator or signal generator has been used, the Receiver will be adjusted properly.

NASH - PHILCO MODEL NT15 SINGLE UNIT RECEIVER



December, 1935

FIGURE 3 *Model NT15 Schematic*

The Model NT15 Receiver (Nash—AC1989) is made for the Nash 400 and Lafayette 3610 cars using the Nash under-car Ant

Model NT15X Parts List

- (1) Antenna Choke 38-7210
- (2) Condenser (110 mmfd.) 30-1031
- (3) Antenna Transformer 32-1934
- (4) Condenser (.05 mfd.) 30-402C
- (5) Tuning Condenser 31-1674
- (6) First Padder (on tun. cond.) ....
- (7) Condenser (.1-.25-.25-.5 mfd.) 30-4374
- (8) Resistor (400 ohms) 33-1211
- (9) Resistor (1,000,000 ohms)33-510344
- (10) Resistor (70,000 ohms) .33-370344
- (11) Condenser (6000 mmfd.) ..30-4125
- (12) R. F. Transformer 32-1926
- (13) Second Padder (on tun. cond.) ....
- (14) Resistor (51,000 ohms) .33-351344
- (15) Low Frequency Padder 31-6056
- (16) Third Padder (on tun. cond.) ....
- (17) Oscillator Transformer 32-1927
- (18) Condenser (250 mmfd.) ...30-1032
- (19) Resistor (45,000 ohms) .33-345344
- (20) Padder (Pri. 1st I. F. Trans.) ....
- (21) First I. F. Transformer 32-1928
- (22) Padder (Sec. 1st I. F. Trans.) ....
- (23) Padder (Pri. 2nd I. F. Trans.) ....
- (24) Second I. F. Transformer ..32-1929
- (25) Padder (Sec. 2nd I. F. Trans.) ....
- (26) Condenser (250 mmfd.) 30-1032
- (27) Resistor (25,000 ohms) ..33-325344
- (28) Condenser (110 mmfd.) ...30-1031
- (29) Volume Control (350,000 ohms) 33-5139
- (30) Condenser (.01 mfd.) 30-4124
- (31) Resistor (32,000 ohms) .33-332433
- (32) Resistor (20,000 ohms) ..33-320333
- (33) Condenser (.01 mfd.) 30-4124
- (34) Resistor (600 ohms) 33-1212
- (35) Resistor (1,000,000 ohms)33-510344
- (36) Resistor (250,000 ohms) 33-424344
- (37) Condenser (250 mmfd.) 30-1032
- (38) Condenser (.01 mfd.) 30-4145
- (39) Resistor (500,000 ohms) 33-449344
- (40) Resistor (250,000 ohms) 33-424344
- (41) Condenser (4,000 mmfd.) ..30-4185
- (42) Output Transformer 32-7495
- (43) Cone and Voice Coil 36-3526
- (44) Field Coil Assembly 32-9236
- (45) On and Off Switch 42-5466
- (46) Pilot Lamp 34-2040
- (47) Condenser (450 mmfd.) ..31-6065
- (48) Condenser (.25 mfd.) 30-4146
- (49) "A" Choke 32-1644
- (50) Condenser (250 mmfd.) 30-1032
- (51) Filament Choke 32-1464
- (52) Vibrator Choke 32 1966
- (53) Condenser (.5 mfd.) 30-4047
- (54) Vibrator Unit 38-5036
- (55) Condenser (.02 mfd.) 30-4039
- (56) Resistor (300 ohms) 33-3130
- (57) Resistor (200 ohms) 33-1210
- (58) Condenser (1250 mmfd.) 5886
- (59) Power Transformer 32-7482
- (60) Condenser (.01 mfd.) 30-4381
- (61) Filter Choke 32-7491
- (62) Filter Condenser (4-4 mfd.) 30-2145
- (63) Condenser (250 mmfd.) ...30-1032
- (64) "B" Choke 32-1932
- Four Hole Socket 27-6044
- Five Hole Socket 27-6035
- Six Hole Socket..........27-6036
- Seven Hole Socket 27-6037
- Distributor Resistor 4851
- Interference Condenser (.5 mfd.) 30-4007
- Dial Assembly 27-5152
- Knob (Tun and Vol.) 27-4258
- Tuning Shaft 28-8452
- Volume Shaft 28-8453
- Fuse 7227
- Fuse Insulator 27-7729
- Tee Bolt (Rec. Mtg.) 28-6161
- Nuts (Rec. Mtg.) W518A
- Speaker Mtg. Clamp 29-3131
- Speaker Cable Assembly 41-3180

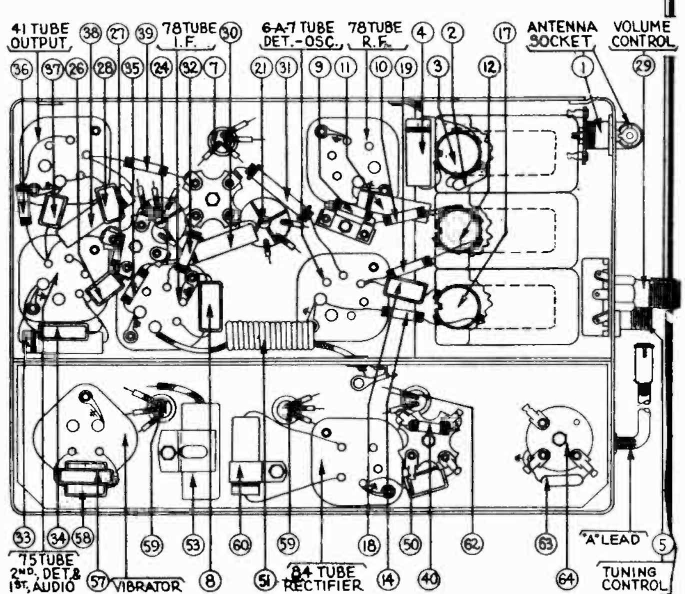


FIGURE 4 *Model NT15 Base View*

MODELS NT15,NT15X
Nash,Lafayette

PHILCO RADIO & TELEV. CORP.

Socket,Trimmers
Alignment

I. F. Transformers and Padders

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Figure 6).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure 5.

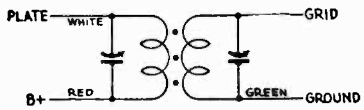


FIGURE 5

If replacements are ever necessary, replace the entire coil assembly, 32-1928 for the first I. F. stage and 32-1929 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

Model NT15 Adjustments

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments to the Model NT15 are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

General

OUTPUT METER — The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

SIGNAL GENERATOR — With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

Procedure

I. F. — Adjust the signal generator to exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser.

Adjust the secondary screw padder (25) on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (23) for maximum reading. (See Figure 6 for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser. Adjust the secondary screw padder (22) on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (20) for maximum reading. (See Figure 6 for location of padders).

HIGH FREQUENCY AND R. F. — After padding the first I. F. stage remove the generator lead from the 6A7 tube.

Adjust the signal generator to 1600 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a.1 mfd. condenser.

Turn the tuning condenser plates out of mesh as far as they will go. With the tuning condenser in this position, adjust the high frequency padder (16) and the R. F. padder (13) until the maximum reading is obtained on the output meter. This is the true setting for 1600 K. C., 160 on the dial scale.

LOW FREQUENCY — Turn the tuning condenser plates in mesh to approximately 580 K. C., 58 on the dial scale and adjust the signal generator to the 580 K. C. Roll the tuning condenser and adjust the low frequency padder screw (15) for maximum reading on the output meter.

HIGH FREQUENCY RE-ADJUSTMENT — Turn the tuning condenser plates out of mesh as far as they will go and adjust the signal generator to 1600 K. C. Then adjust the high frequency padder (16) again for maximum reading on the output meter.

ANTENNA — Connect the generator lead to the antenna cable assembly (made up of Part No. L1915 loom, 1-27-7133 terminal and 40 inches of 16 strand No. 30 wire), using a 200 mmfd. condenser in series between the two leads. Plug the cable into the antenna socket.

Turn the tuning condenser to 1400 K. C. and set the generator for 1400 K. C. Adjust the padders (13) and (6) for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. The signal generator output lead should be connected to a wire placed near the car antenna but not connected to it.

If this procedure has been carefully followed and an accurately calibrated oscillator or signal generator has been used, the Receiver will be adjusted properly.

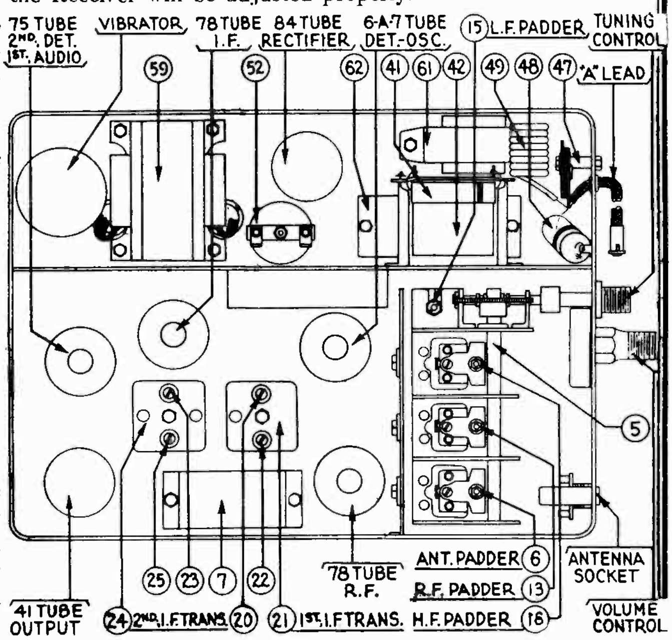


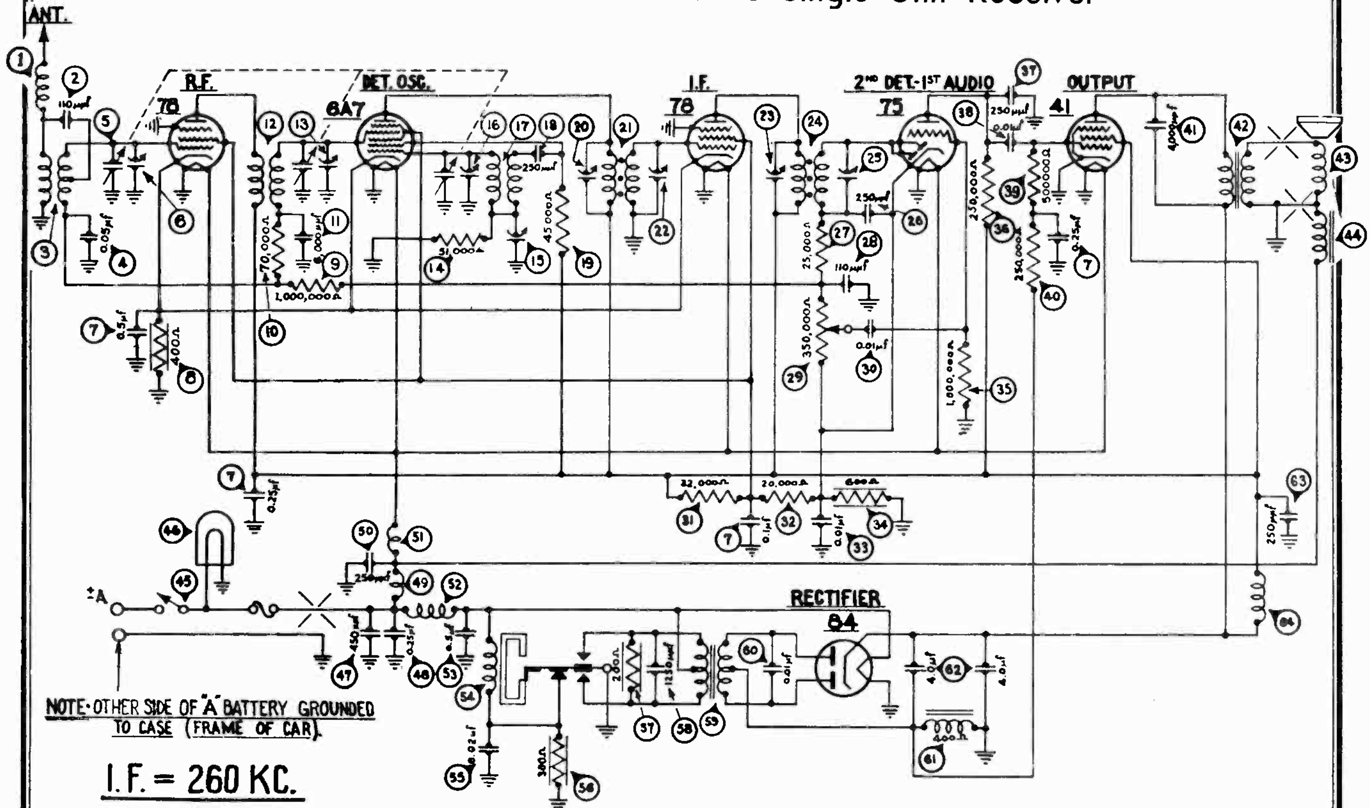
FIGURE 6

The Model NT15 Receiver (Nash — AC1989) is made for the Nash 400 and Lafayette 3610 cars using the Nash under-car Antenna.

PHILCO RADIO & TELEV. CORP.

MODEL ST15
Studebaker
Schematic, Chassis
Parts List

Studebaker-Philco Model ST15 Single Unit Receiver



December 15, 1935

Model ST15 Parts List

(1) Antenna Choke 38-7210
(2) Condenser (110 mmfd.) 30-1031
(3) Antenna Transformer 32-1934
(4) Condenser (.05 mfd.) 30-4020
(5) Tuning Condenser 31-1674
(6) First Padder (on tun. cond.) ....
(7) Condenser (.1-.25-.25-.5 mfd.) 30-4374
(8) Resistor (400 ohms) 33-1211
(9) Resistor (1,000,000 ohms)33-510344
(10) Resistor (70,000 ohms) .33-370344
(11) Condenser (6000 mmfd.) ..30-4125
(12) R. F. Transformer 32-1926
(13) Second Padder (on tun. cond.) ....
(14) Resistor (51,000 ohms) .33-351344
(15) Low Frequency Padder 31-6056
(16) Third Padder (on tun. cond.) ....
(17) Oscillator Transformer 32-1927
(18) Condenser (250 mmfd.) ...30-1032
(19) Resistor (45,000 ohms) .33-345344
(20) Padder (Pri. 1st I. F. Trans.) ....
(21) First I. F. Transformer 32-1928
(22) Padder (Sec. 1st I. F. Trans.) ....
(23) Padder (Pri. 2nd I. F. Trans.) ....
(24) Second I. F. Transformer ..32-1929
(25) Padder (Sec. 2nd I. F. Trans.) ....
(26) Condenser (250 mmfd.) 30-1032
(27) Resistor (25,000 ohms) ..33-325344
(28) Condenser (110 mmfd.) ...30-1031
(29) Volume Control (350,000 ohms) 33-5139
(30) Condenser (.01 mfd.) 30-4124
(31) Resistor (32,000 ohms) .33-332433
(32) Resistor (20,000 ohms) ..33-320333
(33) Condenser (.01 mfd.) 30-4124
(34) Resistor (600 ohms) 33-1212
(35) Resistor (1,000,000 ohms)33-510344
(36) Resistor (250,000 ohms) 33-424344
(37) Condenser (250 mmfd.) 30-1032
(38) Condenser (.01 mfd.) 30-4145
(39) Resistor (500,000 ohms) 33-449344
(40) Resistor (250,000 ohms) 33-424344
(41) Condenser (4,000 mmfd.) ..30-4185
(42) Output Transformer 32-7495
(43) Cone and Voice Coil 36-3526
(44) Field Coil Assembly 32-9236
(45) On and Off Switch 42-1157
(46) Pilot Lamp 34-2039
(47) Condenser (450 mmfd.) ..31-6065
(48) Condenser (.25 mfd.) 30-4146
(49) "A" Choke 32-1644
(50) Condenser (250 mmfd.) 30-1032
(51) Filament Choke 32-1464
(52) Vibrator Choke 32-1968
(53) Condenser (.5 mfd.) 30-4047
(54) Vibrator Unit 38-5036
(55) Condenser (.02 mfd.) 30-4039
(56) Resistor (300 ohms) 33-3130
(57) Resistor (200 ohms) 33-1210
(58) Condenser (1250 mmfd.) 5886
(59) Power Transformer 32-7482
(60) Condenser (.01 mfd.) 30-4381
(61) Filter Choke 32-7491
(62) Filter Condenser (4-4 mfd.) 30-2145
(63) Condenser (250 mmfd.) ...30-1032
(64) "B" Choke 32-1932
Four Hole Socket 27-6044
Five Hole Socket 27-6035
Six Hole Socket..........27-6036
Seven Hole Socket 27-6037
Distributor Resistor 4851
Interference Condenser (.5 mfd.) 30-4007
Clamp (Cont. Mtg.) 29-3463
Dial Assembly (Dictator) ..42-5445
Dial Assembly (President) .42-5449
Knob (Tun. & Vol.) 27-4254
Pointer (Dictator) 28-3461
Pointer (President) 28-3462
Tuning Shaft 28-8442
Volume Shaft 28-8443
Fuse 7227
Fuse Insulator 27-7729

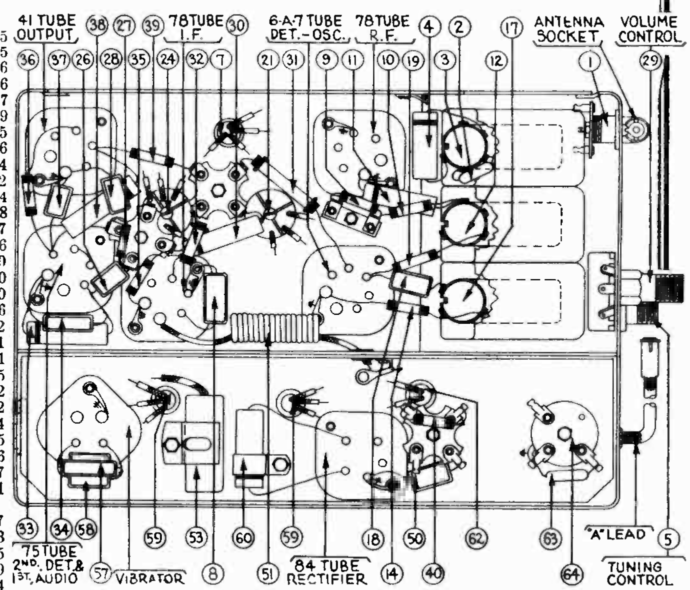


FIGURE 4 — *Model ST15 Base View*

Tee Bolt (Rec. Mtg.) 28-6161
Nuts (Rec. Mtg.) W518A
Speaker Mtg. Clamp 29-3131
Speaker Cable Assembly 41-3180

MODEL ST15
Studebaker
Socket, Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

I. F. Transformers and Padders Model ST15

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Figure 6).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure 5.

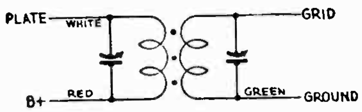


FIGURE 5

If replacements are ever necessary, replace the entire coil assembly, 32-1928 for the first I. F. stage and 32-1929 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

Model ST15 Adjustments

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments to the Model ST15 are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

General

OUTPUT METER — The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

SIGNAL GENERATOR — With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

Procedure

I. F. — Adjust the signal generator to exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser.

Adjust the secondary screw padder (25) on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (23) for maximum reading. (See Figure 6 for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser. adjust the secondary screw padder (22) on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (20) for maximum reading. (See Figure 6 for location of padders).

HIGH FREQUENCY AND R. F. — After padding the first I. F. stage remove the generator lead from the 6A7 tube.

Adjust the signal generator to 1600 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser.

Turn the tuning condenser plates out of mesh as far as they will go. With the tuning condenser in this position, adjust the high frequency padder (16) and the R. F. padder (13) until the maximum reading is obtained on the output meter. This is the true setting for 1600 K. C., 160 on the dial scale.

LOW FREQUENCY — Turn the tuning condenser plates in mesh to approximately 580 K. C., 58 on the dial scale and adjust the signal generator to the 580 K. C. Roll the tuning condenser and adjust the low frequency padder screw (15) for maximum reading on the output meter.

HIGH FREQUENCY RE-ADJUSTMENT — Turn the tuning condenser plates out of mesh as far as they will go and adjust the signal generator to 1600 K. C. Then adjust the high frequency padder (16) again for maximum reading on the output meter.

ANTENNA — Connect the generator lead to the antenna cable assembly (made up of Part No. L1915 loom, 1-27-7133 terminal and 40 inches of 16 strand No. 30 wire), using a 200 mmfd. condenser in series between the two leads. Plug the cable into the antenna socket.

Turn the tuning condenser to 1400 K. C. and set the generator for 1400 K. C. Adjust the padders (13) and (6) for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. The signal generator output lead should be connected to a wire placed near the car antenna but not connected to it.

If this procedure has been carefully followed and an accurately calibrated oscillator or signal generator has been used, the Receiver will be adjusted properly.

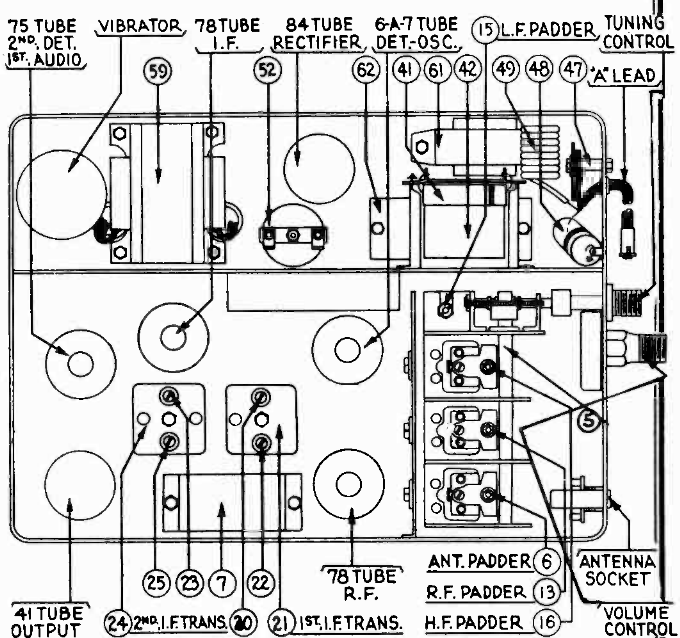


FIGURE 6

PHILCO RADIO & TELEV. CORP.

MODEL 37-33
Schematic
Trimmers, Parts

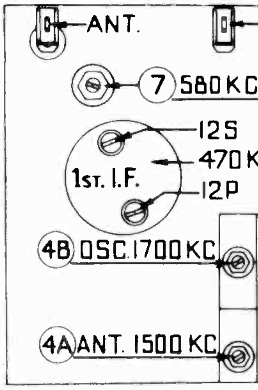


Fig. 2.—Locations of Compensators

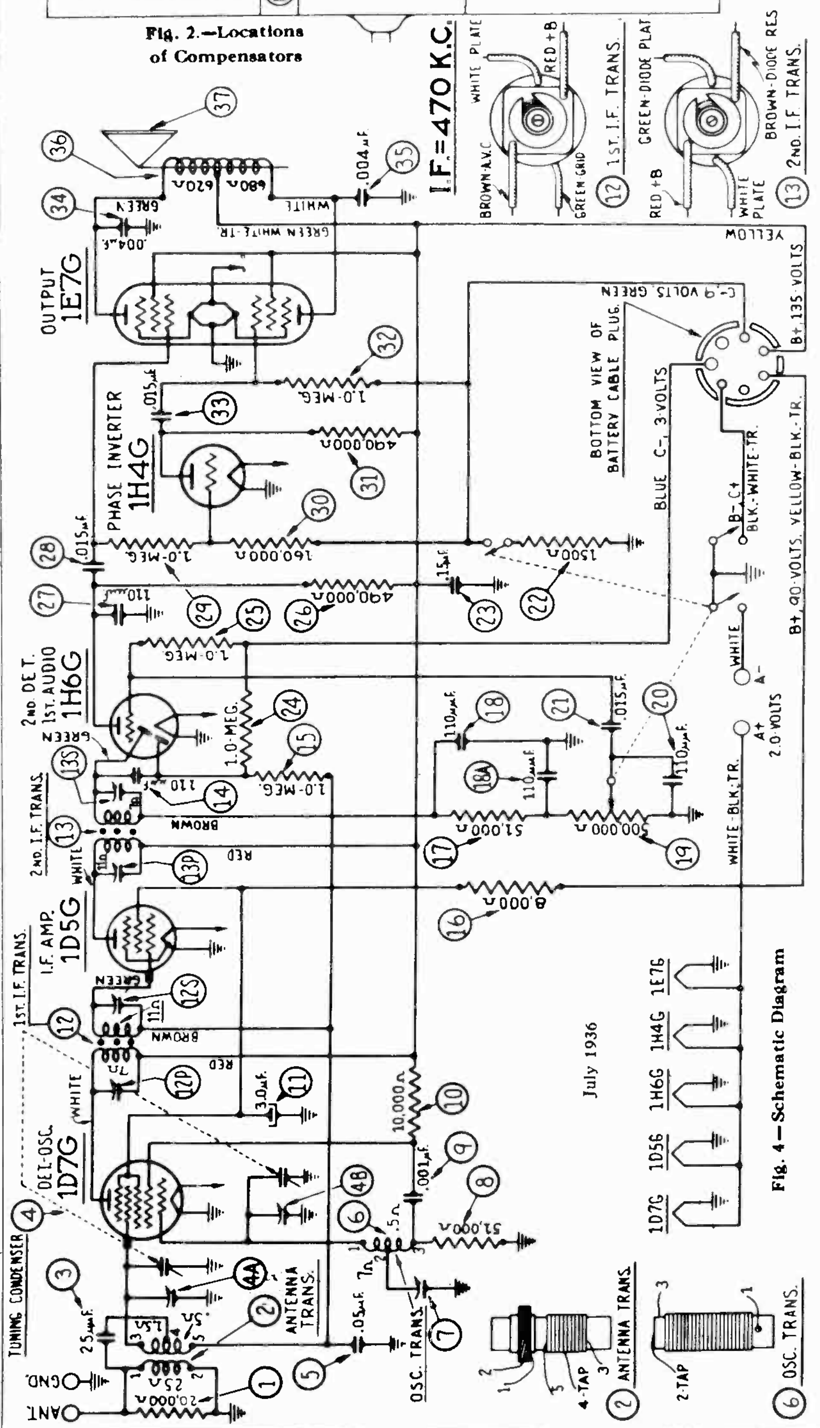


Fig. 4—Schematic Diagram

Replacement Parts

Schem. No.	Description	Part No.	List Price
1	Resistor (20,000 ohm, ½ watt)	33-320339	$0.20
2	Transformer, Antenna	32-2212	1.20
3	Condenser (25 mmfd., mica)	30-1067	.20
4	Tuning Condenser	31-1902	3.00
5	Condenser, Tubular (.05 mfd.)	30-4444	.20
6	Oscillator Transformer	32-2213	.55
7	Compensator (580 K.C.)	04000S	.35
8	Resistor (51,000 ohms)	33-351339	.20
9	Condenser (.001 mfd., tubular)	30-4201	.20
10	Resistor (10,000 ohm, ½ watt)	33-310339	.20
11	Electrolytic Condenser (3 mfd.)	30-2158	.90
12	1st I. F. Transformer	32-2100	1.50
13	2d I. F. Transformer	32-2102	1.50
14	Condenser (110 mmfd., mica)	30-1031	.20
15	Resistor (1 megohm, ½ watt)	33-510339	.20
16	Resistor (8,000 ohm, ½ watt)	33-280339	.20
17	Resistor (51,000 ohm, ½ watt)	33-351339	.20
18	Condenser (110 mmfd., double bakelite)	8035DG	.25
19	Volume Control & Power Switch	33-5169	1.45
20	Condenser (110 mmfd., mica)	30-1031	.20
21	Condenser (.015 mfd.)	3793SU	.35
22	Resistor (1,500 ohm, ½ watt)	33-215339	.20
23	Condenser (.15 mfd., tubular)	30-4191	.25
24	Resistor (1 megohm, ½ watt)	33-510339	.20
25	Resistor (1 megohm, ½ watt)	33-510339	.20
26	Resistor (490,000 ohm, ½ watt)	33-449339	.20
27	Condenser (110 mmfd., mica)	30-1031	$0.20
28	Condenser (.015 mfd., bakelite)	3793SU	.35
29	Resistor (1 megohm, ½ watt)	33-510339	.20
30	Resistor (160,000 ohm, ½ watt)	33-416339	.20
31	Resistor (490,000 ohm, ½ watt)	33-449339	.20
32	Resistor (1 megohm, ½ watt)	33-510339	.20
33	Condenser (.015 mfd., bakelite)	3793SU	.35
34	Condenser (.004 mfd., tubular)	30-4185	.25
35	Condenser (.004 mfd., tubular)	30-4185	.25
36	Speaker L2B, B and F Cabinets	36-1256	6.50
37	Cone Assembly	45-2315	
	Dial	27-5243	.15
	Pointer	27-7933	.01
	Felt Washer	27-7807	.50 C
	Knob Assembly	27-4282	.10
	Vernier Drive	31-1925	
	Pilot Lamp	5316	.23
	Pilot Lamp Assembly	38-7964	.45
	Cable Assembly	41-3203	1.40
	Clamp	28-2345	.60 C
	Terminal Panel R.F.	38-7963	.05
	Spacers	28-4001	.25 C
	Washers	W-442	.20 C
	Mounting Plate (Coil)	28-3808	.02
	Spacer	27-8228	.01
	Screw	W-1635	.30 C
	Socket—7 prong	27-6057	$0.11
	Socket—8 prong	27-6058	.11
	Shield Base	28-3898	.03
	Shield	28-2726	.10
	Fahnstock Clip	L-1126	1.25 C
	Washer	4243	.01
	Washer	27-7414	.70 C
	Lugs	L-1125	.75 C
	B Battery	41-8007	
	A Battery (Wet)	172R	
	A Battery (Dry)	41-8011	
	Ballast Lamp	1Y1	
	Mounting Screw (Chassis)	W-567	3.00 C
	Mounting Washer (Chassis)	W-315	.50 C
	Mounting Nut (Chassis)	W-124	.35 C
	Mounting Bolt (Speaker)	W-1604	.50 C
	Nut (Speaker)	W-124	.35 C

B CABINET

	Baffle Silk Assembly	40-5988	.30

F CABINET

	Baffle Silk Assembly	40-5933	.75
	Bottom Shield	27-8440	.02

Figures in black type indicate circled figures in base view.

Prices Subject to Change Without Notice

MODEL 808
Chassis

PHILCO RADIO & TELEV. CORP.

MODEL 37-33
Socket, Chassis
Alignment, Voltage

Electrical Specifications

Type Circuit: Superheterodyne, with push-pull pentode audio output, battery operated.

Batteries Required:

"A" supply— **Philco 172R** 2 volt storage battery or a dry A battery **Philco Part No. 41-8011.** If a dry A supply is used, a ballast lamp (**Philco Part No. 1Y1**) **must** be inserted in the socket provided in the dry A battery **Part No. 41-8011.** This lamp acts as a voltage regulator, and maintains a constant potential of two volts on the filaments of the receiver tubes.

"BC" supply—Philco battery Part No. 41-8007 is used to supply B and C voltages. This battery contains a socket into which the receiver battery cable plug is inserted.

Current Drain: A Battery, 540MA. B Battery, 13MA.

Philco Tubes Used: 1D7G, Detector Oscillator; 1D5G, I.F. Amplifier; 1H6G, 2nd Detector, 1st audio; 1H4G, Phase inverter; and 1E7G, Output.

Frequency Range: 530-1720 K.C.

Intermediate Frequency: 470 K.C.

Speaker: Permanent Magnet Model L2B.

Aligning Compensators

To accurately adjust this receiver precision test equipment is necessary. A signal generator such as the **Philco Model 088,** covering from 110 to 20,000 K.C. is recommended for adjusting the various compensators at the frequencies specified. A visual indication of the receiver output is also necessary. **Philco Model 025 Circuit Tester** contains a sensitive output meter and is recommended for this purpose.

Philco fibre handle screw-driver **No. 27-7059** and wrench **Part No. 3164** complete the equipment necessary for the following adjustments. The locations of the various compensators are shown in Fig. (2).

OUTPUT METER—The 025 Output Meter is connected between one of the plate contacts of the 1E7G tube and ground. Adjust the meter to use the (0-30) volt scale.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1. Connect the 088 Signal Generator output lead through a .1 mfd. condenser to the control grid of the 1C7G tube; and the ground connection of the output lead to the chassis. Then turn the tuning condenser to approximately 580 K.C. and adjust the signal generator for 470 K.C.

2. Now adjust compensators (18)s, 2nd I. F. Sec., (19)p 2nd I. F. Pri., (12)s 1st I. F. Sec., and (13)p 1st I. F. Pri. for maximum output.

RADIO FREQUENCY CIRCUIT

530 to 1720 K.C.

1. Remove the signal generator output lead from the 1C7G tube and connect it through a 200 mmfd. condenser to the antenna post of the receiver, and the generator ground lead to the chassis.

2. Turn signal generator to 1700 K.C. Rotate receiver tuning condenser to minimum capacity position (clockwise); then place a 006" gauge between the rotor and stator plates (left side of tuning condenser facing front of receiver), and turn condenser until rotor and stator gauge touch gauge. *Now remove gauge without disturbing setting of the plates. Compensators (6)b Osc. and (4)a Ant. are then adjusted for maximum output.

3. Turn signal generator and receiver dials to 580 K.C. and adjust compensator (7) as follows:

First tune compensator (7) for maximum output. Then vary the tuning condenser for maximum output. Now retune compensator (7) and again vary the tuning condenser back and forth about 580 K.C. for maximum output. This operation of first tuning the compensator, then the tuning condenser is continued until maximum output is obtained at the 580 K.C. frequency.

4. Readjust the 1700 K.C. end of dial as given in paragraph 2 above.

5. Then turn signal generator and receiver dials to 1500 K.C. and adjust compensator (4)a Ant. for maximum output.

DIAL CALIBRATION—After the above adjustments have been performed, the dial pointer is adjusted to track properly with the tuning condenser. To do this turn signal generator to 1000 K.C. and tune the receiver tuning condenser for maximum output at this frequency. When maximum output is obtained dial pointer is adjusted to the 1000 K.C. mark on dial.

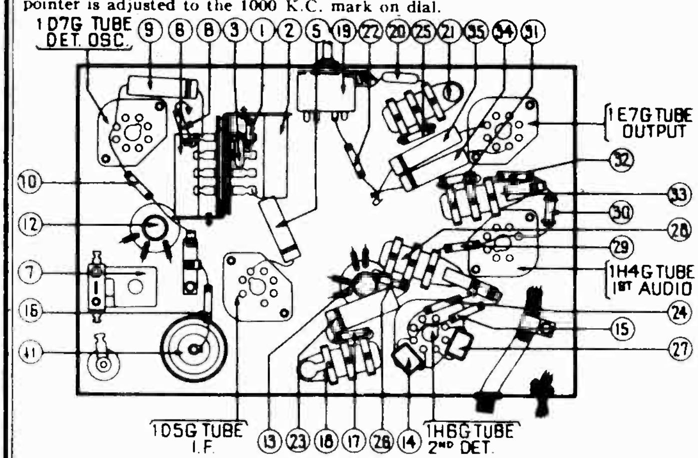
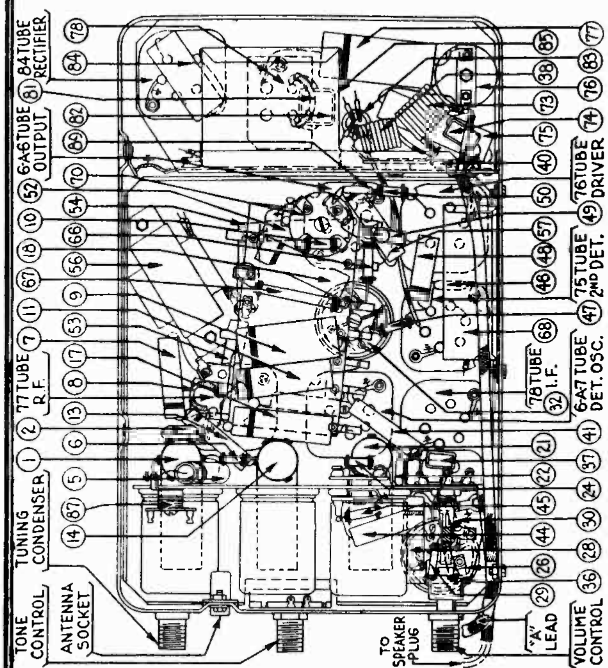


Fig. 3.—Parts Location. Underside of Chassis View

MODEL 808

Bottom view of chassis.



MODEL 808 Chassis

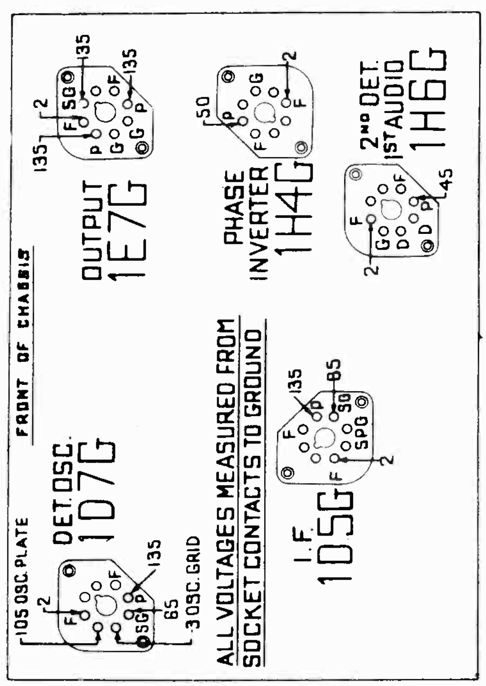


Fig. 1.—View of Sockets from Underside Chassis

The voltages indicated by arrows were measured with a **Philco 25 Circuit Tester** which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum.

MODEL 37-38
Schematic
Parts, Coils

PHILCO RADIO & TELEV. CORP.

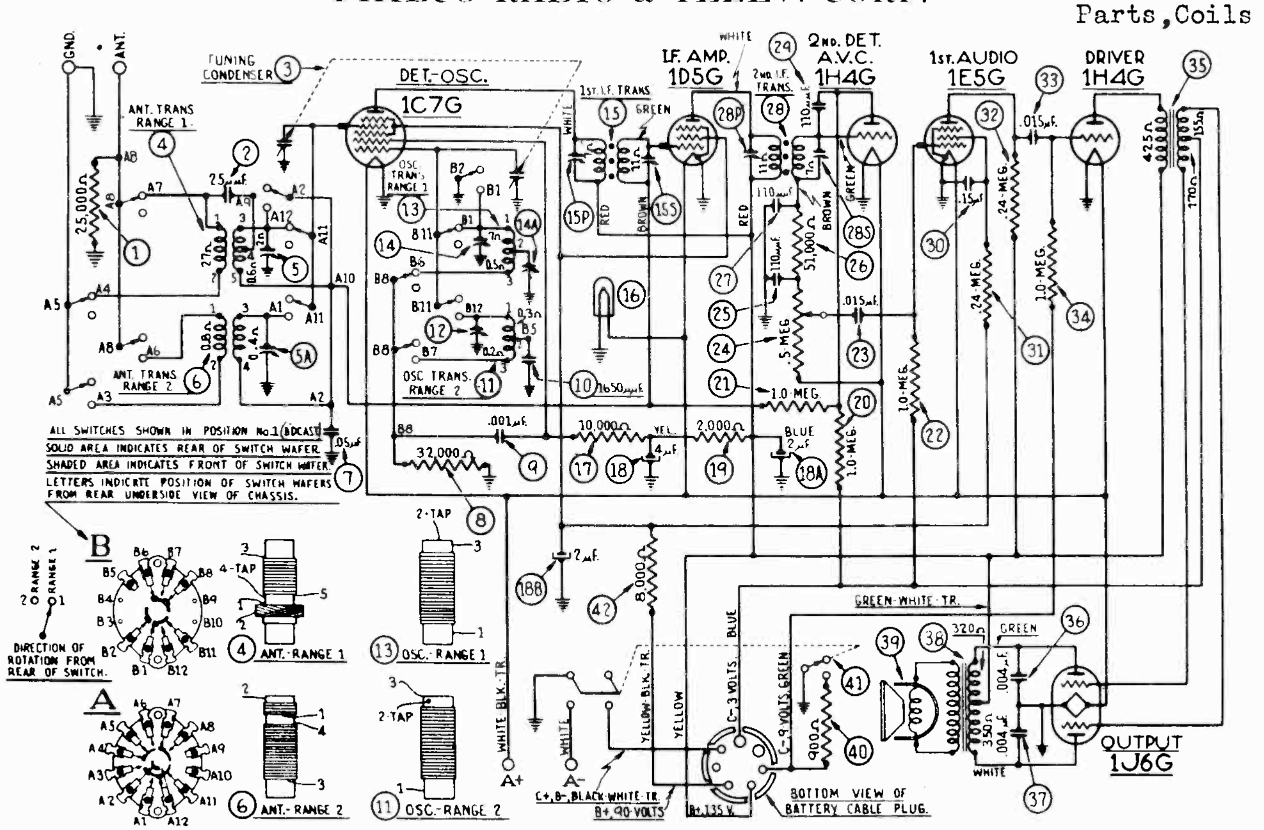
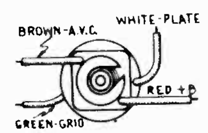
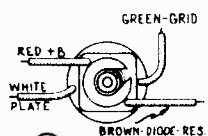


Fig. 5—Schematic Diagram—Model 37-38

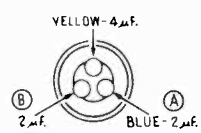
July 1936



(15) 1ST. I.F. TRANS.



(28) 2ND I.F. TRANS.



(18) ELECTROLYTIC COND.

Replacement Parts—Model 37-38

Schem. No.	Description	Part No.	List Price
1	Resistor (25,000 ohm, ½ watt)	33-325339	$0.20
2	Condenser (25 mmfd. mica)	30-1067	.20
3	Tuning Condenser	31-1826	3.00
4	Antenna Transformer (Broadcast)	32-2159	1.20
5	Compensator (Twin)	31-6120	.50
6	Antenna Transformer (Police)	32-2246	.80
7	Condenser (.05 mfd. tubular)	30-4444	.20
8	Resistor (32,000 ohm, ½ watt)	33-332339	.20
9	Condenser (.001 mfd. tubular)	30-4453	.20
10	Condenser (1650 mmfd. semi-fixed)	31-6096	.40
11	Oscillator Transformer (Police)	32-2121	.40
12	Compensator (Single)	31-6101	.20
13	Oscillator Transformer (Broadcast)	32-2120	.65
14	Compensator (Twin)	31-6100	.40
15	1st I.F. Transformer	32-2100	1.50
16	Pilot Lamp	34-2150	.26
17	Resistor (10,000 ohm, ½ watt)	33-310339	.20
18	Electrolytic Condenser (4-2-2 mfd.)	30-2162	1.40
19	Resistor (2,000 ohm, ½ watt)	33-220339	.20
20	Resistor (1 megohm, ½ watt)	33-510339	.20
21	Resistor (1 megohm, ½ watt)	33-510339	.20
22	Resistor (1 megohm, ½ watt)	33-510339	.20
23	Condenser (.015 mfd. tubular)	30-4358	.20
24	Volume Control	33-5165	1.00
25	Condenser (110 mmfd. mica)	30-1031	.20

Schem. No.	Description	Part No.	List Price
26	Resistor (51,000 ohm, ½ watt)	33-351339	$0.20
27	Condenser (110 mmfd., mica)	30-1031	.20
28	2d I.F. Transformer	32-2102	1.50
29	Condenser (110 mmfd., mica)	30-1031	.20
30	Condenser (.15 mfd. bakelite)	6287SG	.35
31	Resistor (240,000 ohm, ½ watt)	33-424339	.20
32	Resistor (240,000 ohm, ½ watt)	33-424339	.20
33	Condenser (.015 mfd. tubular)	30-4226	.20
34	Resistor (1 megohm, ½ watt)	33-510339	.20
35	Audio Transformer (Interstage)	32-7637	2.00
36	Condenser (.004 mfd. tubular)	30-4456	.20
37	Condenser (.004 mfd. tubular)	30-4456	.20
38	Output Transformer—KR17, HR12	32-7639	1.60
39	Cone Voice Coil—KR17	36-3540	.80
	Cone Voice Coil—HR12	36-3557	1.20
40	Resistor (900 ohm, ½ watt)	33-1223	.20
41	Power Switch	33-5170	1.20
42	Resistor (8,000 ohms, ½ watt)	33-280339	.20
	Range Switch	42-1195	
	Screen Bracket Assembly	31-1878	.25
	Dial	27-5196	.45
	Hub	28-7152	.10
	Clamp	28-2837	.10
	Set Screw	W-1506	2.00 C
	Pilot Lamp Assembly	38-7875	

Description	Part No.	List Price
Pilot Lamp	34-2150	
Vernier Drive	31-1863	.35
Socket—8 prong	27-6058	$0.11
Socket—7 prong	27-6057	.11
Tube Shield	28-2726	.10
Tube Shield Base	28-3898	.03
Volume Control Shaft	38-8058	
Shaft Spring	28-4117	.40 C
Shaft Retaining Clip	28-4394	.01
Mounting Grommet R.F. Unit	27-4317	.04
Mounting Sleeve	28-2257	.01
Washer	W-425	.85 C
Screw	W-729	.45 C
Washer	28-3927	.01
Terminal Panel (I.F. Unit)	38-7703	.25
Spacer	28-4001	.25 C
Cable Assembly (Battery)	41-3198	1.40
A Battery, Wet	172R	
A Battery, Dry	41-8011	
B Battery	41-8007	
Cable (Speaker)	41-3207	.30
Knob, Tuning	27-4321	.10
Knob, Tone and Volume	27-4332	.10
Speaker, KR-17, B. and F. Cabinets	36-1248	10.00
Speaker, HR-12, J. Cabinet	36-1250	11.00

Figures in black type indicate circled figures in Base View.

Prices Subject to Change without Notice.

MODEL 37-38
Socket, Trimmers
Voltage, Alignment

PHILCO RADIO & TELEV. CORP.

Electrical Specifications

Type Circuit: Superheterodyne, with class "B" audio output, battery operated.

Batteries Required:

"A" supply—**Philco 172R** 2 volt storage battery or a dry A battery Philco Part No. 41-8011. If a dry A supply is used, a ballast lamp Philco type **1F1 must** be inserted in the socket provided in the dry A battery (Part 41-8011). This small lamp acts as a voltage regulator, and maintains a constant potential of two volts on the filaments of the receiver tubes.

"BC" supply—Philco battery Part No. 41-8007 is used to supply B and C voltages. This battery contains a socket into which the receiver battery cable plug is inserted.

Current Drain: A Battery, 720 M. A.; B Battery, 20 M. A.

Philco Tubes Used: 1C7G, Detector Oscillator; 1D5G, I.F. Amplifier; 1H4G, 2nd Detector, A.V.C.; 1E5G, 1st Audio; 1H4G, Driver; 1J6G, Output.

Frequency Range: Range 1, 530-1720 K. C.; Range 2, 2.3-7.4 M. C.

Intermediate Frequency: 470 K. C.

Speaker: KR-17—B, F Cabinets; HR-12—J Cabinet.

Alignment of Compensators

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 Signal Generator, covering from 110 to 20,000 K. C. is recommended for use in adjusting the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 Circuit Tester contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Wrench No. 3164 and Fibre Handle Screw-Driver No. 27-7059 complete the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 2 and 3.

The following procedure must be observed in adjusting the compensators:—

DIAL ADJUSTMENT—The tuning condenser is set at the maximum capacity position, by turning the tuning knob clockwise. Loosen the set screw of dial hub and set dial, with Glowing Indicator centered between the first and second index lines at the low frequency end of scale.

OUTPUT METER—The 025 Output Meter is connected between one of the plate prongs of the 1J6G tube and the chassis. Then adjust the meter to use the (0-30) volt scale.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1. Connect the 088 Signal Generator output lead through a .1 mfd. condenser, to the control grid of the 1C7G tube, and the generator ground lead to the chassis.

2. Set the range switch in position No. 1 (Broadcast), then rotate the tuning condenser of the receiver to the maximum capacity position (clockwise) and adjust the signal generator for 470 K. C. Now adjust compensators (28s) 2nd I.F. Sec., (28p) 2nd I.F. Pri., (15s) 1st I.F. Sec. and (15p) 1st I.F. Pri. for maximum output.

RADIO FREQUENCY CIRCUIT

Tuning Range 2.3 M. C. to 7.4 M. C.

1. Remove the signal generator output lead from the grid of the 1C7G tube and connect it through a 200 mmf Condenser to the antenna terminal on input panel (rear of chassis), and the generator ground lead to the ground terminal of this panel.

2. Set the range switch in position No. 2. Turn the receiver and signal generator dials to 7.0 M. C. Now adjust compensator (12) for maximum output.

3. Turn signal generator and receiver dials to 6.0 M. C. and adjust compensator (5)a for maximum output.

Tuning Range 530 to 1720 K. C.

1. Set range switch in position No. (1) (Broadcast). Turn signal generator and receiver dials to 1600 K. C. Then adjust (14) Osc. "Screw", and (5) antenna for maximum output.

2. Turn signal generator and receiver dials to 580 K. C. and adjust compensator (14a) Osc., "nut"—see Fig. 3—as follows: To adjust compensator (14a) the tuning condenser must be rolled for maximum output, thusly: First turn the compensator (14a) for maximum output. Then vary the tuning condenser for maximum output about 580 K. C. Now retune compensator (14a) and again vary the tuning condenser back and forth about the 580 K. C. dial mark for maximum output.

This operation of first tuning the compensator, then the tuning condenser is continued until maximum output is obtained at the 580 K. C. dial mark. If the signal generator is not accurately calibrated the maximum point on the dial of the receiver may fall slightly above or below the 580 K. C. dial mark.

3. Turn signal generator and receiver dials to 1600 K. C. and readjust compensator (14) Osc. "screw" for maximum output.

4. Turn signal generator and receiver dials to 1500 K. C. and readjust compensator (5) for maximum output.

SOCKET VOLTAGES

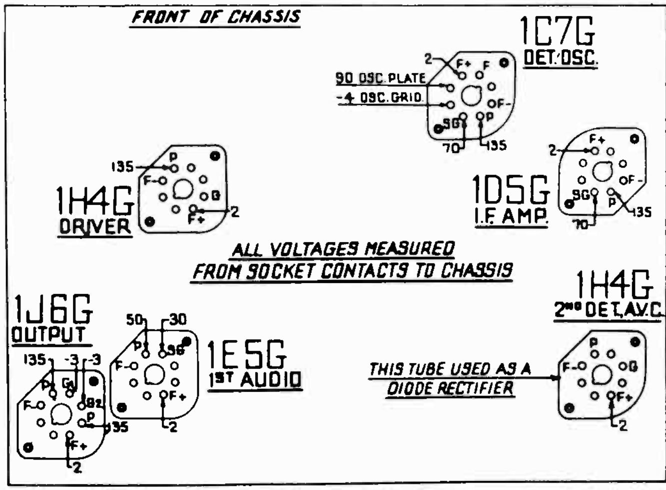


Fig. 1—Socket Voltages—Underside of Chassis View

The voltages indicated by arrows were measured with a **Philco 025 Circuit Tester** which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position.

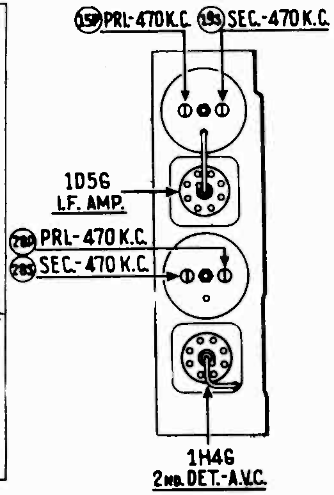


Fig. 2—I.F. Compensators Top of Chassis

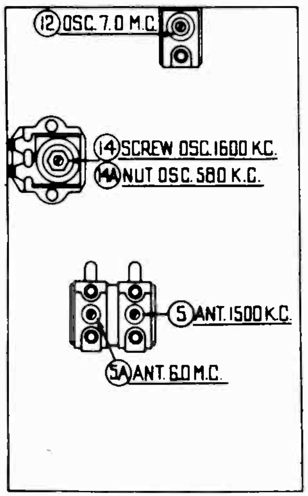


Fig. 3—R.F. Compensators Underside of Chassis

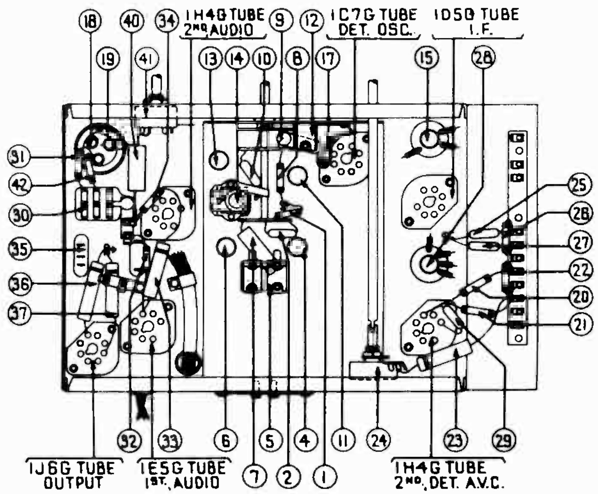


Fig. 4—View of Parts from Underside of Chassis

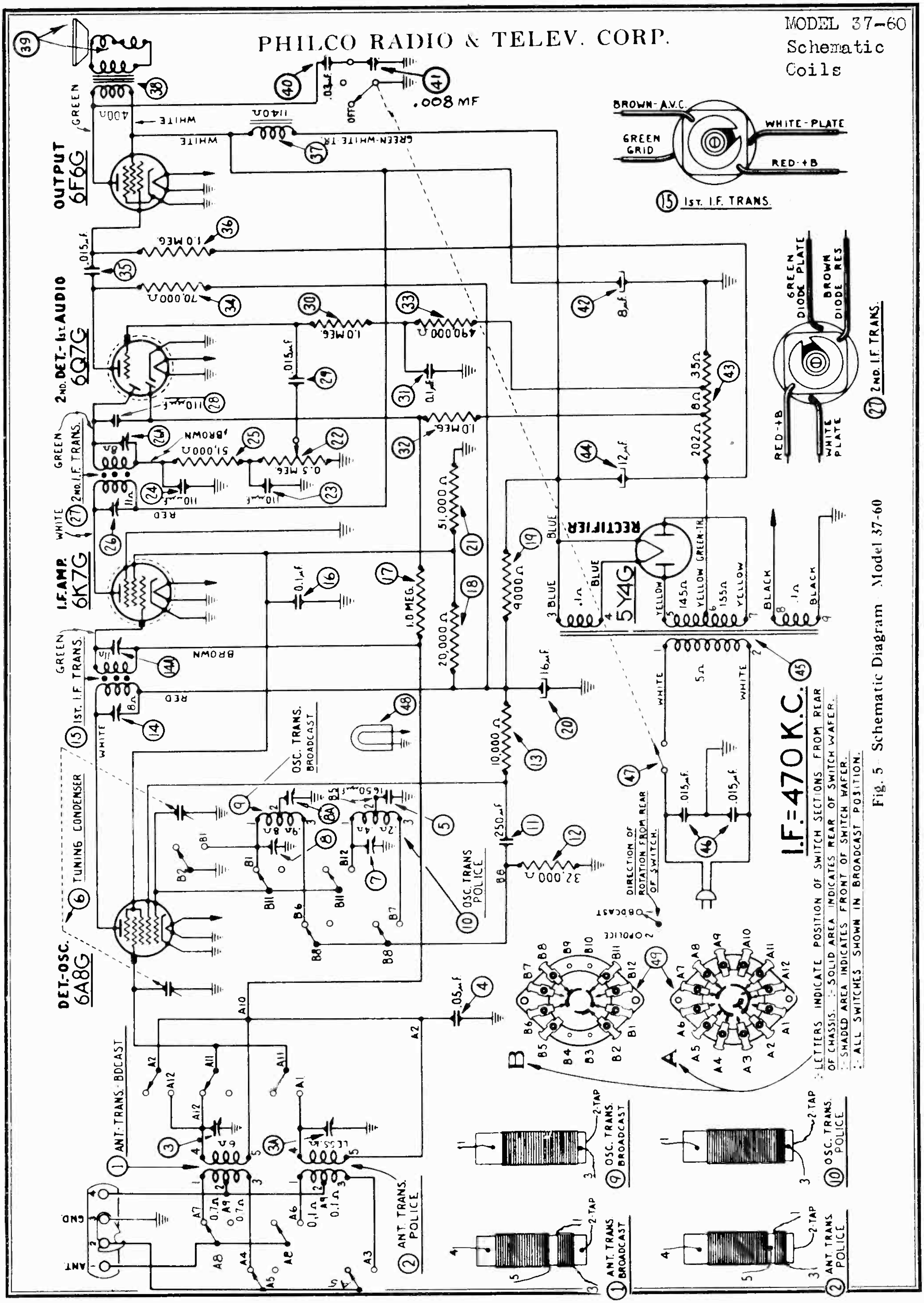


Fig. 5 Schematic Diagram Model 37-60

MODEL 37-60
Voltage, Socket
Circuit Data,
Transformer Data

PHILCO RADIO & TELEV. CORP.

Model 37-60

General Description

Model 37-60 is a 5 tube superheterodyne receiver for operation on alternating current and has two tuning ranges, covering Standard Broadcast and American short-wave reception up to 7 megacycles. The new Philco High Efficiency self-centering glass tubes are used.

The circuit incorporates the Philco Aerial Tuning System—controlled by the range switch—which provides maximum sensitivity and noise reduction when used with the Philco All Wave Aerial.

The red and black leads of the All Wave Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided at the rear of the chassis. Connect the jumper of the terminal panel across terminals 3 and 4.

If a temporary aerial is used, the jumper should be across terminal 2 and 3. The aerial connects to terminal 1 and the ground to terminals 3. A good ground connection is required in all installations.

CONSTRUCTION

The chassis is constructed in three basic assembly units.

The Radio Frequency unit contains a 6A8G tube which functions as a Detector-Oscillator, tuning condenser, antenna and oscillator coils for each tuning range, selector switch—compensating condensers for all coils and other parts necessary for the associated circuits. The unit is separately mounted on rubber grommets, cushioning it from the main chassis.

The Intermediate Frequency unit, mounted on the right-hand side of the chassis (facing the front) consists of the Intermediate Frequency coils compensating condensers, a 6K7G tube for I. F. Amplifier stage, and a 6Q7G tube as the second detector-automatic volume control and first audio stage.

All voltages supplied to the I. F. and R. F. units are furnished from a terminal strip mounted in this unit.

The Power Pack and audio output circuits, together with the required Voltage dividers and filter condensers are mounted in the power unit. All high Voltage A. C. Wiring is housed in the power transformer assembly which includes the rectifier socket.

Although unit construction has changed the appearance of this model, the service bulletin will be of great assistance in checking through all stages of the receiver. The Wiring Diagram, as usual, is numbered, indicating all important parts. These numbers correspond with the parts layout shown in Fig. 6. In addition, the range switch wafers are shown on the schematic diagram. The contacts on each wafer are lettered and numbered to indicate their connection points in the schematic diagram, which are also lettered and numbered. The physical drawings of each coil used in the receiver are also shown on schematic diagram Fig. 5. The connections of these coils are numbered on the coil itself and on the schematic diagram.

Fig. 1 shows the Voltage measurements taken from the bottom of the socket at each contact. In Fig. 2, the correct position of the dial indicator, for proper adjustment of the compensators is shown. Figs. 3 and 4, are the location of the I. F. and R. F. compensators respectively.

This Receiver is supplied in two models, type B and type F. These instructions, however, are used for both types.

Electrical Specifications

Voltage Rating) 115 Volts. A. C.
Frequency Rating: 50-60 Cycle.
For 25-40 cycle operation use Power Transformer, marked with asterisks in Parts List.
Power Consumption: 60 Watts.
Type and Number of Philco Tubes: 1 type 6A8G First Detector-oscillator; 1 type 6K7G I. F. Amplifier; 1 type 6Q7G 2nd Detector, A. V. C., and 1st Audio; 1 type 6F6G Pentode Output and 1 type 5Y4G, Rectifier.
Speaker: S7.
Type of Circuit: Superheterodyne with Pentode Power Output.
Intermediate Frequency: 470 K. C.
Undistorted Power Output: 3 Watts.
Tuning Ranges: Two—(1): 530 to 1720 K.C., (2): 2.3 to 7.4 M.C.

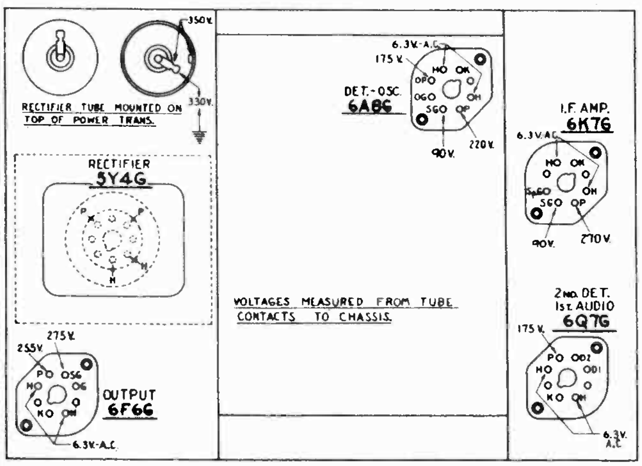


Fig. 1—Socket Voltages Viewed from Underside of Chassis
Measurements taken with Philco Model 025 Circuit Tester which contains a 1000 ohm per volt voltmeter. Line voltage, 115—Wave Switch in Broadcast Position. Dial turned to 600 KC.

POWER TRANSFORMER DATA

Lead No. Shown on Schematic	A. C. Volts	Current	Circuit	Color	Resistance
1-2	120	—	Primary	White	50 ohms
5-7	670	70 M. A.	High Voltage Sec.	Yellow	145 ohms 155 ohms
3-4	5.0	2.0 A	Fil. Rect.	Blue	.1 ohms
8-9	6.7	2.1 A	Fil.	Black	.1 ohms
6	—	—	Center Tap of 5-7	Yellow Green Tr	—

PHILCO RADIO & TELEV. CORP.

MODEL 37-60
Trimmers
Alignment

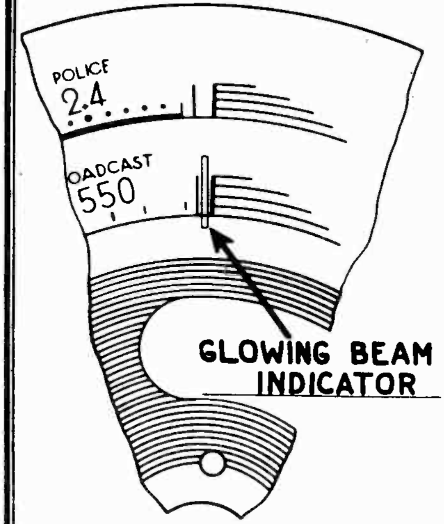


Fig. 2—Dial Calibration

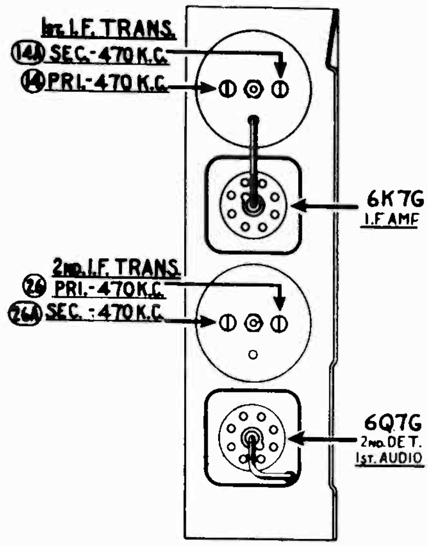


Fig. 3—Locations of I. F. Compensators Top of Chassis

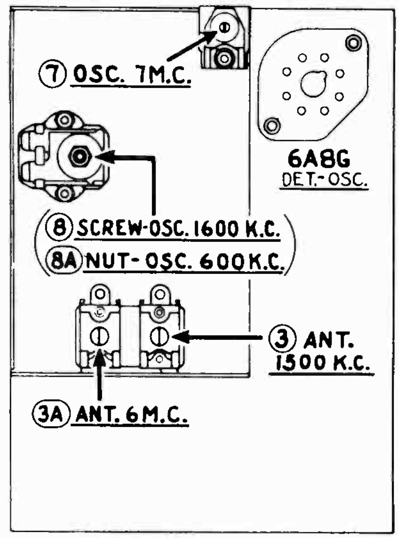


Fig. 4—Locations of R. F. Compensators Underside of Chassis

Adjustment of Compensators

The accurate adjustment of the various compensating condensers is vital to the proper functioning of this receiver. There are four compensating condensers in the I. F. Circuit, three in the Oscillator Circuit, and two in the Antenna Circuit. Incorrect adjustment will cause loss of sensitivity, unsatisfactory tone, and poor selectivity.

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 SIGNAL GENERATOR, covering from 110 to 20,000 K. C. is recommended to adjust the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 CIRCUIT TESTER contains a very sensitive output meter and is recommended for these adjustments.

Philco Fibre Wrench No. 3164 and Fibre Handle Screw-driver No. 27-7059 complete the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 3 and 4.

The following procedure must be observed in adjusting the compensators:

DIAL ADJUSTMENT—The Tuning condenser is set at the maximum capacity position, by turning the tuning knob counter-clockwise. Loosen the set screw of dial hub and set dial, (see Fig. 2) with Glowing Indicator centered between the index lines at the low frequency end of scale.

OUTPUT METER—The Output Meter is attached to the Plate and Cathode terminals of the (6F6G tube) and adjusted to use the (0-30) volt scale. When adjusting each circuit, care should be taken to have the signal generator attenuator set to give approximately ¼ scale reading on output meter.

INTERMEDIATE FREQUENCY CIRCUIT

1 Turn wave band switch to Range 1. Rotate the tuning control to approximately 600 K. C. Connect the 088 Signal Generator output lead through a .1 mfd. condenser to the grid of the 6A8G tube, and the ground lead of Signal Generator to the chassis.

2 Set Signal Generator indicator for 470 K. C., adjust attenuator for approximately ¼ scale reading on output meter. Then adjust compensators 26a 2nd I. F. Sec., 26 2nd I. F. Pri., 14a 1st I. F. Sec., 14 1st I. F. Pri., for maximum reading on output meter.

RADIO FREQUENCY CIRCUIT—Range 2: 2.3 to 7.4 M. C.

1 Turn Range switch to Range 2. Remove signal generator output lead from the grid of 6A8G tube.

2 Attach signal generator output lead through a 0.1 mfd. condenser to the ANT. TERMINAL No. 1, on aerial panel, and the generator ground to chassis. Connect TERMINAL No. 2, to GROUND TERMINAL No. 3, with connector link provided on the panel.

3 Set Signal Generator and receiver dials for 7.0 M. C. Now adjust compensator 7 for maximum reading on output meter. Then turn Signal Generator and Receiver to 6.0 M. C., and adjust compensator 3a for maximum output.

RANGE 1: 530 to 1720 K. C.

1 Turn range switch to Range 1. Turn the Receiver dial to 1600 K. C. Then adjust compensators 8 and 3 for maximum reading on output meter.

The 088 Signal Generator dial is set at 800 K. C. and the second harmonic of this frequency (1600 K. C.) is used in making the above adjustment.

2 The low frequency end of the band is now tuned by turning Signal Generator and Receiver dials to 600 K. C. and adjusting compensator 8a—see note (a) below—for maximum output.

(a) When compensator 8a osc. series is being adjusted, the Tuning Condenser must be rolled for maximum output. This is accomplished as follows: First tune compensator 8a for maximum output. Then vary the Tuning Condenser for maximum output at 600 K. C. Now retune Compensator 8a, and again vary the tuning condenser back and forth about 600 K. C., for maximum output. This operation of first tuning the Compensator, then the Tuning Condenser is continued until maximum output is obtained at the 600 K. C. frequency.

3 Set the Signal Generator and Receiver dials for 1600 K. C. and re-adjust Compensator 8 for maximum output. Then turn the dials to 1500 K. C. and re-adjust compensator 3 for maximum reading on output meter.

MODEL 37-60
Chassis
Parts

PHILCO RADIO & TELEV. CORP.

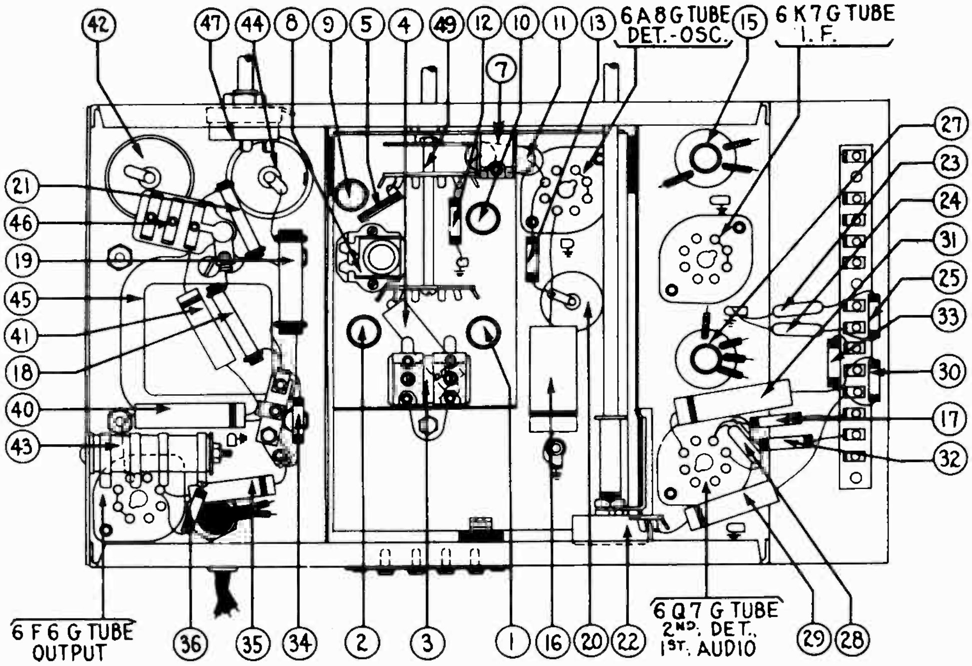


Fig. 6—Base View of Chassis

Replacement Parts—Model 37-60

Schem. No.	Description	Part No.	Price List
1	Antenna Transformer (Broadcast)	32-2108	$0.80
2	Antenna Transformer (Police)	32-2119	.65
3	Compensator ANT 1600 K.C.	31-6093	.40
3A	ANT. Compensator 6 meg.	Part of 3	
4	Condenser (.05 mfd. Tubular)	30-4444	.20
5	Condenser (1650 mfd. Semi-fixed)	31-6096	.40
6	Tuning Condenser	31-1826	3.00
7	Oscillator Compensator (Police 7 M.C.)	31-6101	.20
8	Oscillator Compensator (Broadcast) 1600 K.C. Screw	31-6100	.40
8A	Compensator (600 K.C. Nut)	Part of 8	
9	Oscillator Transformer (Broadcast)	32-2120	.65
10	Oscillator Transformer (Police)	32-2121	.40
11	Condenser (.250 mmfd. Mica)	30-1032	.25
12	Resistor (32000 ohms ½ watt)	33-332339	.20
13	Resistor (10000 ½ watt)	33-310339	.20
14	Compensator (Pri. 1st I.F.)	Part of 15	
14A	Compensator (Sec. 1st I.F.)	Part of 15	
15	1st I.F. Transformer	32-2100	1.50
16	Condenser (.1 mfd. Tubular)	30-4170	.25
17	Resistor (1 meg. ½ watt)	33-510344	.20
18	Resistor (20000 ohms 1 watt)	33-320439	.20
19	Resistor (9000 ohms 2 watts)	33-290539	.30
20	Electrolytic Condenser (16 mfd.)	30-2118	1.65
21	Resistor (51000 ohms 1 watt)	33-351439	.20
22	Volume Control	33-5157	1.00
23	Condenser (mica 110 mmfd.)	30-1031	.20
24	Condenser (mica 110 mmfd.)	30-1031	.20
25	Resistor (51000 ohms ½ watt)	33-351339	.20
26	Compensator 2nd I.F. Pri.	Part of 27	
26A	Compensator 2nd I.F. Sec.	Part of 27	
27	2nd I.F. Transformer Unit	32-2102	1.50
28	Condenser (mica 110 mmfd.)	30-1031	.20
29	Condenser (Tubular .015 mfd.)	30-4358	.20
30	Resistor (1 meg. ½ watt)	33-510339	.20
31	Condenser (Tubular .1 mfd.)	30-4122	.20
32	Resistor (1 megohm ½ watt)	33-510339	.20
33	Resistor (490000 ohm ½ watt)	33-449339	.20
34	Resistor (70000 ohm ½ watt)	33-370339	.20
35	Condenser (Tubular .015 mfd.)	30-4226	.20
36	Resistor (1 meg. ½ watt)	33-510339	.20
37	Field Coil Assembly	36-3039	2.75
38	Output Transformer	32-7019	
39	Cone & Voice Coil Assembly	36-3157	.80
40	Condenser (Tubular .03 mfd.)	30-4380	.20
41	Condenser (Tubular .008 mfd.)	30-4112	.20
42	Electrolytic Condenser (8 mfd.)	30-2024	1.10
43	Bias Resistor	33-3277	.20
44	Electrolytic Condenser (12 mfd.)	30-2117	1.20
45	Power Transformer (50-60 cycle, 115 volts)	32-7583	4.25
	*Power Transformer (25-40 cycle, 115 volts)	32-7584	
46	Condenser (Bakelite Twin .015 mfd.)	3793 DG	.40
47	Tone Control & Power Switch	42-1180	$0.75
48	Pilot Lamp	34-2039	.15
49	Wave Switch	42-1195	1.50
	Dial	27-5196	.30
	Dial Hub	28-7152 FA-3	.10
	Dial Hub Clamp	28-2837 FA-3	.10
	Set Screw	N-1506	Per C 2.00
	Screen Bracket & Screen Assembly	31-1878	.25
	Pilot Lamp Socket Assembly	38-7706	.35
	Tube Socket 7 Prong	27-6057	.11
	Tube Socket 8 Prong	27-6058	.11
	Tube Shield	28-2726	.10
	Tube Shield Base	28-3898	.03
	I. F. Coil Shield	38-7763	.20
	R.F. Trans. Mtg. Plate	28-3808	.02
	R.F. Trans. Mtg. Spacer	27-8228	.01
	R.F. Trans. Mtg. Screw	W-1635	Per C .30
	R.F. Mtg. Grommet	27-4317	.04
	R.F. Mtg. Sleeve	28-2257 FA-3	.01
	R.F. Mtg. Bushing	27-8339	Per C .40
	Screw	W-729	
	Vernier Drive Assem.	31-1879	
	B.C. Resistor Mtg. Screw	W-512	Per C .90
	B.C. Resistor Mtg. Nut	W-317A	Per C .40
	Volume Control Shaft	28-6498	
	Volume Control Shaft Spring	28-4117	Per C .40
	Washer Volume Control Shaft	28-4186	
	Washer Volume Control Shaft	4436	Per C 1.50
	Volume Control Shaft Retaining Clip	28-8610	.03
	Volume Control Mtg. Nut	W-684 FA-3	Per C 1.25
	Tone Control Mtg. Nut	W-684 FA-3	Per C 1.25
	Insulator	27-8320	Per C .40
	I.F. Terminal Panel	38-7703	.25
	I.F. Terminal Spacer	4122	.01
	Knob Tuning	27-4321	.10
	Knob Volume, Tone	27-4332	.10
	Knob Selector Switch	27-4332	.10
	Chassis Mtg. Screw		
	Tuning Condenser Grommet	27-4325	.02
	Screw	W-650 FA-3	Per C .40
	Baffle Assembly B Cabinet	40-5935	
	A.C. Cord	L-2183	.40
	Speaker Cable	L-2181	.25
	Clamp Electrolytic Condenser	6440	.05
	Insulator Electrolytic Condenser	27-7194	.01
	Grid Cap	38-3888	.01
	Spacer, (Compensating Condenser)	29-6032	.04
	Screw	W-1653 FA-3	Per C .30
	†B Speaker S-7	36-1009	5.75
	Nut Mtg. Speaker	W-124 A	Per C 1.35
	Baffle Assem. F Cabinet	40-5933	

*25 cycle Transformer 32-7584 used in Model 37-60A.
†Speaker used in F & B Cabinet.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 37-61
Schematic
Coil Data

PHILCO RADIO & TELEV. CORP.

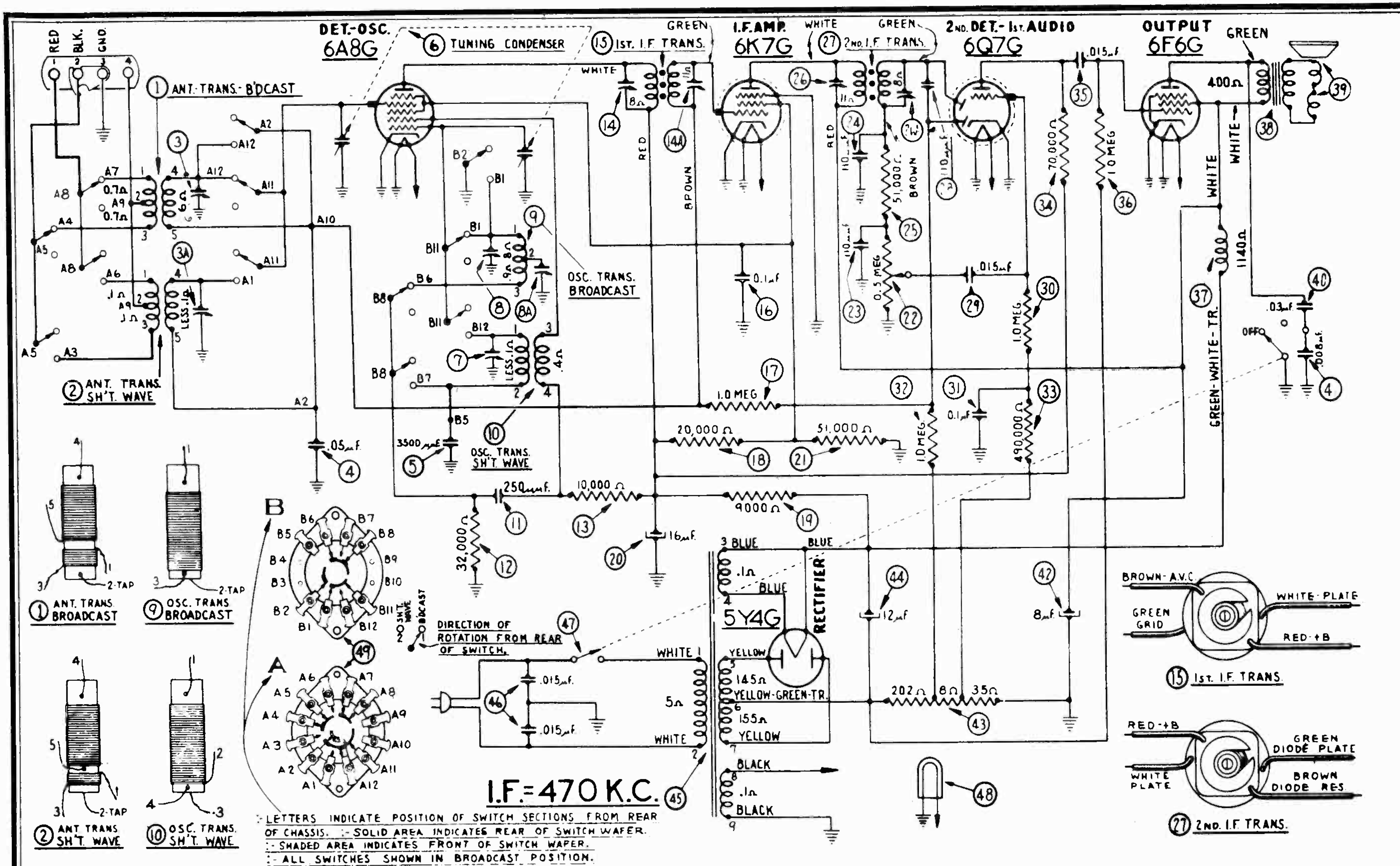


Fig. 5—Schematic Diagram—Model 37-61

The red and black leads of the High-Efficiency Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided at the rear of the chassis. Connect the jumper of the terminal panel across terminal 3 and 4. A good ground connection is required in all installations. Make the ground connection to terminal 3 on the terminal panel.

If a temporary aerial is used, the jumper should be across terminal 2 and 3. The aerial connects to terminal 1 and the ground to terminal 3.

Voltage Rating: 115 Volts. A. C.
Frequency Rating: 50-60 Cycle.
For 25 to 40 cycle operation use Power Transformer, marked with asterisks in Parts List.
Power Consumption: 60 Watts.

Type of Circuit: Superheterodyne with Pentode Power Output.
Intermediate Frequency: 470 K. C.
Undistorted Power Output: 3 Watts.
Tuning Ranges: Two—(1): 530 to 1720 K. C.; (2): 5.7 to 18.2 M. C.

2nd Detector, A. V. C., and 1st Audio; 1 type 6F6G Pentode Output and 1 type 5Y4G, Rectifier.
Speaker: S7.

MODEL 37-61
Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

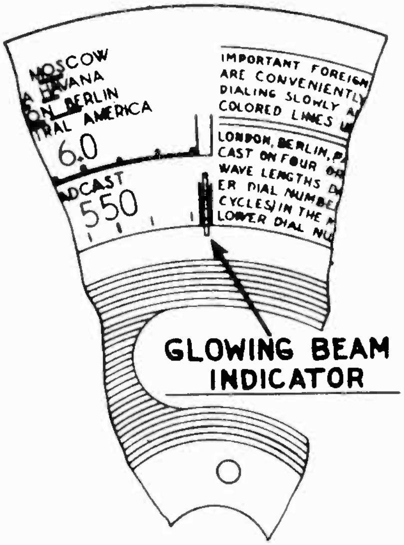


Fig. 2—Dial Calibration

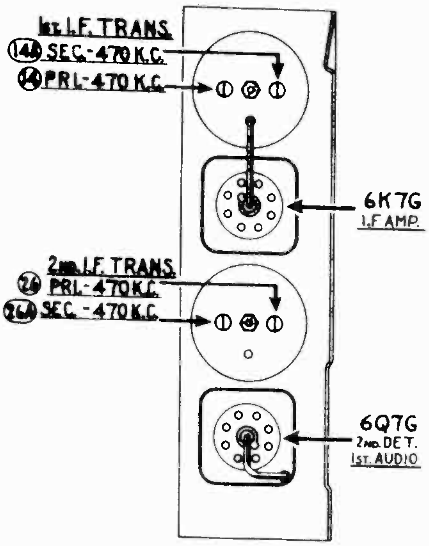


Fig. 3—Locations of I. F. Compensators Top of Chassis

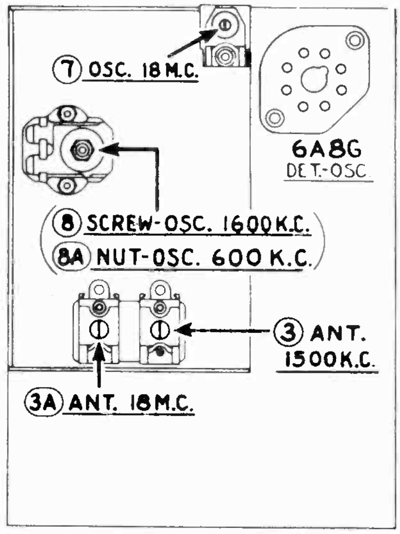


Fig. 4—Locations of R. F. Compensators Underside of Chassis

Adjustment of Compensators

The accurate adjustment of the various compensating condensers is vital to the proper functioning of this receiver. There are four compensating condensers in the I. F. Circuit; three in the Oscillator Circuit; and two in the Antenna Circuit. Incorrect adjustment will cause loss of sensitivity, unsatisfactory tone, and poor selectivity.

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 SIGNAL GENERATOR, covering from 110 to 20000 K. C. is recommended to adjust the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 CIRCUIT TESTER contains a very sensitive output meter and is recommended for these adjustments.

Philco Fibre Wrench No. 3164 and Fibre Handle Screw-driver No. 27-7059 complete the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 3 and 4.

The following procedure must be observed in adjusting the compensators:—

DIAL ADJUSTMENT—The Tuning Condenser is set at the maximum capacity position, by turning the tuning knob counter-clockwise. Loosen the set screw of dial hub and set dial, (see Fig. 2) with Glowing Indicator centered between the index lines at the low frequency end of scale.

OUTPUT METER—The Output Meter is connected to the Plate and Cathode terminals of the (6F6G) tube and adjusted to use the (0-30) Volt scale. When adjusting each circuit, care should be taken to have the Signal Generator attenuator set to give approximately ¼ scale reading on output meter.

INTERMEDIATE FREQUENCY CIRCUIT

1 Turn range switch to Range 1. Rotate the tuning control to approximately 600 K. C. Connect the 088 Signal Generator output lead through a .1 mfd. condenser to the grid of the 6A8G tube.

2 Set Signal Generator indicator for 470 K. C. adjust attenuator for approximately ¼ scale reading on output meter. Then adjust compensators (26)a 2nd I. F. Sec., (26) 2nd I. F. Pri., (14)a 1st I. F. Sec., (14) 1st I. F. Pri., for maximum reading on output meter.

RADIO FREQUENCY CIRCUIT

Range 2.—5.7 to 18 M. C.

1 Remove the signal generator output lead and series condenser from the 6A8G tube and connect them to the ANT. TERMINAL No. 1, on aerial input panel (rear of chassis) and the generator ground lead to GND. TERMINAL No. 3, rear of chassis. Connect TERMINAL No. 2 to GROUND TERMINAL No. 3 with connector link provided on the panel.

2 Set range switch in position No. 2 (S. W.). Turn signal generator and receiver dials to 18 M. C. and adjust compensator (7) Osc. for maximum output.

3 The adjustment of the antenna compensator on the high frequency range causes a slight detuning of the oscillator circuit. In order to overcome this detuning effect, connect a variable condenser of approximately 350 mfd., having a good vernier drive, across the oscillator section of the tuning condenser. Leaving the signal generator and receiver dials at 18 M. C., tune the added condenser so that the second harmonic of the receiver oscillator will beat against the signal from the signal generator. The antenna compensator (3)a should then be adjusted to give maximum output.

4 Now remove the external condenser from the tuning condenser of receiver and turn compensator (7) osc. to the maximum capacity position (clockwise), then without moving signal generator or receiver tuning condenser, turn compensator (7) (counter-clockwise) until a second peak is reached on the output meter. The first peak is caused by tuning to the image frequency signal and must be neglected. Compensator (7) is adjusted on the second peak to give maximum output.

RANGE 1: 530 to 1720 K. C.

Turn range switch to Range No. 1. Turn the Receiver dial to 1600 K. C. Then adjust compensators (8) and (3) for maximum reading on output meter.

The 088 Signal Generator dial is set at 800 K. C. and the second harmonic of this frequency (1600 K. C.) is used in making the above adjustment.

2 The low frequency end of the band is now tuned by turning Signal Generator and Receiver dials to 600 K. C. and adjusting compensator (8)a—see note (a) below—for maximum output.

(a) When compensator (8)a osc. series is being adjusted, the Tuning Condenser must be rolled for maximum output. This is accomplished as follows: First tune compensator (8)a for maximum output. Then vary the Tuning Condenser for maximum output at 600 K. C. Now retune Compensator (8)a and again vary the tuning condenser back and forth at 600 K. C., for maximum output. This operation of first tuning the Compensator, then the Tuning Condenser is continued until maximum output is obtained at the 600 K. C. frequency.

3 Set the Signal Generator and Receiver Dials for 1600 K. C. and re-adjust Compensator (8) for maximum output. Then turn the dials to 1500 K. C. and re-adjust compensator (3) for maximum reading on output meter.

Transformer Data
Notes, Parts

PHILCO RADIO & TELEV. CORP.

MODEL 37-61
Chassis, Voltage

Model 37-61 is a 5 tube superheterodyne receiver for operation on alternating current and has two tuning ranges, covering standard broadcast and short wave reception. It, also, uses the new Philco High Efficiency self-centering glass tubes.

The circuit includes the Philco Foreign Tuning System—controlled by the range switch—providing maximum sensitivity and noise reduction when used with the New Philco High-Efficiency Aerial, supplied with the receiver.

Fig. 1 shows the Voltage measurements taken from the bottom of the socket at each contact. In Fig. 2, the correct position of the dial indicator, for proper adjustment of the compensators is shown. Figs. 3 and 4 show the location of the I. F. and R. F. compensators respectively.

This receiver will be supplied in two model cabinets type B, and F. These instructions, however, will cover both type cabinets.

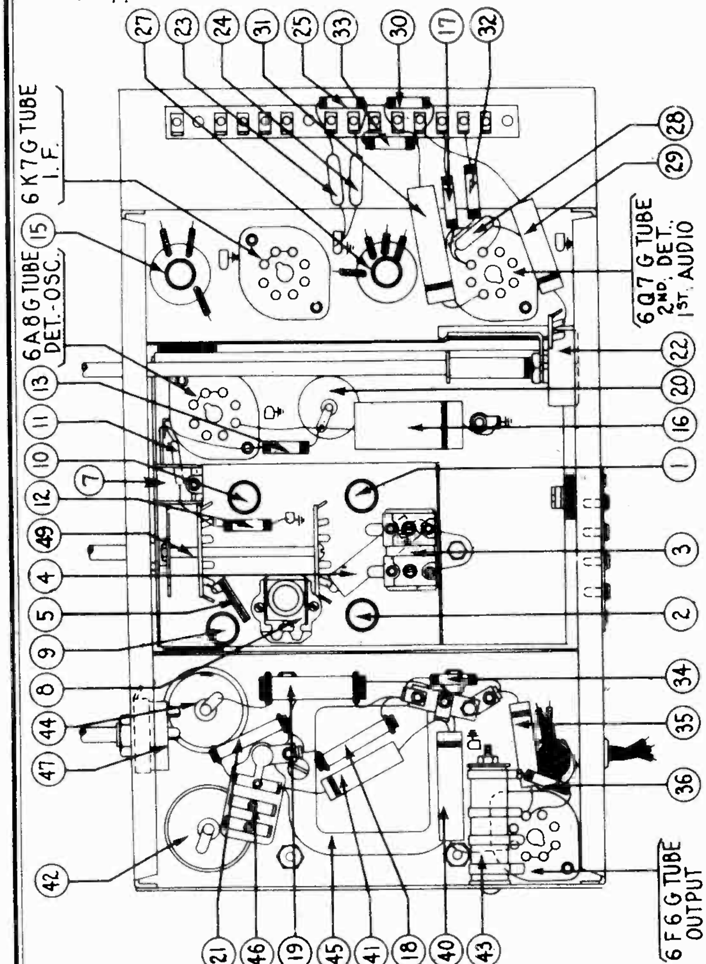


Fig. 6—Base View of Chassis

Schem. No.	Description	Part No.	Price List
1	Antenna Trans. Broadcast	32-2108	$0.80
2	Antenna Trans. S.W.	32-2142	.50
3	Compensator Twin Ant. 1500 K.C.	31-6093	.40
3A	Compensator Ant. 18 M.C.	Part of 3	
4	Condenser (Tubular .05 mfd.)	30-4444	.20
5	Condenser Semi-fixed 3500 mfd.	31-6103	.60
6	Tuning Condenser	31-1851	3.25
7	Compensator Osc., 18 M.C.	31-6101	.20
8	Compensator Osc., 1600 K.C. "Screw"	31-6100	.40
8A	Compensator Osc., 600 K.C. "Nut"	Part of 8	
9	Transformer Osc. Broadcast	32-2120	.65
10	Transformer Osc. S.W.	32-2143	.60
11	Condenser (Tubular 250 mfd.)	30-1032	.25
12	Resistor (32000 ohms ½ watt)	33-332339	.20
13	Resistor (10000 ohms ½ watt)	33-310339	.20
14	Compensator (1st I.F. Pri. 470 K.C.)	Part of 15	
14A	Compensator (1st I.F. Sec. 470 K.C.)	Part of 15	
15	1st I.F. Transformer	32-2100	1.50
16	Condenser (Tubular 0.1 mfd.)	30-4170	.25
17	Resistor (1 megohm ½ watt)	33-510339	.20
18	Resistor (20000 ohm, 1 watt)	33-320439	.20
19	Resistor (9000 ohms, 2 watt)	33-290539	.30
20	Electrolytic condenser, 10 mfd.	30-2118	1.65
21	Resistor (51000 ohms 1 watt)	33-351439	.20
22	Volume Control	33-5157	1.00
23	Condenser (110 mmfd. Mica)	30-1031	.20
24	Condenser (110 mmfd. Mica)	30-1031	.20
25	Resistor (51000 ohms ½ watt)	33-351339	.20
26	Compensator (2nd I.F. Pri.) 470 K.C.	Part of 27	
26A	Compensator (2nd I.F. Sec.) 470 K.C.	Part of 27	
27	2nd I.F. Transformer	32-2102	1.50
28	Condenser (110 mmfd. Mica)	30-1031	.20
29	Condenser (.015 mfd. Tubular)	30-4358	.20
30	Resistor (1 megohm ½ watt)	33-510339	.20
31	Condenser (0.1 mfd. Tubular)	30-4122	.20
32	Resistor (1.0 megohm ½ watt)	33-510339	.20
33	Resistor (490,000 ohm ½ watt)	33-449339	.20
34	Resistor (70000 ohm ½ watt)	33-370339	.20
35	Condenser (.015 mfd. Tubular)	30-4226	.20
36	Resistor (1 megohm ½ watt)	33-510339	.20
37	Field Coil Assembly	36-3039	2.75
38	Output Transformer	32-7019	.85
39	Cone and Voice Coil Assembly	36-3157	.80
40	Condenser (.03 mfd. Tubular)	30-4380	.20
41	Condenser (.008 mfd. Tubular)	30-4112	.20
42	Electrolytic Condenser (8 mfd.)	30-2024	1.10
43	Bias Resistor (245 ohm)	33-3277	.20
44	Electrolytic Condenser 12 mfd.	30-2117	1.20
45	Power Transformer (50-60 cycle 105-120 volt)	32-7583	4.25
	*Power Transformer (25 cycle 115 volt)	32-7584	
46	Condenser Bakelite Twin (.015-.015 mfd.)	3793 DG	.40
47	Tone Control & AC Switch	42-1180	.75
48	Pilot Lamp	34-2039	.15

*Power Transformer used in Model 37-61A

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

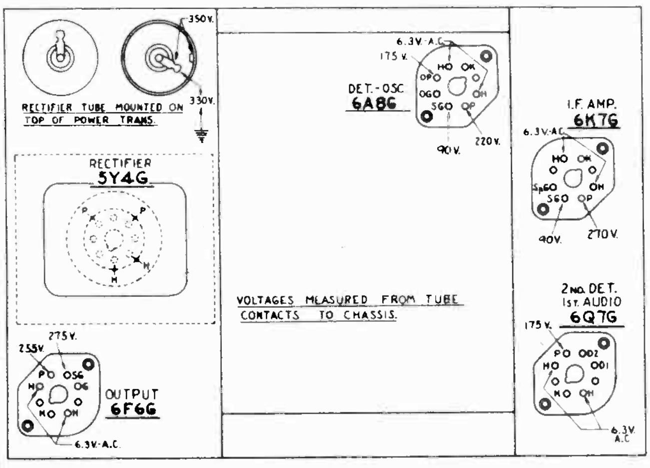


Fig. 1—Socket Voltages Viewed from Underside of Chassis

Measurements taken with PHILCO MODEL 025 Circuit Tester which contains a 1000 ohms per volt Voltmeter. Line voltage, 115—Range Switch in Broadcast Position. Dial tuned to 600 K. C.

POWER TRANSFORMER DATA

Lead No. Shown on Schematic	A. C. Volts	Current	Circuit	Color	Resistance
1-2	120	—	Pri.	White	5 ohms
3-4	5.0	2.0A	Fil. Rect.	Blue	.1 ohm
5-7	670	70 M. A.	High Voltage Sec.	Yellow	145 ohm 155 ohm
6	—	—	Center Tap of 5-7	Yellow Green Tr.	—
8-9	6.7	2.1A	Fil.	Black	.1 ohm

MODELS 806,808,809,PHD
FN,CT-2,ST-3,CT-5
FT-6,NT-7

PHILCO RADIO & TELEV. CORP.

Changes
Parts Numbering System

RUN NUMBER CHANGE DATA

The run numbers are stamped both on the top side and the underneath side of the sub-base. They are usually stamped on the sub-base but when this is not practical, due to all the space being taken up with the parts, then the numbers will be found on the vibrator section partition or in some other conspicuous place. The numbers are stamped in black ink with 1/4" rubber stencils and should not be confused with various other numbers, also stamped inside the housing in black ink, but of a larger size.

The run number and the conveyor number appear together. The run number is the first number given and the conveyor number, which can de disregarded, is the second number.

Not all run number changes affect the parts or the wiring of the Receiver so that information on only those runs, having to do with major changes or part changes will be furnished.

The following run number change data are an invaluable aid in service work and should be kept with other circuit service data.

MODEL 806

RUN No. 3—Second I.F. Transformer, (24 on the schematic), has been replaced with a new type having the same part number. The new Transformer can be identified by the white paint mark on the fibre. The 50 mmfd. Condenser, Part No. 30-1029 (2 on the schematic), has been replaced with another 50 mmfd. Condenser, Part No. 4587.

RUN No. 5—Part No. 33-1177, a 15,000 ohm resistor, (18 on the schematic), has been replaced with a 51,000 ohm resistor Part No. 33-1163.

RUN No. 7—An additional "A" choke, Part No. 32-1438, has been added in series between the "A" choke (54 on the schematic), and the tube filaments. A 250 mmfd. condenser, Part No. 30-1032, has been added. One side is connected between the new choke and the choke 54. The other side of the condenser is connected to ground.

RUN No. 8—An antenna interference choke, Part No 32-1678, has been added in series with the antenna lead and the antenna transformer and condenser (1 and 2 on the schematic).

RUN No. 10—A wiring panel is used for mounting the large tubular condensers on the sub-base to prevent the condenser leads from breaking off.

RUN No. 11—Part No. 30-4227, a .5 mfd. condenser, (7 on the schematic), has been replaced with another .5 mfd. condenser, Part No. 30-4147. This new condenser is mounted on the sub-base under the R. F. transformer shields.

MODEL 808

RUN No. 2—A 250 mmfd. condenser, Part No 30-1032, has been added across the secondary of the output transformer (60 on the schematic).

RUN No. 3—Remove the condenser that was added in run number 2

MODEL 809

RUN No. 2—Part No. 30-4227, a .5 mfd. condenser, (7 on the schematic), has been replaced with another .5 mfd condenser, Part No. 30-4147. This new condenser is mounted on the sub-base under the R. F. transformer shield.

MODEL PHD

RUN No. 4—Part No. 30-1029, a 50 mmfd. condenser, (52 on the schematic), has been replaced with a 250 mmfd. condenser, Part No. 30-1032.

An interference choke, Part No. 32-1374, has been added in series between the pilot lamp and the condenser, and resistor (52 and 53 on the schematic).

The dial, Part No. 27-5022, has been replaced with a new dial, Part No. 27-5070.

MODEL FN

RUN No. 8—The first I. F. transformer, (16 on the schematic) has been replaced with a new type having the same part number. The new transformer can be identified by the green paint mark on the fibre.

Part No. 33-3047, a 1500 ohm resistor, (23 on the schematic) has been replaced with a 2000 ohm resistor, Part No. 33-3048

MODEL CT-2

RUN No. 3—The oscillator transformer, Part No. 32-1537, (14 on the schematic), has been replaced with a new type having the same part number. The new transformer can be identified by the red paint mark on the fibre.

RUN No. 4—An antenna interference choke, Part No. 32-1382, has been added in series with the antenna lead and the antenna transformer and condenser (1 and 2 on the schematic).

Part No. 33-1194, a 11,000 ohm resistor, (11 on the schematic), has been replaced with a 10,000 ohm resistor, Part No. 33-1000.

MODEL ST3

RUN No. 2—The oscillator transformer, Part No. 32-1537, (14 on the schematic), has been replaced with a new type having the same part number. The new transformer can be identified by the red paint mark on the fibre.

RUN No. 3—The white lead of the output transformer is connected directly to the plate of the type 42 tube instead of to the pin-jack. This prevents audio feedback.

RUN No. 4—The tone control, Part No. 30-4243, and the 2000 mmfd condenser, Part No. 30-4177 (50 and 47 on the schematic), have been removed. These parts are replaced with the new tone control, Part No. 30-4298.

RUN No. 5—A wire is connected from the ground spring between the antenna and R. F. stage of the tuning condenser, to the ground lug on the antenna transformer (1 on the schematic), to reduce vibrator interference.

MODEL CT5

RUN No. 2—An antenna interference choke, Part No. 32-1382, has been added in series with the antenna lead, and the antenna transformer and condenser, (1 and 2 on the schematic).

MODEL FT6

RUN No. 3—The oscillator transformer, Part No. 32-1537, (13 on the schematic), has been replaced with a new type having the same part number. The new transformer can be identified by the red paint mark over the white and blue marking on the fibre.

RUN No. 4—A 110 mfd. condenser has been added. One side is connected between the switch and choke (58 and 59 on the schematic), and the other side is connected to ground. Part No. 30-4047, a .5 mfd. condenser, (59 on the schematic), has been replaced with another .5 mfd. condenser, Part No. 30-4227.

RUN No. 5—The 1000 mmfd. condenser, (45 on the schematic), has been relocated. One side of the condenser is connected to the tone control pin jack and the other side connected to ground.

Part No. 33-1000, a 10,000 ohm resistor, (12 on the schematic), has been replaced with an 11,000 ohm resistor, Part No. 33-1194.

RUN No. 8—The series padder, (17 on the schematic), has been removed from the tuning condenser and relocated on the sub-base.

MODEL NT-7

RUN No. 2—Part No. 30-4227, a .5 mfd. condenser, (7 on the schematic), has been replaced with another .5 mfd. condenser, Part No. 30-4147. This new condenser is mounted on the sub-base under the R. F. transformer shields.

RUN No. 3—The .05 mfd. condenser, Part No. 30-4020, (6 on the schematic), has been relocated. It is now between the antenna and R. F. transformer shields. Connections are the same.

PARTS NUMBERING SYSTEM

The first radio part numbers started at 3000 and progressed upward in order as new radio parts were added. Speaker part numbers started at 2999 and progressed downward as new speaker parts were added. There was no attempt made to classify the various kinds of parts and make identification easier until several years later. Part No. 3025 was a mica condenser but almost any other number could be a mica condenser also. The old parts numbering system was practically blind but with the new system now in effect, a part number indicates immediately the kind of part it represents. It consists of a two digit group classification number and a four digit identification number. Since it was not practical to re-number the old parts, they are still the same, but all new parts numbers are assigned in accordance with the following classification:

27—Fibre, bakelite—moulded parts.
1000-1999—forms, moulded parts, etc.
5000-5999—Celluloid parts.
6000-6999—Sockets.
7000-9999—finished parts—miscellaneous.
28—Metal parts—Unplated—unfinished.
29—Metal parts—plated and painted.
30—Fixed condensers
1000-1999—mica condensers.
2000-2999—electrolytic condensers.
3000-9999—paper condensers, sections, etc.
31—Variable condensers.
1000-5999—tuning condensers.
6000-9999—padding condensers.
32—Transformers.
1000-6999—R. F., I. F. and other assemblies.
7000-8999—Power and audio transformers and other assemblies.
9000-9999—Field coils, etc.
33—Resistances.
1000-2999—carbon (fixed).
3000-4999—wire wound (fixed) and
5000- —variable (carbon and wire wound) and volume controls.
34—Tubes and Lamps.
1000-2999—tubes.
3000- —tube kits.
35—Phonograph parts.
36—Speakers and speaker sub-assemblies.
1000-2999—complete speakers.
3000- —speaker sub-assemblies.
37—Chassis and sub-assemblies, etc.
38—Sub-base and assemblies.
39—Printed matter.
40—Accessory kits.
5000- —Accessory kits.
7000-7999—Transitone master kits.
8000-8999—Transitone hardware kits.
9000- —Transitone suppression kits.
41—Dynamotor and Chargers.
1000-1999—Dynamotors, etc.
5000-7999—Chargers.
42—Controls and switches.
1000-4999—Switches and jacks.
5000-5999—Control units, etc.
43—Major sub-assemblies.
44—Silks and cloth.
45—Miscellaneous.
1000-1999—Display kits.
2000-2999—Miscellaneous parts.

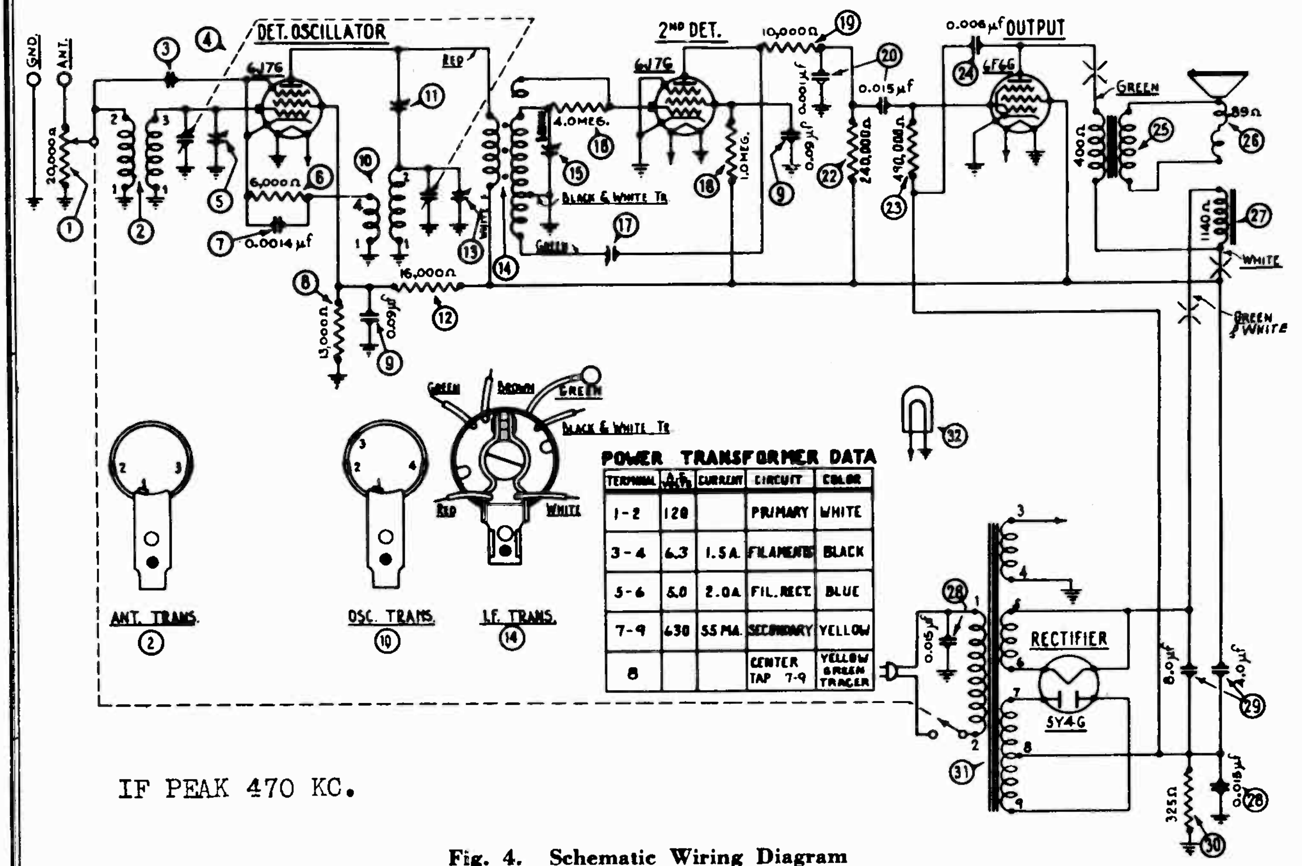
SEPTEMBER, 1935

MODEL 37-84(Code 122)
PHILCO RADIO & TELEV. CORP. Schematic
Parts List

Replacement Parts for Model 37-84

No. On Figs.	Description	Part No.	List Price
(1)	Volume Control and On-off Switch	33-5055	1.45
(2)	Antenna Transformer	32-1310	.40
(3)	Condenser—Capacity obtained by twisting end of two leads together		
(4)	Tuning Condenser Assembly	31-1122	4.00
(5)	Compensator (Antenna)	Part of (4)	...
(6)	Resistor (6000 ohms, ½ watt)	33-260339	.20
(7)	Condenser (.0014 mfd. Mica)	7007	.30
(8)	Resistor (13,000 ohms, ½ watt)	33-313439	.20
(9)	Condenser (Double .09-.09 mfd. Bakelite)	4989-DG	.40
(10)	Oscillator Transformer	32-1311	.40
(11)	Compensator (I. F. Primary)	04000A	.15
(12)	Resistor (16,000 ohms, 3 watt)	33-316639	.30
(13)	Compensator (Osc. 1700 K.C.)	Part of (4)	...
(14)	I.F. Transformer	32-1313	1.05
(15)	Compensator (I.F. Sec.)	0-4000Y	.15
(16)	Resistor (4 meg.) inside (14)	35-540339	.20
(17)	Sensitivity Control	0-4000	...
(18)	Resistor (1 meg., ½ watt)	33-510339	.20
(19)	Resistor (10,000 ohms, ½ watt)	33-310339	.20
(20)	Condenser (.015-.001 mfd. Bakelite)	7762-EU	.25
(21)	Eliminated by Production Changes		
(22)	Resistor (24,000 ohms, ½ watt)	33-424339	.20
(23)	Resistor (490,000 ohms, ½ watt)	33-449339	.20
(24)	Condenser (.006 mfd. Bakelite)	7625-SU	.25
(25)	Output Transformer	32-7019	.85
(26)	Voice Coil and Cone Assembly	36-3157	...
(27)	Field Coil and Pot Assembly	36-3243	1.70
(28)	Condenser (.015-.015 mfd. Bakelite)	7762-EU	.40
(29)	Condenser (Electrolytic 4.-8. mfd.)	30-2013	1.95
(30)	Resistor (Wire Wound 325 ohms)	7465	.15
(31)	Power Transformer (50-60 cycle 115)	32-7180	3.60
	Power Transformer (25 cycle 115)	7422	...
(32)	Pilot Lamp	6608	.09
	Eight Prong Socket Rectifier	27-6053	.11
	Seven Prong Socket	27-6057	.11
	Tube Shield	28-2726	.10
	Tube Shield Cap	28-2727	.02
	Knob	27-4282	.10
	Pointer	27-7933	.01
	AC Cord and Plug	L-2183	.00
	Speaker Cord	L-1474	.15
	Base Shield Plate	27-7452	.10
	Chassis Mounting Screw	W-490-A	2.75C
	Chassis Mounting Washer	W-315-A	.50C
	Output Transformer Shield	36-3025	.08
	Dial	27-5210	1.50C
	R.F. Shield Assembly	38-5483	.50
	Speaker Mounting Screw	W-1604	...
	Speaker Mounting Nut	W-124-A	...
	Speaker SB	36-1073	...
	Baffle Silk Assembly	40-5961	...
	Spacer Padder Assem.	3098	...
	Screw Padder Assem.	W-614 FA-3	
	Nut Padder Assemb.	W-95 FA-3	
	Felt Washer Tuning Knob	27-7807	...
	Pilot Lamp Assem.	38-7578	...

PRICES SUBJECT TO CHANGE WITHOUT NOTICE



POWER TRANSFORMER DATA

TERMINAL	A.C. VOLTS	CURRENT	CIRCUIT	COLOR
1-2	120		PRIMARY	WHITE
3-4	6.3	1.5A.	FILAMENTS	BLACK
5-6	5.0	2.0A.	FIL. RECT.	BLUE
7-9	630	55 MA.	SECONDARY	YELLOW
8			CENTER TAP 7-9	YELLOW GREEN TRACER

IF PEAK 470 KC.

Fig. 4. Schematic Wiring Diagram

MODEL 37-84(Code 122)
Socket,Trimmers
Voltage,Alignment

PHILCO RADIO & TELEV. CORP.

Model 37-84, Code-122

General Specifications

TYPE CIRCUIT: Superheterodyne with Pentode output.
POWER SUPPLY: 115 V., 60 cycle A.C.
TUBES USED: 1 type 6J7G, Det Osc., 1 type 6J7G 2nd detector—first audio, 1 type 6F6G output, 1 type 5Y4G Rectifier.
FREQUENCY RANGE: 540-1700 K.C.
INTERMEDIATE FREQUENCY: 470 K.C.
POWER CONSUMPTION: 45 watts.
SPEAKER: SB.
POWER OUTPUT: ½ watt.

Adjusting Compensating Condensers

To accurately adjust the compensating condensers in the Model 37-84 receiver, it is necessary to use a signal generator of high stability on all frequencies, such as the PHILCO MODEL 088 Signal Generator This instrument has a continuous frequency range from 110 to 20,000 K.C., and is designed to meet every requirement of the serviceman.

An output meter is also needed,—**PHILCO Model 025 Circuit Tester** includes a very sensitive output meter.

Convenient tools to use in adjusting the compensators are the **PHILCO No. 3164 Fibre Wrench** and **No. 27-7059 Fibre Handled Screw-driver.**

The locations of the various compensating condensers are shown in Fig. 1. Connect the output meter to the plate and cathode contacts of the 6F6G power tube, and adjust it to use the 0-30 volt range.

When adjusting each circuit, care should be taken to have the signal generator attenuator set to approximately ¼ scale reading on output meter.

Intermediate Frequency Circuit

1. Turn gang condenser to maximum capacity (counter-clockwise) and set the volume control of the receiver in the maximum position (clockwise).
2. Connect the 088 signal generator output lead through a .1 mfd. condenser, to the grid of the 6J7G Detector-oscillator tube and the generator ground to the chassis.
3. Turn the sensitivity control ⑰ to maximum capacity position (clockwise), and then release 1½ turns (counter-clockwise).
4. Set signal generator at 470 K.C. and adjust compensators ⑪ and ⑮ for maximum reading on the output meter. Then turn sensitivity control ⑰ clockwise until a hiss (oscillation) is heard. Now turn sensitivity control ⑰ counter-clockwise until the hiss ceases, then continue for ¼ turn more.

Radio Frequency Circuit

1. Turn the gang condenser to the minimum capacity position (extreme clockwise) and place a .006" (six-thousandths inch) gauge between the stator and rotor plates Now turn the gang counter-clockwise until stator and rotor plates touch gauge.
2. Remove gauge from gang condenser. Now place signal generator output lead through a 100 mmfd. condenser to the aerial post of the receiver. Set signal generator at 850 K.C., (using second harmonic, 1700 K.C.). Adjust compensators ⑬ osc., and ⑤ ant., for maximum reading on output meter.
3. Turn signal generator to 1400 K.C. and adjust gang condenser for maximum output. Then adjust compensator ⑤ for maximum reading on output meter.
4. After the above adjustments are completed, the dial pointer is checked for calibration by turning signal generator to 1000 K.C. Then tune receiver for maximum signal The dial pointer should then indicate 1000 K.C.

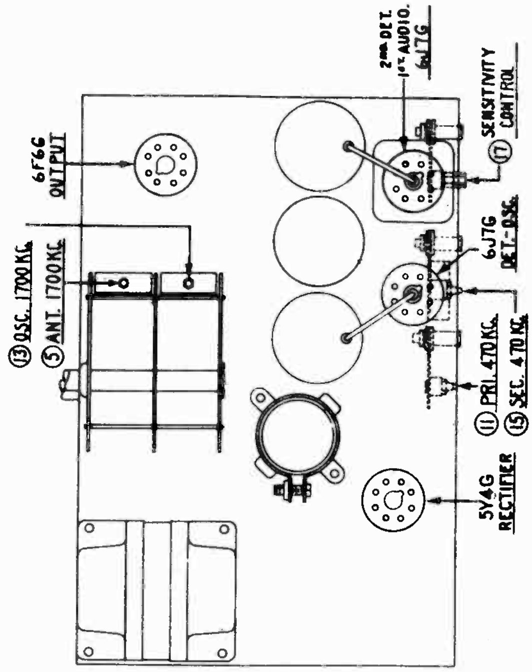


Fig. 1. Locations of Compensating Condensers

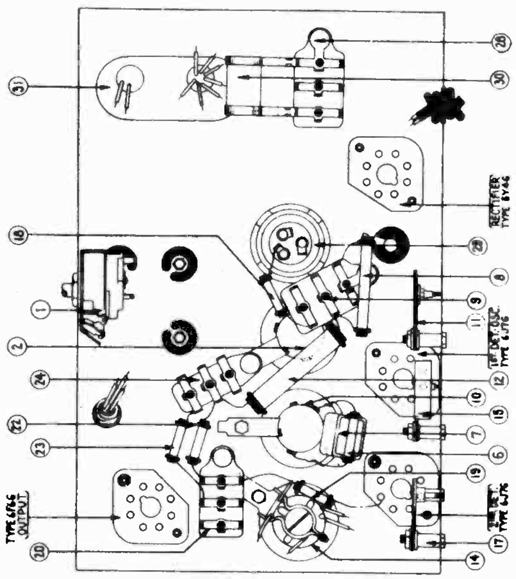
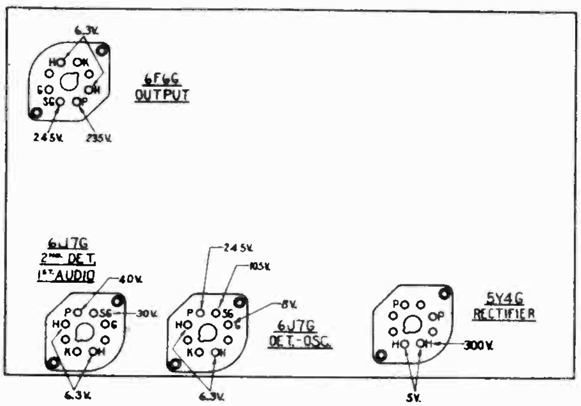


Fig. 3. Base view of Chassis



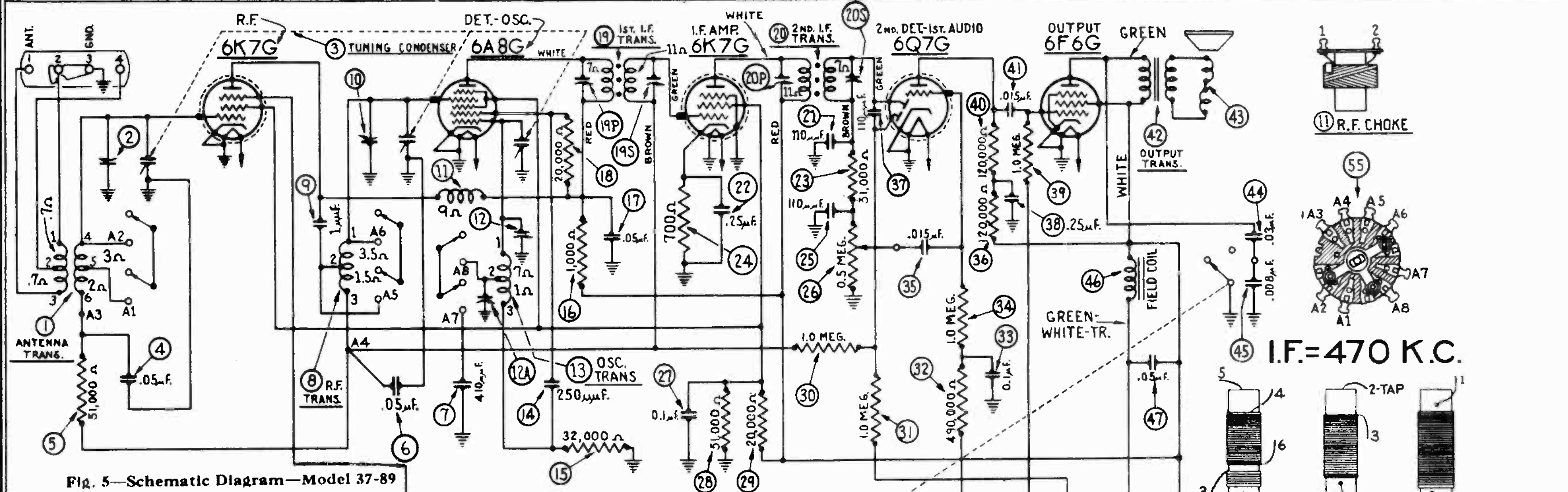
TUBE SOCKET VOLTAGES
(Measured from Tube Contact to Chassis)

Fig. 2. Tubes as viewed from underside of Chassis

The voltages at the points indicated by the arrows above were obtained with a Philco type 025 Circuit Tester which contains a high resistance (1000 ohms per volt) voltmeter.

PHILCO RADIO & TELEV. CORP.

MODEL 37-89
Schematic
Coils, Parts



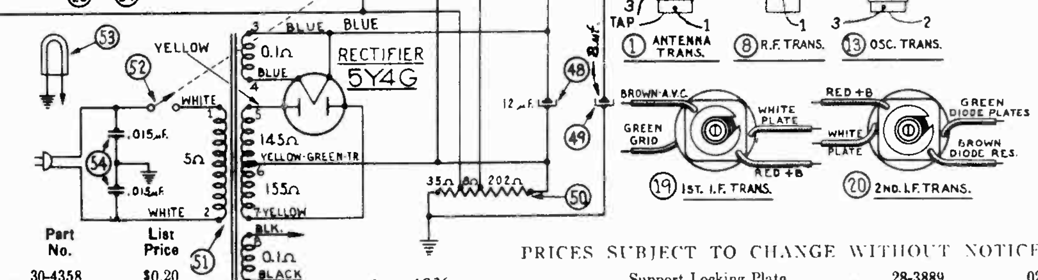


Fig. 5—Schematic Diagram—Model 37-89

Replacement Parts Model 37-89

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer	32-2127	$0.80
2	Compensator	31-6100	.40
3	Tuning Condenser	31-1833	4.00
4	Condenser (.05 mfd. tubular)	30-4020	.20
5	Resistor (51000 ohms ½ watt)	33-351339	.20
6	Condenser (.05 mfd. tubular)	30-4020	.20
7	Condenser (410 mmfd.)	30-1000	.25
8	R. F. Transformer	32-2128	.60
9	Condenser Two Wires Twisted		
10	Compensator	31-6100	.40
11	Choke	32-2139	.35
12	Compensator	31-6101	.20
13	Osc. Transformer	32-2120	.65
14	Condenser (250 mmfd. mica)	30-1032	
15	Resistor (32,000 ohms ½ watt)	33-351339	.20
16	Resistor (1000 ohms, ½ watt)	33-210339	.20
17	Condenser (.05 mfd. tubular)	30-4123	.20
18	Resistor (20000 ohms, ½ watt)	33-320339	.20
19	1st I. F. Transformer	32-2100	1.50
20	2nd I. F. Transformer	32-2102	1.50
21	Condenser (110 mmfd. mica)	30-1031	.20
22	Condenser (.25 mfd. tubular)	30-4446	.20
23	Resistor (51000 ohms, ½ watt)	33-351334	.20
24	Resistor (700 ohm, ½ watt)	33-1220	.20
25	Condenser (110 mmfd. mica)	30-1031	.20
26	Volume Control	33-5157	1.00
27	Condenser (0.1 mfd. tubular)	30-4455	.25
28	Resistor (51000 ohms, 1 watt)	33-351439	.20
29	Resistor (20000 ohms, 2 watt)	33-320539	.30
30	Resistor (1 meg. ½ watt)	33-510339	.20
31	Resistor (1 meg. ½ watt)	33-510339	.20
32	Resistor (490000 ohms ½ watt)	33-449339	.20
33	Condenser (0.1 mfd. tubular)	30-4122	.20
34	Resistor (1 megohm, ½ watt)	33-510339	.20
35	Condenser (.015 mfd. tubular)	30-4358	$0.20
36	Resistor (120000 ohms, ½ watt)	33-412339	.20
37	Condenser (110 mmfd. mica)	30-1031	.20
38	Condenser (.25 mfd. tubular)	30-4134	.35
39	Resistor (1 megohm, ½ watt)	33-510339	.20
40	Resistor (120000 ohms, ½ watt)	33-412339	.20
41	Condenser (.015 mfd. tubular)	30-4226	.20
42	Output Transformer	32-7019	.85
43	Cone & Voice Coil	36-3157	.80
44	Condenser (.03 mfd. bakelite)	8318-SU	.35
45	Condenser (.008 mfd. tubular)	30-4112	.20
46	Field Coil & Pot Assembly	36-3664	
47	Condenser (.05 mfd. tubular)	30-4020	.20
48	Electrolytic Condenser (12 mfd.)	30-2117	1.20
49	Electrolytic Condenser (8 mfd.)	30-2024	1.10
50	Bias Resistor (245 ohms, Taps 35 and 43 ohms)	33-3277	.20
51	Power Transformer (115 volt, 50 to 60 cycle)	32-7583	4.25
52	Tone Control & A. C. Switch	42-1180	.75
53	Pilot Lamp	34-2039	.15
54	Condenser (.015, .015 mfd. bakelite)	3793-DG	.40
55	Wave Switch	42-1194	.60
	Dial	27-5204	.35

June 1936

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Dial Hub	28-7152		.10
Dial Clamp	28-2837		.10
Screen Bracket & Screen Assembly	31-1878		.25
Screw	W-650	Per C	.40
Vernier Drive	31-1844		
Pilot Lamp Assembly	38-7706		.35
Insulator Tone Control	27-8320	Per C	.40
Nut Tone Control	W-684	Per C	1.25
Lock Washer	W-1624	Per C	.50
Volume Control Shaft	28-6498		10
Shaft Spring	28-4117		
Washer	6717	Per C	$0.40
Washer	4436		.02
Shaft Retaining Clip	28-8610	Per C	1.50
Mtg. Grommet	27-4317		.03
Mtg. Washer Sleeve	28-2257		.04
Mtg. Sleeve Bushing	27-8339		.01
Mtg. Screw	W-729	Per C	.40
Mtg. Washer	28-3927	Per C	.45
R. F. Unit Support	28-3856		.01
Support Locking Plate	28-3975		.10
			.01

Support Locking Plate	28-3889		.02
Screw	W-644	Per C	1.50
Knobs Tuning	27-4321		.10
Knob Volume, Waveswitch, Tone	27-4332		.10
Baffle Silk Assembly B, Cabinet	40-5935		.75
Baffle Silk Assembly F, Cabinet	40-5933		
Speaker S-16	36-1225		5.75
Screw Speaker Mtg.	W-1604	Per C	.50
Lockwasher Speaker Mtg.	W-291	Per C	.40
Washer Speaker Mtg.	W-410	Per C	.15
Nut Speaker Mtg.	W-124	Per C	.35
Screw Chassis Mtg.			
Washer Chassis Mtg.	28-2089	Per C	.30
Bezel Frame & Plate	40-5938		.10
Bezel Gasket	27-8311		.01
Bezel Glass	27-8298		.05
Bezel Ring	28-3967		.35
Bezel Screw	W-1644	Per C	.50
Bottom Shield Plate F, Cabinet			
I. F. Coil Shield	38-7763		.20
Speaker S16 B, F Cabinets	36-1225		

MODEL 37-89
Socket, Trimmers
Voltage, Alignment

PHILCO RADIO & TELEV. CORP.

Electrical Specifications

Type of Circuit: Superheterodyne. Pentode Power Output.
Power Supply: 115 volts A. C. 50 to 60 or 25 to 40 cycles.
Power Consumption: 65 Watts.
Philco Tubes Used: 2 type 6K7G, R. F. and I. F. Circuit; 1 type 6A8G, Detector Oscillator; 1 type 6Q7G, 2nd Detector, A. V. C., and 1st Audio; 1 type 6F6G, Output and 1 type 5Y4G, Rectifier.
Intermediate Frequency: 470 K. C.
Tuning Ranges: Two. Range 1—530 to 1650 K. C. Range 2—1500 to 3700 K. C.
Speaker: S-16.
Power Output: 3 watts.
Aerial Connections: The Philco ALL Wave Aerial is recommended for use with this receiver, to obtain maximum sensitivity and noise reduction. The red and black leads of the "transmission line" (lead-in) are connected to terminals 1 and 2 respectively on the terminal panel provided at the rear of the chassis. Connect the link provided on the terminal panel across terminals 3 and 4.

If a temporary aerial is used, the link is connected across terminals 2 and 3, the aerial connects to terminal 1.

A good ground connection is desirable in all installations. Make the ground connection from the nearest water or radiator pipe to terminal 3 on the terminal panel.

Adjusting Compensator

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 Signal Generator, covering from 110 to 20,000 K. C. is recommended for use in adjusting the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 Circuit Tester contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Wrench No. 3164 and Fibre Handle Screw-Driver No. 27-7059 complete the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 2 and 3.

The following procedure must be observed in adjusting the compensators:

DIAL ADJUSTMENT—The tuning condenser is set at the maximum capacity position, by turning the tuning knob clockwise. Loosen the set screw of dial hub and set dial, with Glowing Indicator centered between the first and second index lines at the low frequency end of scale.

OUTPUT METER—The 025 Output Meter is connected to the plate and cathode terminals of the 6F6G tube. Adjust the meter to use the (0-30) volt scale.

During the I. F. and R. F. adjustment, the signal generator output should be maintained at the lowest possible level that will give an indication on the output meter.

INTERMEDIATE FREQUENCY CIRCUIT

1. Turn selector switch to range 1 (counter-clockwise). Rotate the tuning control to approximately 600 K. C. Connect the 088 Signal Generator output lead through a .1 mfd. condenser to the grid of the 6A8G tube and the output ground lead to the receiver chassis.

2. Set signal generator dial indicator for 470 K. C. Adjust attenuator for approximately ¼ scale reading on output meter. Then adjust compensators (20s) 2nd I. F. Sec., (20p) 2nd I. F. Pri., (19s) 1st I. F. Sec., and (19p) 1st I. F. Pri. for maximum reading on output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range 1—530-1650 K. C.

1. Leave selector switch in range 1. Remove the signal generator output lead and .1 mfd condenser from the grid of the 6A8G tube.

2. Attach the signal generator output lead through the .1 mfd. condenser to the antenna terminal No. 1 on the aerial panel and the generator ground lead to terminal 3. Connect Terminal No. 2 to ground Terminal No. 3 with connector link provided on the panel.

3. Set signal generator and receiver dials for 1500 K. C. Now adjust compensators ⑫ Osc. (screw), ⑩ R. F., and ② Ant. for maximum reading on output meter.

4. The low frequency end of the band is now tuned by turning signal generator and receiver dials to 600 K. C. and adjusting compensator ⑫a (see note A below) for maximum output.

(A) When compensator ⑫a Osc. series (nut) is being adjusted, the tuning condenser must be rolled for maximum output. This is accomplished as follows: First tune compensator ⑫a for maximum output at 600 K. C. Then vary the tuning condenser back and forth about the 600 K. C. dial mark for the maximum output point. Now retune compensator ⑫a and again varying the tuning condenser back and forth about 600 K. C. until the maximum output point is reached. This operation of first tuning the compensator, then the tuning condenser is continued until the maximum output is obtained at the 600 K. C. frequency.

5. Turn signal generator and receiver tuning dials to 1500 K. C., then readjust compensators ⑫ Osc.; ⑩ R. F.; ② Ant. for maximum reading on output meter.

Tuning Range 2:

1. The compensating condenser adjustments of Band 1, takes care of Band 2, therefore no compensating condensers are required on the band.

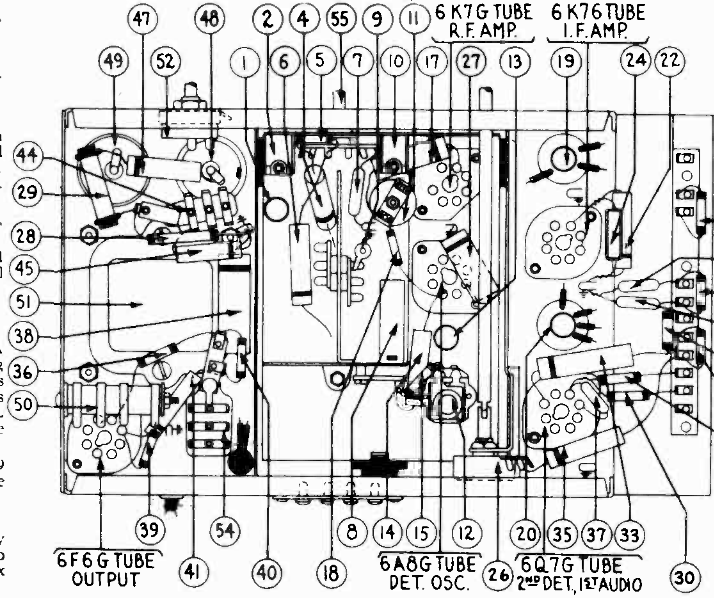


Fig. 4—Base View Chasses

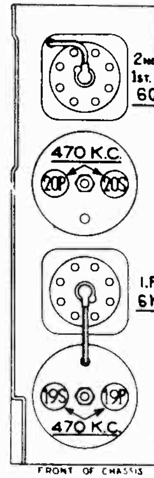


Fig. 2—I. F. Compensator

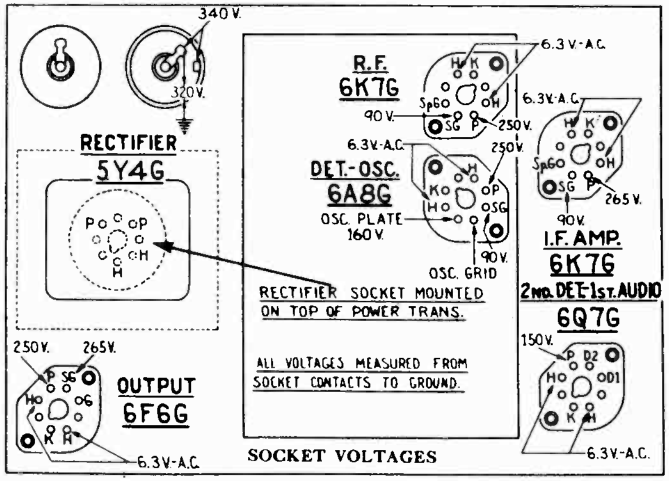


Fig. 1. View of Sockets from Underside Chassis

The voltages indicated by arrows were measured with a **Philco 025 Circuit Tester** which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.

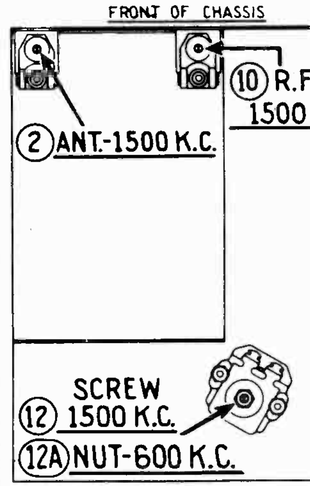
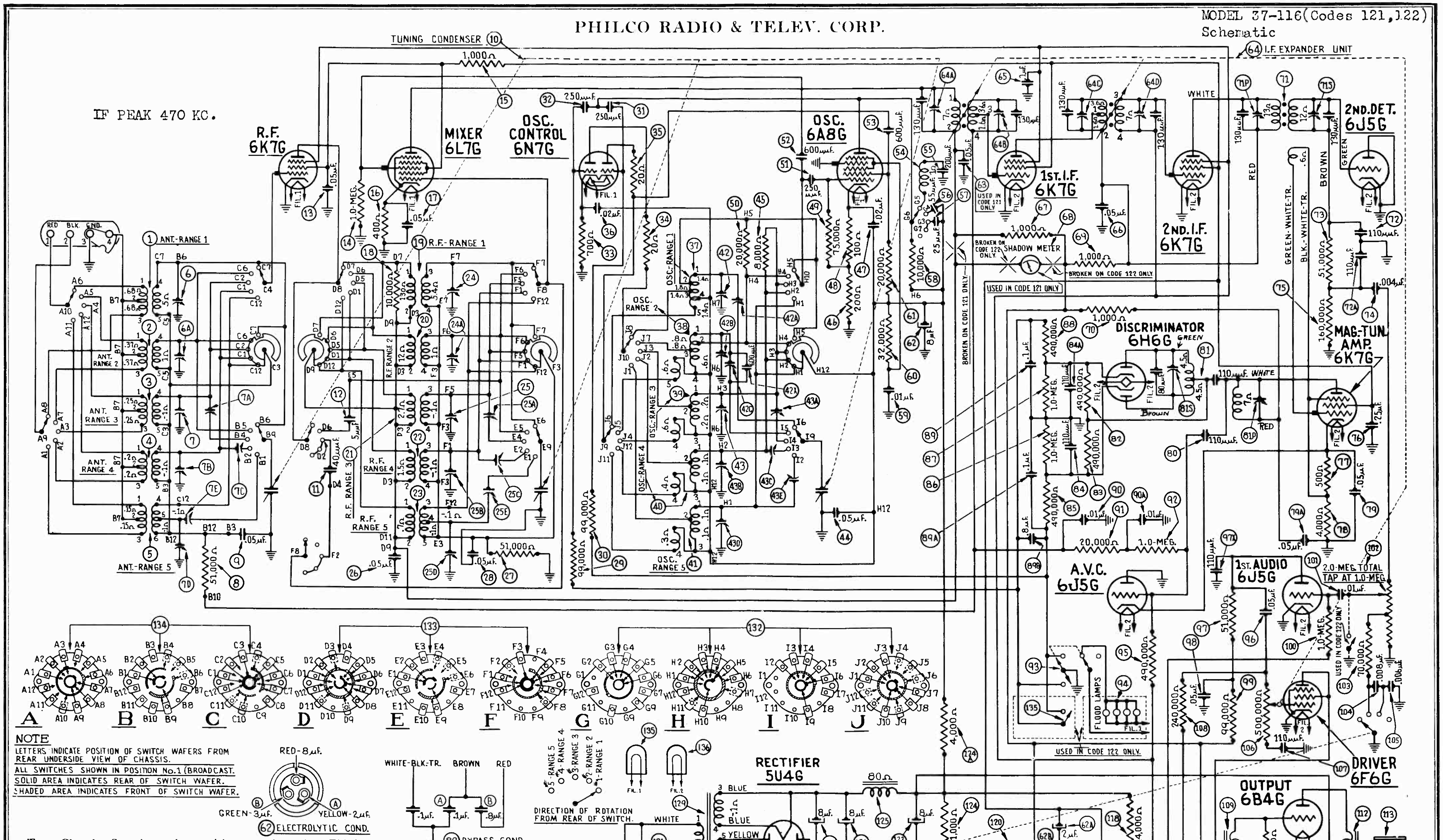


Fig. 3—R. F. Compensators

MODEL 37-116(Codes 121,122)
Schematic

PHILCO RADIO & TELEV. CORP.



NOTE
LETTERS INDICATE POSITION OF SWITCH WAFERS FROM REAR UNDERSIDE VIEW OF CHASSIS.
ALL SWITCHES SHOWN IN POSITION No.1 (BROADCAST.
SOLID AREA INDICATES REAR OF SWITCH WAFER.
SHADED AREA INDICATES FRONT OF SWITCH WAFER.

Type Circuit: Superheterodyne, with magnetic tuning; Fidelity-Selectivity control in the intermediate frequency circuit and pushpull class "A" audio output. The Code 122 Receiver uses the Philco Automatic Dial tuning system.

Power Supply: 115 Volts A.C. 50 to 60 cycles. For 25 to 40 cycle operation use power transformer listed in the parts list for this purpose.

Power Consumption: 165 Watts.

Intermediate Frequency: 470 K. C.

Undistorted Output: 15 Watts.

PHILCO RADIO & TELEV. CORP.

MODEL 37-116 (Codes 121,122)
Coils, Voltage, Trimmers, Notes

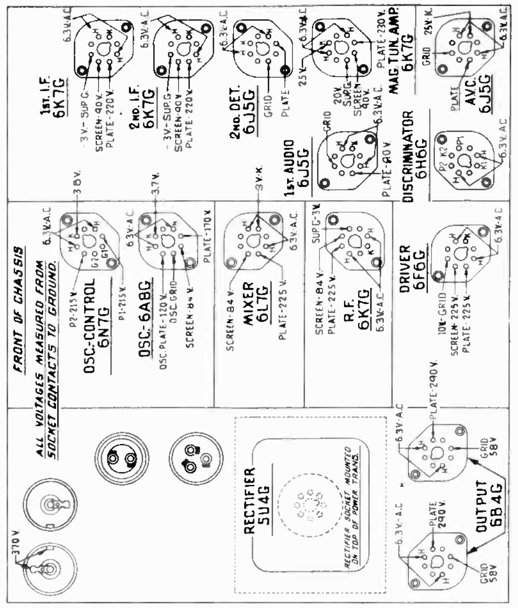


Fig. 2—Socket Voltages, Measured from Underside of Chassis

The voltages indicated by arrows were measured with a Philco 025 Circuit Tester which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.

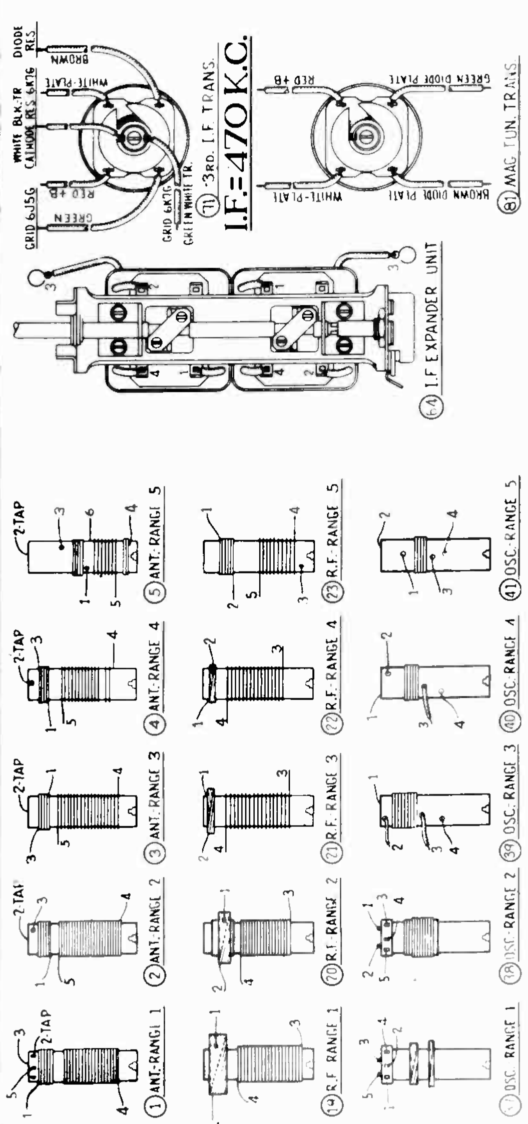


Fig. 5—Coil Wiring

The numbers on the coil leads correspond to those shown on the schematic diagram. For example: On Antenna transformer (1) lead No. 1 is connected to range switch wafer contact A6.

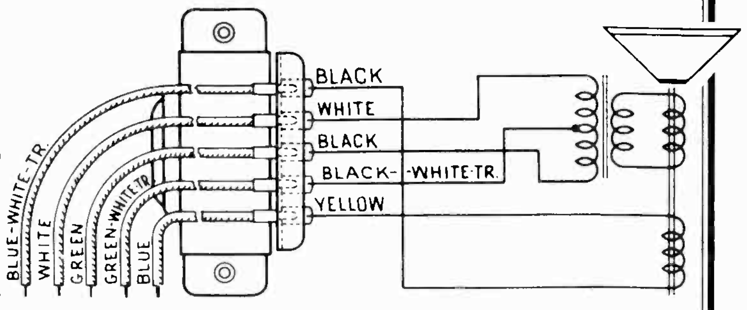


Fig. 6—Speaker Wiring

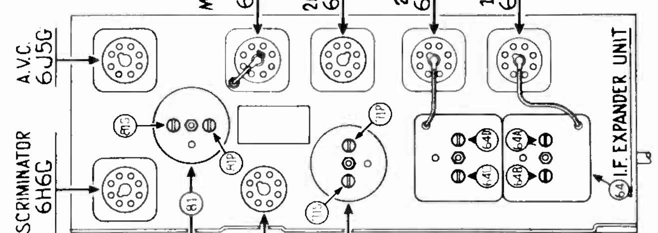


Fig. 7—Locations of I.F. Compensators
Top of I. F. Unit

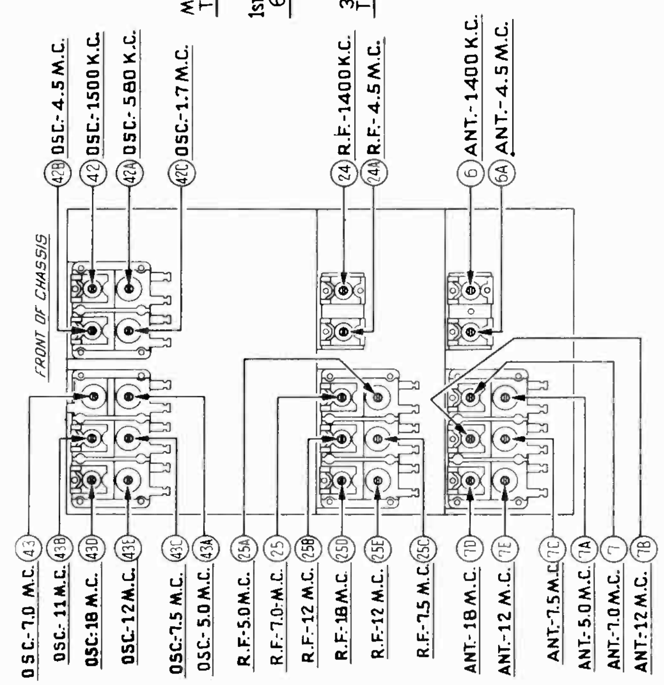


Fig. 8—Locations of R.F. Compensators
Underside of Chassis View

HUM ADJUSTMENT

With Volume control at minimum volume position, adjust Potentiometer (128) on power unit for minimum hum.

SHADOWMETER ADJUSTMENT
Code 121

Remove aerial and allow tubes to warm up. Then adjust shadow meter as follows:

1. Move the shadow meter coil backwards and forwards, until the opposite edges of the shadow are 1/8 of an inch from each end of the shadow screen, measuring along the bottom edge of the screen. Adjustment of the shadow meter light bracket may be necessary for perfect centering.

2. Remove the rectifier tube from its socket, and rotate coil until shadow reaches minimum width. This width must not exceed 1/8 of an inch.

3. Replace the 5U4G rectifier tube in its socket. The shadow should then widen to not more than 1/16 inch or less than 1/32 inch from each side of the screen measuring along the bottom edge. If these limits are not obtained readjust the shadow meter as given in paragraphs 1 and 2 until they are reached.

MODEL 37-116 (Codes 121,122)
Chassis Views

PHILCO RADIO & TELEV. CORP.

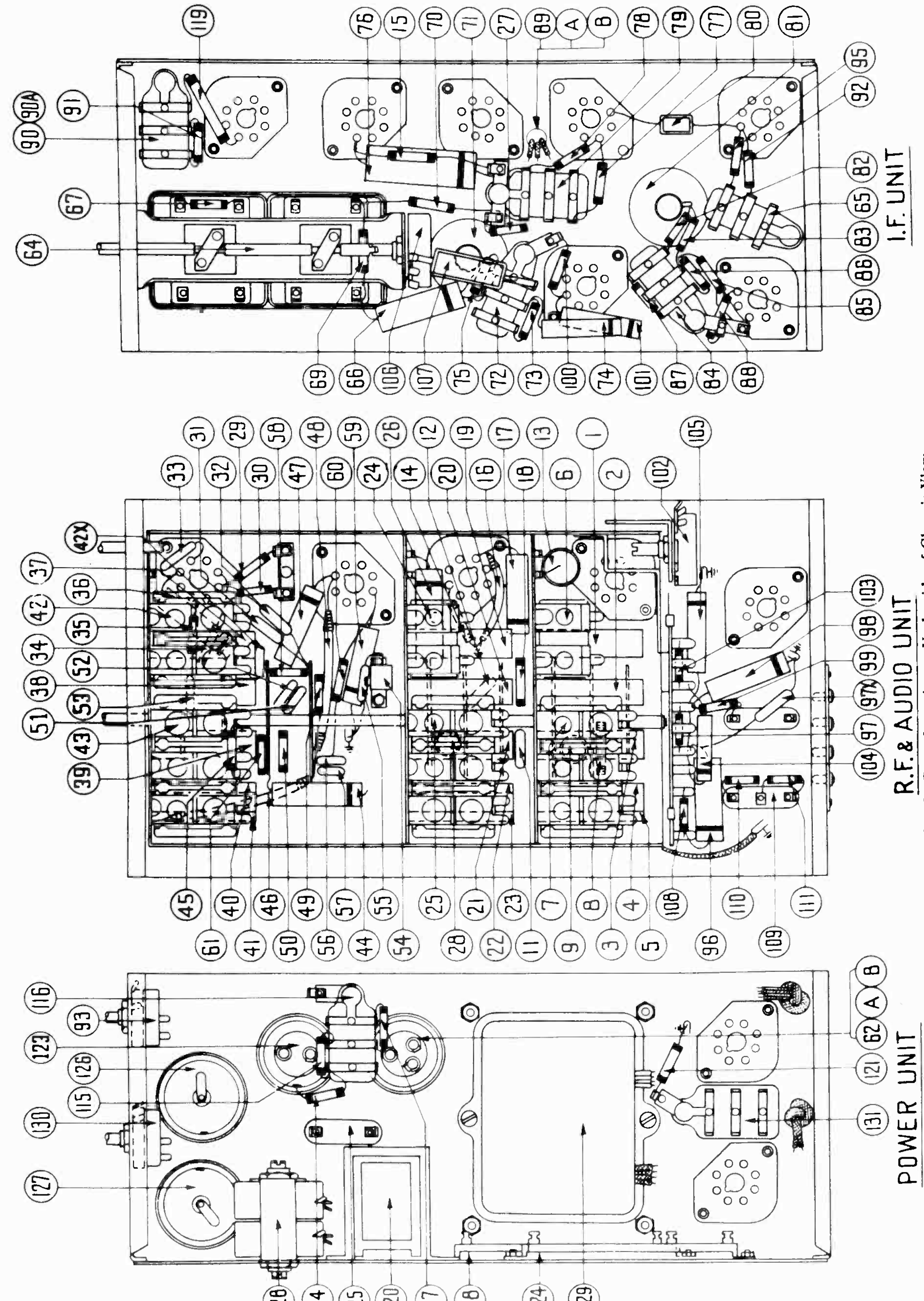


Fig. 3—Parts Locations—Underside of Chassis View

PHILCO RADIO & TELEV. CORP.

MODEL 37-116(Codes 121,122)
Alignment

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 SIGNAL GENERATOR, covering from 110 to 20,000 K. C. is recommended for adjusting the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 CIRCUIT TESTER contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Handle Screw-driver No. 27-7059 completes the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 7 and 8.

NOTE—The receiver should be allowed to heat for at least 15 minutes before adjusting the compensators.

OUTPUT METER

The 025 Output Meter is connected to the plate and cathode terminals of the 6F6G tube. Adjust the meter to use the (0-30) Volt Scale.

DIAL CALIBRATION

In order to adjust this receiver correctly the dial must be aligned to track properly with the tuning condenser. To do this proceed as follows:

1. Loosen the set screws on the shaft coupling of the tuning condenser. Then turn the tuning condenser until the plates are in the maximum capacity position. Now set the glowing beam indicator on the index line at the low frequency end of the broadcast band. With dial and tuning condenser in this position tighten set screws.

2. Turn the tuning condenser control until the indicator is on the first division from the index line.

3. With the dial in this position, loosen the shaft coupling set screws. Then turn the dial until the indicator is again on the index line. Tighten the set screws in this position.

NOTE: Be careful when turning the dial that the position of the tuning condenser is not disturbed.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1. Connect the 088 Signal Generator output lead in series with a .1 mfd. condenser to the grid of the 6L7G tube, and the ground connection of the output lead to the chassis.

2. Set the receiver volume control in the maximum position. Turn the fidelity-selectivity control clockwise; magnetic tuning control in the "off" position (counter-clockwise); range switch in position No. 1 (Broadcast); tuning condenser to approximately 580 K. C., and adjust the signal generator for 470 K. C.

3. Now adjust compensators **(64B)** 1st I.F. Sec., **(64A)** 1st I.F. Pri., **(64D)** 2nd I.F. Sec., **(64C)** 2nd I.F. Pri., **(71S)** 3rd I.F. Sec., and **(71P)** 3rd I.F. Pri. for maximum output.

4. Turn the fidelity-selectivity control to the expanded position (counter-clockwise). The intermediate frequency curve is now checked for symmetry as follows: Slowly shift the signal generator dial between 460 K. C. and 480 K. C. As the dial is turned two peaks will be indicated on the output meter—one about 465 K. C., and the other about 475 K. C. These peaks should give the same deflection or reading on the output meter. If they are unequal, compensator (71S) must be readjusted slightly to the right or left—depending on which peak gives the lowest reading—until they are equalized.

Each time the compensator is set in another position, rotate the signal generator dial through 460 to 480 K. C. and note the reading of each peak on the output meter. If the peaks become more equal when compensator (71S) is turned to the left, continue in this direction until they are equal. If they become more unequal turn the compensator to the right. Continue this adjustment in either direction until the peaks equalize.

5. After adjusting the third I.F. transformer, turn the fidelity-selectivity control clockwise (selective position) and adjust the attenuator of the signal generator for maximum output. Now tune the primary compensator (81P) of the magnetic tuning transformer for minimum output.

RADIO FREQUENCY CIRCUIT

Tuning Range 11.5-18.2 M. C.

1. The signal generator output lead with the .1 mfd. condenser, is connected to terminal No. 1 on the aerial input panel (rear of chassis) and the generator ground lead to terminal No. 3. Terminals 2 and 3 must be connected with the shorting link provided on the panel.

2. Set the magnetic tuning control in the "off" position, and the fidelity-selectivity control in the extreme clockwise position. Set the range switch in position No. 5 (11.5 to 18.2 M. C.) Turn the receiver and signal generator dials to 18 M. C. and adjust the generator attenuator for a readable indication on the output meter. Now adjust compensator (43D) by turning the screw (clockwise) to the maximum capacity position, then slowly turn it counter-clockwise until a second maximum peak is reached on the output meter. The first peak from maximum capacity is the image signal and the receiver *must not* be adjusted to this signal. On some receivers, however, only one peak will be found, therefore, adjust compensator (43D) to this peak. If the above procedure is correctly performed, the image signal will be found at 17.060 M. C. by advancing the signal generator input, and turning the receiver dial to this frequency mark on the scale.

3. Leaving the signal generator and receiver dials at 18 M. C. the antenna and R. F. compensators **(7D)** and **(25D)** are now adjusted by connecting a variable condenser (Philco Part No. 45-2325) across the oscillator compensator **(43D)** contact (first contact from the left side of the receiver facing rear underside view of the chassis) and ground. Now tune the added condenser until the second harmonic of the receiver oscillator beats against the signal from the generator, resulting in a maximum indication on the output meter. Note: It may be necessary to increase the signal generator output to obtain a signal of sufficient strength for reading on the output meter. Compensators **(7D)** and **(25D)** are now adjusted for maximum output. After these adjustments, remove the external condenser and readjust compensator **(43D)** as given in paragraph 2 above.

4. Turn the signal generator and receiver dials to 12 M. C. and adjust compensators **(43E)**, **(25E)** and **(7E)** for maximum output.

5. Readjust compensator **(43D)** as given in paragraph 2 above, for maximum output.

6. Readjust compensators **(7D)**, **(25D)** and **(43D)** as given in paragraph 3 above. This readjustment is to correct any variation that the low frequency compensator may have caused in the high end of this range.

Tuning Range (7.35-11.6 M. C.)

1. Turn selector switch to Range 4. Set the signal generator and receiver dials to 11.0 M. C. Now adjust compensator **(43B)** for maximum output. Check for image at 10.06 M. C.

2. Leaving signal generator and receiver dial turned to 11.0 M. C., connect the external variable condenser across the oscillator compensator **(43B)** contact (third contact from left side of the receiver facing rear underside view of chassis) and ground. Tune the added condenser for maximum output, then adjust compensators **(7B)** and **(25B)** for maximum output. Remove the added condenser and adjust **(43B)** for maximum.

3. Turn the signal generator and receiver dials to 7.5 M. C. and adjust compensators **(43C)**, **(25C)** and **(7C)** for maximum output.

4. Readjust compensator **(43B)** as given in paragraph 1 above.

5. Readjust compensators **(7B)**, **(25B)** and **(43B)** as given in paragraph 2 above.

Tuning Range (4.7 to 7.4 M. C.)

1. Turn selector switch to range 3. Set the signal generator and receiver dials for 7.0 M. C. and adjust compensators **(43)**, **(25)** and **(7)** for maximum output.

2. Rotate the signal generators and receiver dials to 5.0 M. C., then adjust compensators **(43A)**, **(25A)** and **(7A)** for maximum output.

3. Readjust compensators **(43)**, **(25)** and **(7)** on the 7.0 M. C. signal.

Tuning Range (1.58 to 4.75 M. C.)

1. Turn the selector switch to range 2. Set the signal generator and receiver dials to 4.5 M. C. Now adjust compensators **(42B)**, **(24A)** and **(6A)** for maximum output.

2. Rotate the signal generator and receiver dials to 1.7 M. C. Compensator **(42C)** Osc. series is now adjusted for maximum output as follows:

First tune compensator **(42C)** for maximum output, then vary the tuning condenser of the receiver for maximum output about the 1.7 M.C. dial mark. Now turn compensator **(42C)** slightly to the right or left and vary the receiver tuning condenser for maximum output. If the output reading increases, turn compensator **(42C)** in the same direction a trifle more, and again vary the tuning condenser for maximum output. If the output decreases, set the compensator in the opposite direction. This procedure of first setting the compensator and then varying the tuning condenser is continued until there is no further gain in output reading.

3. Readjust compensators **(42B)**, **(24A)** and **(6A)** for maximum output as given in paragraph 1 above.

Tuning Range (530 to 1600 K. C.)

1. Set selector switch in range 1. Rotate the signal generator and receiver dial to 1500 K. C. Adjust compensators **(42)**, **(24)** and **(6)** for maximum output.

2. Turn the signal generator and receiver dials to 580 K. C. Compensator **(42A)** Osc. series is now adjusted, using the same procedure as given in paragraph 2 under Tuning Range (1.58 to 4.75 M. C.). The only difference in the two adjustments is the frequency and compensator used.

3. Readjust compensator (42) on 1500 K. C. and compensators (24) and (6) on a 1400 K. C. signal.

ADJUSTMENT OF THE MAGNETIC TUNING CONTROL

1. Leave the selector switch in position 1. Set the fidelity-selectivity control in the "selective" position (clockwise). Magnetic tuning in the "out" position. Turn the signal generator and dial to 1000 K. C., then adjust the receiver tuning condenser for maximum output.

NOTE: It is very important to accurately adjust the receiver tuning condenser, also, adjust the signal generator attenuator to maximum output.

2. Turn the (Magnetic Tuning Control) to the "on" position (clockwise). Compensator **(81S)** Sec. of magnetic tuning transformer is now adjusted for maximum output. If the indicator of the output meter goes off scale, turn the volume control of the receiver toward the minimum position until a readable indication is obtained.

3. The above adjustment is now checked for accuracy, by turning the magnetic tuning control "off". When this is done there should be no change in the tone of the receiver signal. If a change of tone or a hiss develops, it indicates a shift in frequency and the adjustment must be made again.

MODEL 37-116(Codes 121,122)
Parts List

PHILCO RADIO & TELEV. CORP.

Replacement Parts—Model 37-116

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (Range 1)	32-2108	$0.80
2	Antenna Transformer (Range 2)	32-2146	.80
3	Antenna Transformer (Range 3)	32-2183	.60
4	Antenna Transformer (Range 4)	32-2185	.70
5	Antenna Transformer (Range 5)	32-2175	.80
6	Compensator, 2 Gang	31-6093	.40
7	Compensator (6 Sections)	31-6112	1.40
8	Resistor (51000 ohms ½ watt)	33-351339	.20
9	Condenser (.05 mfd. Tubular)	30-4020	.20
10	Tuning Condenser	31-1892	3.75
11	Condenser (40 mmfd.)	30-1076	....
12	Condenser (5 mmfd.)	30-1077	....
13	Condenser (.05 mfd. Tubular)	30-4123	.20
14	Resistor (1. megohm, ½ watt)	33-510339	.20
15	Resistor (1000 ohms, ½ watt)	33-210339	.20
16	Resistor (400 ohms wirewound)	33-3016	.20
17	Condenser (.05 mfd. Tubular)	30-4444	.20
18	Resistor (10000 ohms, ½ watt)	33-310339	.20
19	R. F. Transformer (Range 1)	32-2105	.75
20	R. F. Transformer (Range 2)	32-2147	.60
21	R. F. Transformer (Range 3)	32-2177	.60
22	R. F. Transformer (Range 4)	32-2178	.60
23	R. F. Transformer (Range 5)	32-2176	.70
24	R. F. Compensator (2 Section)	31-6093	.40
25	R. F. Compensator (6 Section)	31-6113	1.40
26	Condenser (.05 mfd. Tubular)	30-4123	.20
27	Resistor (51000 ohms, ½ watt)	33-351339	.20
28	Condenser (.05 mfd. Tubular)	30-4020	.20
29	Resistor (99000 ohms, ½ watt)	33-399339	.20
30	Resistor (99000 ohms, ½ watt)	33-399339	.20
31	Condenser (250 mmfd. Mica)	30-1032	.25
32	Condenser (250 mmfd. Mica)	30-1032	.25
33	Resistor (700 ohms Wirewound)	33-170339	.20
34	Resistor (20 ohms, ½ watt)	33-020339	.20
35	Resistor (20 ohms, ½ watt)	33-020339	.20
36	Condenser (.02 mfd. Tubular)	30-4481	....
37	Oscillator Transformer (Range 1)	32-2191	.80
38	Oscillator Transformer (Range 2)	32-2194	.80
39	Oscillator Transformer (Range 3)	32-2197	.50
40	Oscillator Transformer (Range 4)	32-2198	.50
41	Oscillator Transformer (Range 5)	32-2199	.50
42	Compensator Oscillator (4 Section)	31-6124	1.00
42X	Condenser (600 mmfd.)	30-1049	....
43	Compensator Oscillator (6 Section)	31-6117	1.20
44	Condenser (.05 mfd. Tubular)	30-4123	.20
45	Resistor (8000 ohms, ½ watt)	33-280339	.20
46	Resistor (200 ohms Wirewound)	7217	.20
47	Condenser (.02 mfd. Tubular)	30-4481	.20
48	Resistor (100 ohms Wirewound)	33-3023	.25
49	Resistor (75000 ohms, ½ watt)	33-375339	.20
50	Resistor (20000 ohms, ½ watt)	33-320339	.20
51	Condenser (250 mmfd. Mica)	30-1032	.25
52	Condenser (600 mmfd. Mica)	30-1049	.25
53	Condenser (600 mmfd. Mica)	30-1049	.25
54	Coil (Osc. Plate)	32-2242	.25
55	Condenser (200 mmfd. Mica)	30-1047	.25
56	Condenser (55 mmfd. Mica)	30-1045	.20
57	Condenser (25 mmfd. Mica)	30-1067	.20
58	Resistor (10000 ohms, ½ watt)	33-310339	.20
59	Condenser (.01 mfd. Tubular)	30-4169	.25
60	Resistor (32000 ohms, ½ watt)	33-332339	.20
61	Resistor (20000 ohms, ½ watt)	33-320339	.20
62	Electrolytic Condenser (2, 3, 8 mfd.)	30-2169	1.60
63	Condenser (.05 mfd. Tubular—Code 121 only)	30-4123	....
64	Expander Unit	38-7929	....
65	Condenser (.1 mfd. Bakelite)	4989SG	.35
66	Condenser (.05 mfd. Tubular)	30-4123	.20
67	Resistor (1000 ohms, ½ watt)	33-210339	.20
68	Shadowmeter	45-2189	....
69	Resistor (1000 ohms, ½ watt)	33-210339	.20
70	Resistor (1000 ohms, ½ watt)	33-210339	.20
71	Third I. F. Transformer	32-2215	....
72	Condenser (110 mmfd. Dual Bakelite)	8035DG	.25
73	Resistor (51000 ohms, ½ watt)	33-351339	.20
74	Condenser (.004 mfd. Tubular)	30-4185	.25
75	Resistor (160,000 ohms, ½ watt)	33-416339	.20
76	Condenser (.25 mfd. Tubular)	30-4134	.25
77	Resistor (500 ohms, ½ watt)	33-150339	.20
78	Resistor (4000 ohms, ½ watt)	33-240339	.20
79	Condenser (.05 mfd. Dual Bakelite)	3615DG	.40
80	Condenser (110 mmfd. Mica)	30-1031	.20
81	Magnet Tuning Transformer	32-2217	....
82	Resistor (490,000 ohms, ½ watt)	33-449339	.20
83	Resistor (490,000 ohms, ½ watt)	33-449339	.20
84	Condenser (110 mmfd. Dual Bakelite)	8035DG	.25
85	Resistor (490,000 ohms, ½ watt)	33-449339	.20
86	Resistor (1 meg. ohm, ½ watt)	33-510339	.20
87	Resistor (1 meg. ohm, ½ watt)	33-510339	.20
88	Resistor (490,000 ohms, ½ watt)	33-449339	.20
89	Condenser (Three section .1, .1, .8 mfd.)	30-4466	1.40
90	Condenser (.01 mfd. Dual Bakelite)	3903DG	.30
91	Resistor (20,000 ohms, ½ watt)	33-320339	.20
92	Resistor (1.0 meg., ½ watt)	33-510339	.20
93	Switch (Mag. Tuning)	42-1216	.75
94	Flood Lamp (Code 122)	34-2039	....
95	Resistor (490,000 ohms, ½ watt)	33-449000	.20
96	Condenser (.05 mfd. Tubular)	30-4123	.20
97	Resistor (51,000 ohms, ½ watt)	33-351339	.20
97X	Condenser (110 mmfd. Mica)	30-1031	....
98	Condenser (.05 mfd. Tubular)	30-4123	.20
99	Resistor (99,000 ohms, ½ watt)	33-399339	.20
100	Resistor (1 meg., ½ watt)	33-510339	.20
101	Condenser (.01 mfd. Tubular)	30-4124	.25
102	Volume Control	33-5158	1.00
103	Resistor (70,000 ohms, ½ watt)	33-370339	.20
104	Condenser (.008 mfd. Tubular)	30-4112	.20
105	Condenser (.006 mfd. Tubular)	30-4445	.20
106	Potentiometer (Expander unit)	33-5172	....
107	Condenser (100 mmfd. Mica)	30-1035	....
108	Resistor (240,000 ohms, ½ watt)	33-424339	.20
109	Input Audio Transformer	32-7057	3.50
110	Resistor (25,000 ohms, ½ watt)	33-325339	.20
111	Resistor (25,000 ohms, ½ watt)	33-325339	.20
112	Output Transformer	32-7717	2.00
113	Cone and Voice Coil	36-3647	2.25
114	Resistor (330,000 ohms, ½ watt)	33-433339	.20
115	Resistor (160,000 ohms, ½ watt)	33-416339	.20
116	Condenser (.1 mfd. Dual Bakelite)	4989DG	.40
117	Resistor (51,000 ohms, ½ watt)	33-351339	.20
118	Resistor (14,000 ohms, ½ watt)	33-3291	....
119	Resistor (20000 ohms, 1 watt)	33-320439	$0.20
120	Choke (Filter)	32-7491	.95
121	Resistor (18 ohms, ½ watt)	33-020439	.20
122	Field Coil (W. Speaker)	36-3788	....
123	Electrolytic Condenser (8 and 10 mfd.)	30-2123	1.60
124	Resistor (1000 and 4000 ohms)	33-3289	.50
125	Choke (Filter)	32-7056	2.20
126	Electrolytic Condenser (8 mfd.)	30-2026	1.05
127	Electrolytic Condenser (8 mfd.)	30-2026	1.05
128	Potentiometer (Dual 60 ohms)	33-5176	....
129	Power Transformer 115 Volts, 60 Cycle	32-7688	7.50
	Power Transformer 115 Volts, 25 to 40 Cycle	32-7689	....
	Power Transformer, 220 Volts	32-7690	....
130	Power and Tone Switch	42-1196	.75
131	Condenser (.015 mfd. Dual Bakelite)	4989DG	.40
132	Range Switch (Osc)	42-1217	2.00
133	Range Switch (R. F.)	42-1212	1.60
134	Range Switch (Ant.)	42-1211	1.60
135	Pilot Lamp (Codes 121-122)	34-2039	.15
136	Shadowmeter Lamp (Code 121 only)	34-2039	.15

USED ON CODES 121-122

Description	Part No.		List Price
Dial Screen Holder Assembly	31-1900		.30
Coupling Assembly (Tuning Condenser)	31-1907		....
Screw	W-650		....
Set Screw	W-644		....
Brace (Drive Mtg.)	28-4119		.05
Volume Control Shaft	38-8061		....
Retaining Clip	28-4394		....
Spring	28-4117	Per C	.40
Shaft & Index Plate (Range Switch)	42-1208		.50
Socket (8 Prong)	27-6058		.11
Socket (7 Prong)	27-6057		.11
Socket (Power Transformer)	27-6061		....
Tube Shield	28-2726		.10
Tube Shield Base	28-3898		.03
Tube Shield (6N7G)	8005		.10
Tube Shield Base (6N7G)	8004		.03
Mtg. Grommet (R. F. Unit)	27-4317		.04
Mtg. Sleeve (R. F. Unit)	28-2257		.01
Mtg. Screw (R. F. Unit)	W-729	Per C	.45
Mtg. Spacer (R. F. Unit) Code 121	27-8339	Per C	.40
Mtg. Spacer (R. F. Unit) Code 122	27-7807		....
Mtg. Washer	28-3927		.01
Mtg. Rubber Tuning Condenser	27-4325		....
Mtg. Spring Shadowmeter	28-8623	Per C	.70
Mtg. Plate (R. F. Transformer)	28-3808		.02
Mtg. Spacer (R. F. Transformer)	27-8228		.01
Mtg. Screw (R. F. Transformer)	W-1635	Per C	.30
Terminal Panel Antenna	38-7714		.15
Terminal Cover (Speaker)	36-3672		.15
Knob	27-4330		.10
Knob	27-4331		.10
Knob	27-4332		.10
Knob	27-4326		.10
Cable (Speaker)	41-3220		.50
A. C. Plug and Cord	L-2288		....
Fuses	45-2046		....
Chassis Mtg. Rubber	3558		....
Rubber Bushing (Small)	27-4359		....
Rubber Bushing (Large)	27-4360		....
Speaker, W	36-1219		....
Speaker, Felt	27-8498		....
Acoustic Clarifier (Type K)	36-1155		....
Bottom Shield	38-8142		....
Snap Fasteners	28-4279		....
Pilot Lamp Assembly	38-7909		.40

CODE 121

Description	Part No.		List Price
Dial	27-5249		.40
Hub	28-7187		.12
Clamp	28-2837		.10
Set Screw	W-1641		.02
Gear (Dial)	28-7185		.10
Gear Drive	31-1884		....
Thrust Spring	28-8611		.01
Thrust Washer	28-3976	Per C	.30
C Washer	28-3904		.01
Mask	27-5206		.30
Mask Arm and Link Assembly	31-1899		.50
Mask Washer	27-8318	Per C	.50
Mask Guide and Bracket	38-7876		.25
Drive Mounting Assembly	31-1901		....
Vernier Drive	31-1895		....
Bezel Frame and Plate Assembly (Cabinet)	40-5948		.80
Glass	27-8300		.06
Ring	28-3988		.45
Gasket	27-8313		.01

CODE 122

Description	Part No.	List Price
Auto Dial Tuning Assembly Complete	31-1886	....
Dial Scale	27-5207	....
Gasket (Dial Scale)	27-8398	....
Mask and Link Assembly	45-2328	....
Mask Guide	28-4118	....
Ring (Retaining Mask Assembly)	28-7195	....
Spring (Retaining Mask Assembly)	28-8629	....
Indexing Plunger	31-1898	....
Plunger Stop and Switch Assembly	45-2330	....
Range Switch Shaft Coupling	28-7198	....
Felt Washer	27-8399	....
Washer	W-495	....
Snap Fastener	28-4279	....
Indexing Handle	45-2329	....
Handle Cover	28-4077	....
Set Screws	28-6493	....
Screws (Cover)	W-1669	....
Dial Escutcheon Assembly	45-2324	....
Flood Lamp Assembly	38-7937	....
Bezel Frame and Plate Assembly (Cabinet)	40-5980	....
Bezel Gasket	27-8517	....
Screw	W-480	....
Station Tab Kit	40-6013	....

Figures in black type indicate circled figures in Base View.

Prices Subject to Change without Notice.

PHILCO RADIO & TELEV. CORP.

MODEL 37-600
Schematic
Socket, Trimmers
Parts List

Replacement Parts for Model 37-600

Schematic Number	Part and Description	Part No.	Price List
1	Volume Control	33-5152	$1.45
2	Condenser (35 Mmf. Mica)	30-1044	.20
3	Ant. Transformer	32-2144	1.40
4	Tuning Condenser	31-1794	3.00
5	Compensator (Det. K.C.)	Part of 4	...
6	Compensator (Osc. K.C.)	Part of 4	...
7	Resistor (300 ohm)	33-3010	.20
8	Condenser (.05 mf. Twin Bakelite)	3615-DG	.40
9	Resistor (4900 ohm, ½ watt)	33-249339	.20
10	Condenser (.09 mf. Twin Bakelite)	4989-DG	.40
11	Resistor (51,000 ohm, ½ watt)	33-351339	.20
12	Resistor (25,000 ohm, ½ watt)	33-325339	.20
13	Resistor (25,000 ohm, 1 watt)	33-325439	.20
14	Osc. Transformer	32-2043	1.20
15	Condenser (110 mmf. Mica)	30-1031	.20
16	Compensator (Osc. Series) (600 K.C.)	04000 S	.35
17	Resistor (25,000 ohm, ½ watt)	33-325339	.20
18	Compensator (I.F. Pri) (460 K.C.)	Part of 19	...
19	I.F. Transformer	32-2031	1.50

Schematic Number	Part and Description	Part No.	Price List
20	Compensator (I.F. Sec.) (460 K.C.)	Part of 19	...
21	Condenser (50 mmf. Mica)	30-1029	.20
22	Resistor (1.5 meg., ¼ watt)	33-515139	.20
23	Sensitivity Compensator	31-6086	.45
24	Condenser (.09 mf.)	Part of 10	...
25	Resistor (10,000 ohm, ¼ watt)	33-310339	.20
26	Resistor (240,000 ohm, ½ watt)	33-424339	.20
27	Condenser (.01 mf.)	30-4169	.20
28	Condenser (.00025 mf.) Mica	30-1032	.25
29	Resistor (750,000 ohm, ¼ watt)	33-475339	.20
30	Resistor (1.0 meg., ¼ watt)	33-510339	.20
31	Condensor (.02 mf.) (Tubular)	30-4113	.20
32	Output Transformer	32-7567	1.00
33	Voice Coil Cone Assy	36-3029	.60
34	Field Coil Assy	36-3609	2.50
35	Elec. Condenser (4 mf.)	30-2149	1.95
36	Resistor (300 ohm)	33-3121	.25
37	Condenser (.05 mf.)	Part of 8	...
38	Elec. Condenser (8.0 mf.)	Part of 35	...
39	Power Transformer (110 V., 60 Cycle)	32-7552	3.25
40	Condenser (.015 mf. Twin)	3793-DG	.40
41	Pilot Lamp (6.3 Volt)	34-2064	.09

Schematic Number	Part and Description	Part No.	Price List
	Power Transformer (230 V., 50-60 Cycle)	32-7554	...
	Power Transformer (110 V., 25 Cycle)	32-7553	5.75
	Tube Shield Body	28-2726	.10
	Tube Shield Base	28-3898	.03
	Tube Socket (7-prong)	27-6057	.11
	Tube Socket (8-prong)	27-6058	.11
	Tube Socket (5-prong)	27-6053	.11
	Volume Control Mtg. Nut	W-648-A	.20C
	Chassis Mtg. Screw	W-1656-A	.75C
	Chassis Mtg. Nut	W-124-A	.35C
	Chassis Mtg. Washer	W-151-A	.15C
	Chassis Mtg. Washer	W-291-A	.40C
	Baffle	40-5951	...
	Dial	27-5193	.15
	Knob (Station Selector)	27-4308	.10
	Knob (Volume, On-Off)	27-4309	.10
	Bottom Shield Assy	29-3795	.40
	Bottom Shield Ins.	27-8122	.05
	Pointer	28-3789	.03
	Pilot Lamp Bracket Assy	38-7529	.30
	A.C. Cord Assy	L-2183	.40
	Speaker, B6	36-1205	6.00
	Aerial Lead	38-5144	.30

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

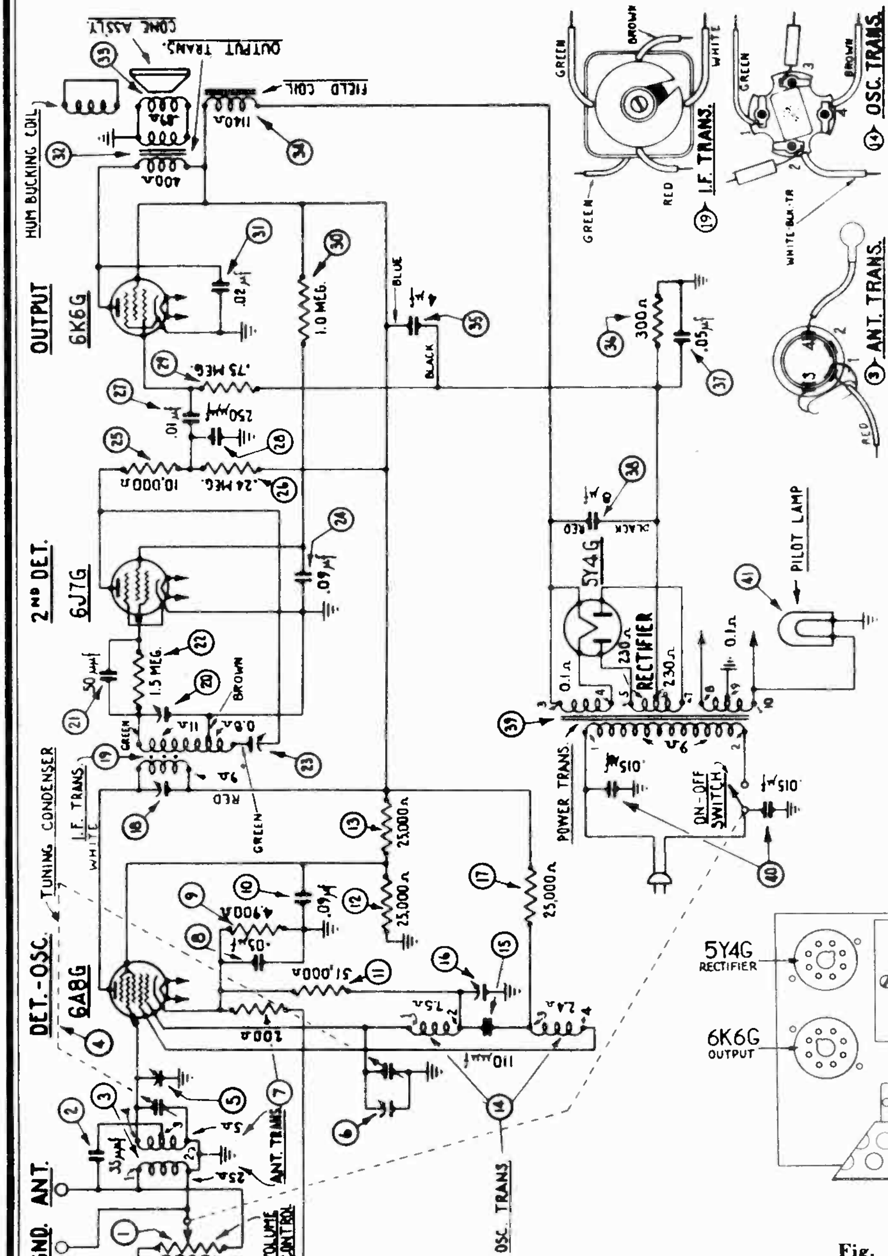


Fig. 4. Schematic Wiring Diagram

Specifications

TYPE CIRCUIT: Superheterodyne with pentode output.

POWER SUPPLY: 115 V., 60 cycle A.C.

TUBES USED: 1 type 6A8G, Det. Osc., 1 type 6J7G, 2nd Det., 1 type 6K6G, Output, 1 type 5Y4G Rectifier.

FREQUENCY RANGE: 530-1800 K.C.

INTERMEDIATE FREQUENCY: 470 K.C.

CURRENT CONSUMPTION: 45 watts.

SPEAKER: B-6.

POWER OUTPUT: ½ watt.

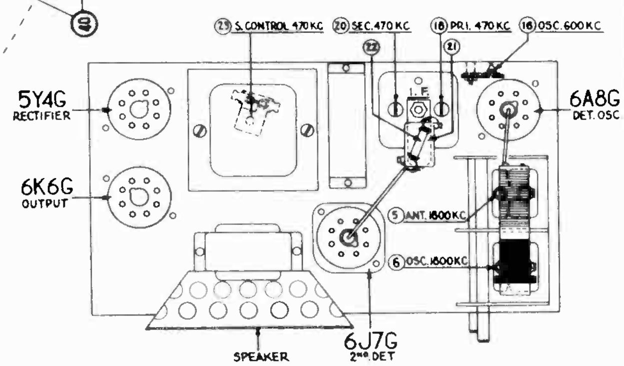


Fig. 1. Location of Compensators

MODEL 37-600
Voltage, Chassis
Alignment
Transformer Data

PHILCO RADIO & TELEV. CORP.

Adjusting Compensating Condensers

To accurately adjust the compensating condensers in the **Model 37-600** receiver, it is necessary to use a signal generator of high stability on all frequencies, such as the **PHILCO Model 088 Signal Generator.** This instrument has a continuous frequency range from 110 to 20,000 K.C., and is designed to meet every requirement of the serviceman.

An output meter is also needed,—**PHILCO MODEL 025 Circuit Tester** includes a very sensitive output meter.

Convenient tools to use in adjusting the compensators are the **Philco No. 3164 Fibre Wrench** and **No. 27-7059 Fibre Handled Screw-driver.**

The locations of the various compensating condensers are shown in Fig. 1. Connect the output meter to the plate and cathode contacts of the 6K6G power tube, and adjust it to use the 0-30 volt range.

When adjusting each circuit, care should be taken to have the signal generator attenuator set for approximately ¼ scale reading on output meter.

Intermediate Frequency Circuit

1. Connect the 088 signal generator output lead through a .1 mfd. condenser to the grid of the 6A8G tube and the ground lead to the chassis.

2. Turn the sensitivity compensator (23) to maximum capacity position (clockwise), and then release it; 1½ turns (counter-clockwise).

3. Turn gang condenser to approximately 600 K.C. Set the signal generator at 470 K.C.

4. Adjust the compensator (18) and (20) for maximum reading on the output meter. Then turn the sensitivity compensator (23) clockwise until a hiss, (oscillation) is heard. Now turn the compensator (23) counter-clockwise until hiss ceases, then continue for ¼ turn more.

Radio Frequency Circuit

1. Remove the signal generator output lead from the 6A8G tube, and connect it to the aerial lead of the receiver through a 100 mmfd. condenser.

2. Turn the gang condenser to minimum capacity position, (counter-clockwise) and place a .006" (six-thousands inch) gauge between the stator and rotor plates. Now turn the gang clockwise until stator and rotor plates touch gauge.

3. Remove gauge from gang condenser. Now set signal generator at 900 K.C., (using second harmonic 1800 K.C.), adjust compensators (6) and (5) for maximum reading on output meter.

4. Turn the signal generator and receiver gang condenser to 600 K.C., and adjust compensator (16). In doing so, the gang condenser must be rolled slightly above and below the 600 K.C. signal until the maximum reading is indicated on the output.

5. Turn the gang condenser to 1800 K.C. and signal generator to 900 K.C., (using second harmonic of signal generator 1800 K.C.), readjust compensator (6) for maximum reading on output meter. Set gang as per paragraph 2, for this adjustment.

6. Turn the gang condenser and signal generator to 1400 K.C., readjust compensator (5) for maximum reading on output meter. After the above adjustments are completed and receiver is placed in the cabinet, the dial pointer is properly placed by turning the signal generator to 1000 K.C. Then tune receiver for maximum signal. The dial pointer is then placed on gang shaft, so that it indicates 1000 K.C. on dial.

POWER TRANSFORMER DATA

TERMINAL	A.C. VOLTS	CURRENT	CIRCUIT	COLOR
1-2	120		PRIMARY	WHITE
5-7	580	50 M.A.	SECONDARY	YELLOW
3-4	5.0	2.0 A.	FIL. RECT	BLUE
8-10	6.3	1.5 A.	FILAMENTS	BLACK
6			CENTER TAP OF 5-7	YELLOW, GREEN TRACER
9			CENTER TAP OF 8-10	BLACK, YELLOW TRACER

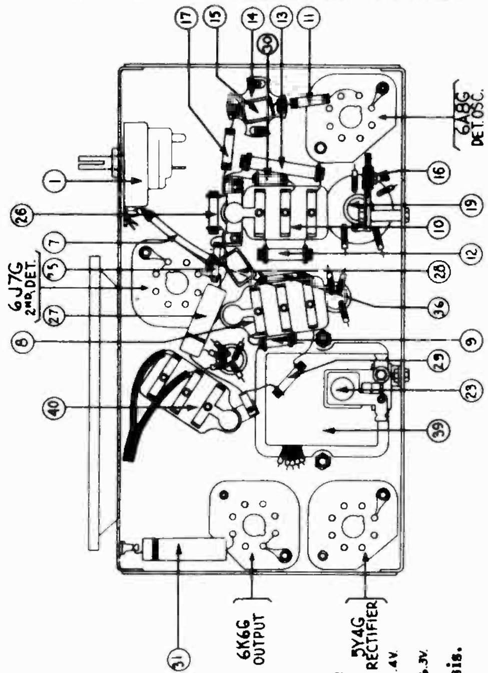


Fig. 3. Base View

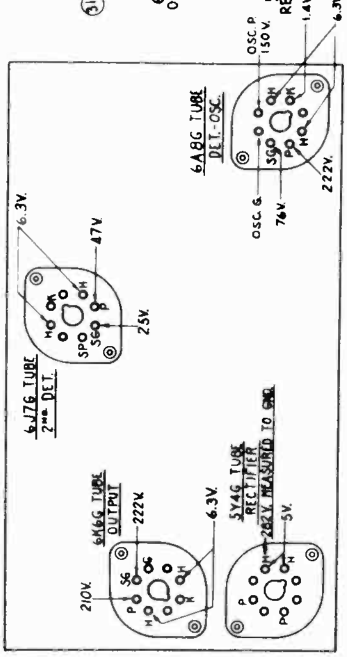


Fig. 2. Tube Sockets as Viewed from Underside of Chassis. (Measured from Socket Terminal to Ground Volume Control in Maximum Position)

MODEL 37-602
Schematic
Parts

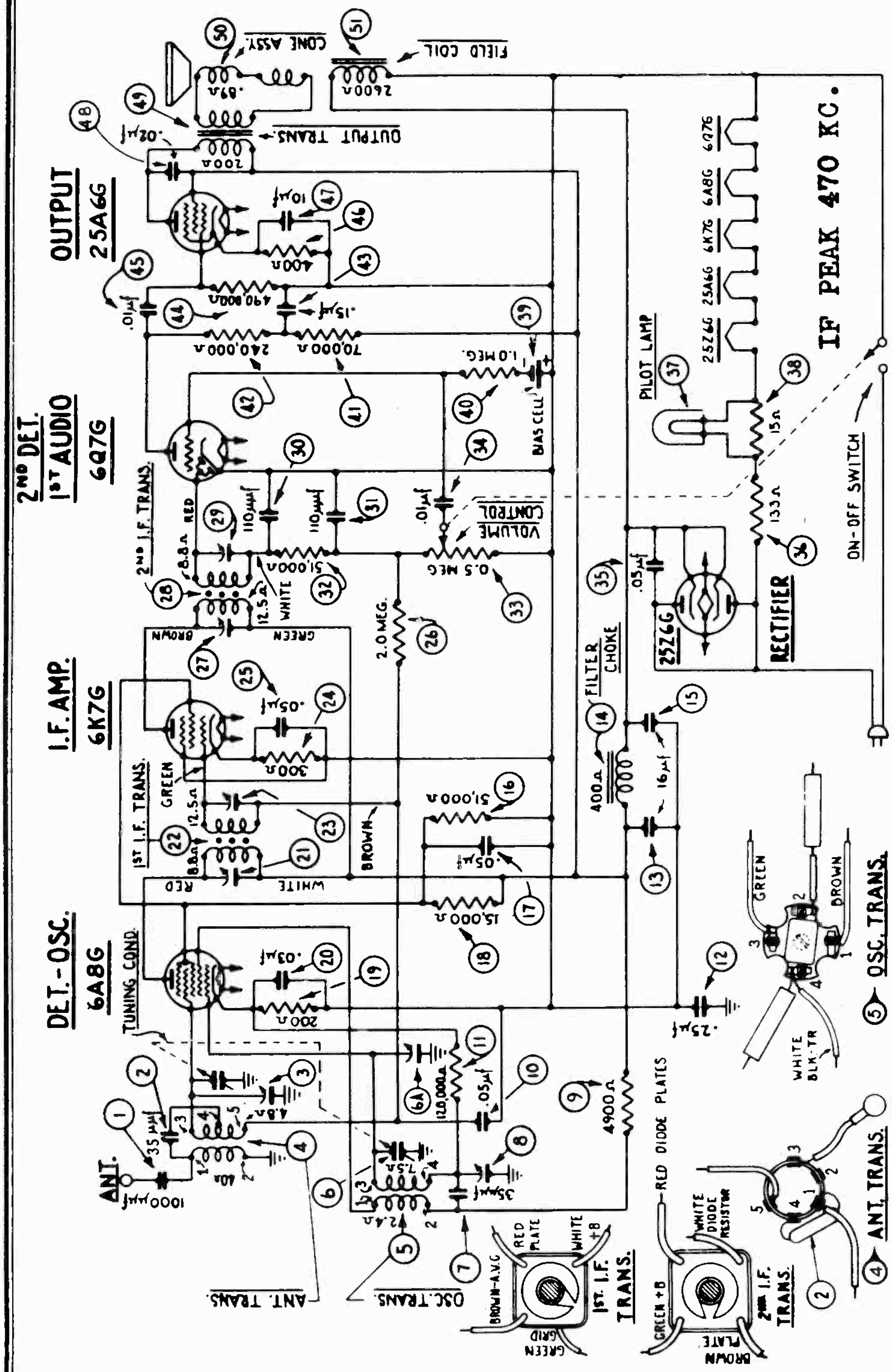
PHILCO RADIO & TELEV. CORP.

Schematic Number	Part and Description	Part No.	Price List
①	Condenser (.001 Mf. Tubular)	30-4201	$.20
②	Condenser (35 mmf. Mica)	30-1044	.20
③	Compensator (Ant. 1800 KC.)		
④	Ant. Transformer	32-2140	1.40
⑤	Osc. Transformer	32-2041	1.20
⑥	Tuning Condenser	31-1794	3.00
⑥a	Compensator (Osc. 1800 KC.)		
⑦	Condenser (35 mmf. Mica)	30-1044	.20
⑧	Compensator (Osc. Series) (600 Kc.)	04000S	.35
⑨	Resistor (4900 ohm, ½ watt)	33-249339	.20
⑩	Condenser (.05 Mf. Bakelite)	3615-OSU	.35
⑪	Resistor (120,000, ½ watt)	33-412339	.20
⑫	Condenser (.25-.05-.05-.05-.15-.01 mf.)	30-4410	1.00
⑬	Elec. Condenser (16-16-10 mf.)	30-2148	3.20
⑭	Filter Choke	32-7544	.95
⑮	Elec. Condenser (16 mf.)	Part of ⑬	...
⑯	Resistor (51,000 ohm, ¼ watt)	33-351339	.20
⑰	Condenser (.05 mf.)	Part of ⑫	...
⑱	Resistor (15,000 ohm, ¼ watt)	33-315339	.20
⑲	Resistor (300 ohm wirewound)	33-3010	.20
⑳	Condenser (.03 mf. Bakelite)	8318-OSU	.35
㉑	Compensator (1st I.F. Pri.)	Part of ㉓	...
㉒	1st I.F. Transformer	32-2005	1.50
㉓	Compensator (1st I.F. Sec.)	Part of ㉒	...
㉔	Resistor (300 ohm wirewound)	33-3010	.20

Replacement Parts

for Model 37-602

PRICES SUBJECT TO CHANGE WITHOUT NOTICE



Schematic Number	Part and Description	Part No.	Price List
㉕	Condenser (.0.5 mf.)	Part of ⑫	...
㉖	Resistor (2.0 meg., ¼ watt)	33-520339	.20
㉗	Compensator (2nd I.F. Pri.)	Part of ㉘	...
㉘	2nd I.F. Transformer	32-2006	1.50
㉙	Compensator (2nd I.F. Sec.)	Part of ㉘	...
㉚	Condenser (.00011 mf. twin)	8035-ODU	.25
㉛	Condenser (.00011 mf.)	Part of ㉚	...
㉜	Resistor (51,000 ohm, ¼ watt)	33-351339	.20
㉝	Volume Control (0.5 meg.)	33-5145	1.45
㉞	Condenser (.01 mf. Tubular)	30-4145	.20
㉟	Condenser (.05 mf.)	Part of ⑫	...
㊱	Resistor (133-15 ohm)	33-3235	.55
㊲	Pilot Lamp	34-2068	.16
㊳	Resistor (15 ohm)	Part of ㊱	...
㊴	Bias Cell	41-8009	.20
㊵	Resistor (1.0 meg., ¼ watt)	33-510339	.20
㊶	Resistor (70,000 ohm, ¼ watt)	33-370339	.20
㊷	Resistor (240,000 ohm, ¼ watt)	33-424339	.20
㊸	Condenser (.15 mf.)	Part of ⑫	...
㊹	Resitor (490,000 ohm, ¼ watt)	33-449339	.20
㊺	Condenser (.01 mf.)	Part of ⑫	...
㊻	Resistor (400 ohm wirewound) (Flexible)	33-3122	.25
㊼	Elec. Condenser (10 mf.)	Part of ⑬	...
㊽	Condenser (.02 mf. Tubular)	30-4113	.20
㊾	Output Transformer	32-7566	1.10
㊿	Voice Coil Cone Assy	36-3029	.60
(51)	Field Coil Assy	36-3040	2.40
	Volume Control Mtg. Nut	W-684-A	1.25C
	B.C. Resistor Mtg. Screw	W-650-A	.40C
	B.C. Resistor Mtg. Nut	W-95-A	.30C
	Tube Shield Base	28-3898	.03
	Tube Shield Body	28-2726	.10

Part and Description	Part No.	Price List
Chassis Mtg. Screw	W-1656-A	.75C
Chassis Mtg. Nut	W-124-A	.35C
Chassis Mtg. Washer	W-151-A	.15C
Chassis Mtg. Washer	W-291-A	.40C
Speaker Baffle	40-5951	...
Dial	27-5193	...
Pointer	28-3789	...
Shield Bottom Assy	38-7765	...
Shield Bottom Insulator	27-8182	.02
Tube Socket (7-prong)	27-6057	.11
Tube Socket (5-prong)	27-6053	.11
Knob (Volume, On-Off)	27-4309	.10
Knob (Station Selector)	27-4308	.10
Elec. Condenser Support	6440	.05
Elec. Condenser Insulator	27-7836	.06
Pilot Lamp Bracket Assy	38-7513	.50
Ant. Coil Bracket	28-3546	.03
Bias Cell Assy	38-7436	.15
Speaker B4	36-1194	6.00
A.C. Cord Assem.	L-2183	.40
Aerial Lead Assem.	38-5144	.30

MODEL 37-602
Voltage, Socket

PHILCO RADIO & TELEV. CORP.

Trimmers, Chassis
Alignment

Adjusting Compensating Condensers

To accurately adjust the compensating condensers in the Model 37-602 receiver, it is necessary to use a signal generator of high stability on all frequencies such as the **PHILCO Model 088 Signal Generator.** This instrument has a continuous frequency range from 110 to 20,000 K.C., and is designed to meet every requirement of the serviceman.

An output meter is also needed,—**PHILCO Model 025 Circuit Tester** includes a very sensitive output meter.

Convenient tools to use in adjusting the compensators are the **PHILCO No. 3164 Fibre Wrench** and **No. 27-7059 Fibre Handled Screw-driver.**

The locations of the various compensating condensers are shown in Fig. 1. Connect the output meter to the plate and cathode contacts of the (25A6G) power tube and adjust it to use the 0-30 volt range.

Intermediate Frequency Circuit

1. Turn the gang condenser to the maximum capacity position (extreme clockwise) and set the Volume Control of the receiver at the maximum position (extreme clockwise).

2. Connect the signal generator output lead through a .1 mfd. condenser to the grid of the 6K7G tube, and the generator ground lead to any point of chassis.

3. Set the signal generator at 470 K.C. and adjust (27) and (29) for maximum reading on the output meter.

4. Remove signal generator output lead and .1 mfd. condenser, from the grid of 6K7G and connect it to the grid of 6A8G. Now adjust condensers (21) and (23) for maximum reading on the output meter.

Radio Frequency Circuit

1. Remove the signal generator output lead from the 6A8G tube and connect it to the aerial lead of the receiver through a 100 mmfd. condenser. Turn the gang condenser to the minimum capacity position (extreme counter clockwise) and place a .006" (six thousandth inch) gauge between the stator and rotor plates. Now turn the gang clockwise until stator and rotor plates touch gauge.

2. Remove gauge from gang condenser. Now set signal generator at 900 K.C. (using second harmonic (1800 K.C.) adjust compensators (6)A and (3) for maximum reading on the output meter.

3. Turn the signal generator and receiver gang condenser to 600 K.C., and adjust compensator (8). In doing so, the gang condenser must be rolled slightly above and below the 600 K.C. signal until the maximum reading is indicated on the output meter.

4. Turn the gang condensor to 1800 K.C. and signal generator to 900 K.C., (using second harmonic of signal generator 1800 K.C.). readjust compensator (6)A for maximum reading on output meter. Set gang as given in paragraph 1, for this adjustment.

5. Turn the gang condenser and signal generator to 1400 K.C., readjust compensator (3) for maximum reading on output meter. After the above adjustments are completed and receiver is placed in the cabinet, the dial pointer is properly placed by turning the signal generator to 1000 K.C. Then tune receiver for maximum signal. The dial pointer is then placed on gang shaft, so that it indicates 1000 K.C. on dial.

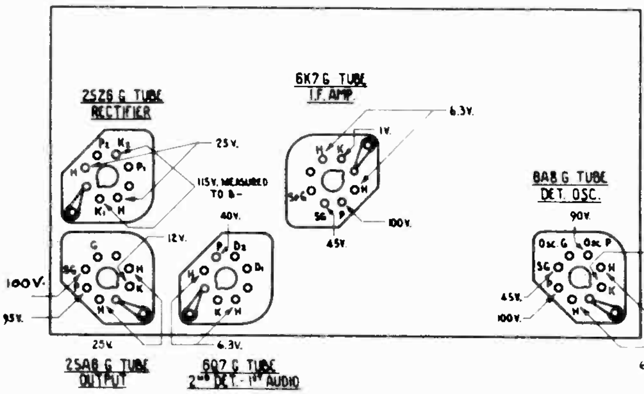


Fig. 2. Tube Sockets as viewed from underside of chassis. (Voltages measured from socket contacts to B—)

Specifications

TYPE CIRCUIT: Superheterodyne with pentode output.
POWER SUPPLY: 115 V., 25 or 60 cycle, A. C.; D. C.

FREQUENCY RANGE: 530--1800 K.C.
INTERMEDIATE FREQUENCY: 470 K.C.
CURRENT CONSUMPTION: 55 watts.
SPEAKER: B-4.
POWER OUTPUT: ¾ watt.

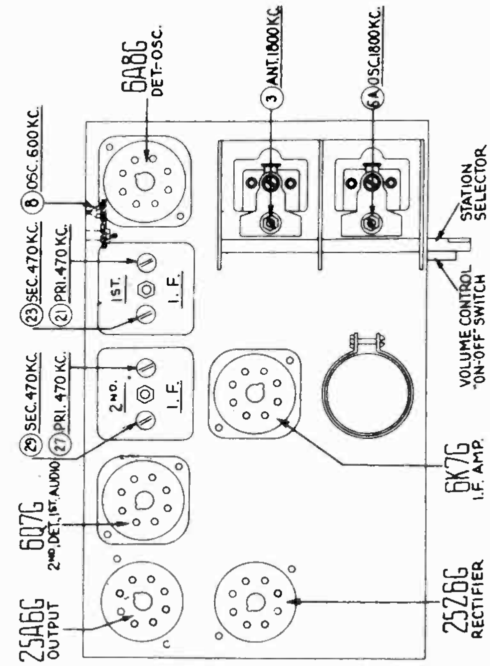


Fig. 1. Location of Compensators

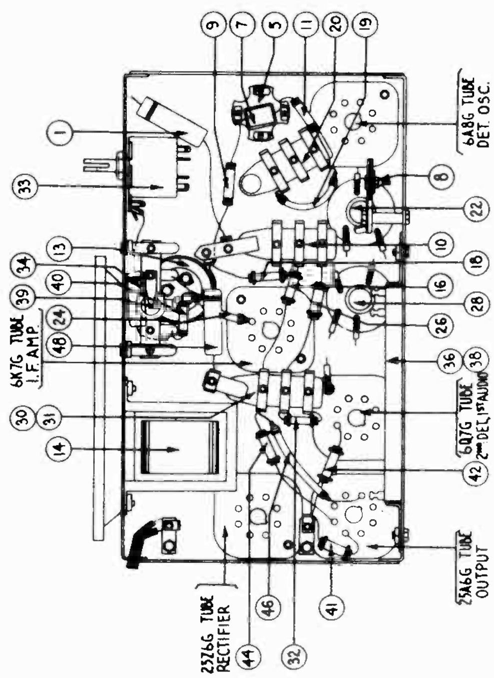


Fig. 3. Base View

MODEL 37-604
Schematic

PHILCO RADIO & TELEV. CORP.

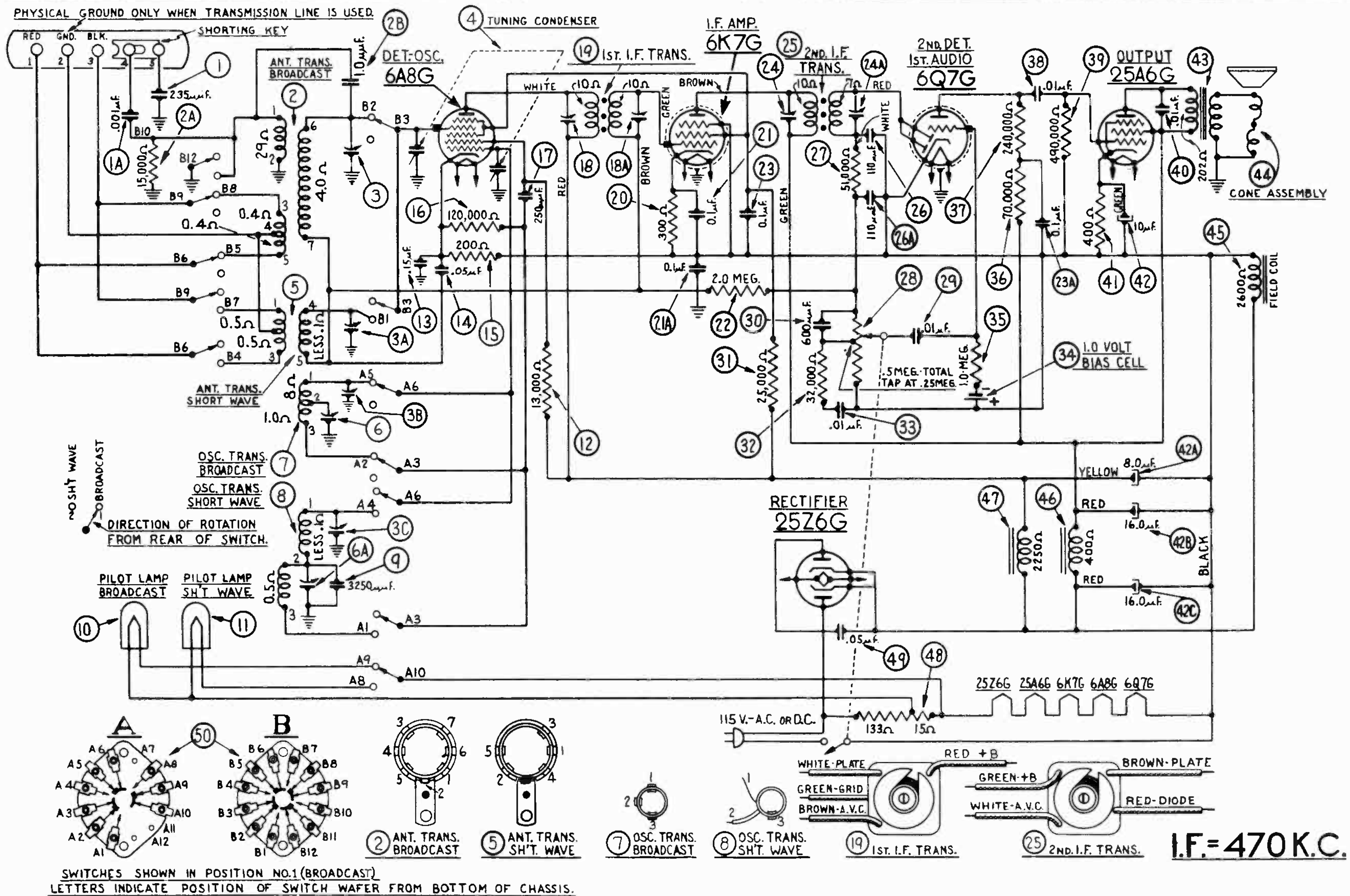


Fig. 2—Schematic Diagram

Electrical Specifications

Type of Circuit: Superheterodyne with pentode output.

Power Supply: 115 V., D.C., or A.C., 25 to 60 cycles.

Power Consumption: 50 watts.

Speaker: B-5.

Power Output: ¾ watt.

Philco Tubes Used: 1 type 6A8G, Detector-Oscillator; 1 type 6K7G, I. F.; 1 type 6Q7G, 2nd Detector, A. V. C., and 1st audio; 1 type 25A6G, Output; and 1 type 25Z6G, Rectifier.

Tuning Ranges: Two. Range 1.— 530 to 1750 K. C.
Range 2.—6.0 to 18.0 M. C.

MODEL 37-604
Alignment
Notes

PHILCO RADIO & TELEV. CORP.

Adjusting Compensating Condensers

The following procedure must be observed in adjusting the compensators:

DIAL ADJUSTMENT—In order to adjust this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, rotate the tuning condenser control to the extreme counter-clockwise position (maximum capacity). Loosen the set screw of dial hub, then turn dial until the glowing indicator is centered on the first index line of dial scale (see Fig. 5). Now tighten the dial hub set screw in this position.

OUTPUT METER—The 025 Output Meter is connected to the plate and cathode terminals of the 25A6G tube. Adjust the meter to use the (0-30) volt scale. Before adjusting the compensators of each circuit, the signal generator attenuator should be set to give approximately ¼ scale reading on output meter.

INTERMEDIATE FREQUENCY CIRCUIT

1—Connect the 088 Signal Generator output lead through a .1 mfd condenser to the control grid of the 6K7G tube and the ground connection of the output lead to the chassis.

2—The range switch is set in position No. 1 (Broadcast). Rotate the tuning condenser of the receiver to the maximum capacity position (counter-clockwise) and adjust the signal generator for 470 K. C.

3—Now adjust compensators ㉔a 2nd I. F. Sec. and ㉔ 2nd I. F. Pri. for maximum output.

4—Remove the signal generator output lead and .1 mfd. condenser from the 6K7G tube and connect them to the grid of the 6A8G tube. Now adjust compensators ⑱a 1st I. F. Sec. and ⑱ 1st I. F. Pri. for maximum output.

RADIO FREQUENCY CIRCUIT

Tuning Range—6.0 to 18.0 M. C.

1—Remove the signal generator output lead and series condenser from the 6A8G tube and connect them to terminal No. 1 on aerial input panel, and the generator ground lead to terminal No. 3, front of chassis.
(a) Terminal 4 and 5 of aerial input panel must be shorted with connector link provided on the panel, during the following adjustments.

2—Set range switch in position No. 2 (Shortwave). Turn signal generator and receiver dials to 18 M. C. and adjust compensator ③c Osc. for maximum output.

3—The adjustment of the antenna compensator on the high frequency range causes a slight detuning of the oscillator circuit. In order to overcome this detuning effect, connect a variable condenser of approximately 350 mmfd, having a good vernier drive, across the oscillator section of the tuning condenser (bottom section). Leaving the signal generator and receiver dials at 18 M. C., tune the added condenser so that the second harmonic of the receiver oscillator will beat against the signal from the signal generator bringing in the signal. The antenna compensator ③a should then be adjusted to give maximum output.

4—Now remove the external condenser from the tuning condenser of receiver and turn compensator ③c Osc. to the maximum capacity position (clockwise). Then without moving signal generator or receiver tuning condenser, turn compensator ③c (counter-clockwise) until a second peak is reached on the output meter. The first peak is caused by tuning to the image frequency signal and must not be used. Compensator ③c is adjusted on the second peak to give maximum output.
A further check on the image signal may be obtained by turning the signal generator attenuator to maximum output. Then turn dial of receiver to approximately 17.060. If the receiver is aligned correctly and the signal from the generator is strong enough, the image signal will be heard at this point.

5—The low frequency compensator ⑥a is now adjusted by turning signal generator and receiver dials to 6 M. C. and adjusting compensator ⑥a Osc. series (see note (a) below) for maximum output.
(a) When compensator ⑥a Osc. series is being adjusted, the tuning condenser must be rolled for maximum output. This procedure is accomplished as follows:—First tune compensator ⑥a for maximum output at 6.0 M. C. Then vary the tuning condenser back and forth about the 6.0 M. C. dial mark until maximum output is obtained. Now retune compensator ⑥a, and again vary the tuning condenser back and forth at 6.0 M. C. for maximum output.
This operation of first tuning the compensator, then the tuning condenser is continued until the maximum output is obtained at or near the 6.0 M. C. frequency. The maximum output point of this adjustment may fall slightly above or below the 6 M. C. dial setting.

6—Compensator ③c Osc. and ③a Ant. are now retuned as given in paragraphs 3 and 4 above.

Tuning Range—530 to 1750 K. C.

1—Set range switch in position No. 1 (Broadcast). Turn the 088 Signal Generator indicator to 800 K. C. and the receiver dial to 1600 K. C. The second harmonic of the 800 K. C. signal, to which the signal generator is tuned, is used for the 1600 K. C. adjustment.
Now adjust compensators ③b Osc. and ③ Ant. for maximum output.

2—Turn the signal generator and receiver dials to 600 K. C. and adjust compensator ⑥ Osc. series (screw)—see note (a) below—for maximum reading on the output meter.
(a) When compensator ⑥ Osc. series is being adjusted, the tuning condenser must be rolled for maximum output. This procedure is accomplished as follows:—First tune compensator ⑥ for maximum output at 600 K. C. Then vary the tuning condenser back and forth until the maximum output point is reached. Now retune compensator ⑥ and again vary the tuning condenser back and forth at 600 K. C. for maximum output. This operation of first tuning the compensator then the tuning condenser is continued until the maximum output is obtained at, or near, the 600 K. C. frequency. The maximum output point of this adjustment may fall slightly above or below the 600 K. C. dial mark.

3—After the low frequency (600 K. C.) end of the range is adjusted, the 1600 K. C. end is readjusted, as given in paragraph (1) above, to correct any variation that the low frequency series compensator may have caused in the alignment of the high frequency end.

4—Now turn signal generator and receiver dials to 1400 K. C. and readjust compensator ③ Ant. for maximum output.

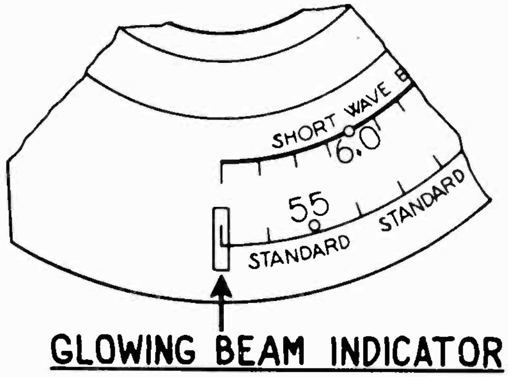


Fig. 5—Dial Calibration

Equipment for Adjusting Receiver

The accurate adjustment of the various compensating condensers is vital to the proper functioning of this receiver. There are four compensating condensers in the I. F. Circuit, four in the Oscillator Circuit, and two in the Antenna Circuit. Incorrect adjustment will cause loss of sensitivity, unsatisfactory tone, and poor selectivity.

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the **PHILCO MODEL 088 SIGNAL GENERATOR,** covering from **110** to **20,000 K. C.** is recommended to adjust the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 CIRCUIT TESTER contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Wrench No. 3164 and Fibre Handle Screw-driver No. 27-7059 complete the necessary equipment for these adjustments. The locations of the various compensators are shown in Fig. 6.

Antenna Connections

On the lower front corner of the chassis is a panel containing five terminals. When using the Philco High-Efficiency Aerial terminals 4 and 5 are connected by the metal strap provided on the panel. The red and black leads of the PHILCO High Efficiency Aerial are connected to terminals 1 and 3 respectively and the ground lead to terminal 2.

If a temporary aerial is used shift the strap to rest across terminals 3 and 4 and connect the aerial to terminal 1. A ground connection must not be used when terminals 3 and 4 are connected.

Pilot Lamp Replacement

Facing the front top of the receiver, the pilot lamp housing will be found directly under the dial scale. Two screws will be found on this housing. The right hand screw holds the housing to the tuning condenser and should be removed only when replacing the housing. The center screw holds the pilot lamp socket assembly to the housing. By removing this center screw, the socket assembly may be removed from the housing for replacement of Pilot Lamps.

MODEL 37-604
Socket, Trimmers
Voltage, Chassis

PHILCO RADIO & TELEV. CORP.

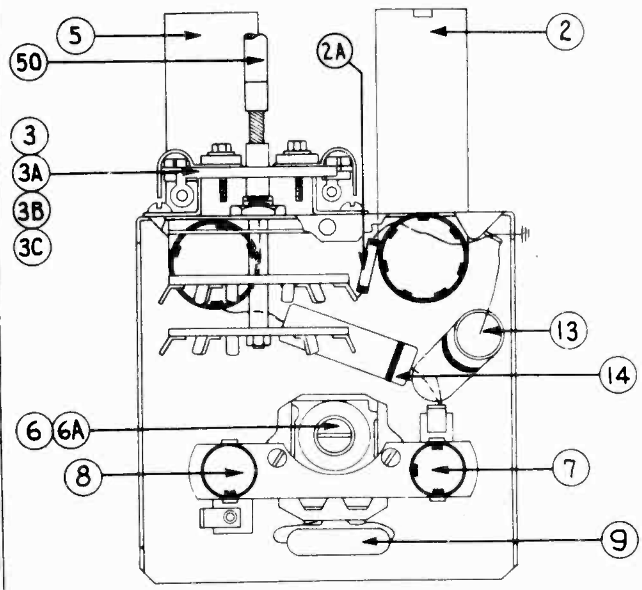


Fig. 3—Rear View of R. F. Unit

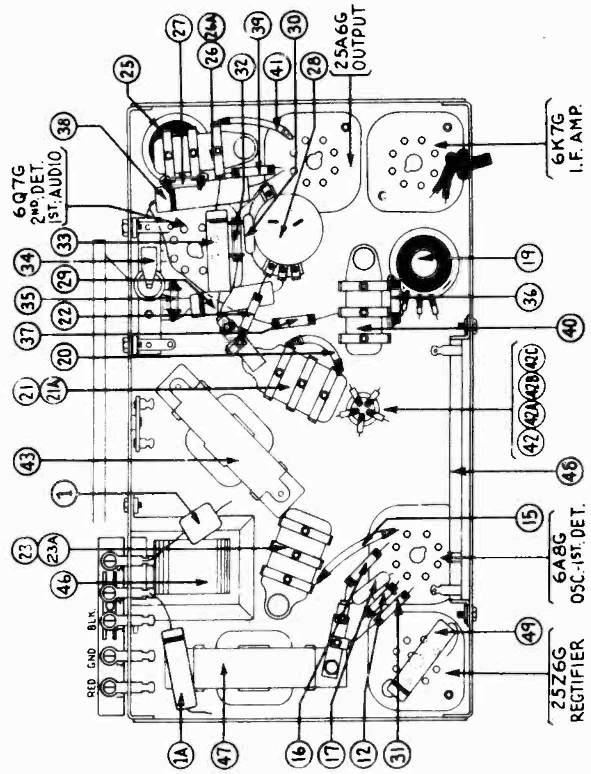


Fig. 4—Base View of Chassis—Underside of Chassis

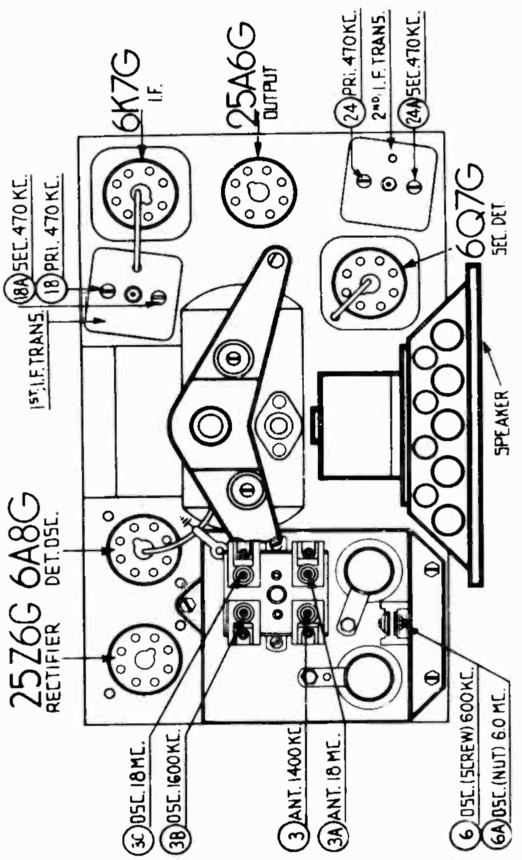


Fig. 6—Location of Compensating Condensers

SOCKET VOLTAGES

Measured from Socket Contact to B—

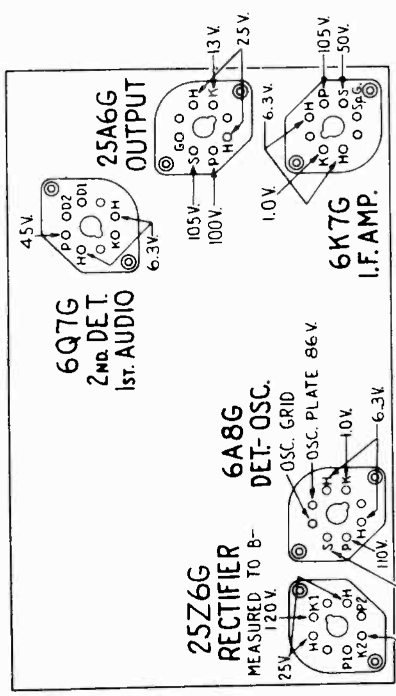


Fig. 1—View of Sockets from Underside of Chassis

The voltages indicated by arrows were measured with a PHILCO 025 CIRCUIT TESTER which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum. Range Switch in broadcast position. Line voltage 115 A. C.

MODEL 37-604
Circuit Data
Parts List

PHILCO RADIO & TELEV. CORP.

General Description

Philco Model 37-604 is a 5 tube superheterodyne receiver using the new Philco High Efficiency self-centering glass tubes and designed for operation on either alternating or direct current. This receiver has two tuning ranges, covering standard broadcast and short wave reception.

The circuit consists of the Philco Foreign Tuning System—controlled by the range switch which provides maximum sensitivity and noise reduction when used with the **New Philco High Efficiency Aerial.** A 6A8G tube is used as the detector-oscillator; 6K7G tube as the I. F. amplifier; 6Q7G tube for the second detector, first audio and automatic volume control; 25A6G tube for Pentode Power Output, and a 25Z6G tube as the Rectifier.

Automatic Bass Compensation is built into the volume control circuit and a Bias cell is used for supplying grid voltage to the first Audio tube.

The Radio Frequency circuit is assembled in one unit and mounted on the left side of the receiver (facing the front). This unit contains the antenna and oscillator coils for each tuning range, range switch, compensating condensers and other parts necessary for the operation of the associated circuits.

Mounted vertically and cushioned on the chassis is the tuning condenser. The bottom section of this condenser is for the oscillator tuning and the top section for the antenna circuit Attached to the condenser is the pilot lamp housing.

Replacement Parts—Model 37-604

Schem. No.	Description	Part No.	List Price
1	Condenser (235 mmfd. mica)	30-1037	$0.25
1a	Condenser (.001 mfd. tubular)	30-4453	.20
2	Antenna Transformer (Broadcast)	32-2141	.90
2a	Resistor (15,000 ohms ½ watt)	33-315339	.20
3	Compensator Ant. (1500 K. C.)	31-6085	.60
4	Tuning Condenser	31-1796	3.25
5	Antenna Transformer (S. W.)	32-2179	.55
6	Compensator (Osc. Series, screw, 600 K. C.)	31-6027	.70
7	Oscillator Transformer (Broadcast)	32-2047	.45
8	Oscillator Transformer (S. W.)	32-2048	.45
9	Condenser (3250 mmfd.)	30-1061	.45
10	Pilot Lamp (Broadcast)	34-2068	.16
11	Pilot Lamp (S. W.)	34-2068	.16
12	Resistor (13000 ohms ½ watt)	33-313339	.20
13	Condenser (.15 mfd. tubular)	30-4191	
14	Condenser (.05 mfd. tubular)	30-4020	.20
15	Resistor (200 ohms Wirewound)	33-3010	.20
16	Resistor (120000 ohms ½ watt)	33-412339	.20
17	Condenser (250 mmfd. mica)	30-1032	.25
18	Compensator (Pri. & Sec.)	Part of 19	
19	1st I. F. Transformer (470 K. C.)	32-2059	3.00
20	Resistor (200 ohms wirewound)	33-3010	.20
21	Condenser (.1 mfd. twin bakelite)	4989-ODU	.40
21a	Condenser (.1 mfd.)	Part of 21	
22	Resistor (2.0 megohms ½ watt)	33-520339	.20
23	Condenser (.1 mfd. Twin Bakelite)	4989-ODU	.40
23a	Condenser (.1 mfd. Bakelite)	Part of 23	
24	Compensator (Pri. & Sec.)	Part of 25	
25	2nd I. F. Transformer (470 K. C.)	32-2049	1.50
26	Condenser (110 mmfd. Mica Twin Bakelite)	8035-ODU	.25
26a	Condenser (110 mmfd. Mica Twin Bakelite)	Part of 26	
27	Resistor (51000 ohms ½ watt)	33-351339	.20
28	Volume Control (AC Switch)	38-7630	1.45
29	Condenser (.01 mfd. Tubular)	30-4124	
30	Condenser (110 mmfd. Mica)	30-1049	
31	Resistor (25000 ohms ½ watt)	33-325339	.20
32	Resistor (32000 ohms ½ watt)	33-332339	.20
33	Condenser (.01 mfd. Tubular)	30-4124	
34	Bias Cell (1.0 Volt)	41-8009	.20
35	Resistor (1.0 megohm ½ watt)	33-510339	.20
36	Resistor (70000 ohms ½ watt)	33-370339	.20
37	Resistor (240000 ohms ¼ watt)	33-424339	.20
38	Condenser (.01 mfd. Tubular)	30-4169	.20
39	Resistor (490000 ohms ½ watt)	33-449339	.20
40	Condenser (.01 mfd. Twin Bakelite)	3903-OSU	.25
41	Resistor (400 ohms Wirewound)	33-3122	.25
42	Condenser (10; 16; 16; and 8 mfd.)	30-2154	3.25
43	Output Transformer	32-7568	.95
44	Cone & Voice Coil	36-3029	.60

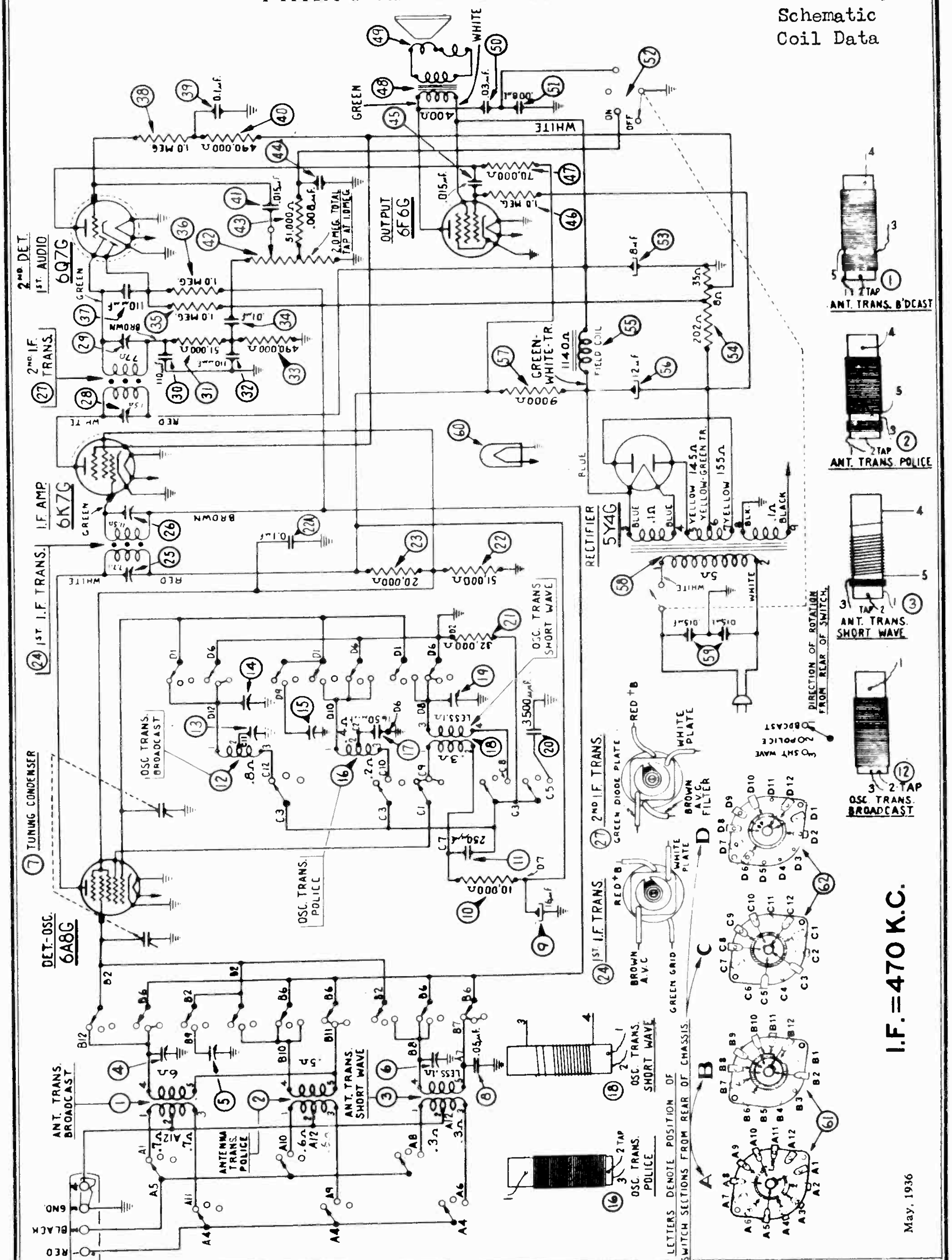
Schem. No.	Description	Part No.	List Price
45	Field Coil Assembly	36-3620	$2.75
46	Filter Choke	32-7572	1.00
47	Filter Choke	32-7569	1.30
48	Filament Resistor (15-133 ohms)	33-3235	.55
49	Condenser (.05 mfd. Tubular)	30-4020	.20
50	Range Switch	38-7631	1.50
	Speaker Assembly	36-1204	5.00
	Pilot Lamp Socket Assembly	38-7616	.80
	Pilot Lamp Housing Assembly	31-1816	
	Pilot Lamp	34-2068	.16
	Dial and Hub Assembly	31-1799	.60
	Socket 8 prong	27-6058	.11
	Socket 7 prong	27-6057	.11
	Tube Shield	28-2726	.10
	Tube Shield Base	28-3898	.03
	Bias Cell Panel Assembly	38-7436	.15
	Terminal Panel Assembly	38-7848	
	Terminal Panel Insulator	27-8360	
	Mtg. Bracket Tuning Condenser	28-3538	.12
	Mtg. Bracket Washer	27-4307	
	Mtg. Bracket Washer	3914	.03
	Mtg. Bracket Sleeve	28-3806	
	Mtg. Bracket Screw	W-1446A	Per C .40
	Shaft Centering Plate	28-3805	.08
	Split Gear Assembly	31-1787	.30
	Gear Tuning Shaft	28-6436	Per C .60
	Retaining Ring	28-8604	.02
	Nut, Volume & Range Switch	W-684	Per C 1.25
	Oscillator Coil Mtg. Plate	28-3808	.02
	Spacers	27-8228	.01
	Wire Panel R. F. Unit	38-7178	.02
	Screw Mtg. Coil		
	Bottom Shield & Insulator Assembly	38-7908	
	Felt Ring Assembly	36-3605	.10
	Baffle & Silk Assembly	40-5918	.20
	Cabinet Top	27-4300	
	Spring	28-8602	
	Cup	28-3842	
	Washer	27-8255	
	Felt Washer	27-8258	
	Felt Washer	27-8235	
	Knob Tuning	27-4330	.10
	Knob Vernier	27-4331	.10
	Knob Volume & Range Switch	27-4332	.10
	R. F. Housing Side	28-3770	.15
	R. F. Housing Back	28-3814	
	Screw Chassis Mtg.	W-599	Per C .50
	Washer Chassis Mtg.	W-151	Per C .20

Figures in black type indicate circled figures in base view.

Prices Subject to Change Without Notice

PHILCO RADIO & TELEV. CORP.

MODEL 37-610
Codes 121,122
Schematic
Coil Data



I.F. = 470 K.C.

May, 1936

MODEL 37-610
Codes 121,122
Circuit Data
Voltage
Transformer Data

PHILCO RADIO & TELEV. CORP.

Model 37-610

Codes, 121–122

General Description

Model 37-610 is a 5 tube superheterodyne receiver for operation on alternating current, having three tuning ranges, covering standard broadcast and short-wave frequencies and using the New Philco High-Efficiency self-centering glass tubes.

The circuit includes the Philco Foreign Tuning System—controlled by the range switch—providing maximum sensitivity and noise reduction when used with the Philco High Efficiency Aerial, supplied with the receiver.

The red and black leads of the High-Efficiency Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided at the rear of the chassis. Connect the jumper of the terminal panel across terminal 3 and 4.

If a temporary aerial is used, the jumper should be across terminal 2 and 3. The aerial connects to terminal 1 and the ground to terminal 3.

A good ground connection is desirable in all installations—with the Philco High-Efficiency Aerial, a ground lead and ground clamp are provided. Make the ground connection from the nearest water or radiator pipe to terminal 3 on the terminal panel.

CONSTRUCTION

The chassis is constructed in three basic assembly units.

The Radio Frequency unit contains a 6A8G tube which functions as a Detector-Oscillator, tuning condenser, antenna and oscillator coils for each tuning range, selector switch—compensating condensers for all coils and other parts necessary for the associated circuits. The unit is separately mounted on rubber grommets, cushioning it from the main chassis.

The Intermediate Frequency unit, mounted on the right-hand side of the chassis, facing front, consists of the Intermediate Frequency coils, compensating condensers, a 6K7G tube for I. F. Amplifier stage, and a 6Q7G tube as the second detector-automatic volume control and first audio stage.

All voltages supplied to the I. F. and R. F. units are furnished from a terminal strip mounted in this unit.

The Power Pack and audio output circuits, together with the required Voltage dividers and filter condensers are mounted in the power unit.

Although unit construction has changed the appearance of this model, the service bulletin will be of great assistance in checking through all stages of the receiver. The Wiring Diagram, as usual, is numbered, indicating all important parts. These numbers correspond with the parts layout shown in Fig. (6). In addition, the range switch wafers are shown on the schematic diagram. The contacts on each wafer are lettered and numbered to indicate their connection points in the schematic diagram, which are also lettered and numbered. The physical drawings of each coil used in the receiver are also shown on schematic diagram Fig. (5). The connections of these coils are numbered on the coil itself and on the schematic diagram.

Fig. 1 shows the Voltage measurements taken from the bottom of the sockets at each contact. In Fig. 2, the correct position of the dial indicator, for proper adjustment of the compensators is shown. Fig. 3, and 4, are the location of the I. F. and R. F. compensators respectively.

The Model 37-610 code 121 receiver is used in cabinets type B and J. In code 122 receiver, Type T cabinet is used. This receiver differs from code 121, only in the rectifier socket mounting and power transformer. The socket is placed adjacent to the 6F6G output tube and power transformer (Part No. 32-7626) is used. Location of rectifier socket is shown in Figs. 1 and 6.

Electrical Specifications

Voltage Rating) 115 Volts. A. C.
Frequency Rating: 50-60 and
For 25 to 40 cycle operation, use Power Transformer marked with asterisk in parts list.
Power Consumption: 60 Watts.
Type and Number of Tubes: 1 type 6A8G, Detector-Oscillator; 1 type 6K7G, I. F.; 1 type 6Q7G; 2nd Detector, A. V. C. and 1st audio; 1 type 6F6G, Output; and 1 type 5Y4G Rectifier.

Undistorted Output: 3 Watts.
Type Circuit: Superheterodyne with Pentode Output.
Intermediate Frequency: 470 K. C.
Tuning Ranges: 3. Range 1; 530 to 1720 Kilocycles.
Range 2; 2.3 to 7.4 Megacycles.
Range 3; 7.35 to 22 Megacycles.
Speaker Code: 121.—HS.
Speaker Code: 122.—S7.

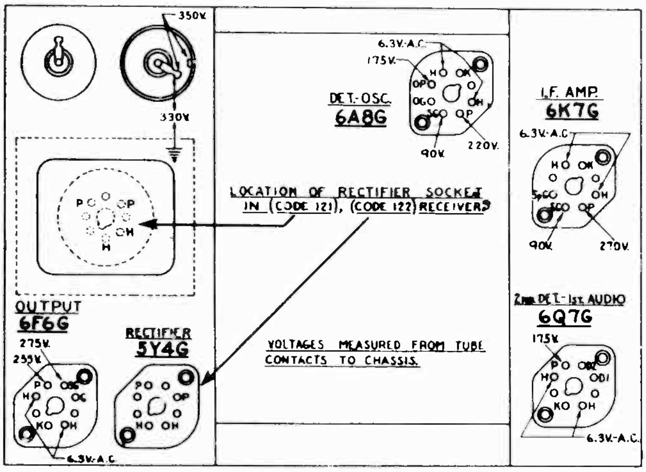


Fig 1—Tube Socket Voltages Viewed from Underside of Chassis

The Voltages Indicated by Arrows were Measured with a PHILCO 025 CIRCUIT TESTER which contains a 1000 ohm per volt Voltmeter. Range Switch in Broadcast Position. 115 volt line.

POWER TRANSFORMER DATA

Lead No. Shown on Schematic	A C Volts	Currents	Circuit	Color	Resistance
1-2	120	—	Pri.	White	5 ohms
3-4	5.0	2.0A	Fil. Rectifier	Blue	.1 ohms
5-7	670	70 M.A.	High Voltage Sec.	Yellow	145 ohms 155 ohms
6	—	—	Center Tap of 5-7	—	—
8-9	6.7	2.1A	Fil.	Black	.1 ohms

MODEL 37-610
Codes 121,122
Trimmers,
Alignment

PHILCO RADIO & TELEV. CORP.

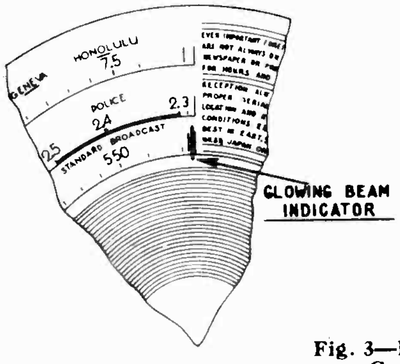


Fig. 2—Dial Calibration

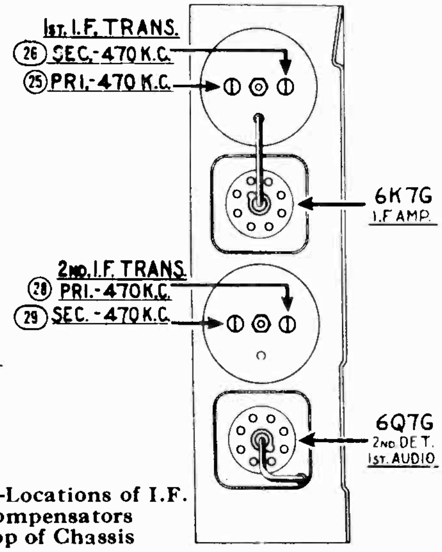


Fig. 3—Locations of I.F. Compensators Top of Chassis

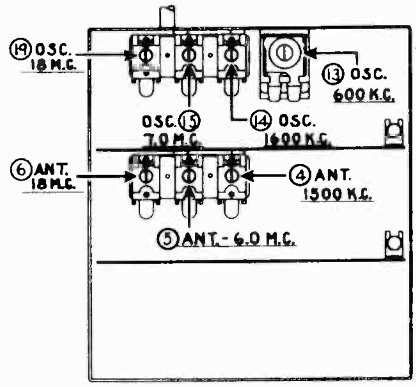


Fig. 4—Locations of R.F. Compensators Underside of Chassis

Alignment of Compensators

The accurate adjustment of the various compensating condensers is vital to the proper functioning of this receiver. There are four compensating condensers in the I. F. Circuit, four in the Oscillator Circuit, and three in the Antenna Circuit. Incorrect adjustment will cause loss of sensitivity, unsatisfactory tone, and poor selectivity.

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 SIGNAL GENERATOR, covering from 110 to 20000 K. C. is recommended to adjust the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 CIRCUIT TESTER contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Wrench No. 3164 and Fibre Handle Screw-driver No. 27-7059 complete the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 3 and 4.

The following procedure must be observed in adjusting the compensators:—

DIAL ADJUSTMENT—In order to adjust this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, rotate the tuning condenser control to the extreme counter-clockwise position (maximum capacity). Loosen the set screw of dial hub, then turn dial until the glowing indicator is centered between the index lines of dial scale (see Fig. 2). Now tighten the dial hub set screw in this position.

OUTPUT METER—The 025 Output Meter is connected to the plate and cathode terminals of the (6F6G) tube. Adjust the meter to use the (0-30) volt scale.

Before adjusting the compensators of each circuit, the signal generator attenuator should be set to give approximately ¼ scale reading on output meter.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1. Connect the 088 signal generator output lead through a .1 mfd. condenser to the control grid of the 6A8G and the ground connection of output lead to the chassis.
2. The tuning range switch is set in position No. 1 (Broadcast). Rotate the tuning condenser of receiver to the maximum capacity position (counter-clockwise), and adjust the signal generator for 470 K. C.
3. Adjust compensators (29) 2nd I. F. Sec., (28) 2nd I. F. Pri., (26) 1st I. F. Sec. and (25) 1st I. F. Pri. for maximum reading on output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range—7.3 to 22.0 M. C.

1. Remove the signal generator output lead from grid of 6A8G tube and connect it through a 0.1 mf. condenser to terminal No. 1 on aerial input panel, rear of chassis. Connect generator ground lead to chassis. Terminals 2 and 3 of aerial input panel must be connected with connector link provided on the panel.
2. Set tuning range switch in position No. 3. Turn signal generator and receiver dial to 18.0 M. C. and adjust compensators (19) osc., and (6) ant. for maximum output.
   The adjustment of the antenna compensator on the high frequency range causes a slight detuning of the oscillator circuit. In order to overcome this detuning effect, connect a variable condenser of approximately 350 mmf., having a good vernier drive, across the oscillator section of the tuning condenser. Leaving the signal generator and receiver dials at 18.0 M.C., tune the added condenser so that the second harmonic of the receiver oscillator will beat against the signal from the 088 signal generator. The antenna compensator (6) should then be adjusted to give maximum output. Now remove the external condenser and turn compensator (19) to maximum capacity (clockwise) then without moving signal generator or receiver tuning condenser, back off compensator (19) (counter-clockwise) until a second peak is reached on the output meter. Note:—The first peak is caused by tuning to the image signal and must be neglected.

Tuning Range: 2.3 to 7.4 Megacycles.

1. Turn range switch to position No. 2 (Police). Rotate signal generator and receiver dials to 7.0 M.C. Then adjust compensator (15) for maximum output. Now turn signal generator and receiver dials to 6.0 M.C. and adjust compensator (5) for maximum reading on output meter.

Tuning Range: 530 to 1720 Kilocycles.

1. Set range switch in position No. 1 (standard broadcast). The 088 signal indicator is set at 800 K. C. and the receiver dial at 1600 K. C.
   (a) In adjusting the receiver at 1600 K. C., the second harmonic of 800 K. C., to which the signal generator is tuned, is used.
   Now adjust compensator (14) osc., (4) ant. for maximum output.
2. The low frequency end of the band is now tuned by turning signal generator and receiver dials to 600 K. C. and adjust compensator (13) for maximum output. When compensator (13) osc. series is being adjusted, the tuning condenser must be rolled for maximum output. This is accomplished as follows: First tune compensator (13) for maximum output. Then vary the tuning condenser for maximum output about 600 K. C. Now retune compensator (13), and again vary the tuning condenser back and forth at 600 K. C. for maximum output. This operation of first tuning the compensator, then the tuning condenser is continued until maximum output is obtained at the 600 K. C. frequency.
3. After the low frequency (600 K. C.) end of range 1 is adjusted, the 1600 K. C. end is re-adjusted, as given in Paragraph 1 above, to correct any variation that the low frequency series compensator may have caused in the alignment of the high frequency end.
4. Now turn signal generator and receiver dial to 1500 K. C. and re-adjust compensator (4) for maximum output.

MODEL 37-610
Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

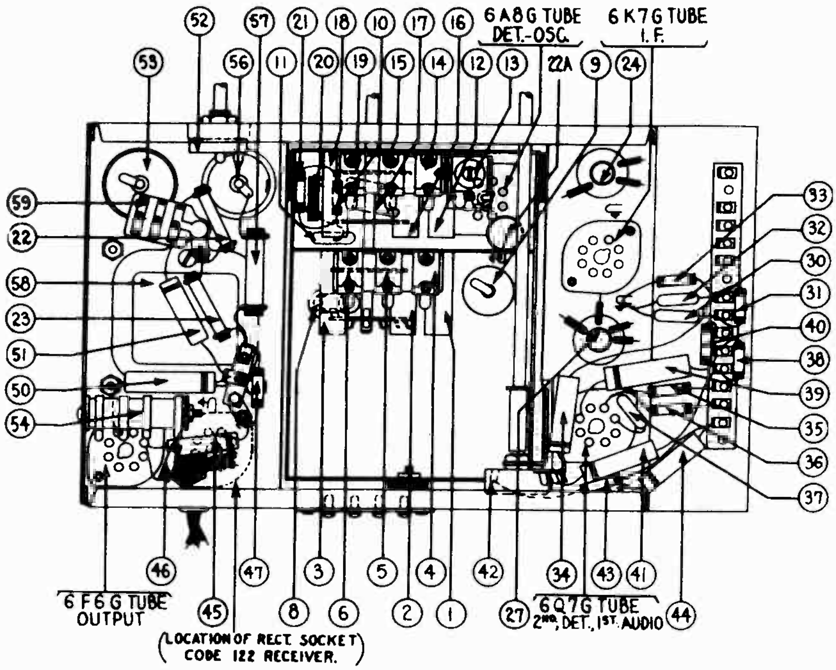


Fig. 6—Base View of Chassis

Replacement Parts—Model 37-610

Schem. No.	Description	Part No.	Price List
1	Antenna Transformer (Broadcast)	32-2108	$0.80
2	Antenna Transformer (Police)	32-2119	.65
3	Antenna Transformer (Short-Wave)	32-2109	.75
4	Compensator (Broadcast)	31-6092	.60
5	Compensator Ant. (Police)	Part of 4	
6	Compensator Ant. (Short-Wave)	Part of 4	
7	Tuning Condenser	31-1821	3.50
8	Condenser (.05 mfd. Tubular)	30-4020	.20
9	Electrolytic Condenser 16 mfd.	30-2118	1.65
10	Resistor (10000 ohm ½ watt)	33-310339	.20
11	Condenser (250 mmfd. Mica)	30-1032	.25
12	Oscillator Transformer (Broadcast)	32-2120	.65
13	Compensator Osc. Series 600 K.C.	31-6056	.55
14	Compensator Osc. 1600 K.C.	31-6092	.60
15	Compensator Osc. 7.0 Meg.	Part of 16	
16	Oscillator Transformer (Police)	32-2121	.40
17	Condenser (Semi-fixed 1650 mfd.)	31-6096	.40
18	Oscillator Transformer (S.W.)	32-2110	.75
19	Compensator (Osc. 18.0 megacycles)	Part of 18	
20	Condenser (Semi-fixed 3500 mfd.)	31-6097	.50
21	Resistor (32000, ½ watt)	33-332339	.20
22	Resistor (51000, ½ watt)	33-351339	.20
22A	Condenser (.1 mfd. Tubular)	30-4170	.25
23	Resistor (20000 ohm, ½ watt)	33-320439	.20
24	1st I. F. Transformer	32-2100	1.50
25	Compensator 1st I. F. Transformer	Part of 24	
26	Compensator 1st I. F. Transformer	Part of 24	
27	2nd I. F. Transformer	32-2102	1.50
28	Compensator 2nd I. F. Transformer	Part of 27	
29	Compensator 2nd I. F. Transformer	Part of 27	
30	Condenser (110 mmfd. Mica)	30-1031	.20
31	Resistor (51000 ohm, ½ watt)	33-351339	.20
32	Condenser (110 mmfd. Mica)	30-1031	.20
33	Resistor (490000 ohm ½ watt)	33-449339	.20
34	Condenser (.01 mfd. Tubular)	30-4124	.25
35	Resistor (1 megohm ½ watt)	33-510339	.20
36	Resistor (1 megohm ½ watt)	33-510339	.20
37	Condenser (110 mfd. Mica)	30-1031	.20
38	Resistor (1 megohm ½ watt)	33-510339	.20
39	Condenser (0.1 mfd. Tubular)	30-4122	.20
40	Resistor (490000 ohms, ½ watt)	33-449339	.20
41	Condenser (.015 mfd. Tubular)	30-4358	.20
42	Volume Control	33-5158	1.00
43	Resistor (51000, ½ watt)	33-510339	.20
44	Condenser (.008 mfd. Tubular)	30-4112	.20
45	Condenser (.015 mfd. Tubular)	30-4226	.20
46	Resistor (1 megohm ½ watt)	33-510339	.20
47	Resistor (70000 ohm ½ watt)	33-370339	.20
48	Output Transformer	32-7019	.85
49	Voice Coil and Cone	36-3157	.80
50	Condenser (.03 mfd. Tubular)	30-4380	.20
51	Condenser (.008 mfd. Tubular)	30-4112	.20
52	Tone Control and AC Switch	42-1182	.75
53	Electrolytic Condenser (8 mfd.)	30-2024	1.10
54	Resistor C-Bias	33-3277	.20
55	Field Coil Assembly	36-3039	2.75
56	Electrolytic Condenser (12 mfd.)	30-2117	1.20
57	Resistor (9000 ohm 2 watt)	33-290539	.30
58	Power Transformer 50-60 cycle 115 volts	32-7583	$4.25
	Power Transformer 25-40 cycle 115 volts	32-7584	
	*Power Transformer 50-60 cycle 115 volts Code 122	32-7626	
	**Power Transformer 25-40 cycle 115 volts Code 122	32-7627	
59	Condenser (Twin Bakelite, .015-.015 mfd.)	3793 DG	.40
60	Pilot Lamp	34-2039	.15
61	Wave Switch Antenna Section	42-1170	1.10
62	Wave Switch Osc. Section	42-1172	1.10
	I. F. Wiring Panel	38-7703	.25
	I. F. Wiring Panel Spacer	28-4001	Per C .25
	Ant. Panel	38-7714	
	Tube Socket 7 prong	27-6057	.11
	Tube Socket 8 prong	27-6058	.11
	Tube Socket Rectifier, Code 122	27-6053	.11
	Tube Shield	28-2726	.10
	I. F. Transformer Shield	38-7763	.20
	AC Cable	L-2183	.40
	Speaker Cable	L-2181	.25
	Grommet Mtg. Tuning Condenser	27-4325	.02
	Grommet Mtg. R. F. Unit	27-4317	.04
	Mtg. Sleeve R. F. Unit	28-2257 FA-3	.01
	Mtg. Screw R. F. Unit	W-729 FA-3	Per C .45
	Mtg. Washer R. F. Unit	28-3927	.01
	Pilot Lamp Assembly	38-7706	.35
	Bracket Electrolytic Condenser	6440	.06
	Bracket Screw Electrolytic Condenser	W-1446 FA-3	Per C .40
	Bracket Nut Electrolytic Condenser	W-95 FA-3	Per C .30
	Chassis Mtg. Screw	W-1358A	Per C 2.60
	Wave Switch Indexing Plate & Shaft	42-1173 Rev-E	.50
	Dial	27-5203	.50
	Dial Hub	28-7187 FA-3	.12
	Dial Set Screw	W-1641	.02
	Dial Clamp	28-2837 FA-3	.10
	Dial Screen Assembly	38-7912	.10
	Dial Gear	28-7185	.10
	Drive Gear	31-1884	.25
	Scale Guard	27-8324	.02
	Dial Gear Thrust Spring	28-8611	.01
	Dial Gear C. Washer	28-3904	.01
	Dial Gear Thrust Washer	28-3976	.30
	Mask	27-5198	.30
	Mask Washer	27-8318	Per C .50
	Mask Arm and Link Assembly	31-1866	.35
	Mask Guide	38-7844	
	Spring	28-8624	Per C .50
	Lens	27-8310	.02
	Knob Tuning Control	27-4330	.10
	Knob Vernier	27-4331	.10
	Knob—Tone & Volume	27-4332	.10
	Knob—Wave Switch	27-4326	.10
	Volume Control Shaft	28-6499	.10
	Volume Control Spring	28-4117	Per C .40
	Retaining Clip	28-8610	.03
	Washer	28-4186	Per C .75
	Washer	4436	Per C 1.50
	Nut Tone Volume Controls	W-684 FA-3	Per C 1.25
	Speaker S7	36-1009	
	Speaker HS	36-1220	

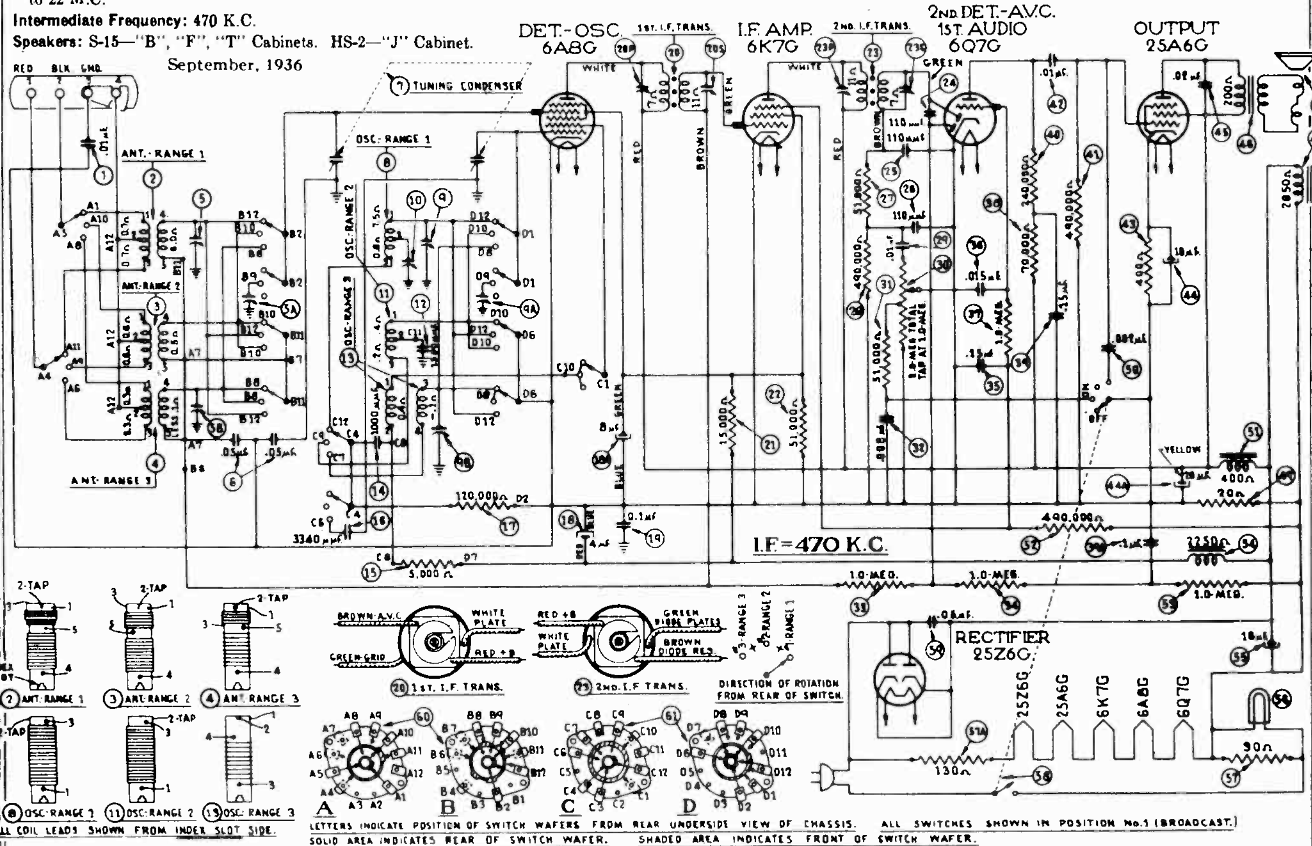
*Code 122, **Code 122, 25 cycle operation

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

PHILCO RADIO & TELEV. CORP.

MODEL 37-611
Schematic
Parts

Frequency Ranges:—Range 1—530 to 1720 K.C.; Range 2—2.3 to 7.4 M.C.; Range 3—7.35 to 22 M.C.
Intermediate Frequency: 470 K.C.
Speakers: S-15—"B", "F", "T" Cabinets. HS-2—"J" Cabinet.
September, 1936



Power Supply: 115 volts, alternating or direct current.
Power Consumption: 55 watts.

Fig. 5—Schematic Diagram

Replacement Parts—Model 37-611

Schem. No.	Description	Part No.	List Price
1	Condenser .01 mfd. tubular	30-4145	$0.20
2	Antenna Transformer (Range 1)	32-2108	.80
3	Antenna Transformer (Range 2)	32-2119	.65
4	Antenna Transformer (Range 3)	32-2109	.75
5	Compensator (3 sections)	31-6092	.60
6	Condenser (.05 mfd. dual tubular)	30-4394	.35
7	Tuning Condenser	31-1821	3.50
8	Oscillator Transformer (Range 1)	32-2120	.65
9	Compensator (3 sections Osc.)	31-6092	.60
10	Compensator (Osc. series 580 K.C.)	31-6056	.55
11	Oscillator Transformer (Range 2)	32-2121	.40
12	Condenser (1650 mmfd.)	31-6096	.40
13	Oscillator Transformer (Range 3)	32-2110	.75
14	Condenser (1000 mmfd. tubular)	30-4453	.20
15	Resistor (5000 ohms ½ watt)	33-250339	.20
16	Condenser (3500 mmfd.)	31-6097	.50
17	Resistor (120000 ohms ½ watt)	33-412339	.20
18	Electrolytic Condenser (4-8 mfd.)	30-2157	
19	Condenser (.01 mfd. tubular)	30-4122	.20
20	1st I. F. Transformer Assembly	32-2100	1.50
21	Resistor (15000 ohms ½ watt)	33-315339	.20
22	Resistor (51000 ohms ½ watt)	33-351339	.20
23	2nd I. F. Transformer Assembly	32-2102	1.50
24	Condenser (110 mmfd. mica)	30-1031	.20
25	Condenser (110 mmfd. mica)	30-1031	.20
26	Condenser (110 mmfd. mica)	30-1031	.20
27	Resistor (51000 ohms ½ watt)	33-351339	.20
28	Resistor (490000 ohms ½ watt)	33-449339	.20
29	Condenser (.01 mfd. tubular)	30-4124	.25
30	Volume Control	33-5158	1.00
31	Resistor (51000 ohms ½ watt)	33-351339	.20
32	Condenser (.008 mfd. tubular)	30-4112	.20
33	Resistor (1.0 megohm ½ watt)	33-510339	.20
34	Resistor (1.0 megohm ½ watt)	33-510339	.20
35	Condenser (.25 mfd. tubular)	30-4446	.25
36	Condenser (.015 mfd. tubular)	30-4358	.20
37	Resistor (1.0 megohms ½ watt)	33-510339	.20
38	Resistor (70000 ohms ½ watt)	33-370339	.20
39	Condenser (.15 mfd. dual bakelite)	4989-DU	.40
40	Resistor (240000 ohms ½ watt)	33-424339	.20
41	Resistor (490000 ohms ½ watt)	33-449339	.20
42	Condenser (.01 mfd. bakelite)	3903-SU	.25
43	Resistor (400 ohms wirewound)	33-3122	.25

Schem. No.	Description	Part No.	List Price
44	Electrolytic Condenser (10-20 mfd.)	30-2166	
45	Condenser (.02 mfd. tubular)	30-4113	$0.20
46	Output Transformer HS-2, S-15	32-7395	1.10
47	Cone Voice Coil HS-2	36-3627	1.00
	Cone Voice Coil S-15	36-3157	.80
48	Field Coil HS-2	36-3519	2.80
	Field Coil S-15	36-3519	2.80
49	Resistor (20 ohms Flexible)	33-3043	.25
50	Condenser (.002 mfd. tubular)	30-4177	.25
51	Choke	32-7668	1.20
52	Resistor (490000 ohms ½ watt)	33-449339	.20
53	Resistor (1.0 megohm ½ watt)	33-510339	.20
54	Choke	32-7667	1.60
55	Electrolytic Condenser (16 mfd.)	30-2124	.75
56	Pilot Lamp		
57	Resistor (30-130 ohms wirewound)	33-3292	.60
58	Tone Control & Power Switch	42-1224	.75
59	Condenser (.05 mfd. tubular)	30-4020	.20
60	Range Switch (Ant.)	42-1200	1.20
61	Range Switch (Osc.)	42-1246	1.20
	Pilot Lamp Assembly	38-7910	
	Switch Index Plate & Shaft	42-1173	.50
	Dial	27-5203	.50
	Hub	28-7187	.12
	Clamp	28-2837	.10
	Set Screw	W-1641	.02
	Dial Gear	28-7185	.10
	Drive Gear & Hub Assembly	31-1884	.25
	Thrust Spring	28-8611	.01
	Thrust Washer	28-3976	.30 C
	C Washer	28-3904	.01
	Mask	27-5198	.30
	Mask Arm & Link Assembly	31-1866	.35
	Mask Guide & Pilot Lamp Bracket	38-7844	.15
	Mask Washer	27-8318	.50 C
	Ind. Bracket & Lens Assembly	38-7912	.30
	Scale Guard	27-8324	.02
	Volume Control Shaft	38-8059	
	Shaft Spring	28-4117	.40 C
	Retaining Clip	28-4394	.01
	Tube Socket (7 Prong)	27-6057	.11
	Tube Socket (8 Prong)	27-6058	.11
	Tube Shield	28-2726	.10

Description	Part No.	List Price
Shield Base	28-3898	$0.03
Mtg. Grommet R. F. Unit	27-4317	.04
Mtg. Sleeve R. F. Unit	28-2257	.01
Mtg Screw R. F. Unit	W-729	.45 C
Mtg. Washer R. F. Unit	28-3927	.01
Mtg. Washer Felt R. F. Unit	27-7807	.50 C
Mtg. Rubber Tuning Condenser	27-4325	.02
Mtg. Transformer Plate	28-3808	.02
Spacer	27-8228	.01
Screw	W-1635	.30 C
Rubber Washer	5189	.03
Rubber Bushing	27-4360	.04
Chassis Mtg. Screw	W-1495	1.50 C
Washer	28-2089	.50 C
Knob Tuning Control	27-4330	.10
Knob Vernier	27-4331	.10
Knob Tone Volume	27-4332	.10
Knob Range Switch	27-4326	.10
Bottom Shield Plate	28-4234	
Snap Fasteners	28-4279	.75 C
Bottom Shield Plate T Cabinet	28-4358	
Bezel Plate & Frame	40-4939	.75
Gasket	27-8311	.01
Screw	W-1644	.50 C
Glass	27-8298	.05
A. C. Cable	L-2183	.40
Speaker Cahle	L-2218	
Speaker S-15 ("B", "T", "F" Cabinets)	36-1173	5.75
Speaker HS-2 ("J" cabinet)	36-1255	
"B" CABINET		
Baffle Silk Assembly	40-5968	.30
"F" CABINET		
Baffle Silk Assembly	40-5933	.75
"J" CABINET		
Baffle Silk Assembly	40-5971	.80
"T" CABINET		
Baffle Silk Assembly	40-5969	.30

Figures in black type indicate circled figures ... Base View. **Prices Subject to Change without Notice**

MODEL 37-611
Voltage, Socket
Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

Alignment of Compensators

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the **Philco Model 088 Signal Generator,** covering from 110 to 20,000 K.C. is recommended to adjust the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. **Philco Model 025 Circuit Tester** contains a sensitive output meter and is recommended for these adjustments. Philco Fibre Handle Screw-driver No. 27-7059 and Tuning Condenser Part No. 45-2325 complete the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 2 and 3.

The following procedure must be observed in adjusting the compensators:—

DIAL ADJUSTMENT—In order to adjust this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, rotate the tuning condenser control to the extreme counter-clockwise position (maximum capacity). Loosen the set screw of dial hub, then turn dial until the glowing indicator is centered between the index lines of dial scale. Now tighten the dial hub set screw in this position.

OUTPUT METER—The 025 Output Meter is connected to the plate and cathode terminals of the (25A6G) tube. Adjust the meter to use the (0-30) volt scale.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1. Connect the 088 Signal Generator output lead through a .1 mfd. condenser to the control grid of the 6A8G, and the ground connection of output lead to the chassis.

2. The tuning range switch is set in position No. 1 (Broadcast). Rotate the tuning condenser of the receiver to the maximum capacity position (counter-clockwise), and adjust the signal generator for 470 K. C.

3. Adjust compensators (23S) 2nd I. F. Sec., (23P) 2nd I. F. Pri., (20S) 1st I. F. Sec. and (20P) 1st I. F. Pri. for maximum reading on the output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range—7.3 to 22.0 M. C.

1. Remove the signal generator output lead from the grid of the 6A8G tube and connect it with the .1 mfd. condenser to terminal No. 1 on the aerial input panel and the generator ground lead to terminal No. 3, rear of chassis. Terminals 2 and 3 must be connected by the shorting link provided on the panel.

2. Set the range switch in position 3. Turn the receiver and signal generator dials to 18 M. C. Now adjust compensator (9B) by turning the screw (clockwise) to the maximum capacity position, then slowly turning it (counter-clockwise) until a second peak signal is reached on the output meter. The first peak from maximum capacity is the image signal and must not be used. If the above procedure is correctly performed, the image signal will be found at 17.06 M. C., by advancing signal generator attenuator and turning receiver dial to this frequency mark on the scale.

3. The antenna compensator (5B) is now adjusted by connecting a variable condenser of approximately 350 mmfd., Philco Part No. 45-2325, across the oscillator section of the gang condenser and ground. Leaving the signal generator and receiver dials at 18 M. C. tune the added condenser from the maximum capacity point until the second harmonic of the receiver oscillator beats against the signal from the generator thereby bringing in the signal. The antenna compensator (5B) is then adjusted for maximum output. Now remove the external condenser and readjust compensator (9B) as given in paragraph 2 above.

Tuning Range: 2.3 to 7.4 Megacycles.

1. Turn the range switch to position No. 2 (Police). Rotate the signal generator and receiver dials to 7.0 M. C. Then adjust compensator (9A) for maximum output. Now turn the signal generator and receiver dials to 6.0 M. C. and adjust compensator (5A) for maximum reading on output meter.

Tuning Range: 530 to 1720 Kilocycles.

1. Set the range switch in position No. 1 (Broadcast). Rotate the signal generator and receiver dials to 1600 K. C. Now adjust compensators (9) Osc., and (5) Ant. for maximum output.

2. Rotate the signal generator and receiver dials to 580 K. C. Compensator (10) Osc. series is now adjusted for maximum output as follows:

First tune compensator (10) for maximum output, then vary the tuning condenser of the receiver for maximum output about the 580 K. C. dial mark. Now turn the compensator (10) slightly to the right or left and vary the receiver tuning condenser for maximum output. If the output reading increases, turn compensator (10) in the same direction a trifle more, and again vary the tuning condenser for maximum output. If the output decreases, set the compensator in the opposite direction. This procedure of first setting the compensator and then varying the tuning condenser is continued until there is no further gain in output reading.

3. Readjust compensator (9) for maximum output, by turning signal generator and receiver dials to 1600 K. C.

4. Turn the signal generator and receiver dials to 1500 K. C. and adjust compensator (5) Ant. for maximum output.

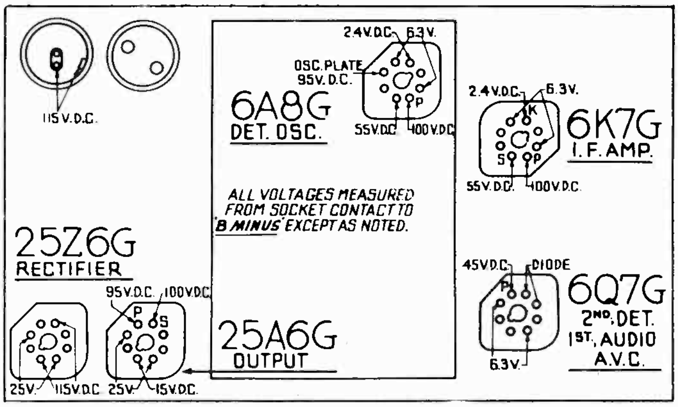


Fig. 1—Socket Voltages—Underside of Chassis View

The voltages indicated by arrows were measured with a **Philco 025 Circuit Tester** which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.

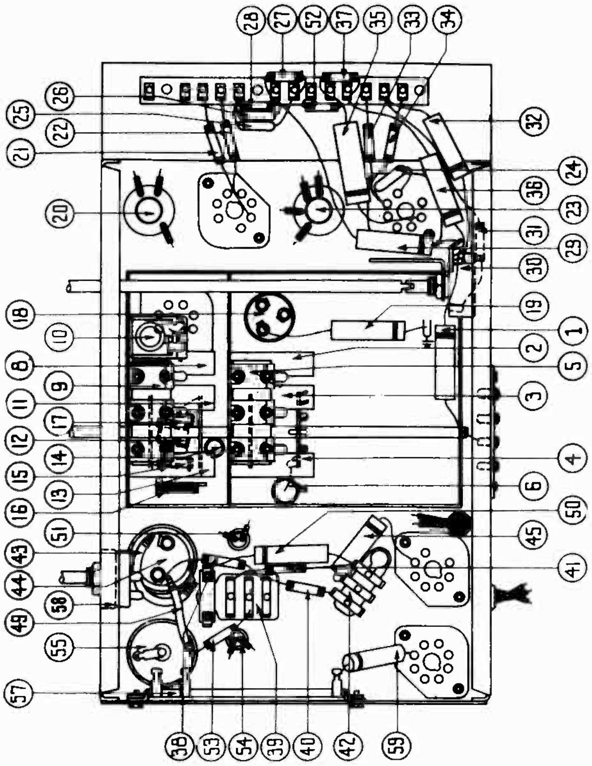


Fig. 4—View of Parts from Underside of Chassis

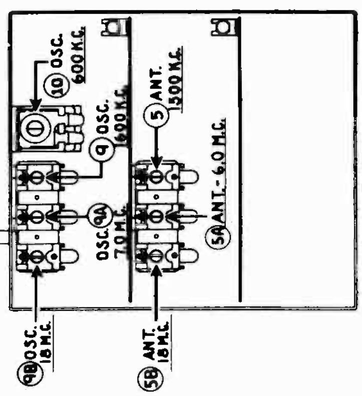


Fig. 3—R. F. Compensators

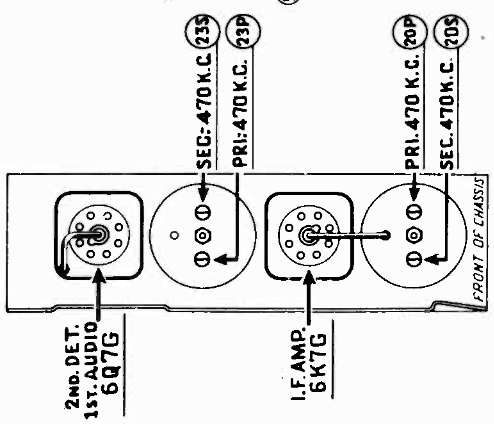


Fig. 2—I. F. Compensators

PHILCO RADIO & TELEV. CORP.

MODEL 37-620
Schematic
Coil Data

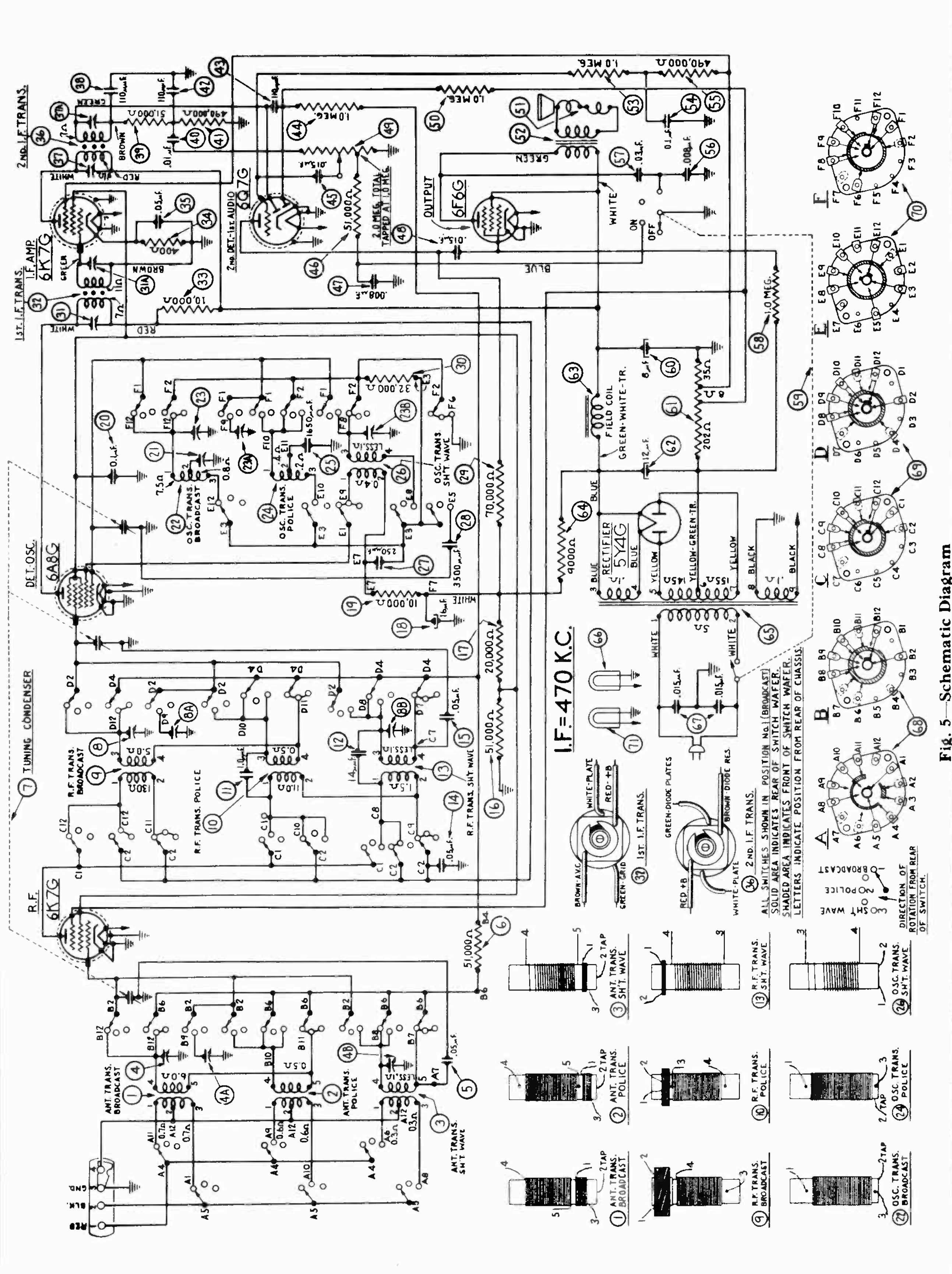


Fig. 5—Schematic Diagram

MODEL 37-620
Circuit Data
Voltage
Transformer Data

PHILCO RADIO & TELEV. CORP.

Electrical Specifications

Voltage Rating: 115 Volts AC.

Frequency Rating: 50 to 60 cycles.
For 25 to 40 cycle operation, the Power Transformer marked with asterisk in the parts list is used.

Power Consumption: 65 Watts

Types and Number of Tubes: 2 type 6K7G, R. F. and I. F. Amplifiers; 1 type 6A8G, Detector-Oscillator; 1 type 6Q7G, 2nd Detector, Automatic Volume Control and 1st Audio; 1 type 6F6G, Output; and 1 type 5Y4G Rectifier.

Undistorted Output: 3 watts.

Intermediate Frequency: 470 K. C.

Tuning Ranges: Three, Range 1.—530 to 1720 Kilocycles; Range 2.—2.3 to 7.4 Megacycles; Range 3.—7.35 to 22 Megacycles.

Speakers: B Cabinet—S-7.
J Cabinet—HS.

General Description

Model 37-620 is a 6 tube superheterodyne receiver for operation on alternating current, having three tuning ranges, covering standard broadcast and short-wave frequencies, and using the new Philco High-Efficiency self-centering glass tubes.

The circuit includes the Philco "Foreign Tuning System"—controlled by the tuning range switch—which provides maximum sensitivity and noise reduction, when used with the **Philco High Efficiency Aerial** supplied with the receiver. One stage of Radio Frequency amplification which greatly increases the signal-to-noise ratio, automatic bass compensation in the volume control circuit, and a separate diode circuit for automatic volume control are also incorporated in this receiver.

The red and black leads of the High-Efficiency Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided at the rear of the chassis. Connect the jumper on the terminal panel across terminals 3 and 4.

If a temporary aerial is used, the jumper should be across terminals 2 and 3. The aerial connects to terminal 1 and the ground to terminal 3.

A good ground connection is desirable in all installations. Make the ground connection from the nearest water or radiator pipe to terminal 3 on the terminal panel.

CONSTRUCTION

The chassis is constructed in three basic assembly units, concentrating each circuit in a single unit.

(1) The Radio Frequency unit, located in the center of the chassis, contains a 6K7G tube which functions as a Radio Frequency Amplifier; a 6A8G tube, for the Detector-Oscillator circuit; individual Antenna, R. F. Amplifier and Oscillator coils for each tuning range; selector switch; compensating condensers for all coils; and other parts necessary for the associated circuits. The unit is separately mounted on rubber grommets, cushioning it from the main chassis.

(2) The Intermediate Frequency unit, mounted on the right hand side of the chassis (facing front of set) consists of the Intermediate Frequency transformers, compensating condensers, a 6K7G tube for the I. F. Amplifier stage, and a 6Q7G tube as the second detector—automatic volume control and first audio stage. All voltages supplied to the I. F. and R. F. units are furnished from a terminal strip mounted on this unit.

(3) The Power Pack and Audio Output circuits, together with the required voltage dividers and filter condensers are mounted in the power unit. This unit contains a 6F6G tube and a 5Y4G tube for the Power output and rectifier circuits respectively; and the combined tone control and power switch. The socket for the 5Y4G tube is mounted on the power transformer.

Schematic Diagram Fig. 5 is numbered, indicating all important parts. These numbers correspond with the parts layout shown in Fig. 6. In addition, the range switch wafers are shown on the schematic diagram. The contacts on each wafer are lettered and numbered to indicate their connection points in the schematic diagram, which are also lettered and numbered. The physical drawings of each coil used in the receiver are also shown on schematic diagram Fig. 5. The connections of these coils are numbered on the coil Drawing and on the schematic diagram.

Fig. 1 shows the Voltage measurements taken from the bottom of the sockets at each contact. In Fig. 2, the correct position of the dial indicator, for proper adjustment of the compensator condenser is shown. Fig. 3 and 4 are the locations of the I. F. and R. F. compensators respectively.

This receiver is used in cabinets type B and J. These instructions, however, will cover both types.

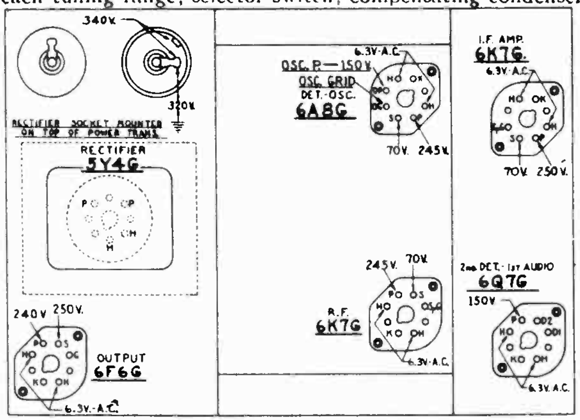


Fig. 1—Socket Voltages
Measured from Socket Contact to Ground
Underside of Chassis View

The voltages indicated by arrows were measured with a **Philco 025 Circuit Tester** which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum. Range Switch in broadcast position. Line voltage 115 A. C.

POWER TRANSFORMER DATA

Lead No. Shown on Schematic	A.C. Volts	Current	Circuit	Color	Resistance
1–2	120	—	Pri.	White	5 ohms
3–4	5.0	2.0 A.	Fil. Rectifier	Blue	.1 ohm
5–7	670	70 Ma.	High Voltage Sec.	Yellow	145 ohms 155 ohms
6	—	—	Center Tap of 5–7	—	—
8–9	6.7	2.1 A.	Fil.	Black	.1 ohm

Run 2.

While the circuit arrangement remains the same, the position of the parts is slightly changed in this Run. Bakelite condenser (3) Part No. 3793-DG is removed from front and placed in the rear of the chassis. Tubular condenser (3) Part No. 30-4380 is replaced with a Part No. 8318-SU bakelite condenser, placed in the position formerly held by 3793-DG.

PHILCO RADIO & TELEV. CORP.

MODEL 37-620
Trimmers
Alignment

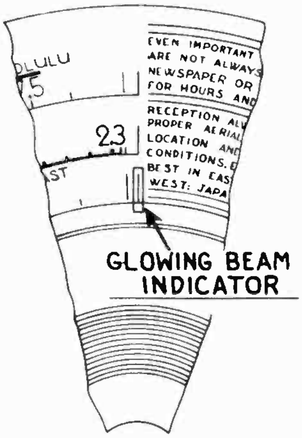


Fig. 2—Dial Calibration

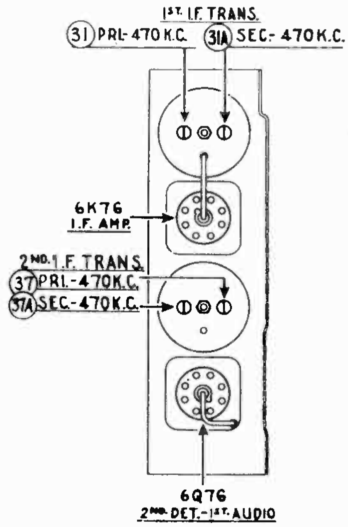


Fig. 3—Locations of I. F. Compensators

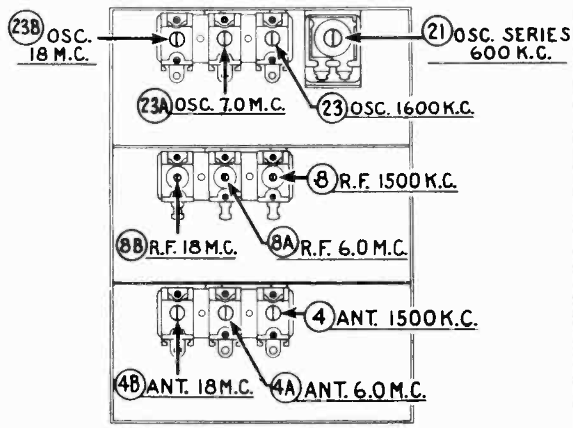


Fig. 3—Locations of R. F. Compensators

Adjustment of Compensators

The accurate adjustment of the various compensating condensers is vital to the proper functioning of this receiver. There are four compensating condensers in the I. F. Circuit, four in the Oscillator Circuit, three in the R. F. Amplifier Circuit and three in the Antenna Circuit. Incorrect adjustment will cause loss of sensitivity, unsatisfactory tone, and poor selectivity.

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 SIGNAL GENERATOR, covering from 110 to 20,000 K. C. is recommended for adjusting the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 CIRCUIT TESTER contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Handle Screw-driver No. 27-7059 completes the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 3 and 4.

The following procedure must be observed in adjusting the compensators:—

DIAL CALIBRATION—In order to adjust this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, rotate the tuning condenser control to the extreme counter-clockwise position (maximum capacity). Loosen the screw of dial hub, then turn dial until the glowing indicator is centered on the first index line of dial scale (see Fig. 2). Now tighten the dial hub set screw in this position.

OUTPUT METER—The 025 Output Meter is connected to the plate and cathode terminals of the (6F6G) tube. Adjust the meter to use the (0-30) Volt Scale.

During the I. F. and R. F. adjustments, the signal generator output should be maintained at the lowest possible level that will give indication on the output meter.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1 Connect the 088 Signal Generator output lead, through a .1 mfd. condenser, to the control grid of the 6A8G tube; and the ground connection of the output lead to the chassis.

2 Set the range switch in position No. 1 (Broadcast), then rotate the tuning condenser of the receiver to the maximum capacity position (counter-clockwise), and adjust the signal generator for 470 K. C.

3 Adjust compensators 37a 2nd I. F. Sec., 37 2nd I. F. Pri., 31a 1st I. F. Sec., and 31 1st I. F. Pri. for maximum reading on output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range—7.3 to 22.0 M. C.

1 Remove the signal generator output lead from the grid of 6A8G tube, and connect it through a .1 mfd. condenser to terminal No. 1 on aerial input panel, and the generator ground lead to terminal No. 3, rear of chassis.

(a) Terminals 2 and 3 of aerial input panel must be connected with connector link provided on the panel, during these adjustments.

2 Set the tuning range switch in position No. 3 (Short Wave). Turn the signal generator and receiver dials to 18. M. C. and adjust compensators 23b Osc., 8b R. F. and 4b Ant. for maximum output. (See Note (a) below).

(a) The adjustment of the Radio Frequency compensator on the high frequency range causes a slight detuning of the oscillator circuit. In order to overcome this detuning effect, connect a variable condenser of approximately 350 mmfd., having a good vernier drive, across the oscillator section of the tuning condenser. Leaving the signal generator and receiver dials at 18 M. C., tune the added condenser so that the second harmonic of the receiver oscillator will beat against the signal from the 088 signal generator bringing in the signal. The antenna and R. F. compensator 4b and 8b should then be adjusted to give maximum output. Now remove the external condenser and turn compensator 23b to maximum capacity (clockwise) then without moving signal generator or receiver tuning condenser, back off compensator 23b (counter-clockwise) until a second peak is reached on the output meter. The first peak is caused by tuning to the image frequency signal and must not be used.

Tuning Range 2.3 to 7.4 M. C.

1 Turn the range switch to position No. 2 (police). Rotate the signal generator and receiver dials to 7.0 M. C. Then adjust compensator 23a for maximum output. Now turn the signal generator and receiver dials to 6.0 M. C. and adjust compensators 8a R. F. and 4a Ant. for maximum reading on the output meter.

Tuning Range 530 to 1720 K. C.

1 Set the range switch in position No. 1 (Broadcast). Set the 088 Signal Generator indicator at 800 K. C. and the receiver dial at 1600 K. C.

(a) In adjusting the receiver at 1600 K. C. the second harmonic of 800 K. C., to which the signal generator is tuned, is used. The second harmonic of 800 K. C. is 1600 K. C. Now adjust compensators 23 Osc., 8 R. F. and 4 Ant. for maximum reading on output meter.

2 The low frequency end of the range is now tuned by turning the signal generator and receiver dials to 600 K. C. and adjusting compensator 21 Osc. Series—(see Note (a) below)—for maximum reading on output meter.

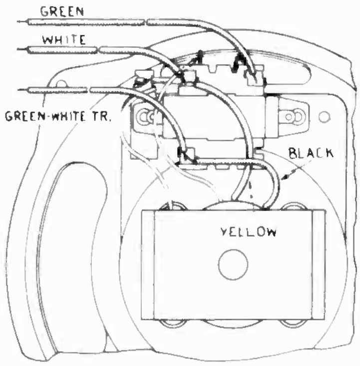
(a) While compensator 21 is being adjusted, the tuning condenser must be rolled for maximum output. This is accomplished as follows:—First tune compensator 21 for maximum output. Then vary the tuning condenser for maximum output at 600 K. C. Now retune compensator 21, and again vary the tuning condenser back and forth at 600 K. C. for maximum output. This operation of first turning the compensator then the tuning condenser is continued until maximum output is obtained at the 600 K. C. frequency.

3 After the low frequency (600 K. C.) end of the range is adjusted, the 1600 K. C. end is readjusted, as given in Paragraph (1) above, to correct any variation that the low frequency series compensator may have caused in the alignment of the high frequency end.

4 Now turn the signal generator and receiver dials to 1500 K. C. and readjust compensators 4 ant., and 8 R. F., for maximum output.

MODEL 37-620
Chassis
Speaker Data
Parts List

PHILCO RADIO & TELEV. CORP.



Speaker Wiring

When replacing any part of the speaker, the hum bucking coil connections should be connected for minimum hum.

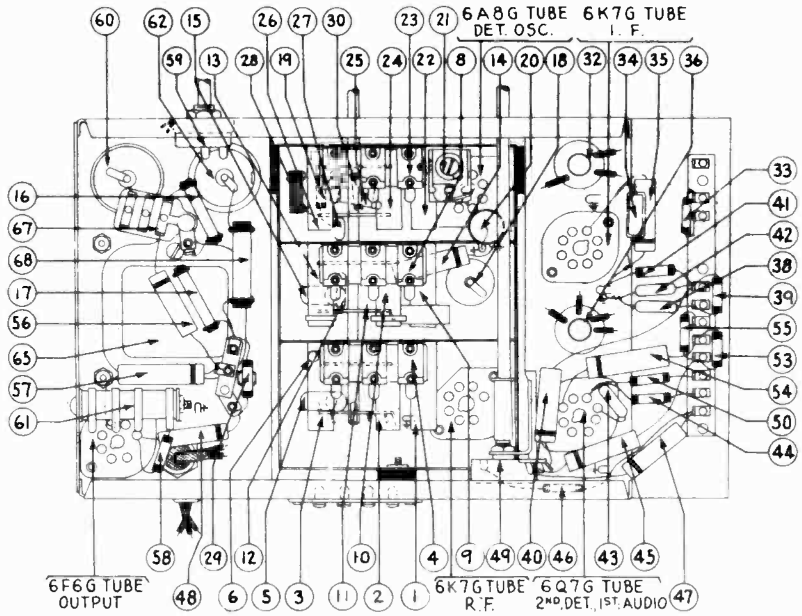


Fig. 6—Base View

Replacement Parts—Model 37-620

Schem. No.	Description	Part No.	Price List
1	Antenna Transformer (Broadcast)	32-2108	$0.80
2	Antenna Transformer (Police)	32-2119	.65
3	Antenna Transformer (S. W.)	32-2109	.75
4	Compensator Ant. 1500 K.C.	31-6092	.60
5	Condenser (.05 mfd. Tubular)	30-4020	.20
6	Resistor (51000 ohms ½ watt)	33-351339	.20
7	Tuning Condenser	31-1818	4.50
8	Compensator (R. F. 1500 K.C.)	31-6092	.60
9	R. F. Transformer (Broadcast)	32-2105	.75
10	R. F. Transformer (Police)	32-2106	.65
11	Condenser (1.0 mmfd.)		
12	Condenser (14 mmfd. Mica)	30-1073	.20
13	R. F. Transformer (S. W.)	32-2126	.55
14	Condenser (.05 mfd. Tubular)	30-4123	.20
15	Condenser (.05 mfd. Tubular)	30-4020	.20
16	Resistor (51000 ohms 1 watt)	33-351439	.20
17	Resistor (20000 ohms 1 watt)	33-320439	.20
18	Electrolytic Condenser (16 mfd.)	30-2118	1.65
19	Resistor (10000 ohms ½ watt)	33-310339	.20
20	Condenser (.1 mfd. Tubular)	30-4170	.25
21	Compensator (Osc. Series 600 K.C.)	31-6056	.55
22	Osc. Transformer (Broadcast)	32-2120	.65
23	Compensator (Osc. 1600 K.C.)	31-6092	.60
24	Osc. Transformer (Police)	32-2121	.40
25	Condenser (1650 mmfd. Semi-fixed)	31-6096	.40
26	Osc. Transformer (S.W.)	32-2110	.75
27	Condenser (250 mmfd. Mica)	30-1032	.25
28	Condenser (3500 mmfd. Semi-fixed)	31-6097	.50
29	Resistor (70000 ohms ½ watt)	33-370339	.20
30	Resistor (32000 ohms ½ watt)	33-332339	.20
31	Compensator (1st I. F. Pri. 470 K.C.)	Part of 39	
32	1st I. F. Transformer	32-2100	1.50
33	Resistor (1000 ohms ½ watt)	33-210339	.20
34	Resistor (400 ohm Bakelite)	33-1211	.20
35	Condenser (.05 mfd. Tubular)	30-4020	.20
36	2nd I. F. Transformer	32-2102	1.50
37	Compensator (2nd I. F. Pri. 470 K.C.)	Part of 42	
38	Condenser (110 mmfd. Mica)	30-1031	.20
39	Resistor (51000 ohms ½ watt)	33-351339	.20
40	Condenser (.01 mfd. Tubular)	30-4124	.25
41	Resistor (490000 ohms ½ watt)	33-449339	.20
42	Condenser (110 mmfd. Mica)	30-1031	.20
43	Condenser (110 mmfd. Mica)	30-1031	.20
44	Resistor (1 megohm ½ watt)	33-510339	.20
45	Condenser (.015 mfd. Tubular)	30-4358	.20
46	Resistor (51000 ohms, ½ watt)	33-351339	.20
47	Condenser (.006 mfd. Tubular)	30-4112	.20
48	Condenser (.015 mfd. Tubular)	30-4226	.20
49	Volume Control	33-5158	1.00
50	Resistor (1 megohm ½ watt)	33-510339	.20
51	Voice Coil and Cone. S7 Speaker	36-3014	.80
	Voice Coil & Cone. HS Speaker	36-3627	
52	Output Transformer. S7 & HS Speaker	32-7019	.85
53	Resistor (1 megohm ½ watt)	33-510339	.20
54	Condenser (0.1 mfd. Tubular)	30-4122	.20
55	Resistor (490000 ohms ½ watt)	33-449339	.20
56	Condenser (.008 mfd. Tubular)	30-4112	.20
57	Condenser (.03 mfd. Tubular)	30-4380	.20
58	Resistor (1 megohm ½ watt)	33-510339	.20
59	Tone Control and A. C. Switch	42-1182	.75
60	Electrolytic Condenser (8 mfd.)	30-2024	1.10
61	Bias Resistor	33-3277	.20
62	Electrolytic Condenser (12 mfd.)	30-2117	1.20
63	Field Coil Assembly. S7 Speaker	36-3039	2.75
	Field Coil Assem. HS Speaker	36-3690	

* 25-40 cycle operation.

Figures in black type indicate circled figures in Base View.

June, 1936

Schem. No.	Description	Part No.	Price List
64	Resistor (9000 ohms, 2 watt)	33-290539	$0.30
65	Power Transformer (115 Volt 50-60 cycle)	32-7583	4.50
*	Power Transformer (115V; 25-40 cycle)	38-7584	
66	Pilot Lamp	34-2039	.15
67	Condenser (.015-.015 mfd. Double Bakelite)	3793 DG	.40
68	Wave Switch Antenna	42-1170	1.10
69	Wave Switch R. F.	42-1171	1.00
70	Wave Switch Osc.	42-1172	1.10
	Wave Switch Indexing Plate & Shaft	42-1173	.50
	Pilot Lamp Assembly	38-7706	.35
	Dial	27-5203	.50
	Dial Hub	28-7187	.12
	Dial Clamp	28-2837	.10
	Dial Hub Set Screw	W-1641	.02
	Dial Gear	28-7185	.10
	Dial Guard	27-8324	.02
	Thrust Spring	28-8611	.01
	Thrust Washer	28-3976	Per C .30
	"C" Washer	28-3904	.01
	Drive Gear	31-1884	.25
	Vernier Drive	31-1871	.75
	Mask	27-5198	.30
	Mask Arm Assembly	31-1866	.35
	Mask Guide on Lamp Bracket Support	28-7844	.15
	Mask Washer	27-8318	Per C .50
	Dial Screen Assem	38-7912	.30
	Spring	28-8624	Per C .50
	Lens	27-8310	.02
	Volume Control Shaft	28-6499	.10
	Volume Control Shaft Spring	28-4117	Per C .40
	Retaining Clips	28-8610	.03
	Washer	28-4186	Per C .75
	Socket 8 prong	27-6058	.11
	Socket 7 prong	27-6057	.11
	Tube Shield	28-2726	.10
	Tube Shield Base	28-3898	.03
	I. F. Shield	38-7763	.20
	Terminal Panel I. F. Unit	38-7703	.25
	Washer I. F. Unit	28-4001	Per C .25
	Wiring Panel	38-6306	.03
	Wiring Panel Power Unit	38-5864	.02
	Grommet Mtg. Tuning Condenser	27-4325	.02
	Grommet R. F. Unit	27-4317	.04
	Sleeve Mtg. R. F. Unit	28-2257	.01
	Spacer Mtg. R. F. Unit	27-8339	Per C .40
	Screw Mtg. R. F. Unit	W-729	Per C .45
	Washer Mtg. R. F. Unit	28-3927	.01
	Insulator, Mtg. Elect. Cond	27-7194	.01
	Bracket Mtg. Elect. Cond.	6440	.05
	Antenna Panel	38-7714	.15
	Speaker Cable	L-2181	.25
	A. C. Cord	L-2183	.40
	Speaker S7—B. Cabinet	36-1009	5.75
	Speaker HS—J. Cabinet	36-1220	6.25
	Knobs Tuning	27-4330	.10
	Knobs Tuning Vernier	27-4331	.10
	Knobs Wave Switch	27-4326	.10
	Knobs Tone & Volume	27-4332	.10
	Bezel Frame & Plate Assembly	40-5939	.75
	Gasket	27-8311	.01
	Glass	27-8298	.05
	Ring	28-3967	.35
	Screw Bezel Mtg.	W-1644	Per C .50
	Nut Mtg. Volume & Tone Control	W-684	Per C 1.25
	Chassis Mtg. Screw	W-1358A	Per C 2.60
	Chassis Mtg. Washer	28-2089	Per C .30

Prices Subject to Change Without Notice

Printed in U. S. A.

PHILCO RADIO & TELEV. CORP.

MODEL 37-623
Schematic
Parts, Coils

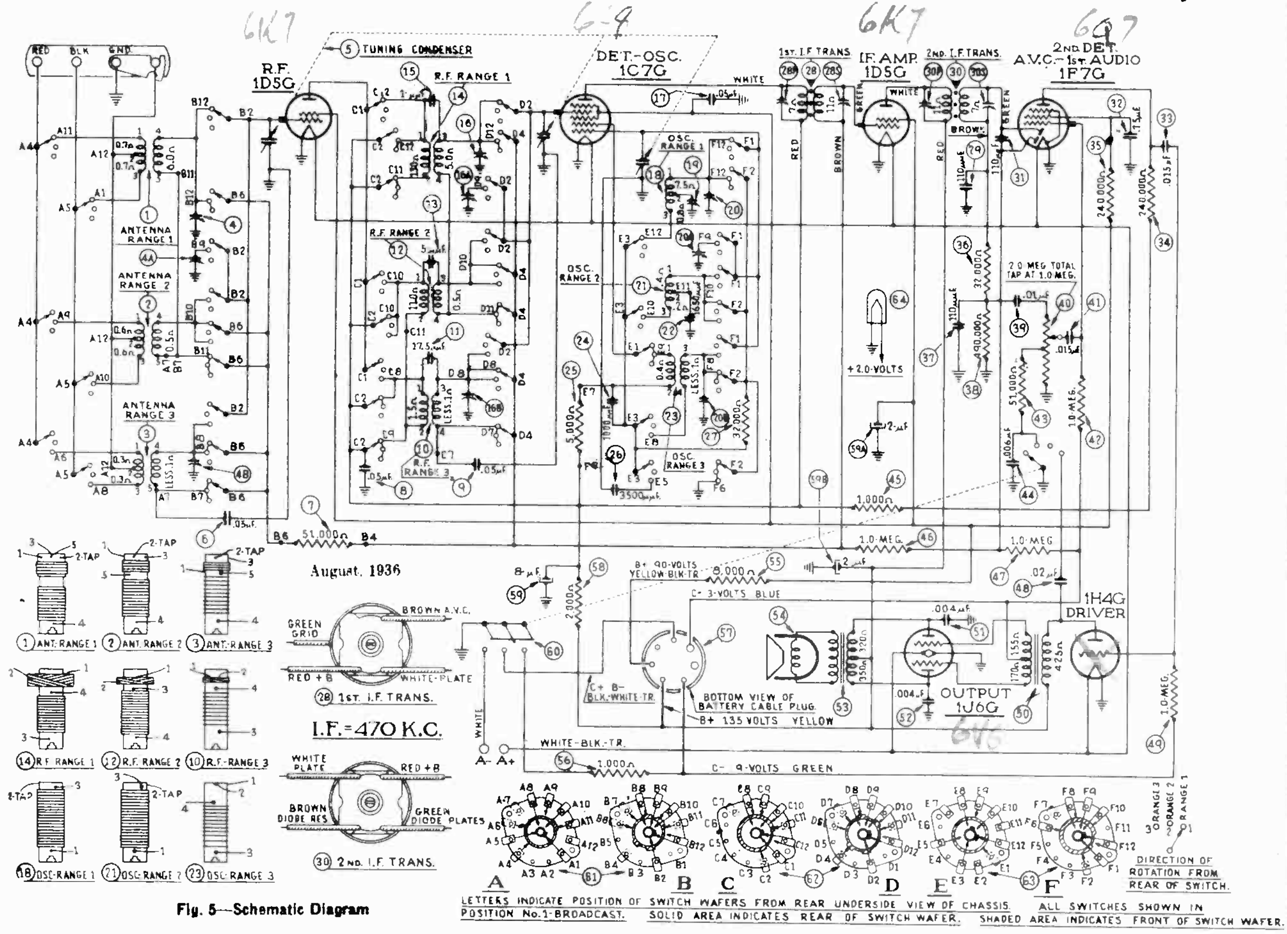


Fig. 5—Schematic Diagram

Replacement Parts—Model 37-623

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (530-1720 K.C.)	32-2108	$0.80
2	Antenna Transformer (2.3 to 7.4 M.C.),	32-2119	.65
3	Antenna Transformer (7.35 to 22 M.C.)	32-2109	.75
4	Compensator (Three Sections)	31-6092	.60
5	Tuning Condenser	31-1818	4.50
6	Condenser (.05 mfd. Tubular)	30-4020	.20
7	Resistor (51,00 ohms, ½ watt)	33-351339	.20
8	Condenser (.05 mfd. Tubular)	30-4020	.20
9	Condenser (.05 mfd. Tubular)	30-4020	.20
10	R. F. Transformer (7.35 to 22 M.C.)	32-2126	.55
11	Condenser (17.5 mmfd. Mica)	30-1079	
12	R. F. Transformer (2.3 to 7.4 M.C.)	32-2106	.65
13	Condenser (5 mmfd. Mica	30-1080	
14	R. F. Transformer (530-1720 K.C.)	32-2105	.75
15	Condenser (Twist wire and lug)	38-7878	
16	Compensator (Three section)	31-1621	
17	Condenser (.05 mfd. Tubular)	30-4020	.20
18	Oscillator Transformer (530-1720 K.C.)	32-2120	.65
19	Compensator (580 K.C.)	31-6056	.55
20	Compensator (Three section)	31-6092	.60
21	Oscillator Transformer (2.3 to 7.4 M.C.)	32-2121	.40
22	Condenser (1650 mmfd.)	31-6096	.40
23	Oscillator Transformer (7.35 to 22 M.C.)	32-2110	.75
24	Condenser (1,000 mmfd. Mica)	30-4453	.20
25	Resistor (5,000 ohms, ½ watt)	33-250393	.20
26	Condenser (3,500 mmfd. Semifixed)	31-6097	.50
27	Resistor (32,000 ohms, ½ watt)	33-332339	.20
28	First I. F. Transformer	32-2100	1.50
29	Condenser (110 mmfd. Mica)	30-1031	.20
30	Second I. F. Transformer	32-2102	1.50
31	Condenser (110 mmfd. Mica)	30-1041	.20
32	Condenser (.15 mfd. Bakelite)	6287SG	.35
33	Condenser (.015 mfd. Tubular)	30-4226	.20
34	Resistor (240,000 ohms, ½ watt)	33-424339	.20
35	Resistor (240,000 ohms, ½ watt)	33-424339	.20
36	Resistor (32,000 ohms, ½ watt)	33-332339	.20
37	Condenser (110 mmfd. Mica)	30-1031	.20
38	Resistor (490,000 ohms, ½ watt)	33-449339	.20
39	Condenser (.01 mfd. Tubular)	30-4124	.25
40	Volume Control	33-5158	1.00
41	Condenser (.015 mfd. Tubular)	30-4358	.20
42	Resistor (1 megohm, ½ watt)	33-510339	.20
43	Resistor (51,000 ohms, ½ watt)	33-351339	.20
44	Condenser (.006 mfd. Tubular)	30-4125	.20

Schem. No.	Description	Part No.	List Price
45	Resistor (1,000 ohms, ½ watt)	33-210339	$0.20
46	Resistor (1 megohm, ½ watt)	33-510339	.20
47	Resistor (1 megohm, ½ watt)	23-510339	.20
48	Condenser (.02 mfd. Tubular)	30-4113	.20
49	Resistor (1 megohm, ½ watt)	33-510339	.20
50	Audio Input Transformer	32-7637	2.00
51	Condenser (.004 mfd. Tubular)	30-4456	.20
52	Condenser (.004 mfd. Tubular)	30-4456	.20
53	Output Transformer	32-7638	1.60
54	Cone and Voice Coil Assembly KR-17.	36-3540	.80
	Cone and Voice Coil Assembly HR-12.	36-3557	1.20
55	Resistor (8,000 ohm, ½ watt)	33-280339	.20
56	Resistor (1,000 ohms, ½ watt)	33-210339	.20
57	Cable Battery	41-3198	1.40
58	Resistor (2,000 ohms, ½ watt)	33-220339	.20
59	Electrolytic Condenser (2, 2, 8 mfd.)	30-2161	1.60
60	Power and Tone Control Switch	42-1207	1.20
61	Range Switch (ANT)	42-1200	1.20
82	Range Switch (R.F.)	42-1245	1.20
63	Range Switch (Osc.)	42-1246	1.20
	Pilot Lamp Assembly	38-7875	.45
	Pilot Lamp	34-2150	.22
	Vernier Drive Assembly	31-1871	.75
	Dial	27-5214	.40
	Dial Hub	28-7187	.12
	Dial Clamp	28-2837	.10
	Dial Guard	27-8324	.02
	Set Screw	W-1641	.02
	Gear (Dial)	28-7185	.10
	Thrust Spring	28-8611	.01
	Thrust Washer	28-3976	.30/C
	C Washer	28-3904	.01
	Gear (Drive)	31-1834	.25
	Mask	27-5198	.30
	Mask Arm and Assembly	31-1940	
	Shaft Coupling (Mask)	31-1941	
	Felt Washers	27-8399	
	Washer	27-8318	.50/C
	Snap Fastener	28-4279	.75/C
	Indicator Bracket and Lens Assembly	38-7912	.30
	Mask Guide and Lamp Support	38-7844	.15
	Shaft and Index Plate (Range Switch)	42-1173	.50
	Shaft (Volume Control)	38-8059	
	Retaining Clip (Vol. Shaft)	28-4394	.01

Schem. No.	Description	Part No.	List Price
	Spring (Vol. Shaft)	28-4117	$0.40/C
	Socket (8 prong)	27-6058	.11
	Socket (7 prong)	27-6057	.11
	Shield Tube	28-2726	.10
	Base Tube Shield	28-3898	.03
	Grommet Mtg. R. F. Unit	27-4317	.04
	Sleeve Mtg. R. F. Unit	28-2257	.01
	Screw Mtg. R. F. Unit	W-729	.45/C
	Washer Mtg. R. F. Unit	28-3927	.01
	Washer Mtg. R. F. Unit	27-8339	.40/C
	Rubber Mtg. Tuning Condenser	27-4325	.02
	Mtg. Plate (Trans.)	28-3808	.02
	Mtg. Spacer (Trans.)	27-8228	.01
	Mtg. Screw (Trans.)	W-1635	30/C
	Terminal Panel I. F. Unit	38-7703	.25
	Cable Speaker	41-3207	.30
	Mtg. Bolt (Chassis)	W-1495	1.50/C
	Mtg. Rubbers	5189	.03
	Mtg. Bushing	27-4360	
	Knob	27-4330	.10
	Knob	27-4331	.10
	Knob	27-4326	.10
	Knob	27-4332	.10
	"B" Battery	41-8007	
	"A" Battery (Wet)	172R	
	"A" Battery (Dry)	41-8011	
	Ballast Lamp	1FI	
	Bezel Plate and Frame	40-5939	.75
	Gasket	27-8311	.01
	Glass	27-8298	.05
	Ring	28-3967	.35
	Screws	W-1644	.50/C

B CABINET

Description	Part No.	List Price
Baffle and Silk Assembly	40-5970	
Speaker—KR17	36-1248	10.00

J CABINET

Description	Part No.	List Price
Speaker—HR12	36-1250	11.00
Baffle and Silk Assembly	40-5971	.80
Speaker	36-1250	11.00
Speaker Ring	27-8016	
Speaker Bolts	W-1693	

Figures in black type indicate circled figures in Base View.

Prices Subject to Change without Notice

MODEL 37-623
Chassis, Voltage
Socket, Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

Electrical Specifications

Type of Circuit: Superheterodyne; battery operated; with class "B" output, the Philco Automatic Aerial Tuning System and built in connections for the Philco High Efficiency Aerial.

Batteries Required: "A"—Philco 172-R two volt storage battery or a dry "A" battery **Philco Part** No. 41-8011. If a dry "A" battery is used, a ballast lamp PHILCO type 1F1 must be inserted in the socket provided in the dry "A" battery. This lamp acts as a voltage regulator, and maintains a constant potential of two volts on the filaments of the receiver tubes.

"BC" Philco battery Part No. 41-8007 is used to supply B and C voltage. This battery contains a socket into which the receiver battery cable plug is inserted.

Current Drain: A Battery, 720 M.A.; B Battery, 21 M.A.

Philco Tubes Used: R. F. Amp. 1D5G, Det.—Osc. 1C7G I. F. Amp. 1D5G, 2nd Det. A. V. C.; 1st audio: 1F7G, Driver 1H4G, Output 1J6G.

Frequency Ranges: Range 1—530 to 1720 K. C.; Range 2—2.3 to 7.4 M. C.; Range 3—7.35 to 22 M. C.

Intermediate Frequency: 470 K. C.

Speakers: KR-17-"B" Cabinet RR-12-"J" Cabinet

Alignment of the Compensators

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the **Philco Model 088** Signal Generator, covering from 110 to 20,000 K. C. is recommended for use in adjusting the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. **Philco Model 025** Circuit Tester contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Handle Screw-Driver No. 27-7059 and Variable Condenser Part No. 45-2325 complete the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 2 and 3.

The following procedure must be observed in adjusting the compensators:—

DIAL ADJUSTMENT The tuning condenser is set at the maximum capacity position, by turning the tuning knob counter-clockwise. Loosen the set screw of dial hub and set dial, with Glowing Indicator centered between the first and second index lines at the low frequency end of the broadcast scale.

OUTPUT METER—The 025 Output Meter is connected between one of the plate prongs of the 1J6G tube and the chassis. Then adjust the meter to use the (0-30) volt scale.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1. Connect the 088 Signal Generator output lead, through a .1 mfd. condenser to the control grid of the 1C7G tube, and the ground connection of the output lead to the chassis.
2. Set the range switch in position No. 1 (Broadcast). Rotate the tuning condenser of the receiver to approximately 580 K. C. Then adjust the signal generator for 470 K. C.
3. Adjust compensators (30S), (30P), (28S), and (28P) for maximum output, see Fig. 2.

RADIO FREQUENCY CIRCUIT

Tuning Range (7.35 to 22 M. C.)

1. Remove the signal generator output lead from the grid of the 1C7G, and connect it through the .1 mfd. condenser to terminal No. 1 on the aerial input panel. Connect the generator ground lead to terminal No. 3. Terminals 2 and 3 of the aerial input panel must be shorted with the connector link provided on the panel during the following adjustments.
2. Set the range switch in position No. 3 (extreme clockwise). Turn the signal generator and receiver dials to 20 M. C.
3. Now adjust compensator (20B) by turning the screw (clockwise) to the maximum capacity position, then slowly turn it counter-clockwise until a second maximum peak is reached on the output meter. The first peak from maximum capacity is the image signal and the receiver must not be adjusted to it. **NOTE:** In adjusting some receivers only one peak will be observed, therefore tune the compensator to maximum on this peak. If the above procedure is correctly performed, the image signal will be found at 19.060 M. C., by advancing the signal generator input, and turning the receiver dial to this frequency mark on the scale.
4. Leaving the signal generator and receiver dials at 20 M. C. the antenna and R. F. compensators (4B) and (16B) are now adjusted, by connecting a variable condenser (Philco Part No. 45-2325) across the oscillator compensator (20B) contact (first contact from the left side of the receiver facing rear underside view of the chassis) and ground. Now tune the added condenser until the second harmonic of the receiver oscillator beats against the signal from the generator, resulting in a maximum indication on the output meter. **NOTE:** It may be necessary to increase the signal generator output to obtain a signal of sufficient strength for reading on the output meter. Compensators (4B) and (16B) are now adjusted for maximum output. After these adjustments, remove the external condenser and readjust compensator (20B) as given in paragraph 3 above.

Tuning Range 2.3 to 7.4 M. C.

1. Turn the range switch to position No. 2 (middle range). Rotate the signal generator and receiver dials to 7.0 M. C. Then adjust compensator (20A) for maximum output.
2. Now turn the signal generator and receiver dials to 6 M. C. and adjust compensators (4A) Ant., and (16A) R. F. for maximum output.

Tuning Range 530 to 1720 K. C.

1. Turn the range switch to position No. 1 (Broadcast). Set the 088 signal generator indicator and the receiver dial to 1600 K. C.

Now adjust compensators (20) osc., (4) ant. and (16) R. F. for maximum output.

2. The low frequency end of this range is now adjusted as follows: Turn the signal generator and receiver dials to 580 K. C. Now tune compensator (19) for maximum output, then vary the tuning condenser of the receiver for maximum output about the 580 K. C. dial mark. Turn compensator (19) slightly to the right or left and vary the receiver turning condenser for maximum output. If the output reading increases, turn compensator (19) in the same direction a trifle more and again vary the tuning condenser for maximum output. This procedure of first setting the compensator, and then varying the tuning condenser, is continued until there is no further gain in the output reading. When a decrease in output is noted turn the compensator in the opposite direction.
3. Set the signal generator and receiver dials as given in Paragraph 1 above and adjust compensator (20) for maximum output.
4. Now turn the signal generator and receiver dials to 1500 K. C. and adjust compensators (4) ant. and (16) R. F. for maximum output.

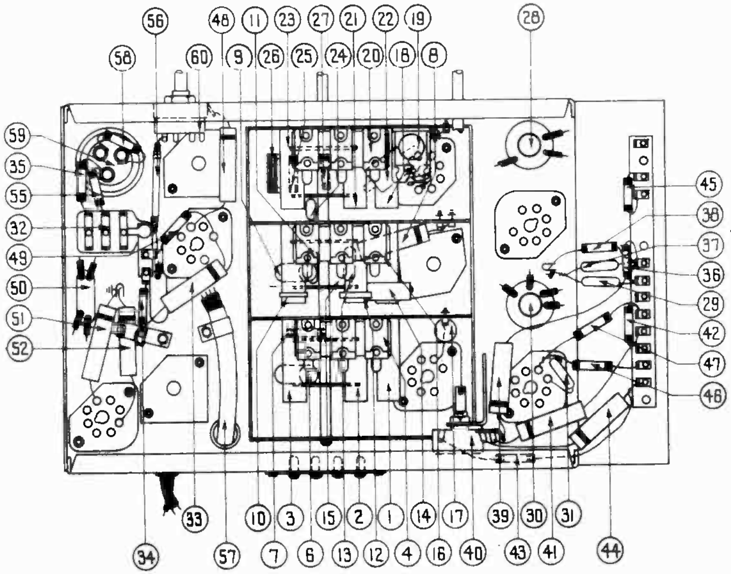


Fig. 4—Parts Location, Under Side of Chassis

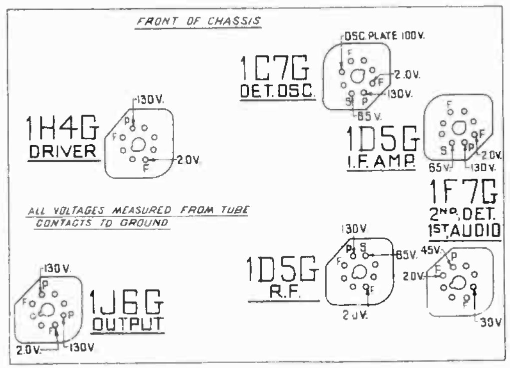


Fig.1—Socket Voltages Underside of Chassis View

The voltages indicated by arrows were measured with a **Philco 025 Circuit Tester** which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position.

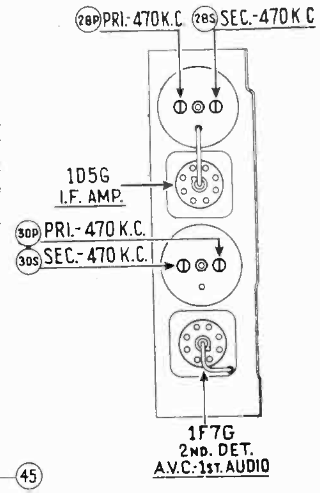


Fig. 2—I. F. Compensators, Top of Chassis

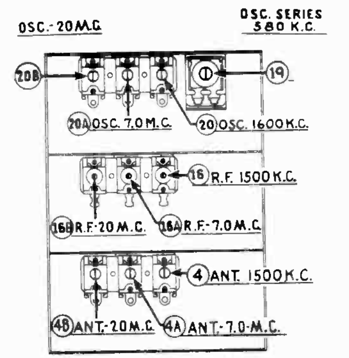


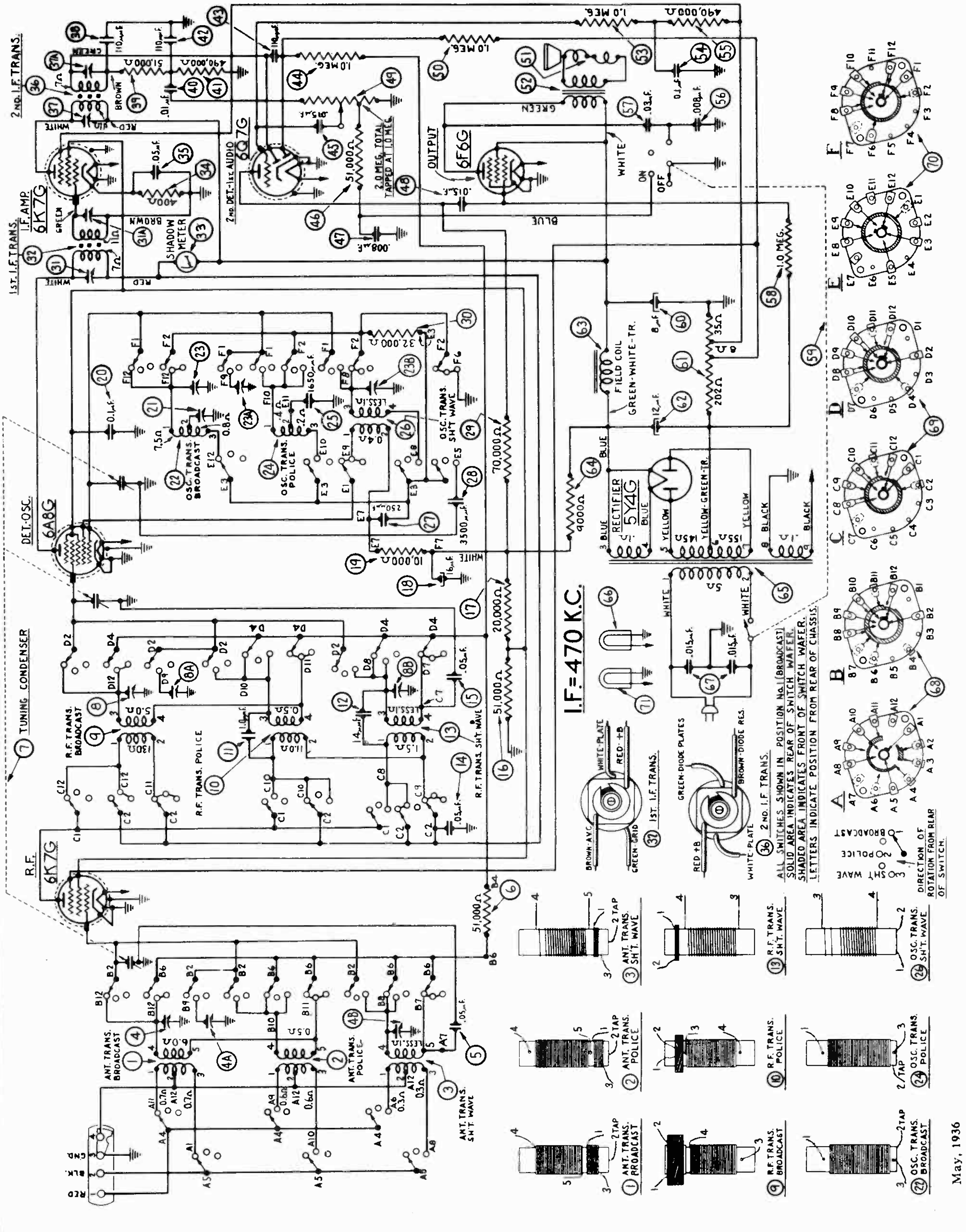
Fig. 3—R. F. Compensators, Under Side of Chassis

MODEL 37-630
Schematic, Coils
Change

PHILCO RADIO & TELEV. CORP.

Run 2.

While the circuit arrangement remains the same, the locations of the parts are slightly changed in this Run. Bakelite condenser ⑰ Part No. 3793-DG is removed from front and placed in the rear of the chassis. Tubular condenser ⑮ Part No. 30-4380 is replaced with a Part No. 8318-SU bakelite condenser placed in the position formerly held by 3793-DG.



MODEL 37-630
Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

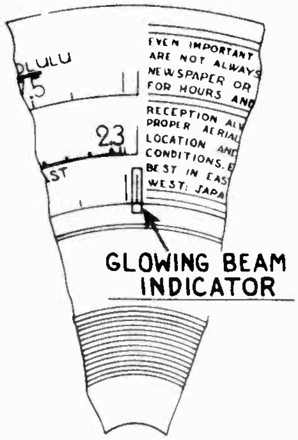


Fig. 2—Dial Calibration

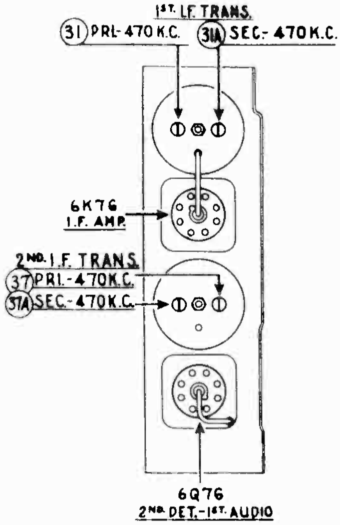


Fig. 3—Locations of I. F. Compensators

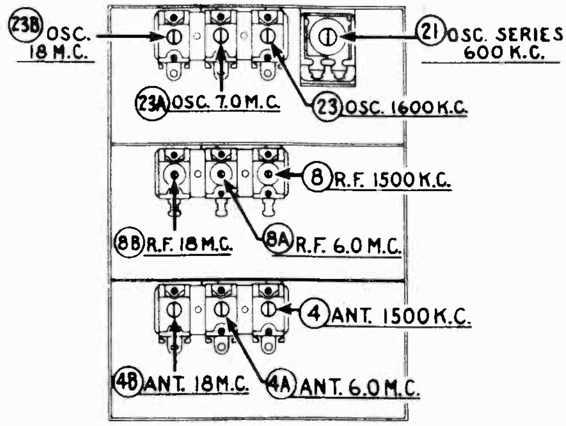


Fig. 4—Locations of R. F. Compensators

Alignment of the Compensators

The accurate adjustment of the various compensating condensers is vital to the proper functioning of this receiver. There are four compensating condensers in the I. F. Circuit, four in the Oscillator Circuit, three in the R. F. Amplifier Circuit and three in the Antenna Circuit. Incorrect adjustment will cause loss of sensitivity, unsatisfactory tone, and poor selectivity.

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 SIGNAL GENERATOR, covering from 110 to 20,000 K. C. is recommended for adjusting the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 CIRCUIT TESTER contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Handle Screw-driver No. 27-7059 completes the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 3 and 4.

The following procedure must be observed in adjusting the compensators:—

Dial Calibration—In order to adjust this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, rotate the tuning condenser control to the extreme counter-clockwise position (maximum capacity). Loosen the screw of dial hub, then turn dial until the glowing indicator is centered on the first index line of dial scale (see Fig. 2). Now tighten the dial hub set screw in this position.

Shadow Meter Adjustment—Remove aerial and allow tubes to warm up. Then adjust shadow meter as follows:

1 Move the Shadow meter coil backwards and forwards, until the shadow is within one-eighth of an inch of each side of the screen.
2 Remove the Rectifier tube from its socket, and rotate the shadow meter coil for minimum shadow width.
3 Replace the Rectifier tube. The shadow should then return to maximum width or within one-eighth of an inch of each side of the screen. If the shadow does not return to maximum width, operations 1 and 2 should be continued until it does.

Output Meter—The 025 Output Meter is connected to the plate and cathode terminals of the (6F6G) tube. Adjust the meter to use the (0-30) Volt Scale.

During the I. F. and R. F. adjustments, the signal generator output should be maintained at the lowest possible level that will give an indication on the output meter.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1 Connect the 088 Signal Generator output lead, through a .1 mfd. condenser, to the control grid of the 6A8G tube; and the ground connection of the output lead to the chassis.
2 Set the range switch in position No. 1 (Broadcast), then rotate the tuning condenser of the receiver to the maximum capacity position (counter-clockwise), and adjust the signal generator for 470 K. C.
3 Adjust compensators 37a 2nd I. F. Sec., 37 2nd I. F. Pri., 31a 1st I. F. Sec., and 31 1st I. F. Pri. for maximum reading on output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range—7.3 to 22.0 M. C.

1 Remove the signal generator output lead from the grid of 6A8G tube, and connect it through a .1 mfd. condenser to terminal No. 1 on aerial input panel, and the generator ground lead to terminal No. 3, rear of chassis.
(a) Terminals 2 and 3 of aerial input panel must be connected with connector link provided on the panel, during these adjustments.
2 Set the tuning range switch in position No. 3 (Short Wave). Turn the signal generator and receiver dials to 18 M. C. and adjust compensators 23b Osc., 8b R. F. and 4b Ant. for maximum output. (See Note (a) below).
(a) The adjustment of the Radio Frequency compensator on the high frequency range causes a slight detuning of the oscillator circuit. In order to overcome this detuning effect, connect a variable condenser of approximately 350 mmfd., having a good vernier drive, across the oscillator section of the tuning condenser. Leaving the signal generator and receiver dials at 18 M. C., tune the added condenser so that the second harmonic of the receiver oscillator will beat against the signal from the 088 signal generator bringing in the signal. The antenna and R. F. compensators 4b and 8b should then be adjusted to give maximum output. Now remove the external condenser and turn compensator 23b to maximum capacity (clockwise) then without moving signal generator or receiver tuning condenser, back off compensator 23b (counter-clockwise) until a second peak is reached on the output meter. The first peak is caused by tuning to the image frequency signal and must not be used.

Tuning Range 2.3 to 7.4 M. C.

1 Turn the range switch to position No. 2 (police). Rotate the signal generator and receiver dials to 7.0 M. C. Then adjust compensator 23a for maximum output. Now turn the signal generator and receiver dials to 6.0 M. C. and adjust compensators 8a R. F. and 4a Ant. for maximum reading on the output meter.

Tuning Range 530 to 1720 K. C.

1 Set the range switch in position No. 1 (Broadcast). Set the 088 Signal Generator indicator at 800 K. C. and the receiver dial at 1600 K. C.
(a) In adjusting the receiver at 1600 K. C. the second harmonic of 800 K. C., to which the signal generator is tuned, is used. The second harmonic of 800 K. C. is 1600 K. C. Now adjust compensators 23 Osc., 8 R. F. and 4 Ant. for maximum reading on output meter.
2 The low frequency end of the range is now tuned by turning the signal generator and receiver dials to 600 K. C. and adjusting compensator 21 Osc. Series—(see Note (a) below)—for maximum reading on output meter.
(a) While compensator 21 is being adjusted, the tuning condenser must be rolled for maximum output. This is accomplished as follows:—First tune compensator 21 for maximum output. Then vary the tuning condenser for maximum output at 600 K. C. Now retune compensator 21, and again vary the tuning condenser back and forth at 600 K. C. for maximum output. This operation of first turning the compensator then the tuning condenser is continued until maximum output is obtained at the 600 K. C. frequency.
3 After the low frequency (600 K. C.) end of the range is adjusted, the 1600 K. C. end is readjusted, as given in Paragraph (1) above, to correct any variation that the low frequency series compensator may have caused in the alignment of the high frequency end.
4 Now turn the signal generator and receiver dials to 1500 K. C. and readjust compensators 4 Ant., and 8 R. F., for maximum output.

MODEL 37-630
Circuit Data
Voltage, Socket
Transformer Data

PHILCO RADIO & TELEV. CORP.

Electrical Specifications

Voltage Rating: 115 Volts A.C.

Frequency Rating: 50 to 60 cycles.
For 25 to 40 cycle operation the Power Transformer marked with asterisk in parts list is used.

Power Consumption: 65 Watts.

Types and Number of Tubes: 2 type 6K7G, R. F. and I. F. Amplifiers; 1 type 6A8G, Detector-Oscillator; 1 type 6Q7G, 2nd Detector, Automatic Volume Control and 1st Audio; 1 type 6F6G, Output; and 1 type 5Y4G Rectifier.

Undistorted Output: 3 watts.

Intermediate Frequency: 470 K. C.

Tuning Ranges: Three. Range 1.—530 to 1720 Kilocycles; Range 2.—2.3 to 7.4 Megacycles; Range 3.—7.35 to 22 Megacycles.

Speakers: X Cabinet—H24
T Cabinet—K38

POWER TRANSFORMER DATA

Lead No. Shown on Schematic	A.C. Volts	Current	Circuit	Color	Resistance
1–2	120	—	Pri.	White	5 ohms
3–4	5.0	2.0 A.	Fil. Rectifier	Blue	.1 ohm
5–7	670	70 Ma.	High Voltage Sec.	Yellow	145 ohms 155 ohms
6	—	—	Center Tap of 5–7	—	—
8–9	6.7	2.1 A.	Fil.	Black	.1 ohm

General Description

Model 37-630 is a 6 tube superheterodyne receiver for operation on alternating current, having three tuning ranges, covering standard broadcast and short-wave frequencies, and using the new Philco High-Efficiency self-centering glass tubes.

The circuit includes the Philco "Foreign Tuning System" controlled by the tuning range switch which provides maximum sensitivity and noise reduction, when used with the **Philco High Efficiency Aerial** supplied with the receiver. One stage of Radio Frequency amplification which greatly increases the signal to noise ratio, automatic bass compensation in the volume control circuit, shadow tuning and a separate diode circuit for automatic volume control are also incorporated in this receiver.

The red and black leads of the High-Efficiency Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided at the rear of the chassis. Connect the jumper on the terminal panel across terminals 3 and 4.

If a temporary aerial is used, the jumper should be across terminals 2 and 3. The aerial connects to terminal 1 and the ground to terminal 3.

A good ground connection is desirable in all installations. Make the ground connection from the nearest water or radiator pipe to terminal 3 on the terminal panel.

The chassis is constructed in three basic assembly units, concentrating each circuit in a single unit.

The Radio Frequency unit, located in the center of the chassis, contains a 6K7G tube which functions as a Radio Frequency Amplifier; a 6A8G tube, for the Detector-Oscillator circuit; individual Antenna, R. F. Amplifier and Oscillator coils for each tuning range; selector switch; compensating condensers for all coils; and other parts necessary for the associated circuits. The unit is separately mounted on rubber grommets, cushioning it from the main chassis.

The Intermediate Frequency unit, mounted on the right hand side of the chassis (facing front of set) consists of the Intermediate Frequency transformers, compensating condensers, a 6K7G for the I. F. Amplifier stage, and a 6Q7G tube as the second detector—automatic volume control and first audio stage. All voltages supplied to the I. F. and R. F. units are furnished from a terminal strip mounted in this unit.

The Power Pack and Audio Output circuits, together with the required voltage dividers and filter condensers are mounted in the power unit. This unit contains a 6F6G tube and a 5Y4G tube for the Power Output and Rectifier Circuits respectively, and the combined tone control and power switch.

Schematic Diagram, Fig. 5, is numbered, indicating all important parts. These numbers correspond with the parts layout shown in Fig. 6. In addition, the range switch wafers are shown on the schematic diagram. The contacts on each wafer are numbered and lettered to indicate their connection points in the schematic diagram, which are also lettered and numbered. The physical drawings of each coil used in the receiver are also shown on schematic diagram Fig. 5. The connections of these coils are numbered on the coil drawing and on the schematic diagram.

Fig. 1 shows the Voltage measurements taken from the bottom of the socket at each contact. In Fig. 2, the correct position of the dial indicator, for proper adjustment of the compensator condenser is shown. Fig. 3 and 4 are the locations of the I. F. and R. F. compensators respectively.

This receiver is used in cabinets type X code 121 and type T code 122. These instructions, however, will cover both types.

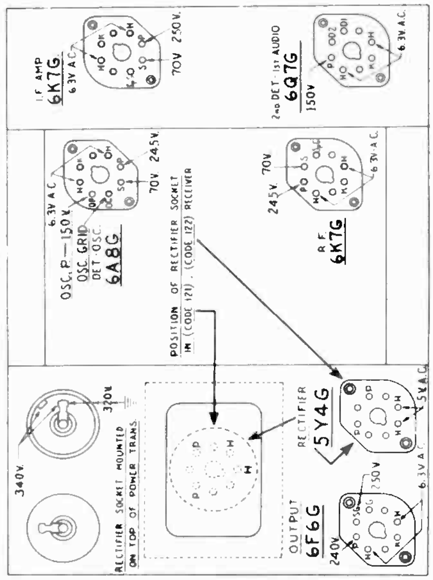
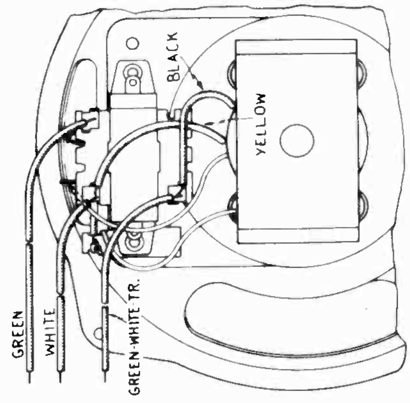


Fig. 1. Socket Voltages
Measured from Socket Contact to Ground
Underside of Chassis View

The voltages indicated by arrows were measured with a **Philco 025 Circuit Tester** which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum. Range Switch in broadcast position. Line voltage 115 A.C.



Speaker Wiring

When replacing any part of the speaker, the hum bucking coil connections should be connected for minimum hum.

MODEL 37-630
Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

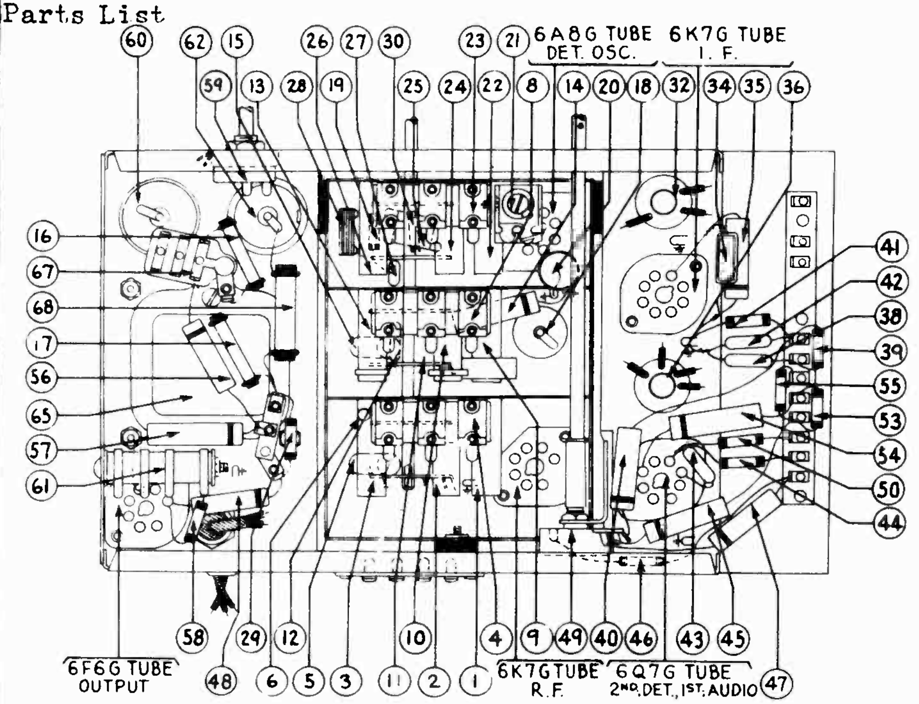


Fig. 6—Base View

Description	Part No.		List Price
Retaining Clips	28-8610		.03
Washer	28-4186	Per C	.75
Socket 8 prong	27-6058		.11
Socket 7 prong	27-6057		.11
Tube Shield	28-2726		.10
Tube Shield Base	28-3898		.03
I. F. Shield	38-7763		.20
Terminal Panel I. F. Unit	38-7703		.25
Washer I. F. Unit	28-4001	Per C	.25
Wave Switch Indexing Plate & Shaft	42-1173		.50
Pilot Lamp Assembly	38-7706		.35
Dial	27-5203		.50
Dial Hub	28-7187		.12
Dial Clamp	28-2837		.10
Dial Hub Set Screw	W-1641		.02
Dial Gear	28-7185		.10
Dial Guard	27-8324		.02
Thrust Spring	28-8611		.01
Thrust Washer	28-3976	Per C	.30

Schematic No.	Description	Part No.	List Price
1	Antenna Transformer (Broadcast)	32-2108	$0.80
2	Antenna Transformer (Police)	32-2119	.65
3	Antenna Transformer (S. W.)	32-2109	.75
4	Compensator Ant. 1500 K. C.	31-6092	.60
5	Condenser (.05 mfd. Tubular)	30-4020	.20
6	Resistor (51000 ohms ½ watt)	33-351339	.20
7	Tuning Condenser	31-1818	4.50
8	Compensator (R. F. 1500 K.C.)	31-6092	.60
9	R. F. Transformer (Broadcast)	32-2105	.75
10	R. F. Transformer (Police)	32-2106	.65
11	Condenser (1.0 mmfd.)		
12	Condenser (14 mmfd. Mica)	30-1073	.20
13	R. F. Transformer (S. W.)	32-2126	.55
14	Condenser (.05 mfd. Tubular)	30-4123	.20
15	Condenser (.05 mfd. Tubular)	30-4020	.20
16	Resistor (51000 ohms 1 watt)	33-351439	.20
17	Resistor (20000 ohms 1 watt)	33-320439	.20
18	Electrolytic Condenser (16 mfd.)	30-2118	1.65
19	Resistor (10000 ohms ½ watt)	33-310339	.20
20	Condenser (.1 mfd. Tubular)	30-4170	.25
21	Compensator (Osc. 600 K.C.)	31-6056	.55
22	Osc. Transformer (Broadcast)	32-2120	.65
23	Compensator (Osc. 1600 K.C.)	31-6092	.60
24	Osc. Transformer (Police)	32-2121	.40
25	Condenser (1650 mmfd. Semi-fixed)	31-6096	.40
26	Osc. Transformer (S.W.)	32-2110	.75
27	Condenser (250 mmfd. Mica)	30-1032	.25
28	Condenser (3500 mmfd. Semi-fixed)	31-6097	.50
29	Resistor (70000 ohms ½ watt)	33-370339	.20
30	Resistor (32000 ohms ½ watt)	33-332339	.20
31	Compensator (1st I. F. Pri. 470 K.C.)	Part of 39	
32	1st I. F. Transformer	32-2100	1.50
33	Shadowmeter	45-2189	2.50
34	Resistor (400 ohm Bakelite)	33-1211	.20
35	Condenser (.05 mfd. Tubular)	30-4020	.20
36	2nd I. F. Transformer	32-2102	1.50
37	Compensator (2nd I. F. Pri. 470 K.C.)	Part of 42	
38	Condenser (110 mmfd. Mica)	30-1031	.20
39	Resistor (51000 ohms ½ watt)	33-351339	.20
40	Condenser (.01 mfd. Tubular)	30-4124	.25
41	Resistor (490000 ohms ½ watt)	33-449339	.20
42	Condenser (110 mmfd. Mica)	30-1031	.20
43	Condenser (110 mmfd. Mica)	30-1031	.20
44	Resistor (1 megohm ½ watt)	33-510339	.20
45	Condenser (.015 mfd. Tubular)	30-4358	.20
46	Resistor (51000 ohms, ½ watt)	33-351339	.20
47	Condenser (.006 mfd. Tubular)	30-4112	.20
48	Condenser (.015 mfd. Tubular)	30-4226	.20
49	Volume Control	33-5158	1.00
50	Resistor (1 meghom ½ watt)	33-510339	.20
51	Voice Coil and Cone, H24 Speaker	02625	1.20
	Voice Coil and Cone, K38 Speaker	36-3174	.80
52	Output Transformer, H24	2580	1.00
	Output Transformer, K38	2580	1.00
53	Resistor (1 megohm ½ watt)	33-510339	.20
54	Condenser (0.1 mfd. Tubular)	30-4122	.20
55	Resistor (490000 ohms ½ watt)	33-449339	.20
56	Condenser (.008 mfd. Tubular)	30-4112	.20
57	Condenser (.03 mfd. Tubular)	30-4380	.20
58	Resistor (1 megohm ½ watt)	33-510339	.20
59	Tone Control and A. C. Switch	42-1182	.75
60	Electrolytic Condenser (8 mfd.)	30-2024	1.10
61	Bias Resistor	33-3277	.20
62	Electrolytic Condenser (12 mfd.)	30-2117	1.20
63	Field Coil Assembly, H24 Speaker	36-3665	
	Field Coil Assembly, K38 Speaker	36-3718-01	
64	Resistor (9000 ohms, 2 watt)	33-290539	.30
65	Power Transformer (115 Volt 50-60 cycle) Code 121	32-7583	4.50
	Power Transformer (115 Volt 25-40 cycle) Code 121	32-7584	6.50
	Power Transformer (115 Volt 50-60 cycle) Code 122	32-7626	4.25
	Power Transformer (115 Volt 50-60 cycle) Code 122	32-7627	
66	Pilot Lamp	34-2039	$0.15
67	Condenser (.015-.015 mfd. Double Bakelite)	3793 DG	.40
68	Wave Switch Antenna	42-1170	1.10
69	Wave Switch R. F.	42-1171	1.00
70	Wave Switch Osc.	42-1172	1.10
	Drive Gear	31-1884	.25
	Vernier Drive	31-1871	.75
	Lens	27-8310	.02
	Volume Control Shaft	28-6499	.10
	Volume Control Shaft Spring	28-4117	Per C .40
	Wiring Panel	38-6306	.03
	Wiring Panel Power Unit	38-5864	.02
	Grommet Mtg. Tuning Condenser	27-4325	.02
	Grommet R. F. Unit	27-4317	.04
	Sleeve Mtg. R. F. Unit	28-2257	.01
	Spacer Mtg. R. F. Unit	27-8339	Per C .40
	Screw Mtg. R. F. Unit	W-729	Per C .45
	Washer Mtg. R. F. Unit	28-3927	.01
	Insulator Mtg. Electrolytic Condenser	27-7194	.01
	Bracket Mtg. Electrolytic Condenser	6440	.05
	Antenna Panel	38-7714	.15
	Speaker Cable	L-2181	.25
	A. C. Cord	L-2183	.40
	Knobs Tuning	27-4330	.10
	Knobs Tuning Vernier	27-4331	.10
	Knobs Wave Switch	27-4326	.10
	Knobs Tone & Volume	27-4332	.10
	Shadowmeter Lamp Shield	28-2917	.02
	Shadowmeter Mtg. Spring	28-8623	

MODEL T CABINET

Description	Part No.	List Price
Bezel Frame & Plate Assembly	40-5937	
Bezel Frame Gasket	27-8311	
Bezel Frame Rubber	5198	.01
Bezel Frame Glass	27-8298	.05
Bezel Frame Ring	28-3967	.35
Speaker K-38	36-1262	
Baffle & Silk Assembly	40-5973	

MODEL X CABINET

Description	Part No.
Bezel Frame & Plate Assembly	40-5945
Bezel Frame Gasket	27-8312
Bezel Frame Glass	27-8299
Bezel Frame Ring	28-3987
Speaker H-24	36-1224
Baffle and Silk Assembly	40-5972

Figures in black type indicate circled figures in Base View.

May, 1936

PHILCO RADIO & TELEV. CORP.

MODEL 376
MODEL 37-640
Schematic
Coil Data

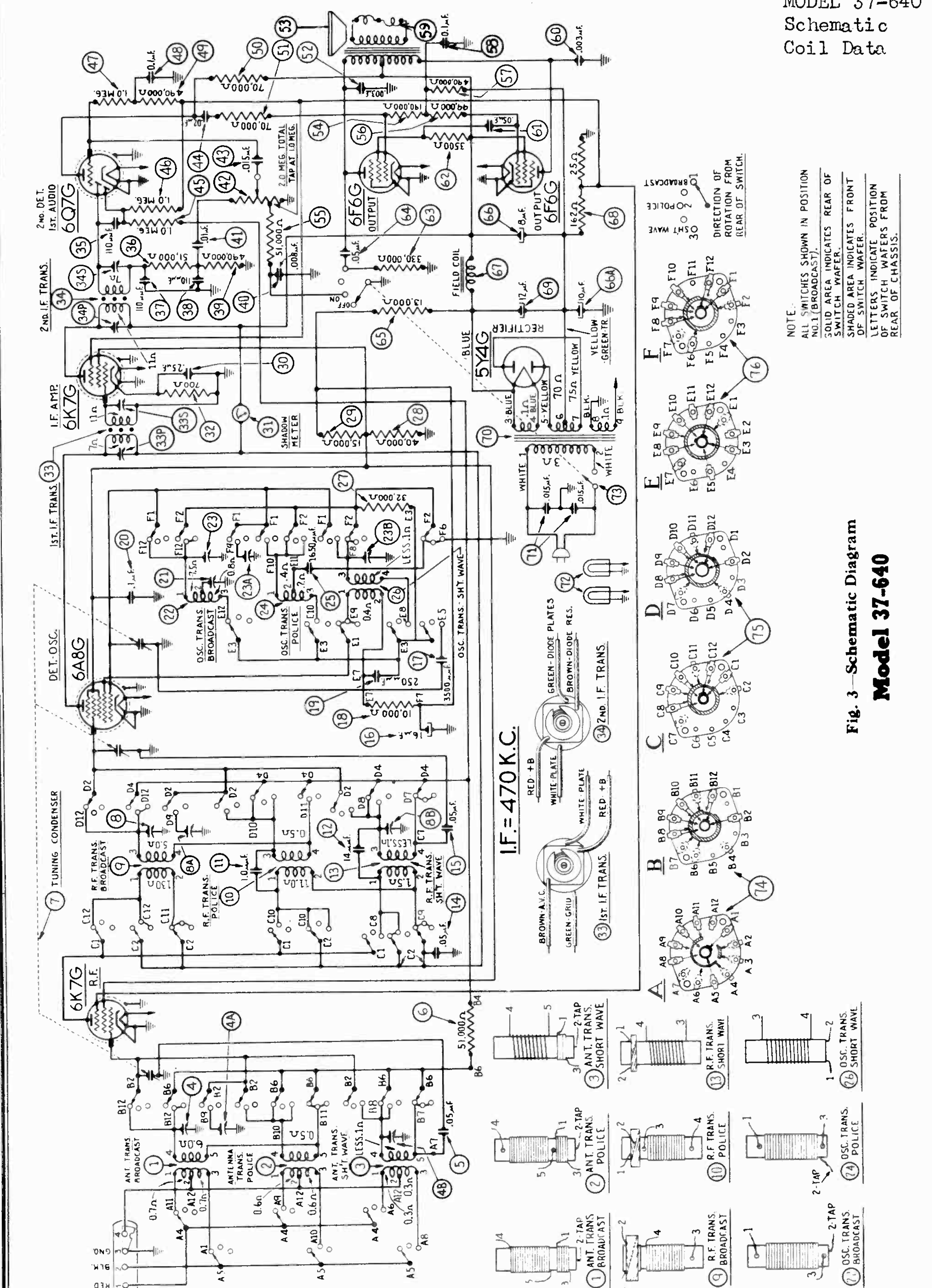


Fig. 3—Schematic Diagram
Model 37-640

MODEL 37-640

PHILCO RADIO & TELEV. CORP.

Trimmers Alignment

Alignment of Compensators

The accurate adjustment of the various compensating condensers is vital to the proper functioning of this receiver. There are four compensating condensers in the I. F. Circuit, four in the Oscillator Circuit, three in the R. F. Amplifier Circuit and three in the Antenna Circuit. Incorrect adjustment will cause loss of sensitivity, unsatisfactory tone, and poor selectivity.

To accurately adjust this receiver, precision test equipment is necessary. A signal generator such as the PHILCO MODEL 088 SIGNAL GENERATOR, covering from 110 to 20,000 K. C. is recommended for adjusting the compensators at the various frequencies specified. A visual indication of the receiver output is also necessary to obtain correct adjustment of the compensators. PHILCO MODEL 025 CIRCUIT TESTER contains a sensitive output meter and is recommended for these adjustments.

Philco Fibre Handle Screw-driver No. 27-7059 completes the necessary equipment for these adjustments. The locations of the various compensators are shown in Figs. 6 and 7.

The following procedure must be observed in adjusting the compensators:

DIAL CALIBRATION—In order to adjust this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, rotate the tuning condenser control to the extreme counter-clockwise position (maximum capacity). Loosen the screw of dial hub, then turn dial until the glowing indicator is centered on the first index line of dial scale (see Fig. 5). Now tighten the dial hub set screw in this position.

SHADOW METER ADJUSTMENT—Remove aerial and allow tubes to warm up. Then adjust shadow meter as follows:

1—Move the Shadow meter coil backwards and forwards, until the shadow is within one-eighth of an inch of each side of the screen.

2—Remove the Rectifier tube from its socket, and rotate the shadow meter coil for minimum shadow width.

3—Replace the Rectifier tube. The shadow should then return to maximum width or within one-eighth of an inch of each side of the screen. If the shadow does not return to maximum width, operations 1 and 2 should be continued until it does.

OUTPUT METER—The 025 Output Meter is connected to the plate and cathode terminals of one (6F6G) tube. Adjust the meter to use the (0-30) Volt Scale.

During the I. F. and R. F. adjustments, the signal generator output should be maintained at the lowest possible level that will give an indication on the output meter.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1—Connect the 088 Signal Generator output lead, through a .1 mfd. condenser, to the control grid of the 6A8G tube; and the ground connection of the output lead to the chassis.

2—Set the range switch in position No. 1 (Broadcast), then rotate the tuning condenser of the receiver to the maximum capacity position (counter-clockwise), and adjust the signal generator for 470 K. C.

3—Adjust compensators 34s 2nd I. F. Sec., 34p 2nd I. F. Pri., 33s 1st I. F. Sec., and 33p 1st I. F. Pri. for maximum reading on output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range—7.3 to 22.0 M. C.

1—Remove the signal generator output lead from the grid of 6A8G tube, and connect it through the .1 mfd. condenser to terminal No. 1 on aerial input panel, and the generator ground lead to terminal No. 3, rear of chassis.
(a) Terminals 2 and 3 of aerial input panel must be connected with connector link provided on the panel, during these adjustments.

2—Set the tuning range switch in position No. 3 (Short Wave). Turn the signal generator and receiver dials to 18 M. C. and adjust compensators 23b Osc., 8b R. F. and 4b Ant. for maximum output (see note (a) below).
(a) The adjustment of the Radio Frequency compensator on the high frequency range causes a slight detuning of the oscillator circuit. In order to overcome this detuning effect, connect a variable condenser of approximately 350 mmfd., having a good vernier drive, across the oscillator section of the tuning condenser. Leaving the signal generator and receiver dials at 18 M. C., tune the added condenser so that the second harmonic of the receiver oscillator will beat against the signal from the 088 signal generator bringing in the signal. The antenna and R. F. compensator 4b and 8b should then be adjusted to give maximum output. Now remove the external condenser and turn compensator 23b to maximum capacity (clockwise) then without moving signal generator or receiver tuning condenser, back off compensator 23b (counter-clockwise) until a second peak is reached on the output meter. The first peak is caused by tuning to the image frequency signal and must not be used.

Tuning Range—2.3 to 7.4 M. C.

1—Turn the range switch to position No. 2 (police). Rotate the signal generator and receiver dials to 7.0 M. C. Then adjust compensator 23a for maximum output. Now turn the signal generator and receiver dials to 6.0 M. C. and adjust compensators 8a R. F. and 4a Ant. for maximum reading on the output meter.

Tuning Range—530 to 1720 K. C.

1—Set the range switch in position No. 1 (Broadcast). Set the 088 Signal Generator indicator at 800 K. C. and the receiver dial at 1600 K. C.
(a) In adjusting the receiver at 1600 K. C. the second harmonic of 800 K. C., to which the signal generator is tuned, is used. The second harmonic of 800 K. C. is 1600 K. C. Now adjust compensators 23 Osc., 8 R. F. and 4 Ant. for maximum reading on output meter.

2—The low frequency end of the range is now tuned by turning the signal generator and receiver dials to 600 K. C. and adjusting compensator 21 Osc. series (see Note (a) below) for maximum reading on output meter.
(a) While compensator 21 is being adjusted, the tuning condenser must be rolled for maximum output. This is accomplished as follows: First tune compensator 21 for maximum output. Then vary the tuning condenser for maximum output at 600 K. C. Now retune compensator 21 and again vary the tuning condenser back and forth at 600 K. C. for maximum output. This operation of first turning the compensator then the tuning condenser is continued until maximum output is obtained at the 600 K. C. frequency.

3—After the low frequency (600 K. C.) end of the range is adjusted, the 1600 K. C. end is readjusted, as given in Paragraph (1) above, to correct any variation that the low frequency series compensator may have caused in the alignment of the high frequency end.

4—Now turn the signal generator and receiver dials to 1500 K. C. and readjust compensators 4 Ant., and 8 R. F., for maximum output.

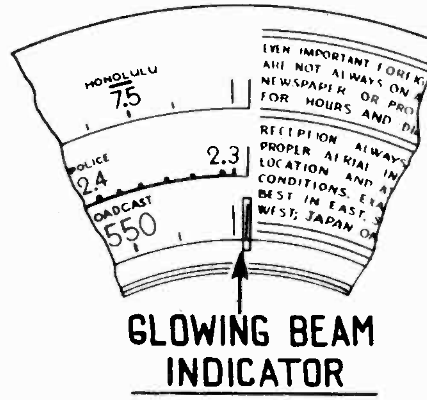


Fig. 5—Dial Calibration

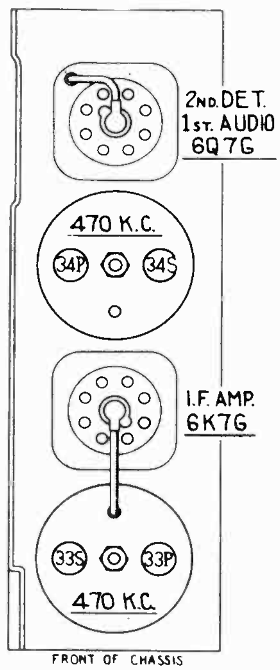


Fig. 6—Location of I. F. Compensators

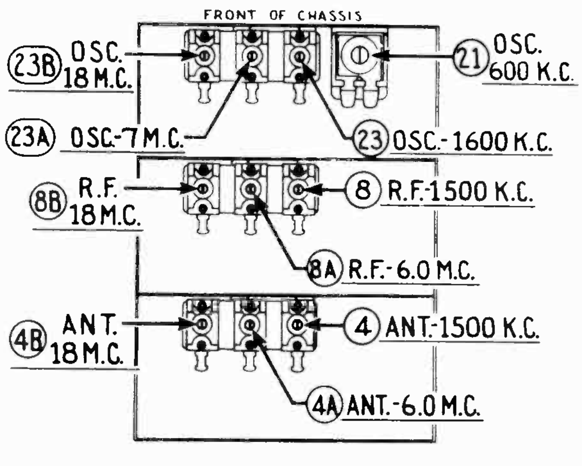


Fig. 7—Locations of R. F. Compensators

MODEL 37-640
Voltage, Socket
Transformer Data
Notes

PHILCO RADIO & TELEV. CORP.

Model 37-640 is a 7 tube superheterodyne receiver for operation on alternating current, having three tuning ranges, covering standard broadcast and short-wave frequencies. The chassis is constructed in three basic assembly units, concentrating the R. F., I. F. and Audio Output circuits in individual units.

The circuit consists of the **"PHILCO FOREIGN TUNING SYSTEM"**—controlled by the range switch—providing maximum sensitivity and noise reduction, when used with the **PHILCO HIGH EFFICIENCY AERIAL.** One stage of radio frequency amplification which increases the signal to noise ratio, Automatic Bass Compensation in the volume control circuit, Shadow Tuning, a separate diode circuit for the Automatic Volume Control and a push-pull pentode audio output circuit are also incorporated in this receiver.

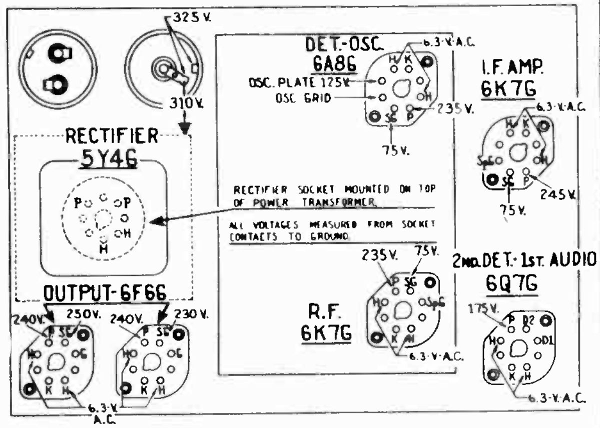


Fig. 1—Socket Voltages Measured from Underside of Chassis

The voltages indicated by arrows were measured with a **Philco 025 Circuit Tester** which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.

Aerial Connections

The Philco High Efficiency Aerial is recommended, for use with this receiver, to obtain maximum performance. A terminal panel is provided at the rear of the chassis for connecting the aerial. This panel contains four screw terminals and a connecting link.

When using the PHILCO HIGH EFFICIENCY AERIAL connect the red and black leads of the Aerial transmission line (lead-in) to terminals 1 and 2 respectively and the ground lead to terminal 3. The connector link should be across terminals 3 and 4.

If a temporary aerial and ground is used shift the connecting link to rest across terminals 2 and 3 and connect the aerial and ground to terminals 1 and 3 respectively.

REMOVING SWITCH AND COIL ASSEMBLIES FROM R. F. UNIT

Remove the center mounting screw on the rear of the R. F. unit. Then lift the rear of the unit and push forward until the rubber mounting grommet, on each side of the unit, clear the mounting slots. The unit is then lifted far enough from the chassis for removal of the two screws holding the selector switch indexing plate and shaft (front of the unit) then pull shaft straight out. Removal of the volume control shaft is also necessary.

IMPORTANT—When selector switch shaft is replaced, care should be taken to have all wafer rotors in the same position so that index projection on the end of shaft will slide freely into notched hole in wafer rotors. **Never force shaft into rotors.**

AERIAL SWITCH AND COIL ASSEMBLY. FIRST SECTION FROM REAR OF UNIT

a. Remove screw holding shield plate to unit base. This screw is located in the right hand corner of shield plate, facing rear underside of chassis.

b. Unsolder the leads connecting the range switch to the aerial panel and I. F. terminal panel; tubular condenser (5) to the tuning condenser stator plate and ground lead from assembly shield to unit frame—lift assembly straight out of unit.

R. F. AMPLIFIER ASSEMBLY, CENTER SECTION

a. Remove screw holding shield plate to unit base.

b. Unsolder the leads connecting the range switch to I. F. terminal panel and 6K7G plate socket contact, tubular condenser (15) to the tuning condenser housing, selector switch contact (D2) to the tuning condenser stator plates, tubular condenser (14) to shield ground lug and shield to R. F. unit base. The amplifier assembly may then be removed.

OSCILLATOR SWITCH AND COIL ASSEMBLY. THIRD SECTION FROM REAR OF UNIT

a. The oscillator assembly may now be removed by unscrewing the four screws holding shield to R. F. base. These screws are located on each side of the R. F. base.

b. Unsolder the leads connecting range switch to the 6K7G socket contacts and terminal panel in the I. F. unit, condenser (17) lead from tuning condenser housing and lead connecting selector switch to the tuning condenser stator plates. Then unsolder wires connecting selector switch to electrolytic condenser (16) and 6A8G socket contacts.

Parts are replaced by following the above procedure in the reverse order.

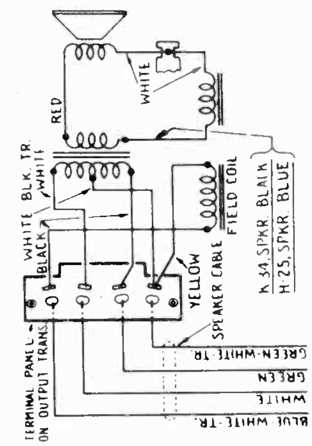


Fig. 2—Speaker Wiring

POWER TRANSFORMER DATA

Schematic Lead Number	A.C. Volts	Current	Circuit	Color	Resistance
1-2	120		Pri.	White	3 ohms
3-4	5.0	2.0A	Fil. Rect.	Blue	1 ohms
5-7	670	100 MA	High Voltage Sec.	Yellow	70 ohms 75 ohms
6			Center Top of 5-7		Yellow Green
8-9	6.7	3.0A	Fil. Tubes	Black	1 ohm

Electrical Specifications

Voltage Rating: 115 A. C.
Frequency Rating: 50 to 60 cycle.
For 25 to 40 cycle operation use Power Transformer marked with asterisk in parts list.
Power Consumption: 80 watts.
Undistorted Output: 5 watts.
Intermediate Frequency: 470 K. C.
Tuning Ranges: Three. Range 1—530 to 1720 K. C. Range 2—2.3 to 7.4 M. C. Range 3—7.35 to 22 M. C.
Speakers: K-34 B Cabinet. H-25 X-MX Cabinet.

MODEL 37-640
Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

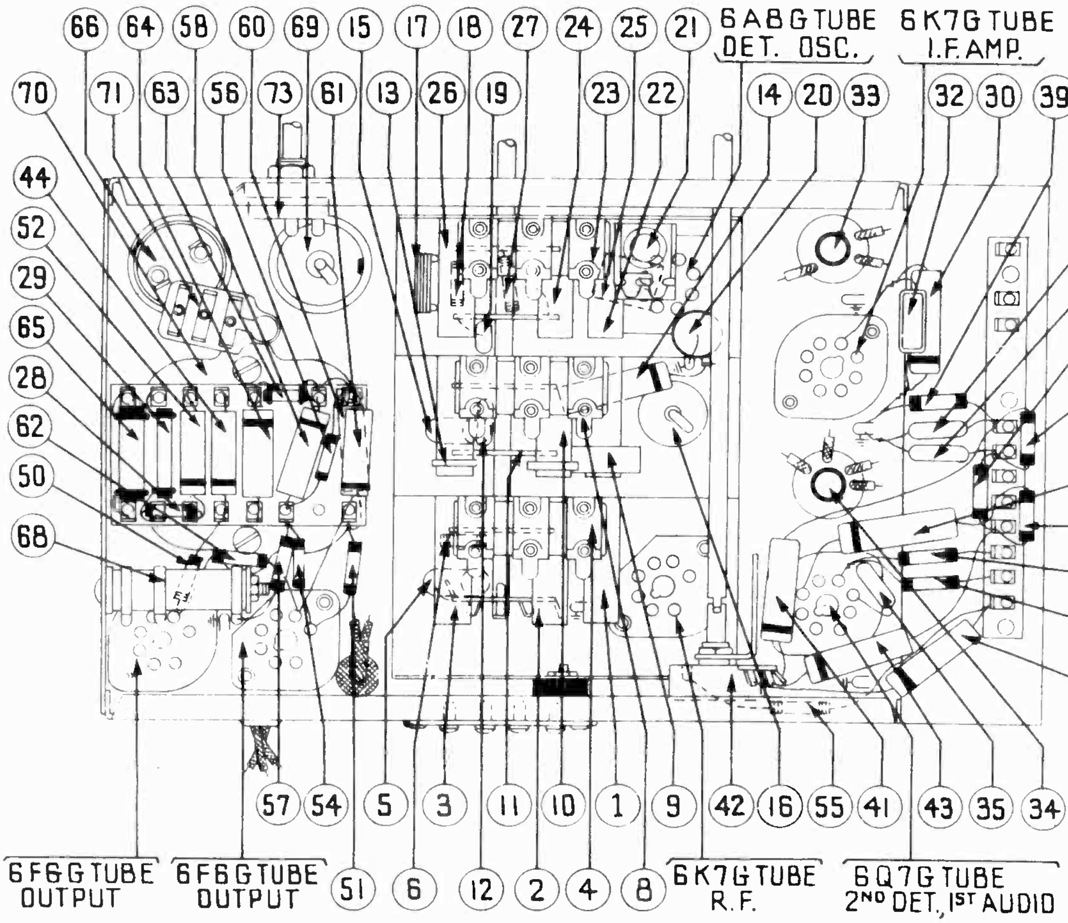


Fig. 4—Base View

Replacement Parts—Model 37-640

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (Broadcast)	32-2108	$0.80
2	Antenna Transformer (Police)	32-2119	.65
3	Antenna Transformer (S. W.)	32-2109	.75
4	Compensating Condensers Ant.	31-6092	.60
5	Condenser (.05 mfd. tubular)	30-4020	.20
6	Resistor (51000 ohms ½ watt)	33-351339	.20
7	Tuning Condenser	31-1820	5.00
8	Compensating Condensers R. F.	31-6092	.60
9	R. F. Transformer (Broadcast)	32-2105	.75
10	R. F. Transformer (Police)	32-2106	.65
11	Condenser		
12	Condenser (14 mmfd. mica)	30-1073	.20
13	R. F. Transformer (S. W.)	32-2126	.55
14	Condenser (.05 mfd. tubular)	30-4123	.20
15	Condenser (.05 mfd. tubular)	30-4020	.20
16	Electrolytic Condenser (16 mfd.)	30-2118	1.65
17	Condenser (3500 mmfd. semi-fixed)	31-6097	.50
18	Resistor (10000 ohms ½ watt)	33-310339	.20
19	Condenser (250 mmfd. mica)	30-1032	.25
20	Condenser (.1 mfd. tubular)	30-4170	.25
21	Compensator (Osc. Series Broadcast)	31-6056	.55
22	Osc. Transformer (Broadcast)	32-2120	.65
23	Compensating Condensers Osc.	31-6092	.60
24	Osc. Transformer (Police)	32-2121	.40
25	Condenser (1650 mmfd. semi-fixed)	31-6096	.40
26	Osc. Transformer (S. W.)	32-2110	.75
27	Resistor (32000 ohms ½ watt)	33-332339	.20
28	Resistor (40000 ohms ½ watt)	33-340339	.20
29	Resistor (15000 ohms 1 watt)	33-315439	.20
30	Condenser (.25 mfd. tubular)	30-4446	.20
31	Shadow meter	45-2189	2.50
32	Resistor, 700 ohms, Violet, Black, Brown	33-1220	.20
33	1st I. F. Transformer	32-2100	1.50
34	2nd I. F. Transformer	32-2102	1.50
35	Condenser (110 mmfd. mica)	30-1031	.20
36	Resistor (51000 ohms, ½ watt)	33-351339	.20
37	Condenser (110 mmfd. mica)	30-1031	.20
38	Condenser (110 mmfd. mica)	30-1031	.20
39	Resistor (490000 ohms ½ watt)	33-449339	.20
40	Condenser (.008 mfd. tubular)	30-4112	.20
41	Condenser (.01 mfd. tubular)	30-4124	.25
42	Volume Control	33-5158	1.00
43	Condenser (.015 mfd. tubular)	30-4358	.20
44	Condenser (.02 mfd. tubular)	30-4113	.20
45	Resistor (1 megohm ½ watt)	33-510339	.20
46	Resistor (1 megohm ½ watt)	33-510339	.20
47	Resistor (1 megohm ½ watt)	33-510339	.20
48	Condenser (.1 mfd. tubular)	30-4122	.20

Schem. No.	Description	Part No.	List Price
49	Resistor (490000 ohms ½ watt)	33-449339	$0.20
50	Resistor (70000 ohms ½ watt)	33-370339	.20
51	Resistor (70000 ohms ½ watt)	33-370339	.20
52	Condenser (.003 mfd. tubular)	30-4042	.20
53	Output Transformer B. X. MX	32-7634	1.50
54	Resistor (190000 ohms ½ watt)	33-419339	.20
55	Resistor (51000 ohms ½ watt)	33-351339	.20
56	Resistor (99000 ohms ½ watt)	33-399339	.20
57	Resistor (490000 ohms ½ watt)	33-449339	.20
58	Condenser (.1 mfd. tubular)	30-4122	.20
59	Cone & Voice Coil K-34 Speaker	36-3174	.80
	Cone & Voice Coil H-25 Speaker	02625	1.20
60	Condenser (.003 mfd. tubular)	30-4042	.20
61	Condenser (.05 mfd. tubular)	30-4123	.20
62	Resistor (3500 ohms ½ watt)	33-235339	.20
63	Resistor (330000 ohms ½ watt)	33-433339	.20
64	Condenser (.05 mfd. tubular)	30-4454	.25
65	Resistor (13000 ohms 2 watt)	33-313539	
66	Electrolytic Condenser	30-2045	1.80
67	Field Coil Assembly K-34 Speaker	36-3239	3.75
	Field Coil Assembly H-25 Speaker	36-3218	3.50
68	Bias Resistor	33-3276	.20
69	Electrolytic Condenser (12 mfd.)	30-2117	1.20
70	Power Transformer 115 V., 50-60 cycles	32-7597	5.25
	Power Transformer 115 V., 25-40 cycles	32-7598	
71	Condenser (.015-.015 mfd. double)	3793-DG	.40
72	Pilot Lamp	34-2039	.15
73	Tone Control & A. C. Switch	42-1182	.75
74	Ant. Switch	42-1170	1.10
75	R. F. Range Switch	42-1171	1.00
76	Osc. Range Switch	42-1172	1.10
	Selector Switch Indexing Plate & Shaft	42-1173	.50
	Pilot Lamp Assembly	38-7706	.35
	Dial	27-5214	.40
	Dial Hub	28-7187	.12
	Dial Clamp	28-2837	.10
	Set Screw	W-1641	.02
	Dial Guard	27-8324	.02
	Dial Gear	28-7185	.10
	Thrust Spring	28-8611	.01
	C Washer	28-3904	.01
	Thrust Washer	28-3976 Per C	.30
	Drive Gear	31-1884	.25
	Vernier Drive	31-1871	.75
	Mask	27-5198	.30
	Mask Arm Assembly	31-1866	.35
	Mask Guide Lamp Bracket Support	38-7844	.15
	Mask Washer	27-8318 Per C	.50

Schem. No.	Description	Part No.	List Price
	Indicator Bracket & Lens Assem.	38-7912	$0.30
	Spring	28-8624 Per C	.50
	Lens	27-8310	.02
	Volume Control Shaft	28-6499	.10
	Volume Control Shaft Spring	28-4117 Per C	.40
	Retaining Clips	28-8610	.03
	Washer	28-4186 Per C	.75
	Washer	4436 Per C	1.50
	Socket Power Trans.	27-6052	
	Socket 8 prong	27-6058	.11
	Socket 7 prong	27-6057	.11
	Tube Shield	28-2726	.10
	Tube Shield Base	28-3898	.03
	I. F. Shield	38-7763	.20
	Terminal Panel I. F. Unit	38-7703	.25
	Spacer	28-4001 Per C	.25
	Grommet Mtg. Tuning Condenser	27-4325	.02
	Grommet R. F. Unit	27-4317	.04
	Sleeve Mtg. R. F. Unit	28-2257	.01
	Spacer Mtg. R. F. Unit	27-7807 Per C	.50
	Screw Mtg. R. F. Unit	W-729 Per C	.45
	Washer Mtg. R. F. Unit	28-3927	.01
	Insulator Mtg. Electrolytic Condenser	27-7194	.01
	Bracket Mtg. Electrolytic Condenser	6440	.05
	Nut Mtg. Volume & Tone Control	W-684	1.25
	Antenna Panel	38-7714	.15
	Speaker Cable	41-3201	
	A. C. Cord	L-2183	.40
	Knob Tuning	27-4330	.10
	Knobs Tuning Vernier	27-4331	.10
	Knob Wave Switch	27-4326	.10
	Knob Tone & Volume	27-4332	.10
	Shadow Meter Mtg. Spring	28-8623 Per C	.70
	Speaker K-34, B Cabinet	36-1229	7.25
	Speaker H-25	36-1236	8.25
	Model B Cabinet		
	Bezel Frame & Plate Assembly	40-5927	.30
	Glass	27-8298	.05
	Bezel Ring	28-3967	.35
	Gasket	27-8311	.01
	Model X & MX Cabinets		
	Bottom Shield Plate	28-3895	
	Bezel Frame & Plate Assembly	40-5945	.70
	Gasket	27-8312	.01
	Screws	W-1644 Per C	.50
	Glass	27-8299	.06
	Ring	28-3987	.40

Figures in black type indicate circled figures in Base View.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 37-650
Schematic
Coil Data

PHILCO RADIO & TELEV. CORP.

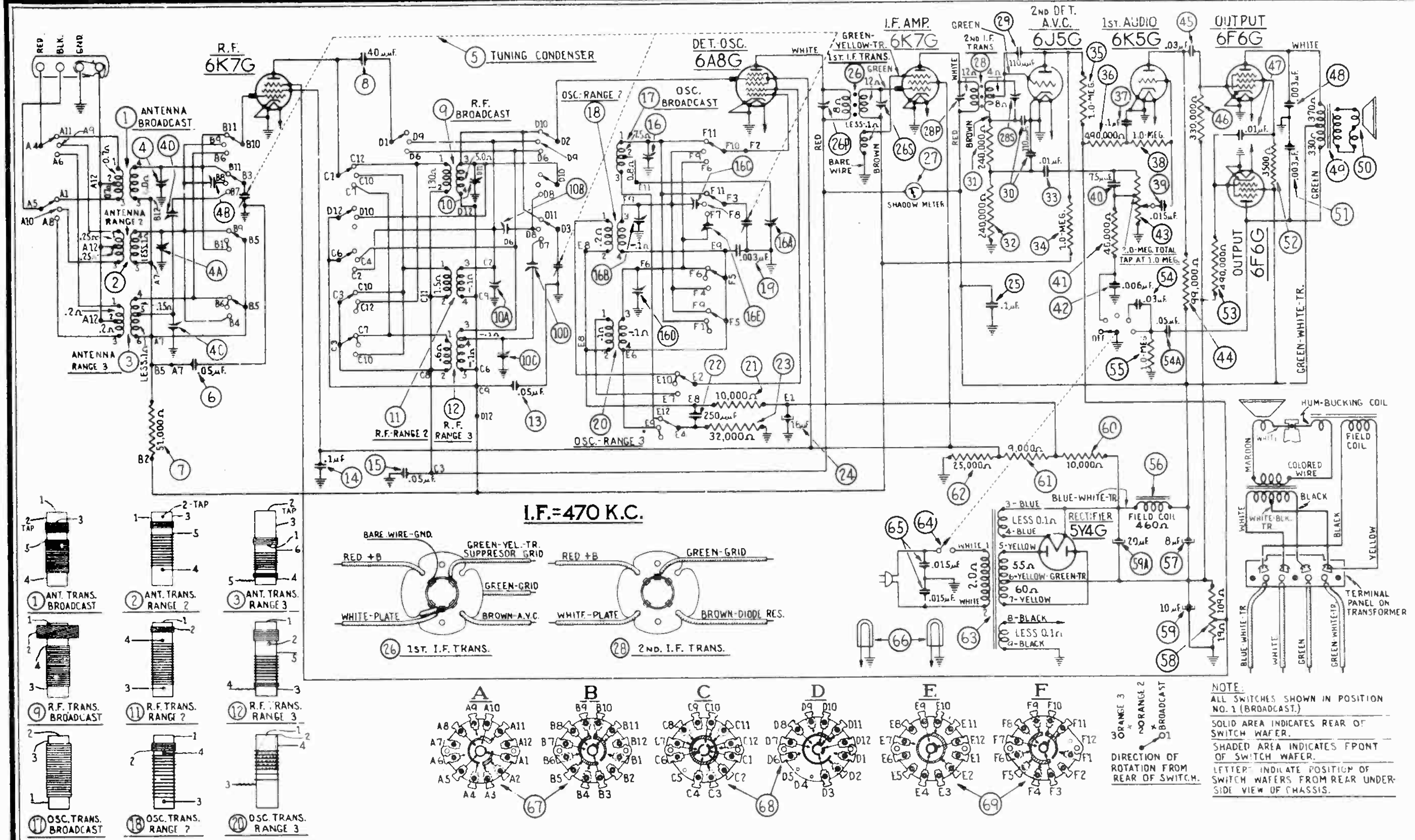


Fig. 2—Schematic Diagram

Model 37-650

Electrical Specifications

Power Supply:	Voltage	Frequency Cycles	Consumption
	115	50-60	110 watts
	115	25-40	110 watts

Intermediate Frequency: 470 K. C.
Output: Undistorted 7 watts.

Philco Tubes: 6K7G—R. F. Amplifier; 6A8G—Oscillator and first detector; 6K7G—I. F. Amplifier; 6J5G—2nd Detector, A. V. C.; 6K5G—1st Audio; 2-6F6G—Output; 5Y4G—Rectifier.

Tuning Ranges: Range 1—530 to 1720 K. C.; Range 2—5.7 to 11.6 M. C.; Range 3—11.5 to 18.2 M. C.

Speakers: X Cabinet—H-26; B Cabinet—K-35.

MODEL 37-650
Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

Alignment of Compensators

The accurate adjustment of the various compensating condensers is vital to the proper functioning of this receiver. There are four compensating condensers in the I. F. Circuit, six in the Oscillator Circuit, five in the R. F. Amplifier Circuit and five in the Antenna Circuit. Incorrect adjustment will cause loss of sensitivity, unsatisfactory tone, and poor selectivity.

The locations of the various compensators are shown in Figs. 5 and 6.

The following procedure must be observed in adjusting the compensators:—

SHADOWMETER ADJUSTMENT

1. Remove the aerial and allow tubes to warm up. Then adjust shadowmeter as follows: Move the coil backward and forward until opposite edges of the shadow are 1/8 of an inch from each end of shadow screen, measuring along bottom edge. Adjustment of the shadowmeter light bracket may be necessary for perfect centering.
2. Remove the (5Y4G) rectifier tube from its socket and rotate coil until shadow reaches minimum width. This width is not to exceed 3/32".
3. Replace the (5Y4G) rectifier tube. Shadow must not widen to more than 3/16" or less than 1/16" from each side of screen. If these limits are not obtained readjust the shadowmeter as given in paragraphs 1 and 2 until they are reached.

OUTPUT METER—The 025 Output Meter is connected to the plate and cathode terminals of one of the (6F6G) tubes. Adjust the meter to use the (0-30) volt scale.

DIAL CALIBRATION—Rotate the tuning condenser control to the extreme counter-clockwise position (maximum capacity). Loosen the screw of dial hub, then turn dial until the glowing indicator is centered on the second index line of dial scale (see Fig. 4). Then tighten the dial hub set screw in this position.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1. Turn volume control to maximum volume position. Connect the 088 Signal Generator output through a .1 mfd. condenser, to the control grid of the 6A8G tube and the ground connection of the output lead to the chassis.
2. Set the range switch in position No. 1 (Broadcast), then rotate the tuning condenser of the receiver to the maximum capacity position (counter-clockwise) and adjust the signal generator for 470 K. C.
3. Adjust compensators (28S) 2nd I. F. Sec., (28P) 2nd I. F. Pri., (26S) 1st I. F. Sec. and (26P) 1st I. F. Pri. for maximum reading on the output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range—7.3 to 18.0 M. C.

1. Remove the signal generator output lead from the grid of the 6A8G tube and connect it through the .1 mfd. condenser to terminal No. 1 on aerial input panel and the generator ground lead to terminal No. 3, rear of chassis. Terminals 2 and 3 must be connected with the shorting link provided on the panel during these adjustments.
2. Set the range switch in position No. 3. Turn the receiver and signal generator dials to 18 M. C. Now adjust compensator (16D) by turning the screw (clockwise) to the maximum capacity position. Then slowly turn it counter-clockwise until a second peak signal is reached on the output meter. The first peak from maximum capacity is the image signal and must not be used. NOTE: In some cases only one peak will be found, therefore, tune the compensator to this peak. If the above procedure is correctly performed, the image signal will be found at 17.060 M. C., by advancing signal generator input and turning receiver dial to this frequency mark on the dial.
3. The antenna and R. F. compensators (4C) and (10C) are now adjusted by connecting a variable condenser of approximately 350 mmfd.,—having a good vernier drive—across the oscillator compensator (16D) contact (first contact from left side of receiver facing rear underside view of chassis) and ground. Leaving the signal generator and receiver dials at 18 M. C., tune the added condenser until the second harmonic of the receiver oscillator beats against the signal from the generator, thereby giving an indication on the output meter. It may be necessary to increase the signal generator output to obtain a signal of sufficient strength for reading on the output meter. The antenna and R. F. compensators (4C) and (10C) should then be adjusted for maximum output. Then remove external condenser and readjust compensator (16D) as given in paragraph 2 above.
4. Turn signal generator and receiver dials to 12 M. C. and adjust compensators (16E), (10D), (4D) for maximum output.
5. Now turn signal generator and receiver dials to 18 M. C. and readjust compensators (16D), (10C) and (4C) as given in Paragraphs 2 and 3 above.

Tuning Range—5.7 to 11.6

1. Set range switch in position No. 2. Rotate signal generator and receiver dials to 11 M. C. Compensator (16B) is now adjusted as given in Paragraph 2, under tuning range 7.3 to 18 M. C. above. *Check image signal on the 10.06 dial mark.* The only difference in the two procedures is the frequency used.
2. Turn the signal generator to 11 M. C. Then connect a 350 mmfd. variable condenser from the oscillator compensator (16B) contact (third contact from left side of the receiver, facing rear underside view of chassis) and ground. Tune the added condenser, as given in Paragraph 3 under tuning range 7.3 to 18 M. C. Now adjust compensators (10A) and (4A) for maximum output. The only difference in the two procedures is in the connection of the variable condenser and the frequency used.
3. Readjust compensator (16B) as given in Paragraph 1 for maximum output.
4. Turn signal generator and receiver dials to 6 M. C. and adjust compensators (16C), (10B) and (4B) for maximum output.
5. After the 6 M. C. end of scale is adjusted, the high frequency end is readjusted as given in Paragraphs 1, 2 and 3 above.

Tuning Range—530 to 1720 K. C.

1. Turn signal generator and receiver dials to 1600 K. C.—If signal generator scale is not calibrated for 1600 K. C. the dial of the generator may be rotated to 800 K. C. and the second harmonic of this frequency (1600 K. C.) may be used for following adjustments. Compensators (16), (10) and (4) are now adjusted for maximum output.
2. Turn signal generator and receiver dials to 580 K. C. and adjust compensator (16A) for maximum output. This is accomplished as follows:
First tune compensator (16A) for maximum output. Then vary the tuning condenser for maximum output about the 580 K. C. scale mark. Now retune compensator (16A), and again vary the tuning condenser back and forth about 580 K. C. for maximum output. This operation of first tuning the compensator, then the tuning condenser is continued until maximum output is obtained on or about the 580 K. C. dial mark.
3. Turn signal generator and receiver dials to 1600 K. C. and readjust compensator (16) for maximum output.
4. Now rotate signal generator and receiver dials to 1500 K. C. and adjust compensators (10) and (4) for maximum output.

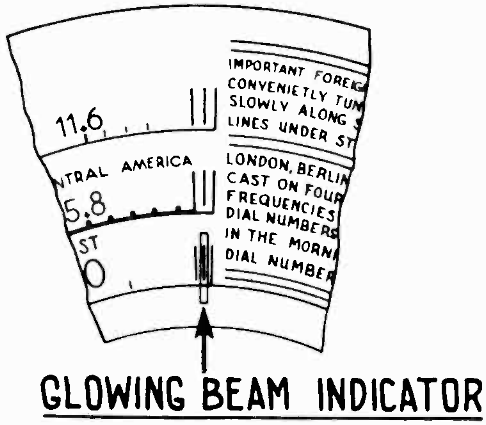


Fig. 4—Dial Calibration

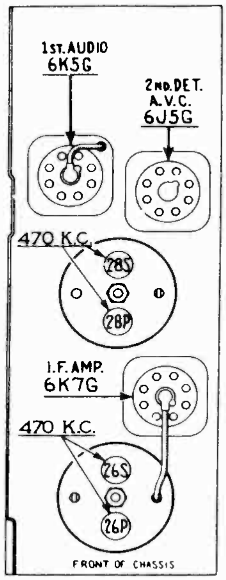


Fig. 5—I. F. Compensators—Top of Chassis

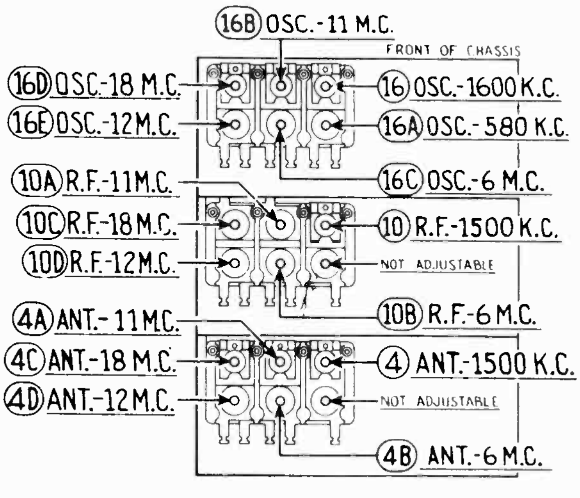


Fig. 6—R. F. Compensators—Underside of Chassis

PHILCO RADIO & TELEV. CORP.

MODEL 37-650
Voltage, Socket
Transformer Data
Notes

SERVICE DATA

DESCRIPTION

Model 37-650 is an 8 tube superheterodyne receiver for operation on alternating current. It has three tuning ranges, covering standard broadcast and short-wave frequencies. The chassis is constructed in four basic assembly units, concentrating the R. F., I. F., Audio and Power Circuits in individual units.

The circuit includes the **Philco Foreign Tuning System**—controlled by the range switch—providing maximum sensitivity and noise reduction, when used with the **Philco High Efficiency Aerial;** one stage of radio frequency amplification before the Detector-Oscillator tube; Automatic Bass Compensation in the Volume Control Circuit; Shadow Tuning; Automatic Volume Control, and a Push-Pull Pentode Output Circuit.

AERIAL CONNECTIONS

The red and black leads of the High-Efficiency Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided at the rear of the chassis. Connect the jumper on the terminal panel across terminals 3 and 4.

If a temporary aerial is used, the jumper should be across terminals 2 and 3. The aerial connects to terminal 1 and the ground lead to terminal 3. A good ground connection is desirable in all installations.

REPLACING DIAL

To replace the dial, remove the clamp holding the dial to the hub by turning clamp counter-clockwise, using the two holes provided on the clamp for this purpose.

REMOVING MASK ARM & LINK ASSEMBLY

First remove dial, then loosen set screw of dial hub and remove the hub and felt washer from the shaft. Now loosen screws holding indicator bracket and lens assembly, and move bracket forward about ½ inch. The assembly may now be removed by loosening set screw of range switch arm, then pull arm off of range switch shaft.

REMOVING SWITCH & COIL ASSEMBLIES OF R. F. UNIT

To replace any part in the switch and coil assemblies of the R. F. Unit, each assembly can be removed separately as follows:

First remove the tuning dial, mask and arm assembly. Remove the center mounting screw on the rear of the R. F. Unit. Then lift the rear of the unit and push forward until the rubber mounting grommets, on each side of the unit, clear the mounting slots. The unit is then lifted far enough from the chassis for removal of the two screws holding the selector switch indexing plate and shaft (front of unit). Then pull shaft straight out from the unit. Also, remove the volume control shaft by releasing the retaining clip, inside the chassis, from the shaft.

IMPORTANT—When selector switch shaft is replaced, care should be taken to have all wafer rotors in the same position, so that the key on the switch shaft will slide freely into the notched hole in each wafer rotor. *NEVER* force shaft into rotors.

Servicing Stages—It is necessary to unsolder some connecting leads in order to release the stage for servicing. If all the following connections are unfastened the stage will be entirely released. Ordinarily only one or two leads need be loosened in order to change coils, replace coupling condensers, or replace switch sections.

Antenna Stage Assembly—Rear Section of Unit

A. Remove screw holding shield plate to the unit base. This screw is located in the right hand corner of the shield plate, facing rear underside of the chassis.

B. Unsolder the wires at the I. F. and Aerial terminal panels which connect to the range switch, also wires from tuning condenser housing to tubular condenser (6); tuning condenser stator plate to selector switch contact (B3), and ground lead from assembly shield to unit frame. After disconnecting these wires assembly may be removed.

R. F. Stage Assembly—Middle Section

A. Remove screw (right side of assembly) holding shield plate to unit base.

B. Unsolder the two wires connecting the I. F. Unit to range switch contacts (C3) and (D12); also wires connecting tuning condenser housing to tubular condenser ⑬ and stator plates to selector switch contact (D3); selector switch contact (D2) to the grid of the 6A8G tube, and ground lead from shield to unit frame. Remove assembly from the unit.

Oscillator Stage Assembly—Front Section

A. The oscillator assembly may be removed by unscrewing the four screws holding shield to R. F. base. These screws are located on each side of the R. F. Unit.

B. Unsolder the wires connecting range switch contacts (E2) and (F2) to the 6A8G socket; tuning condenser stator plates to range switch contact (F3); mica condenser ⑲ to the tuning condenser housing; range switch to resistor (60) and (61), and ground lead to I. F. Unit. With these leads disconnect unit may be removed.

Replace the units by following the above procedure in the reverse order.

POWER TRANSFORMER DATA

Schematic Lead No.	A. C. Volts	Current	Circuit	Color	Resistance
1-2	120	—	Pri.	White	2.0 ohm
3-4	5.	2.0A	Rect. Fil.	Blue	Less than 0.1 ohm
5-7	700	135 MA	High Volt. Sec.	Yellow	55 ohms 60 ohms
6	—	—	Center Tap 5-7	Yellow Green tr.	—
8-9	6.7	3.3 A	Fil.	Black	Less than 0.1 ohm

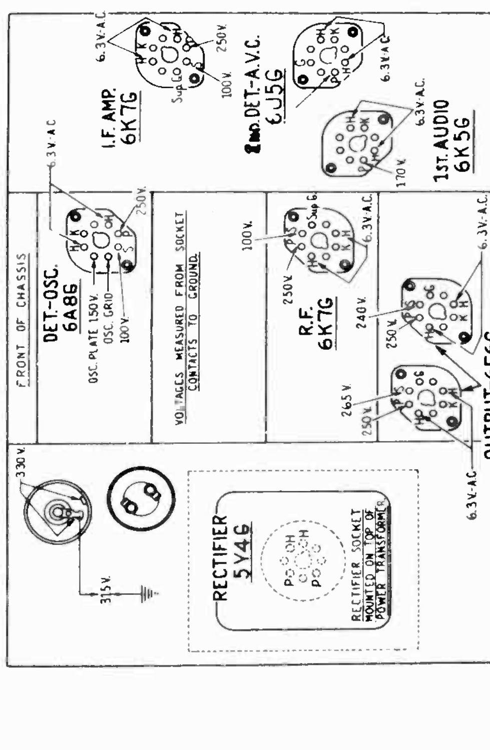


Fig. 1—Socket Voltages—Underside of Chassis View

The voltages indicated by arrows were measured with a Philco 025 Circuit Tester which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.

MODEL 37-650
Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

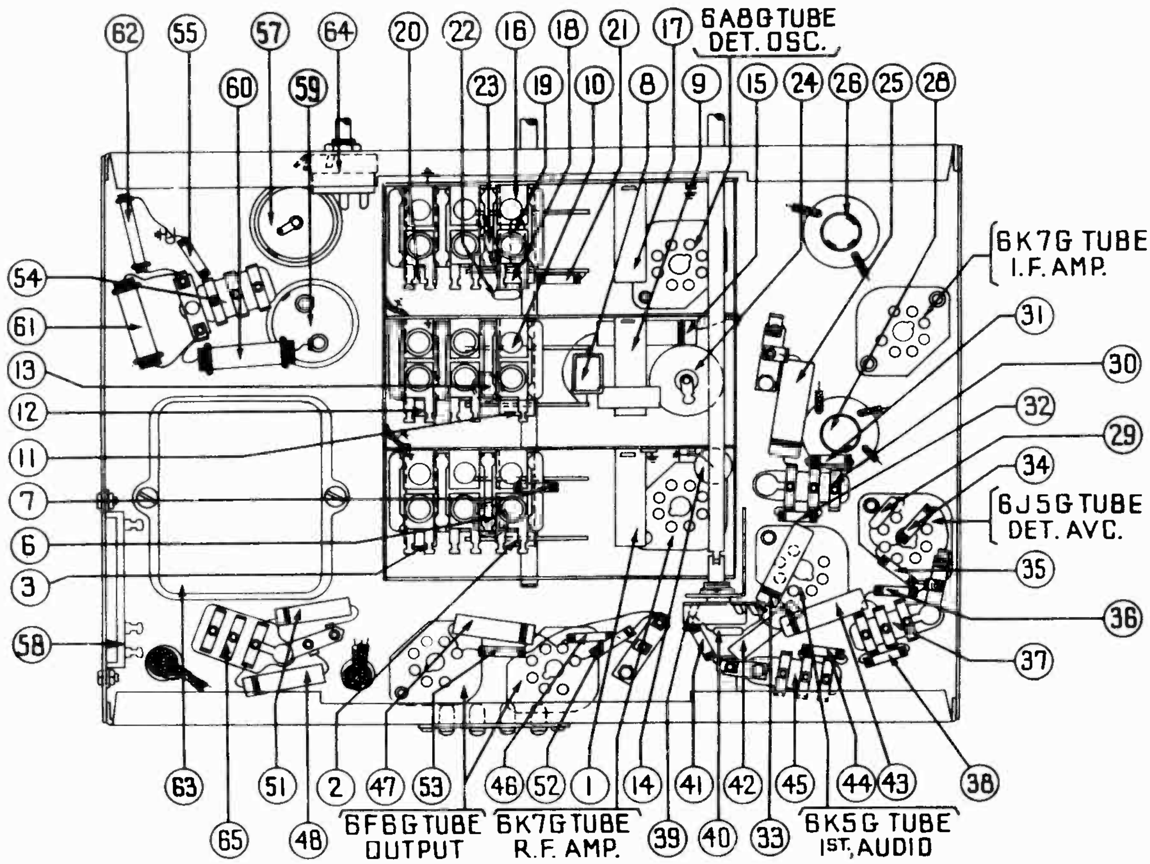


Fig. 3—Base View

Replacement Parts—Model 37-650

Schem. No.	Description	Part No.	Price List
1	Ant. Transformer (Broadcast)	32-2108	$0.80
2	Ant. Transformer	32-2150	.80
3	Ant. Transformer (S. W.)	32-2175	.80
4	Compensator Ant. (Five sections)	31-6104	
5	Tuning Condenser	31-1855	4.50
6	Condenser (.05 mfd. tubular)	30-4020	.20
7	Resistor (51000 ohms, ½ watt)	33-351339	.20
8	Condenser (40 mmfd. mica)	30-1076	.20
9	R. F. Transformer (Broadcast)	32-2105	75
10	Compensator (R. F.) (Five sections)	31-6110	
11	R. F. Transformer	32-2151	.60
12	R. F. Transformer (S. W.)	32-2176	.70
13	Condenser (.05 mfd. tubular)	30-4020	.20
14	Condenser (.1 mfd. tubular)	30-4170	.25
15	Condenser (.05 mfd. tubular)	30-4123	.20
16	Compensator Osc. (Six sections)	31-6111	
17	Osc. Transformer (Broadcast)	32-2120	.65
18	Osc. Transformer	32-2152	.75
19	Condenser (.003 mfd. mica)	30-1028	.45
20	Osc. Transformer (S. W.)	32-2182	.70
21	Resistor (10000 ohms, ½ watt)	33-310339	.20
22	Condenser (250 mmfd. mica)	30-1032	.25
23	Resistor (32000 ohms, ½ watt)	33-332339	.20
24	Electrolytic Condenser (16 mfd.)	30-2118	1.65
25	Condenser (.1 mfd. tubular)	30-4170	.25
26	1st I. F. Transformer & Compensators	32-2169	
27	Shadow meter	45-2189	2.50
28	2nd I. F. Transformer & Compensators	32-2171	
29	Condenser (110 mmfd. mica)	30-1031	.20
30	Condenser (110 mmfd. double bakelite)	8035-DG	.25
31	Resistor (240000 ohms, ½ watt)	33-424339	.20
32	Resistor (240000 ohms, ½ watt)	33-424339	.20
33	Condenser (.01 mfd. tubular)	30-4124	.20
34	Resistor (1 megohm, ½ watt)	33-510339	.20
35	Resistor (1 megohm, ½ watt)	33-510339	.20
36	Resistor (190000 ohms, ½ watt)	33-449339	.20
37	Condenser (.1 mfd. bakelite)	4989-SG	.35
38	Resistor (1 megohm, ½ watt)	33-510339	.20
39	Volume Control	33-5158	1.00
40	Condenser (.75 mmfd. mica)	30-1053	.20
41	Resistor (40000 ohms, ½ watt)	33-340339	.20
42	Condenser (.006 mfd. tubular)	30-4125	.20
43	Condenser (.015 mfd. tubular)	30-4358	.20
44	Resistor (99000, ½ watt)	33-399339	.20
45	Condenser (.03 mfd. bakelite)	8318-SU	.35
46	Resistor (330000 ohms, ½ watt)	33-433339	.20
47	Condenser (.01 mfd. tubular)	30-4169	.20
48	Condenser (.003 mfd. tubular)	30-4469	.20

Figures in black type indicate circled figures in Base View.

Schem. No.	Description	Part No.	Price List
49	Output Transformer K35-H26	32-7634	$1.50
50	Cone and Voice Coil K35	36-3174	.80
	Cone and Voice Coil H26	02625	1.20
51	Condenser (.003 mfd. tubular)	30-4469	
52	Resistor (3500 ohms, ½ watt)	33-235339	.20
53	Resistor (490000 ohms, ½ watt)	33-449339	.20
54	Condenser (.05 mfd., .03 mfd. bakelite)	3615-YU	
55	Resistor (1 megohm, ½ watt)	33-510339	.20
56	Field Coil K35-H26	36-3687	
57	Electrolytic Condenser 8.0 mfd.	30-2024	1.10
58	Bias Resistor	33-3280	
59	Electrolytic Condenser (10, 20 mfd.)	30-2163	
60	Resistor (10000 ohms, 2 watt)	33-310539	
61	Resistor (9000 ohms, 2 watt)	33-290539	.30
62	Resistor (25000 ohms, 1 watt)	33-325339	.20
63	Power Transformer 115 V., 50-60 cycles	32-7606	
	Power Transformer 115 V., 25-40 cycles	32-7607	
64	Tone Control & A. C. Switch	42-1184	75
65	Condenser (.015 mfd. double bakelite)	3793-DG	.40
66	Pilot Lamp	34-2039	.15
67	Range Switch Ant.	42-1189	1.25
68	Range Switch R. F.	42-1190	1.25
69	Range Switch Osc.	42-1191	1.25
	Selector Switch Indexing Plate & Shaft	42-1192	.50
	Dial	27-5248	.40
	Dial Hub	28-7187	.12
	Dial Clamp	28-2837	.10
	Set Screw	W-1641	.02
	Retaining Washer	4436	Per C 1.50
	Gear (Dial)	28-7185	10
	Gear Drive	31-1884	.25
	Thrust Spring	28-8611	.01
	Thrust Washer	28-3976	Per C .30
	C Washer	28-3904	.01
	Scale Guard	27-8324	
	Indicator Brkt. & Lens Assembly	38-7912	.30
	Pilot Lamp	34-2039	.15
	Pilot Lamp Assembly	38-7706	.35
	Mask	27-5198	.30
	Mask Arm & Link Assembly	31-1866	.35
	Mask Guide	38-7844	
	Mask Washer	27-8318	Per C .50
	Socket 8 prong	27-6058	.11
	Socket 7 prong	27-6057	.11
	Socket, Rect.	27-6052	
	Tube Shield Base	28-3898	.03

Price Subject to Change without Notice

Schem. No.	Description	Part No.	Price List
	Tube Shield	28-2726	$0.10
	Terminal Panel Assembly I. F.	38-6306	.03
	Terminal Panel Antenna	38-7714	.15
	Grommet Mtg. R. F. Unit	27-4317	.04
	Sleeve Mtg. R. F. Unit	28-2257	.01
	Screw Mtg. R. F. Unit	W-729	Per C .45
	Washer Mtg. R. F. Unit	28-3927	.01
	Washer Felt R. F. Unit	27-7807	Per C .40
	Grommet Mtg. Tuning Condenser	27-4325	.02
	Shadowmeter Lamp Shield	28-2917	.02
	Mtg. Plate R. F. Transformer	28-3808	.02
	Mtg. Spacer R. F. Transformer	27-8228	.01
	Mtg. Screw R. F. Transformer	W-1635	Per C .30
	Shaft Volume Control	38-8060	.12
	Clip Retaining	28-4394	.03
	Spring	28-4117	Per C .40
	Cable Speaker	41-3202	
	Cord A. C.	L-2183	.40
	Insulator Electrolytic Condenser	27-7194	.01
	Vernier Drive Tuning Condenser		
	I. F. Shield	38-7984	
	Shadowmeter Mtg. Spring	28-8623	Per C .70
	Knob Tuning	27-4330	.10
	Knob Tuning Vernier	27-4331	.10
	Knob Tone Volume	27-4332	.10
	Knob Range Switch	27-4326	.10
	Terminal Cover Speaker	36-3672	
	"B" CABINET		
	Speaker K-35	36-1231	7.25
	Screw Chassis Mtg.		
	Washer Chassis Mtg.	28-2089	Per C .30
	Bezel Frame & Plate Assembly	40-5945	
	Glass	27-8299	.06
	Ring	28-3927	.40
	Gasket	27-8312	.01
	"X" CABINET		
	Speaker H-26	36-1238	8.25
	Bezel Frame & Plate Assembly	40-5937	
	Glass	27-8300	.06
	Ring	28-3988	.45
	Gasket	27-8313	.01
	Screws	W-1644	Per C .50
	Bottom Shield Plate	28-4031	.45
	Snap Fastener	28-4279	
	Screw Speaker Mtg.	W-1695	
	Nut	W-124	Per C .35
	Washer	W-291	Per C .40
	Screw (Chassis Mtg.)	W-1495	
	Rubber (Chassis Mtg.)	3558	
	Washer	29-3089	Per C .40

MODEL 37-660
Schematic
Coil Data

PHILCO RADIO & TELEV. CORP.

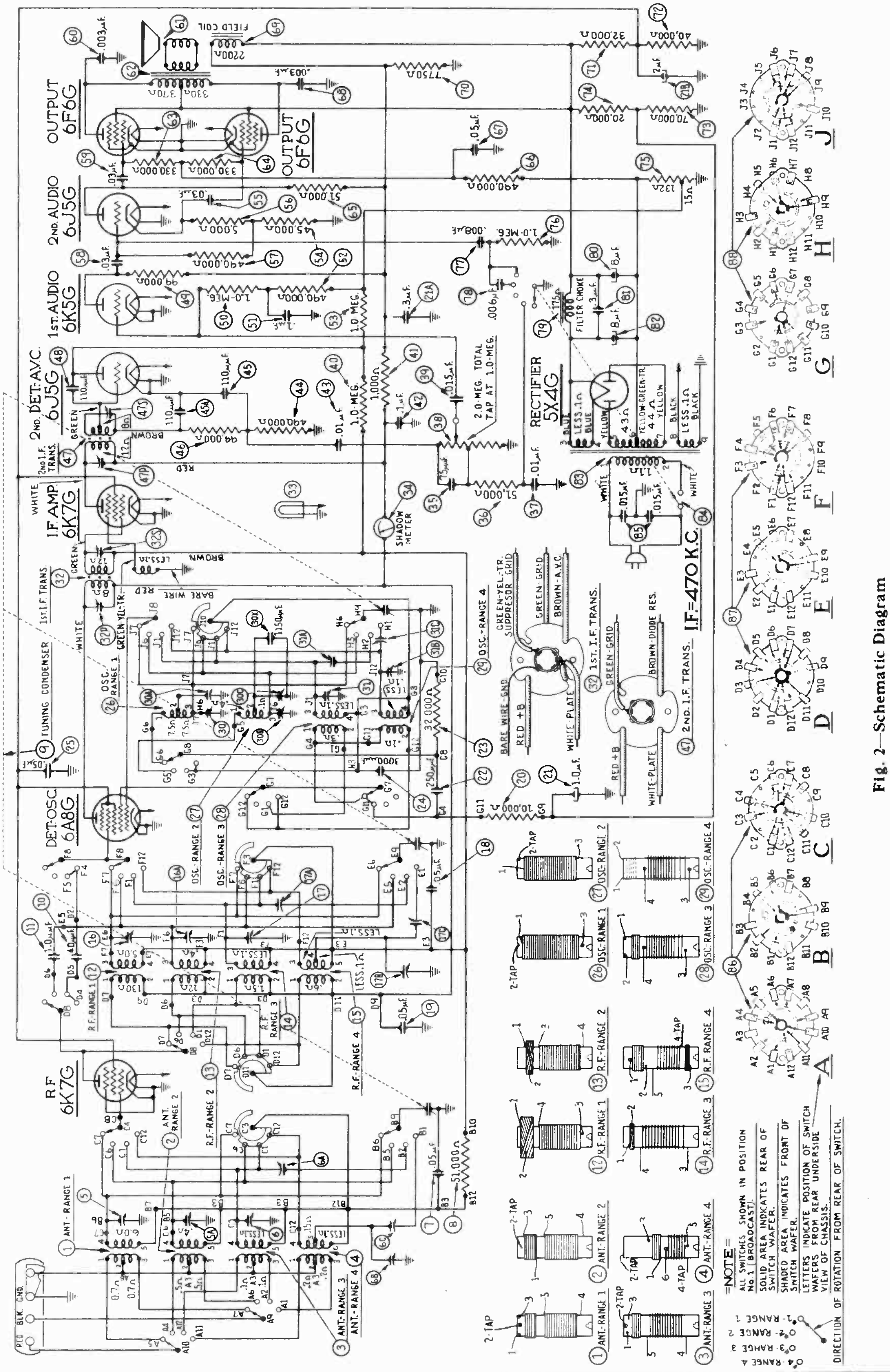


Fig. 2—Schematic Diagram

Model 37-660

July, 1936

Electrical Specifications

Power Supply: 115 V.
Frequency: 50-60 cycle.
For 25 to 40 cycle operation, use the Power transformer marked with asterisk in the parts list.
Consumption: 130 Watts.
Intermediate Frequency: 470 K. C.

Output: 10 Watts.
Philco Tubes: 6K7G—R.F. Amplifier; 6A8G—Oscillator and first detector; 6K7G—I.F. Amplifier; 6J5G—2nd detector, A.V.C.; 6K5G—1st Audio; 6J5G Phase Inverter; 2-6F6G—Output; 5Y4G—Rectifier.
Tuning Ranges: Range 1—530 to 1720 K. C.; Range 2—2.3 to 7.4 M. C.; Range 3—7.35 to 11.6 M. C.; Range 4—11.5 to 18.2 M. C.
Speakers: X cabinet—H-27; B cabinet—K-36.

MODEL 37-660

PHILCO RADIO & TELEV. CORP.

Trimmers Alignment

Alignment of Compensators

The following procedure must be observed in adjusting the compensators:

DIAL CALIBRATION—In order to adjust this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this rotate the tuning control to the extreme counter-clockwise position (maximum capacity). Loosen the set screw of the dial hub, then turn dial until the glowing indicator is centered between the first and second index lines of dial scale (see Fig. 4). Now tighten the dial hub set screw in this position.

SHADOW METER ADJUSTMENT—Remove aerial and allow tubes to warm up. Then adjust shadow meter as follows:

1. Move the shadow meter coil backwards and forwards, until the opposite edges of the shadow are 1/8 of an inch from each end of the shadow screen, measuring along the bottom edge of the screen. Adjustment of the shadow meter light bracket may be necessary for perfect centering.
2. Remove the rectifier tube from its socket, and rotate coil until shadow reaches minimum width. This width must not exceed 3/16 of an inch.
3. Replace the 5X4G rectifier tube in its socket. The shadow should then widen to not more than 3/8 inch or less than 1/16 inch from each side of the screen measuring along the bottom edge. If these limits are not obtained readjust the shadow meter as given in paragraphs 1 and 2 until they are reached.

OUTPUT METER—The 025 Output Meter is connected between the plate and cathode prongs of one of the 6F6G tubes. The meter is adjusted to use the (0-30) volt scale.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1. Connect the 088 Signal Generator output lead through a .1 mfd. condenser to the control grid of the 6A8G tube and the ground connection of the output lead to the chassis. Turn the Volume Control to maximum volume position.
2. Set the range switch in position No. 1 (Broadcast), then rotate the tuning condenser of the receiver to approximately 580 K. C. and adjust the signal generator for 470 K. C.
3. Adjust compensators 47s 2nd I.F. sec., 47p 2nd I.F. Pri., 32s 1st I.F. Sec. and 32p 1st I.F. Pri. for maximum reading on the output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range—11.5 to 18.2 M. C.

1. Remove the signal generator output lead from the grid of the 6A8G tube and connect it with the .1 mfd. condenser to terminal No. 1 on aerial input panel and the generator ground lead to terminal No. 3, rear of chassis. Terminals 2 and 3 must be connected with the shorting link provided on the panel.
2. Set the range switch in position 4. Turn the receiver and signal generator dials to 18 M. C. Now adjust compensator 31b by turning the screw (clockwise) to the maximum capacity position, then slowly turning it (counter-clockwise) until a second peak signal is reached on the output meter. The first peak from maximum capacity is the image signal and must not be used. NOTE—In adjusting some receivers only one peak will be observed, therefore, tune the compensator to maximum on this peak. If the above procedure is correctly performed, the image signal will be found at 17.06 M. C., by advancing signal generator attenuator and turning receiver dial to this frequency mark on the dial.
3. The antenna and R.F. compensators 6b and 17b are now adjusted by connecting a variable condenser of approximately 350 mmfd.—having a good vernier drive—across the oscillator compensator 31b contact (first contact from left side of the receiver facing rear underside view of chassis) and ground. Leaving the signal generator and receiver dials at 18 M. C., tune the added condenser from the maximum capacity point until the second harmonic of the receiver oscillator beats against the signal from the generator thereby bringing in the signal. The antenna and R.F. compensators 6b and 17b are then adjusted for maximum output. Now remove the external condenser and readjust compensator 31b as given in paragraph 2 above.
4. Turn signal generator and receiver dials to 12 M. C. and adjust compensator 31c for maximum output. Then adjust compensators 17c and 6c for maximum output.
5. Now turn signal generator and receiver dials to 18 M. C. and readjust compensators 31b Osc., 6b Ant. and 17b R.F. as given in paragraphs 2 and 3 above.

Tuning Range (7.35) to (11.6) M. C.

1. Set range switch in position 3. Rotate signal generator and receiver dials to 11 M. C. Now adjust compensator 31 by turning the screw (clockwise) to the maximum capacity position, then slowly turn it (counter-clockwise) until a second peak signal is reached on the output meter. The first peak from maximum capacity is the image signal and must not be used. NOTE—In adjusting some receivers only one peak will be observed, therefore, tune the compensator to maximum on this peak. If the above procedure is correctly performed, the image signal will be found at 10.06 M. C. by advancing the signal generator attenuator and turning receiver dial to this frequency mark on the dial.
2. Using the 11 M. C. signal, compensators 17 R.F. and 6 Ant. are adjusted by using the procedure given in paragraph 3, under tuning range (11.5) to (18.2) M. C., with the exception, that the external condenser is connected from compensator 31 contact to ground. This contact is the third one from left side of the receiver facing rear underside view of chassis. Also use a 11 M. C. signal.
3. Readjust compensator 31 Osc. as given in paragraph 1 above.
4. Turn signal generator and receiver dial to 7.5 M. C. and adjust compensators 31a Osc. series 17a R.F. and 6a Ant. for maximum output.
5. Due to the slight interaction of the high and low frequency compensators of this range, compensators 31 osc., 17 R.F. and 6 Ant. are readjusted using procedure in paragraphs 1 and 2 above.

Tuning Range 2.3 to 7.4 M. C.

1. Set range switch in Position 2. Turn signal generator and receiver dials to 7.0 M. C. Now adjust compensators 30b Osc., 16a R.F. and 5a Ant. for maximum output.
2. Turn signal generator and receiver dials to 2.35 M. C. Compensator 30c is now adjusted for maximum as follows:

First tune compensator 30c for maximum output. Then vary the tuning condenser for maximum output about the 2.35 dial mark. Now retune compensator 30c, and again vary the tuning condensers back and forth about the 2.35 dial mark for maximum output. This operation of first tuning the compensator, then the tuning condenser is continued until maximum output is obtained at or about the 2.35 dial mark.

If the signal generator is not accurately calibrated the maximum point on the dial of the receiver may fall slightly above or below the dial mark.

3. Turn the signal generator and receiver dials to 7.0 M. C. and readjust compensator 30b for maximum output. Then turn signal generator and receiver dials to 6.0 M. C. and adjust compensators 16a R.F. and 5a Ant. for maximum output.

Tuning Range 530 to 1720 K. C.

1. Set range switch in position No. 1 (Broadcast). Rotate signal generator and receiver dials to 1600 K. C. Now adjust compensators 30 Osc., 16 R.F. and 5 Ant. for maximum output.
2. Tune signal generator and receiver dials to 580 K. C. Compensator 30a Osc. series is then adjusted for maximum output as given in paragraph 2 under tuning range 2.3 to 7.4 M. C., the only difference in the procedure being in the frequency used.
3. Readjust compensator 30 for maximum output, by turning signal generator and receiver dials to 1600 K. C.
4. Turn signal generator and receiver dials to 1500 K. C. and adjust compensators 16 R.F. and 5 Ant. for maximum output.

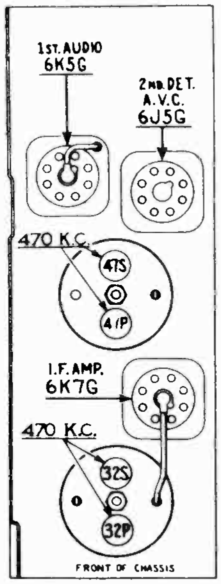


Fig. 5—Locations of I.F. Compensators Top of Chassis

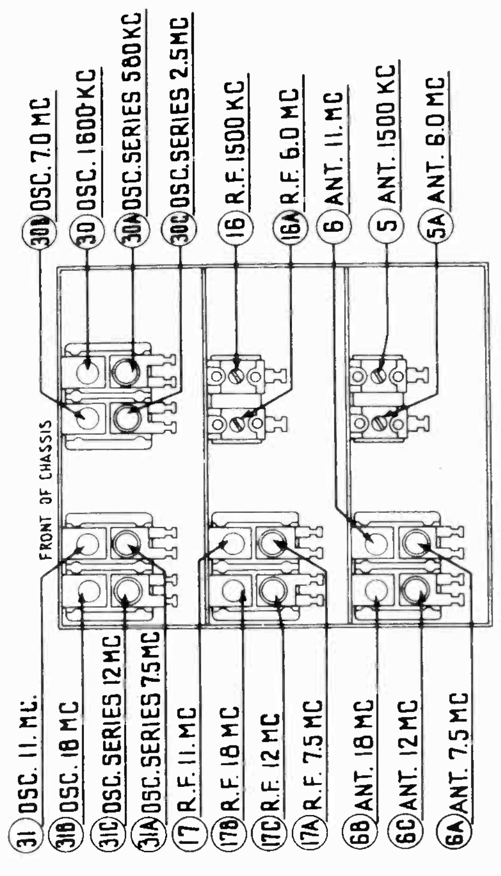


Fig. 6—Locations of R.F. Compensators Underside of Chassis

PHILCO RADIO & TELEV. CORP.

MODEL 37-660
Voltage, Socket
Notes

SERVICE DATA

Model 37-660 is a 9 tube superheterodyne receiver designed for operation on alternating current. It has four tuning ranges, covering standard broadcast and short-wave frequencies. The chassis is constructed in four basic assembly units, concentrating the R.F., I.F., Audio and Power circuits in individual units.

The circuit includes the PHILCO Foreign Tuning System—controlled by the range switch—providing maximum sensitivity and noise-reduction, when used with the Philco High-Efficiency Aerial; automatic bass compensation in the volume control circuit; shadow tuning; automatic volume control, and a push-pull pentode output circuit.

AERIAL CONNECTIONS

The red and black leads of the High-Efficiency Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided on the rear of the chassis. Connect the jumper on the terminal panel across terminals 3 and 4.

If a temporary aerial is used, the jumper should be across terminals 2 and 3. The aerial connects to terminal 1 and the ground lead to terminal 3. A good ground connection is desirable in all installations.

REPLACING DIAL

To replace the dial, remove the clamp holding the dial to the hub, by turning clamp counter-clockwise, using the two holes provided on the clamp for this purpose.

REMOVING MASK ARM & LINK ASSEMBLY

First remove dial, then loosen set screw of dial hub and remove the hub and felt washer from the shaft. Now loosen screws holding indicator bracket and lens assembly, and move bracket forward about ½ inch. The assembly may now be removed by loosening set screw of range switch arm, then pull arm off of range switch shaft.

REMOVING SWITCH & COIL ASSEMBLIES OF R.F. UNIT

To replace any part in the switch and coil assemblies of the R.F. Unit, each assembly can be removed separately as follows:

First remove the tuning dial, mask and arm assembly. Remove the center mounting screw on the rear of the R.F. Unit. Then lift the rear of the unit and push forward until the rubber mounting grommets, on each side of the unit, clear the mounting slots. The unit is then lifted far enough from the chassis for removal of the two screws holding the selector switch indexing plate and shaft (front of unit). Then pull shaft straight out from the unit. Also, remove the volume control shaft by releasing the retaining clip, inside the chassis, from the shaft.

IMPORTANT—When selector switch shaft is replaced, care should be taken to have all wafer rotors in the same position, so that the key on the switch shaft will slide freely into the notched hole in each wafer rotor. NEVER force shaft into rotors.

Servicing Stages—It is necessary to unsolder some connecting leads in order to release the stage for servicing. If all the following connections are unfastened the stage will be entirely released. Ordinarily only one or two leads need be loosened in order to change coils, replace coupling condensers, or replace switch sections.

ANTENNA ASSEMBLY—Rear Section

1. Unsolder the wires which connect the antenna panel and I.F. Unit to the range switch and assembly shield plate ground leads.
2. Unsolder the two leads from the gang condenser terminal panel which connect to the range switch. Also lead of tubular condenser (7) at the ground lug on the R.F. Unit.
3. Remove screw holding shield plate to the unit base. This screw is located in the right hand corner of the shield plate, facing the rear underside of the chassis. The assembly can then be removed.

R.F. ASSEMBLY—Middle Section

1. Unsolder the wires from the I.F. Unit and the 6K7G plate contact in R.F. Unit which connects to the range switch. Then remove ground leads of shield plate.
2. Unsolder the leads from the gang condenser terminal panels and the lead of tubular condenser (18) at the ground lug on R.F. Unit base.
3. Remove the screw holding shield plate to the unit base. This screw is located in the right hand corner of the shield plate facing the rear underside of the chassis. Then pull assembly straight out.

OSCILLATOR ASSEMBLY—Front Section

1. The oscillator assembly can be removed by unscrewing the two screws located on each side of the R.F. Unit.
2. Unsolder the wires connecting range switch to bakelite condenser (78) in the power unit, electrolytic condenser (21) in the R.F. Unit and OSC plate contact on the 6A8G socket.
3. Remove the leads from the gang condenser terminal panels and the lead of Mica condenser (24) at the ground lug on R.F. Unit base.

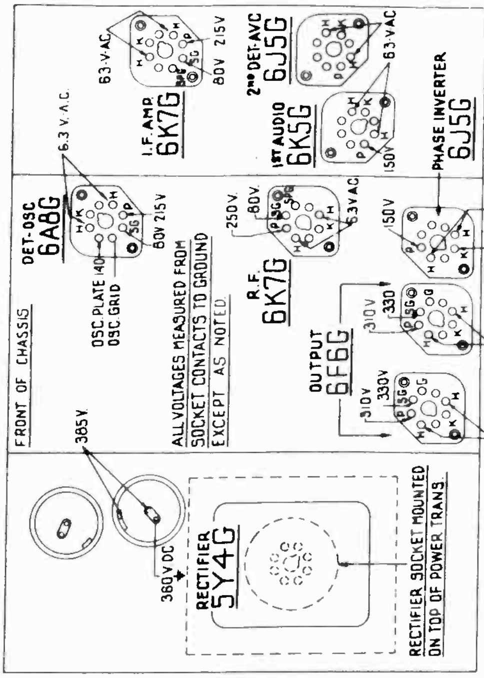
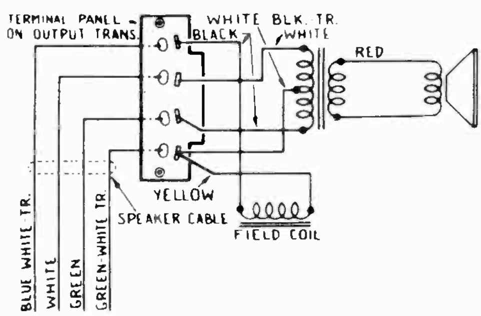


Fig. 1—Socket Voltages—Underside of Chassis View

The voltages indicated by arrows were measured with a Philco 025 Circuit Tester which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.



Speaker Wiring for Types K-36 and H-27

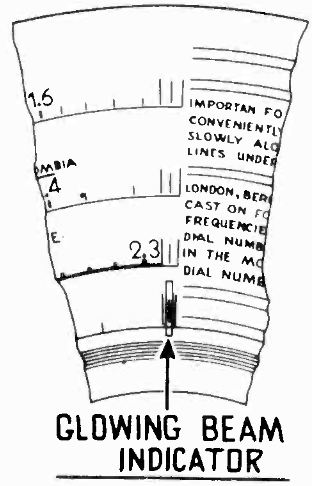


Fig. 4—Dial Calibration

MODEL 37-660
Chassis Views
Parts List

PHILCO RADIO & TELEV. CORP.

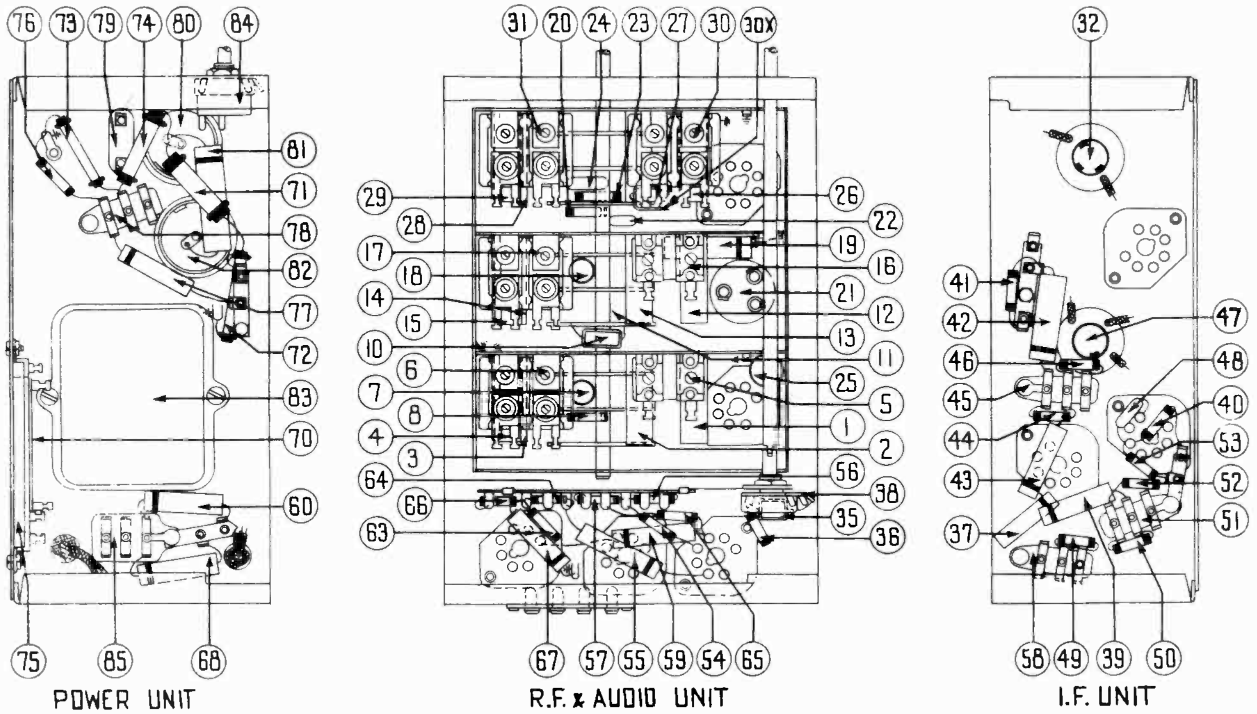


Fig. 3—Parts Locations—Underside View of Chassis.

Replacement Parts—Model 37-660

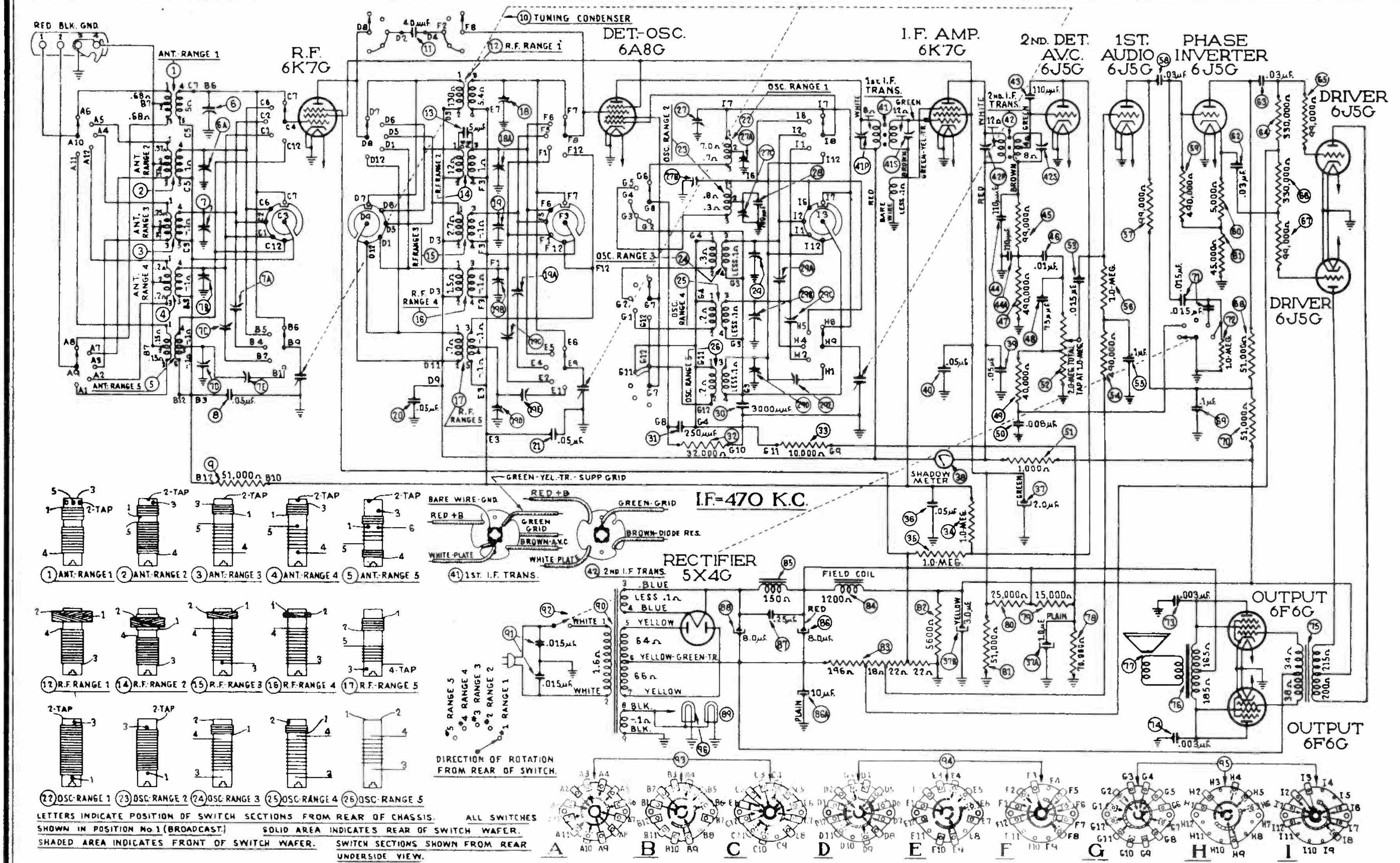
Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (530 to 1720 K.C.)	32-2108	$0.80
2	Antenna Transformer (2.3 to 7.4 M.C.)	32-2119	.65
3	Antenna Transformer (7.35 to 11.6 M.C.)	32-2185	.70
4	Antenna Transformer (11.5 to 18.2 M.C.)	32-2175	.80
5	Compensator (Two sections) brown dot	31-6120	
6	Compensator (Four sections) brown dot	31-6105	
7	Condenser (.05 mfd. tubular)	30-4020	.20
8	Resistor (51000 ohms, ½ watt)	33-351339	.20
9	Tuning Condenser	31-1855	4.50
10	Condenser (40 mmfd. mica)	30-1076	.20
11	Condenser twisted wire & lugs		
12	R.F. Transformer (530 to 1720 K.C.)	32-2105	.75
13	R.F. Transformer (2.3 to 7.4 M.C.)	32-2106	.65
14	R.F. Transformer (7.3 to 11.6 M.C.)	32-2178	.60
15	R.F. Transformer (11.5 to 18.2 M.C.)	32-2176	.70
16	Compensator (Two sections) brown dot	31-6120	
17	Compensator (Four sections) red dot	31-6106	
18	Condenser (.05 mfd. tubular)	30-4020	.20
19	Condenser (.05 mfd. tubular)	30-4123	.20
20	Resistor (10000 ohms, ½ watt)	33-310339	.20
21	Electrolytic Condenser (three sections 1, 2, 3 mfc.)	30-2122	1.85
22	Condenser (250 mmfd. mica)	30-1032	.25
23	Resistor (32000 ohms, ½ watt)	33-332339	.20
24	Condenser (.003 mfd. mica)	30-1028	.45
25	Condenser (.05 mfd. tubular)	30-4123	.20
26	Oscillator Transformer (530 to 1720 K.C.)	32-2120	.65
27	Oscillator Transformer (2.3 to 7.4 M.C.)	32-2121	.40
28	Oscillator Transformer (7.3 to 11.6 M.C.)	32-2186	.70
29	Oscillator Transformer (11.5 to 18.2 M.C.)	32-2182	.70
30	Compensator (Four sections) yellow dot	31-6108	
30x	Condenser (1150 mmf)	30-1081	
31	Compensator (Four sections) brown dot	31-6105	
32	1st I.F. Transformer	32-2169	
33	Pilot Lamp Shadowmeter	34-2039	.15
34	Shadowmeter	45-2189	2.50
35	Condenser (75 mmfd. mica)	30-1053	.20
36	Resistor (51000 ohms, ½ watt)	33-351339	.20
37	Condenser (.006 mfd. tubular)	30-4125	.20
38	Volume Control	33-5158	1.00
39	Condenser (.015 mfd. tubular)	30-4358	.20
40	Resistor (1 megohm, ½ watt)	33-510339	.30
41	Resistor (1000 ohms, ½ watt)	33-210339	.20
42	Condenser (.1 mfd. tubular)	30-4170	.25
43	Condenser (.01 mfd. tubular)	30-4124	.25
44	Resistor (490000 ohms, ½ watt)	33-449339	.20
45	Condenser (110 mmfd. twin bakelite)	8035-DG	.25
46	Resistor (99000 ohms, ½ watt)	33-399339	$0.20
47	2nd I.F. Transformer	32-2171	
48	Condenser (110 mmfd. mica)	30-1031	.20
49	Resistor (99000 ohms, ½ watt)	33-399339	.20
50	Resistor (1 megohm, ½ watt)	33-510339	.30
51	Condenser (.1 mfd. bakelite)	4989-SG	.35
52	Resistor (490000 ohms, ½ watt)	33-449339	.20
53	Resistor (1 megohm, ½ watt)	33-510339	.30
54	Resistor (45000 ohm, ½ watt)	33-345339	.20
55	Condenser (.03 mfd. tubular)	30-4380	.20
56	Resistor (5000 ohms, ½ watt)	33-250339	.20
57	Resistor (490000 ohms, ½ watt)	33-449339	.20
58	Condenser (.03 mfd. bakelite)	8318-SU	.35
59	Condenser (.03 mfd. tubular)	30-4380	.20
60	Condenser (.003 mfd. tubular)	30-4469	
61	Cone & Voice Coil (H-27)	02625	1.20
	Cone & Voice Coil (K-36)	36-3020	
62	Output Transformer (H-27, K-36)	32-7634	1.50
63	Resistor (330000 ohms, ½ watt)	33-433339	.20
64	Resistor (330000 ohms, ½ watt)	33-433339	.20
65	Resistor (51000 ohms, ½ watt)	33-351339	.20
66	Resistor (490000 ohms, ½ watt)	33-449339	.20
67	Condenser (.05 mfd. tubular)	30-4444	.20
68	Condenser (.003 mfd. tubular)	30-4469	
69	Field Coil (H-27, K-36)	36-3673	
70	Resistor (7750 ohms, wirewound)	33-3279	
71	Resistor (32000 ohms, 2 watts)	33-332539	
72	Resistor (40000 ohms, 1 watt)	33-340339	
73	Resistor (70000 ohms, 1 watt)	33-370439	.20
74	Resistor (20000 ohms, 2 watt)	33-320539	
75	Bias Resistor (Wirewound)	33-3278	
76	Resistor (1 megohm, ½ watt)	33-510339	.20
77	Condenser (.008 mfd. tubular)	30-4112	.20
78	Condenser (.006 mfd. bakelite)	7625-SU	.25
79	Filter Choke	32-7115	1.80
80	Electrolytic Condenser 8 uf.	30-2026	1.05
81	Condenser (.3 mfd. tubular)	30-4465	
82	Electrolytic Condenser 8 uf.	30-2026	1.05
83	Power Transformer (115 V., 50-60 Cycles)	32-7615	
*	Power Transformer (115 V., 25-40 Cycles)	32-7616	
84	Tone Control & AC Switch	42-1184	.75
85	Condenser (.015 Twin Bakelite)	3793-DG	.40
86	Antenna Range Switch	42-1202	1.50
87	R.F. Range Switch	42-1203	1.50
88	Oscillator Range Switch	42-1204	1.50
	Switch Indexing Plate & Shaft	42-1186	
	Dial	27-5209	.55
	Hub	28-7187	.12
	Clamp	28-2837	.10
	Screw Set	W-1641	
	Dial Gear	28-7185	$0.10
	Drive Gear	31-1884	.25
	Thrust Spring	28-8611	.01
	Thrust Washer	28-3976	.30 C
	C Washer	28-3904	.01
	Vernier Drive Assem.	31-1871	
	Mask	27-5240	
	Mask Arm & Link Assembly	31-1887	
	Mask Washer	27-8318	.50 C
	Mask Guide Bracket	38-7876	
	Screen & Lens Holder Assembly	31-1900	
	Pilot Lamp Assembly	38-7706	.35
	Shadow Meter Lamp Shield	28-2917	.02
	Shadow Meter Mtg. Spring	28-8623	.70 C
	Socket, 7 Prong	27-6057	.11
	Socket, 8 Prong	27-6052	
	Tube Shield	28-2726	.10
	Tube Shield Base	28-3898	.03
	Volume Control Shaft	28-6500	.12
	Retaining Clips	28-8610	.03
	Washer (Volume Control)	28-4186	.75 C
	Washer Volume Control (Spring)	4436	1.50 C
	Spring	28-4117	.40 C
	Grommet Mtg. R.F. Unit	27-4317	.04
	Sleeve Mtg. R.F. Unit	28-2257	.01
	Screw Mtg. R.F. Unit	W-729	.45 C
	Washer	28-3927	.01
	Mtg. Rubber Tuning Condenser	27-4325	.02
	Speaker Cable	41-3202	
	A. C. Cord	L-2183	.40
	Terminal Panel Ant.	38-7714	.15
	Knob Assembly	27-4330	.10
	Knob Assembly	27-4331	.10
	Knob Assembly	27-4332	.10
	Knob Assembly	27-4326	.10
	"B" CABINET		
	Speaker K-36	36-1233	
	Bezel Frame & Plate Assembly	40-5946	
	Gasket	27-8312	.01
	Glass	27-8299	.06
	Ring	28-3987	.40
	"X" CABINET		
	Speaker H-27	36-1240	
	Screw Mtg. Speaker	W-709	
	Bezel Frame & Plate Assembly	40-5948	
	Glass	27-8300	.06
	Ring	28-3988	.45
	Gasket	27-8313	.01
	Bottom Shield Plate	28-4031	.45

Figures in black type indicate circled figures in Base View.

Prices Subject to Change without Notice

MODEL 37-670
Schematic
Coil Data

PHILCO RADIO & TELEV. CORP.



Electrical Specifications

POWER SUPPLY:

Voltage	Frequency	Power Consumption
115	50–60	130 watts
115	25–40	130 watts
220		

Power transformers for the different voltage and frequency ratings are listed in the Parts List, page 3.

Intermediate Frequency: 470 K. C.

Fig. 3—Schematic Diagram 37-670

September, 1936

Audio Output: 10 watts

Philco Tubes Used: 6K7G, R.F. Amplifier; 6A8G, Oscillator and First Detector; 6K7G, I.F. Amplifier; 6J5G, 2nd Detector, A.V.C.; 6J5G, First Audio; 6J5G, Phase Inverter; 2-6J5G, Push-Pull Drivers; 2-6F6G, Output; 5X4G, Rectifier.

Tuning Ranges: Five. Range 1—530-1600 K. C.; Range 2—1.58 to 4.75 M. C.; Range 3—4.7 to 7.4 M. C.; Range 4—7.35 to 11.6 M. C.; Range 5—11.5 to 18.2 M. C.

Speakers: "X" Cabinet, H-28; "B" Cabinet, K-37.

Alignment of Compensators

The locations of the various compensators are shown in Figs. 6 and 7.
The following procedure must be observed in adjusting the compensators:

DIAL CALIBRATION—In order to adjust this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this rotate the tuning control to the extreme counter-clockwise position (maximum capacity). Loosen the set screw of the dial hub, then turn dial until the glowing indicator is centered on second index line of dial scale (see Fig. 5). Now tighten the dial hub set screw in this position.

SHADOW METER ADJUSTMENT—Remove aerial and allow tubes to warm up. Then adjust the shadow meter as follows:

1. Move the shadow meter coil backwards and forwards, until the opposite edges of the shadow are 1/8 of an inch from each end of the shadow screen, measuring along the bottom edge of the screen. Adjustment of the shadow meter light bracket may be necessary for perfect centering.
2. Remove the 5X4G rectifier tube from its socket and rotate coil until shadow reaches minimum width. This width must not exceed 3/16 of an inch.
3. Replace the 5X4G rectifier tube in its socket. The shadow should then widen until it is not more than 3/16 inch or less than 1/16 inch from each side of the screen, measuring along the bottom edge. If these limits are not obtained readjust the shadow meter as given in paragraphs 1 and 2 until they are reached.

OUTPUT METER—The 025 Output Meter is connected between the plate and cathode prongs of one of the (6F6G) tubes. The meter is adjusted to use the (0-30) volt scale.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

1. Connect the 088 Signal Generator output lead through a .1 mfd. condenser to the control grid of the 6A8G tube, and the ground connection of the output lead to the chassis. Turn the Volume Control to maximum volume position.
2. Set the range switch in position No. 1 (Broadcast), then rotate the tuning condenser of the receiver to approximately 580 K. C. and adjust the signal generator for 470 K. C.
3. Adjust compensators (42S) 2nd I.F. Sec., (42P) 2nd I.F. Pri., (41S) 1st I.F. Sec., and (41P) 1st I.F. Pri. for maximum reading on the output meter.

RADIO FREQUENCY CIRCUIT

Tuning Range (11.5) to (18.2) M. C.

1. Remove the signal generator output lead from the grid of the 6A8G tube and connect it through the .1 mfd. condenser to terminal No. 1 on aerial input panel and the generator ground lead to terminal No. 3, rear of chassis. Terminals 2 and 3 must be connected by the shorting link provided on the panel.
2. Set the range switch in position No. 5. Turn the receiver and signal generator dials to 18 M. C. Now adjust compensator (29D) by turning the screw (clockwise) to the maximum capacity position, then slowly turning it (counter-clockwise) until a second peak signal is reached on the output meter. The first peak from maximum capacity is the image signal and must not be used. NOTE—In adjusting some receivers only one peak will be observed, therefore, tune the compensator to maximum on this peak. If the above procedure is correctly performed, the image signal will be found at 17.06 M. C. by advancing the signal generator attenuator and turning the receiver dial to this frequency mark on the dial.
3. The antenna and R.F. compensators (7D) and (19D) are now adjusted by connecting a variable condenser of approximately 350 mmfd.—Philco Part No. 45-2325 across the oscillator compensator (29D) (First contact from left side of the receiver facing rear underside of chassis) and ground. Leaving the signal generator and receiver dials at 18 M. C., tune the added condenser from the maximum capacity point until the second harmonic of the receiver oscillator beats against the signal from the generator thereby bringing in the signal. The antenna and R. F. compensators (7D) and (19D) are then adjusted for maximum output. Now remove the external condenser and readjust compensator (29D) as given in paragraph 2 above.
4. Turn signal generator and receiver dials to 12 M. C. and adjust compensator (29E) for maximum output. Then adjust compensators (19E) and (7E) for maximum output.
5. Now turn the signal generator and receiver dials to 18 M. C. and readjust compensators (29D) Osc., (7D) Ant. and (19D) R.F. as given in paragraphs 2 and 3 above.

Tuning Range (7.35) to (11.8) M. C.

1. Set range switch in position 4. Rotate signal generator and receiver dials to 11 M. C. Now adjust compensator (29B) by turning the screw (clockwise) to the maximum capacity position, then slowly turn it (counter-clockwise) until a second peak signal is reached on the output meter. The first peak from maximum capacity is the image signal and must not be used. NOTE—In adjusting some receivers only one peak will be observed, therefore, tune the compensator to maximum on this peak. If the above procedure is correctly performed, the image signal will be found at 10.06 M. C. by advancing the signal generator attenuator and turning receiver dial to this frequency mark on the dial.
2. Using the 11 M. C. signal, compensators (19B) R.F. and (7B) Ant. are adjusted by using the procedure given in paragraph 3, under tuning range (11.5) to (18.2) M. C. with the exception that the external condenser is connected across compensator (29B) (Third contact from left side of the receiver) and ground.
3. Remove the variable condenser and readjust compensator (29B) Osc. as given in paragraph 1 above.
4. Turn the signal generator and receiver dials to 7.5 M. C. and adjust compensators (29C) Osc. series, (19C) R.F. and (7C) Ant. for maximum output.
5. Due to the slight interaction of the high and low frequency compensators of this range, compensators (29B) Osc., (19B) R.F. and (7B) Ant. must be readjusted using the procedure in paragraphs 1 and 2 above.

Tuning Range (4.7) to (7.4) M. C.

1. Set range switch in Position 3. Turn signal generator and receiver dials to 7.0 M. C. Now adjust compensator (29) Osc., (19) R.F. and (7) Ant. for maximum output.
2. Turn the signal generator and receiver dials to 5.0 M.C. and adjust compensators (29A), (19A) and (7A) for maximum output.
3. Turn the signal generator and receiver dials to 7.0 M. C. and readjust compensators (29) Osc., (19) R.F. and (7) Ant. for maximum output.

Tuning Range (1.58) to (4.75) M. C.

1. Set the range switch in position 2. Turn the signal generator and receiver dials to 4.5 M. C.
2. Now adjust compensators (27B) Osc., (18A) R.F. and (6A) Ant. for maximum output.
3. Rotate the signal generator and receiver dials to 1.7 M. C. Compensator (27C) Osc. series is now adjusted for maximum output as follows:

First tune compensator (27C) for maximum output, then vary the tuning condenser of the receiver for maximum output about the 1.7 M. C. dial mark. Now turn compensator (27C) slightly to the right or left and vary the receiver tuning condenser for maximum output. If the output reading increases, turn compensator (27C) in the same direction a trifle more, and again vary the tuning condenser for maximum output. If the output decreases, set the compensator in the opposite direction. This procedure of first setting the compensator and then varying the tuning condenser is continued until there is no further gain in output reading.

4. Turn signal generator and receiver dials to 4.5 M. C. and readjust compensators (27B), (18A) and (6A) as given in Paragraphs 1 and 2 above.

Tuning Range (530) to (1600) K. C.

1. Set range switch in position No. 1 (Broadcast). Rotate the signal generator and receiver dials to 1500 K. C. Now adjust compensators (27) Osc., (18) R.F. and (6) Ant. for maximum output.
2. Tune signal generator and receiver dials to 580 K. C. Compensator (27A) Osc. series is then adjusted for maximum output as given in paragraph 3 under tuning range (1.58) to (4.75) M. C., the only difference in the procedure being in the frequency used.
3. Readjust compensator (27) for maximum output, by turning the signal generator and receiver dials to 1500 K. C.
4. Turn the signal generator and receiver dials to 1400 K. C. and adjust compensators (18) R.F. and (6) Ant. for maximum output.

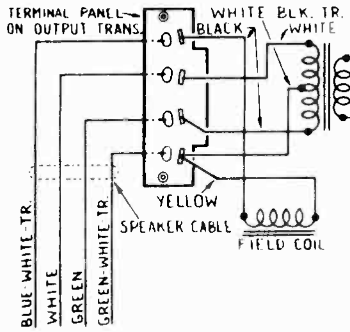


Fig. 1—Speaker Wiring for Types K-37 and H-28

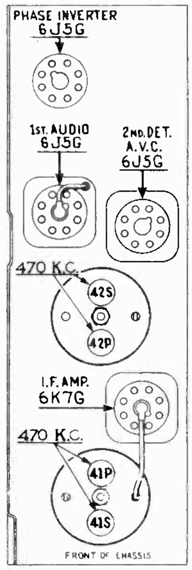


Fig. 6—I.F. Compensators Top of Chassis

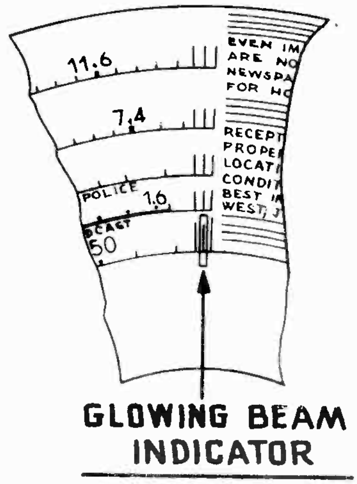


Fig. 5—Dial Calibration

PHILCO RADIO & TELEV. CORP.

SERVICE DATA

Model 37-670 is an 11 tube superheterodyne receiver designed for operation on alternating current. It has five tuning ranges, covering standard broadcast and short-wave frequencies. The chassis is constructed in four basic assembly units, concentrating the R.F., I.F., Audio and Power circuits in individual units.

The circuit includes the PHILCO Foreign Tuning System—controlled by the range switch—providing maximum sensitivity and noise-reduction, when used with the Philco High-Efficiency Aerial; automatic bass compensation in the volume control circuit; shadow tuning; automatic volume control, and a push-pull class "A" output circuit.

AERIAL CONNECTIONS

The red and black leads of the High-Efficiency Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided on the rear of the chassis. Connect the jumper on the terminal panel across terminals 3 and 4.

If a temporary aerial is used, the jumper should be across terminals 2 and 3. The aerial connects to terminal 1 and the ground lead to terminal 3. A good ground connection is desirable in all installations.

REPLACING DIAL

To replace the dial, remove the clamp holding the dial to the hub, by turning clamp counter-clockwise, using the two holes provided on the clamp for this purpose.

REMOVING MASK ARM & LINK ASSEMBLY

First remove dial, then loosen set screw of dial hub and remove the hub and felt washer from the shaft. Now loosen screws holding indicator bracket and lens assembly, and move bracket forward about ½ inch. The assembly may now be removed by loosening set screw of range switch arm, then pulling arm off of range switch shaft.

REMOVING SWITCH & COIL ASSEMBLIES OF R.F. UNIT

To replace any part in the switch and coil assemblies of the R.F. Unit, each assembly can be removed separately as follows:

First remove the tuning dial, mask and arm assembly. Remove the center mounting screw on the rear of the R.F. Unit. Then lift the rear of the unit and push forward until the rubber mounting grommets, on each side of the unit, clear the mounting slots. The unit is then lifted far enough from the chassis for removal of the two screws holding the selector switch indexing plate and shaft (front of unit). Then pull shaft straight out from the unit. Also, remove the volume control shaft by releasing the retaining clip, inside the chassis, from the shaft.

IMPORTANT—When selector switch shaft is replaced, care should be taken to have all wafer rotors in the same position, so that the key on the switch shaft will slide freely into the notched hole in each wafer rotor. **NEVER** force shaft into rotors.

Servicing Stages—It is necessary to unsolder some connecting leads in order to release the stage for servicing. If all the following connections are unfastened the stage will be entirely released. Ordinarily only one or two leads need be loosened in order to change coils, replace coupling condensers, or replace switch sections.

ANTENNA ASSEMBLY—Rear Section

1. Unsolder the wires which connect the antenna panel and I.F. Unit to the range switch, also the assembly shield ground leads.
2. Unsolder the two leads from the gang condenser terminal panel which connect to the range switch. Also the lead of tubular condenser (40) at the ground lug on the R.F. Unit.
3. Remove the screw holding the shield plate to the unit base. This screw is located in the right hand corner of the shield plate, facing the rear underside of the chassis. The assembly can then be removed.

R.F. ASSEMBLY—Middle Section

1. Unsolder the wires from the I.F. Unit and the 6K7G plate contact in R.F. Unit which connect to the range switch. Then remove ground leads of shield plate.
2. Unsolder the leads from the gang condenser terminal panels and the lead connecting D2 on the range switch to the 6K7G Plate Contact.
3. Remove the screw holding the shield plate to the unit base. This screw is located in the right hand corner of the shield plate facing the rear underside of the chassis. Then pull the assembly straight out.

OSCILLATOR ASSEMBLY—Front Section

1. Unscrew the two screws located on each side of the R.F. Unit.
2. Unsolder the wires connecting the range switch to resistors (81) and (78) in the power unit, electrolytic condenser (77) in the R.F. Unit and Osc. plate and grid contacts on the 6A8G socket.
3. Remove the leads from the gang condenser terminal panels and the lead of Mica condenser (30) at the ground lug on R.F. Unit base. With these leads disconnected lift oscillator section from unit.

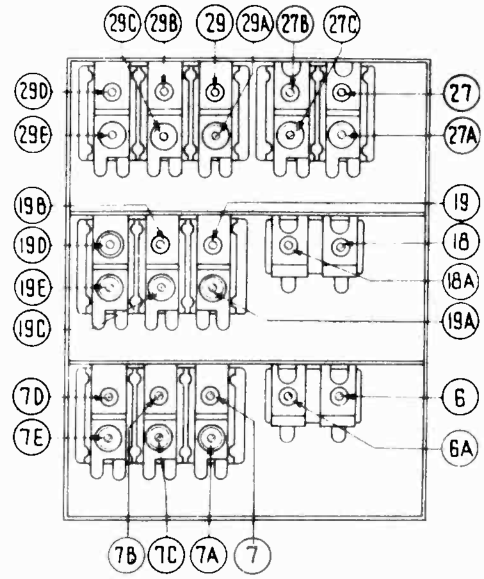


Fig. 7—R.F. Compensators Underside of Chassis

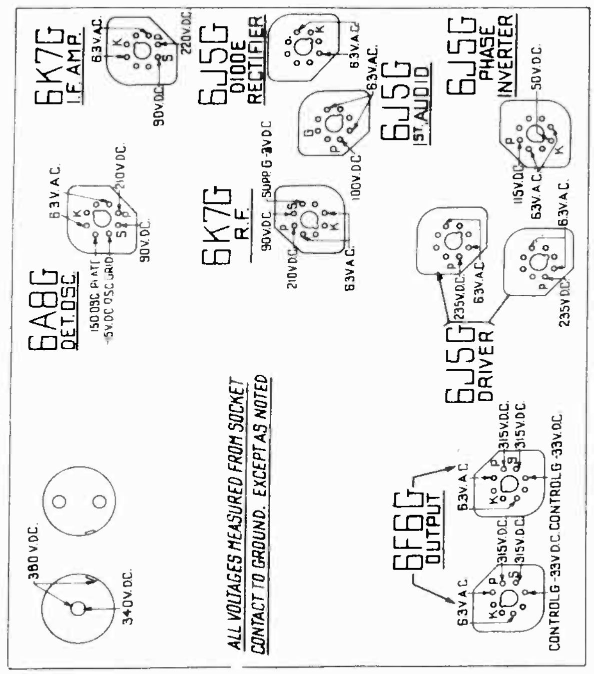


Fig. 2—Socket Voltages—Underside of Chassis View

The voltages indicated by arrows were measured with a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A.C.

MODEL 37-670
Chassis Views
Parts List

PHILCO RADIO & TELEV. CORP.

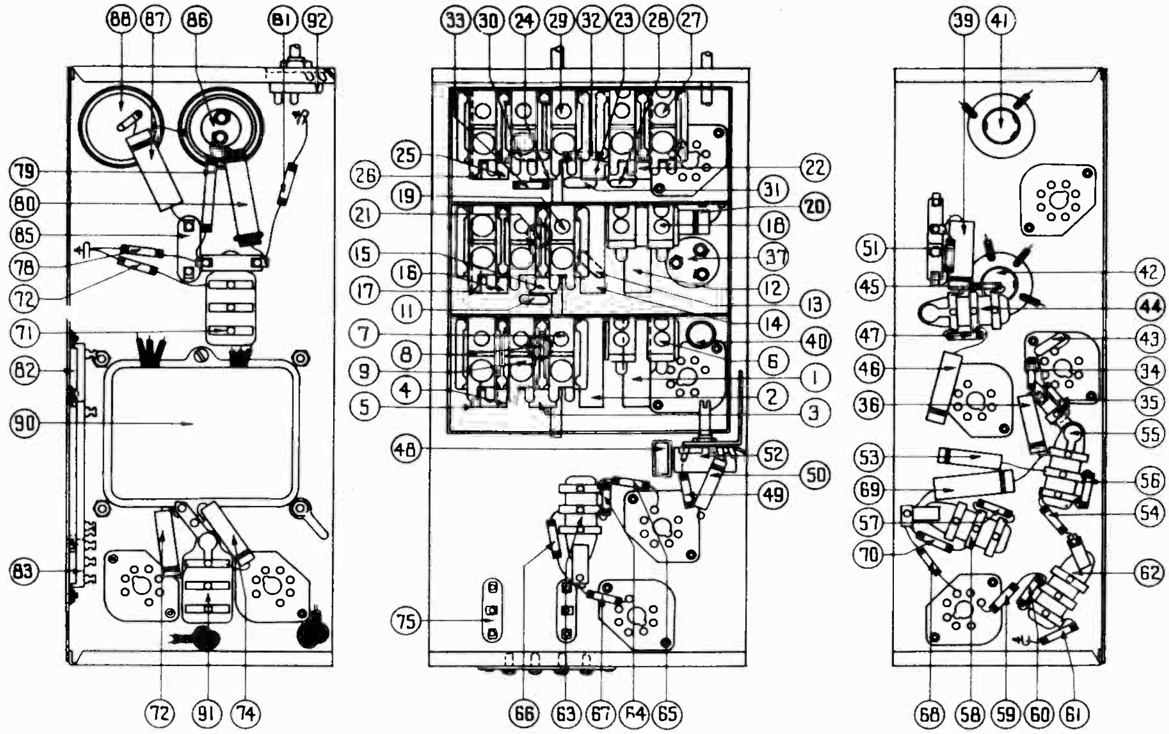


Fig. 4—Parts Location—Underside of Chassis

Replacement Parts — Model 37-670

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (530 to 1600 K.C.)	32-2108	$0.80
2	Antenna Transformer (1.58 to 4.75 M.C.)	32-2146	.80
3	Antenna Transformer (4.7 to 7.4 M.C.)	32-2183	.60
4	Antenna Transformer (7.35 to 11.6 M.C.)	32-2185	.70
5	Antenna Transformer (11.5 to 18.2 M.C.)	32-2175	.80
6	Compensator (two section)	31-6093	.40
7	Compensator (six section)	31-6112	1.40
8	Condenser (.05 mfd. tubular)	30-4020	.20
9	Resistor (51000 ohms)	33-351339	.20
10	Tuning Condenser	31-1855	4.50
11	Condenser (40 mmfd. mica)	30-1076	.20
12	R. F. Transformer (530 to 1600 K.C.)	32-2105	.75
13	Condenser (5 mmfd. mica)	30-1077	.20
14	R. F. Transformer (1.58 to 4.75 M.C.)	32-2147	.60
15	R. F. Transformer (4.7 to 7.4 M.C.)	32-2177	.60
16	R. F. Transformer (7.3 to 11.6 M.C.)	32-2178	.60
17	R. F. Transformer (11.5 to 18.2 M.C.)	32-2176	.70
18	Compensator (two section)	31-6093	.40
19	Compensator (six section)	31-6113	1.40
20	Condenser (.05 mfd. tubular)	30-4123	.20
21	Condenser (.05 mfd. tubular)	30-4020	.20
22	Oscillator Transformer (530 to 1600 K.C.)	32-2120	.65
23	Oscillator Transformer (1.58 to 4.75 M.C.)	32-2149	.60
24	Oscillator Transformer (4.7 to 7.4 M.C.)	32-2184	.60
25	Oscillator Transformer (7.3 to 11.6 M.C.)	32-2186	.70
26	Oscillator Transformer (11.6 to 18.2 M.C.)	32-2182	.70
27	Compensator (four section)	31-6108	
28	Condenser (700 mmf.)	5863	.25
29	Compensator (six section)	31-6112	
30	Condenser (3000 mmfd. mica)	30-1028	.45
31	Condenser (250 mmfd. mica)	30-1032	.25
32	Resistor (32000 ohms)	33-332339	.20
33	Resistor (10000 ohms)	33-310339	.20
34	Resistor (1.0 megohm)	33-510339	.20
35	Resistor (1.0 megohm)	33-510339	.20
36	Condenser (.05 mfd. tubular)	30-4444	.20
37	Electrolytic Condenser (2, 1, 3 mfd.)	30-2122	1.85
38	Shadowmeter	45-2189	2.50
39	Condenser (.05 mfd. tubular)	30-4012	.25
40	Condenser (.05 mfd. tubular)	30-4123	.20
41	1st I. F. Transformer	32-2170	2.00
42	2nd I. F. Transformer	32-2172	2.00
43	Condenser (110 mmfd. mica)	30-1031	.20
44	Condenser (110 mmfd. dual bakelite)	8035-DG	.25
45	Resistor (99000 ohms)	33-399339	.20
46	Condenser (.01 mfd. tubular)	30-4124	.25
47	Resistor (490000 ohms)	33-449339	.20
48	Condenser (75 mmfd. mica)	30-1053	.20
49	Resistor (40000 ohms)	33-340339	$0.20
50	Condenser (.006 mfd. tubular)	30-4125	
51	Resistor (1000 ohms)	33-210339	.20
52	Volume Control	33-5158	1.00
53	Condenser (.015 mfd. tubular)	30-4358	.20
54	Resistor (490000 ohms)	33-449339	.20
55	Condenser (.1 mfd. bakelite)	4989-SG	.35
56	Resistor (1 megohm)	33-510339	.20
57	Resistor (99000 ohms)	33-399339	.20
58	Condenser (.03 mfd. bakelite)	8318-SU	.35
59	Resistor (490000 ohms)	33-449339	.20
60	Resistor (5000 ohms)	33-250339	.20
61	Resistor (45000 ohms)	33-345339	.20
62	Condenser (.03 mfd. bakelite)	8318-SU	.20
63	Condenser (.03 mfd. bakelite)	8318-SU	.20
64	Resistor (330000 ohms)	33-433339	.20
65	Resistor (99000 ohms)	33-399339	.20
66	Resistor (330000 ohms)	33-433339	.20
67	Resistor (99000 ohms)	33-399339	.20
68	Resistor (51000 ohms)	33-351339	.20
69	Condenser (.1 mfd. tubular)	30-4455	
70	Resistor (51000 ohms)	33-351339	.20
71	Condenser (.015 mfd. dual bakelite)	3903-LU	
72	Resistor (1 megohm)	33-510339	.20
73	Condenser (.003 mfd. tubular)	30-4469	.20
74	Condenser (.003 mfd. tubular)	30-4469	.20
75	Audio Input Transformer	32-7671	2.50
76	Output Transformer (K-37, H-28)	32-7638	
77	Cone and Voice Coil (K-37)	36-3020	
	Cone and Voice Coil (H-28)	02625	
78	Resistor (70000 ohms)	33-370439	.20
79	Resistor (15000 ohms)	33-315339	.20
80	Resistor (25000 ohms)	33-325639	.30
81	Resistor (51000 ohms)	33-351339	.20
82	Resistor (5600 ohms wirewound)	33-3282	.60
83	Resistor (258 ohms wirewound)	33-3281	.60
84	Field Coil Assembly (K-37, H-28)	36-3104	
85	Filter Choke	32-7115	1.80
86	Electrolytic Condenser (8, 10 mfd.)	30-2045	1.80
87	Condenser (.25 mfd.) tubular	30-4446	.25
88	Electrolytic Condenser (8 mfd.)	30-2025	1.35
89	Pilot Lamp	34-2039	.15
90	Power Transformer 115 V., 50-60 cycles	32-7640	6.50
	Power Transformer 115 V., 25-40 cycles	32-7641	
91	Condenser (.015 mfd. dual bakelite)	3793-DG	.40
92	Power and Tone Control Switch	42-1184	.75
93	Range Switch (Ant.)	42-1211	1.60
94	Range Switch (R.F.)	42-1255	1.60
95	Range Switch (Osc.)	42-1213	1.60
96.	Shadowmeter Lamp	34-2064	.09
	Switch Index Plate and Shaft	42-1187	.50
	Pilot Lamp Assembly	38-7706	.35
	Dial	27-5213	.40
	Hub	28-7187	.12
	Clamp	28-2837	$0.06
	Set Screw	W-1641	.02
	Gear (Dial)	28-7185	.10
	Gear (Drive)	31-1884	.25
	Thrust Spring	28-8611	.01
	Thrust Washer	28-3976	.30 C
	"C" Washer	28-3904	.01
	Mask	27-5206	.30
	Mask Arm and Link Assembly	31-1887	.45
	Mask Washer	27-8318	.50 C
	Mask Guide and Bracket	38-7876	.25
	Screens and Lens Holder Assembly	31-1900	.30
	Volume Control Shaft	38-8060	
	Retaining Clip	28-4394	
	Spring	28-4117	.40 C
	Tube Shield	28-2726	
	Tube Shield Base	28-3898	
	Socket 7 prong	27-6057	.11
	Socket 8 prong	27-6058	.11
	Socket Rectifier	27-6052	.11
	Terminal Panel (Ant.)	38-7714	.15
	Grommet Mtg. R. F. Unit	27-4317	.04
	Sleeve Mtg. R. F. Unit	28-2257	.01
	Washer Mtg. R. F. Unit	27-7807	.50 C
	Screw Mtg. R. F. Unit	W-729	.45 C
	Rubber Mtg. (Gang Condenser)	27-4325	.02
	Spring Mtg. Shadowmeter	28-8623	.70 C
	Plate Mtg. R. F. Transformer	28-3808	
	Spacer Mtg. R. F. Transformer	27-8228	
	Screw Mtg. R. F. Transformer	W-1635	
	Screw Chassis Mtg.	W-1495	1.50 C
	Washer Chassis Mtg.	28-2089	.30 C
	Shield (Chassis Bottom)	38-8143	
	Snap Fasteners	28-4279	
	Rubber Cushion (X Cabinet)	3558	
	Rubber Bushing (two required)	27-4360	
	Rubber Washer	5189	
	Speaker Cable	41-3210	
	A. C. Cord	L-2183	.40
	Knob Tuning	27-4330	.10
	Knob Tuning Vernier	27-4331	.10
	Knob Tone & Volume	27-4332	.10
	Knob Range Switch	27-4326	10

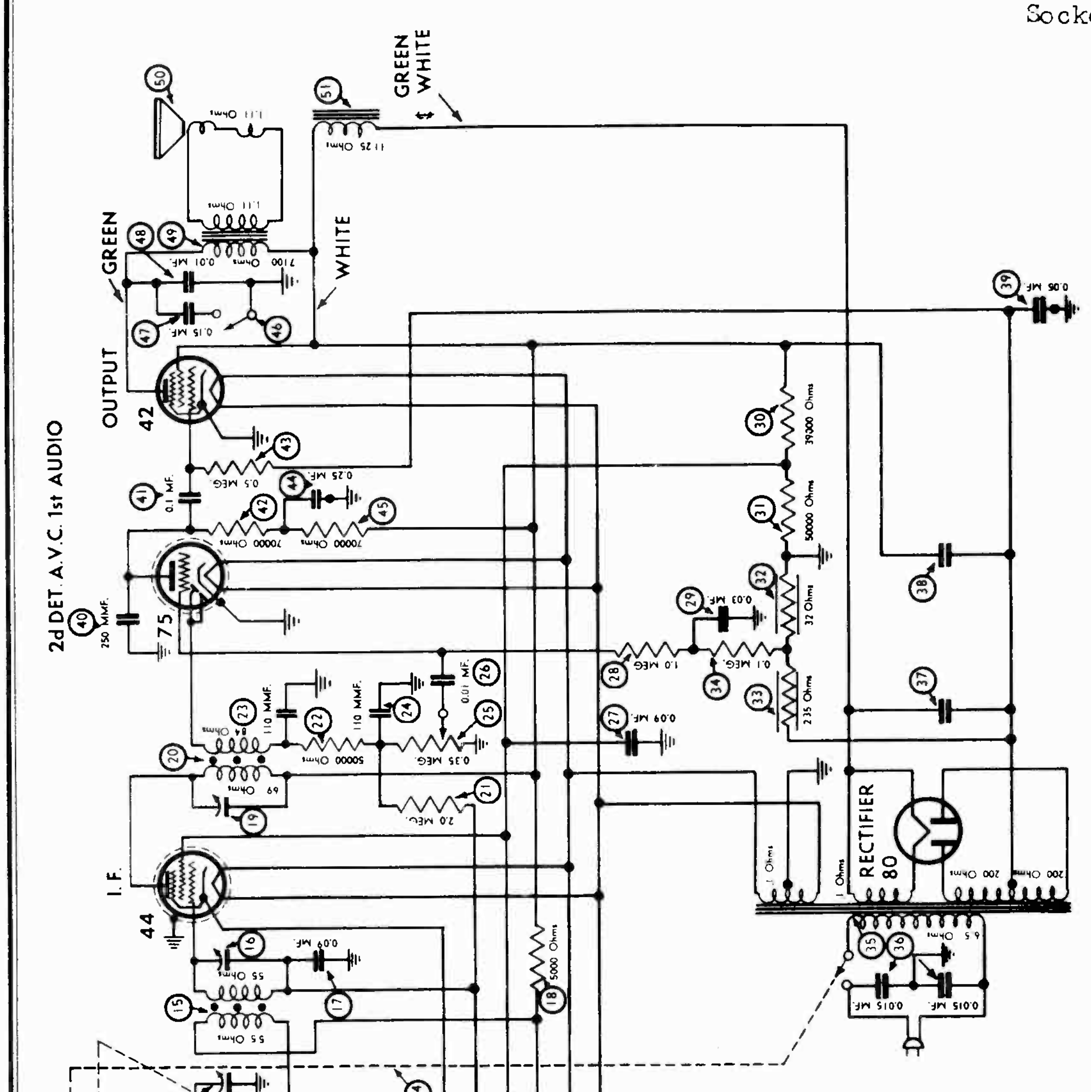
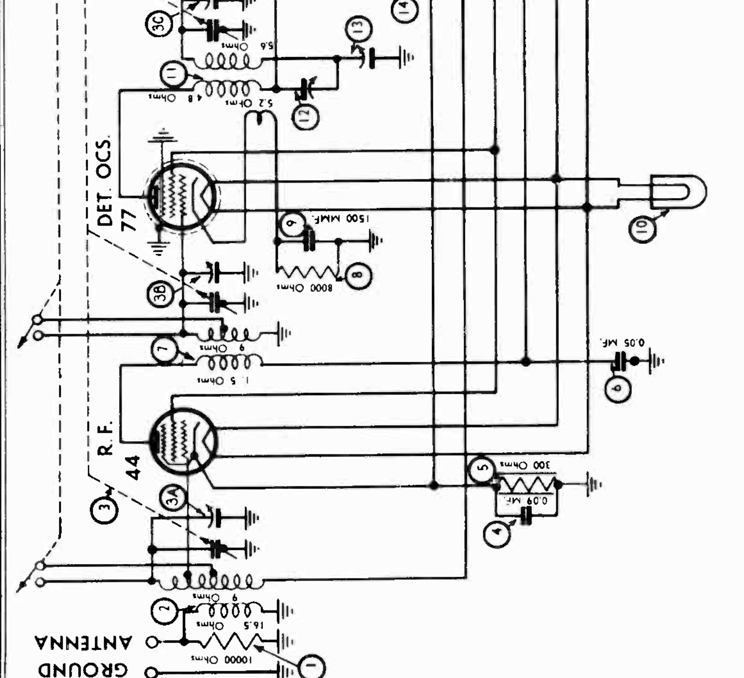
B & X CABINET PARTS

Description	Part No.	List Price
Besel Frame and Plate	40-5948	.80
Glass	27-8300	.06
Ring	28-3988	.45
Gasket	27-8313	.01
Speaker K-37, "B" Cabinet	36-1235	7.25
Baffle Silk Assembly, X Cabinet	40-6015	
Speaker (H-28) "X" Cabinet	36-1242	

Figures in black type indicate circled figures in Base View. Prices Subject to Change Without Notice.

PHILCO RADIO & TELEV. CORP.

MODEL 89(Code 123)
Schematic
Socket, Trimmers

BAND COVERAGE: Number one—550 to 1500 K. C.; number two—1.5 to 3.2 M. C.
NUMBER OF TUBES: Six.
NUMBER OF ACTUAL TUBE FUNCTIONS: Nine.
POWER SUPPLY: 115 volts, alternating current.
CURRENT CONSUMPTION: 60 watts.
SPEAKER: K-21.
TONE CONTROL: 2 point.
INTERMEDIATE FREQUENCY: 260 K. C.

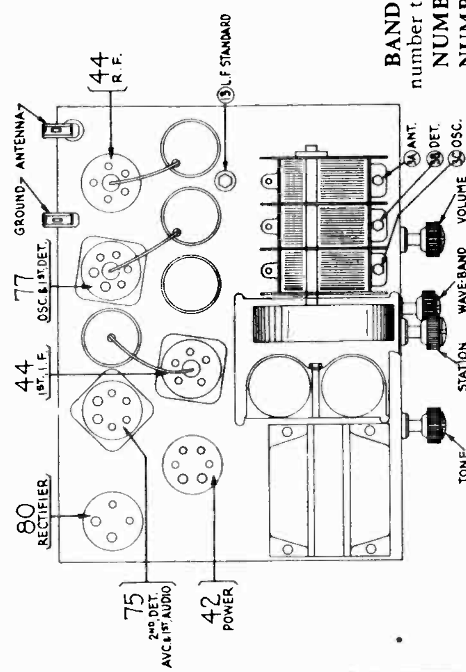


Fig. 2. Location of Compensating Condensers

MODEL 89(Code 123)
Voltage,Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

Model 89 (Code 123)

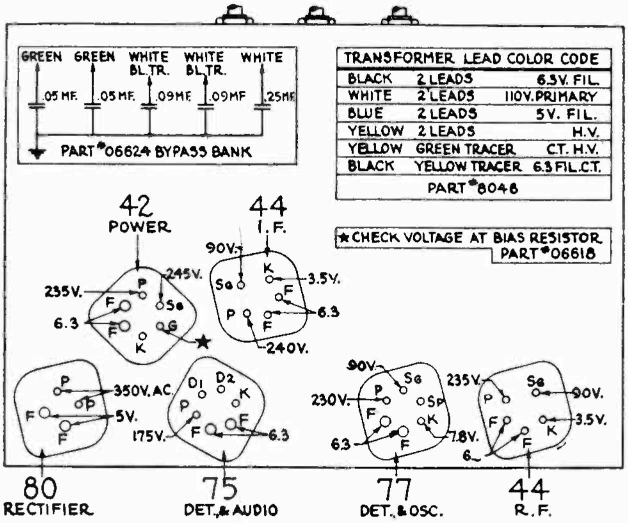


Fig. 1. Bottom View of Tube Sockets (Showing Voltages)

Description

The **PHILCO Model 89,** code 123, is of advanced design, incorporating a highly selective and very efficient R. F. Pre-amplifier, using the type 44 high mu tube.

The 1st detector and oscillator are combined in one tube, a type 77. The design of the oscillator circuit is such that changes in climatic conditions do not affect its stability. A single intermediate frequency stage designed around the high gain type 44 tube is used, insuring a maximum of power; a saving of two tubes is accomplished in the second detector unit by using a type 75 tube. This tube is a combination diode, triode; the diode functioning as a detector and automatic volume control and the triode as a separate audio amplifier.

The power or output stage uses a type 42 (6.3 fil.) pentode and is capable of delivering 3 watts undistorted output.

Adjusting Compensating Condensers

Adjustment of compensating condensers in the Model 89 requires an accurate signal generator covering the intermediate frequency as well as the standard broadcast range. The **PHILCO Model 088** or **024** can be used for this purpose.

Some instrument for measuring the output of the receiver while adjustments are being made is necessary. The **PHILCO 025 Circuit Tester** incorporates an output meter that is ideal for this purpose.

A **PHILCO No. 3164 Fibre Wrench** completes the equipment needed.

The location of the various compensating condensers is shown in Fig. 2 and Fig. 3. Connect the output meter to the plate and cathode terminals of the type 42 power tube, using the adapters provided with the "025" and set it for the 0–30 volt range.

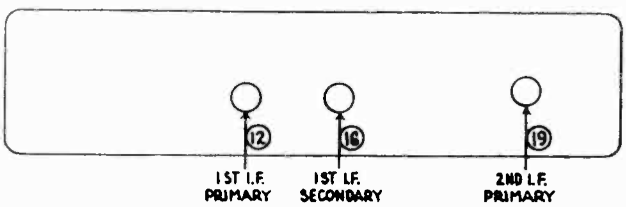


Fig. 3. I. F. Padder View from Rear of Chassis

I.F.—Set the signal generator at 260 K. C. and attach its antenna lead to the grid of the type 44 I.F. tube. Connect the ground lead of signal generator to the ground post of chassis. Turn the dial of the set to 540 K. C. and the volume control to the extreme right (maximum). Wave band switch in No. 1 position (left), tone control also in No. 1 position (left), adjust the signal generator attenuator for approximately ¼ scale reading on output meter. Using the fibre tuning wrench adjust condenser (19) (2nd I.F.) for maximum output meter reading. Remove the signal generator antenna lead from the grid of the 44 I.F. tube and connect it to the grid (removing grid clip), of the type 77, 1st detector and oscillator tube. Adjust the signal generator attenuator as before for ¼ scale output meter reading. With the fibre tuning wrench adjust condensers (16) and (12) (1st I.F.) for maximum output meter reading.

STANDARD (broadcast) and POLICE: Remove the antenna lead of the signal generator from the grid of the type 77 tube (replacing grid clip) and attach it to the antenna post on the chassis. Set the signal generator at 1500 K. C. and tune the set to 150 (1500 K. C.). Adjust signal generator attenuator as before for ¼ scale output meter reading. With the fibre tuning wrench adjust condensers (3)A, (3)B and (3)C, for maximum output meter reading. Set the signal generator at 550 K. C. and tune the set to 55 (550 K. C.) adjust condenser (13) for maximum output meter reading. Readjust condenser (3)C at 1500 K. C. During adjustments keep the output meter reading approximately ¼ scale to insure proper peaking of transformers.

Parts List

MODEL 89(Code 123) Chassis

PHILCO RADIO & TELEV. CORP.

Replacement Parts for Model 89 (Code 123)

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

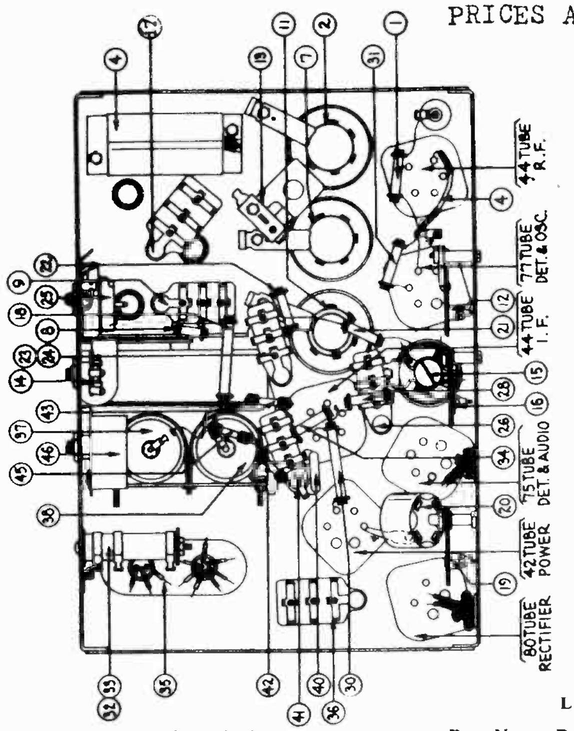


Fig. 5. Bottom View of Chassis

	Description	Part No.	List Price
1	Resistor (10,000 ohms)	4412	$0.20
2	Antenna Transformer	32-1062	.70
3	Tuning Condenser Gang	31-1053	4.80
3a	Compensator (Antenna)	Part of 3	....
3b	Compensator (R. F.)	Part of 3	....
3c	Compensator (Osc.)	Part of 3	....
4	Condenser (.09-.05-.09-.05-.25 mf.)	06624	.90
5	Resistor (300 ohms)	33-3010	.20
6	Condenser (0.05 mf.)	Part of 4	....
7	Detector Coil	32-1063	.50
8	Resistor (8,000 ohms)	33-1114	.20
9*	Condenser (.0015 mf. and .05 mf.)	3615-XG	.40
10	Pilot Light	6608	.09
11	Oscillator Coil	06620	.90
12	Compensating Condenser (Pri. 1st I. F.)	31-6024	.25
13	Compensating Condenser (L. F. Series)	04000-S	.35
14	Waveband Switch	42-1016	1.25
15	1st I. F. Transformer	32-1289	.60
16	Compensating Condenser (1st I. F. Sec.)	04000-M	.20
17	Condenser (0.09 mf.) (Twin)	4989-DG	.40
18	Resistor (5,000 ohms)	3526	.20
19	Compensating Condenser (2nd I. F. Pri.)	04000-A	.15

*The .05 mf. section connects the same as condenser 6.

	Description	Part No.	List Price
20	2nd I. F. Transformer	06622	$1.20
21	Resistor (2.0 meg.)	5872	.20
22	Resistor (50,000 ohms)	4518	.20
23	Condenser (.00011 mf.)	8035-DG	.25
24	Condenser (.00011 mf.)	Part of 23	....
25	Volume Control, On-Off Switch	33-5004	1.45
26	Condenser (0.01 mf.)	3903-SU	.25
27	Condenser (0.09 mf.)	Part of 4	....
28	Resistor (1.0 meg.)	4409	.20
29	Condenser (0.09 mf.)	Part of 17	....
30	Resistor (39,000 ohms)	33-1027	.20
31	Resistor (50,000 ohms)	4518	.20
32	B. C. Resistor (32 ohms)	7998	.20
33	B. C. Resistor (235 ohms)	Part of 32	....
34	Resistor (100,000 ohms)	4411	.20
35	Power Transformer 32-7381	8046	3.50
36	Condenser (0.015-0.015 mf.)	3793-DG	.40
37	Condenser (Electrolytic) (8 mf.)	7558	1.25
38	Condenser (Electrolytic) (8 mf.)	7558	1.25
39	Condenser (0.05 mf.)	Part of 4	....
40	Condenser (250 mmf.)	5858	.25
41	Condenser (0.01 mf.)	3903-SU	.25
42	Resistor (70,000 ohms)	5385	.20
43	Resistor (500,000 ohms)	4517	.20
44	Condenser (0.25 mf.)	Part of 4	....
45	Resistor (70,000 ohms)	5385	.20
46	Tone Control	06764	.50
47	Condenser (0.015 mf.)	Part of 46	....
48	Condenser (0.01 mf.)	Part of 46	....
49	Output Transformer	2580	1.00
50	Replacement Cone Assembly (K-21)	36-3159	.80
51	Replacement Field Coil Assembly (K-21)	36-3245	4.00
	I. F. Shield	4450	.15
	R. F. Shield	5084	.15
	R. F. Shield	8000	.12
	Tube Shield Body	28-2726	.10
	Tube Shield Base	28-2725	03
	Speaker Cable	02720	.35
	Drive Cord Spring	7776	2.00C
	Drive Cord	31-1457	.10
	Dial Hub and Scale	31-1590	.40
	Bezel	27-4113	.20
	Bezel Screws	W841B	.50C
	Knob (Tuning)	27-4051	.10
	Knob (Volume, Tone, Wave Switch)	27-4052	.10

MODEL 600
Voltage, Socket
Chassis, Alignment
Chassis, Data

PHILCO RADIO & TELEV. CORP.

Model 600

Specifications

TYPE CIRCUIT: Superheterodyne with pentode output.
POWER SUPPLY: 115 V., 60 cycle A.C.
TUBES USED: 1 type 6A7, Det. Osc., 1 type 77, 2nd Det., 1 type 41, Output, 1 type 80 Rectifier.
FREQUENCY RANGE: 530-1800 K.C.
INTERMEDIATE FREQUENCY: 460 K.C.
CURRENT CONSUMPTION: 45 watts.
SPEAKER: B-6.
POWER OUTPUT: ½ watt.

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 600 requires an accurate signal generator covering I.F., and standard-wave frequencies. The **PHILCO Model 088 All-Wave Signal Generator,** having a continuous range of from 100 to 20,000 K.C., is ideal for this purpose.

An output meter is also needed. **PHILCO Model 025 Circuit Tester** includes a high grade output meter.

Philco No. 3164 fibre wrench and No. 27-7059 fibre-handled screwdriver complete the equipment needed for making these adjustments. The locations of the various compensaters are shown in Fig. 4. Connect the output meter to the plate and cathode contacts of the type 41 power tube (using the adapters provided with the "025") and set it at the 0-30 volt range.

INTERMEDIATE FREQUENCY: Connect the 088 signal generator antenna lead to the grid of the 6A7 (removing grid clip) and the ground lead to the ground post or some part of the chassis. Adjust sensitivity control 23 approximately 1½ turns from tight (counter clockwise), then set the 088 signal generator at 460 K.C. and the attenuator for approximately ¼ scale reading on output meter. Adjust condensers 18 and 20 for maximum reading on output meter. Turn sensitivity control 23 in (clockwise) until a low hiss or click (oscillation) is heard. Then turn it out (counter clockwise) approximately ¼ turn.

STANDARD and POLICE: Remove the 088 signal generator antenna lead from the grid of the 6A7 (replacing grid clip) and connect it to the aerial post on the set. Turn the condenser gang all the way out (minimum capacity) and place a .006" (six thousandth inch) gauge between the stator and rotor plates. Turn the condenser gang in until the correct spacing (.006") is had between the rotor and stator plates. The pointer on the front of the cabinet should be set at 1800 K.C. to coincide with this condenser gang setting.

With the condenser gang set in this manner, set the 088 signal generator at 1800 K.C. and adjust condensers 5 and 11 for maximum reading on output meter.

Set the condenser gang and 088 signal generator at 600 K.C. and adjust condenser 16 for maximum output meter reading.

Care should be taken to adjust the 088 signal generator attenuator for approximately ¼ scale output meter reading for each stage before attempting to adjust compensators.

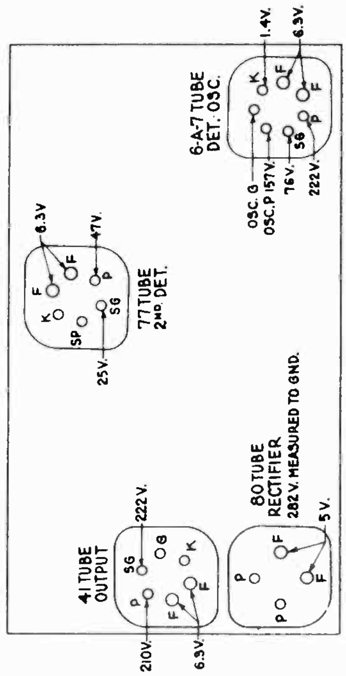


Fig. 2. Tube Sockets as Viewed from Bottom (Measured from Socket Terminal to B—)

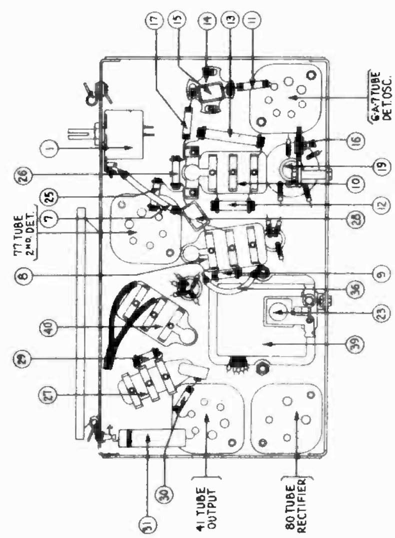


Fig. 3. Base View

POWER TRANSFORMER DATA

TERMINAL	A.C. VOLTS	CURRENT	CIRCUIT	COLOR
1-2	120		PRIMARY	WHITE
5-7	710	118 M.A.	SECONDARY	YELLOW
3-4	5.0	2.0 A.	FIL. RECT.	BLUE
8-10	6.3	3.5 A.	FILAMENTS	BLACK
6			CENTER TAP OF 5-7	YELLOW, GREEN TRACER
9			CENTER TAP OF 8-10	BLACK, YELLOW TRACER

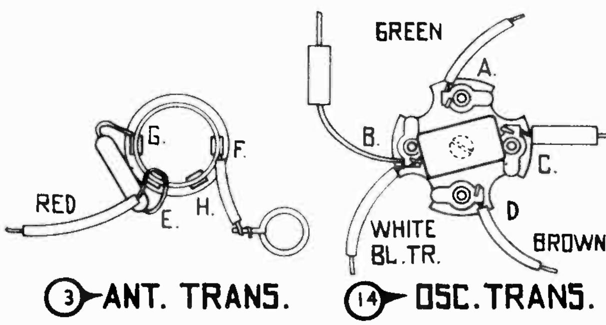
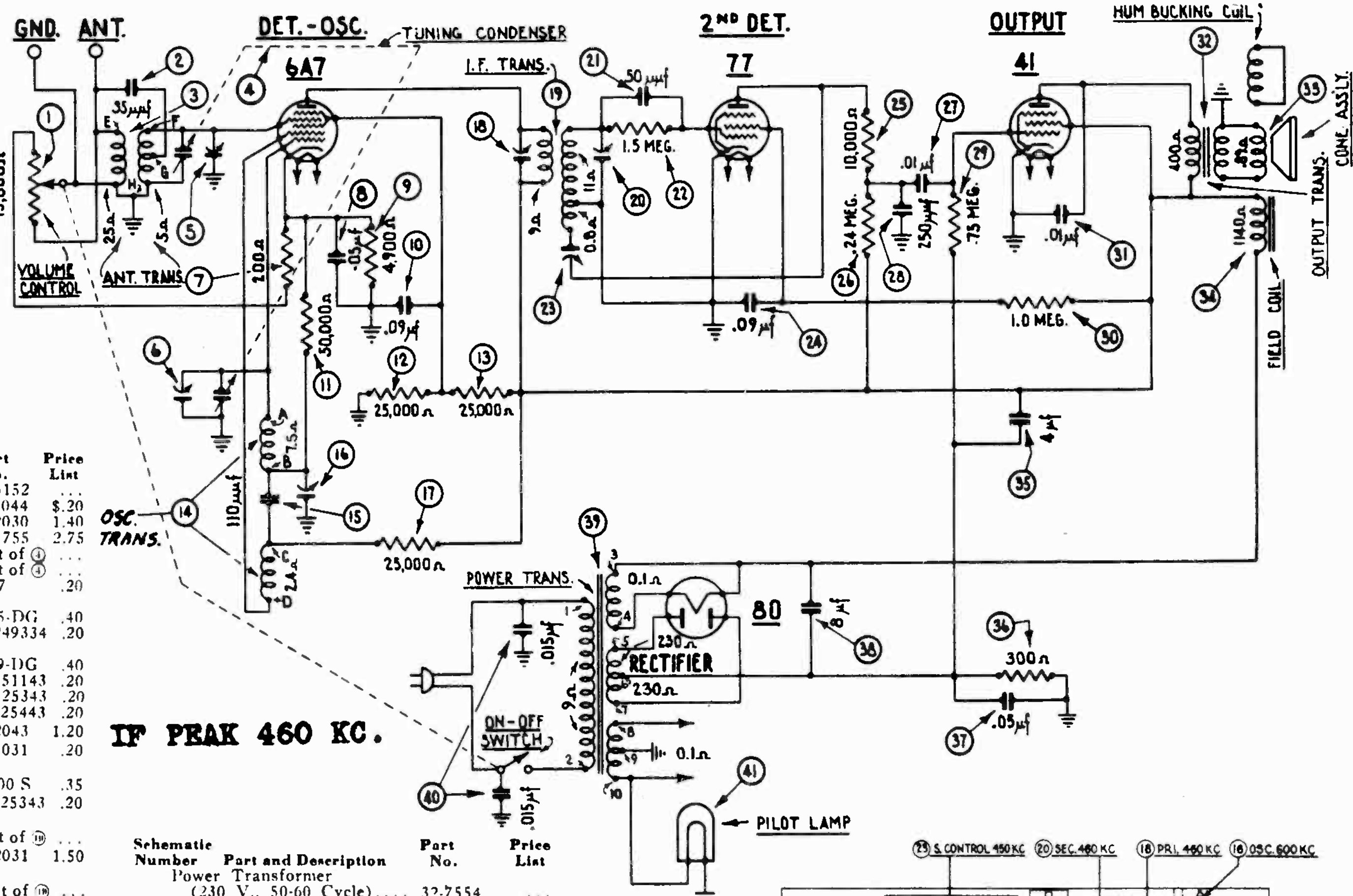


Fig. 1. Transformer Terminal Code

PHILCO RADIO & TELEV. CORP.

MODEL 600
Schematic
Socket, Trimmers
Parts List

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE



IF PEAK 460 KC.

Replacement Parts for Model 600

Schematic Number	Part and Description	Part No.	Price List
1	Volume Control	33-5152	...
2	Condenser (35 Mmf. Mica)	30-1044	$.20
3	Ant. Transformer	32-2030	1.40
4	Tuning Condenser	31-1755	2.75
5	Compensater (Det. 1500 K.C.)	Part of (4)	...
6	Compensater (Osc. 1500 K.C.)	Part of (4)	...
7	Resistor (200 ohm)	7217	.20
8	Condenser (.05 mf. Twin Bakelite)	3615-DG	.40
9	Resistor (4900 ohm, ½ watt)	33-249334	.20
10	Condenser (.09 mf. Twin Bakelite)	4989-DG	.40
11	Resistor (51,000 ohm, ¼ watt)	33-351143	.20
12	Resistor (25,000 ohm, ½ watt)	33-325343	.20
13	Resistor (25,000 ohm, 1 watt)	33-325443	.20
14	Osc. Transformer	32-2043	1.20
15	Condenser (110 mmf. Mica)	30-1031	.20
16	Compensater (Osc. Series) (600 K.C.)	04000 S	.35
17	Resistor (25,000 ohm, ½ watt)	33-325343	.20
18	Compensater (I.F. Pri) (460 KC.)	Part of (19)	...
19	I.F. Transformer	32-2031	1.50
20	Compensater (I.F. Sec.) (460 KC.)	Part of (19)	...
21	Condenser (50 mmf. Mica)	30-1029	.20
22	Resistor (1.5 meg., ¼ watt)	33-515133	.20
23	Sensitivity Control	31-6086	.45
24	Condenser (.09 mf.)	Part of (10)	...
25	Resistor (10,000 ohm, ¼ watt)	33-310133	.20
26	Resistor (240,000 ohm, ¼ watt)	33-424143	.20
27	Condenser (.01 mf. Bakelite)	3903-SU	.25
28	Condenser (.00025 mf.) (Mica)	30-1032	.25
29	Resistor (750,000 ohm, ¼ watt)	33-475133	.20
30	Resistor (1.0 meg., ¼ watt)	33-510143	.20
31	Condenser (.01 mf.) (Tubular)	30-4124	.25
32	Output Transformer	32-7041	.95
33	Voice Coil Cone Assy.	36-3029	.60
34	Field Coil Assy.	36-3593	2.50
35	Elec. Condenser (4-8 mf.)	30-2149	1.95
36	Resistor (300 ohm)	33-3121	.25
37	Condenser (.05 mf.)	Part of (8)	...
38	Elec. Condenser (8.0 mf.)	Part of (35)	...
39	Power Transformer (110 V., 60 Cycle)	32-7552	3.25
40	Condenser (.015 mf. Twin)	3793-DG	.40
41	Pilot Lamp (6.3 Volt)	34-2064	.09

Schematic Number	Part and Description	Part No.	Price List
	Power Transformer (230 V., 50-60 Cycle)	32-7554	...
	Power Transformer (110 V., 25 Cycle)	32-7553	...
	Tube Shield Body	28-2726	.10
	Tube Shield Base	28-2725	.03
	Tube Socket (6-prong)	27-6036	.11
	Tube Socket (7-prong)	27-6037	.11
	Tube Socket (4-prong)	27-6044	.10
	Volume Control Mtg. Nut	W-648-A	.20C
	Chassis Mtg. Screw	W-1587-A	.75C
	Chassis Mtg. Nut	W-124-A	.35C
	Chassis Mtg. Washer	W-410-A	.15C
	Chassis Mtg. Washer	W-291-A	.40C
	Baffle	27-8232	.04
	Dial	27-5179	.20
	Knob (Station Selector)	27-4302	...
	Knob (Volume, On-Off)	27-4273	.10
	Bottom Shield Assy.	29-3795	.40
	Bottom Shield Ins.	27-8122	.05
	Pointer	27-7933	.01
	Pilot Lamp Bracket Assy.	38-7581	.20
	Coupling (For Tuning Knob)	28-6426	.15

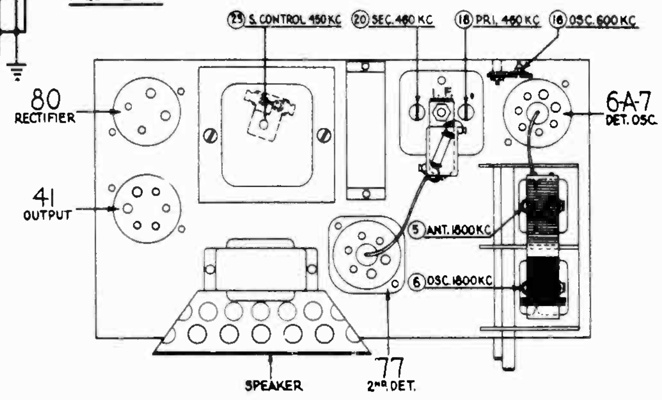


Fig. 4. Location of Compensators

MODEL 602
Voltage, Socket
Trimmers, Chassis
Alignment

PHILCO RADIO & TELEV. CORP.

Model 602

Specifications

TYPE CIRCUIT: Superheterodyne with pentode output.
POWER SUPPLY: 115 V., 25 or 60 cycle A. C., D. C.
TUBES USED: 1 type 6A7, Osc. Det., 1 type 78 I.F. Amplifier, 1 type 75, 2nd Det. 1st audio, 1 type 43 output, 1 type 25Z5, rectifier.
FREQUENCY RANGE: 530-1800 K.C.
INTERMEDIATE FREQUENCY: 460 K.C.
CURRENT CONSUMPTION: 55 watts.
SPEAKER: B-4.
POWER OUTPUT: ¾ watt.

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 602 requires an accurate signal generator covering I.F., and standard-wave frequencies. The **PHILCO Model 088 All-Wave Signal Generator,** having a continuous range of from 100 to 20,000 K.C., is ideal for this purpose.

An output meter is also needed. **PHILCO Model 025 Circuit Tester** includes a high grade output meter.

Philco No. 3164 fibre wrench and No. 27-7059 fibre-handled screwdriver complete the equipment needed for making these adjustments. The locations of the various compensating condensers are shown in Fig. 4. Connect the output meter to the plate and cathode contacts of the type 43 power tube (using the adapters provided with the "025") and set it at the 0-30 volt range.

INTERMEDIATE FREQUENCY: Turn the condenser gang all the way in (maximum capacity) and set the volume control of set at maximum (clockwise). Connect the 088 signal generator antenna lead to the grid of the 78 I.F. tube through a .00025 mf. condenser and the ground lead to the ground post of the set. Set the 088 signal generator attenuator for approximately ¼ scale reading on output meter. Adjust condensers 27 and 29 for maximum output meter reading.

Remove the 088 signal generator antenna lead from the grid of the 78 and connect it to the grid of the 6A7, adjust condensers 21 and 23 for maximum output meter reading.

WAVE TRAP: Connect the 088 signal generator antenna lead to the aerial post of set. Adjust condenser 1a for *minimum* output meter reading.

STANDARD and POLICE: Turn the condenser gang all the way out (minimum capacity) and place a .006" (six thousandth inch) gauge between the stator and rotor plates. Turn the condenser gang in until the correct spacing (.006") is had between the rotor and stator plates. The pointer on the front of the cabinet should be set at 1800 K.C. to coincide with this condenser gang setting.

With the condenser gang set in this manner, set the 088 signal generator at 1800 K.C. and adjust condensers 4a and 6a for maximum output meter reading.

Set the condenser gang and 088 signal generator at 600 K.C. and adjust condenser 8 for maximum output meter reading.

Care should be taken to adjust the 088 signal generator attenuator for approximately ¼ scale output meter reading for each stage before attempting to adjust compensators.

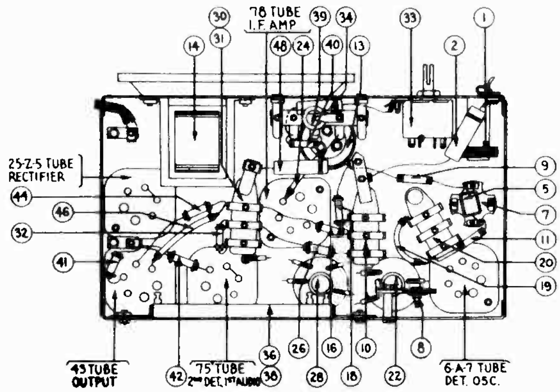


Fig. 3. Base View

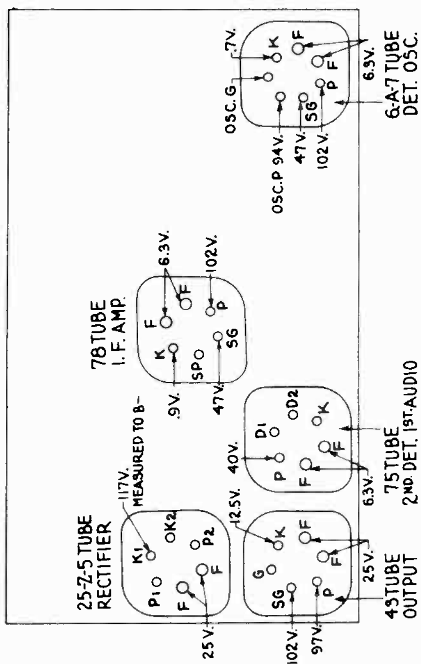


Fig. 2. Tube Sockets as Viewed from Bottom (Measured from Socket Terminal to B—)

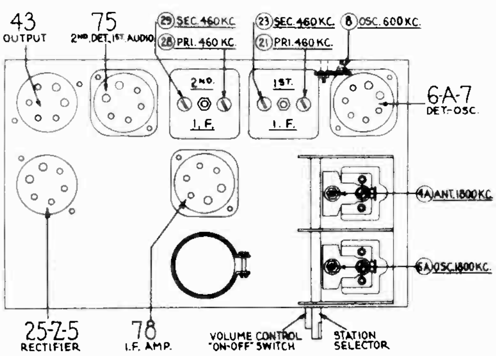


Fig. 4. Location of Compensators

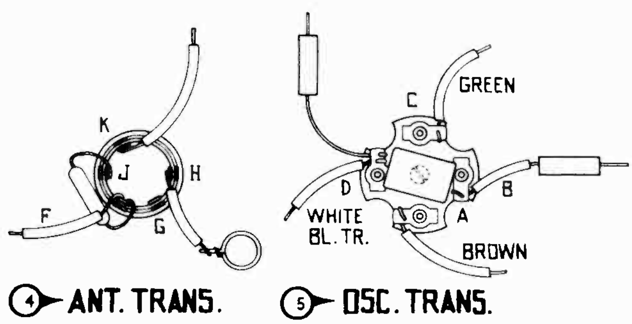


Fig. 1. Transformer Terminal Code

MODEL 602
Schematic
Parts List

PHILCO RADIO & TELEV. CORP.

PRICES ARE SUBJECT TO
CHANGE WITHOUT NOTICE

IF PEAK 460 KC.

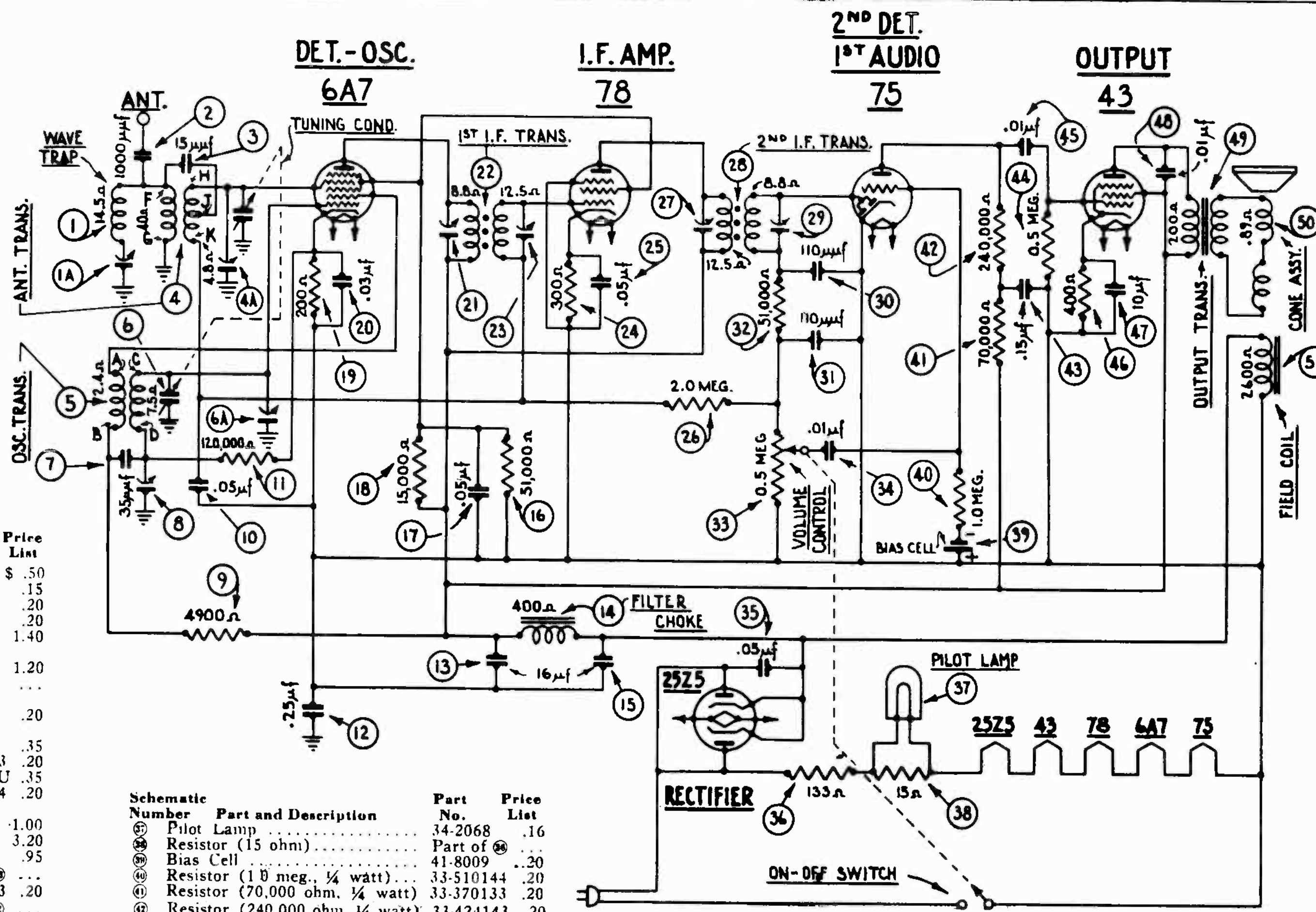


Fig. 5. Schematic Wiring Diagram

Replacement Parts for Model 602

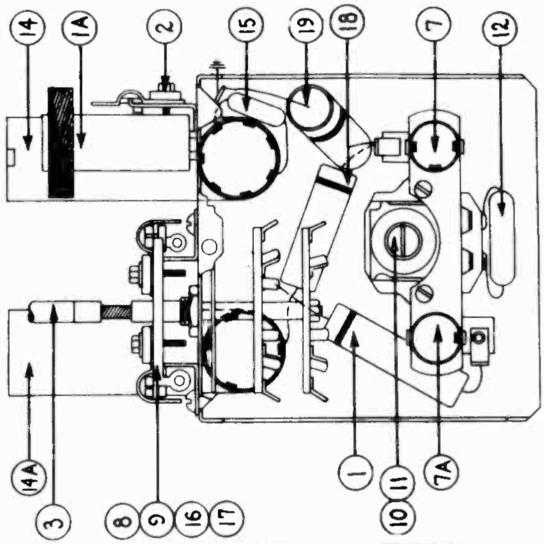
Schematic Number	Part and Description	Part No.	Price List
1	Wave Trap Coil	32-2007	$ .50
1a	Wave Trap Compensator	04000D	.15
2	Condenser (.001 Mf. Tubular)	30-4201	.20
3	Condenser (15 mmf. Mica)	30-1030	.20
4	Ant. Transformer	32-2003	1.40
4a	Compensater (Osc. 1800 KC.)		
5	Osc. Transformer	32-2041	1.20
6	Tuning Condenser	31-1794	...
6a	Compensater (Ant. 1800 KC.)		
7	Condenser (35 mmf. Mica)	30-1044	.20
8	Compensator (Osc. Series) (600 Kc.)	04000S	.35
9	Resistor (4900 ohm, ½ watt)	33-249333	.20
10	Condenser (.05 Mf. Bakelite)	3615-OSU	.35
11	Resistor (120,000, ½ watt)	33-412334	.20
12	Condenser (.25-.05-.05-.05-.15-.01 mf)	30-4410	1.00
13	Elec. Condenser (16-16-10 mf.)	30-2148	3.20
14	Filter Choke	32-7544	.95
15	Elec. Condenser (16 mf.)	Part of 13	...
16	Resistor (51,000 ohm, ¼ watt)	33-351143	.20
17	Condenser (.05 mf.)	Part of 12	...
18	Resistor (15,000 ohm, ¼ watt)	33-315133	.20
19	Resistor (200 ohm wirewound)	7217	.20
20	Condenser (.03 mf. Bakelite)	8318-OSU	.35
21	Compensator (1st I.F. Pri.)	Part of 22	...
22	1st I.F. Transformer	32-2005	1.50
23	Compensater (1st I.F. Sec.)	Part of 22	...
24	Resistor (300 ohm wirewound)	33-3010	.20
25	Condenser (.05 mf.)	Part of 12	...
26	Resistor (2.0 meg., ¼ watt)	33-520143	.20
27	Compensater (2nd I.F. Pri.)	Part of 28	...
28	2nd I.F. Transformer	32-2006	1.50
29	Compensator (2nd I.F. Sec.)	Part of 28	...
30	Condenser (.00011 mf. twin)	8035-ODU	.25
31	Condenser (.00011 mf.)	Part of 30	...
32	Resistor (51,000 ohm, ¼ watt)	33-351143	.20
33	Volume Control (0.5 meg.)	33-5145	1.45
34	Condenser (.01 mf. Tubular)	30-4145	.20
35	Condenser (.05 mf.)	Part of 12	...
36	B. C. Resistor (133-15 ohm)	33-3225	.55

Schematic Number	Part and Description	Part No.	Price List
37	Pilot Lamp	34-2068	.16
38	Resistor (15 ohm)	Part of 36	...
39	Bias Cell	41-8009	.20
40	Resistor (1.0 meg., ¼ watt)	33-510144	.20
41	Resistor (70,000 ohm, ¼ watt)	33-370133	.20
42	Resistor (240,000 ohm, ¼ watt)	33-424143	.20
43	Condenser (.15 mf.)	Part of 12	...
44	Resistor (490,000 ohm, ¼ watt)	33-449143	.20
45	Condenser (.01 mf.)	Part of 12	...
46	Resistor (400 ohm wirewound) (Flexible)	33-3122	.25
47	Elec. Condenser (10 mf.)	Part of 13	...
48	Condenser (.01 mf. Tubular)	30-4169	.20
49	Output Transformer	32-7566	...
50	Voice Coil Cone Assy	36-3029	.60
51	Field Coil Assy	36-3040	2.40
	Volume Control Mtg. Nut	W-684-A	1.25C
	B.C. Resistor Mtg. Screw	W-650-A	.40C
	B.C. Resistor Mtg. Nut	W-95-A	.30C
	Tube Shield Base	28-2725	.03
	Tube Shield Body	28-2726	.10
	Chassis Mtg. Screw	W-1587-A	.75C
	Chassis Mtg. Nut	W-124-A	.35C
	Chassis Mtg. Washer	W-410-A	.15C
	Chassis Mtg. Washer	W-291-A	40C

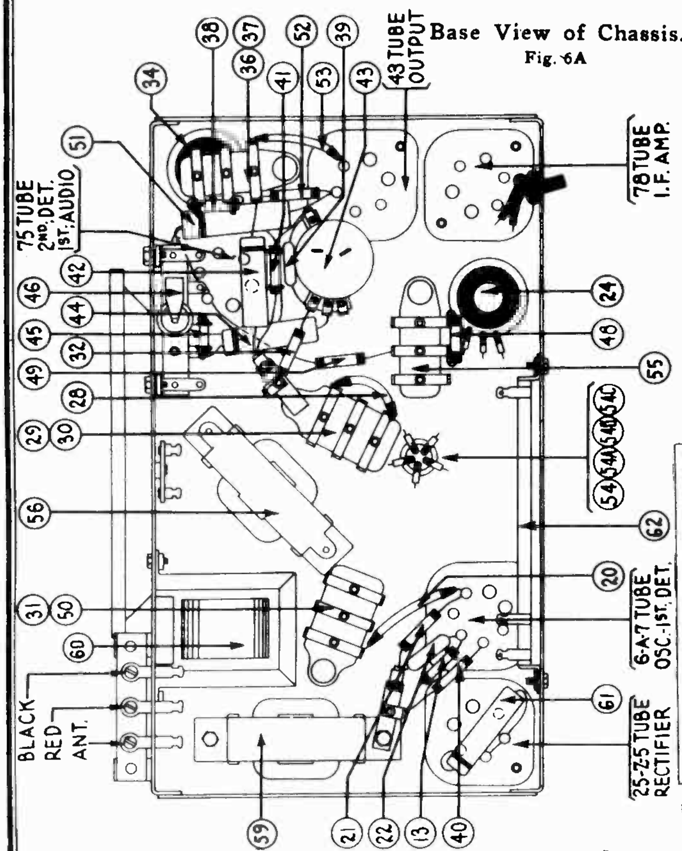
Part and Description	Part No.	Price List
Speaker Baffle	40-5840	...
Dial	27-5188	...
Pointer	27-8236	...
Shield Bottom Assy	29-3605	...
Shield Bottom Insulator	27-8182	.02
Tube Socket (6-prong)	27-6036	.11
Tube Socket (7-prong)	27-6037	.11
Knob (Volume, On-Off)	27-4273	.10
Knob (Station Selector)	27-4302	...
Elec. Condenser Support	6440	.05
Elec. Condenser Insulator	27-7836	.06
Pilot Lamp Bracket Assy	38-7513	.50
Ant. Coil Mfg. Bracket	28-3546	.03
Bias Cell Assy	38-7436	.15
Coupling (For Tuning Knob)	28-6426	.15

MODEL 604
Voltage, Socket
Chassis, Parts

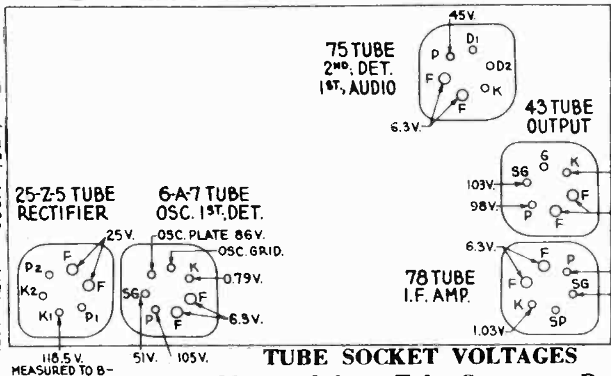
PHILCO RADIO & TELEV. CORP.



Rear View of R. F. Unit.
Fig. 6



Base View of Chassis.
Fig. 6A



TUBE SOCKET VOLTAGES
(Measured from Tube Contact to B—)
FIG. 3. Tubes as Viewed from Bottom

Schematic Number	Part and Description	Part No.	List Price
1	Condenser (.001 Mfd. Tubular)	30-4201	$0 20
1a	Wave Trap Coil	32-2093	.50
2	Wave Trap Compensator (460 K.C.)	31-6084	.15
3	Wave Band Switch Assy	38-7631	1.50
4	Pilot Lamp (S.W. 6.3 V.)	34-2068	.16
5	Pilot Lamp (Bdcst. 6.3 V.)	34-2068	.16
6	Tuning Condenser	31-1796	3.25
7	Oscillator Transformer (Bdcst.)	32-2047	.45
7a	Oscillator Transformer (S.W.)	32-2048	.45
8	Compensator (Osc. 1600 K.C.)	31-6085	.60
9	Compensator (Osc. 18.0 M.C.)	Part of 8	
10	Compensator (Osc. series, screw, 580 K.C.)	31-6027	.70
11	Compensator (Osc. series, nut, 6.0 M.C.)	Part of 10	
12	Condenser (.00325 Mfd. Mica)	30-1061	.45
13	Resistor (13,000 ohms, ¼ watt)	33-313133	.20
14	Antenna Transformer (Bdcst.)	32-2045	1.10
14a	Antenna Transformer (S.W.)	32-2046	.55
15	Condenser (15 Mmfd., Mica)	30-1030	.20
16	Compensator (Ant., 1400 K.C.)	Part of 6	
17	Compensator (Ant., 18.0 M.C.)	Part of 6	
18	Condenser (.05 Mfd., Tubular)	30-4020	.20
19	Condenser (.15 Mfd., Tubular)	30-4191	.25
20	Resistor (200 ohms, wire wound)	7217	.20
21	Resistor (120,000 ohms, ½ watt)	33-412334	.20
22	Condenser (250 Mmfd., Mica)	30-1032	.25
23	Compensator (1st I.F. Pri. 460 K.C.)	Part of 24	
24	1st I.F. Transformer	32-2049	1.50
25	Compensator (1st I.F. Sec. 460 K.C.)	Part of 24	
26, 27	Eliminated By Production Changes		
28	Resistor (300 ohms, wire wound)	33-3010	.20
29	Condenser (.1 Mfd. Twin Bakelite)	4989-ODU	.40
30	Condenser (.1 Mfd. Twin Bakelite)	Part of 29	
31	Condenser (.1 Mfd. Twin Bakelite)	4989-ODU	.40
32	Resistor (2.0 Meg., ¼ watt)	33-520143	.20
33	Compensator (2nd I.F. Pri., 460 K.C.)	Part of 34	
34	2nd I.F. Transformer	32-2059	3.00
35	Compensator (2nd I F. Sec. 460 K.C.)	Part of 34	
36	Condenser (110 Mmfd., Twin Bakelite)	8035-ODU	.25
37	Condenser (110 Mmfd.)	Part of 36	
38	Resistor (51,000 oms, ¼ watt)	33-351143	.20
39	Condenser (600 Mmfd., Mica)	30-1049	.25
40	Resistor (25,000 ohms, ½ watt)	33-325344	.20
41	Resistor (32,000 ohms, ½ watt)	33-332334	.20
42	Condenser (.01 Mfd. Tubular)	30-4124	.25
43	Volume Control Assy. (500,000 ohms)	38-7630	1.45
44	Condenser (.01 Mfd. Tubular)	30-4124	.25

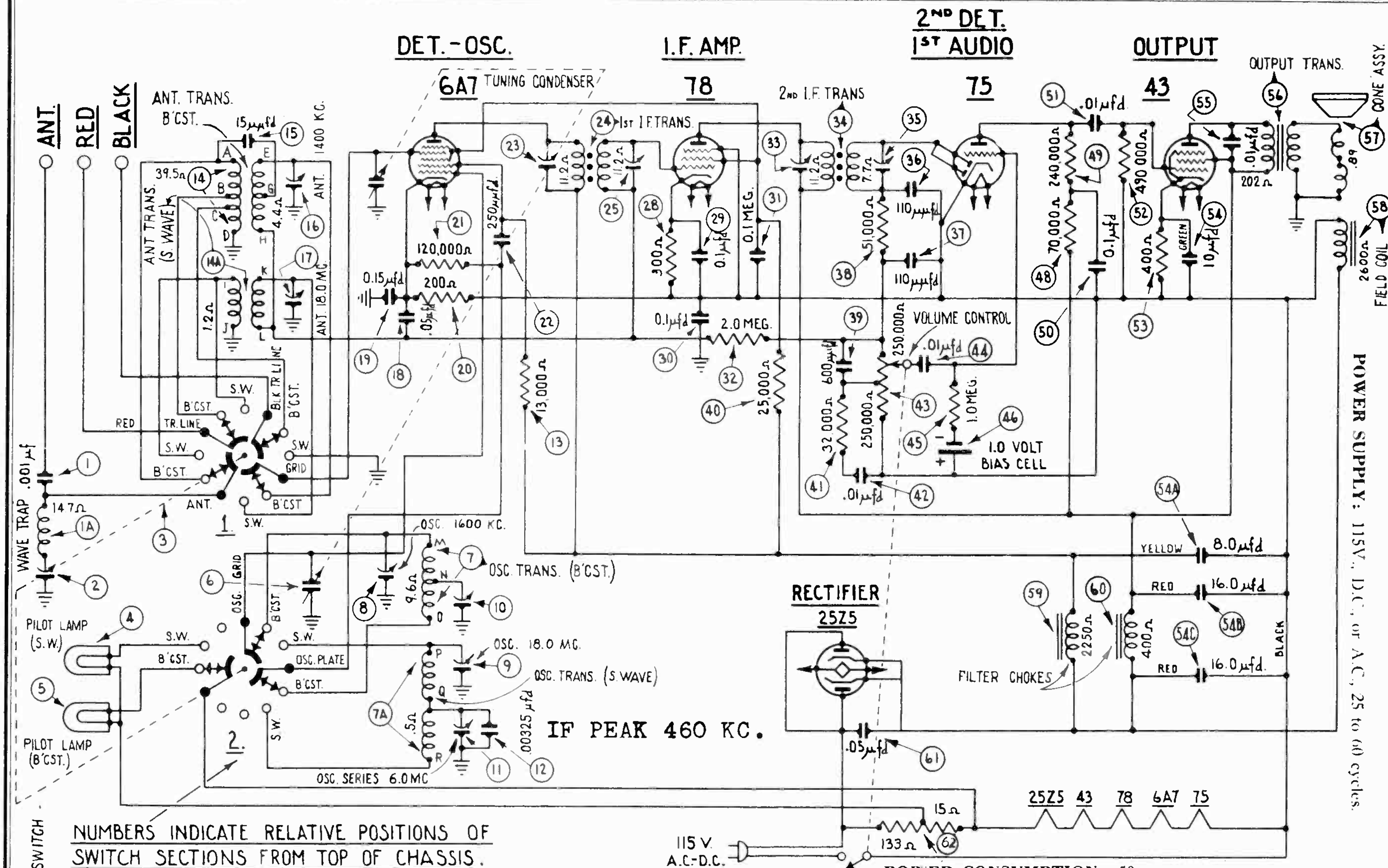
Schematic Number	Part and Description	Part No.	List Price
45	Resistor (1.0 Meg., ¼ watt)	33-510143	$0.20
46	Bias Cell (1.0 volt)	41-8009	.20
47	Eliminated By Production Changes		
48	Resistor (70,000 ohms, ¼ watt)	33-370133	.20
49	Resistor (240,000 ohms, ½ watt)	33-424344	.20
50	Condenser (0.1 Mfd.)	Part of 31	
51	Condenser (.01 Mfd. Tuoular)	30-4169	.20
52	Resistor (490,000 ohms, ½ watt)	33-449344	.20
53	Resistor (400 ohms, wire wound)	33-3122	.25
54	Elec. Condensers (10.0 Mfd., 8.0 Mfd., 16.0 Mfd., 16 Mfd.)	30-2154	3.25
55	Condenser (.01 Mfd. Bakelite)	3903-OSU	.25
56	Output Transformer	32-7568	.95
57	Cone Assy.	36-3029	.60
58	Field Coil Assy	36-3620	2.75
59	Filter Choke	32-7569	1.30
60	Filter Choke	32-7572	1.00
61	Condenser (.05 Mfd. Tubular)	30-4020	.20
62	B. C. Resistor (15—133 ohms)	33-3235	.55
	R. F. Coil Housing	29-3755	.15
	R. F. Coil Housing, Side	29-3770	.10
	R. F. Coil Housing, Back	29-3814	.05
	Bias Cell Panel Assy	38-7436	.15
	B. C. Resistor Mtg. Screw	W-650-A	.40C
	B. C. Resistor Mtg. Nut	W-95-A	.30C
	Tube Shield Body	28-2726	.10
	Tube Shield Base	28-2725	.03
	Socket (6-prong)	27-6036	.11
	Socket (7-prong)	27-6037	.11
	Volume Control Mtg. Nut	W-684-A	1.25C
	Volume Control Shaft	Part of 43	
	Wave Switch Shaft	Part of 3	
	Dial Assembly	31-1799	
	Shaft Centering Plate	29-3805	.10
	Pilot Lamo Bracket Assy	38-7616	.80
	Chassis Mtg. Screw	W-1587-A	.75C
	Chassis Mtg. Nut	W-124-A	.35C
	Chassis Mtg. Washer	W-151	.20C
	Chassis Mtg. Washer	W-1335	.80C
	Chassis Mtg. Washer	W-291	40C
	Knob (Tuning)	27-4206	.12
	Knob (Slow Speed Tuning)	27-4207	.10
	Knob (Wave Band Switch, Vol. Control)	27-4208	.10
	Shield Plate Assy	29-3769	.40
	Shield Plate Ins.	27-8214	1.15
	Baffle Assy	40-5918	

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 604
Schematic

PHILCO RADIO & TELEV. CORP.

POWER SUPPLY: 115V., D.C., or A.C., 25 to 60 cycles.



SPEAKER: B5.
POWER OUTPUT: ¾ Watt.

POWER CONSUMPTION: 50 watts.
PHILCO TUBES USED: 1 type 6A7, Det. Osc., 1 type 78 I.F. amplifier, 1 type 75, 2nd Det., 1st audio, 1 type 43 output, 1 type 25Z5 rectifier.
WAVE BANDS: Two: (1) Shortwave, (2) Standard and some Police.
FREQUENCY RANGE: Band (1) 6.0 to 18.0 M.C., Band (2) 530 to 1750 K.C.

FIG. 5. Schematic Diagram of Model 604

PHILCO RADIO & TELEV. CORP.

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 604 requires an accurate signal generator covering I.F., and standard-wave frequencies. The **PHILCO Model 088 All-Wave Signal Generator,** having a continuous range of from 100 to 20,000 K.C., is ideal for this purpose.

An output meter is also needed. **PHILCO Model 025 Circuit Tester** includes a high grade output meter.

Philco No. 3164 fibre wrench and No. 27-7059 fibre-handled screwdriver complete the equipment needed for making these adjustments. The locations of the various compensating condensers are shown in Fig. 4. Connect the output meter to the plate and cathode contacts of the type 43 power tube (using the adapters provided with the "025") and set it at the 0-30 volt range.

INTERMEDIATE FREQUENCY: Turn the condenser gang all the way in (maximum capacity) and set the volume control of Receiver at maximum (clockwise). Connect the 088 signal generator antenna lead to the grid of the 78 I.F. tube through a .00025 mf. condenser and the ground lead to the chassis of the receiver. Set the 088 signal generator attenuator for approximately ¼ scale reading on output meter. Adjust condensers 33 and 35 for maximum output meter reading.

Remove the 088 signal generator antenna lead from the grid of the 78 and connect it to the grid of the 6A7, adjust condensers 23 and 25 for maximum output meter reading.

WAVE TRAP: Connect the 088 signal generator antenna lead to the aerial post of receiver. Adjust condenser 2 for *minimum* output meter reading.

SHORT WAVE: In adjusting the short wave or high frequency band, the det. compensator will have a tendency to "pull" or **change** the frequency of the oscillator. By shunting a padding or variable condenser (about .00025 Mf.) across the oscillator section of the gang (bottom section) and tuning it so that the second harmonic, instead of the fundamental, beats with the incoming signal, this "pull" can be minimized. The procedure for tuning this band is as follows:

Set the dial of the receiver at 18 megacycles (top scale) and the 088 dial at the same frequency. Turn wave band switch to position 1 (extreme right). Connect the shunt condenser to the oscillator section of the gang and tune it so that the second harmonic of the oscillator beats with the 18 M.C. signal from the 088. Next tune condenser 17 (antenna) for maximum reading of the output meter. Disconnect shunt condenser and tune condenser 9 (osc.) for correct dial calibration. The receiver, oscillator frequency, when correctly adjusted, will be higher than that of the incoming signal. In order to check this it should be possible to pick up the 18 M.C. 088 oscillator signal as an image signal by increasing the 088 output and tuning the receiver to approximately 17.1 M.C.

For the low frequency adjustment of this band, turn the dial to 6.0 M.C., set the signal generator at 6.0 M.C. and adjust condenser 11 (nut) for maximum output meter reading. Readjust condenser 9 at 18.0 M.C.

STANDARD AND POLICE: Turn wave band switch to position 2 (extreme left), set signal generator at 800 K.C. and dial of receiver at 1600 K.C. (using second harmonic of Signal Generator). Now adjust the oscillator and antenna "standard" condensers. These are 8 and 16 respectively. Turn dial of receiver and Signal Generator to 1400 K.C., and readjust condenser 16.

Turn the dial of receiver to 58, set signal generator at 580 K.C. and adjust condenser 10, (oscillator standard series), (screw) for maximum output meter reading.

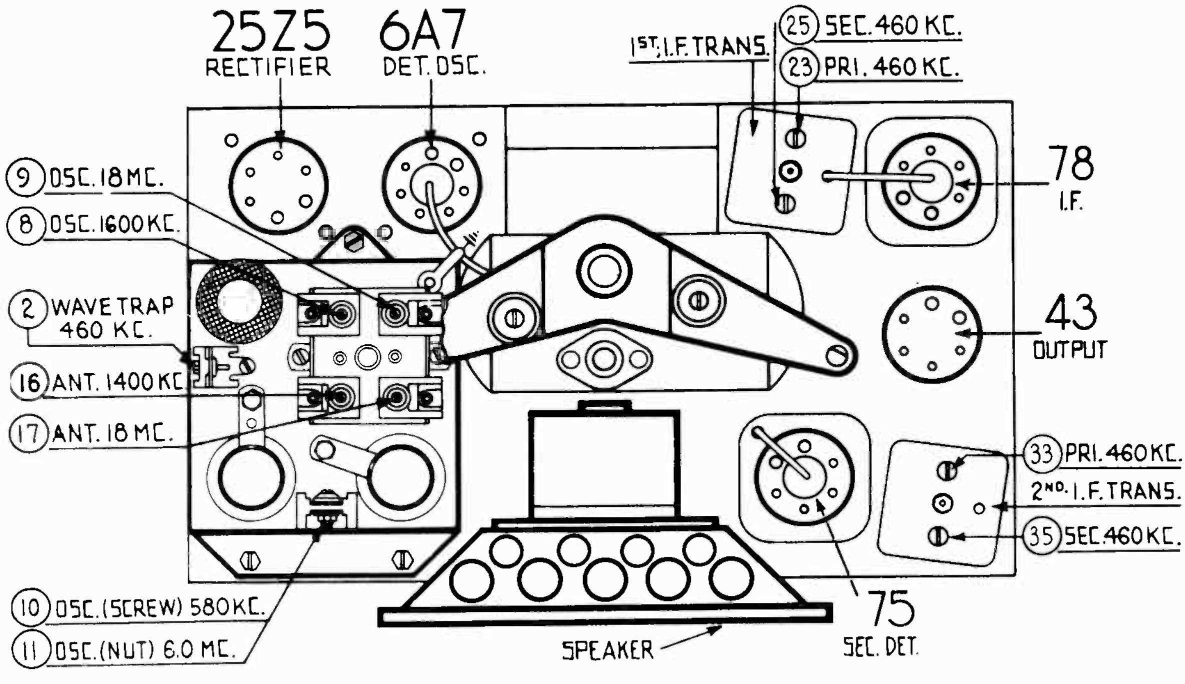


FIG. 4. Location of Compensating Condensers

The letters appearing on the terminals of the transformers below, correspond to those shown on the schematic diagram, Fig. 5.

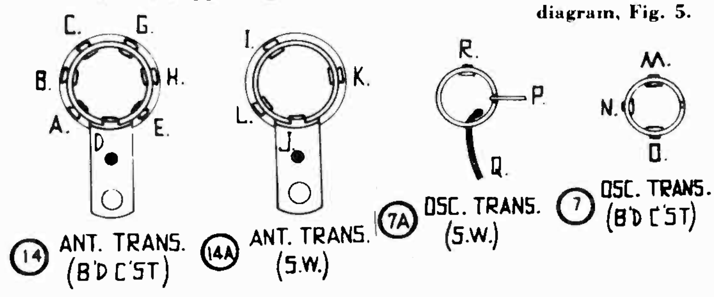


FIG. 1. R.F. Transformers

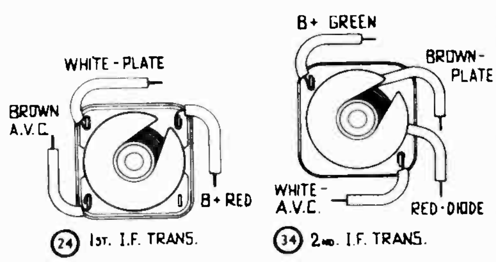
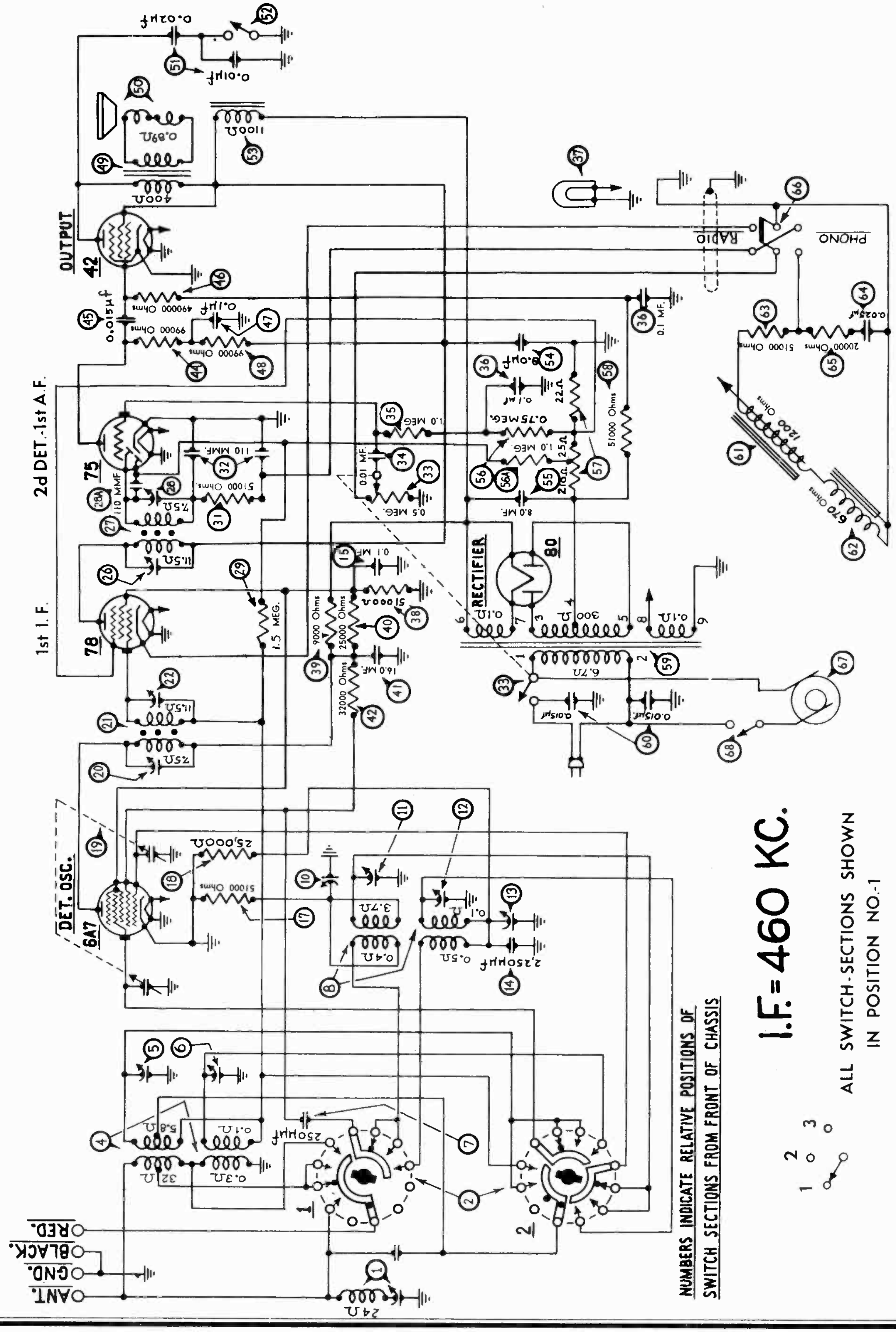


FIG. 2. I.F. Transformers

PHILCO RADIO & TELEV. CORP.

MODELS 610,610PF
2nd Type
Schematic



MODELS 610, 610PF
Changes, Parts

PHILCO RADIO & TELEV. CORP.

Later 1935 Production Runs

This sheet supplements the regular bulletin No. 217 on the Philco 610 and also covers the Philco Radio-Phonograph 610PF. All circuit and part number changes up to date have been included.

Beginning with run No. 9 the grid bias arrangement for the 6A7 1st detector and 78 I.F. was changed. A fixed bias from the B.C. resistor is fed through the AVC circuit to the grids of these tubes.

Beginning with run No. 11 the oscillator circuit was changed to series feed to eliminate possibilities of failure at 6.0 mc.

Beginning with run No. 14 the dial mask assembly was changed to the glowing arrow wave band indicator type.

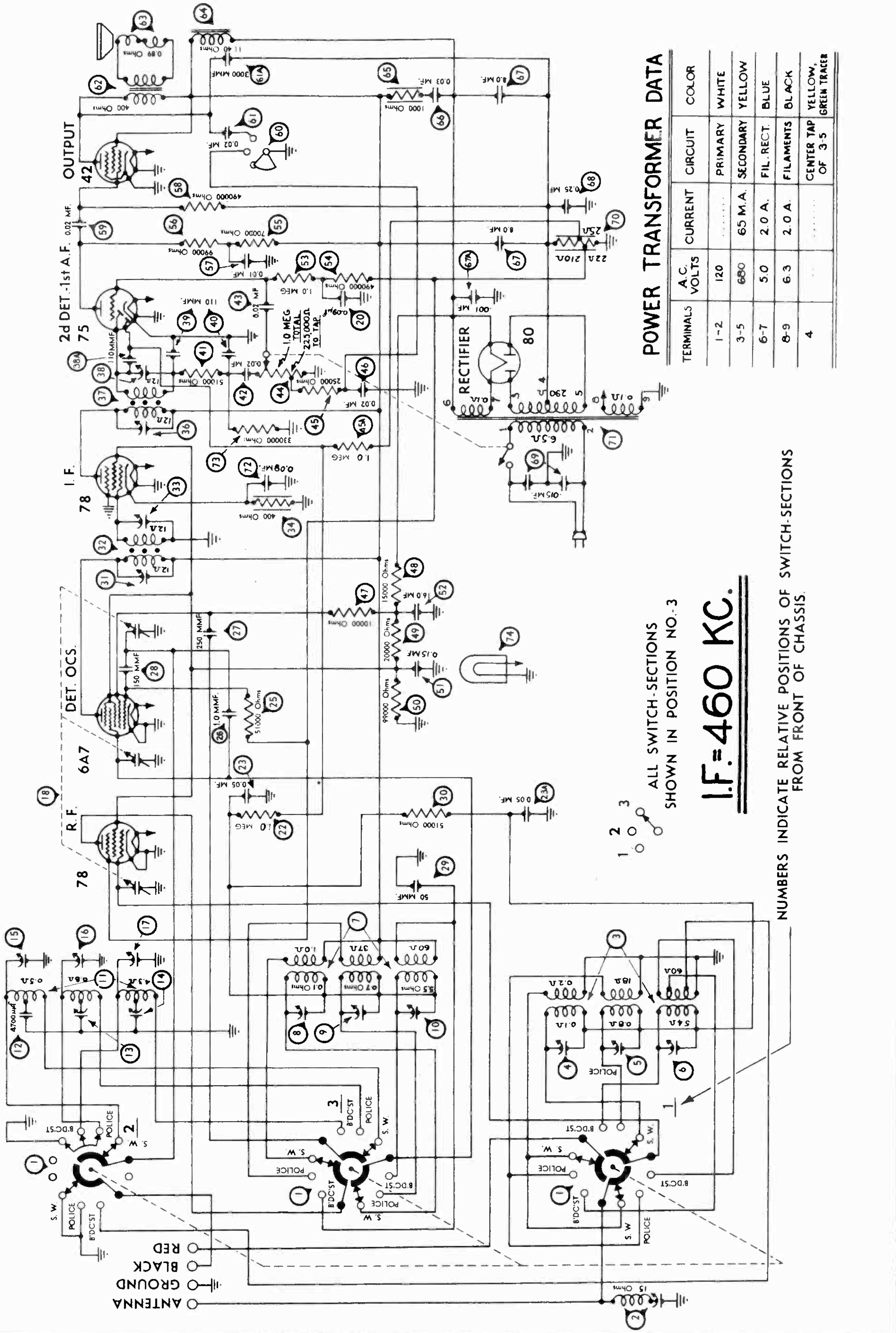
PARTS LIST

No.	Description	Part No.	List Price
(1)	Wavetrap	38-6777	$1.00
(2)	Waveband Switch	42-1152	1.75
(4)	Antenna Transformer	32-1669	1.15
(5)	Compensating Condenser (Antenna, Standard)	Part of 31-6047	.50
(6)	Compensating Condenser (Antenna, S.W.)	Part of 31-6047	.50
(7)	Condenser (.00025 Mfd. Mica)	30-1032	.20
(8)	Oscillator Transformer	32-1973	1.00
(10)	Compensating Condenser (Osc. L.F. Standard) (Screw)	Part of 31-6027	.70
(11)	Compensating Condenser (Osc. H.F., Standard)	Part of 31-6047	.50
(12)	Compensating Condenser (Osc. S.W., H.F. End)	Part of 31-6047	.50
(13)	Compensating Condenser (Osc. S.W., L.F. End) (Nut)	Part of 31-6027	.70
(14)	Condenser (.00225 Mfd. Mica)	30-1055	.40
(17)	Resistor (50000 ohms) (Green, Brown, Orange)	6098	.20
(18)	Resistor (25000 ohms) (Red, Green, Orange)	33-1013	.20
(19)	Tuning Condenser Assembly	31-1740	....
(20)	Compensating Condenser (1st I.F. Primary)	Part of (21)	....
(21)	1st I.F. Transformer	32-1671	1.35
(22)	Compensating Condenser (1st I.F. Secondary)	Part of (21)	....
(25)	Condenser (.05 Mfd. Tubular)	30-4020	.35
(26)	Compensating Condenser (2nd I.F. Primary)	Part of (27)	....
(27)	2nd I.F. Transformer	32-1672	1.35
(28)	Compensating Condenser (2nd I.F. Secondary)	Part of (27)	....
(29)	Resistor (2 Megs.) (Red, Black, Green)	33-1188	.20
(31)	Resistor (50000 ohms) (Green, Brown, Orange)	6098	.20
(32)	Condenser (.00011 Twin Bakelite Block)	8035-DG	.25
(33)	Volume Control & On-Off Switch	33-5106	1.45
(34)	Condenser (.01 Mfd. Bakelite Block)	3903-SU	.25
(35)	Resistor (1 Meg.) (Brown, Black, Green)	33-1096	.20
(36)	Condenser (.1 Mfd. Twin Bakelite Block)	4989-DG	.40
(37)	Pilot Lamp	34-2039	.09
(38)	Resistor (50000 ohms) (Green, Brown, Orange)	4237	.20
(39)	Resistor (9000 ohms) (Black, White, Orange)	33-1215	.20
(40)	Resistor (25000 ohms) (Red, Green, Orange)	3656	.20
(41)	Condenser (Electrolytic—16 Mfd.)	30-2118	1.65
(42)	Resistor (32000 ohms) (Orange, Red, Orange)	5279	.20
(44)	Resistor (.1 Meg.) (Brown, Black, Green)	6099	.20
(45)	Condenser (.015 Mfd. Bakelite Block)	3793-SU	.35
(46)	Resistor (.5 Meg.) (Yellow, White, Yellow)	6097	.20
(47)	Condenser (.1 Mfd. Tubular)	30-4170	$0.35
(48)	Resistor (.1 Meg.) (White, White, Yellow)	6099	.20
(49)	Output Transformer	32-7019	1.25
(50)	Cone & Voice Coil Assembly (P-27 Speaker)	02861	.65
(51)	Condensers (in Tone Control)	Part of (52)	....
(52)	Tone Control	30-4318	.50
(53)	Field Coil & Pot Assembly (P-27 Speaker)	36-3341	2.75
(54)	Condenser (Electrolytic—8 Mfd.)	30-2025	1.35
(55)	Resistor (750000 ohms) (Violet, Green, Yellow) (½ Watt)	33-1203	.20
(56)	Condenser (Electrolytic) (8 Mfd.)	30-2025	1.35
(56)a	Resistor (1. Megohm) (Brown, Black, Green)	33-1096	.20
(57)	Resistor (B.C. Wire-wound, 22 ohms, 25 ohms, 210 ohms)	33-3222	.20
(58)	Resistor (50000 ohms) (Green, Brown, Orange)	6098	.20
(59)	Power Transformer (110 volts, 60 cycles)	32-7381	4.00
	(110 volts, 25 cycles)	32-7382	6.25
	(230 volts, 50 cycles)	32-7383	4.50
(60)	Condenser (.015 Mfd. Twin Bakelite Block)	3793-DG	.40
(61)	Pickup Head	35-2014	7.25
(62)	Hum Bucking Coil	32-1940	1.10
(63)	Resistor (51,000 ohm)	6098	.20
(64)	Resistor (20,000 ohm)	33-1178	.20
(65)	Condenser (.025 mf.)	7653-SU	.35
(66)	Phono. Radio Switch & Cable Assy	35-3014	1.30
(67)	Phono. Radio Motor (115 V., 60 cycles)	35-1116	18.00
(68)	Phono. Radio Motor Switch	4535	.75
	Glowing Arrow Mask	27-5162	.20
	Glowing Arrow Screen	27-5161	.10
	Mask Arm	29-3274	....
	Link	29-3285	.04
	Coupling	29-3586	.10
	Screen Bracket Assy	31-1745	....
	Dial Mask	27-5137	.15
	Dial Assembly	31-1539	.30
	Tube Shield Body	28-2726	.10
	Tube Shield Base	28-2725	.03
	Four Prong Socket	27-6034	.10
	Six Prong Socket	27-6036	.11
	Seven Prong Socket	27-6037	.11
	Knob (Station Selector)	27-4206	.12
	Knob (Fine Tuning)	27-4207	.10
	Knob (Volume, Waveband and Tone Control)	27-4208	.10
	Bezel	28-2928	.35
	Bezel Glass	27-7887	.60

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 620
Schematic

PHILCO RADIO & TELEV. CORP.



POWER TRANSFORMER DATA

TERMINALS	A.C. VOLTS	CURRENT	CIRCUIT	COLOR
1-2	120	....	PRIMARY	WHITE
3-5	680	65 M.A.	SECONDARY	YELLOW
6-7	5.0	2.0 A.	FIL. RECT.	BLUE
8-9	6.3	2.0 A.	FILAMENTS	BLACK
4	......	......	CENTER TAP OF 3-5	YELLOW, GREEN TRACER

MODEL 620
Changes, Parts

PHILCO RADIO & TELEV. CORP.

Later 1935 Production Runs

This sheet supplements the regular bulletin No. 218 on the Philco Model 620. All circuit and part number changes up to date have been included.

Beginning with run No. 7 the grid bias arrangement for the 78 R.F. and 6A7 1st detector was changed. A fixed bias from the B.C. resistor is fed through the AVC circuit to the grids of these tubes. The oscillator circuit was changed to series feed to eliminate possibilities of failure at 6.0 mc.

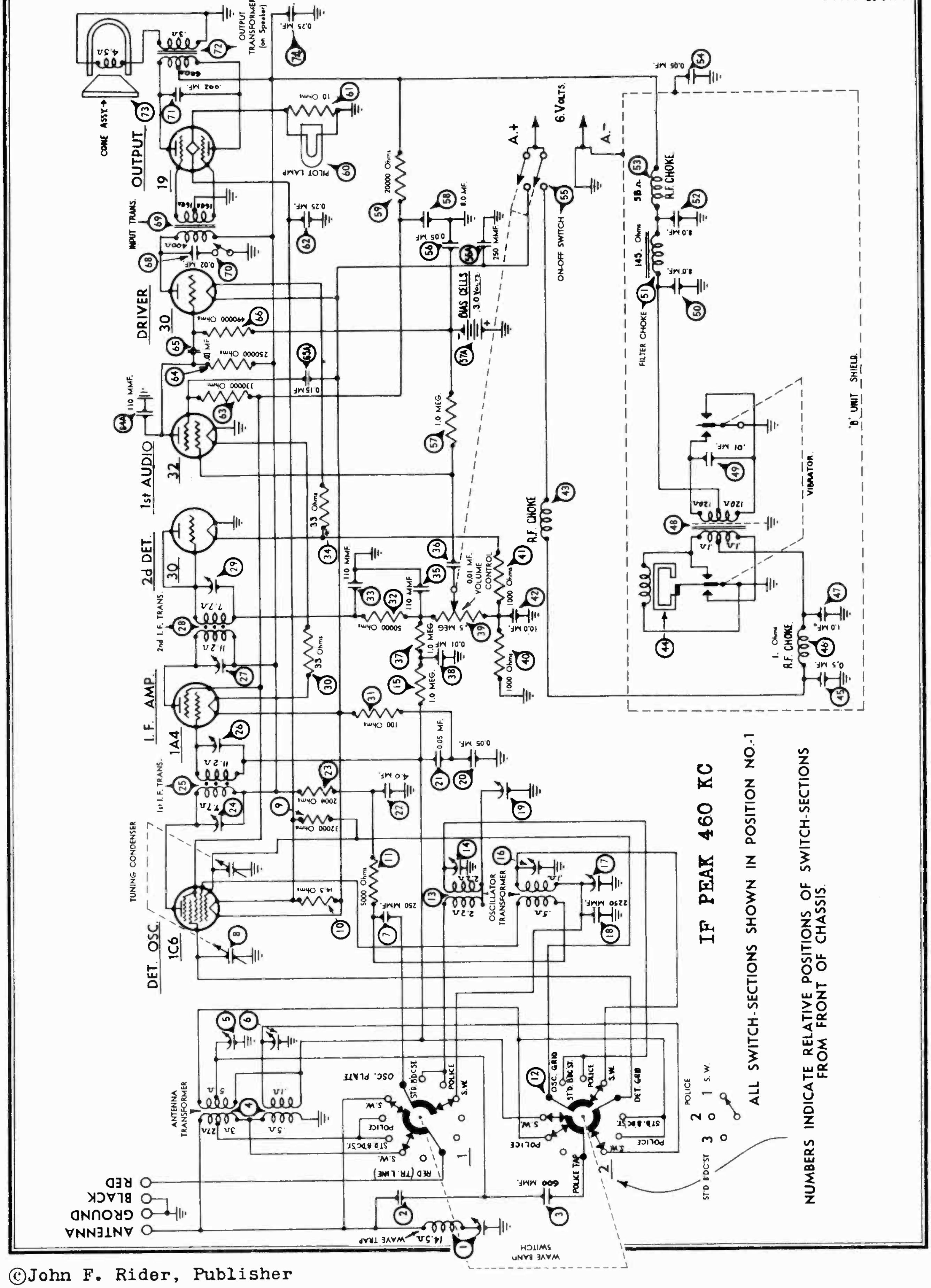
PARTS LIST

	Description	Part No.	Price List
1	Waveband Switch	42-1152	$1.75
2	Wavetrap	38-6850	1.10
3	Antenna Transformer	32-1699	3.00
4	Compensating Condenser (Ant. S.W.)	Part of ③	....
5	Compensating Condenser (Ant. Police)	Part of ③	....
6	Compensating Condenser (Ant. Standard)	Part of ③	....
7	R. F. Transformer	32-1636	3.25
8	Compensating Condenser (R.F. Short-Wave)	Part of ⑦	....
9	Compensating Condenser (R.F. Police)	Part of ⑦	....
10	Compensating Condenser (R.F. Standard)	Part of ⑦	....
11	Oscillator Transformer	32-1637	2.50
12	Condenser (.0047 Mfd. Mica)	30-1052	.60
13	Compensating Condenser (Osc. Police)	Part of ⑪	....
14	Compensating Condenser (Osc. H.F. Standard)	Part of ⑪	....
15	Compensating Condenser (Osc. S.W.)	Part of ⑪	....
16	Compensating Condenser (Osc. L.F. Police)	Part of 31-6027	.70
17	Compensating Condenser (Osc. L.F. Standard)	Part of 31-6027	
18	Tuning Condenser Assembly	31-1741	....
20	Condenser (.09 Mfd. Twin Bakelite Block)	4989-DG	.40
22	Resistor (1. Meg.) (Red, Black, Green)	33-1096	.20
23	Condenser (.05 Mfd. Tubular)	30-4020	.35
23a	Condenser (.05 Mfd. Tubular)	30-4020	.35
25	Resistor (50000 ohms) (Green, Brown, Orange)	6098	.20
26	Condenser (1 Mmfd.)	Part of ⑱	....
27	Condenser (.00025 Mfd. Mica)	30-1032	.35
28	Condenser (.00015 Mfd. Mica)	30-1033	.35
29	Condenser (.00005 Mfd. Mica)	30-1029	.35
30	Resistor (51,000 ohms) (Green, Brown, Orange)	6098	.20
31	Compensating Condenser (1st I.F. Primary)	Part of ㉜	....
32	1st I.F. Transformer	32-1646	2.25
33	Compensating Condenser (1st I.F. Secondary)	Part of ㉜	....
34	Resistor (400 ohms Flexible) (Yellow, Black, Brown)	33-3016	.20
36	Compensating Condenser (2nd I.F. Pri.)	Part of ㊲	....
37	2nd I.F. Transformer	32-1647	2.25
38	Compensating Condenser (2nd I.F. Sec.)	Part of ㊲	....
38a	Condenser (.00011 Mfd. Mica)	30-1031	.35
39	Condenser (.00011 Mfd. (Twin Bakelite)	8035-DG	.25
40	Condenser (.00011 Mfd. Mica)	Part of ㊴	....
41	Resistor (50000 ohms) (Green, Brown, Orange)	6098	.20
42	Condenser (.02 Mfd. Tubular)	30-4215	.30
43	Condenser (.02 Mfd. Tubular)	30-4215	.30
44	Volume Control and On-Off Switch	33-5105	1.45
45	Resistor (25000 ohms) (Red, Green, Orange)	33-1013	.20
45a	Resistor (1. Meg.) (Brown, Black, Green)	33-1096	.20
46	Condenser (.02 Mfd. Tubular)	30-4215	.30
47	Resistor (10000 ohms) (Brown, Black, Orange)	4412	.20
48	Resistor (15000 ohms) (Brown, Green, Orange)	5718	.35
49	Resistor (20000 ohms) (Red, Black, Orange)	6649	.20
50	Resistor (99000 ohms) (White, White, Yellow)	6099	$0.20
51	Condenser (.15 Mfd. Tubular)	30-4191	.35
52	Condenser (16 Mfd. Electrolytic)	30-2118	1.65
53	Resistor (1 Meg.) (Brown, Black, Green)	33-1096	.20
54	Resistor (.5 Meg.) (Yellow, White, Yellow)	6097	.20
55	Resistor (70000 ohms) (Violet, Black, Orange)	33-1115	.20
56	Resistor (99000 ohms) (White, White, Yellow)	6099	.20
57	Condenser (.09 Mf.)	4989-SG	.35
58	Resistor (.5 meg.) (Yellow, White, Yellow)	6097	.20
59	Condenser (.03 Mfd. Bakelite)	8318-SU	.35
60	Tone Control	30-4316	.75
61	Condenser in Tone Control	Part of ㊵	....
61a	Condenser (.003 Mfd. Tubular)	30-4042	.25
62	Output Transformer	32-7019	1.25
63	Voice Coil & Cone Assembly (S-14 Speaker)	36-3157	.80
64	Field Coil & Pot Assembly (S-14 Speaker)	36-3495	2.75
65	Resistor (1000 ohms) (Brown, Black, Red)	33-1028	.20
66	Condenser (.3 Mfd. Bakelite Block)	6287-DU	.40
67	Condenser (8 Mfd. & 8 Mfd. Electrolytic)	30-2079	2.40
67a	Condenser (.001 Mf.)	30-4310	.25
68	Condenser (.25 Mfd. Tubular)	30-4146	.40
69	Condenser (.015 Mfd. Bakelite Block)	3793-DG	.40
70	Resistor (BC Wirewound, 22 ohms, 25 ohms, 210 ohms)	33-3222	.20
71	Power Transformer (115 Volts 60 Cycles)	32-7381	4.00
	(115 Volts 25 Cycles)	32-7382	6.25
	(230 Volts 50 Cycles)	33-7383	4.50
72	Condenser (.1 Mfd. Tubular)	Part of ㊾	....
73	Resistor (330,000 ohms) (Orange, Orange, Yellow)	33-1200	.20
74	Pilot Lamp	34-2064	.09
	Dial Scale	27-5098	.25
	Dial Hub and Set Screw	31-1550	.15
	Dial Front Spring	28-2837	.10
	Knob (Station Selector)	27-4206	.12
	Knob (Fine Tuning)	27-4207	.10
	Knob (Waveband)	27-4219	.10
	Knob (Tone, Volume)	27-4208	.10
	Tube Shield	28-2726	.10
	Tube Shield Base	28-2725	.03
	Tube Socket (4 Prong)	27-6034	.10
	Tube Socket (6 Prong)	27-6036	.11
	Tube Socket (7 Prong)	27-6037	.11
	Speaker Plug Socket	27-6033	.08
	Chassis Mtg. Screw	W-1495	1.50perC.
	Chassis Mtg. Washer (Rubber)	27-4198	.01
	Electric Cord and Plug	L-943-A	.60
	Bezel	28-2928	.35
	Bezel Glass	27-7887	.60

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

PHILCO RADIO & TELEV. CORP.

MODEL 624
Schematic



MODEL 624
Voltage, Socket
Trimmers, Alignment

PHILCO RADIO & TELEV. CORP.

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 624 requires an accurate signal generator covering I.F., standard wave, police and short-wave frequencies. The **PHILCO Model 088 All-Wave Signal Generator,** having a continuous range of from 100 to 20,000 K.C., is ideal for this purpose.

An output meter is also needed. **PHILCO Model 025 Circuit Tester** includes a high grade output meter.

Philco No. 3164 fibre wrench and No. 27-7059 fibre-handled screwdriver complete the equipment needed for making these adjustments. The locations of the various compensating condensers are shown in Fig. 2. Connect the output meter to the plate and cathode contacts of the type 30 driver tube (using the adapters provided with the "025") and set it at the 0-30 volt range.

Set the signal generator at 460 K.C. with attenuator set at minimum, and attach its antenna lead to the grid cap of the 1A4 I.F. amplifier tube. Connect ground lead to ground terminal on set or some part of chassis. Set the dial at 55 and turn the waveband switch to position 3 (extreme left). Adjust the volume control of set to almost maximum (just before oscillator hiss becomes noticeable), and the 088 attenuator so that about one-fourth (¼) scale reading is had on the output meter. With a fibre screw-driver adjust condensers ㉗ and ㉙ (2nd I.F.) for maximum reading on output meter. Turn attenuator of signal generator to minimum and remove its antenna lead from the grid of the 1A4 I.F. tube. Place it on the grid of the 1C6, removing grid lead. Adjust 088 attenuator as before, then proceed to adjust condensers ㉔ and ㉖ (1st I.F.) for maximum output meter reading. Then remove the 088 oscillator lead and replace grid connection. Care should be taken to keep the output meter reading during adjustments at about one-fourth scale reading. This should be done by using the 088 attenuator control.

Connect the Signal Generator antenna and ground leads to the antenna and ground posts of the set. With the signal generator operating at 460 K.C. and the set controls adjusted as before for I.F. alignment, adjust wavetrap ① until a minimum reading is obtained on the output meter.

SHORT WAVE

In adjusting the short wave or high frequency band, the R.F. compensator will have a tendency to "pull" or **change** the frequency of the oscillator. By shunting a compensating or variable condenser (about .00025 Mf.) across the oscillator section of the gang (front section) and tuning it so that the second harmonic, instead of the fundamental, beats with the incoming signal, this "pull" can be minimized. The procedure for tuning this band is as follows:

Set the dial of the receiver at 18 megacycles (top scale) and the 088 dial at the same frequency. Turn wave band switch to position 1 (extreme right). Connect the shunt condenser to the oscillator section of the gang and tune it so that the second harmonic of the oscillator beats with the 18 M.C. signal from the 088. Next tune condenser ⑥ (antenna) for maximum reading of the output meter. Disconnect shunt condenser and tune condenser ⑯ (osc.) for correct dial calibration. The oscillator frequency, when correctly set, will be higher than that of the incoming signal and the image frequency lower. In order to check this it should be possible to tune the image at approximately 17.1 M.C. by increasing the input from the 088 oscillator.

For the low frequency adjustment of this band, turn the dial to 6.0 M.C., set the signal generator at 6.0 M.C. and adjust condenser ⑰ (nut) for maximum output meter reading. Readjust condenser ⑯ at 18.0 M.C.

STANDARD WAVE: Turn waveband switch to position 3 (standard broadcast), set signal generator at 1500 and dial of set at 150. Now adjust the oscillator and antenna "Standard" condensers for maximum output meter reading. These are ⑭ and ⑤, respectively.

Now turn the dial to 60, set signal generator at 600 and adjust condenser ⑲ (oscillator standard and police series) (screw) for maximum output meter reading.

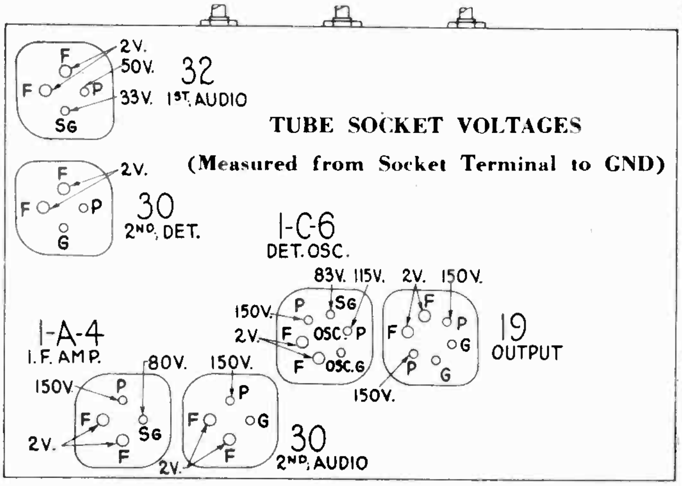


Fig. 1. Bottom View of Sockets, Showing Voltages

The voltages at the points indicated by the arrows above were obtained with a Philco type 025 Circuit Tester which contains a high resistance (1000 ohms per volt) voltmeter. Volume control at minimum, waveband switch at standard broadcast. KR-12 speaker.

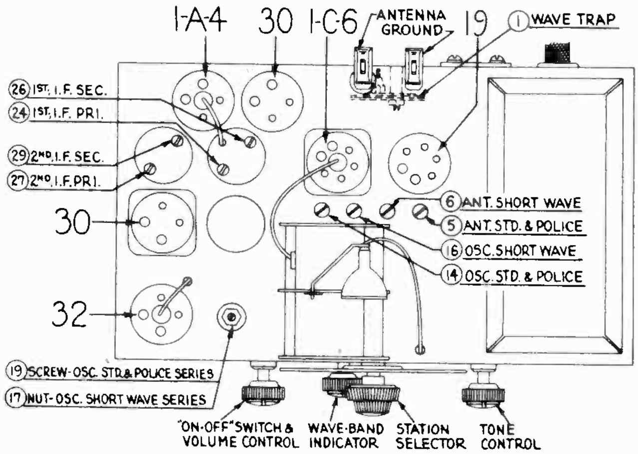


Fig. 2. Location of Compensating Condensers

Description

Philco Model 624 is a new type receiver designed to operate entirely from a 6-volt storage battery. Through a specially designed vibrator and power supply, the 6 volts from the storage battery is stepped up to the necessary "B" voltage for the plate and screen grid of the tubes. The correct filament voltages are obtained by using a series resistor arrangement.

TYPE CIRCUIT: Superheterodyne, with Class B output; built in connections for Philco all-wave aerial; aerial selector built into and operated by wave-band switch.

POWER SUPPLY: Battery operated; Model 624 uses a 6-volt 125-ampere-hour storage battery (Philco 110-R).

WAVE BANDS: Three—(1) Short Wave; (2) Police; (3) Standard.

COVERAGE OF EACH BAND: Band 1, 5700–18,000 K.C. (5.7 to 18.0 megacycles); Band 2, 2300–2500 K.C. (2.3–2.5 megacycles); Band 3, 530–1720 K.C.

TUNING DRIVE: Dual gear drive, ball bearing. 50 to 1 ratio for slow-speed tuning, 6 to 1 on main shaft.

TONE CONTROL: 2-Position.

INTERMEDIATE FREQUENCY: 460 K.C.

CURRENT CONSUMPTION: A battery, 1.5A.

SPEAKER: KR-12, Permanent Magnet Dynamic.

MODEL 624
Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

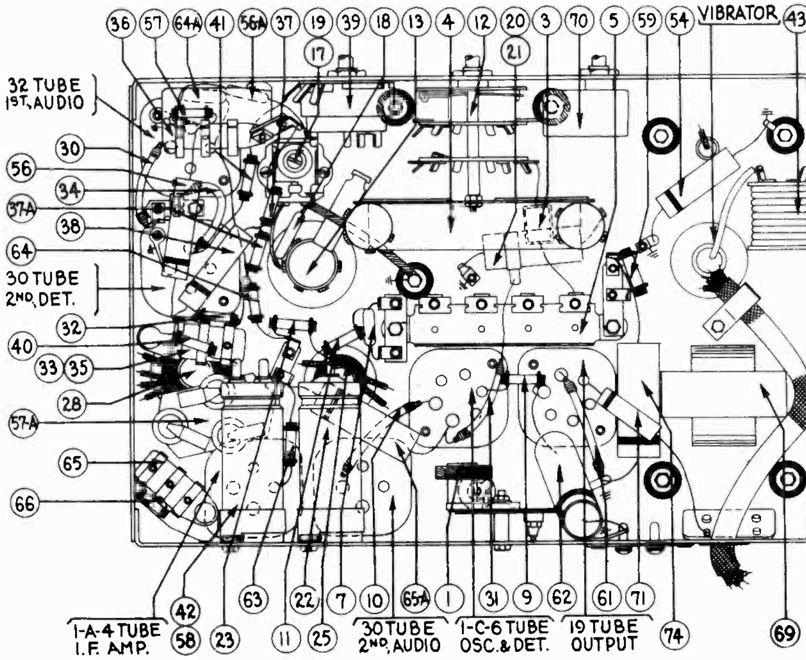


Fig. 4. Base View

Replacement Parts—Model 624

Schematic Number	Part and Description	Part No.	List Price
1	Wave Trap	38-6850	$1.10
2	Condenser (Leads twisted together)	......	....
3	Condenser (.0006 Mf. mica)	30-1049	.25
4	Aerial Transformer	32-1669	1.15
5	Compensator (Antenna Standard & Police)	31-6047	.50
6	Compensator (Antenna Short Wave)	Part of 5	....
7	Condenser (.00025 Mf. mica)	30-1032	.25
8	Tuning Condenser	31-1740	....
9	Resistor (32,000 ohms)	33-1208	.20
10	Resistor (14.3 ohms wire wound)	33-3232	.20
11	Resistor (5,000 ohms)	6096	.20
12	Wave Band Switch	42-1151	1.20
13	Oscillator Transformer	32-1973	1.00
14	Compensator (Oscillator Standard & Police)	Part of 5	....
15	Resistor (40,000 ohms, ¼ watt)	33-1180	.20
16	Compensator (Oscillator Short Wave)	Part of 5	....
17	Compensator (Nut) (Osc. Short Wave Series)	31-6027	.70
18	Condenser (2250 Mmf. mica)	30-1055	.40
19	Compensator (Screw) (Osc. Standard Series)	Part of 17	....
20	Condenser (.05 Mf. twin tubular)	30-4394	.35
21	Condenser (.05 Mf.)	Part of 20	....
22	Electrolytic Condenser (4 Mf., 200 V.)	30-2144	1.05
23	Resistor (2000 ohms, ¼ watt)	33-1029	.20
24	Compensator (Primary 1st I.F.)	Part of 25	....
25	1st I.F. Transformer	32-1671	1.35
26	Compensator (Secondary 1st I.F.)	Part of 25	....
27	Compensator (Primary 2nd I.F.)	Part of 28	....
28	2nd I.F. Transformer	32-1672	1.35
29	Compensator (Secondary 2nd I.F.)	Part of 28	....
30	Resistor (33 ohms wire wound)	33-3233	.20
31	Resistor (100 ohms wire wound)	33-3187	.20
32	Resistor (51,000 ohms, ¼ watt)	6098	.20
33	Condenser (.00011 Mf. twin bakelite)	8035-DG	.25
34	Resistor (33 ohms wire wound)	33-3233	.20
35	Condenser (.00011 Mf.)	Part of 33	....
36	Condenser (.01 Mf. bakelite)	3903-SU	.25
37	Resistor (1 Meg., ¼ watt)	33-1096	.20
37A	Resistor (1 Meg., ¼ watt)	33-1096	.20
38	Condenser (.01 Mf. tubular)	30-4124	.25
39	Volume Control (.5 Meg.)	33-5137	1.45
40	Resistor (1000 ohms, ¼ watt)	33-1028	.20
41	Resistor (1000 ohms, ¼ watt)	33-1028	.20
42	Electrolytic Condenser (10 Mf., 8.0 Mf.)	30-2143	1.00
43	R.F. Choke	32-1954	.40
44	Vibrator Unit	41-2015	....
45	Condenser (.5 Mf. metal case)	30-4058	.60
46	R.F. Choke	32-1954	.40
47	Condenser (1.0 Mf. metal case)	30-4399	.75
48	Power Transformer	32-7504	2.75
49	Condenser (.01 Mf. tubular)	30-4318	.50
50	Electrolytic Condenser (8.0 Mf. twin)	30-2138	2.50
51	Filter Choke	32-7543	1.35
52	Electrolytic Condenser (8.0 Mf.)	Part of 50	....
53	R.F. Choke	32-1842	.50
54	Condenser (.05 Mf. tubular)	30-4020	.20
55	Off-On Switch	Part of 39	....
56	Condenser (.05 Mf. tubular)	30-4020	.20
56A	Condenser (.00025 Mf. mica)	30-1032	.25
57	Resistor (1.0 megohm, ¼ watt)	33-1096	.20
57A	Bias Cells Assembly	38-7275	....
58	Electrolytic Condenser (8.0 Mf.)	Part of 42	....
59	Resistor (20,000 ohms, ½ watt)	6650	.20
60	Pilot Lamp	34-2065	.35
61	Resistor (10 ohms wire wound)	33-3041	.25
62	Condenser (.25 Mf. tubular)	30-4146	.25
63	Resistor (330,000 ohms, ¼ watt)	33-1200	.20
64	Resistor (240,000 ohms, ¼ watt)	33-1097	.20
64A	Condenser (.00011 Mf. mica)	30-1031	.20
65	Condenser (.01 Mf. bakelite)	3903-SU	.25
65A	Condenser (.15 Mf. tubular)	30-4191	.25
66	Resistor (490,000 ohms, ¼ watt)	6097	.20
67	Condenser (.00011 Mf. mica)	30-1031	.20
68	Condenser (.02 Mf.)	Part of 70	....
69	Input Transformer	32-7454	1.60
70	Tone Control Assembly	30-4391	.50
71	Condenser (.002 Mf. tubular)	30-4177	.25
72	Output Transformer	32-7503	1.65
73	Voice Coil and Cone Assembly	36-3540	....
74	Condenser (.25 Mf. tubular)	30-4146	.25
	Wiring Panel (2 lug)	38-5500	.03
	Wiring Panel (2 lug)	38-6801	.03
	Wiring Panel (1 lug)	38-7178	.01
	Wiring Panel (2 lug)	38-5501	.03
	Tube Shield Body	28-2726	.10
	Tube Shield Base	28-2725	.03
	Glowing Arrow Mask	27-5167	.20
	Screen	27-5166	.10
	Mask Arm	29-3274	.03
	Link	29-3285	.04
	Coupling	29-3586	.10
	Electrolytic Condenser Support	29-1328	.05
	Screen Bracket Assembly	31-1751	....
	Dial Scale	27-5163	.25
	Hub Assembly	28-7129	.10
	Pilot Lamp Bracket Assembly	38-7499	.25
	R.F. Shield Assembly	38-6757	.20
	Battery Cable	41-3176	.95
	Speaker Plug Socket	27-6043	.08
	Speaker Terminal Cover	02824	.10
	Knob (tuning)	27-4206	.12
	Knob (slow-speed tuning)	27-4207	.10
	Knob (volume, tone, wave switch)	27-4208	.10
	Bezel	28-3163	.50
	Bezel Gasket	27-7980	.01
	Bezel Glass	27-8112	....
	Bezel Glass Mask	28-3429	....
	Bezel Mounting Screw	W-1494	....
	Speaker Cable	36-3009	.35
	Front Bumper	27-4197	2.50C
	Chassis Mounting Screw	W-1496-A	....
	Chassis Mounting Washer (rubber)	27-4198	.01
	Chassis Mounting Cushion (rubber)	27-4199	....
	Chassis Mounting Sleeve	28-2897	....

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 625
Socket, Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

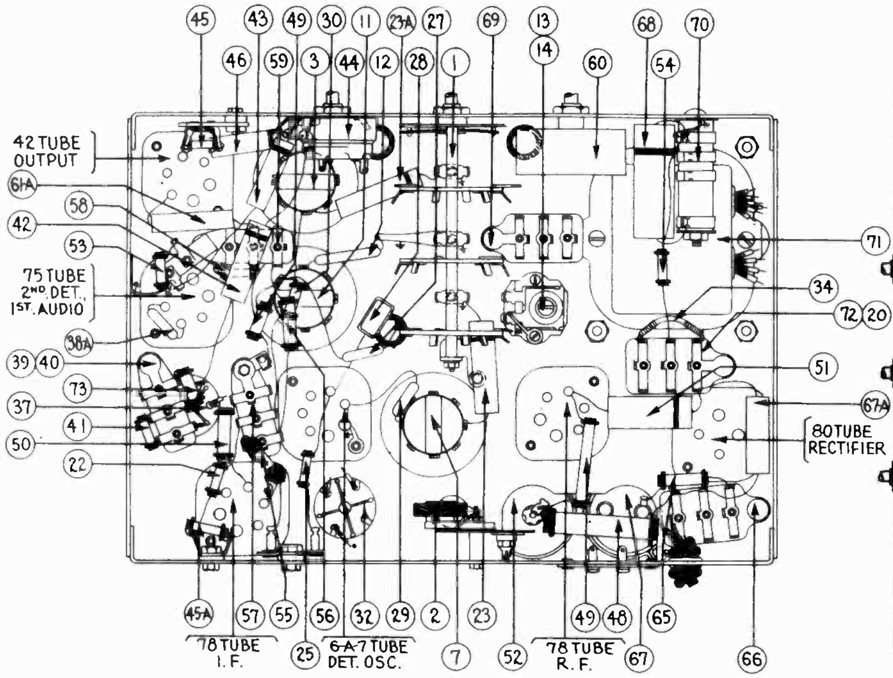


Fig. 4. Bottom View of Chassis

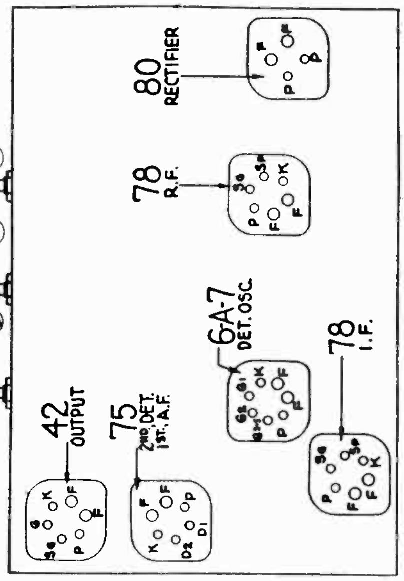


Fig. 1. Tube Sockets as viewed from bottom.

Replacement Parts—Model 625

No.	Description	Part No.	Price List
1	Waveband Switch	42-1152	$1.75
2	Wavetrap	38-6850	1.10
3	Antenna Transformer	32-1867	3.00
4	Compensater (Ant. S.W.)	Part of 3	....
5	Compensater (Ant. Police)	Part of 3	....
6	Compensater (Ant. Standard)	Part of 3	....
7	R. F. Transformer	32-1868	3.00
8	Compensater (R.F. Short-Wave)	Part of 7	....
9	Compensater (R.F. Police)	Part of 7	....
10	Compensater (R.F. Standard)	Part of 7	....
11	Oscillator Transformer	32-1869	2.50
12	Condenser (.0047 Mfd. Mica)	30-1052	.60
13	Compensater (Osc. Police Series) (Nut)	31-6027	.70
14	Compensater (Osc. Standard Series) (Screw)	Part of 13	....
15	Compensater (Osc. S.W.)	Part of 11	....
16	Compensater (Osc. Police)	Part of 11	....
17	Compensater (Osc. Standard)	Part of 11	....
19	Tuning Condenser Assembly	31-1741	....
20	Condenser (.09 Mfd. Twin Bakelite Block)	4989-DG	.40
22	Resistor (1. Meg.) (Red, Black, Green)	33-1096	.20
23	Condenser (.05 Mfd. Tubular)	30-4020	.35
23a	Condenser (.05 Mfd. Tubular)	30-4020	.35
25	Resistor (5000 ohms) (Green, Brown, Orange)	6098	.20
26	Condenser (1 Mmf.), Wires Twisted	Part of 19	....
27	Condenser (.00025 Mfd. Mica)	30-1032	.35
28	Condenser (.00015 Mfd. Mica)	30-1033	.35
29	Condenser (.00005 Mfd. Mica)	30-1029	.35
30	Resistor (51,000 ohms) (Green, Brown, Orange)	6098	.20
31	Compensater (1st I.F. Primary)	Part of 32	....
32	1st I.F. Transformer	32-2019	....
33	Compensater (1st I.F. Secondary)	Part of 32	....
34	Resistor (400 ohms Flexible) (Yellow, Black, Brown)	33-3016	.20
36	Compensater (2nd I.F. Pri.)	Part of 37	....
37	2nd I.F. Transformer	32-2020	....
38	Compensater (2nd I.F. Sec.)	Part of 37	....
38a	Condenser (.00011 Mfd. Mica)	30-1031	.35
39	Condenser (.00011 Mfd. (Twin Bakelite)	8035-DG	.25
40	Condenser (.00011 Mfd. Mica)	Part of 39	....
41	Resistor (5000 ohms) (Green, Brown, Orange)	6098	.20
42	Condenser (.02 Mfd. Tubular)	30-4215	.30
43	Condenser (.02 Mfd. Tubular)	30-4215	.30
44	Volume Control and On-Off Switch	33-5105	1.45
45	Resistor (25000 ohms) (Red, Green, Orange)	33-1013	.20
45a	Resistor (1. Meg.) (Brown, Black, Green)	33-1096	.20
46	Condenser (.02 Mfd. Tubular)	30-4215	.30
47	Resistor (10000 ohms) (Brown, Black, Orange)	33-310334	.20
48	Resistor (15000 ohms) (Brown, Green, Orange)	5718	.35
49	Resistor (20000 ohms) (Red, Black, Orange)	6649	.20
50	Resistor (99000 ohms) (White, White, Yellow)	6099	.20
51	Condenser (.15 Mfd. Tubular)	30-4191	.35
52	Condenser (16 Mfd. Electrolytic)	30-2118	$1.65
53	Resistor (1 Meg.) (Brown, Black, Green)	33-1096	.20
54	Resistor (490,000 ohm) (Yellow, White)	6097	.20
55	Resistor (70000 ohms) (Violet, Black, Orange)	33-1115	.20
56	Resistor (99000 ohms) (White, White, Yellow)	6099	.20
57	Condenser (.09 Mf.) (Bakelite)	4989-SG	.35
58	Resistor (490,000 ohm) (Yellow, White, Yellow)	6097	.20
59	Condenser (.03 Mfd. Bakelite)	8318-SU	.35
60	Tone Control	30-4332	.75
61	Condenser in Tone Control (.02 Mf.)	Part of 60	....
61a	Condenser (.003 Mfd. Tubular)	30-4042	.25
62	Output Transformer	32-7019	1.25
63	Voice Coil & Cone Assembly (S-14 Speaker)	36-3157	.80
64	Field Coil & Pot Assembly (S-14 Speaker)	36-3495	2.75
65	Resistor (1000 ohms) (Brown, Black, Red)	33-1028	.20
66	Condenser (.3 Mfd. Bakelite Block)	6287-DU	.40
67	Condenser (8 Mfd. & 8 Mfd. Electrolytic)	30-2079	2.40
67a	Condenser (.001 Mf.)	30-4310	.25
68	Condenser (.25 Mfd. Tubular)	30-4146	.40
69	Condenser (.015 Mfd. Twin Bakelite Block)	3793-DG	.40
70	Resistor (BC Wirewound, 22 ohms, 25 ohms, 210 ohms)	33-3222	.20
71	Power Transformer (115 Volts 60 Cycles)	32-7381	4.00
	(115 Volts 25 Cycles)	32-7382	6.25
	(230 Volts 50 Cycles)	32-7418	....
72	Condenser (.09 Mfd.)	Part of 20	....
73	Resistor (330,000 ohms) (Orange, Orange, Yellow)	33-1200	.20
74	Pilot Lamp	34-2064	.09
	Dial Scale	27-5098	.25
	Dial Hub and Set Screw	31-1550	.15
	Dial Front Spring	28-2837	.10
	Knob (Station Selector)	27-4206	.12
	Knob (Fine Tuning)	27-4207	.10
	Knob (Waveband)	27-4219	.10
	Knob (Tone, Volume)	27-4208	.10
	Tube Shield	28-2726	.10
	Tube Shield Base	28-2725	.03
	Tube Socket (4 Prong)	27-6034	.10
	Tube Socket (6 Prong)	27-6036	.11
	Tube Socket (7 Prong)	27-6037	.11
	Speaker Plug Socket	27-6033	.08
	Chassis Mtg. Screw	W-1495	1.50perC.
	Chassis Mtg. Washer (Rubber)	27-4198	.01
	Electric Cord and Plug	L-943-A	.60
	Bezel	28-2928	.35
	Bezel Glass	27-7887	.60
	Glowing Arrow Mask	27-5162	.20
	Glowing Arrow Screen	27-5161	.10
	Mask Arm	29-3274	.03
	Link	29-3285	.04
	Coupling	29-3586	.10

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

PHILCO RADIO & TELEV. CORP.

MODEL 625
Schematic

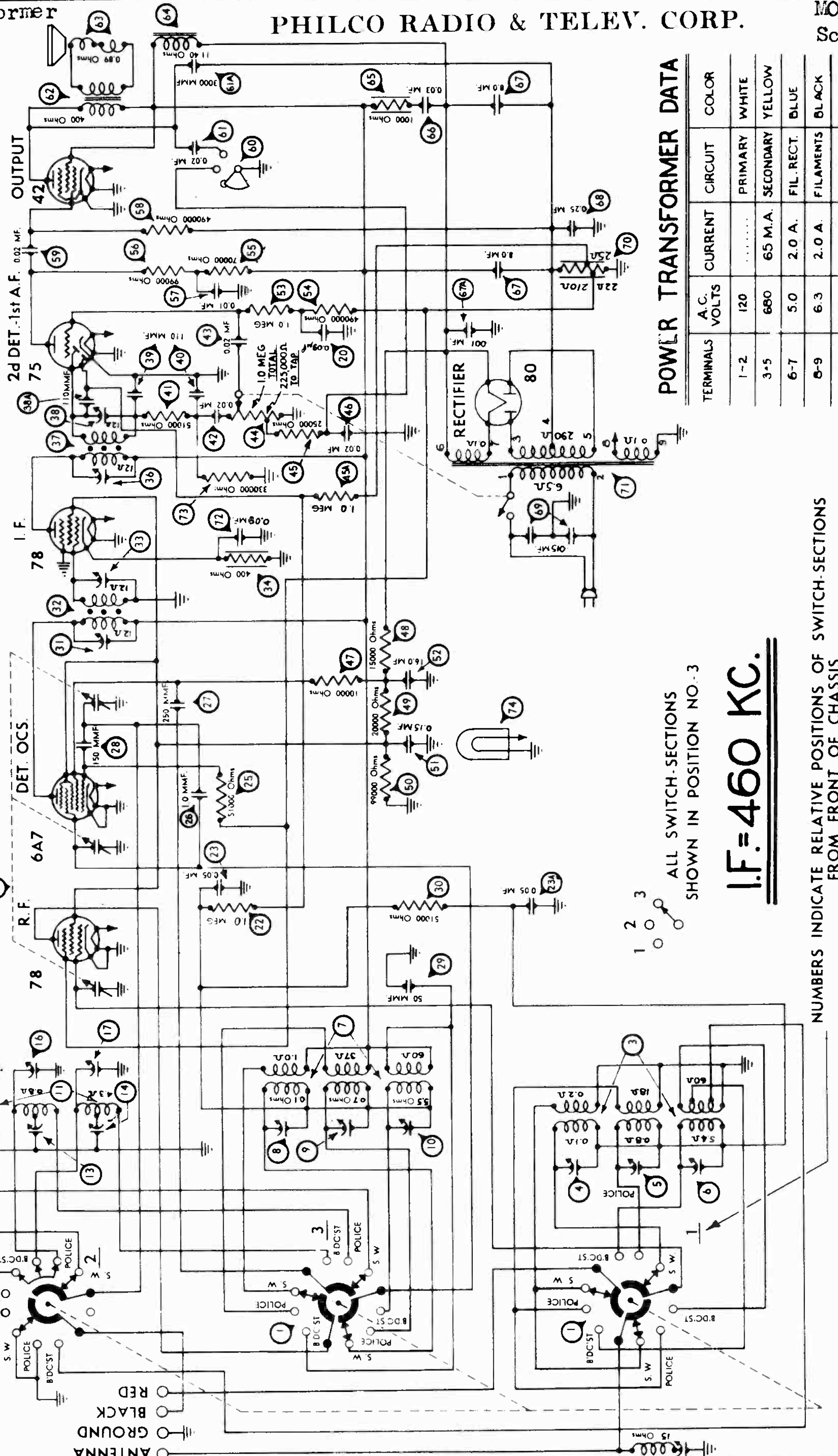
Transformer Data

Intermediate Frequency: 460 K.C.

Power Consumption: 65 watts.

Tuning Drive: Two-speed gear drive, ball bearing. 50 to 1 ratio for slow-speed tuning.

Program Control: 3-position, with bass compensation effective in first position.



POWER TRANSFORMER DATA

TERMINALS	A.C. VOLTS	CURRENT	CIRCUIT	COLOR
1-2	120	....	PRIMARY	WHITE
3-5	680	65 M.A.	SECONDARY	YELLOW
6-7	5.0	2.0 A.	FIL. RECT.	BLUE
8-9	6.3	2.0 A.	FILAMENTS	BLACK
4	...	....	CENTER TAP OF 3-5	YELLOW, GREEN TRACER

ALL SWITCH-SECTIONS SHOWN IN POSITION NO. 3

I.F.=460 KC.

NUMBERS INDICATE RELATIVE POSITIONS OF SWITCH-SECTIONS FROM FRONT OF CHASSIS

Fig. 3. Schematic Diagram of Model 625

Wave Bands: Three—(1) standard (with some Police); (2) Police, Aircraft and Amateur; (3) Short-wave.

Coverage of Each Band: Band 1, 540-1720 K.C.; Band 2, 1750 to 5800 K.C. (1.75-5.8 megacycles); Band 3, 5700-18000 K.C. (5.7 to 18.0 megacycles).

MODEL 625
Trimmers

PHILCO RADIO & TELEV. CORP.

Voltage
Alignment

Adjusting Compensating Condensers Model 625

The adjustment of the compensating condensers in Model 625 requires a signal generator covering the broadcast and police band, and also one capable of producing a signal at certain frequencies in the short wave band. Philco Model 088 All-wave signal generator is ideal for these requirements. Or you can use the Philco Model 024 or 048A instrument for the broadcast frequencies, and the Model 091 crystal controlled short wave signal generator for the "short-wave" frequencies. The location of all compensating condensers is shown in Fig. 2. An output meter is also needed, such as in Philco Model 025.

Adjustment of I. F.

1. Remove the antenna connection from the receiver, disconnect the grid clip from the first detector (type 6A7 tube), and connect the "ANT" output terminal of the broadcast signal generator to the grid cap of this tube; connect the "GND" terminal of the signal generator to the "GND" terminal of the receiver.

2. Connect the 0 to 30 volt range of the output meter in the Philco 048A or 025 unit to the plate and cathode of the output tube or to the two bottom prongs of the speaker plug.

3. Adjust the signal generator to a frequency of 460 K.C. Place the receiver in operation with the dial turned to the low frequency end of the standard broadcast band, wave band switch to extreme left (clockwise), and have the volume control adjusted near its maximum setting. Adjust the signal generator attenuator for approximately half-scale reading of the output meter.

4. The I.F. compensating condensers are located at the tops of the I.F. coil shields. The primary is adjusted by turning the screw in top and the secondary by the nut. Adjust condensers (36) and (38) (2d I.F. primary and secondary) for maximum reading in the output meter, and then condensers (31) and (33) (1st I.F. primary and secondary).

Adjustment of Wave-Trap

1. Connect the signal generator leads to the antenna and ground terminals of the receiver. Replace the grid clip on the 6A7 grid cap.

2. With the wave-band switch of the receiver still in the extreme left (standard band), (540-1720 K.C.), turn the station selector to 55.

3. With the signal generator in operation at 460 K.C., adjust the wave-trap (2) condenser until a MINIMUM reading is obtained on the output meter. The Philco fibre wrench, part No. 3164, is used for this adjustment. The wave-trap compensator is reached from rear of chassis.

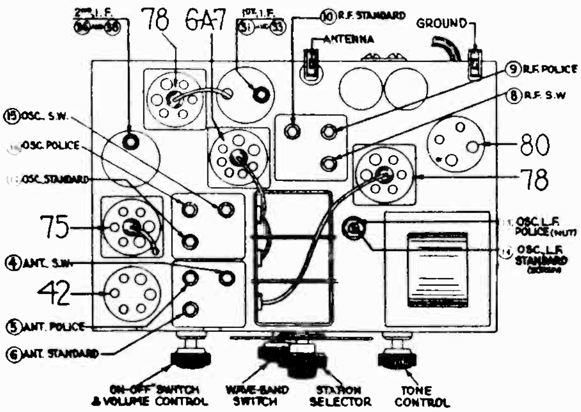


Fig. 2. Locations of Compensating Condensers

Adjustment of High and Low Frequency Compensators

1. With the wave-band switch still at Range No. 1 (broadcast band), set the dial at 1700 K.C. Set the signal generator at this frequency and adjust compensators (17), (6) and (10) for maximum output. These are the oscillator, antenna, and R.F. "standard" compensators respectively.

2. Tune the receiver and the signal generator to 600 K.C. and adjust compensator (14) (screw) for maximum output. This is the oscillator L.F. standard compensator.

3. Turn the wave-band switch to the second (middle) position. Set the dial at 3.6 M.C., at which point the fundamental of the 091 signal will be heard. If the Model 088 signal generator is being used, set it at 3.6 M.C. Adjust condensers (16), (5) and (9) in succession. These are the oscillator, antenna and R.F. police band adjustments.

4. Turn the tuning dial to 1.8 M.C., and set the signal generator (Model 024 or Model 088) at 1800 K.C. Adjust condenser (13) (Osc. L.F., police) (nut), to maximum signal.

5. Turn the wave-band switch to Band 3 (extreme right) and adjust the station selector to 18.0 megacycles. Set the signal generator at 18 M.C. By means of the Philco wrench, part No. 3164, adjust the oscillator S.W., antenna S.W. and R.F. S.W. compensators for maximum reading in the output meter. These are numbered (15), (4) and (8) respectively in figure No. 2.

Tube Socket Voltages
Measured to Ground

Tube	78 R.F.	6A7 Det. Osc.	78 I.F.	75 2d Det.	42 Output
Point P	258	258	258	153	243
SG	95	95	95	...	258
K	...	...	2.85	...	...
	6A7: $G_{3 \& 5}$ = 173				

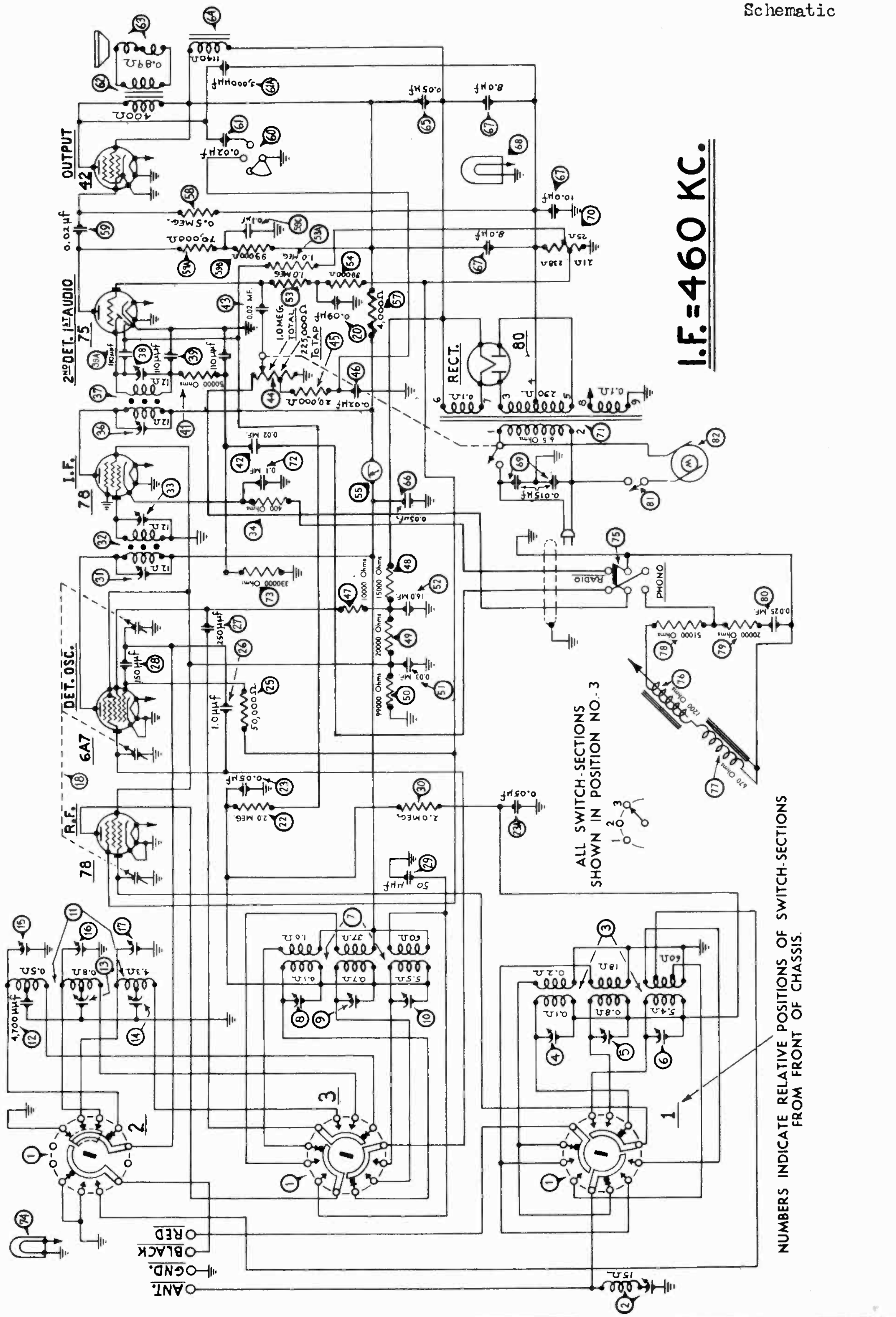
Above voltages were obtained by using a PHILCO type 025 Circuit Tester (or 048A All-purpose Tester), using test prods applied to underside of chassis. Volume control at maximum; dial at 55; waveband switch counter-clockwise (band 1). Use Fig. 1 for test points. Line voltage 115 volts.

Power Transformer Data

Terminals	A.C. Volts	Current	Circuit	Color
1–2	120	......	Primary	White
3–5	680	65 M.A.	Secondary	Yellow
6–7	5.0	2.0 A.	Fil. Rect.	Blue
8–9	6.3	2.0 A.	Filaments	Black
4	...	......	Center Tap of 3-5	Yellow, Green Tracer

PHILCO RADIO & TELEV. CORP.

MODEL 630,630PF
2nd Type
Schematic



MODELS 630,630PF
Changes,Parts

PHILCO RADIO & TELEV. CORP.

Later 1935 Production Runs

This sheet supplements the regular bulletin No. 219 on the Philco 630 and also covers the Philco Radio-Phonograph 630PF. All circuit and part number changes up to date have been included.

Beginning with run No. 5 the grid bias arrangement for the 78 R.F. and 6A7 1st detector was changed. A fixed bias from the B.C. resistor is fed through the AVC circuit to the grids of these tubes.

PARTS LIST

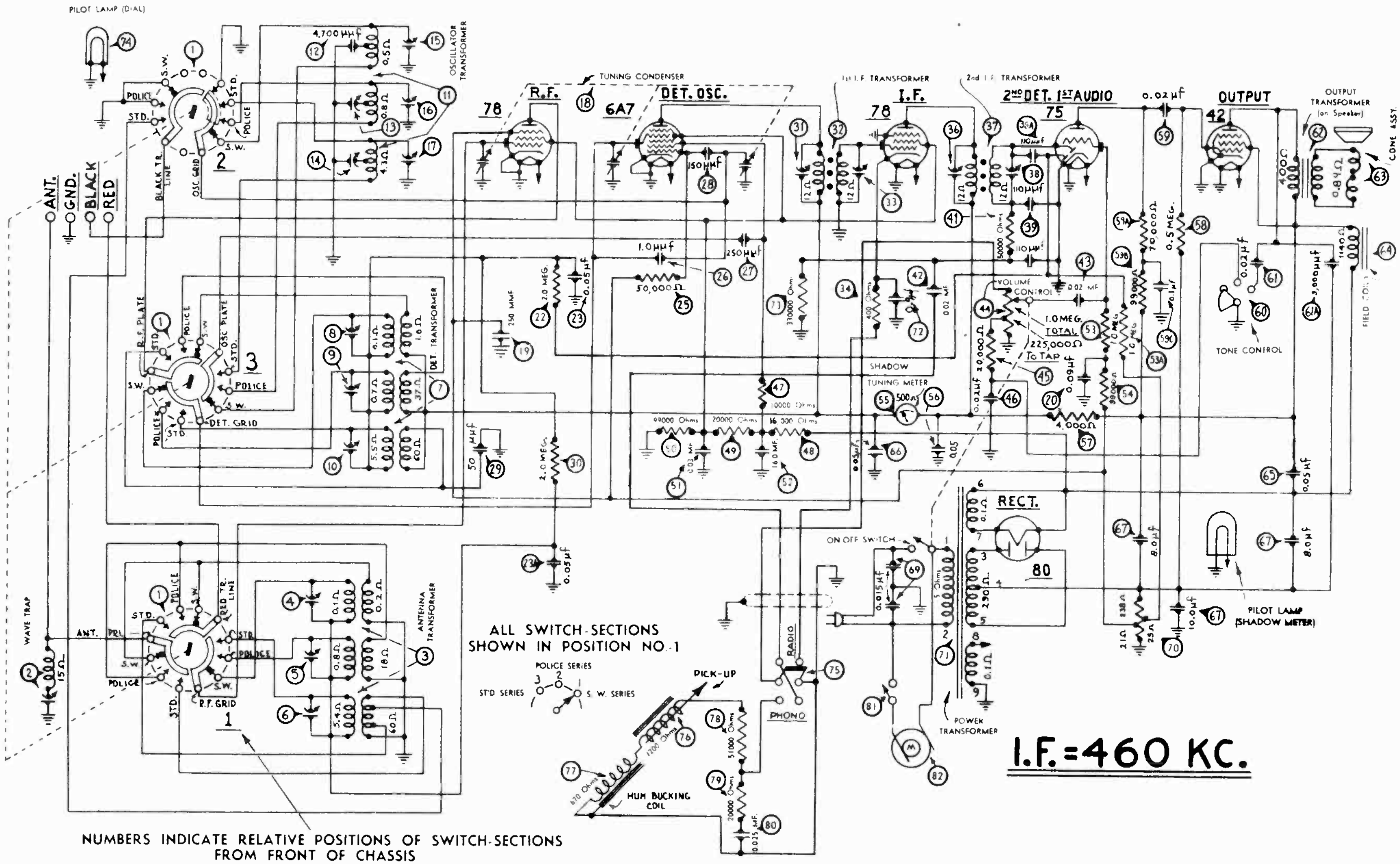
	Description	Part No.	List Price
1	Wave Band Switch	42-1152	$1.75
2	Wavetrap	38-6850	1.10
3	Antenna Transformer	32-1699	3.00
4	Compensating Condenser (Ant. S.W.)	Part of 3	....
5	Compensating Condenser (Ant. Police)	Part of 3	....
6	Compensating Condenser (Ant. Standard)	Part of 3	....
7	R. F. Transformer	32-1636	3.25
8	Compensating Condenser (R.F. Short-Wave)	Part of 7	....
9	Compensating Condenser (R.F. Police)	Part of 7	....
10	Compensating Condenser (R.F. Standard)	Part of 7	....
11	Oscillator Transformer	32-1637	2.50
12	Condenser (.0047 Mfd. Mica)	30-1052	.60
13	Compensating Condenser (Osc. Police)	Part of 11	....
14	Compensating Condenser (Osc. H.F. Standard)	Part of 11	....
15	Compensating Condenser (Osc. S.W.)	Part of 11	....
16	Compensating Condenser (Osc. L.F. Police) Part of	31-6027	.70
17	Compensating Condenser (Osc. L.F. Standard) Part of	31-6027	
18	Tuning Condenser Assembly	31-1741	....
21	Condenser (.09 Mfd. Twin Bakelite Block)	4989-DG	.40
22	Resistor (1 Meg.) (Brown, Black, Green)	33-1096	.20
23	Condenser (.05 Mfd. Tubular)	30-4020	.35
23a	Condenser (.05 Mfd. Tubular)	30-4020	.35
25	Resistor (50000 ohms) (Green, Brown, Orange)	6098	.20
26	Condenser (1 Mmfd.)	Part of 18	....
27	Condenser (.00025 Mfd. Mica)	30-1032	.35
28	Condenser (.00015 Mfd. Mica)	30-1033	.35
29	Condenser (.00005 Mfd. Mica)	30-1029	.35
30	Resistor (51000 ohms) (Green, Brown, Orange)	6098	.20
31	Compensating Condenser (1st I.F. Primary)	Part of 32	....
32	1st I.F. Transformer	32-1646	2.25
33	Compensating Condenser (1st I.F. Secondary)	Part of 32	....
34	Resistor (400 ohms Flexible) (Yellow, Black, Brown)	33-3016	.20
36	Compensating Condenser (2nd I.F. Pri.)	Part of 37	....
37	2nd I.F. Transformer	32-1647	2.25
38	Compensating Condenser (2nd I.F. Sec.)	Part of 37	....
39	Condenser (.00011 Mfd.) (Twin Bakelite)	8035-DG	.35
39a	Condenser (.00011 Mfd. Mica)	30-1031	.35
40	Condenser (.00011)	Part of 39	....
41	Resistor (50000 ohms) (Green, Brown, Orange)	6098	.20
42	Condenser (.02 Mfd. Tubular)	30-4215	.30
43	Condenser (.02 Mfd. Tubular)	30-4215	.30
44	Volume Control and On-Off Switch	33-5105	1.45
45	Resistor (20000 ohms) (Red, Black, Orange)	33-1178	.20
46	Condenser (.02 Mfd. Tubular)	30-4215	.30
47	Resistor (10000 ohms) (Brown, Black, Orange)	4412	.20
48	Resistor (15000 ohms) (Brown, Black, Orange)	5718	.35
49	Resistor (20000 ohms) (Red, Black, Orange)	3524	.20
50	Resistor (20000 ohms) (Red, Black, Orange)	6649	.20
51	Condenser (.15 Mfd. Tubular)	30-4191	.40
52	Condenser (16 Mfd. Electrolytic)	30-2118	1.65

	Description	Part No.	List Price
53	Resistor (1 Meg.) (Brown, Black, Green)	33-1096	$0.20
53a	Resistor (1. Meg.) (Brown. Black, Green)	33-1096	.20
54	Resistor (99000 ohms) (White, White, Orange)	6099	.20
55	Shadow Tuning Meter	45-2086	2.00
56	Condenser (.05 Mf. Twin Bakelite)	3615-DG	.40
57	Resistor (4000 ohms) (Yellow, Black, Red)	33-1031	.20
58	Resistor (490,000 ohms) (Yellow, White, Yellow)	33-1097	.20
59	Condenser (.02 Mfd. Bakelite)	8318-SU	.30
59a	Resistor (70000 ohms) (Violet, Black, Orange)	5385	.20
59b	Resistor (99000 ohms) (White, White, Orange)	6099	.20
59c	Condenser (.09 Mf. Bakelite)	4989-SG	.35
60	Tone Control (3 position)	30-4332	.75
61	Condenser in Tone Control	Part of 60	....
61a	Condenser (.003 Mfd. Tubular)	30-4042	.25
62	Output Transformer	32-7178	1.60
63	Voice Coil & Cone Assembly (K-32)	36-3159	.80
64	Field Coil & Pot Assembly (K-32)	36-3498	3.25
65	Condenser (.05 Mfd. Tubular)	30-4020	.35
66	Condenser (.05 Mfd.)	Part of 56	....
67	Condenser (8 Mfd., 8 Mfd., 10 Mfd. Electrolytic)	30-2073	2.15
68	Pilot Lamp (Shadow Tuning Meter)	Part of 55	....
69	Condenser (.015 Mfd. Twin Bakelite Block)	3793-DG	.40
70	Resistor (BC Wirewound—22 ohms, 25 ohms, 210 ohms)	33-3222	.20
71	Power Transformer (115 Volts 60 Cycles)	32-7384	5.50
	(115 Volts 25 Cycles)	32-7385	7.75
	(230 Volts 50 Cycles)	33-7386	5.75
72	Condenser (.05 Mf.)	Part of 56	....
73	Resistor (330,000 ohms) (Orange, Orange, Yellow)	33-1200	.20
74	Pilot Lamp	34-2039	.09
75	Phono Switch Cable Assy	35-3014	1.30
76	Pickup Head Assy	35-2014	7.25
77	Hum Bucking Coil Assy	32-1940	1.10
78	Resistor (51,000 ohms)	6098	.20
79	Resistor (20,000 ohms)	33-1178	.20
80	Condenser (.025 Mf.)	7653-SU	.35
81	Automatic Stop	6345	3.15
82	Phono. Motor (115 V. 60 Cycle)	35-1112	20.00
	Dial Scale	27-5098	.25
	Dial Hub & Set Screw	31-1550	.15
	Dial Front Spring	28-2837	.10
	Knob (Station Selector)	27-4206	.12
	Knob (Fine Tuning)	27-4207	.10
	Knob (Waveband)	27-4219	.10
	Knob (Volume Control, Tone Control)	27-4208	.10
	Tube Shield	28-2726	.10
	Tube Shield Base	28-2725	.03
	Tube Socket (4-Prong)	27-6034	.10
	Tube Socket (6-Prong)	27-6036	.11
	Tube Socket (7-Prong)	27-6037	.11
	Speaker Plug Socket	27-6033	.08
	Chassis Mfg. Screw	W-1495	1.50perC.
	Chassis Mtg. Washer (Rubber)	27-4198	.01
	Electric Cord & Plug	L-943-A	.60

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 635
Schematic

PHILCO RADIO & TELEV. CORP.



Type Circuit: Superheterodyne, with preselector R.F. amplifier, and pentode output (5 watts); built in connections for Philco All-wave aerial; aerial selector built into and operated by wave-band switch.

Power Supply: Alternating Current. Voltage and frequency as specified on chassis nameplate.

Tubes Used: 1 type 78, R.F.; 1 type 6A7, Detector-Oscillator; 1 type 78, I.F.; 1 type 75, 2d Detector and 1st A.F.; 1 type 42 Output; 1 type 80 Rectifier.

Wave Bands: Three—(1) Short Wave (with some Police); (2) Police, Aircraft and Amateur; (3) Standard.

Coverage of Each Band: Band 1, 540-1720 K.C.; Band 2, 1750 to 5800 K.C. (1.75-5.8 megacycles); Band 3, 5700-18000 K.C. (5.7 to 18.0 megacycles).

Tuning Drive: Two-speed gear drive, ball bearing. 50 to 1 ratio for slow-speed tuning.

Tone Control: 3-position, with bass compensation effective in first position.

Intermediate Frequency: 460 K.C.

Power Consumption: 70 watts.

MODEL 635
Socket, Trimmers

PHILCO RADIO & TELEV. CORP.

Voltage, Alignment
Transformer Data

Adjusting Compensating Condensers

The adjustment of the compensating condensers in Model 635 requires a signal generator covering the broadcast and police band, and also one capable of producing a signal at certain frequencies in the short wave band. Philco Model 088 All-wave signal generator is ideal for these requirements. Or you can use the Philco Model 024 or 048A instrument for the broadcast frequencies, and the Model 091 crystal controlled short wave signal generator for the "short wave" frequencies. The location of all compensating condensers is shown in Fig. 2. An output meter is also needed, such as in Philco Model 025

Adjustment of I. F.

1. Remove the antenna connection from the receiver, disconnect the grid clip from the first detector (type 6A7 tube), and connect the "ANT" output terminal of the broadcast signal generator to the grid cap of this tube; connect the "GND" terminal of the signal generator to the "GND" terminal of the receiver.

2. Connect the 0 to 30 volt range of the output meter in the Philco 048A or 025 unit to the plate and cathode of the output tube or to the two bottom prongs of the speaker plug.

3. Adjust the signal generator to a frequency of 460 K.C. Place the receiver in operation with the dial turned to the low frequency end of the standard broadcast band, wave band switch to extreme left (clockwise), and have the volume control adjusted near its maximum setting. Adjust the signal generator attenuator for approximately half-scale reading of the output meter.

4. The I.F. compensating condensers are located at the tops of the I.F. coil shields. The primary is adjusted by turning the screw in top and the secondary by the nut. Adjust condensers 36 and 38 (2d I.F. primary and secondary) for maximum reading in the output meter, and then condensers 31 and 33 (1st I.F. primary and secondary).

Adjustment of Wave-Trap

1. Connect the signal generator leads to the antenna and ground terminals of the receiver. Replace the grid clip on the 6A7 grid cap.

2. With the wave-band switch of the receiver still in the extreme left (standard band), (540-1720 K.C.), turn the station selector to 55.

3. With the signal generator in operation at 460 K.C., adjust the wave-trap 2 condenser until a MINIMUM reading is obtained on the output meter. The Philco fibre wrench, part No. 3164, is used for this adjustment. The wave-trap compensator is reached from rear of chassis.

Adjustment of High and Low Frequency Compensators

1. With the wave-band switch still at Range No. 3 (broadcast band), set the dial at 1700 K.C. Set the signal generator at this frequency and adjust compensators 17, 6 and 10 for maximum output. These are the oscillator, antenna, and R.F. "standard" compensators respectively.

2. Tune the receiver and the signal generator to 600 K.C. and adjust compensator 14 (screw) for maximum output. This is the oscillator L.F. standard compensator.

3. Turn the wave-band switch to the second (middle) position. Set the dial at 3.6 M.C. at which point the fundamental of the 091 signal will be heard. If the Model 088 Signal Generator is being used, set it at 3.6 M.C. Adjust condensers 16, 5 and 9 in succession. These are the oscillator, antenna and R.F. police band adjustments.

4. Turn the tuning dial to 1.8 M.C., and set the signal generator (Model 026 or Model 088) at 1800 K.C. Adjust condenser 13 (Osc. L.F., police) (nut), to maximum signal.

5. Turn the wave-band switch to Band 1 (extreme right) and adjust the station selector to 18.0 megacycles. Set the signal generator at 18 M.C. By means of the Philco wrench, part No. 3164, adjust the oscillator S.W., antenna S.W. and R.F. S.W. compensators for maximum reading in the output meter. These are numbered 15, 4 and 8 respectively in figure No. 2.

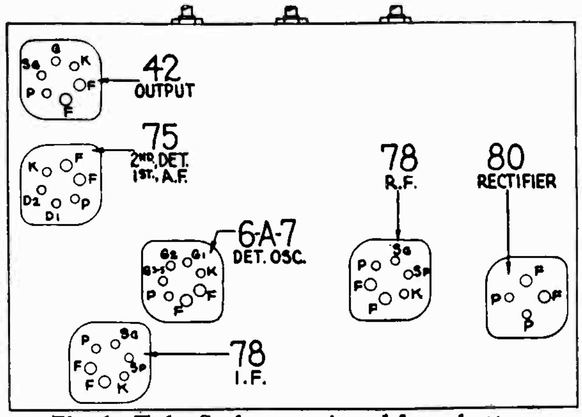


Fig. 1. Tube Sockets as viewed from bottom

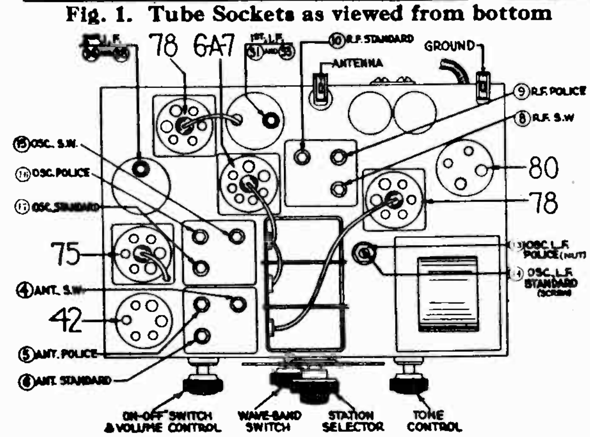


Fig. 2. Location of Compensating Condensers

Tube Socket Voltages
Measured to Ground

Tube	78 R.F.	6A7 Det. Osc.	78 I.F.	75 2d Det.	42 Output
Point P	245	245	245	188	298
SG	102	102	102	...	311
K	...	...	2.6	...	...
	6A7: G 3 & 5 = 175				

Above voltages were obtained by using a PHILCO type 025 Circuit Tester (or 048A All-purpose Tester), using test prods applied to underside of chassis. Volume control at maximum; dial at 55; waveband switch counter-clockwise (band 1). Use Fig. 1 for test points. Line voltage 115 volts.

Power Transformer Data

Terminals	A.C. Volts	Current	Circuit	Color
1–2	120	......	Primary	White
3–5	746	78 M.A.	Secondary	Yellow
6–7	5.0	2.0 A.	Fil. Rect.	Blue
8–9	6.3	2.25 A.	Filaments	Black
4	...	......	Center Tap of 3-5	Yellow, Green Tracer

MODEL 635
Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

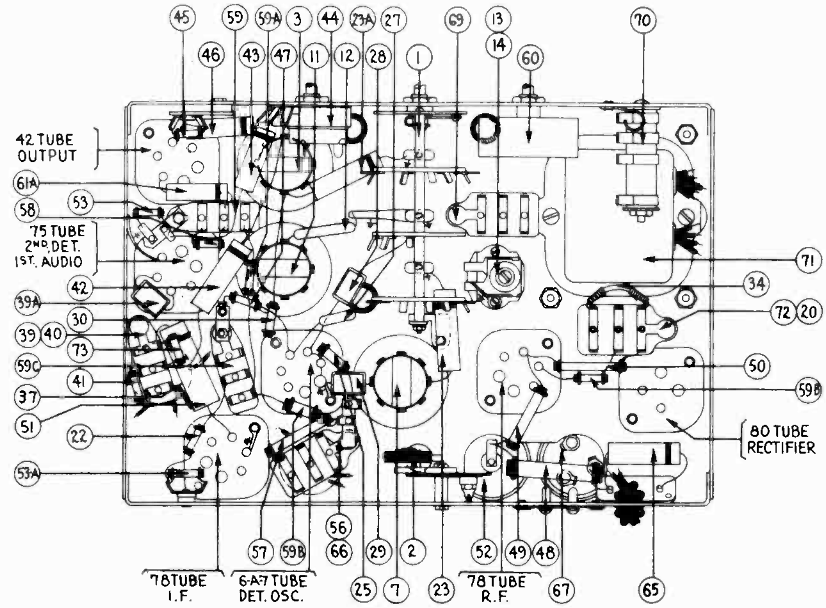


Fig. 4. Bottom View of Chassis

Replacement Parts—Model 635

	Description	Part No.	List Price
1	Wave Band Switch	42-1152	$1.75
2	Wavetrap	38-6850	1.10
3	Antenna Transformer	32-1867	3.00
4	Compensater (Ant. S.W.)	Part of 3	....
5	Compensater (Ant. Police)	Part of 3	....
6	Compensater (Ant. Standard)	Part of 3	....
7	R. F. Transformer	32-1868	3.00
8	Compensater (R.F. Short-Wave)	Part of 7	....
9	Compensater (R.F. Police)	Part of 7	....
10	Compensater (R.F. Standard)	Part of 7	....
11	Oscillator Transformer	32-1869	2.50
12	Condenser (.0047 Mfd. Mica)	30-1052	.60
13	Compensater (Osc. L.F. Police)	31-6027	.70
14	Compensater (Osc. L.F. Standard)	Part of 13	....
15	Compensater (Osc. S.W.)	Part of 11	....
16	Compensater (Osc. Police)	Part of 11	....
17	Compensater (Osc. Standard)	Part of 11	....
18	Tuning Condenser Assembly	31-1741	....
19	Condenser (.00025 Mica)	5858	.25
20	Condenser (.09 Mfd. Twin Bakelite Block)	4989-DG‡	.40
22	Resistor (1 Meg.) (Brown, Black, Green)	33-1096	.20
23	Condenser (.05 Mfd. Tubular)	30-4020	.35
23a	Condenser (.05 Mfd. Tubular)	30-4020	.35
25	Resistor (50000 ohms) (Green, Brown, Orange)	6098	.20
26	Condenser (1 Mmfd.)	Part of 18	....
27	Condenser (.00025 Mfd. Mica)	30-1032	..35
28	Condenser (.00015 Mfd. Mica)	30-1033	.35
29	Condenser (.00005 Mfd. Mica)	30-1029	.35
30	Resistor (51000 ohms) (Green, Brown, Orange)	6098	.20
31	Compensater (1st I.F. Primary)	Part of 32	....
32	1st I.F. Transformer	32-1646	2.25
33	Compensater (1st I.F. Secondary)	Part of 32	....
34	Resistor (400 ohms Flexible) (Yellow, Black, Brown)	33-3016	.20
36	Compensater (2nd I.F. Pri.)	Part of 37	....
37	2nd I.F. Transformer	32-1647	2.25
38	Compensater (2nd I.F. Sec.)	Part of 37	....
39	Condenser (.00011 Mfd.) (Twin Bakelite)	8035-DG‡	.35
39a	Condenser (.00011 Mfd. Mica)	30-1031	.35
40	Condenser (.00011)	Part of 39	....
41	Resistor (50000 ohms) (Green, Brown, Orange)	6098	.20
42	Condenser (.02 Mfd. Tubular)	30-4215	.30
43	Condenser (.02 Mfd. Tubular)	30-4215	.30
44	Volume Control and On-Off Switch	33-5105	1.45
45	Resistor (20000 ohms) (Red, Black, Orange)	33-1178	.20
46	Condenser (.02 Mfd. Tubular)	30-4215	.30
47	Resistor (10000 ohms) (Brown, Black, Orange)	4412	.20
48	Resistor (16000 ohms) (Brown, Black, Orange)	33-316633	.30
49	Resistor (20000 ohms) (Red, Black, Orange)	3524	.20
50	Resistor (20000 ohms) (Red, Black, Orange)	6649	.20
51	Condenser (.15 Mfd. Tubular)	30-4191	.40
52	Condenser (16 Mfd. Electrolytic)	30-2118*	1.65
53	Resistor (1 Meg.) (Brown, Black, Green)	33-1096	.20
53a	Resistor (1. Meg.) (Brown, Black, Green)	33-1096	.20
54	Resistor (99000 ohms) (White, White, Orange)	6099	.20
55	Shadow Tuning Meter	45-2083	2.50
56	Condenser (.05 Mf. Twin Bakelite)	3615-DG‡	.40
57	Resistor (4000 ohms) (Yellow, Black, Red)	33-1031	.20
58	Resistor (490,000 ohms) (Yellow, White, Yellow)	33-1097	$0.20
59	Condenser (.02 Mfd. Bakelite)	8318-SU‡	.30
59a	Resistor (70000 ohms) (Violet, Black, Orange)	5385	.20
59b	Resistor (99000 ohms) (White, White, Orange)	6099	.20
59c	Condenser (.09 Mf. Bakelite)	4989-SG‡	.35
60	Tone Control (3 position)	30-4332†	.75
61	Condenser in Tone Control	Part of 60	....
61a	Condenser (.003 Mfd. Tubular)	30-4042	.25
62	Output Transformer	32-7178	1.60
63	Voice Coil & Cone Assembly (K-32)	36-3159	.80
64	Field Coil & Pot Assembly (K-32)	36-3498	3.25
65	Condenser (.05 Mfd. Tubular)	30-4020	.35
66	Condenser (.05 Mfd.)	Part of 56	....
67	Condenser (8 Mfd., 8 Mfd., 10 Mfd. Electrolytic)	30-2073	2.15
68	Pilot Lamp (Shadow Tuning Meter)	Part of 55	....
69	Condenser (.015 Mfd. Twin Bakelite Block)	3793-DG‡	.40
70	Resistor (BC Wirewound—22 ohms, 25 ohms, 210 ohms)	33-3222	.20
71	Power Transformer (115 Volts 60 Cycles)	32-7384	5.50
	(115 Volts 25 Cycles)	32-7385	7.75
	(230 Volts 50 Cycles)	32-7420	....
72	Condenser (.09 Mf.)	Part of 20	....
73	Resistor (330,000 ohms) (Orange, Orange, Yellow)	33-1200	.20
74	Pilot Lamp	34-2039	.09
75	Phono Switch Cable Assy	35-3014	1.30
76	Pickup Head Assy	35-2014	7.25
77	Hum Bucking Coil Assy	32-1940	1.10
78	Resistor (51,000 ohms)	6098	.20
79	Resistor (20,000 ohms)	33-1178	.20
80	Condenser (.025 Mf.)	7653-SU‡	.35
81	Automatic Stop	6345	3.15
82	Phono. Motor (115 V. 60 Cycle)	35-1112	20.00
	Dial Scale	27-5098	.25
	Dial Hub & Set Screw	31-1550	.15
	Dial Front Spring	28-2837	.10
	Knob (Station Selector)	27-4206	.12
	Knob (Fine Tuning)	27-4207	.10
	Knob (Waveband)	27-4219	.10
	Knob (Volume Control, Tone Control)	27-4208	.10
	Tube Shield	28-2726	.10
	Tube Shield Base	28-2725	.03
	Tube Socket (4-Prong)	27-6034	.10
	Tube Socket (6-Prong)	27-6036	.11
	Tube Socket (7-Prong)	27-6037	.11
	Speaker Plug Socket	27-6033	.08
	Chassis Mtg. Screw	W-1495	1.50perC.
	Chassis Mtg. Washer (Rubber)	27-4198	.01
	Electric Cord & Plug	L-943-A	.60
	Glowing Arrow Mask	27-5162	.20
	Glowing Arrow Screen	27-5161	.10
	Mask Arm	29-3274	.03
	Link	29-3285	.04
	Coupling	29-3586	.10
	Shadow Screen	27-5120	1.50C
	Inverted Dial Scale	27-5121	....

*CODE 124:– 30-2126 † 30-4350 ‡ Use "O" (ODG, etc.) Type Condensers

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 641
Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Replacement Parts for Model 641

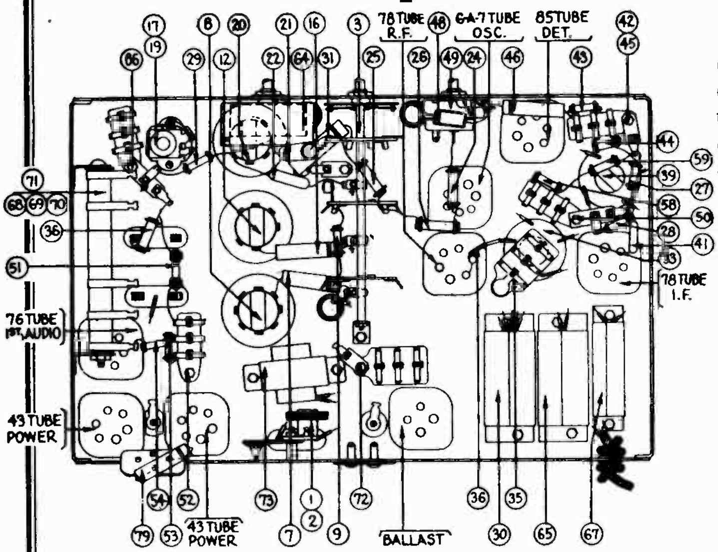


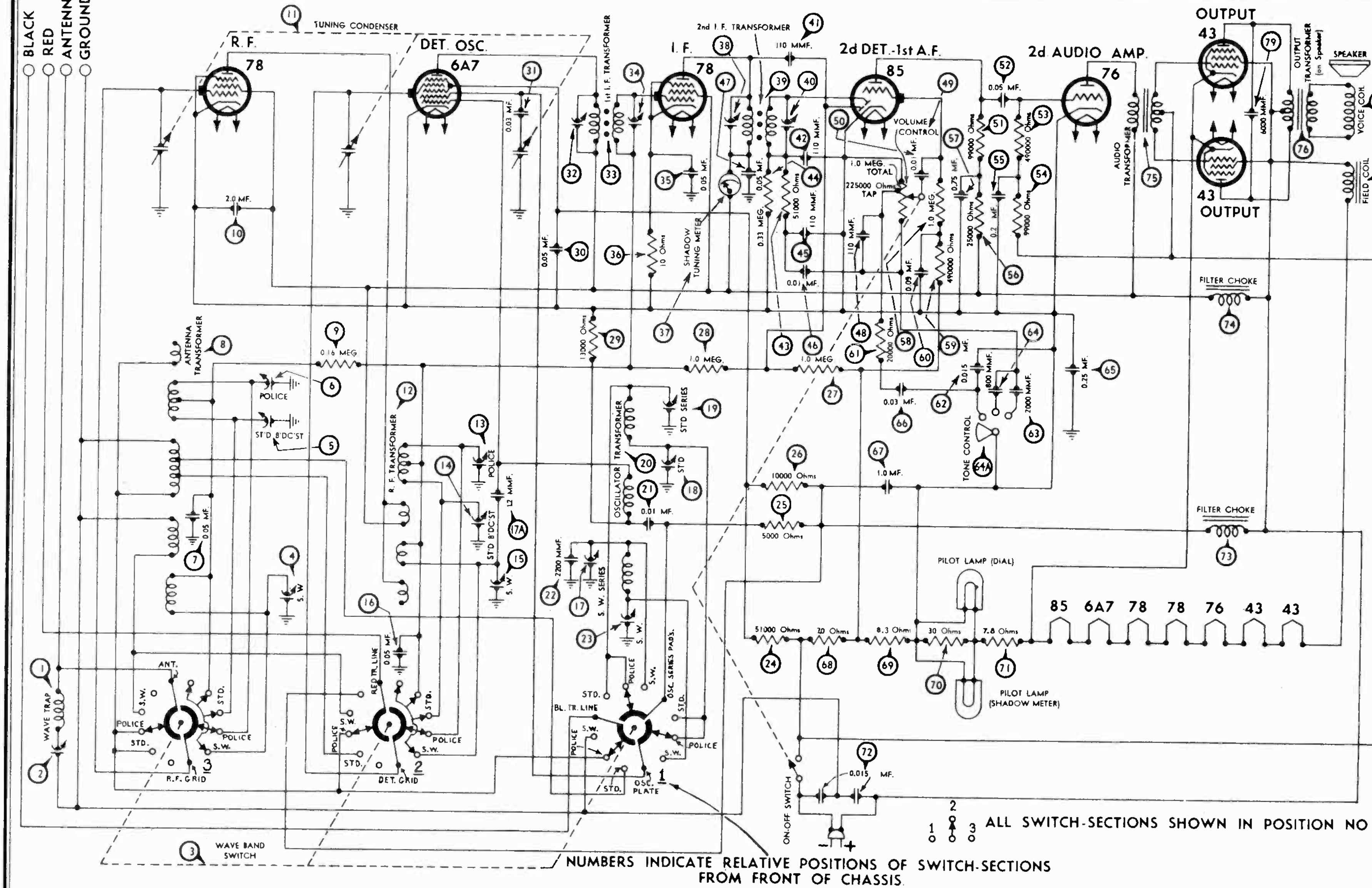
Fig. 4. Bottom View of Chassis

	Description	Part No.	List Price
1	Coil—Wavetrap }	38-6972	$0.75
2	Condenser—Wavetrap }		
3	Waveband Switch	42-1130	....
4	Padder	Part of 8	....
5	Padder	Part of 8	....
6	Padder	Part of 8	....
7	Condenser (0.05 mfd.)	30-4020	.20
8	Antenna Transformer	32-1827	2.40
9	Resistor (160,000 ohms)	33-1191	.20
10	Condenser (2.0 mfd.)	30-4355	2.25
11	Tuning Condenser Gang	31-1645	....
12	R. F. Transformer	32-1828	2.00
13	Padder	Part of 12	....
14	Padder	Part of 12	....
15	Padder	Part of 12 S.W	....
16	Condenser (0.05 mfd.)	30-4020	.20
17	Padder (Nut S.W.)	31-6027	.70
17A	Condenser (1.2 mmf.)	......	....
18	Padder	Part of 20	..
19	Padder (Screw, Broadcast)	Part of 17	....
20	Oscillator Transformer	32-1829	1.25
21	Condenser (0.01 mfd.)	30-4169	.20
22	Condenser (2200 mmf.)	30-1057	.40
23	Padder (S.W.)	Part of 20	...
24	Resistor (51,000 ohms)	6098	.20
25	Resistor (5000 ohms)	5310	.20
26	Resistor (10,000 ohms)	4412	.20
27	Resistor (1.0 meg.)	33-1096	.20
28	Resistor (1.0 meg.)	33-1096	.20
29	Resistor (13,000 ohms)	8267	.20
30	Condenser (0.05 mfd.)	Part of 65	....
31	Condenser (0.3 mfd.)	30-4020	.20
32	Padder	Part of 33	....
33	1st I. F. Transformer	32-1711	2.00
34	Padder	Part of 33	....
35	Condenser (0.05 mfd.)	3615-DU	.40
36	Resistor (10 ohms)	33-3041	.25
37	Shadow Meter	45-2083	2.00
38	Padder	Part of 39	....
39	2nd I. F. Transformer	32-1830	2.00

	Description	Part No.	List Price
40	Padder	Part of 39	....
41	Condenser (110 mmf.)	30-1031	.20
42	Condenser (110 mmf.)	8035-DU	.25
43	Resistor (51,000 ohms)	6098	.20
44	Resistor (330,000 ohms)	33-1200	.20
45	Condenser (110 mmf.)	Part of 42	....
46	Condenser (0.01 mfd.)	30-4169S	.20
47	Condenser (0.05 mfd.)	Part of 35	....
48	Condenser (110 mmf.)	30-1031	.20
49	Volume Control (1. meg.)	33-5116	1.45
50	Condenser (0.01 mfd.)	3903-SU	.25
51	Resistor (99,000 ohms)	6099	.20
52	Condenser (0.05 mfd.)	3615-SU	.35
53	Resistor (490,000 ohms)	6097	.20
54	Resistor (99,000 ohms)	6099	.20
55	Condenser (0.2 mfd.)	Part of 65	....
56	Resistor (25,000 ohms)	4516	.20
57	Condenser (0.75 mfd.)	Part of 65	....
58	Resistor (1. meg.)	33-1096	.20
59	Resistor (490,000 ohms)	6097	.20
60	Condenser (0.09 mfd.)	Part of 65	....
61	Resistor (20,000 ohms)	33-1178	.20
62	Condenser (0.015 mfd.)	8318-SU	.35
63	Condenser (2000 mmf.) }	Part of 64A	....
64	Condenser (800 mmf.) }		
64A	Tone Control	30-4333	.75
65	Condenser (0.25 mfd.)	30-4356	1.20
66	Condenser (0.03 mfd.)	8318-SU	.35
67	Condenser (1.0 mfd.)	30-4357	1.30
68	Resistor (7 ohms) }	B.C. 38-6970	....
69	Resistor (8.3 ohms) }		
70	Resistor (30 ohms) }		
71	Resistor (7.8 ohms) }		
72	Condenser (0.015 mfd.) Double	3793-DU	.40
73	Choke	32-7476	1.25
74	Choke	32-7213	1.60
75	Input Transformer	32-7211	2.25
76	Output Transformer (on speaker)	2550	1.75
77	Speaker Model K-13 (641-B)	....	....
78	Speaker Model H-10 (641-X)	....	....
79	Condenser (.006 mfd.)	30-4125	.20
	Tube Shield Base	28-2725	.03
	Tube Shield Body	28-2726	.10
	R. F. Shield	38-6938	.35
	I. F. Shield	38-6808	.25
	4-prong Socket	27-6042	.10
	5-prong Socket	27-6035	.11
	6-prong Socket	27-6036	.11
	7-prong Socket	27-6037	.11
	Speaker Socket	27-6043	.08
	Bezel	28-3164	.50
	Bezel Gasket	27-8036	....
	Bezel Glass	27-8008	.55
	Bezel Frame Gasket	27-7972	....
	Dial	27-5125	....
	Hub and Set Screw Assembly	31-1550	.15
	Spring Clamp	28-2837	.10
	Pilot Lamp	34-2068	.16
	Knob (Station Selector)	27-4206	.12
	Knob (Fine Tuning)	27-4207	.10
	Knob (Volume Control, Tone Control)	27-4208	.10
	Knob (Waveband Switch)	27-4225	....

MODEL 641
Schematic

PHILCO RADIO & TELEV. CORP.



INTERMEDIATE FREQUENCY: 460 Kilocycles.

POWER SUPPLY: 115 volts D. C. use type 4 ballast tube for 230 volt operation. **Fig. 3. Schematic Diagram of Model 641** **WAVE BANDS:** Three: (1) Standard (broadcast); (2) Police; (3) Shortwave.

MODEL 641
Socket, Voltage

PHILCO RADIO & TELEV. CORP.

Trimmers, Notes
Alignment

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 641 requires an accurate signal generator covering standard wave police, and shortwave frequencies. The **PHILCO Model 088 All-Wave Signal Generator,** having a continuous range of from 100 to 20000 K. C., is ideal for this purpose.

An output meter is also needed. **PHILCO Model 025 Circuit Tester** includes a high grade output meter.

Philco No. 3164 Fibre Wrench and **No. 27-7059 Fibre-Handled Screwdriver** complete the equipment needed for making these adjustments. The locations of the various compensating condensers are shown in Fig. 2. Connect the output meter to the plate contacts of the 43 output tubes (using the adapters provided with the "025") and set it at the 0-30 volt range.

I.F.—Connect the antenna lead from the No. 088 Signal Generator to the grid cap of the 78 I.F. amplifier (having removed the grid clip from the tube), and the ground lead to the ground post on the chassis. Set the Signal Generator No. 088 at 460 K. C., volume control of set full on, tone control counter-clockwise, wave band switch in No. 1 position, and condenser gang all the way in. Adjust the signal generator attenuator for approximately ¼ scale reading on the output meter, now adjust condensers ㊳ and ㊵ for maximum reading of the output meter. Remove the signal generator antenna lead from the grid cap (replacing grid clip) and connect to the 6A7 grid cap. Repeat procedure, this time tuning condensers ㉜ and ㉞ for maximum output reading. Care should be taken to keep the signal input from the signal generator low at all times to insure proper peaking of the transformers.

WAVE TRAP—Connect the Signal Generator antenna and ground-leads to the antenna and ground posts of the set. Replace the grid clip on the 6A7 tube cap. With the signal generator operating at 460 K. C. and the set controls adjusted as for I.F. adjustments, adjust wavetrap ① until a minimum reading is obtained in the output meter.

SHORT WAVE—Turn wave band switch to extreme right (position 3) and set dial at 18.0 meg. Set Signal Generator at 18.0 meg. connect a shunt condenser across the oscillator section of the gang and tune the shunt for maximum output. Adjust condensers ④ and ⑮ for maximum output. Remove shunt condenser and adjust condenser ㉓ for correct calibration. Turn dial of set and signal generator to 6.0 meg. and adjust condenser ⑰ for maximum output. Repad condenser ㉓ on 18.0 meg.

STANDARD—Turn wave switch to Standard (position 1) and set dial at 1400 K. C. Set signal generator at 1400 K. C. adjust condensers ⑤, ⑭, ⑱ for maximum. Turn dial of set and signal generator to 580 K. C. and adjust condenser ⑲ for maximum output, retune condenser ⑱ at 1400 K. C.

POLICE BAND—Turn wave band switch to Police band (position 2), turn dial of set and signal generator to 2400 K. C. Adjust condensers ⑥ and ⑬ for maximum output.

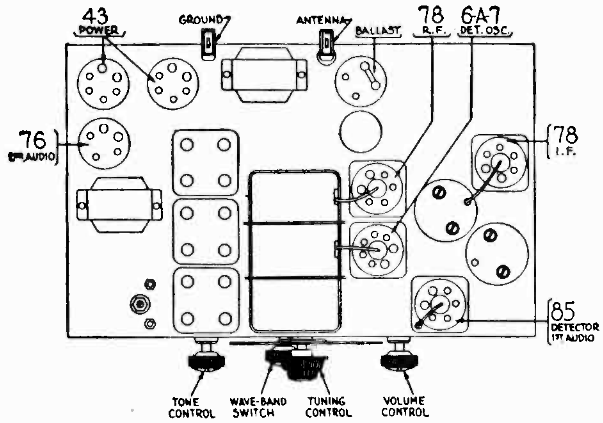


Fig. 1. Tube Sockets, top view

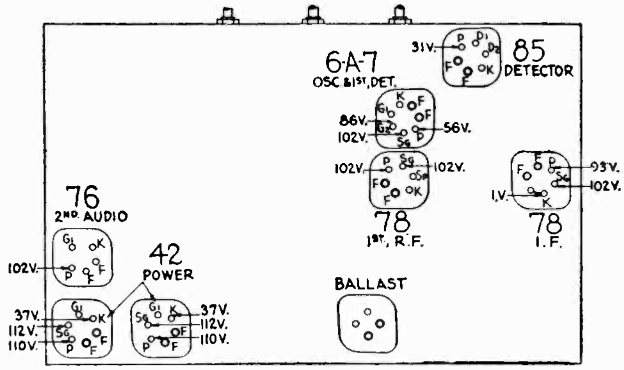


Fig. 2. Bottom View of Sockets with voltage measurements

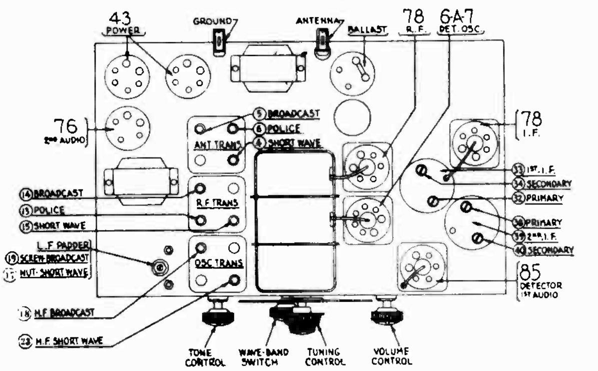


Fig. 5. Location of Compensating Condensers

TYPE CIRCUIT: Superheterodyne with preselector R. F. amplifier, and push-pull output (3 watts); built-in connections for Philco all-wave aerial; aerial selector built into and operated by wave band switch.

POWER CONSUMPTION: 40 watts.

SPEAKER: 641B—K-13; 641X—H-10.

COVERAGE OF EACH BAND: Standard (1), 530 to 1720 K. C.; Police (2), 2200 to 2600 K. C.; Shortwave (3), 5.8 to 18.0 Meg.

TUNING DRIVE: Dual Planetary, ball bearing, 80 to 1 ratio for slow speed tuning, 10 to 1 on main shaft.

TONE CONTROL: 3-position, base compensation effective in first position, second position (medium), third position (brilliant).

PHILCO RADIO & TELEV. CORP.

MODEL 643
Schematic

WAVE BANDS: Four—(1) Longwave (U. S. weather forecasts); (2) Standard; (3) Police; (4) Shortwave.

COVERAGE OF EACH BAND: Band 1, 150-390 K.C.; Band 2, 540-1750 K.C.; Band 3, 1.75 to 5.8 megacycles; Band 4, 5.8 to 18.0 megacycles.

TUNING DRIVE: Dual planetary, ball bearing, 80 to 1 ratio for slow speed tuning.

TONE CONTROL: 3-Position.

INTERMEDIATE FREQUENCY: 460 K.C.

CURRENT CONSUMPTION: "A" battery, .750 M.A.; "B" battery, 22 M.A.

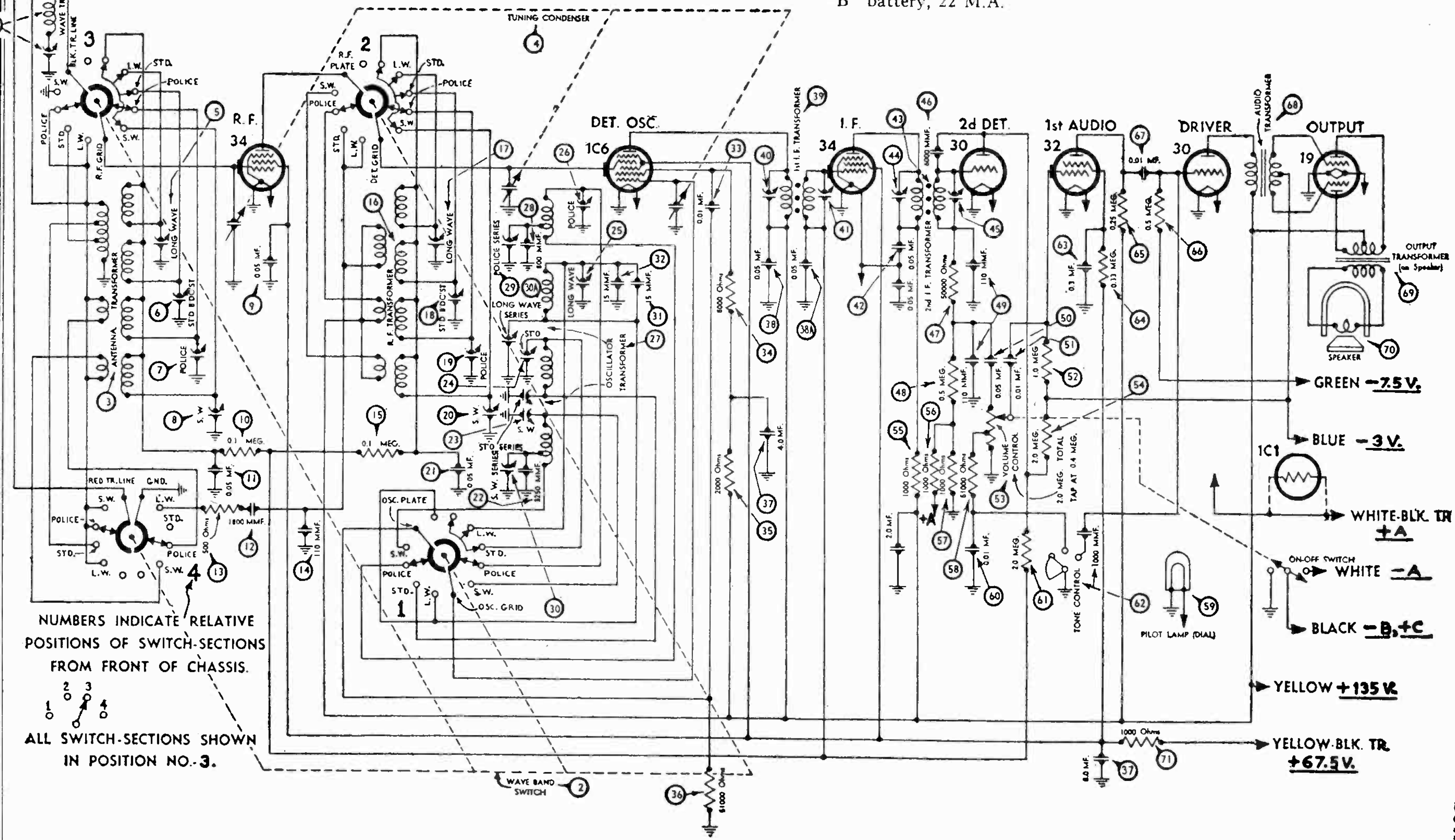


Fig. 3. Schematic Diagram of Model 643

MODEL 643
Socket, Voltage
Trimmers, Notes
Alignment

PHILCO RADIO & TELEV. CORP.

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 643 requires an accurate signal generator covering long-wave, standard wave, police and short-wave frequencies.

The locations of the various compensating condensers are shown in Fig. 2. Connect the output meter to the plate and cathode contacts of the type 30 driver tube (using the adapters provided with the "025") and set it at the 0-30 volt range.

I.F.—Set the signal generator at 460 K.C. with attenuator set at minimum, and attach its antenna lead to the grid cap of the 34 I.F. amplifier tube (removing grid lead). Connect ground lead to ground terminal on set or some part of chassis. Set the dial at 55 and turn the waveband switch to position 2 (standard). Adjust the volume control of set to almost maximum (just before oscillator hiss becomes noticeable), and the 088 attenuator so that about one-fourth (¼) scale reading is had on the output meter. With a fibre screwdriver adjust condensers ㊹ and ㊺ (2nd I.F.) for maximum reading on output meter. Turn attenuator of signal generator to minimum and remove its antenna lead from the grid of the 34 I.F. tube, placing it on the grid of the 1C6. Adjust 088 attenuator as before then proceed to adjust condensers ㊵ and ㊶ (1st I.F.) for maximum reading. Then remove the 088 oscillator lead and replace grid connection. Care should be taken to keep the output meter reading during adjustments at about one-fourth scale reading. This should be done by using the 088 attenuator control.

WAVE TRAP—Connect the Signal Generator antenna and ground leads to the antenna and ground posts of the set. With the signal generator operating at 460 K.C. and the set controls adjusted as before for I.F. alignment, adjust wavetrap ① until a minimum reading is obtained in the output meter.

SHORT WAVE—In adjusting the short wave or high frequency band, the R.F. compensator will have a tendency to "pull" or **change** the frequency of the oscillator. By shunting a padding or variable condenser across the oscillator section of the gang and tuning it so that the second harmonic, instead of the fundamental, beats with the incoming signal, this "pull" can be minimized. The procedure for tuning this band is as follows:

Set the dial of the receiver at 18 megacycles (top scale) and the 088 dial at the same frequency. Connect the shunt condenser to the oscillator section of the gang and tune it so that the second harmonic of the oscillator beats with the 18 M.C. signal from the 088. Next tune padders ⑳ and ⑧ (antenna and R.F.) for maximum reading of the output meter. Disconnect shunt condenser and tune padder ㉓ (osc.) for correct dial calibration. The oscillator frequency, when correctly set, will be higher than that of the incoming signal and the image frequency lower. In order to check this it should be possible to tune the image at approximately 17.1 M.C. by increasing the input from the 088 oscillator.

For the low frequency adjustment of this band, turn the dial to 6.0 M.C., set the signal generator at 6.0 M.C. and adjust condenser ㉚ for maximum reading. This compensator is underneath the chassis and reached from underneath.

POLICE BAND—Turn waveband switch to position 3 from left (police band); set dial at 5.5 and signal generator at 5500 K.C. Adjust condenser ㉖, ⑲ and ⑦ for maximum reading (osc., R.F. and Ant.). Turn dial to 1.8 and signal generator to 1800. Then adjust condenser ㉙ (nut) for maximum output reading.

STANDARD WAVE—Turn waveband switch to position 2 (standard broadcast), set signal generator at 1500 and dial of set at 150. Now adjust the oscillator, R.F., and antenna "Standard" condensers. These are ㉔, ⑱ and ⑥, respectively.

Now turn the dial to 60, set signal generator at 600 and adjust condenser ㉘A (oscillator standard-series) (screw) for maximum reading.

LONG WAVE (Weather) BAND—Turn waveband switch to position 1 (left) (Longwave). Set dial at 35 and signal generator at 350 K.C. Adjust condensers ㉕, ⑰ and ⑤ (oscillator, R.F., and Antenna Longwave) for maximum reading.

Turn dial to 17, signal generator to 170 and adjust condenser ㉚A (longwave series) for maximum reading.

In making these adjustments be sure that the signal level from the 088 is kept as low as possible. If the dial calibration is off, go over the low and high frequency padders in the oscillator circuit of each band until this is corrected.

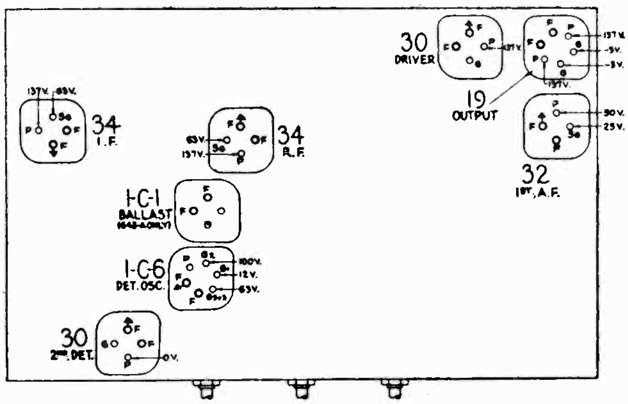


Fig. 1. Tube Sockets as viewed from bottom

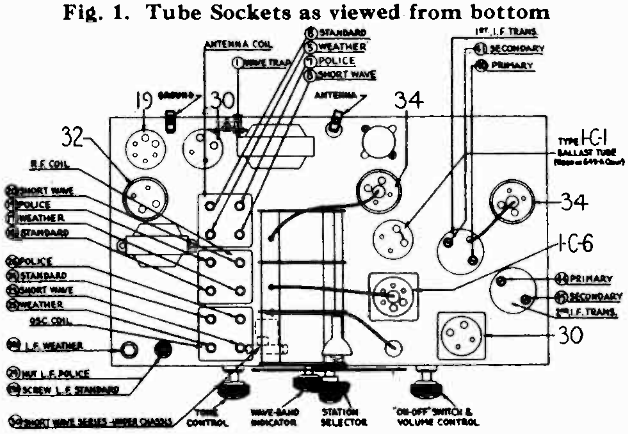


Fig. 2. Locations of Compensating Condensers

General Specifications

POWER SUPPLY: Battery operated Model 643 uses a 2-volt storage battery (Philco 172-R). Model 643-A uses dry A battery (Philco 41-8006). Both sets use a dry combination "B" and "C" battery unit (41-8061). This has a socket into which the plug on the battery cable attached to chassis is to be inserted.

TUBES USED: 1 type 34, pre-selector; 1 type 1C6, Detector-Oscillator; 1 type 34, I. F.; 1 type 30, 2nd Detector and A. V. C.; 1 type 32, 1st A. F.; 1 type 30, driver; 1 type 19 output. Model 643-A has also a ballast tube, type 1C1, to maintain constant filament voltage on all tubes. The socket for this tube exists in both 643 and 643-A chassis, but in the former, the type 1C1 tube is not used, and the filament contacts of the socket are shorted by a metal jumper.

MODEL 643
Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Replacement Parts for Model 643

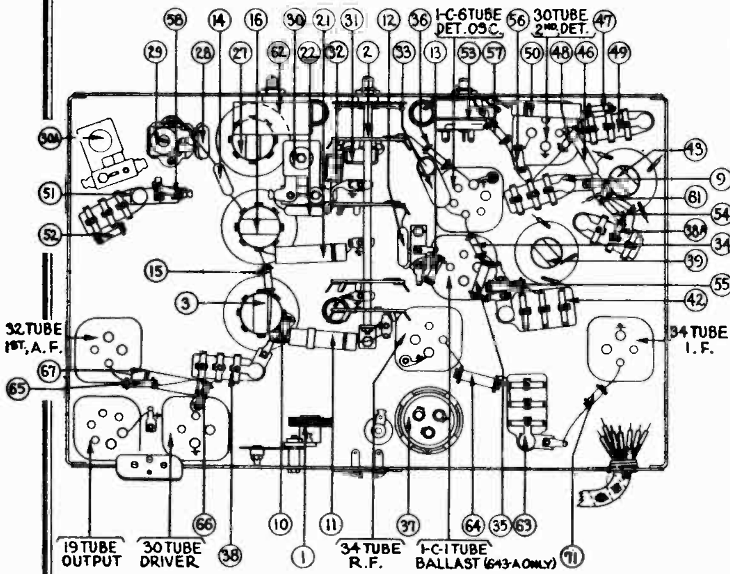


Fig. 4. Bottom View of Chassis

	Description	Part No	List Price
1	Wave Trap Assembly	38-6850	$1.10
2	Wave Band Switch	42-1128	2.50
3	Antenna Transformer	32-1806	3.25
4	Condenser Gang Assembly	31-1634	5.50
5	Padder	Part of 32-1806 (3)	....
6	Padder		
7	Padder		
8	Padder		
9	Condenser (.05 mfd.)	3615-SG	.35
10	Resistor (100,000 ohms)	6099	.20
11	Condenser (.05 mfd. tubular)	30-4020	.35
12	Condenser (Mica 1800 mmf.)	6018	.40
13	Resistor (500 ohms)	33-1207	.20
14	Condenser (Mica 110 mmf.)	30-1031	.35
15	Resistor (100,000 ohms)	6099	.20
16	R.F. Transformer	32-1807	3.00
17	Padder	Part of 32-1807 (16)	....
18	Padder		
19	Padder		
20	Padder		
21	Condenser (Tubular .05 mf.)	30-4020	.35
22	Condenser (Mica 3250 mmf.)	30-1061	.45
23	Padder	Part of 32-1808 (27)	....
24	Padder		
25	Padder		
26	Padder		
27	Oscillator Transformer	32-1808	2.50
28	Condenser (Mica 600 mmf.)	30-1049	.35
29	Padding Condenser	31-6027	.70
30	Padding Condenser	04000-R	.45
30A	Padding Condenser	04000-F	.25
31	Condenser (Mica 15 mmf.)	30-1030	.35
32	Condenser (Mica 15 mmf.)	30-1030	.35
33	Condenser (Tubular .01 mf.)	30-4145	.25

	Description	Part No.	List Price
34	Resistor (8000 ohms)	5838	.20
35	Resistor (2000 ohms)	6984	.20
36	Resistor (51,000 ohms)	6098	.20
37	Electrolytic Condenser	30-2127	1.50
38	Condenser (0.05 mf.)	3615-SG	.35
38A	Condenser (.05 mfd.)	3615-SG	.35
39	1st I.F. Transformer	32-1809	1.50
40	Padder	Part of (39)	....
41	Padder		
42	Condenser (Twin 0.05 mf.)	3615-DU	.40
43	2nd I.F. Transformer	32-1810	2.00
44	Padder	Part of (43)	....
45	Padder		
46	Condenser (Mica 6000 mmf.)	6359	.60
47	Resistor (50,000 ohms)	6098	.20
48	Resistor (.5 meg.)	4410	.20
49	Condenser (Twin 110 mmf.)	30-1031	.35
50	Condenser (.05 mf.)	3615-SU	.35
51	Condenser (.01 mf.)	3903-SU	.25
52	Resistor (1 meg.)	33-1096	.20
53	Volume Control and Switch	33-5119	1.10
54	Resistor (2 meg.)	33-1025	.20
55	Resistor (1000 ohms)	33-1028	.20
56	Resistor (1000 ohms)	33-1028	.20
57	Resistor (1000 ohms)	33-1028	.20
58	Resistor (50,000 ohms)	6098	.20
59	Pilot Lamp	5316	.35
60	Condenser (.01 mf.)	3903-SG	.25
61	Resistor (2 meg.)	33-1025	.20
62	Tone Control	30-4352	.75
63	Condenser (0.3 mf.)	6287-DG	.40
64	Resistor (330,000 ohms)	6046	.20
65	Resistor (250,000 ohms)	4410	.20
66	Resistor (500,000 ohms)	6097	.20
67	Condenser (0.01 mf.)	3903-SU	.25
68	Input Transformer	32-7473	1.75
69	Output Transformer	32-7472	1.50
70	Voice Coil and Cone Assembly (K-7)	36-3159	.80
71	Resistor (1000 ohms)	5837	.20
	Battery Cable Assembly	41-3144	1.50
	Tube Shield Base (2)	28-2725	.03
	Tube Shield Base (3)	8004	.01
	Tube Shield Body (2)	28-2726	.10
	Tube Shield Body (3)	8005	.10
	4-prong Tube Socket (5)	27-6044	.10
	5-prong Tube Socket (1)	27-6042	.10
	6-prong Tube Socket (2)	27-6036	.11
	Speaker Socket (1)	27-6043	.08
	Dial Scale	27-5124	.25
	Knobs (1)	27-4206	.12
	Knobs (1)	27-4207	.10
	Knobs (2)	27-4208	.10
	Knobs (1)	27-4219	.10
	Bezel	28-2933	.55
	Bezel Glass	27-8009	.55
	Bezel Frame Gasket	27-7972	....
	Chassis Mounting Screw	W-1496-H	1.60 per C.
	Chassis Mounting Washer	27-4021	1.40 per C.
	Chassis Mounting Cushion	27-4202	.03
	"A" Battery	172R	....
	"B" and "C" Battery	P9068	....

MODEL 645
Socket, Voltage
Chassis, Parts

PHILCO RADIO & TELEV. CORP.

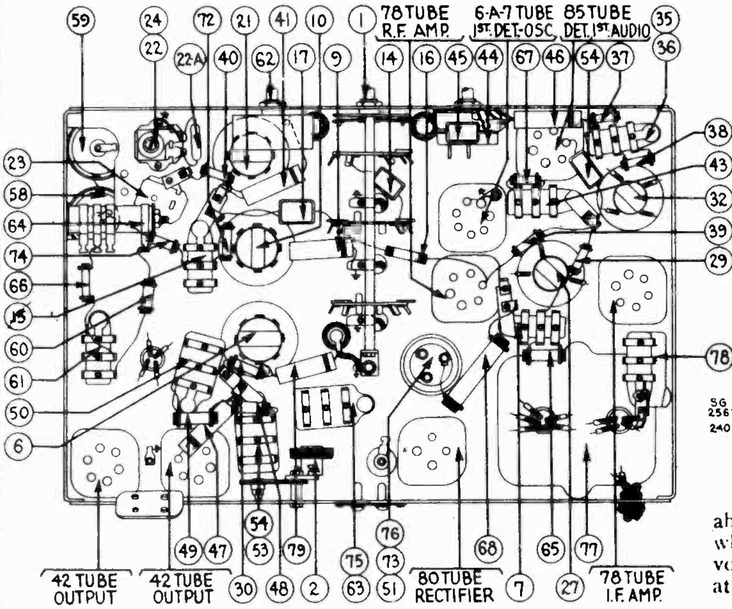
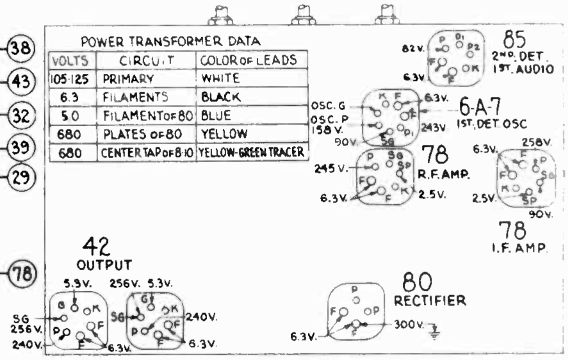


Fig. 6. Base View

TUBE SOCKET VOLTAGES
(Measured from Tube Contact to Gnd.)



VOLTS	CIRCUIT	COLOR OF LEADS
105-125	PRIMARY	WHITE
6.3	FILAMENTS	BLACK
5.0	FILAMENT OF 80	BLUE
680	PLATES OF 80	YELLOW
680	CENTER TAP OF 8-10	YELLOW-GREEN TRACER

Fig. 3. Tubes as Viewed from Bottom

The voltages at the points indicated by the arrows above were obtained with a Philco type 025 Circuit Tester which contains a high resistance (1000 ohms per volt) voltmeter. Volume control at minimum, waveband switch at standard broadcast. K31 speaker.

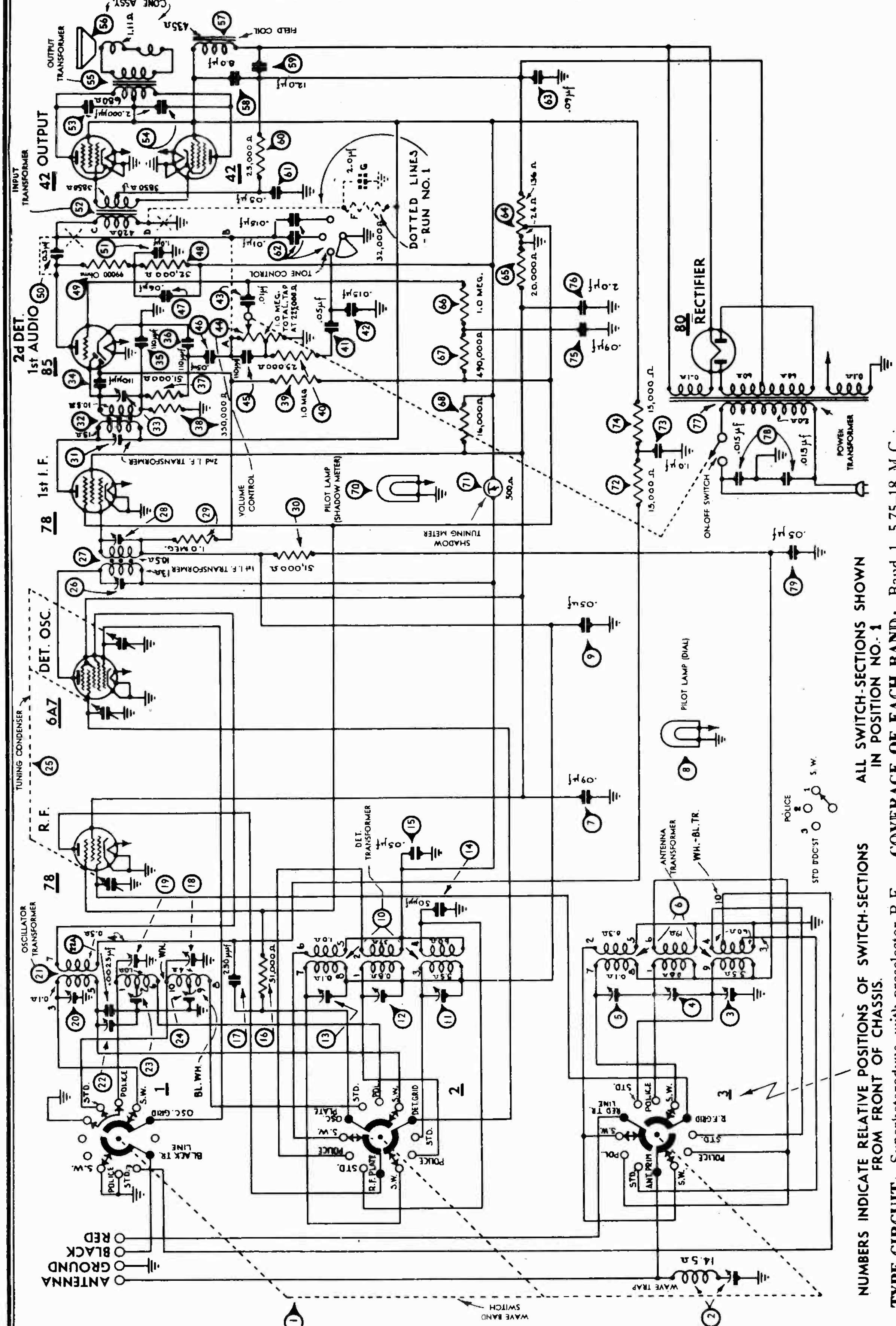
Schematic Number	Part and Description	Part No.	List Price
1	Wave Band Switch	42-1153	$2.00
2	Wave Trap	38-6850	1.10
3	Compensater (Ant. Standard)	31-6058	.60
4	Compensater (Ant. Police)		
5	Compensater (Ant. Short-Wave)		
6	Ant. Transformer	32-1867	3.00
7	Condenser (.09 mf. Bakelite)	4989-SG	.35
8	Pilot Lamp (Dial)	34-2039	.15
9	Condenser (.05 mf. Tubular)	30-4020	.20
10	Det. Transformer	32-1868	3.00
11	Compensater (Det. Standard)	31-6063	.50
12	Compensater (Det. Police)		
13	Compensater (Det. Short-Wave)		
14	Condenser (50 mmf.)	30-1029	.20
15	Condenser (.05 Bakelite)	3615-SG	.35
16	Resistor (51.000 ohms. ¼ watt)	33-351143	.20
17	Condenser (.00025 mf. Mica)	30-1056	.40
18	Compensater (Osc. Standard)	31-6058	.60
19	Compensater (Osc. Police)		
20	Compensater (Osc. Short-Wave)		
21	Osc. Transformer	32-1976	1.75
22	Compensater (Short-Wave Series)	31-6027	.70
22a	Condenser (.0025 mf. Mica)	7006	.40
23	Compensater (Police Series)	31-6073	.50
24	Compensater (Standard Series)	Part of (23)	
25	Tuning Condenser Assy	31-1555	4.50
26	Compensater (1st I.F. Pri.)	31-6053	.50
27	1st I.F. Transformer	32-1917	1.75
28	Compensater (1st I.F. Sec.)	Part of (26)	
29	Resistor (1.0 Meg., ¼ watt)	33-510143	.20
30	Resistor (51,000 ohm, ¼ watt)	33-351143	.20
31	Compensater (2nd I.F. Pri.)	31-6053	.50
32	2nd I.F. Transformer	32-1836	1.60
33	Compensater (2nd I.F. Sec.)	Part of (31)	
34	Condenser (.00011 mf. Mica)	30-1031	.20
35	Condenser (.00011 mf. Twin Bakelite)	8035-DG	.25
36	Condenser (.00011 mf.)	Part of (35)	
37	Resistor (51.000 ohm, ¼ watt)	33-351143	.20
38	Resistor (330,000 ohm. ¼ watt)	33-433133	.20
39	Resistor (1.0 Meg., ¼ watt)	33-510143	.20
40	Resistor (25,000 ohm, ⅓ watt)	33-325243	.20
41	Condenser (.05 mf. Tubular)	30-4020	.20
42	Condenser (.015 mf.)	Part of (62)	
43	Condenser (.01 mf. Bakelite)	3903-SU	.25
44	Volume Control (1.0 Meg. ohm)	33-5113	1.45
45	Condenser (.00011 mf. Mica)	30-1031	.20
46	Condenser (.05 mf. Tubular)	30-4020	.20
47	Condenser (.06 mf. Tubular)	30-4123	.20
48	Resistor (32,000 ohm, ½ watt)	33-332333	.20
49	Resistor (99,000 ohm, ½ watt)	33-399343	.20
50	Resistor (.3 mf. Twin Bakelite)	6287-DU	.40
51	Elec. Condenser (1.0 mf., 1.0 mf., 2.0 mf.)	30-2080	1.85
52	Audio Input Transformer	32-7532	4.25
53	Condenser (.002 mf. Twin Bakelite)	7296-DU	.30
54	Condenser (.002 mf.)	Part of (53)	
55	Output Transformer	2585	1.25
56	Voice Coil Cone Assy. (B. G. K31)	36-3159	.80
57	Field Coil Assy. (B. G. K. 31)	36-3463	3.75
58	Electrolytic Condenser (8. mf.)	30-2025	1.35
59	Electrolytic Condenser (12 mf.)	30-2117	1.50
60	Resistor (25.000 ohm. ⅓ watt)	33-325243	.20
61	Condenser (.05 mf. Bakelite)	3615-SG	.35

Schematic Number	Part and Description	Part No.	List Price
62	Program Control	30-4406	$0.75
63	Condenser (.09 mf. Twin Bakelite)	4989-DG	.40
64	B.C. Resistor (136 ohm, 24 ohm)	33-3236	.20
65	Resistor (20.000 ohm, 1 watt)	33-320433	.20
66	Resistor (490.000 ohm. ¼ watt)	33-449143	.20
67	Resistor (1.0 meg. ohm, ¼ watt)	33-510143	.20
68	Resistor (16,000 ohm. 3 watt)	33-316633	.30
70	Pilot Lamp (Shadow Meter)	34-2064	.09
71	Shadow Meter	45-2083	2.50
72	Resistor (15,000 ohm, ¼ watt)	33-315133	.20
73	Electrolytic Condenser (1.0 mf.)	Part of (51)	
74	Resistor (15,000 ohm. ¼ watt)	33-315133	.20
75	Condenser (.09 mf.)	Part of (63)	
76	Electrolytic Condenser (2.0 mf.)	Part of (51)	
77	Power Transformer (110 V., 60 cycle)	32-7462	6.00
78	Condenser (.015 mf. Twin Bakelite)	3793-DG	.40
79	Condenser (.05 mf. Tubular)	30-4020	.20
	Power Transformer (115 V., 25 cycle)	32-7407	9.00
	Power Transformer (220 V., 50-60 cycle)	32-7464	6.50
	4-prong Socket	27-6044	.10
	6-prong Socket	27-6036	.11
	7-prong Socket	27-6037	.11
	Speaker Socket	27-6043	.08
	R.F. Transformer Shield	38-6921	.35
	I.F. Transformer Shield	38-6808	.25
	Tube Shield Base	28-2725	.03
	Tube Shield Body	28-2726	.10
	Shadow Meter Light Shield	28-2917	.02
	Electrolytic Condenser Clamp	6440	.05
	Electrolytic Condenser Insulator	27-7194	.01
	Dial Scale	25-5165	.30
	Dial Hub Assy	31-1724	.15
	Screen Bracket Assy	29-3061	.07
	Scale Guard	27-8140	.01
	Glowing Arrow Mask	27-5160	.20
	Glowing Arrow Screen	27-5159	.10
	Mask Arm	29-3274	.03
	Link	29-3338	.03
	Coupling	29-3339	.06
	Sub. Base Mtg. Foot	29-2959	.03
	Chassis Mtg. Screw	W-1496-A	1.60C
	Chassis Mtg. Washer (Rubber)	27-4201	1.40C
	Chassis Mtg. Cushion (Rubber)	27-4202	.03
	Knob (Tuning)	27-4206	.12
	Knob (Slow Speed Tuning)	27-4207	.10
	Knob (Volume, Tone)	27-4208	.10
	Knob (Wave Band)	27-4225	.10
	Bezel	28-3164	.50
	Bezel Mounting Screw	W-1494	.30C
	Bezel Glass	27-8113	.07
	Bezel Glass Gasket	27-8036	.01
	Shadow Screen	27-5120	1.50C
	Speaker Cable	02722	.30
	Bottom Shield	38-7189	.40
	Mask	28-3433	.25
	Pilot Lamp Bracket Assy	38-6789	.50
	Front Bumper	27-4200	3.75C
	Speaker Mtg. Bolt	29-3128	.02
	Speaker Mtg. Nut	W-124-A	.35C
	*Voice Coil Cone Assy. (Furn. H-21)	02625	1.20
	□Field Coil Assy. (Furn. H-21)	36-3461	3.75
	G. Elec. Condenser (2.0 mf.)	Part of 30-2080	
	F. Resistor (32.000 ohm)	3525	.20

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 645
Schematic

PHILCO RADIO & TELEV. CORP.



NUMBERS INDICATE RELATIVE POSITIONS OF SWITCH-SECTIONS FROM FRONT OF CHASSIS.

ALL SWITCH-SECTIONS SHOWN IN POSITION NO. 1

TYPE CIRCUIT: Superheterodyne, with preselector R.F. amplifier, and push-pull pentode output (7 watts); built in connections for Philco All-wave aerial; aerial selector built into and operated by wave-band switch.

COVERAGE OF EACH BAND: Band 1, 5.75–18 M.C.; Band 2, 1.75–5.8 M.C.; Band 3, 540–1750 K.C.

POWER CONSUMPTION: 85 watts.

TUNING DRIVE: Dual planetary, ball bearing. 80 to 1 ratio for slow-speed tuning; glowing arrow wave band indicator.

SPEAKER: 645 Baby Grand Model—K31; 645 Furniture Model—H21.

INTERMEDIATE FREQUENCY: 460 K.C.

POWER SUPPLY: 115v., 60 cycle A.C.

MODEL 645
Trimmers
Coil Data
Alignment

PHILCO RADIO & TELEV. CORP.

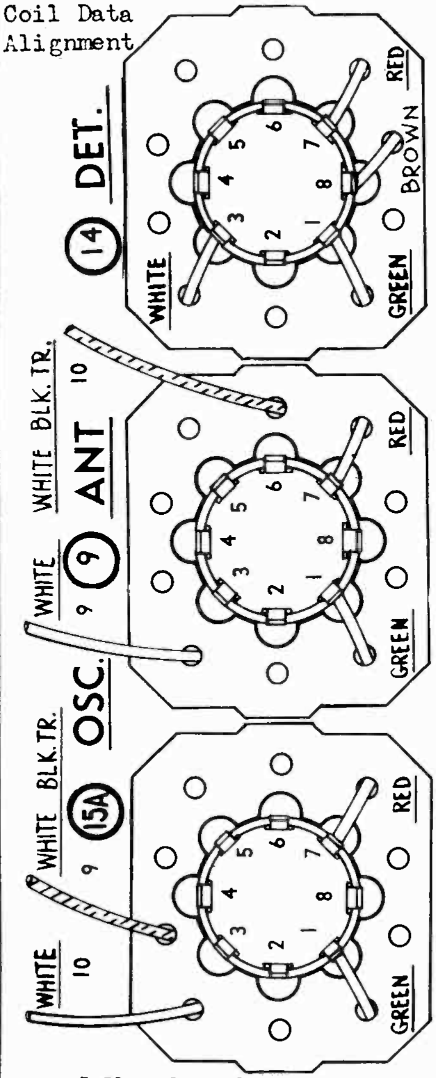


Fig. 1. R.F. Transformers

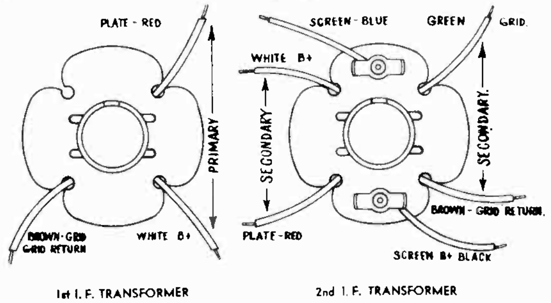


Fig. 2. I.F. Transformers

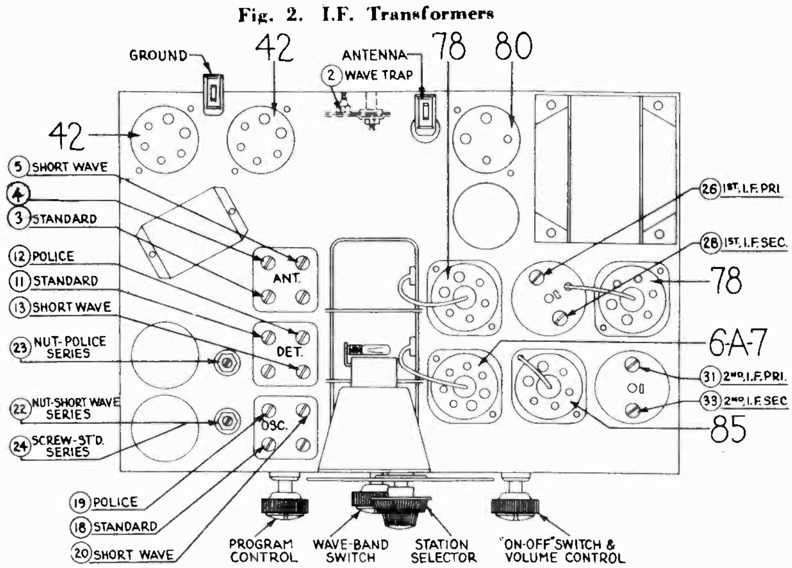


Fig. 4. Location of Compensating Condensers

Adjusting Compensating Condensers

The locations of the various compensating condensers are shown in Fig. 4. Connect the output meter to the plate contacts of the type 42 output tubes (using the adapters provided with the "025") and set it at the 0-30 volt range.

INTERMEDIATE FREQUENCY: Set the signal generator at 460 K.C. with attenuator set at minimum, connect a .001 mf. condenser in series with its antenna lead and attach it to the grid cap of the 78 I.F. amplifier tube. Connect ground lead to ground terminal on set. Set the dial at 55 and turn the waveband switch to position 3 (extreme left). Adjust the volume control of set to almost maximum, and the 088 attenuator so that about one-fourth (¼) scale reading is had on the output meter. With a fibre screwdriver adjust condensers (31) and (33) (2nd I.F.) for maximum reading on output meter. Turn attenuator of signal generator to minimum and remove its antenna lead from the grid of the 78 I.F. tube; place it on the grid of the 6A7. Adjust 088 attenuator as before, then proceed to adjust condensers (26) and (28) (1st I.F.) for maximum output meter reading. Then remove the 088 oscillator lead. Care should be taken to keep the output meter reading during adjustments at about one-fourth scale reading. This should be done by using the 088 attenuator control.

WAVE TRAP: Connect the Signal Generator antenna and ground leads to the antenna and ground posts of the set. With the signal generator operating at 460 K.C. and the set controls adjusted as before for I.F. alignment, adjust wave trap (2) until a minimum reading is obtained in the output meter.

SHORT WAVE:. In adjusting the short wave or high frequency band, the det. compensator will have a tendency to "pull" or change the frequency of the oscillator. By shunting a padding or variable condenser (about .00025 Mf.) across the oscillator section of the gang (front section) and tuning it so that the second harmonic, instead of the fundamental, beats with the incoming signal, this "pull" can be minimized. The procedure for tuning this band is as follows:

Set the dial of the receiver at 18 megacycles (top scale) and the 088 dial at the same frequency. Turn wave band switch to position 1 (extreme right). Connect the shunt condenser to the oscillator section of the gang and tune it so that the second harmonic of the oscillator beats with the 18 M.C. signal from the 088. Next tune condensers (5) and (13) (antenna and det.) for maximum reading of the output meter. Disconnect shunt condenser and tune condenser (20) (osc.) for correct dial calibration. The oscillator frequency, when correctly set, will be higher than that of the incoming signal and the image frequency lower. In order to check this it should be possible to pick up the image at approximately 17.1 M.C. by increasing the input from the 088 oscillator.

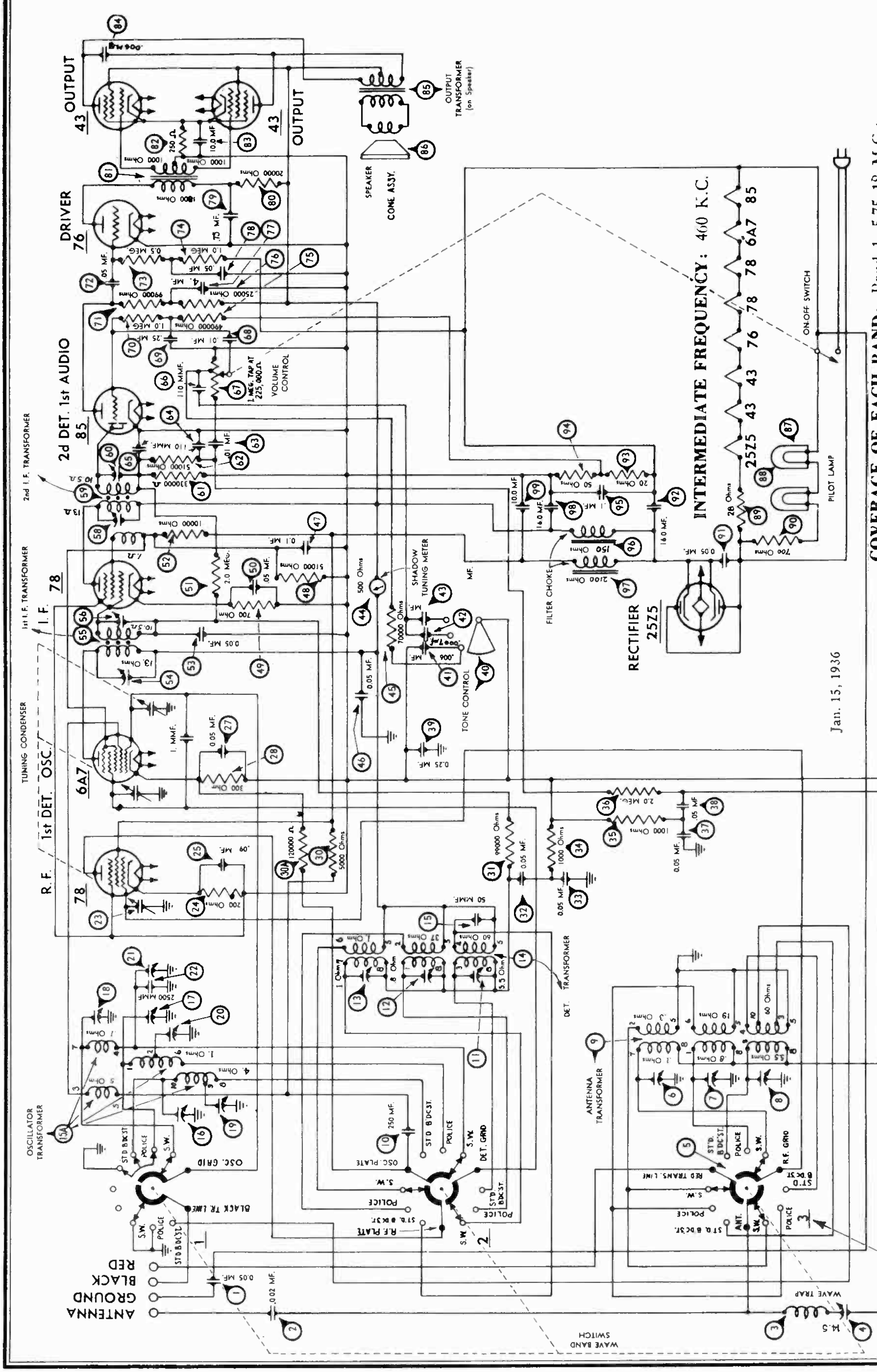
For the low frequency adjustment of this band, turn the dial to 6.0 M.C., set the signal generator at 6.0 M.C. and adjust condenser (22) (nut) for maximum output meter reading. Readjust condenser (20) at 18.0 M.C.

POLICE: Turn wave band switch to position 2 (center), set signal generator at 5500 and dial of set at 5.5. Adjust condensers (19), (1) and (12) (osc., ant., and det.) for maximum output. Turn the set dial to 1.8 and the signal generator to 1800. Adjust condenser (23) (nut) (osc. series) for maximum output meter reading.

STANDARD WAVE: Turn waveband switch to position 3 (extreme left), set signal generator at 1500 and dial of set at 150. Now adjust the oscillator, antenna and det. "Standard" condensers. These are (18), (3) and (11) respectively. Turn the dial to 60, set signal generator at 600 and adjust condenser (24) (oscillator standard series), (screw) for maximum output meter reading.

MODEL 651
Schematic

PHILCO RADIO & TELEV. CORP.



COVERAGE OF EACH BAND: Band 1, 5.75-18 M.C.; Band 2, 1.75-5.8 M.C.; Band 3, 540-1750 K.C.

TUNING DRIVE: Dual planetary, ball bearing, 80 to 1 ratio for slow-speed tuning; glowing arrow wave band indicator.

SPEAKER: 651 Baby Grand Model—KR13; Furniture Model—HR5.

ALL SWITCH-SECTIONS SHOWN IN POSITION NO. 1 STD B'DCST

NUMBERS INDICATE RELATIVE POSITIONS OF SWITCH-SECTIONS FROM FRONT OF CHASSIS.

Fig. 5. Schematic Diagram of Model 651

POWER CONSUMPTION: 65 watts.

MODEL 651
Socket, Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

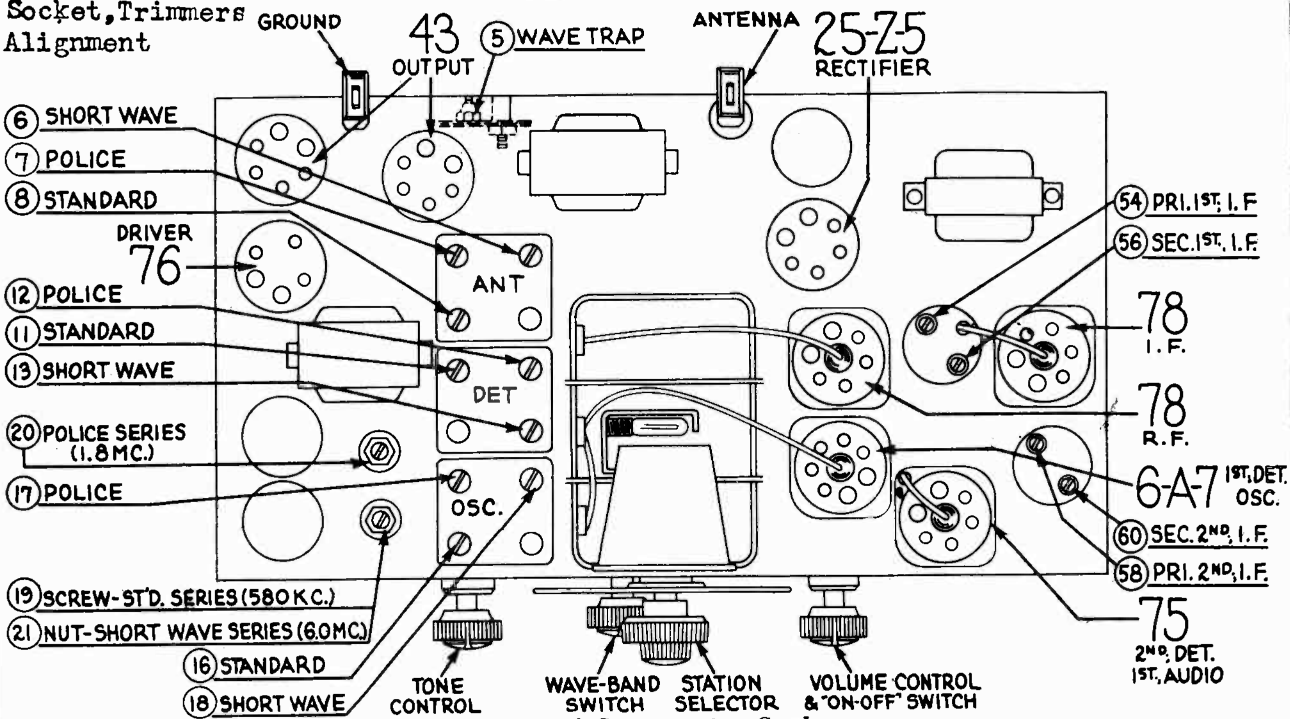


Fig. 4. Location of Compensating Condensers

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 651 requires an accurate signal generator covering I.F., standard-wave, police and short-wave frequencies. The **PHILCO Model 088 All-Wave Signal Generator,** having a continuous range of from 100 to 20,000 K.C., is ideal for this purpose.

An output meter is also needed. **PHILCO Model 025 Circuit Tester** includes a high grade output meter.

Philco No. 3164 fibre wrench and No. 27-7059 fibre-handled screwdriver complete the equipment needed for making these adjustments. The locations of the various compensating condensers are shown in Fig. 4. Connect the output meter to the plate contacts of the type 43 output tubes (using the adapters provided with the "025") and set it at the 0-30 volt range.

INTERMEDIATE FREQUENCY: Set the signal generator at 460 K.C. with attenuator set at minimum, connect a .001 mf. condenser in series with its antenna lead and attach it to the grid cap of the 78 I.F. amplifier tube. Connect ground lead to ground terminal on set. Set the dial at 55 and turn the waveband switch to position 3 (extreme left). Adjust the volume control of set to almost maximum, and the 088 attenuator so that about one-fourth (¼) scale reading is had on the output meter. With a fibre screwdriver adjust condensers (58) and (60) (2nd I.F.) for maximum reading on output meter. Turn attenuator of signal generator to minimum and remove its antenna lead from the grid of the 78 I.F. tube; place it on the grid of the 6A7. Adjust 088 attenuator as before, then proceed to adjust condensers (54) and (56) (1st I.F.) for maximum output meter reading. Then remove the 088 oscillator lead. Care should be taken to keep the output meter reading during adjustments at about one-fourth scale reading. This should be done by using the 088 attenuator control.

WAVE TRAP: Connect the Signal Generator antenna and ground leads to the antenna and ground posts of the set. With the signal generator operating at 460 K.C. and the set controls adjusted as before for I.F. alignment, adjust wave trap (4) until a minimum reading is obtained in the output meter.

SHORT WAVE: In adjusting the short wave or high frequency band, the det. compensator will have a tendency to "pull" or **change** the frequency of the oscillator. By shunting a padding or variable condenser (about .00025 Mf.) across the oscillator section of the gang (front section) and tuning it so that the second harmonic, instead of the fundamental, beats with the incoming signal, this "pull" can be minimized. The procedure for tuning this band is as follows:

Set the dial of the receiver at 18 megacycles (top scale) and the 088 dial at the same frequency. Turn wave band switch to position 1 (extreme right). Connect the shunt condenser to the oscillator section of the gang and tune it so that the second harmonic of the oscillator beats with the 18 M.C. signal from the 088. Next tune condensers (6) and (13) (antenna and det.) for maximum reading of the output meter. Disconnect shunt condenser and tune condenser (18) (osc.) for correct dial calibration. The oscillator frequency, when correctly set, will be higher than that of the incoming signal and the image frequency lower. In order to check this it should be possible to pick up the image at approximately 17.1 M.C. by increasing the input from the 088 oscillator.

For the low frequency adjustment of this band, turn the dial to 6.0 M.C., set the signal generator at 6.0 M.C. and adjust condenser (21) (nut) for maximum output meter reading. Readjust condenser (18) at 18.0 M.C.

POLICE: Turn wave band switch to position 2 (center), set signal generator at 5500 and dial of set at 5.5. Adjust condensers (7), (12) and (17) (ant., det., and osc.) for maximum output. Turn the set dial to 1.8 and the signal generator to 1800. Adjust condenser (20) (osc. series) for maximum output meter reading.

STANDARD WAVE: Turn waveband switch to position 3 (extreme left), set signal generator at 1500 and dial of set at 150. Now adjust the oscillator, antenna and det. "Standard" condensers. These are (16), (11) and (8) respectively.

Now turn the dial to 60, set signal generator at 600 and adjust condenser (19) (oscillator standard series), (screw) for maximum output meter reading.

Parts List

PHILCO RADIO & TELEV. CORP.

MODEL 651
Voltage, Chassis

TUBE SOCKET VOLTAGES
(Measured from Tube Contact to B—)

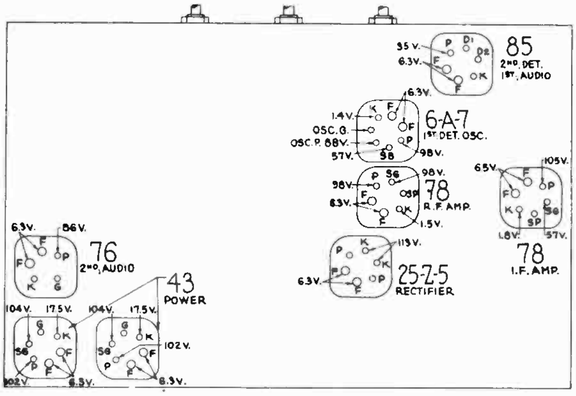


Fig. 3. Tubes as Viewed from Bottom

The voltages at the points indicated by the arrows above were obtained with a Philco type 025 Circuit Tester which contains a high resistance (1000 ohms per volt) voltmeter. Volume control at minimum, waveband switch at standard broadcast. KR-13 speaker.

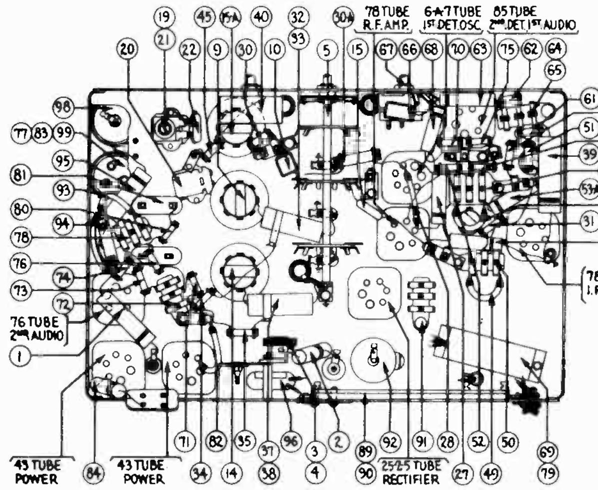


Fig. 6. Base View

NOTE: For Fig. 1. R.F. Transformers, For Fig. 2. I.F. Transformers, See MODEL 645.

Model 651

Schematic Number	Part and Description	Part No.	List Price
1	Condenser (.05 mf. Tubular)	30-4020	$0.20
2	Condenser (.002 mf.) Tubular	30-4177	.25
3	Wave Trap	38-6972	.75
4	Compensating Cond.	Part of 3	....
5	Wave Band Switch	42-1151	1.20
6	Compensating Condenser (Ant. S. Wave)	31-6058	.60
7	Compensating Condenser (Ant. Police)		
8	Compensating Condenser (Ant. Std.)		
9	Aerial Transformer	32-1867	3.00
10	Condenser (.00025 mf. Mica)	30-1032	.25
11	Compensating Condenser (Det. Std.)	31-6063	.50
12	Compensating Condenser (Det. Pol.)		
13	Compensating Condenser (Det. S. Wave)		
14	Det. Transformer	32-1868	3.00
15	Condenser (mica .00005 mf.)	30-1029	.20
15a	Oscillator Transformer	32-1976	1.75
16	Compensating Condenser (Osc. Std.)	31-6058	.60
17	Compensating Condenser (Osc. Pol.)		
18	Compensating Condenser (Osc. S. Wave)		
19	Compensating Condenser (Series Std.) (Screw)	31-6027	.70
20	Compensating Condenser (Series Pol.)	31-6073	.50
21	Compensating Condenser (Series S, Wave) (Nut)	Part of 19	....
22	Condenser (mica .0025 mf.)	7006	.40
23	Tuning Condenser Assy	31-1555	4.50
24	Resistor (200 ohms wire wound)	33-3120	.25
25	Condenser (.09 mf. twin bakelite)	4989-DU	.40
26	Condenser (1 MMf., wires twisted)	......	....
27	Condenser (.05 mf., tubular)	30-4020	.20
28	Resistor (300 ohm, wire wound)	33-3010	.20
29	Resistor (13,000 ohms)	8267	.20
30	Resistor (5,000 ohms)	33-250123	.20
30a	Resistor (120.000 ohms)	33-412334	.20
31	Resistor (99.000 ohms)	33-399344	.20
32	Condenser (.05 mf. twin tubular)	30-4394	.35
33	Condenser (.05 mf.)	Part of 32	....
34	Resistor (1000 ohms)	33-210133	.20
35	Resistor (1000 ohms)	33-210133	.20
36	Resistor (2 meg.)	33-520143	.20
37	Condenser (.05 mf. twin tubular)	30-4394	.35
38	Condenser (.05 mf.)	Part of 37	....
39	Condenser (.25 mf. tubular)	30-4146	.25
40	Tone Control	30-4382	....
41	Condenser (.015) mf.)	Part of 40	....
42	Condenser (.0007 mf.)		
43	Condenser (.0012 mf.)		
44	Shadow Meter	45-2083	2.50
45	Resistor (70.000 ohms, ¼ watt)	33-370133	.20
46	Condenser (.05 mf. tubular)	30-4020	.20
47	Condenser (.09 mf.)	Part of 25	....
48	Resistor (51.000 ohms)	33-351143	.20
49	Resistor (700 ohms, wire wound)	33-3124	.25
50	Condenser (.05 mf. bakelite)	3615-OSU	.35
51	Resistor (2 meg.)	33-520143	.20
52	Resistor (10,000 ohms)	33-310133	.20
53	Condenser (.05 mf. tubular)	30-4020	.20
54	Compensating Condenser (1st I.F. Pri.)	Part of 55	....
55	1st I.F. Transformer	32-1835	1.60
56	Compensating Condenser (1st I.F. Sec.)	Part of 55	....
58	Compensating Condenser (2nd I.F. Pri.)	Part of 59	....
59	2nd I.F. Transformer	32-1978	2.00
60	Compensating Condenser (2nd I.F. Sec.)	Part of 59	....
61	Resistor (330.000 ohms)	33-433133	.20
62	Resistor (51.000 ohms)	33-351143	.20
63	Condenser (.01 mf. tubular)	30-4169	.20
64	Condenser (.0001 mf. twin bakelite)	8035-ODU	.25

Schematic Number	Part and Description	Part No.	Price List
65	Condenser (.0001 mf.)	Part of 64	....
66	Condenser (mica .00011 mf.)	30-1031	.20
67	Volume Control	33-5116	1.45
68	Condenser (.01 mf., tubular)	30-4169	.20
69	Condenser (4—.75 mf. metal can)	30-4405	....
70	Resistor (1 meg.)	33-510143	.20
71	Resistor (99,000 ohms)	33-399344	.20
72	Condenser (.05 mf. bakelite)	3615-SU	.35
73	Resistor (490.000 ohms)	33-449344	.20
74	Resistor (99,000 ohms)	33-399344	.20
75	Resistor (490,000 ohms)	33-449344	.20
76	Resistor (25.000 ohms)	33-325143	.20
77	Condenser (4—10—10 mf.) (electrolytic)	30-2147	1.85
78	Condenser (.05 mf. bakelite)	3615-SU	.35
79	Condenser (.75 mf.)	Part of 69	....
80	Resistor (20,000 ohms)	33-320133	....
81	Input Transformer	32-7211	2.25
82	Resistor (250 ohms, wire wound)	33-3046	.25
83	Condenser (10 mf.)	Part of 77	....
84	Condenser (.006 mf. tubular)	30-4024	.25
85	Output Transformer	32-7508	1.50
86	Cone & Voice Coil Assy. (651-B)	36-3540*	.80
87	Pilot Lamp, 6.3 volt (Dial)	34-2068	.16
88	Pilot Lamp. 6.3 volt (Shadow Meter)	34-2068	.16
89	Resistor (700 ohms, wire wound)	33-3231	.75
90	Resistor (28 ohms)	Part of 89	....
91	Condenser (.05 mf. bakelite)	3615-SU	.35
92	Condenser electrolytic (16 mf.)	30-2124	.75
93	Resistor (20 ohms, wire wound)	33-3043	.25
94	Resistor (50 ohms, wire wound)	33-3044	.25
95	Condenser (.09 mf. tubular)	30-4170	.25
96	Choke (Filter)	32-7527	1.50
97	Choke (Filter)	32-7528	1.35
98	Electrolytic Condenser (16 mf.)	30-2124	.75
99	Electrolytic Condenser (10 mf.) yellow terminal	Part of 77	....
	R.F. Shield Assy	38-6938	.35
	I.F. Shield Assy	38-6808	.25
	Tube Shield	28-2726	.10
	Tube Shield Base	28-2725	.03
	5 Prong Socket	27-6035	.11
	6 Prong Socket	27-6036	.11
	7 Prong Socket	27-6037	.11
	Speaker Plug Socket	27-6043	.08
	Screen Bracket Assy	31-1749	....
	Screen	27-5159	.10
	Mask	27-5160	.20
	Mask Arm	29-3274	.03
	Shaft Coupling	29-3339	.06
	Dial Scale	27-5170	.30
	Hub Assembly	31-1724	.15
	Knob (Tuning)	27-4206	.12
	Knob (Vernier)	27-4207	.10
	Knob (Volume)	27-4208	.10
	Knob (Tone Control)	27-4291	....
	Knob (Wave Switch)	27-4225	.10
	Bezel	28-3164	.50
	Bezel Glass	27-8113	.07
	Bezel Mounting Screws	W-1494	.30C
	Speaker Cable	36-3009	.35
	Chassis Mounting Bolt	W-1496-A	1.60C
	Chassis Mounting Washer (Rubber)	27-4201	1.40
	Chassis Mounting Washer (Cushion)	27-4202	.03
	Elec. Condenser Clamp	6440	.05
	*Cone Assy. for Cabinet Models	36-3557	....

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 655
Coil Data
Parts

PHILCO RADIO & TELEV. CORP.

Model 655

Schematic Number	Part and Description	Part No.	List Price
1	Wave Band Switch	42-1153	$2.00
2	Wave Trap	38-6850	1.10
3	Ant. Transformer	32-1867	3.00
4	Compensater (Standard) (Ant.)	31-6058	.60
5	Compensater (Police) (Ant.)		
6	Compensater (Short-Wave) (Ant.)		
7	Condenser (.05 mf. Bakelite)	3615-SG†	.35
8	Condenser (.05 mf. Bakelite)	3615-SG†	.35
9	Condenser (50 mmf. Mica)	30-1029	.20
10	Det. Transformer	32-1868	3.00
11	Compensater (Standard) (Det.)	31-6063	.50
12	Compensater (Police) (Det.)		
13	Compensater (Short-Wave) (Det.)		
14	Resistor (51,000 ohm, ¼ watt)	33-351143	.20
15	Condenser (.00025 mf. Mica)	30-1032	.25
16	Osc. Transformer	32-1976	1.75
17	Compensater (Standard) (Osc.)	31-6058	.60
18	Compensater (Police) (Osc.)		
19	Compensater (Short-Wave) (Osc.)		
20	Compensater (Std. Series) (Osc.)	31-6027	.70
20a	Condenser (.0025 Mica)	7006	.40
21	Compensater (Police Series) (Osc.)	31-6073	.50
22	Compensater (Short-Wave Series) (Osc.)	Part of 20	
23	Tuning Condenser	31-1555	4.50
24	Compensater (1st I.F. Pri.)	31-6053	.50
25	1st I.F. Transformer	32-1917	1.75
26	Compensater (1st I.F. Sec.)	Part of 24	
27	Resistor (1.0 meg., ¼ watt)	33-510143	.20
28	Resistor (51,000 ohm, ¼ watt)	33-351143	.20
29	Compensater (2nd I.F. Pri.)	31-6053	.50
30	2nd I.F. Transformer	32-1836	1.60
31	Compensater (2nd I.F. Sec.)	Part of 29	
32	Condenser (.00011 mf. Mica)	30-1030	.20
33	Condenser (.00011 mf. Twin Bakelite)	8035-DG†	.25
34	Resistor (330,000 ohm, ¼ watt)	33-433133	.20
35	Resistor (99,000 ohm, ¼ watt)	33-399143	.20
36	Condenser (.00011 mf.)	Part of 33	
37	Condenser (.05 mf. Tubular)	30-4020	.20
38	Condenser (50 mmf. mica)	30-1029	.20
39	Resistor (1.0 megohm, ¼ watt)	33-510143	.20
40	Resistor (51,000 ohm, ¼ watt)	33-351143	.20
41	Condenser (.01 mf.)	Part of 42	
42	Program Control	30-4378‡	.75
43	Volume Control	33-5108	1.45
44	Resistor (1.0 megohm, ¼ watt)	33-510143	.20
45	Condenser (.03 mf. Tubular)	30-4025	.20
46	Condenser (.25 mf. Tubular)	30-4134	.35
47	Resistor (99,000 ohm, ¼ watt)	33-399143	.20
48	Resistor (160,000 ohm, ¼ watt)	33-416133	.20
49	Condenser (.05 mf. Bakelite)	3615-SU†	.35
50	Resistor (70,000 ohm, ¼ watt)	33-370133	.20
51	Input Transformer	32-7114	3.00
52	Output Transformer	32-7078	1.25
53	Voice Coil & Cone Assy. (B.G. K-17)	*36-3159	.80
54	Field Coil Assy. (B.G. K-17)	†36-3104	2.70
55	Electrolytic Condenser (3.0-1.0-2.0 mf.)	30-2122	1.85
56	B. C. Resistor (7750 ohm)	33-3211	.65
57	B. C. Resistor (10-10-100-130 ohm)	33-3226	.25
58	Electrolytic Condenser (8.0-10.0 mf.)	30-2045	1.80
59	Condenser (.3 mf. Bakelite)	6287-DU†	.40
60	Electrolytic Condenser (8.0 mf.)	30-2025*	1.35
61	Electrolytic Condenser (10 mf.)	Part of 58	
62	Filter Choke	32-7115	1.80
63	Power Transformer (115 V., 60 cycle)	32-7402	4.50
64	Condenser (.015 Twin Bakelite)	3793-DG†	.40
65	Phono-motor switch assy.	6345	3.15
66	Phono-motor (115 V., 60 cycle)	35-1002	23.00
67	Resistor (39,000 ohm, 1 watt)	33-339443	.20
68	Electrolytic Condenser (1.0 mf.)	Part of 55	
69	Resistor (15,000 ohm, ¼ watt)	33-315133	.20
70	Electrolytic Condenser (2.0 mf.)	Part of 55	
71	Resistor (32,000 ohm, 2 watt)	33-332533	.30
72	Resistor (51,000 ohm, ½ watt)	33-351343	.20
73	Shadow Tuning Meter	45-2083	2.50
75	Pilot lamp (shadow meter)	34-2064	.09
76	Condenser (.05 mf. Tubular)	30-4020	.20
77	Pilot lamp (dial)	34-2039	.15
78	Phono-radio switch assy.	35-3014	1.30
79	Condenser (.05 mf. Tubular)	30-4020	.20
80	Condenser (.09 mf. Bakelite)	4989-SU†	.35

Schematic Number	Part and Description	Part No.	List Price
81	Resistor (5,000 ohm)	33-250123	.20
82	Resistor (15,000 ohm)	33-315133	.20
83	Pickup head	35-2014	7.25
	Pickup arm	35-2010	8.30
	Phono-motor (115 V., 50 cycle)	35-1007	23.00
	Phono-motor (115 V., 40 cycle)	35-1003	35.00
	Phono-motor (115 V., 25 cycle)	35-1008	35.00
	Phono-motor (230 V., 60 cycle)	35-1004	28.50
	Phono-motor (230 V., 50 cycle)	35-1009	....
	Phono-motor (230 V., 40 cycle)	35-1005	....
	Phono-motor (230 V., 25 cycle)	35-1006	....
	Hum Bucking coil	32-1940	1.10
	Radio-phono switch plate	28-2250	.10
	Switch Pointer	4277	.02
	Needle Cup	28-2222	.05
	Needle Cup Cover	28-2223	.05
	Speed Change lever	28-1648	.25
	Speed Change lever spring	28-1649	.05
	Speed Change lever spacer	28-6103	.03
	Speed Change lever washer	5577	.25C
	Turntable	35-3001	9.00
	Motor Board	25869	3.00
	Motor Board mtg. washer	27-4199	1.60C
	Motor Board mtg. washer	28-2089	.30C
	Motor Board mtg. washer	W-464-A	.55C
	Motor Board mtg. screw	W-461-B	.01
	Motor Board mtg. nut	W-149-A	.45C
	Motor Connector plug	4091	.30
	Shadow Meter light shield	28-2917	.02
	Glowing arrow screen	27-5159	.10
	Glowing arrow mask	27-5160	.20
	Scale guard	27-8140	.01
	Screen bracket	29-3061	.07
	Mask arm	29-3274	.03
	Coupling	29-3339	.06
	Link	29-3338	.03
	Shadow Screen	27-5120	1.50C
	Speaker Cable	02722	.30
	Knob (Phono-Radio)	03334	.10
	Knob (Tuning)	27-4206	.12
	Knob (Slow Speed Tuning)	27-4207	.10
	Knob (Volume Program Control)	27-4208	.10
	Knob (Wave Band)	27-4225	.10
	Socket (4-prong)	27-6044	.10
	Socket (6-prong)	27-6036	.11
	Socket (7-prong)	27-6037	.11
	Speaker Socket	27-6043	.08
	Tube Shield Body	28-2726	.10
	Tube Shield Base	28-2725	.03
	R. F. Shield	38-6921	.35
	I. F. Shield	38-6808	.25
	Wave Switch Nut	W-684-A	1.25C
	Power Transformer (115 V., 25 cycle)	32-7403	9.00
	Power Transformer (230 V., 50-60 cycle)	32-7404	7.50
	Electrolytic Condenser clamp	6440	.05
	Electrolytic Condenser insulator	27-7194	.01
	Chassis Mtg. screw	W-1496-A	1.60C
	Chassis Mtg. washer (rubber)	27-4201	1.40C
	Chassis Mtg. cushion (rubber)	27-4202	.03
	Chassis Mtg. sleeve	28-3101	.04
	Mask	28-3433	.25
	Bezel	28-[illegible]164	.50
	Bezel mtg. screw	W-1494	.30C
	Bezel glass	27-8113	.07
	Bezel glass gasket	27-8036	.01
	Dial scale	27-5165	.30
	Hub & set screw assy.	31-1724	.15
	Pilot lamp bracket assy.	38-6789	.50
	B.C. Resistor mtg. screw	W-888	1.00C
	B.C. Resistor mtg. nut	W-317-A	.40C
	B.C. Resistor spacer	3791	.45C
	Front Bumper	27-4200	3.75C
	Dial scale (inverted type code 123)	27-5183	.30
	Speaker Trans. Terminal cover	02824	.10
	Bottom shield	38-7189	.40
	Speaker mtg. bolt	29-3128	.02
	Speaker mtg. nut	W-124-A	.35C
	*Voice coil cone assy. (Furn. H-13)	02625	1.20
	†Field coil assy. (Furn. H-13)	02803	2.70

†Code 122—Use Type "O" (ODG, etc.) Prefix Condensers

*Code 122—30-2014 ‡Code 122—30-4379

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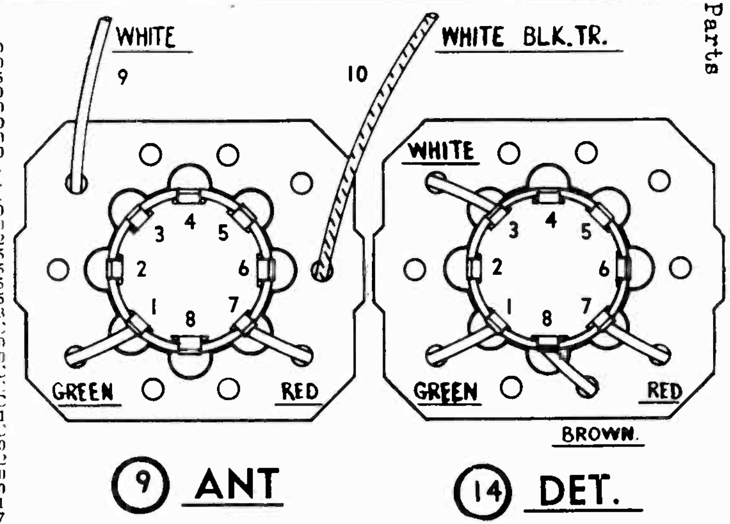
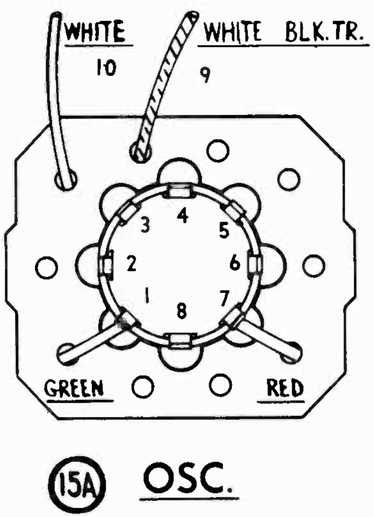


Fig. 1. R.F. Transformers



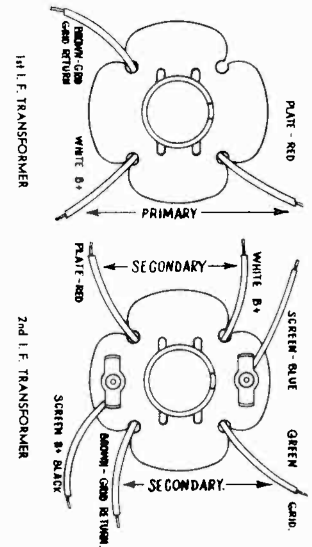


Fig. 2. I.F. Transformers

MODEL 655
Schematic
Voltage

PHILCO RADIO & TELEV. CORP.

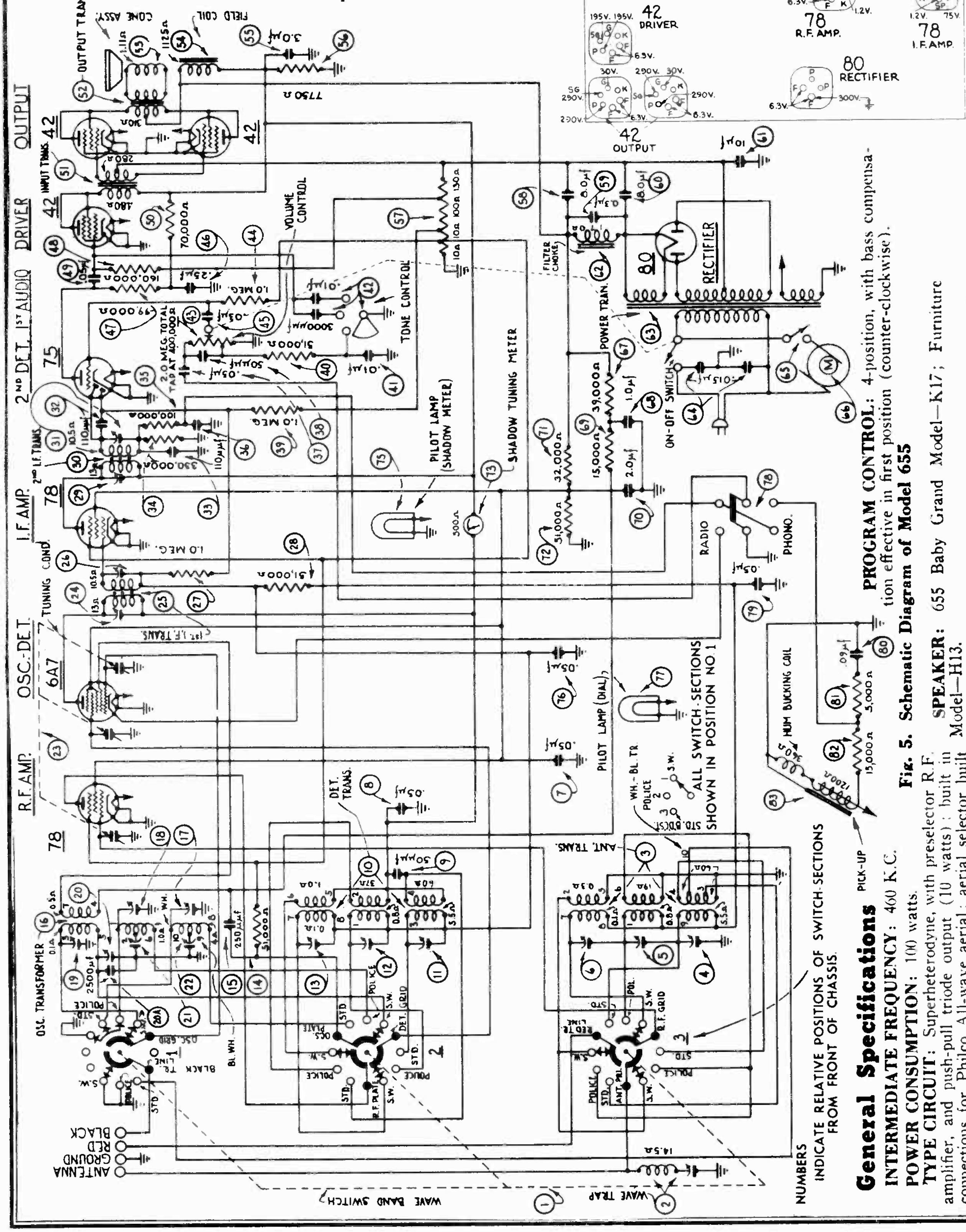
TUBE SOCKET VOLTAGES
(Measured from Tube Contact to Gnd.)

Fig. 3. Tubes as Viewed from Bottom

The voltages at the points indicated by the arrows above were obtained with a Philco type 025 Circuit Tester which contains a high resistance (1000 ohms per volt) voltmeter. Volume control at minimum, waveband switch at standard broadcast. K17 speaker.

POWER TRANSFORMER DATA

VOLTS	CIRCUIT	COLOR OF LEADS
105-125	PRIMARY	WHITE
6.3	FILAMENTS	BLACK
5.0	FILAMENT OF 80	BLUE
680	PLATES OF 80	YELLOW
680	CENTER TAP OF 8-10	YELLOW-GREEN TRACER



PROGRAM CONTROL: 4-position, with bass compensation effective in first position (counter-clockwise).

Fig. 5. Schematic Diagram of Model 655

SPEAKER: 655 Baby Grand Model—K17; Furniture Model—H13.

WAVE BANDS: Three; (1) Short-wave; (2) Police, aircraft and amateur; (3) Standard.

NUMBERS INDICATE RELATIVE POSITIONS OF SWITCH SECTIONS FROM FRONT OF CHASSIS.

General Specifications

INTERMEDIATE FREQUENCY: 460 K.C.

POWER CONSUMPTION: 100 watts.

TYPE CIRCUIT: Superheterodyne, with preselector R.F. amplifier, and push-pull triode output (10 watts); built in connections for Philco All-wave aerial; aerial selector built into and operated by wave-band switch.

POWER SUPPLY: 115v., 60 cycle A.C.

MODEL 655
Socket, Trimmers

PHILCO RADIO & TELEV. CORP.

Chassis, Alignment

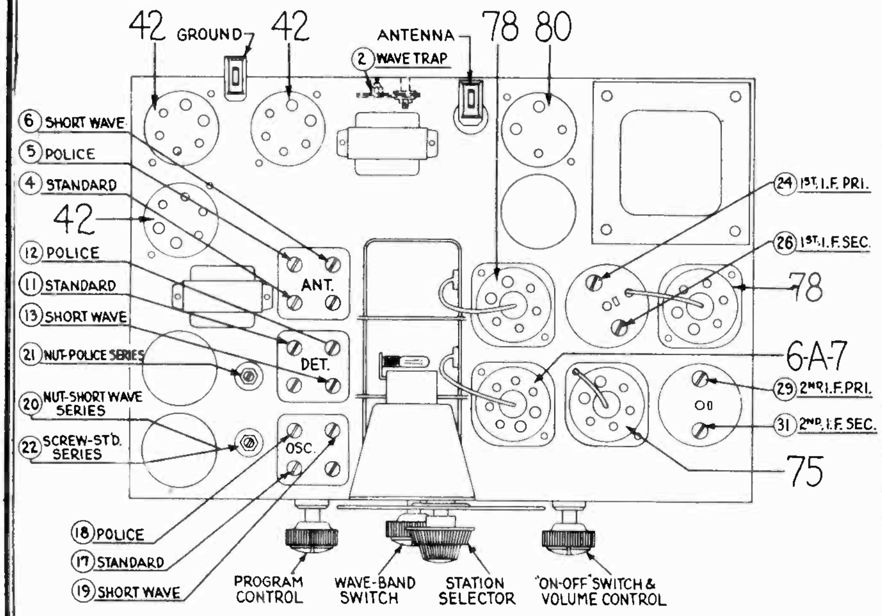


Fig. 4. Location of Compensating Condensers

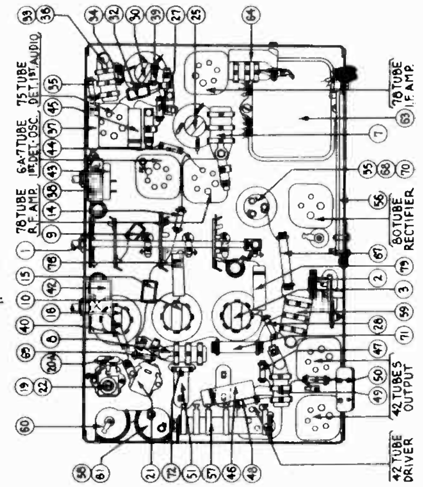


Fig. 6. Base View

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 655 requires an accurate signal generator covering I.F., standard-wave, police and short-wave frequencies. The **PHILCO Model 088 All-Wave Signal Generator,** having a continuous range of from 100 to 20,000 K.C., is ideal for this purpose.

An output meter is also needed. **PHILCO Model 025 Circuit Tester** includes a high grade output meter.

Philco No. 3164 fibre wrench and No. 27-7059 fibre-handled screwdriver complete the equipment needed for making these adjustments. The locations of the various compensating condensers are shown in Fig. 4. Connect the output meter to the plate contacts of the type 42 output tubes (using the adapters provided with the "025") and set it at the 0-30 volt range.

INTERMEDIATE FREQUENCY: Set the signal generator at 460 K.C. with attenuator set at minimum, connect a .001 mf. condenser in series with its antenna lead and attach it to the grid cap of the 78 I.F. amplifier tube. Connect ground lead to ground terminal on set. Set the dial at 55 and turn the waveband switch to position 3 (extreme left). Adjust the volume control of set to almost maximum, and the 088 attenuator so that about one-fourth (¼) scale reading is had on the output meter. With a fibre screwdriver adjust condensers (29) and (31) (2nd I.F.) for maximum reading on output meter. Turn attenuator of signal generator to minimum and remove its antenna lead from the grid of the 78 I.F. tube; place it on the grid of the 6A7. Adjust 088 attenuator as before, then proceed to adjust condensers (24) and (26) (1st I.F.) for maximum output meter reading. Then remove the 088 oscillator lead. Care should be taken to keep the output meter reading during adjustments at about one-fourth scale reading. This should be done by using the 088 attenuator control.

WAVE TRAP: Connect the Signal Generator antenna and ground leads to the antenna and ground posts of the set. With the signal generator operating at 460 K.C. and the set controls adjusted as before for I.F. alignment, adjust wave trap (2) until a minimum reading is obtained in the output meter.

SHORT WAVE: In adjusting the short wave or high frequency band, the det. compensator will have a tendency to "pull" or **change** the frequency of the oscillator. By shunting a padding or variable condenser (about .00025 Mf.) across the oscillator section of the gang (front section) and tuning it so that the second harmonic, instead of the fundamental, beats with the incoming signal, this "pull" can be minimized. The procedure for tuning this band is as follows:

Set the dial of the receiver at 18 megacycles (top scale) and the 088 dial at the same frequency. Turn wave band switch to position 1 (extreme right). Connect the shunt condenser to the oscillator section of the gang and tune it so that the second harmonic of the oscillator beats with the 18 M.C. signal from the 088. Next tune condensers (6) and (13) (antenna and det.) for maximum reading of the output meter. Disconnect shunt condenser and tune condenser (19) (osc.) for correct dial calibration. The set, oscillator frequency, when correctly adjusted, will be higher than that of the incoming signal. In order to check this it should be possible to pick up the 18 M.C. 088 oscillator signal as an image signal by increasing the 088 output and tuning the set to approximately 17.1 M.C.

For the low frequency adjustment of this band, turn the dial to 6.0 M.C., set the signal generator at 6.0 M.C. and adjust condenser (20) (nut) for maximum output meter reading. Readjust condenser (19) at 18.0 M.C.

POLICE: Turn wave band switch to position 2 (center), set signal generator at 5500 and dial of set at 5.5. Adjust condensers (18), (5) and (11) (osc., ant., and det.) for maximum output. Turn the set dial to 1.8 and the signal generator to 1800. Adjust condenser (21) (nut) (osc. series) for maximum output meter reading.

STANDARD WAVE: Turn waveband switch to position 3 (extreme left), set signal generator at 1500 and dial of set at 150. Now adjust the oscillator, antenna and det. "Standard" condensers. These are (17), (4) and (11) respectively.

Turn the dial to 60, set signal generator at 600 and adjust condenser (22) (oscillator standard series), (screw) for maximum output meter reading.

PHILCO RADIO & TELEV. CORP.

MODEL 665
Schematic

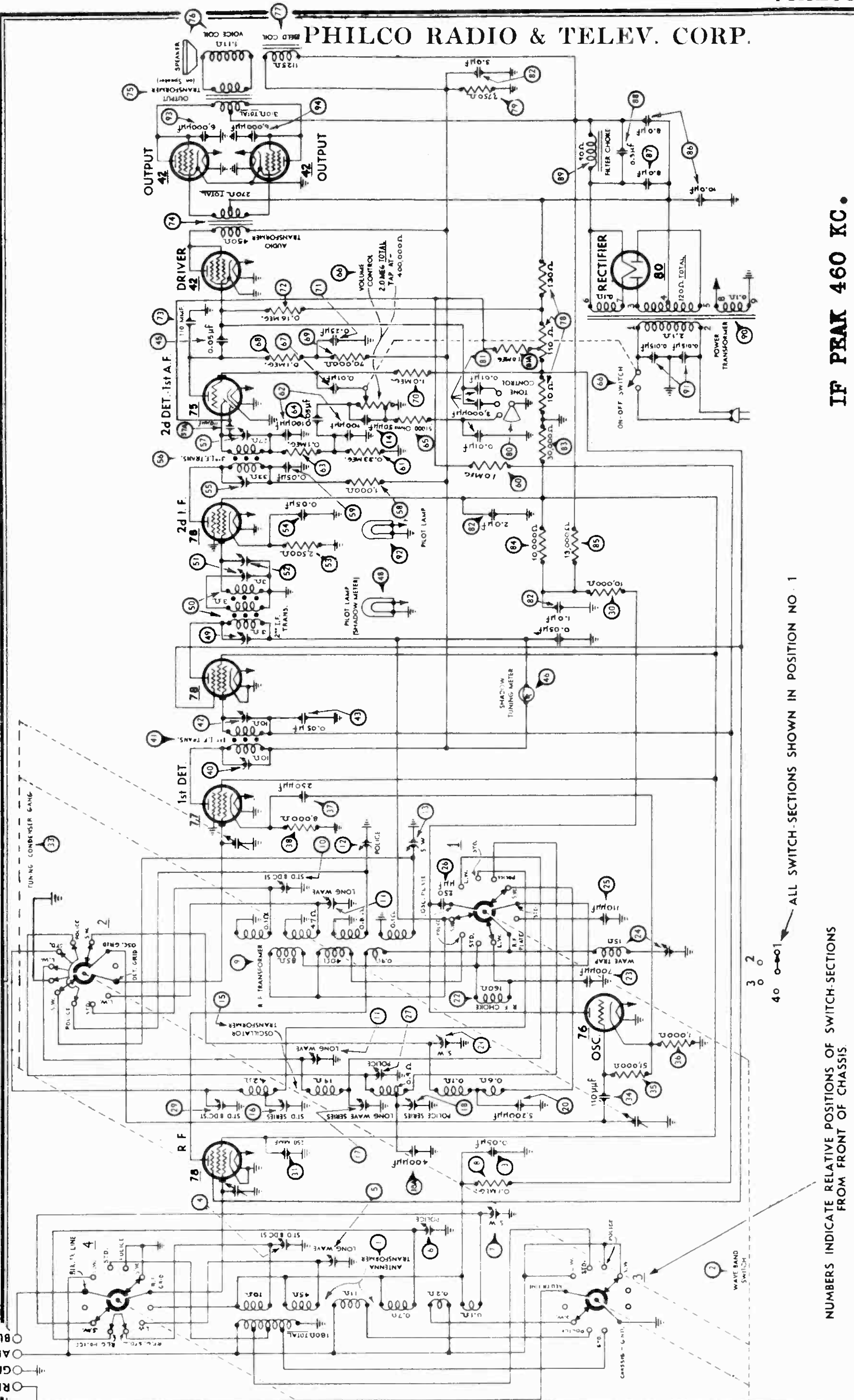


Fig. 3 — Schematic Diagram — Model 665

MODEL 665
Socket, Voltage
Trimmers, Alignment

PHILCO RADIO & TELEV. CORP.

General Specifications

Type Circuit: Superheterodyne, with push-pull pentodes connected as triodes in output; output 10 watts; built in connections for Philco All-wave aerial; aerial selector built into and operated by wave-band switch.

Power Supply: Alternating Current. Voltage and frequency as specified on chassis nameplate.

Tubes Used: Ten (10) Total: 1 type 78 R.F., 1 type 77 1st detector, 1 type 76 oscillator, 2 type 78 I.F., 1 type 75 2nd detector 1st audio, 1 type 42 driver, 2 type 42 output, 1 type 80 rectifier.

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 665 requires an accurate signal generator covering long-wave, standard wave, police, and short-wave frequencies. The PHILCO Model 088 All-Wave Signal Generator, having a continuous range of from 100 to 20,000 K.C. (all fundamental frequencies) will be ideal for this purpose.

An output meter is also needed. PHILCO Model 025 Circuit Tester includes a high-grade output meter.

Philco No. 3164 fibre wrench and No. 27-7059 fibre handled screwdriver complete the equipment needed for making these adjustments. The locations of the various compensating condensers are shown in Fig. 2. Connect the output meter to the plate contacts of the output tubes (using the adapters provided with the "025") and set it at the 0-30 volt range.

I.F.—Set the Signal Generator at 460 K.C., and attach its antenna lead to the grid cap of the 77 1st detector tube (having removed the grid clip from the tube). Connect the ground terminal of the Signal Generator to the ground terminal of the set. Turn on the set, turn the waveband switch to standard broadcast (second position from left) and set dial at 60. Turn condenser 51 (2nd I.F. tertiary) all the way down before adjusting the other I.F. Compensators. Now with the fibre screwdriver, adjust condensers 57 and 55 (3rd I.F.), 52 and 49 (2nd I.F.), and then 42 and 40 (1st I.F.) until maximum reading is obtained in the output meter. Turn down the "attenuator" on the signal generator if the output meter needle goes off the scale. Now adjust condenser 51 (2nd I.F. tertiary) for maximum reading.

WAVE TRAP—Connect the Signal Generator antenna lead to the grid cap of the 78 R.F. tube. Replace the grid clip on the 77 tube cap. With the signal generator operating at 460 K.C. and the set controls adjusted as for I.F., adjust wavetrap 24 until the **minimum** reading is obtained in the output meter.

SHORTWAVE—Turn wave band switch to the shortwave position (extreme right). Set signal generator at 18 megacycles and dial of set at 18.0 (top scale). Now adjust the oscillator, Antenna, and R.F. shortwave compensators in turn, for maximum reading. These are 21, 13 and 7 respectively.

POLICE AND AMATEUR BAND—Turn the waveband switch to position 3 (from left). Set the dial and signal generator at 4.5 megacycles and adjust condensers 27, 12 and 6 respectively for maximum reading.

Set the signal generator at 1800 K.C. and turn the dial to 1.8. Adjust condenser 18 (nut), oscillator police series, to maximum reading.

STANDARD BROADCAST BAND—Turn the waveband switch to position 2 (from left). Set the dial and signal generator at 1500 K.C. and adjust condensers 29, 10 and 4 for maximum reading.

Set the dial and signal generator at 600 K.C. and adjust condenser 16 (screw), broadcast series, for maximum reading.

LONGWAVE BAND—Turn waveband switch to position 1 (left). Set the dial and signal generator at 340 K.C. and adjust condenser 28 (screw) to maximum. Then adjust 11 and 5 for maximum reading. Finally, set the dial and signal generator at 175 K.C. and adjust condenser 17 (nut) for maximum reading. This is the longwave series compensator.

Wave Bands: Four—(1) Shortwave; (2) Police and amateur; (3) Standard Broadcast; (4) Longwave (weather forecasts).

Frequency Ranges: Band (1)—5.7-18.0 Megacycles; Band (2)—1.75-5.8 Megacycles; Band (3)—540 to 1750 K.C.; Band (4)—150-390 K.C.

Program Control: 4 positions: (1) Mellow, (2) Brilliant, (3) Normal, (4) Noise reducing. Last two positions recommended for foreign short wave stations.

Tuning Meter: Shadow type tuning meter, mounted directly above scale.

Waveband Indicator: Glowing arrow on tuning scale shifts to proper scale when waveband switch is turned.

Automatic Volume Control: Fully effective on all stations.

Bass Compensation: Automatic: Effective on first two positions of program control, with volume control turned down.

Tuning Drive: Dual planetary, ball bearing. 80 to 1 ratio for slow-speed tuning, 10 to 1 on main knob.

Intermediate Frequency: 460 K.C.

Power Consumption: 90 watts.

Speaker: Type H-13.

Tube Socket and Power Transformer Voltages
Line Voltage 115

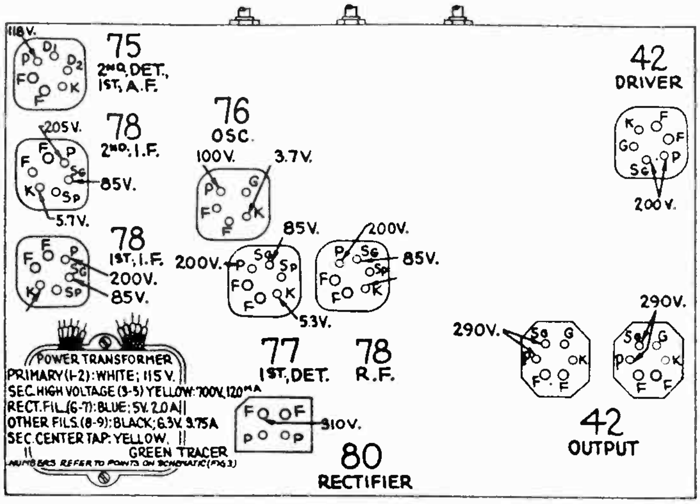


Fig. 1. Sockets as Viewed from Bottom

Socket voltages (measured to ground) obtained at points indicated by arrows. Above voltages were obtained by using a PHILCO type 025 Circuit Tester (or 048A All-purpose Tester), using test prods applied to sockets on underside of chassis. Volume control at minimum; dial at 60; waveband switch at standard broadcast (2d position from left). H-13 Speaker used.

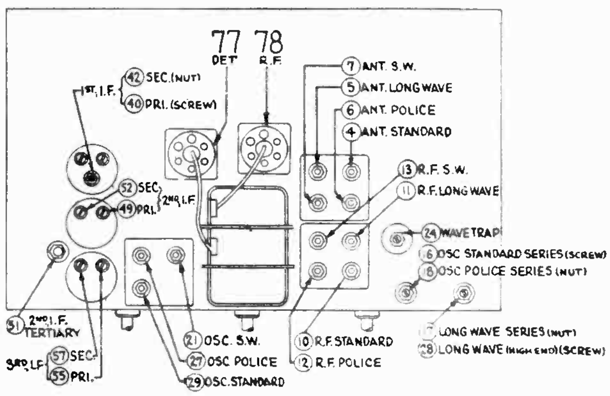
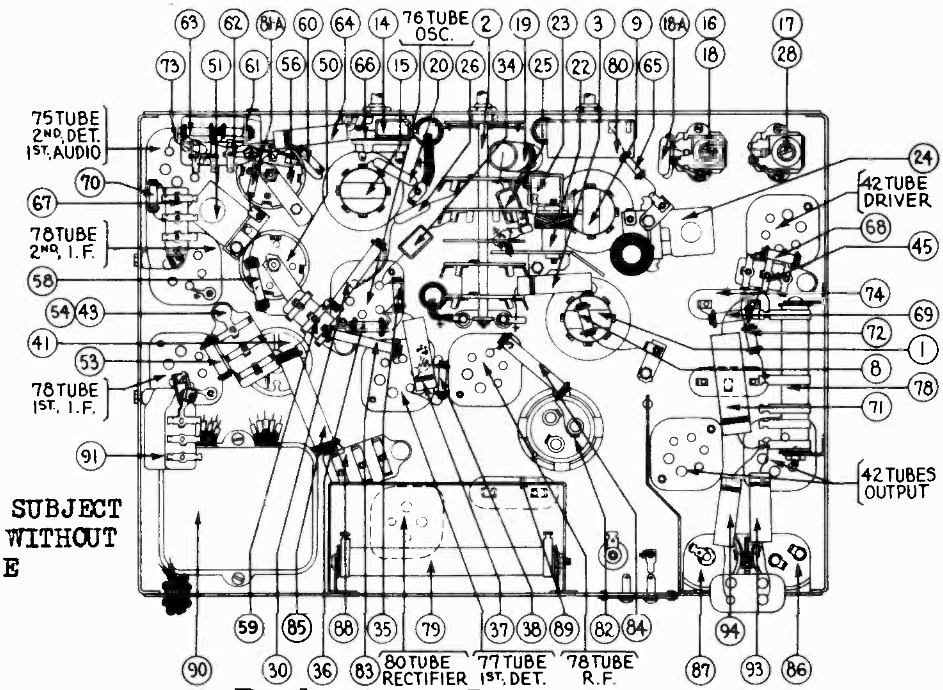


Fig. 2. Location of Compensating Condensers

PHILCO RADIO & TELEV. CORP.

MODEL 665
Chassis
Parts



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Replacement Parts—Model 665

No.	Part	Part No.	Price
(1)	Antenna Transformer	32-1750	$3.25
(2)	Waveband Switch	42-1120	2.50
(3)	Condenser (.05 Mfd. Tubular)	30-4020	.35
(4)	Compensater (Ant. Standard)	Part of (1)	
(5)	Compensater (Ant. Longwave)	Part of (1)	
(6)	Compensater (Ant. Police)	Part of (1)	
(7)	Compensater (Ant. Shortwave)	Part of (1)	
(8)	Resistor (99,000 ohm) (White, White, Orange)	33-399343	.20
(9)	R. F. Transformer	32-1751	3.00
(10)	Compensater (R. F. Standard)	Part of (9)	
(11)	Compensater (R. F. Longwave)	Part of (9)	
(12)	Compensater (R. F. Police)	Part of (9)	
(13)	Compensater (R. F. Shortwave)	Part of (9)	
(14)	Condenser (.00005 Mfd. Mica)	30-1029	.20
(15)	Oscillator Transformer	32-1752	2.25
(16)	Compensater (Standard Series)	Part of 31-6027	.70
(17)	Compensater (Longwave Series)	Part of 31-6054	.45
(18)a	Condenser (.0004 Mfd. Mica)	30-1000	.25
(18)	Compensater (Osc. Police Series)	Part of 31-6027	.70
(19)	Condenser (.1 Mfd. Tubular)	30-4170	.25
(20)	Condenser (.0052 Mfd. Mica)	30-1058	.55
(21)	Compensater (Osc. Shortwave)	Part of (15)	
(22)	R. F. Choke	32-1745	.65
(23)	Condenser (.0007 Mfd. Mica)	5863	.25
(24)	Wave Trap	38-6850	1.10
(25)	Condenser (.00011 Mfd. Mica)	30-1031	.20
(26)	Condenser (.00025 Mfd. Mica)	30-1032	.25
(27)	Compensater (Osc. Police)	Part of (15)	
(28)	Compensater (Longwave H. F. End)	Part of 31-6054	.45
(29)	Compensater (Osc. Standard)	Part of (15)	
(30)	Resistor (10000 ohms) (Brown, Black, Orange)	33-310433	.20
(31)	Condenser (.00025 Mica)	30-1032	.25
(33)	Tuning Condenser Assembly	31-1609	5.50
(34)	Condenser (.00011 Mfd. Mica)	30-1031	.20
(35)	Resistor (51000 ohms) (Green, Brown, Orange)	33-351143	.20
(36)	Resistor (1000 ohms) (Brown, Black, Red)	33-210343	.20
(37)	Condenser (.00025 Mica)	30-1032	.25
(38)	Resistor (8000 ohms) (Gray, Black, Red)	33-280133	.20
(40)	Compensater (1st I. F. Primary)	Part of (41)	
(41)	1st I. F. Transformer	* 32-1642	2.00
(42)	Compensater (1st I. F. Secondary)	Part of (41)	
(43)	Condenser (.05 Mfd. Bakelite Block)	+ 3615-DG	.40
(45)	Condenser (.05 Mfd. Bakelite Block)	+ 3615-SU	.35
(46)	Shadow Tuning Meter	45-2083	2.50
(48)	Pilot Lamp (Shadow Tuning Meter)	Part of (46)	
(49)	Compensater (2nd I. F. Primary)	31-6067	.45
(50)	2nd I. F. Transformer	32-1865	1.00
(51)	Compensater (2nd I. F. Tertiary)	04000-R	.45
(52)	Compensater (2nd I. F. Secondary)	Part of (49)	
(53)	Resistor (2500 ohms) (Red, Green, Red)	33-225333	.20
(54)	Condenser (.05 Mfd. Twin Bakelite Block)	Part of (43)	
(55)	Compensater (3rd I. F. Primary)	Part of 31-6003	.45
(56)	Third I. F. Transformer	△ 32-1188	.65
(57)	Compensater (3rd I. F. Secondary)	Part of 31-6003	.45
(57)a	Condenser (.110 Mmf. Mica)	30-1031	.20
(58)	Resistor (1000 ohms) (Brown, Black, Red)	33-210633	.20
(59)	Condenser (.05 Mfd. Bakelite)	3615-SG	.35
(60)	Resistor (1.0 Meg. ¼ Watt)	33-510143	.20
(61)	Resistor (330000 ohms) (Orange, Orange, Yellow)	33-33133	.20
(62)	Condenser (.00011 Mfd. Twin Bakelite Block)	+ 8035-DG	.25
(63)	Resistor (99000 ohms) (White, White, Orange)	33-399143	.20
(64)	Condenser (.05 Mfd. Tubular)	30-4020	.20
(65)	Resistor (5000 ohms) (Green, Brown, Orange)	33-351143	.20
(66)	Volume Control & On-Off Switch	33-5110	$1.45
(67)	Condenser (.01 Mfd. Bakelite Block)	+ 3903-SU	.25
(68)	Resistor (99000 ohms) (White, White, Orange)	33-399143	.20
(69)	Resistor (70000 ohms) (Violet, Black, Orange)	33-370343	.20
(70)	Resistor (1 Meg.) (Brown, Black, Green)	33-510143	.20
(71)	Condenser (.25 Mfd. Tubular)	30-4134	.35
(72)	Resistor (160000 ohms) (Brown, Blue, Orange)	33-416133	.20
(73)	Condenser (.00011 Mfd. Mica)	30-1031	.20
(74)	Audio Transformer	32-7057	3.50
(75)	Output Transformer	32-7078	1.25
(76)	Cone & Voice Coil Assembly (H-13)	02625	1.20
(77)	Field Coil & Pot Assembly (H-13)	36-3104	2.70
(78)	Resistor (B. C., Wirewound) (10 ohms, 110 ohms, 130 ohms)	33-3226	.25
(79)	Resistor (Wirewound, 7750 ohms)	33-3020	.35
(80)	Tone Control	□ 30-4378	.75
(81)	Condensers in Tone Control	Part of (80)	
(81)a	Resistor (1.0 Meg. ¼ Watt)	33-510143	.20
(82)	Condenser (Electrolytic) (3 Mfd., 2 Mfd., 1 Mfd.)	30-2122	1.85
(83)	Resistor (30000 ohms) (Orange, Black, Orange)	33-330443	.20
(84)	Resistor (10000 ohms) (Brown, Black, Orange)	33-310433	.20
(85)	Resistor (13000 ohms) (Brown, Orange, Orange)	33-313633	.30
(86)	Condenser (Electrolytic, 8 Mfd., 10 Mfd.)	30-2045	1.80
(87)	Condenser (Electrolytic, 8 Mfd.)	○ 30-2025	1.35
(88)	Condenser (.3 Mfd. Bakelite Block)	+ 6287-DU	.40
(89)	Filter Choke	32-7056	2.20
(90)	Power Transformer 115 Volts 60 Cycles	32-7440	6.00
	115 Volts 25 Cycles	32-7441	8.75
	230 Volts 50 Cycles	32-7442	6.75
(91)	Condenser (.015 Mfd. Twin Bakelite Block)	+ 3793-DG	.40
(92)	Pilot Lamp (Dial)	34-2039	.15
(93)	Condenser (.006 Mfd. Tubular)	30-4024	.25
(94)	Condenser (.006 Mfd. Tubular)	30-4024	.25
	Dial Scale	27-5115	.40
	Dial Mask and Hub Assembly	31-1724	.15
	Dial Hub	28-7129	.10
	Dial Spring Clamp	28-2837	.10
	Socket—4-Prong	27-6042	.10
	Socket—5-Prong	27-6035	.11
	Socket—6-Prong	27-6036	.11
	Speaker Plug Socket	27-6033	.08
	Knob (Volume, Tone, Waveband)	27-4208	.10
	Knob (Station Selector)	27-4206	.12
	Knob (Slow Speed)	27-4207	.10
	Tube Shield (4 used)	28-2726	.10
	Tube Shield (2 used)	28-2755	.05
	Tube Shield Base	28-2725	.03
	A. C. Cord & Plug	L-943A	.60
	Bezel	28-3165	.50
	Bezel Glass	27-8011	.55
	Chassis Mtg. Bolt	W-1496A	1.60 per C
	Chassis Mtg. Washer (Rubber)	27-4201	1.40 per C
	Chassis Mtg. Bumper (Rubber)	27-4200	3.75 per C
	Mask	27-5136	.30
	Scale and Mask Guide	29-3272	.05
	R. F. Shield Assy	38-6938	.35
	I. F. Shield Assy	38-6872	.35
	Elec. Condenser Clamp	29-2460	.05
	Elec. Condenser Clamp	6440	.05
	Elec. Condenser Insulator	27-7194	.01
	Shadow Meter Light Shield	28-2917	.02
	Wave Switch Coupling	28-7150	.20
	Inverted Dial Scale	27-5123	.40

* Code 122: 32-1864 △ Code 122: 32-1866 □ Code 122: 30-4379 ○ Code 122: 30-2014

+ The letter O should be added to parts (43), (45), (62), (67), [illegible], (88), (91), for Code 122. Example (3615-DG = 3615-ODG).

MODEL 680
Chassis

PHILCO RADIO & TELEV. CORP.

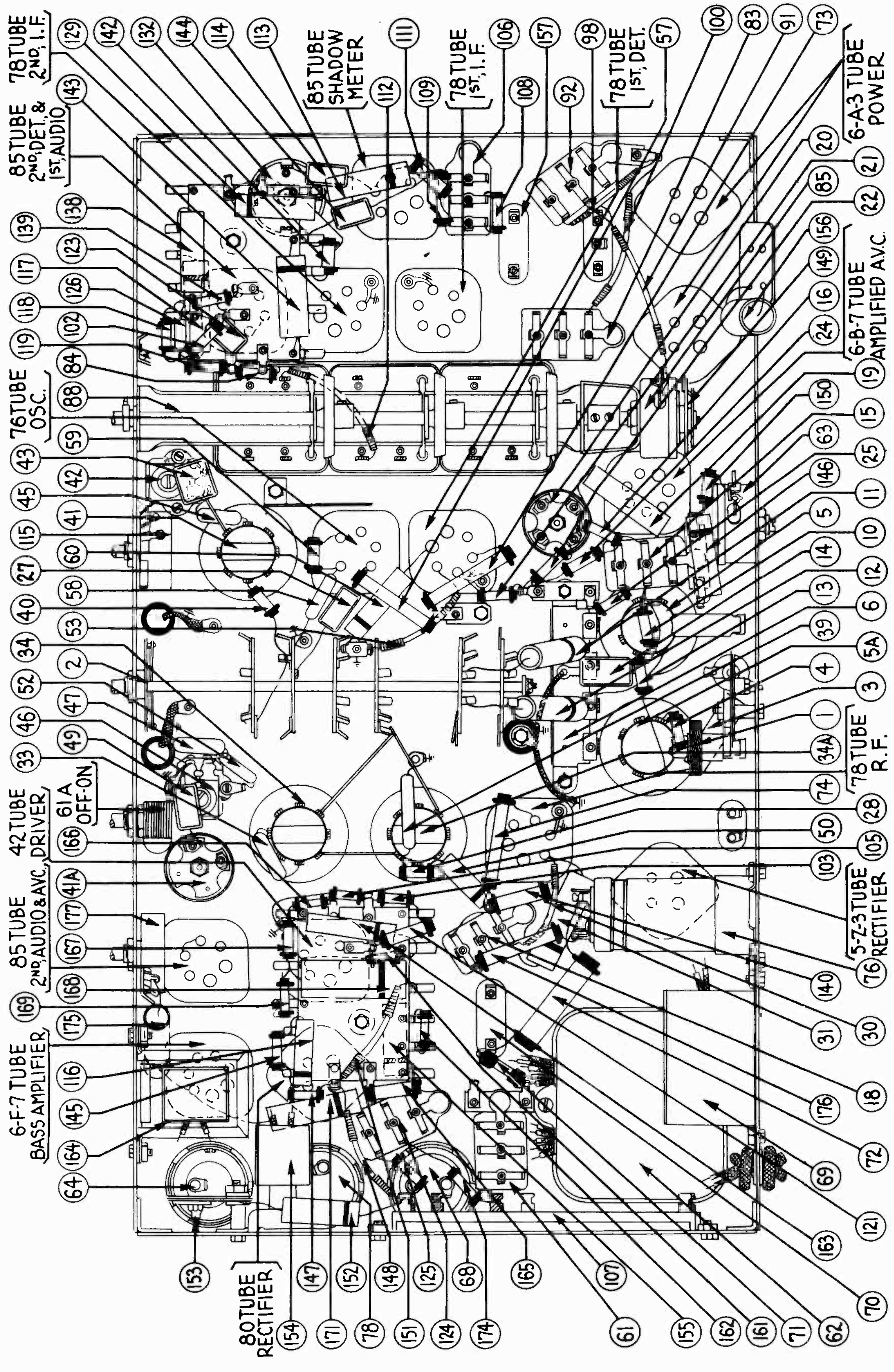
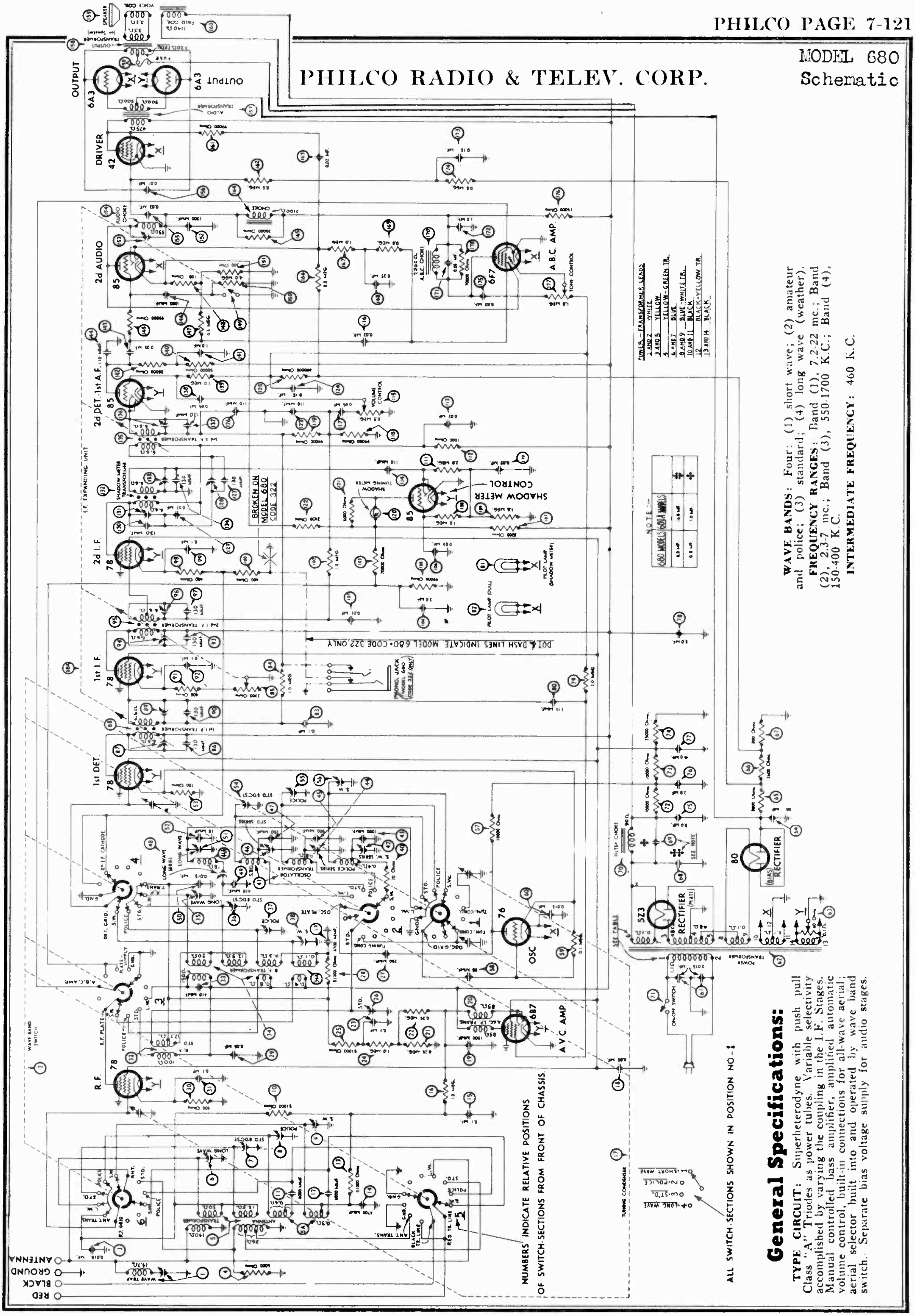


Fig. 3. Bottom View of Chassis

PHILCO RADIO & TELEV. CORP.

MODEL 680
Schematic



General Specifications:

TYPE CIRCUIT: Superheterodyne with push pull Class "A" Triodes as power tubes. Variable selectivity accomplished by varying the coupling in the I.F. Stages. Manual controlled bass amplifier, amplified automatic volume control, built-in connections for all-wave aerial; aerial selector built into and operated by wave band switch. Separate bias voltage supply for audio stages.

WAVE BANDS: Four: (1) short wave; (2) amateur and police; (3) standard; (4) long wave (weather).

FREQUENCY RANGES: Band (1), 7.2-22 mc.; Band (2), 2.3-7 mc.; Band (3), 550-1700 K.C.; Band (4), 150-400 K.C.

INTERMEDIATE FREQUENCY: 460 K.C.

MODEL 680
Socket, Voltage
Alignment

PHILCO RADIO & TELEV. CORP.

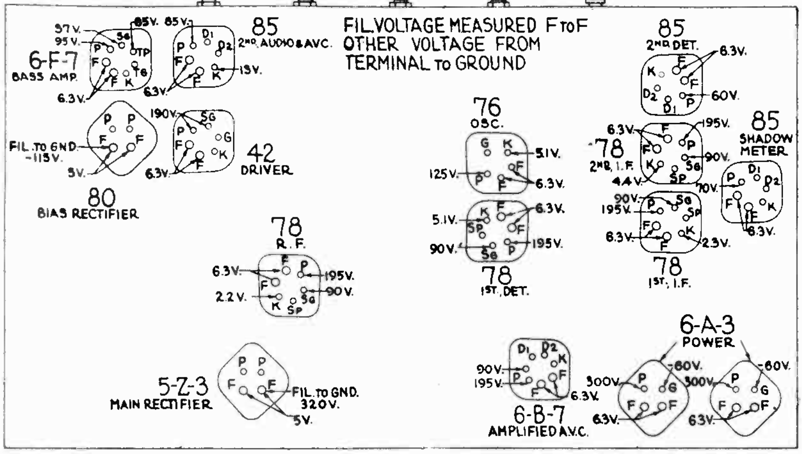


FIG. 1. Sockets Viewed from Bottom—Voltage Measurements to Ground, Unless Otherwise Shown—Line Voltage 115

POWER SUPPLY: Alternating current, voltage and frequency as specified on name plate.

WAVE BAND INDICATOR: Glowing arrow on tuning scale shifts to proper scale when waveband switch is turned.

TUNING METER: Shadow type tuning meter mounted directly above scale and operated by a separate tube.

AUDIO OUTPUT: 20 watts undistorted output.

TUNING DRIVE: Dual Planetary, ball-bearing, 80 to 1 ratio for slow speed tuning. 10 to 1 normal.

POWER CONSUMPTION: 142 watts.

SPEAKER: U-10.

Adjusting Compensating Condensers

Adjustment of compensating condensers in Model 680 requires an accurate signal generator covering long-wave, standard wave, police, and short-wave frequencies. The **PHILCO Model 088 All-Wave Signal Generator,** having a continuous range of from 100 to 20,000 K.C. (all fundamental frequencies) will be ideal for this purpose.

An output meter is also needed. **PHILCO Model 025 Circuit Tester** includes a high-grade output meter.

PHILCO No. 3164 Fibre Wrench and **No. 27-7059 Fibre Handled Screwdriver** complete the equipment needed for making these adjustments. The locations of the various compensating condensers are shown in Fig. 2. Connect the output meter to the plate contacts of the output tubes (using the adapters provided with the "025") and set it at the 0-30 volt range.

Under no conditions attempt to adjust this receiver without these instruments.

Before attempting to adjust the I.F. stages, turn the condenser gang all the way in. The glowing arrow should then be between the two vertical lines at the extreme left of the low frequency calibrations. The Bass Control should be turned off (turn to left). The fidelity control in selective position (turn to left). Adjust the hum control (back of set) for minimum hum.

Attach the signal generator antenna lead to the grid of the 2nd I.F. 78 tube, and the ground lead to the ground post on set. Adjust the volume control of set to maximum (turn to right), tune the signal generator to 460 K.C., and adjust the attenuator of the signal generator for approximately ¼ scale output meter reading.

Turn condenser (133) (shadow meter compensator) approximately four turns to the left. Adjust condensers (130), (128), and (131) for maximum output meter reading. Adjust condenser (133) for minimum output meter reading.

Remove the signal generator antenna lead from the grid of the 2nd I.F., 78 tube and place it on the grid of the 1st I.F., 78 tube, again adjust the signal generator attenuator for approximately ¼ scale output meter reading and adjust condensers (96) and (94) for maximum output meter reading.

Remove the signal generator antenna lead from the grid of the 1st I.F., 78 tube and place it on the grid of the 1st detector, 78 tube. Regulate the signal generator attenuator as before for ¼ scale output meter reading. Adjust condensers (89) and (87) for maximum output meter reading.

Turn down the volume control of set and advance the signal generator attenuator until the shadow meter width decreases approximately fifty percent. Adjust condenser (133) for minimum shadow meter width.

Remove the signal generator antenna lead from the grid of 1st detector, 78 tube and couple it to the aerial post on the set through a 125 mmf. condenser. Turn the volume control of the set back to maximum (to right) and adjust the signal generator attenuator for approximately ½ scale output meter reading. Adjust the wave trap (condenser (1)) for minimum output meter reading.

Reconnect the signal generator antenna lead to the grid of the first detector 78 tube and adjust the signal generator attenuator for approximately ¼ scale output meter reading.

If the fidelity selectivity control is turned to the extreme right hand position, it will be found, upon varying the frequency of the signal generator, that two definite peaks will appear in the output meter reading—one at 452 K.C. and another at 468 K.C. These peaks in the output meter reading indicate peaks in the tuning curve. The amplitude of these peaks should be equal; that is, the same output meter reading should be obtained at both 452 K.C. and 468 K.C. Any variations in these two readings can be corrected by a slight readjustment of the shadow meter I.F. primary padder (131). If the peak at 452 K.C. is higher than the one at 468 K.C., the primary padder will have to be turned out. If the reverse is true, the capacity of this padder must be increased. In any case, the voltmeter readings must be made equal by dividing the differences through readjustment.

R. F. and Oscillator Adjustments

SHORT WAVE

Turn the fidelity control back to the extreme left and the wave band switch to the extreme right (band 1). Connect the signal generator antenna lead to the aerial post on set through a two-meg resistor. Tune the set and signal generator to 18 mc. Turn the signal generator attenuator to maximum and adjust the volume control of set for ¾ scale reading on the output meter. Adjust condenser (56) for maximum output meter reading. Turn the dial of the set to approximately 17.1 mc. and check the image frequency.

Turn the dial of the set back to 18 mc. and connect a variable condenser (approximately 250 mmf.) across the oscillator section of the gang (2nd from front of chassis). Turn the variable shunt condenser in until the 18 mc. signal gives a reading on the output meter. Adjust condensers (9) and (38) for maximum output meter reading.

Removing the shunt condenser, turn the dial of the set and signal generator to 8 mc. and adjust condenser (42) for maximum output meter reading. Readjust condenser (56) with the set and signal generator tuned to 18 mc.

POLICE

Turn the wave band switch to position 2 and tune the set and signal generator to 6 mc. Adjust condensers (8), (37) and (55) for maximum output meter reading.

Turn the dial of the set and signal generator to 2.4 mc. and adjust condenser (44) for maximum output meter reading. Turn the dial of the set and signal generator back to 6 mc. and readjust condenser (55).

STANDARD

Turn the wave band switch to position 3 and tune the set and signal generator to 1500 K.C. and adjust condensers (7), (26), (30) and (54) for maximum output meter reading.

Turn the dial of the set and signal generator to 580 K.C., and remove the two meg. resistor from the antenna lead. Turn the volume control to maximum and adjust the signal generator attenuator for approximately ¼ scale output meter reading. Adjust condenser (46) for maximum output meter reading.

WEATHER

Turn the wave band switch to position 4, and tune the set and signal generator to 340 K.C. Adjust condensers (6), (33) and (51) for maximum output meter reading.

Turn the dial of the set and signal generator to 175 K.C. and adjust condenser (48) for maximum output meter reading. Readjust condenser (51) at 340 K.C.

Turn the wave band switch back to position (3) and tune the set and signal generator to 580 K.C. Adjust condenser (46) for maximum output meter reading. Tune the set and signal generator to 1500 K.C. and adjust condenser (54) for maximum output meter reading. Turn down (to left) the volume control and turn up (to right) the signal generator attenuator. Then adjust condenser (36) for maximum output meter reading.

Adjustment of 10 K. C. Filter

The 10 K.C. filter in the audio circuit will rarely require readjustment. As the proper adjustment of this padder ((158) on diagram) requires an accurately calibrated audio oscillator, it should be reset only in the event that it has been tampered with or in cases where it has become necessary to replace one of the elements of this filter.

Instructions covering an emergency adjustment of this filter can be obtained from your Philco distributor.

MODEL 680
Trimmers
Parts List

PHILCO RADIO & TELEV. CORP.

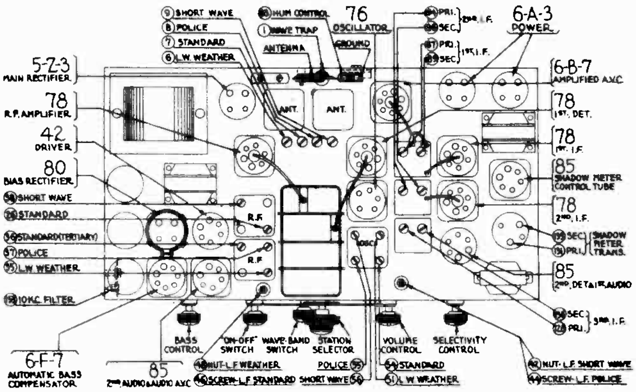


FIG. 2. Location of Compensating Condensers

TUBES USED: Fifteen (15) total: 1 type 78 R.F., 1 type 76 osc., 1 type 78, 1st det. and mixer, 2 type 78 I.F., 1 type 85, 2nd det. and 1st audio, 1 type 85, 2nd audio and audio A.V.C., 1 type 42 driver, 2 type 6A3 output, 1 type 6B7 amplified A.V.C., 1 type 6F7 automatic bass compensation, and bass amplifier, 1 type 85 shadow meter control, 1 type 80 fixed bias rectifier, 1 type 5Z3 main rectifier.

Replacement Parts for Model 680

Schematic No.	Part and Description	Part No.	List Price
1	Wave Trap	38-6850	$1.10
2	Wave Band Switch	42-1127	2.85
3	Condenser (0.015 mf.)	39-4358	.20
4	Resistor (5,000 ohms)	6096	.20
5	Antenna Transformer (Bdcst. 3 and 4)	32-1811	1.75
5a	Antenna Transformer (Bdcst. 1 and 2)	32-1812	1.10
6	Padder (Antenna Band 4)	31-6047	.50
7	Padder (Antenna Band 3)		
8	Padder (Antenna Band 2)		
9	Padder (Antenna Band 1)		
10	Resistor (51,000 ohms)	6098	.20
11	Condenser (6,000 mmf.)	30-4125	.20
12	Condenser (6.000 mmf.)	30-4125	.20
13	Resistor (51,000 ohms)	6098	.20
14	Condenser (4.700 mmf.)	30-1052	.55
15	Condenser (0.1 mf.)	4989-ODG	.40
16	Resistor (1.0 meg.)	33-1096	.20
17	Condenser Gang	31-1619	7.00
18	Condenser (0.05 mf.)	3615-ODG	.40
19	Condenser (1,000 mmf.)	30-4201	.20
20	I.F. Transformer (AVC)	32-1837	.70
21	Resistor (0.25 meg.)	6097	.20
22	Resistor (0.25 meg.)	6097	.20
23	Condenser (0.1 mf.)	Part of 15	....
24	Resistor (1.0 meg.)	33-1096	.20
25	Resistor (51,000 ohms)	6098	.20
26	Padder (R.F. Std.)	Part of 34a	....
27	Condenser (250 mmf.)	30-1032	.25
28	Resistor (51.000 ohms)	6098	.20
29	Condenser (0.05 mf.)	Part of 18	....
30	Resistor (400 ohms)	33-3016	.20
31	Condenser (0.1 mf.)	30-4122	.20
32	Transformer	Part of 34a	....
33	Condenser (410 mmf.)	30-1000	.20
34	Detector Transformer (Bdcst. 4 and 2)	32-1813	2.60
34a	Detector Transformer (Bdcst. 1 and 3)	32-1814	2.10
35	Padder (Det., Weather)	31-6058	.60
36	Padder (Det., Tertiary)		
37	Padder (Det., Police)		
38	Padder (Part of 34a)	61-6059	.50
39	Condenser (4.700 mmf.)	30-1052	.55
40	Resistor (70 ohms)	33-1129	.20
41	Oscillator Transformer (Bdcst. 1, 2 and 3)	32-1815	2.50
41a	Oscillator Transformer (Bdcst. 1)	32-1816	.30
42	Padder (S.W. Series)	31-6027	.70
43	Condenser (1.000 mmf.)	30-1063	.30
44	Padder (Police Series)	Part of 42	....
45	Condenser (900 mmf.)	30-1060	.25
46	Padder (Standard)	31-6033	.50
47	Condenser (250 mmf.)	30-1032	.25
48	Padder (Weather Srs.)	Part of 46	....
49	Condenser (410 mmf.)	30-1000	.25
50	Condenser (0.015 mf.)	30-4358	.20
51	Padder (Osc. Weather)	Part of 41a	....
52	Condenser (15 mmf.)	30-1030	.20
53	Resistor (700 ohms)	33-3124	.25
54	Padder (Osc. Standard)	31-6057	.70
55	Padder (Osc. Police)		
56	Padder (Osc. Short Wave)		
57	Resistor (10,000 ohms)	3524	.20
58	Condenser (50 mmf.)	4587	.20
59	Resistor (100.000 ohms)	6099	.20
60	Condenser (0.015 mf.)	30-4358	.20
61	Condenser (0.015-0.015 mf.)	3793-ODG	.40
62	Power Transformer	32-7455	8.00
63	Potentiometer (Hum Adj.)	33-5111	.70
64	Condenser (50.0 mf.)	30-2128X	1.80
65	Resistor (9,800 ohms)	33-3216	.60
66	Resistor (2,600 ohms)		
67	Resistor (800 ohms)		
68	Condenser (8.0 mf.) double	30-2028M	2.15
69	Condenser (0.6 mf.)	30-4384	.50
70	Choke (Filter)	32-7056	2.20
71	Off-On Switch	42-1129	.50
72	Resistor (10,000 ohms)	33-1024	.35
73	Resistor (10,000 ohms)	3524	.20
74	Resistor (25.000 ohms)	3656	.20
75	Condenser (8.0 mf.)	Part of 68	....
76	Condenser (2.0, 2.0, 1.0, 1.0 mf.)	30-2130	2.15
77	Condenser (4.0 mf.)	30-2129	1.65
78	Condenser (8.0 mf.)	Part of 77	....
79	Resistor (2.0 meg.)	33-1025	.20
80	Condenser (110 mmf.)	30-1031	.20
81	Pilot Lamp (Shadowmeter)	6608	.09
82	Pilot Lamp (Dial Scale)	34-2039	.15
83	Condenser (0.1 mf.)	4989-ODG	.40
84	Resistor (1.0 meg.)	33-1096	.20
85	Potentiometer (2300 ohms)	33-5124	1.00
86	Condenser (130 mmf.)	30-1036	.20
87	Padder (Primary)	31-6055	.50
88	1st I.F. Transformer Part of I.F. Unit 88a		....
88a	I.F. Expander Unit	38-7013	15.00
89	Padder (Secondary)	Part of 87	....
90	Condenser (130 mmf.)	30-1036	.20
91	Resistor (400 ohms)	33-3016	.20
92	Condenser (0.1 mf.)	4989-ODG	.40
93	Condenser (130 mmf.)	30-1036	.20
94	Padder (Primary)	31-6055	.50
95	2nd I.F. Transformer Part of I.F. Unit 88a		....
96	Padder (Secondary)	Part of 94	....
97	Condenser (130 mmf.)	30-1036	.20
98	Resistor (400 ohms)	33-3016	.20
99	Condenser (0.1 mf.)	Part of 92	....
100	Resistor (400 ohms)	33-3016	.20
101	Condenser (0.01 mf.)	Part of 83	....
102	Resistor (1.0 meg.)	33-1096	.20
103	Resistor (70,000 ohms)	33-1115	.20
104	Condenser (2.0 mf.)	Part of 76	....
105	Resistor (99,000 ohms)	6099	.20
106	Condenser (0.03 mf.)	8318-OSG	.35
107	Resistor (3.200 ohms)	33-3215	.70
108	Resistor (1.0 meg.)	33-1096	.20
109	Resistor (1.5 meg.)	33-1188	.20
110	Condenser (0.03 mf.)	Part of 106	....
111	Resistor (2.0 meg.)	33-1025	.20
112	Resistor (1.000 ohms)	33-3017	.20
113	Condenser (0.02 mf.)	30-4113	.20
114	Condenser (110 mmf.)	30-1031	.20
115	Volume Control (0.5 meg.)	33-5117	1.00
116	Condenser (0.02 mf.)	30-4215S	.20
117	Condenser (0.05 mf.)	30-4020P	.20
118	Resistor (99,000 ohms)	6099	.20
119	Resistor (99,000 ohms)	6099	.20
120	Shadow Meter	45-2088	2.50
121	Resistor (6,000 ohms)	7352	.20
122	Resistor (2,400 ohms)	Part of 65	....
123	Condenser (110 mmf.)	30-1031	.20
124	Condenser (0.15 mf.)	6287-ODG	.40
125	Resistor (490,000 ohms)	6097	.20
126	Condenser (110 mmf.)	30-1031	.20
127	Condenser (130 mmf.)	30-1036	.20
128	Padder (Primary)	31-6055	.50
129	Condenser (0.01 mf.)	30-4124P	.25
130	Condenser (130 mmf.)	30-1036	.20
131	Padder (Primary)	31-6055	.50
132	I.F. Transformer (Shadow Meter)	32-1838	.90
133	Padder (Secondary)	Part of 132	....
134	Condenser (130 mmf.)	30-1036	.20
135	3d I. F. Transformer Part of I.F. Unit 88a		....
136	Padder (Secondary)	Part of 135	....
137	Condenser (130 mmf.)	30-1036	.20
138	Condenser (0.05 mf.)	30-4020M	.20
139	Resistor (1.0 meg.)	33-1096	.20
140	Resistor (50,000 ohms)	4518	.20
141	Condenser (1.0 mf.)	Part of 76	....
142	Resistor (25.000 ohms)	33-1013	.20
143	Condenser (0.05 mf.)	30-4020M	.20
144	Condenser (110 mmf.)	30-1031	.20
145	Resistor (99,000 ohms)	6099	.20
146	Condenser (1,000 mmf.)	30-1063	.30
147	Resistor (0.5 meg.)	6097	.20
148	Resistor (100 ohms)	33-3187	.20
149	Switch	Part of 88a I.F. Exp. Unit	....
150	Resistor (4.0 meg.)	33-1002	.20
151	Resistor (300 ohms)	33-3121	.25
152	Condenser (1,000 mmf.)	30-1063	.30
153	Padder	04000-T	.35
154	Transformer (10KC Filter)	32-7368	.60
155	Condenser (0.02 mf.)	30-4215S	.20
156	Condenser (0.01 mf.)	30-4051P	.25
157	Input Transformer	32-7446	1.75
158	Output Transformer	32-7461	2.00
158a	Fuse	45-2113	.16
159	Speaker Cone Assembly	36-3381	1.75
160	Field Coil Assembly	36-3162	8.00
161	Resistor (99,000 ohms)	6099	.20
162	Resistor (0.5 meg.)	6097	.20
163	Condenser (0.02 mf.)	6097	.20
164	Choke	32-7476	1.25
165	Resistor (20.000 ohms)	6650	.20
166	Resistor (0.5 meg.)	6097	.20
167	Resistor (1.0 meg.)	33-1096	.20
168	Condenser (0.25 mf.)	6097	.20
169	Resistor (0.5 meg.)	6097	.20
170	Choke (Bass)	32-7478	1.50
171	Condenser (0.06 mf.)	30-4373	.20
172	Condenser (1.0 mf.)	Part of 76	....
173	Condenser (0.15 mf.)	Part of 124	....
174	Resistor (0.5 meg.)	6097	.20
175	Condenser (0.02 mf.)	30-4113X	.20
176	Resistor (15.000 ohms)	5278	.20
177	Potentiometer (1.0 meg.)	33-5118	.70
178	Resistor (70,000 ohms)	33-1182	.20
	Dial Mask Assembly	31-1575	.40
	Dial Mask Bearing	28-6307	.05
	Dial Mask Bearing Nut	28-6308	.10
	Cord Take-up Slide	28-7134	.10
	Mask Drive Cord	31-1580	.05
	Drive Cord Spring	28-8386	.01
	Dial Scale	27-5127	.40
	R.F. Shield Assembly	38-6938	.35
	R.F. Shield Assembly	38-6793	.35
	I.F. Shield Assembly	38-6986	.20
	Coil Shield (Oscillator-Long Wave)	5840	.10
	5-Prong Socket	27-6035	.11
	6-Prong Socket	27-6036	.11
	7-Prong Socket	27-6037	.11
	4-Prong Socket	27-6044	.10
	Speaker Socket	27-6043	.08
	Tube Shield Body	28-2726	.10
	Tube Shield Base	28-2725	.03
	Knob (Station Selector)	27-4206	.12
	Knob (Slow Tuning)	27-4207	.10
	Knob (Off-On, Fidelity, Volume, Bass)	27-4225	.10
	Bezel	28-3165	.50
	Bezel Gasket	27-7982	.90C
	Bezel Glass	27-7890	.60
	Acoustic Compensator	36-1155	1.25
	Speaker Cable	02722	.30
	Shadow Screen	27-5120	1.50C
	Mounting Foot	29-2957	.06
	Wave Switch Shaft (Coupling)	28-7121	1.80C
	Bottom Shield Assembly	38-7042	.60
	Mounting Clamp (Electrolytic Condenser)	6440	.05
	Insulator	27-7194	.01
	Fahnestock Clip (Antenna and Ground)	L-1126	1.25C

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

MODELS 811PA, 811PB, 811PV
Notes

PHILCO RADIO & TELEV. CORP.

MODEL 811PV
Alignment

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure 1.

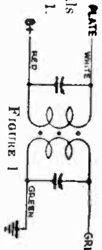


FIGURE 1

If replacements are ever necessary, replace the entire coil assembly, 32-2160 for the first I. F. stage and 32-2164 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

POLICE AUTO RADIO — MODELS 811PA, 811PB AND 811PV

There are two new types of Philco police auto radio Receivers, each designed to meet the special requirements of this particularly rigorous service: The Model 811PV, a variable tuning Police Receiver — and the Model 811P, a crystal controlled, fixed frequency Receiver, the DeLuxe Police Auto Radio.

HOUSING, PLATING, FINISH Both are single unit Receivers, housed in containers, 10¾ inches long by 7⅝ inches wide by 5-15/16 inches deep. The chassis, housing and covers are all steel and are plated to prevent rusting. They are given an exterior black wrinkle finish.

MOUNTING BRACKETS Hanger brackets riveted to the Receiver, hook on to a dash bracket which is permanently installed in the car, while a single bolt at the bottom fastens the Receiver securely to the dash. This makes the installation and removal of the Receiver a simple, rapid operation.

CONTROL SHAFTS, CONNECTIONS The volume control and (in case of 811PV) the tuning control couplers, the "A" battery and the antenna connectors are located on one end of the housing. The shafts are the rapid coupling type with the locking gland nut at the Receiver end. The "A" battery and antenna connections are quick detachable bayonet locking type, with the "A" fuse placed in the "A" lead.

CONDENSER MOUNTING The tuning condenser is mounted on live rubber. This prevents microphonic trouble from developing in the condenser and is a patented Philco feature.

CONDENSER DRIVE The condenser drive gear ratio (Model 811PV) is 16:1. This eliminates practically all back lash and due to the mechanism used, prevents the tuning condenser from detuning from vibration. This high gear ratio also makes accurate tuning much easier.

CONTROL UNIT The control unit for the Model 811PV is for installation on the edge of the instrument board. It contains the "On-Off" switch and the volume and tuning control knobs. The calibrated scale is illuminated. The Model 811P, fixed frequency Receiver, utilizes a single control knob, which is mounted on the instrument board. This controls the "On-Off" switch and the volume.

SUPERHETERODYNE RANGE 811PV DRIFT A superheterodyne circuit is used for the 811PV, also the 811P. The frequency coverage of the Model 811PV is from 1560 K.C. to 2600 K.C. continuously in one band. The oscillator and I.F. circuits are especially designed to reduce frequency drift to a minimum.

RANGE 811P The Model 811P, the fixed frequency Receiver, can be furnished adjusted for any one particular frequency within the limits of the regular police band, i. e., from 1630 K. C. to 1712 K. C. and from 2382 K. C. to 2490 K. C.

CRYSTAL CONTROL A crystal controlled oscillator circuit is employed in the Model 811P. The crystal control holds the oscillator on the required frequency and is responsible, in a large measure, for the greatly improved performance of this Receiver.

TUBE EQUIPMENT The tubes used in the 811P and 811PV are:

78 Tube — Tuned R. F. Amplifier with A. V. C.
6A7 Tube — First Detector — Oscillator with A. V. C.
78 Tube — I. F. Amplifier
75 Tube — Second Detector and "Q" Relay Stage.
75 Tube — First A. F. Amplifier with "Q" Control.
41 Tube — Power Output Stage
84 Tube — Full Wave Rectifier.

ANTENNAS Both Receivers employ antenna circuits that will track satisfactorily on any antenna capacity between 100 and 2500 mmf. This permits satisfactory operation on inserted metal top, door, spare wheel and other special types of antennas.

A. V. C. Both the R. F. stage and the first detector stage have full automatic volume control supplied by the diode detector.

"Q" CIRCUIT In addition to this, the Receivers also have a "Q" or carrier relay circuit. The function of this circuit is to completely silence the Receiver when tuned off carrier, or when the carrier goes off the air. The correct values of the resistor network have been determined and used for satisfactory city operation where it is desirable to exclude street car noises, etc. A switch is provided on the end of the Receiver housing, to open or close this circuit, since, when in remote sections of the territory, where the police transmitter signal might be very weak, slight additional sensitivity can be obtained with the "Q" circuit cut out. This "Q" circuit should not be confused with the conventional squelch circuit. The "Q" relay circuit operates on a carrier field strength equivalent to approximately 3 microvolts in the antenna. A carrier below this strength is almost always of insufficient strength to give satisfactory reception, especially in noisy locations.

DYNAMIC SPEAKER SPECIAL AUDIO A full-powered electro-dynamic speaker is used to give clarity of reproduction and better articulation. The audio and the speaker circuits are especially designed to give the best reproduction of the voice frequencies. The Receiver and speaker are capable of delivering considerably greater undistorted output than is normally required.

POWER SUPPLY The power supply is self contained and is not polarized. The Receiver can be installed in any car without reversing battery connections. Philco's Improved Full-wave Vibrator is used.

These models are without peer and are the best modern police Receivers obtainable. They represent the best designing, engineering and production skill in the industry.

ADJUSTMENTS — MODEL 811PV

The Model 811PV is a variable frequency Auto Radio Receiver with a frequency range of 1560 K. C. to 2600 K. C. The scale is calibrated only between 1575 K. C. and 1750 K. C., and between 2100 K. C. and 2500 K. C., since these are the conventional emergency police bands. The Model 811PV has an intermediate frequency of 260 K. C. and does not employ crystal control.

The Receiver must be set up for operation and the volume control set at maximum. The Receiver "Q" switch must be in the off position, cutting out the carrier relay circuit. Use a quality modulated oscillator or signal generator for the test signal, with an output meter connected across the output stage. The signal from the generator should be attenuated so that the output signal is just sufficient to actuate the output meter. The signal should not be strong enough to operate the automatic volume control.

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accesible thru the holes in the top of the shield. (See Figure 1.)

I. F. STAGES — The signal generator must be set at exactly 260 K. C. and the generator lead connected to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser. Adjust the padders ㉒ and ㉔ on the second I. F. transformer for maximum output.

In a like manner, connect the signal generator lead to the grid caps of the 6A7 detector oscillator tube and adjust the padders on the first I. F. transformer.

R. F. — Connect a 2600 K. C. signal to the grid of the 78 R. F. amplifier tube in series with a .1 mfd. condenser. Set the tuning condenser at minimum capacity, using a strip of bond paper as a gauge under the heel of the rotor plates.

Adjust the first detector and oscillator padders ⑩ and ⑬ for maximum output.

Reset the signal generator for a 1600 K. C. signal. Tune in the signal and roll the variable condenser while adjusting the oscillator series padder ⑰.

Recheck the oscillator padder adjustment at 2600 K. C. Connect the signal generator to the Receiver antenna lead, using a 200 mmfd. condenser dummy antenna and adjust the antenna padder ⑥ at 2600 K. C.

IMPORTANT — All adjustments should be repeated after the Receiver has been operated at 8 volts for approximately 8 hours.

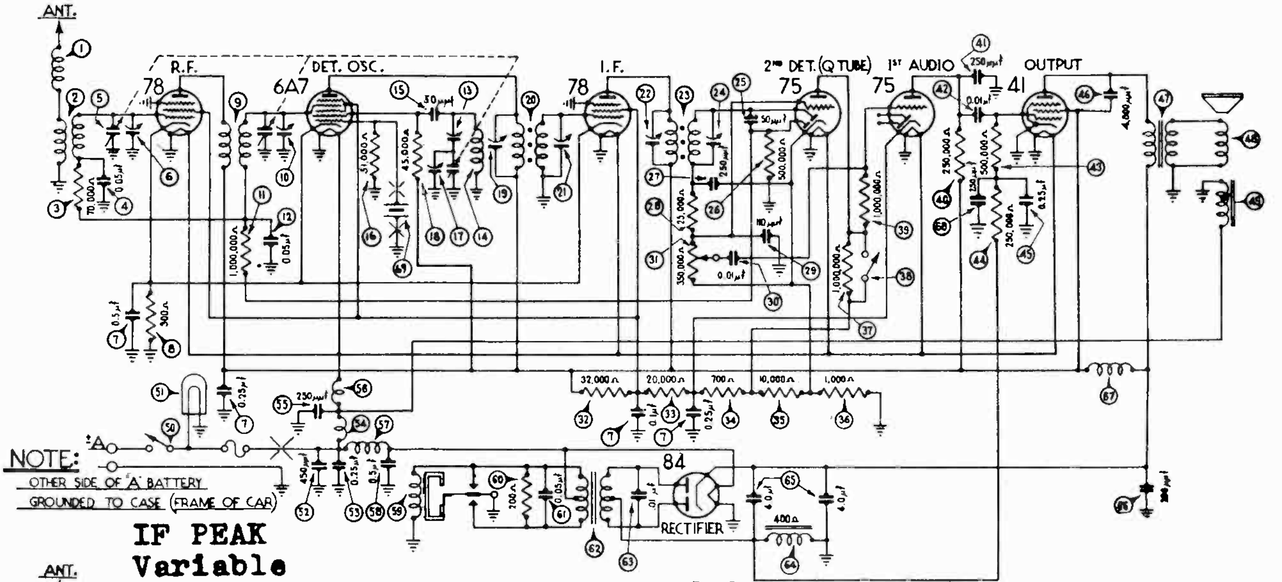
I. F. TRANSFORMERS AND PADDERS

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Figure 3.)

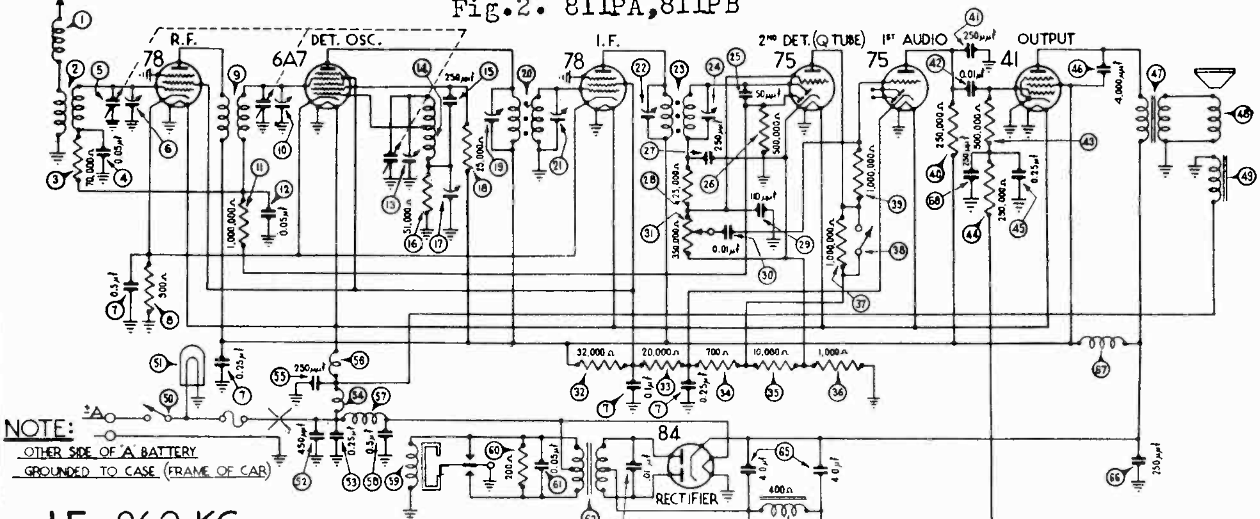
PHILCO RADIO & TELEV. CORP.

MODELS 811PA,811PB
MODEL 811PV
Schematics
Parts



IF PEAK Variable

Fig.2. 811PA,811PB



I.F. = 260 KC.

JULY, 1936

FIGURE 4 — 811 PV

PARTS LIST - MODELS 811PA,811PB and 811PV

1 Antenna Choke 38-7210
2 Antenna Transformer 32-2111
3 Resistor (70,000 ohms) .33-370134
4 Condenser (.05 mfd.) .. 30-4444
5 Tuning Condenser (811 P.V.)31-1831
5 Tuning Condenser (811P) ..31-1872
6 First Padder (on Tun. Cond.) ....
7 Condenser (.1-.25-.25-.5 mfd.) ...30-4374
8 Resistor (300 ohms) 33-1214
9 R. F. Transformer (811P) 32-2112
9 R. F. Transformer (811PV) 32-2168
10 Second Padder (on Tun. Cond.)
11 Resistor (1,000,000 ohms)33-510344
12 Condenser (.05 mfd.) 30-4444
13 Third Padder (on Tun. Cond.)
14 Oscillator Transformer(811P) 32-2131
14 Oscillator Transformer (811PV) 32-2113
15 Condenser (50 mmfd.) 811P 30-1029
15 Condenser (250 mmfd.) (811PV) 30-1032
16 Resistor (51,000 ohms) ..33-351344
17 Low Frequency Padder 31-6056
18 Resistor (25,000 ohms) (811PV) 33-325344
18 Resistor (45,000 ohms (811P) 33-345344
19 Padder (Pri. 1st I. F. Trans.)
20 First I. F. Transformer ..32-2160
21 Padder (Sec. 1st I. F. Trans.)
22 Padder (Pri. 2nd I. F. Trans.)
23 Second I. F. Transformer .32-2164
24 Padder (Sec. 2nd I. F. Trans.)
25 Condenser (50 mmfd.) 30-1029
26 Resistor (500,000 ohms) 33-449344
27 Condenser (250 mmfd.) ..30-1032
28 Resistor (25,000 ohms) 33-325344
29 Condenser (110 mmfd.) ..30-1031
30 Condenser (.01 mfd.) 30-4124
31 Volume Control (350,000 ohms) 33-5139
32 Resistor (32,000 ohms) 33-332434
33 Resistor (20,000 ohms) .33-320334
34 Resistor (700 ohms) 33-1220
35 Resistor (10,000 ohms) 33-310134
36 Resistor (1,000 ohms) ...33-3017
37 Resistor (1,000,000 ohms)33-510344
38 "Q" Control Switch 3253
39 Resistor (1,000,000 ohms)33-510344
40 Resistor (250,000 ohms) 33-424344
41 Condenser (250 mmfd.) ..30-1032
42 Condenser (.01 mfd.) 30-4145
43 Resistor (500,000 ohms) 33-449344
44 Resistor (250,000 ohms) 33-424344
45 Condenser (.25 mfd.) 30-4446
46 Condenser (4000 mmfd.) ..30-4185
47 Output Transformer 32-7495
48 Cone and Voice Coil 36-3526
49 Field Coil 32-9236
50 On and Off Switch (811P) 42-1188
50 On and Off Switch (811PV) 42-1160
51 Pilot Lamp (811 PV Only) 34-2040
52 Condenser (450 mmfd.) ..31-6065
53 Condenser (.25 mfd.) 30-4446
54 "A" Choke 32-1464
55 Condenser (250 mmfd.) ..30-1032
56 Filament Choke 32-1930
57 Vibrator Choke 32-1968
58 Condenser .5 mfd.) 30-4047
59 Vibrator 41-3186
60 Resistor (200 ohms) 33-1210
61 Condenser (.05 mfd.) 30-4444
62 Power Transformer 32-7482
63 Condenser (.01 mfd.) 30-4381
64 Filter Choke 32-7491
65 Filter Condenser (4-4 mfd.) 30-2145
66 Condenser (250 mmfd.) ..30-1032
67 "B" Choke 32-1932
68 Condenser (250 mmfd.) ...30-1032
69 Crystal (811P)
1908 K. C. Crystal 45-2194
Frequencies 1630-1634-1642-1650-1658-1666 K. C.
1953 K. C. Crystal 45-2195
Frequencies 1674-1682-1690-1698-1706-1712 K. C.
2658 K. C. Crystal 45-2196
Frequencies 2382-2390-2398-2406-2414 K. C.
2696 K. C. Crystal 45-2197
Frequencies 2422-2430-2442-2450 K. C.
2734 K. C. Crystal 45-2198
Frequencies 2458-2466-2474-2482-2490 K. C.
Four-prong Socket 27-6044
Five-prong Socket 27-6035
Six-prong Socket 27-6036
Seven-prong Socket 27-6037
Relay Circuit Switch Plate 28-2415
Speaker Clamps 29-3131
Control Assembly (811PV) 42-5585
Control Assembly (811P) ..42-5591
Bracket (811PV) 28-3711
Scale Assembly (811PV) ..42-5590
Tuning and Volume Shaft (811PV) 28-8595
Volume Shaft (811P) 28-8620
Tuning and Volume Knob (811PV) 27-4288
Volume Knob (811P) 27-4208
Switch Lever Knob (811PV) 27-4314
Antenna Lead Assembly ..41-3191
Fuse 7227
Fuse Insulator 27-7729
Receiver Mounting Plate ...28-3086
Receiver Housing 38-1657

ADJUSTMENTS — MODELS 8 1 1 PA AND 8 1 1 PB

The fixed frequency Auto Radio Receivers are identical, except for the crystals used to obtain the various oscillator frequencies.

The Receivers, when used with the proper crystals, can be adjusted for any specified frequency between the limits of 1630 K. C. and 1712 K. C. (Model 811 PA) and 2382 K. C. and 2490 K. C. (Model 811 PB). Different crystals are used to obtain these frequencies. The crystal frequency, however, is no indication of the Receiver frequency adjustment.

FREQ. OF CRYSTAL	RECEIVER FREQ.	PART NO. CRYSTAL
1908 K. C.	1630-1634-1642 1650-1658-1666 K. C.	45-2194
1953 K. C.	1674-1682-1690 1698-1706-1712 K. C.	45-2195
2658 K. C.	2382-2390-2398 2406-2414 K. C.	45-2196
2696 K. C.	2422-2430-2442 2450 K. C.	45-2197
2734 K. C.	2458-2466-2474 2482-2490- K. C.	45-2198

The I. F. frequency used in each Receiver is the difference between the frequency of the crystal in the Receiver and the frequency of the transmitter, i. e.: the transmitter frequency is 2422 K. C., the crystal used is 2696 K. C., the difference is 274 K. C., which is the frequency to which the I. F. amplifier must be tuned.

The Receivers are carefully adjusted to the required frequency at the factory and ordinarily need no readjustments except when the transmitter frequency is changed. Then the Receiver must be padded while warm.

The Receiver must be set up for operation and the volume control set at maximum. The Receiver "Q" switch must be in the off position, cutting out the carrier relay circuit. Use a quality modulated oscillator or signal generator for the test signal, with an output meter connected across the output stage. The signal from the signal generator should be attenuated so that the output signal is just sufficient to actuate the output meter. The signal should not be strong enough to operate the automatic volume control.

I. F. STAGES — The signal generator must be set exactly on the predetermined frequency and the generator lead connected to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser. Adjust the padders (22), (24) on the second I. F. transformer for maximum output.

In a like manner, connect the signal generator lead to the grid cap of the 6A7 detector oscillator tube and adjust the padders (19) and (21) on the first I. F. transformer.

Check the adjustments of the second I. F. transformer and the first I. F. transformer.

R. F. — Tune the signal generator to the frequency of the transmitter and connect the output of the generator to the Receiver antenna lead, through a 200 mmfd. dummy antenna.

The variable condenser is locked in place with two set screws. Adjust these and tune the variable condenser to the input frequency. If the crystal oscillator circuit does not function at first, loosen the padder (13) on the oscillator section of the tuning condenser and also the series padder (17). If the oscillator output is low, it can be increased by adjusting the padder (13) for the higher frequencies and the padder (17) for the lower frequencies.

Adjust the R. F. and detector padders (6) and (10) for maximum output. If after adjusting, they are loose, back out the tuning condenser slightly — or if they are too tight, turn the condenser in slightly. Then readjust the padders.

On the Model 811PA (lower frequency band) adjust the series padder (17) for maximum output reading, and on the Model 811PB (higher frequency band) adjust the high frequency padder (13). The adjustment will not give a sharp peak, but it is possible to adjust for the maximum output. After this is obtained, back off the adjusting nut a half turn.

After completing these adjustments, recheck all the padders. This time, using a carefully calibrated signal generator, or better still, test tone from the police transmitter, connected to the Receiver antenna lead through a 200 mmfd. dummy antenna. Recheck the padders (6), (10), (13) and (17) on the gang condenser. Using the same signal, adjust the second I. F. and first I. F. padders for maximum output.

IMPORTANT — These adjustments should be repeated after the Receiver has been operated at 8 volts for approximately 8 hours.

DO NOT OPEN THE CRYSTAL HOLDER. If, for any reason whatever it has been opened, the crystal and plates should be very carefully cleaned with carbon tetrachloride. After cleaning, the crystal must not be touched by the fingers. Use a clean cloth for handling.

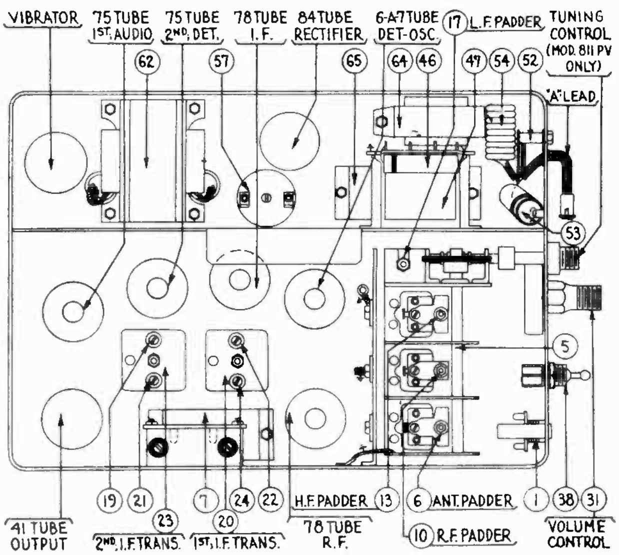


FIGURE 3 — MODELS 8 1 1

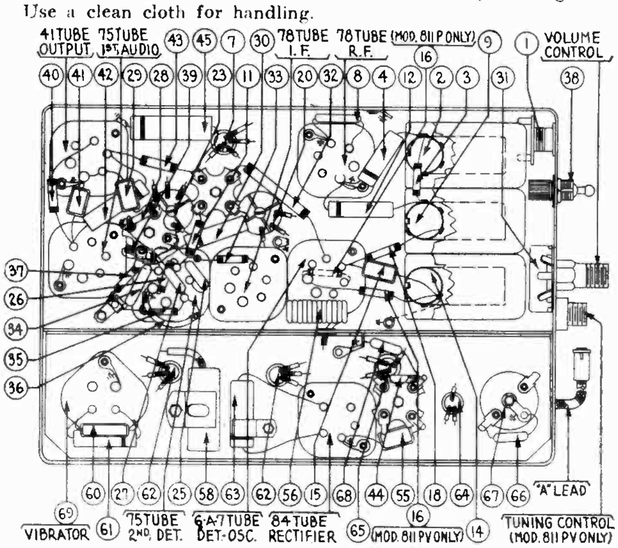


FIGURE 5 — MODELS 8 1 1

Trimmers, Chassis Parts List

PHILCO RADIO & TELEV. CORP.

MODEL 816
Schematic, Socket

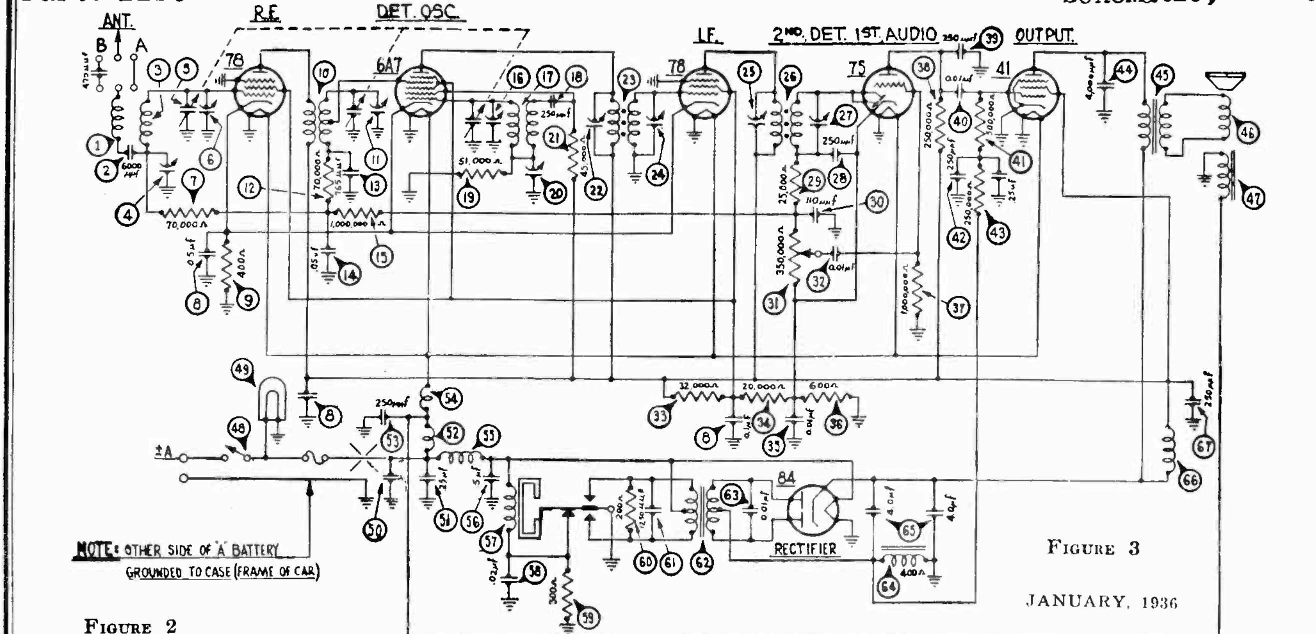
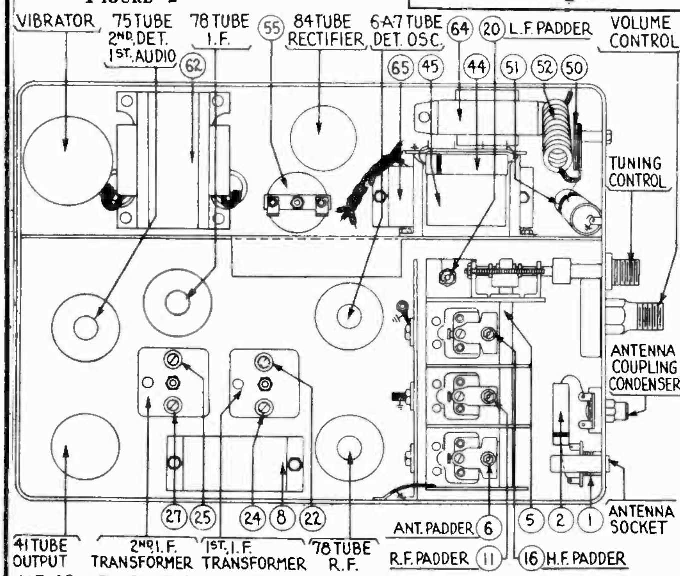
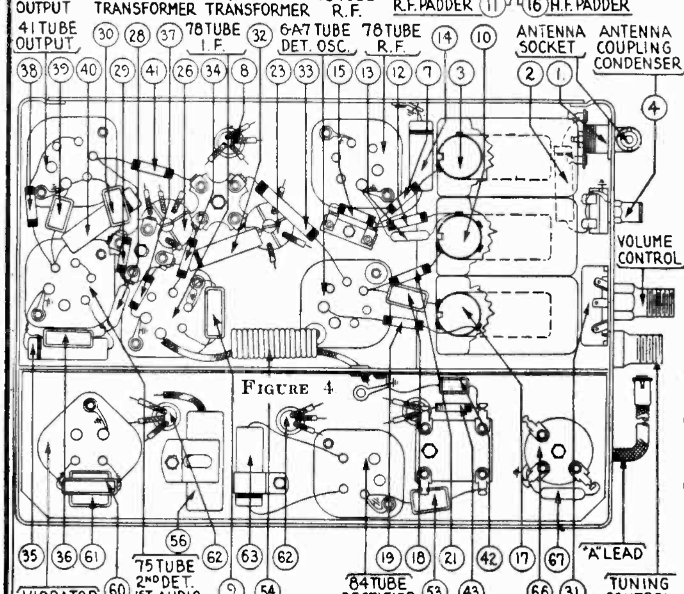


FIGURE 3

JANUARY, 1936

FIGURE 2





ANTENNA CONNECTIONS

NOTE:

• USE A WIRING WHEN RECEIVER IS INSTALLED IN A CAR HAVING A TOP SCREEN ANTENNA, UNDERCAR ANTENNA, SPARE WHEEL ANTENNA OR ANTENNA HAVING SIMILARLY LOW RELATIVE CAPACITANCE (50µµf TO 450µµf)

• USE B WIRING WHEN RECEIVER IS INSTALLED IN A CAR HAVING A METAL INSERT TOP ANTENNA, INSULATED DOOR ANTENNA, INSULATED TRUNK COVER ANTENNA OR ANTENNA HAVING SIMILARLY HIGH RELATIVE CAPACITANCE (450µµf TO 2500µµf)

I.F.-260 KC.

For Alignment and Remote Control Parts List, see Index

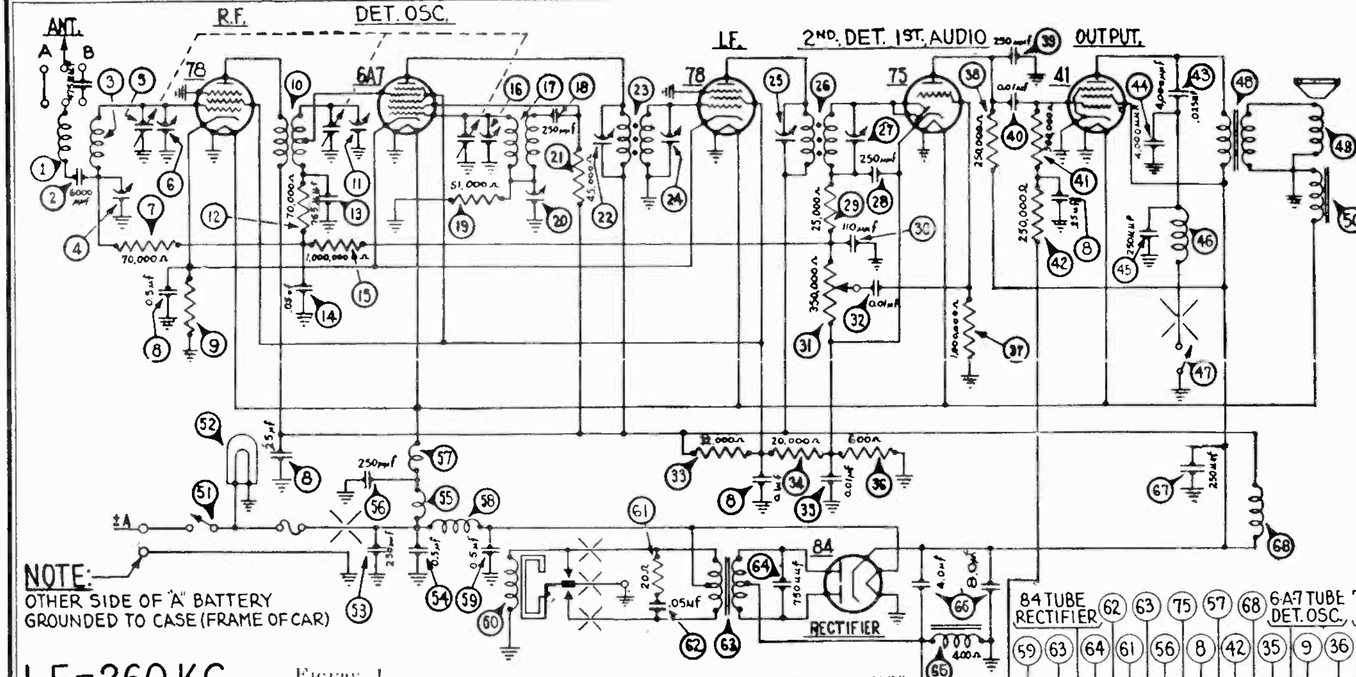
MODEL 816 PARTS LIST

No.	Description	Part No.	No.	Description	Part No.
1	Antenna Choke	38-7516	48	"On" and "Off" Switch	42-1160
2	Condenser (6000 mmfd.)	30-4125	49	Pilot Lamp	34-2039
3	Antenna Transformer	32-1984	50	Condenser (450 mmfd.)	31-6065
4	Antenna Coupling Condenser	31-6082	51	Condenser (.25 mfd.)	30-4146
5	Tuning Condenser	31-1767	52	"A" Choke	32-1464
6	First Padder (on Tun. Cond.)	....	53	Condenser (250 mmfd.)	30-1032
7	Resistor (70,000 ohms)	33-370334	54	Filament Choke	32-1930
8	Condenser (.1-.25-.25-.5 mfd.)	30-4374	55	Vibrator Choke	32-1968
9	Resistor (400 ohms)	33-1211	56	Condenser (.5 mfd.)	30-4047
10	R. F. Transformer	32-1985	57	Vibrator	38-5036
11	Second Padder (on Tun. Cond.)	....	58	Condenser (.02 mfd.)	30-4039
12	Resistor (70,000 ohms)	33-370334	59	Resistor (300 ohms)	33-3130
13	Condenser (765 mmfd.)	30-1069	60	Resistor (200 ohms)	33-1210
14	Condenser (.05 mfd.)	30-4020	61	Condenser (1250 mmfd.)	5886
15	Resistor (1,000,000 ohms)	33-510344	62	Power Transformer	32-7482
16	Third Padder (on Tun. Cond.)	....	63	Condenser (.01 mfd.)	30-4381
17	Oscillator Transformer	32-1986	64	Filter Choke	32-7491
18	Condenser (250 mmfd.)	30-1032	65	Filter Condenser (4-4 mfd.)	30-2145
19	Resistor (51,000 ohms)	33-351344	66	R. F. Choke	32-1932
20	Low Frequency Padder	31-6083	67	Condenser (250 mmfd.)	30-1032
21	Resistor (45,000 ohms)	33-345344		Four Prong Socket	27-6044
22	Padder (Pri. 1st I. F. Trans.)	....		Five Prong Socket	27-6035
23	First I. F. Transformer	32-1928		Six Prong Socket	27-6036
24	Padder (Sec. 1st I. F. Trans.)	....		Seven Prong Socket	27-6037
25	Padder (Pri. 2nd I. F. Trans.)	....		Clamps (Speaker Mtg.)	29-3131
26	Second I. F. Transformer	32-1929		Speaker Cable	41-3180
27	Padder (Sec. 2nd I. F. Trans.)	....		Control Assembly (816)	42-5534
28	Condenser (250 mmfd.)	30-1032		Scale Assembly	42-5539
29	Resistor (25,000 ohms)	33-325344		Interference Condenser (½ mfd.)	30-4007
30	Condenser (110 mmfd.)	30-1031		Distributor Resistor	33-1196
31	Volume Control (350,000 ohms)	33-5148		Tuning and Volume Shaft	28-8495
32	Condenser (.01 mfd.)	30-4124		Tee Bolt (Receiver Mtg.)	28-6161
33	Resistor (32,000 ohms)	33-332433		Nuts (Receiver Mtg.)	W58A
34	Resistor (20,000 ohms)	33-320334		Bracket (Control Mtg.)	29-3711
35	Condenser (.01 mfd.)	30-4124		Fuse	7227
36	Resistor (600 ohms)	33-1212		Fuse Insulator	27-7729
37	Resistor (1,000,000 ohms)	33-510344		Antenna Loom Assembly (816)	41-3191
38	Resistor (250,000 ohms)	33-424344		Antenna Connector	29-6423
39	Condenser (250 mmfd.)	30-1032		Antenna Connector Insulator	27-8199
40	Condenser (.01 mfd.)	30-4145		Condenser Plug	30-4412
41	Resistor (500,000 ohms)	33-449344		Control Assembly (816B-C)	42-5561
42	Condenser (250 mmfd.)	30-1032		Control Assembly (816P)	42-5562
43	Resistor (250,000 ohms)	33-424344		Scale Assembly (816B-C)	42-5570
44	Condenser (4000 mmfd.)	30-4185		Scale Assembly (816P)	42-5540
45	Output Transformer	32-7495		Knob (816P)	27-4299
46	Cone and Voice Coil	36-3526		Knob (816-816B-C)	27-4288
47	Field Coil Assembly	32-9236		Knob Base	28-3698

MODEL 817
Schematic, Chassis
Notes, Parts List

PHILCO RADIO & TELEV. CORP.

NOTE: When receiver is installed in a car having top, under-car, spare wheel, or antenna's having similar lo-relative capacitance (50mmf.-450mmf.) use connector plug in "A". When installed in a car having a metal insert top, insulated door, insulated trunk cover, or antenna's having similarly hi-relative capacitance (450mmf.-2500mmf.) use condenser plug in "B".



I.F.=260 KC.

FIGURE 1

JANUARY 15, 1936.

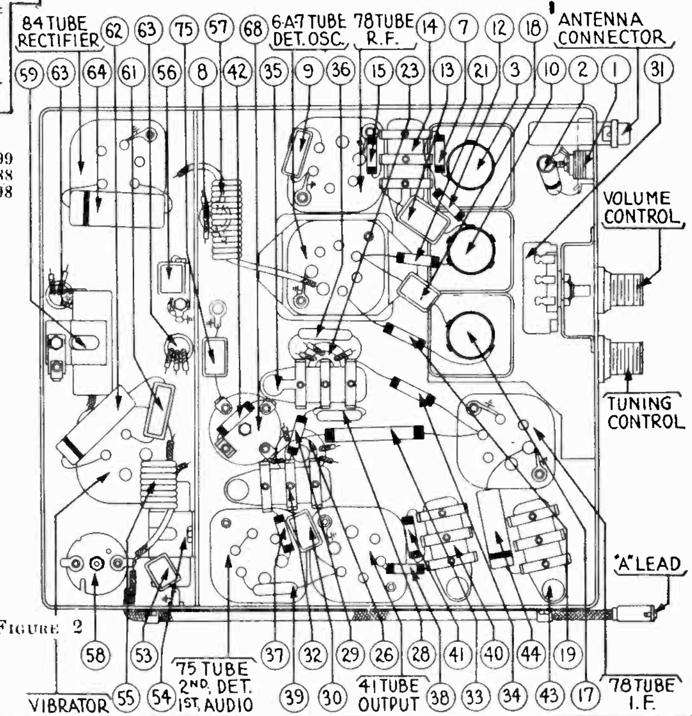


FIGURE 2

For Remote Control Parts List, see Index

PARTS LIST

No.	Description	Part No.
1	Antenna Choke	38-7516
2	Condenser (6,000 mmfd.)	30-4425
3	Antenna Transformer	32-1984
4	Antenna Coupling Condenser	31-6082
5	Tuning Condenser	31-1769
6	First Padder (on tun. cond.)	....
7	Resistor (70,000 ohms)	33-370331
8	Condenser (.1-.25-.25-.5 mfd.)	30-4415
9	Resistor (150 ohms)	33-1218
10	R. F. Transformer	32-1985
11	Second Padder (on tun. cond.)	....
12	Resistor (70,000 ohms)	33-370334
13	Condenser (765 mmfd.)	30-1069
14	Condenser (.05 mfd.)	3615-OSG
15	Resistor (1,000,000 ohms)	33-510314
16	Third Padder (on tun. cond.)	....
17	Oscillator Transformer	32-1986
18	Condenser (250 mmfd.)	30-1032
19	Resistor (51,000 ohms)	33-351344
20	Low Frequency Padder	31-6083
21	Resistor (15,000 ohms)	33-345344
22	Padder (Pri. 1st I. F. Trans.)	....
23	First I. F. Transformer	32-2026
24	Padder (Sec. 1st I. F. Trans.)	....
25	Padder (Pri. 2nd I. F. Trans.)	....
26	Second I. F. Transformer	32-2027
27	Padder (Sec. 2nd I. F. Trans.)	....
28	Condenser (250 mmfd.)	30-1032
29	Resistor (25,000 ohms)	33-325344
	Antenna Loom Assembly	41-3191
	Scale Assembly (817B-C)	42-5570
	Scale Assembly (817P)	42-5540
30	Condenser (110 mmfd.)	30-1031
31	Volume Control (350,000 ohms)	33-5148
32	Condenser (.01 mfd.)	3903-OSU
33	Resistor (32,000 ohms)	33-332134
34	Resistor (20,000 ohms)	33-320334
35	Condenser (.01 mfd.)	3903-OSG
36	Resistor (600 ohms)	33-1212
37	Resistor (1,000,000 ohms)	33-510344
38	Resistor (250,000 ohms)	33-424344
39	Condenser (250 mmfd.)	30-1032
40	Condenser (.01 mfd.)	3903-OSU
41	Resistor (500,000 ohms)	33-449344
42	Resistor (250,000 ohms)	33-424344
43	Condenser (.025 mfd.)	7653-OSU
44	Condenser *(4000 mmfd.)	30-4185
45	Condenser (250 mmfd.)	30-1032
46	Choke	32-2063
47	Tone Control Switch	42-1160
48	Output Transformer	32-7495
49	Cone and Voice Coil	36-3586
50	Field Coil Assembly	36-3597
51	"On and Off Switch"	42-1160
52	Pilot Lamp	34-2039
53	Condenser (250 mmfd.)	30-1032
54	Condenser (.5 mfd.)	30-1015
55	"A" Choke	32-1132
56	Condenser (250 mmfd.)	30-1032
57	Filament Choke	32-2038
58	Vibrator Choke	32-2039
59	Condenser (.5 mfd.)	30-1015
	Knob (817P)	27-4299
	Knob (817B-C)	27-4288
	Knob Base	28-3698
60	Vibrator	41-3170D
61	Resistor (20 ohms)	33-020133
62	Condenser (.05 mfd.)	30-4020S
63	Power Transformer	32-7550
64	Condenser (750 mmfd.)	30-4120
65	Filter Choke	32-7545
66	Filter Condenser (4-8 mfd.)	30-2150
67	Condenser (250 mmfd.)	30-1032
68	"B" Choke	32-1281
	Four Prong Socket	27-6014
	Five Prong Socket	27-6035
	Six Prong Socket	27-6036
	Seven Prong Socket	27-6037
	Control Assembly (817)	42-5536
	Bracket (Control Mtg.)	29-3711
	Knob	27-4288
	Condenser Connector	30-4412
	Connector Plug	29-6423
	Insulator	27-8199
	Fuse	7227
	Fuse Insulator	27-7729
	"Tee" Bolt (Rec. Mtg.)	28-6161
	Nut (Rec. Mtg.)	W518A
	Speaker (Model CB)	36-1203
	Pilot Lamp Assembly	38-7213
	Dial Assembly	42-5539
	Tuning and Volume Shaft	28-8495
	Distributor Resistor	33-1196
	Interference Condenser	30-4007

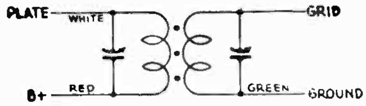
PHILCO RADIO & TELEV. CORP.

I. F. TRANSFORMERS AND PADDERS

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield (See Figure).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure



If replacements are ever necessary, replace the entire coil assembly, 32-2026 for the first I. F. stage and 32-2027 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

MODEL 816 817 ADJUSTMENTS

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

General

OUTPUT METER—The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

SIGNAL GENERATOR—With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

Procedure

I. F.—Set the signal generator at exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser (without removing the grid cap).

Adjust the secondary screw padder (27) on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (25) for maximum reading. (See Figure for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser (without removing the grid cap). Adjust the secondary screw padder (24) on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (22) for maximum reading. (See Figure for location of padders).

HIGH FREQUENCY AND R. F.—After padding the first I. F. stage remove the generator lead from the 6A7 tube.

Set the signal generator at 1550 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser (without removing the grid cap).

Turn the tuning condenser plates out of mesh as far as they will go. With the tuning condenser in this position, adjust the high frequency padder (16) and the R. F. padder (11) until the maximum reading is obtained on the output meter. This is the true setting for 1550 K. C., 155 on the dial scale.

LOW FREQUENCY—Turn the tuning condenser plates in mesh to approximately 580 K. C., 58 on the dial scale and set the signal generator at 580 K. C. Roll the tuning condenser and adjust the low frequency padder screw (20) for maximum reading on the output meter.

HIGH FREQUENCY RE-ADJUSTMENT—Turn the tuning condenser plates out of mesh as far as they will go and set the signal generator at 1550 K. C. Then adjust the high frequency padder (16) again for maximum reading on the output meter.

Remove the generator lead from the 78 R.F. tube.

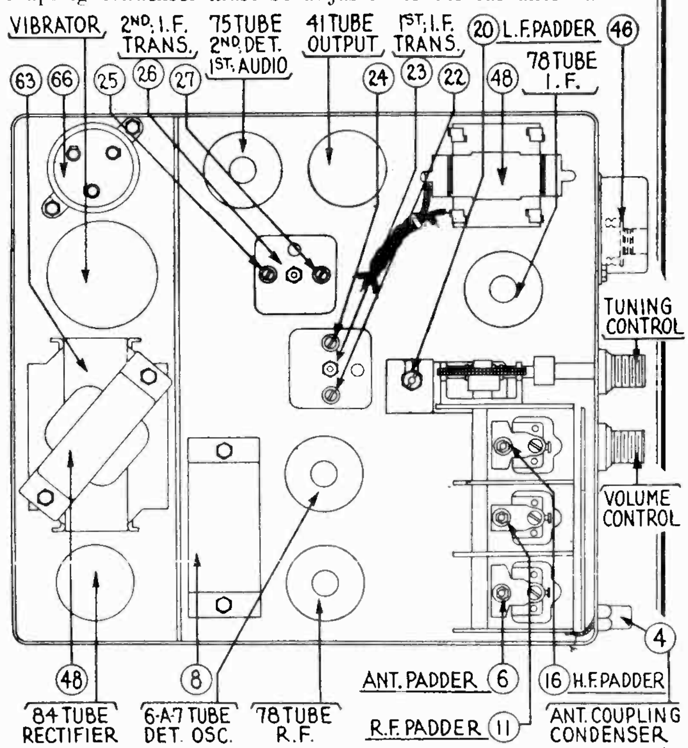
ANTENNA—Connect the generator lead to the antenna cable assembly (made up of Part No. L1915 loom, 1-27-7133 terminal and 40 inches of 16 strand No. 30 wire), using a 200 mmfd. condenser in series between the two leads. Place the connector plug in the antenna socket on the Receiver. Plug the cable into the antenna socket.

Turn the tuning condenser in mesh to 580 K. C., and adjust the signal generator at 580 K. C. Adjust the Antenna coupling condenser (4) for maximum reading.

Turn the tuning condenser to 1400 K. C. and set the generator at 1400 K. C. Adjust the padders (11) and (6) for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. Connect the signal generator output lead to a wire placed near the car antenna but not connected to it.

When installing the radio in a car, follow the installation instructions carefully. The correct connector must be used in the antenna lead connector in the Receiver and the antenna coupling condenser must be adjusted to the car antenna.



The Model 817 Receiver is furnished with the new streamline "wide vision" control which can be installed on the edge of the instrument board. This control unit is exceptionally attractive and is designed to blend harmoniously with the instrument boards of practically all cars. The circuit and layout of the Models 817B-817C and 817P Receivers are the same as the Model 817. However, these Receivers are equipped with a special "customed" control unit which matches the instrument board fittings, and is designed for installation in the space provided for radio control in the instrument board of the 1936 Buick, Chevrolet and Pontiac cars.

MODEL 818
MODEL 818K
Socket, Trimmers
Alignment

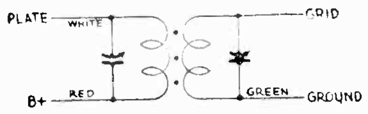
PHILCO RADIO & TELEV. CORP.

I. F. Transformers and Padders

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Figure).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure



If replacements are ever necessary, replace the entire coil assembly, 32-2026 for the first I. F. stage and 32-2027 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

MODEL 818 818K ADJUSTMENTS

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

General

OUTPUT METER—The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

SIGNAL GENERATOR—With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

Procedure

I. F.—Set the signal generator at exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser (without removing the grid cap).

Adjust the secondary screw padder (39) on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (37) for maximum reading. (See Figure for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser (without removing the grid cap). Adjust the secondary screw padder (25) on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (23) for maximum reading. (See Figure for location of padders).

HIGH FREQUENCY AND R. F.—After padding the first I. F. stage remove the generator lead from the 6A7 tube.

Set the signal generator at 1550 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser (without removing the grid cap).

Turn the tuning condenser plates out of mesh as far as they will go. With the tuning condenser in this position, adjust the high frequency padder (16) and the R. F. padder (11) until the maximum reading is obtained on the output meter. This is the true setting for 1550 K. C., 155 on the dial scale.

LOW FREQUENCY—Turn the tuning condenser plates in mesh to approximately 580 K. C., 58 on the dial scale and set the signal generator at 580 K. C. Roll the tuning condenser and adjust the low frequency padder screw (20) for maximum reading on the output meter.

HIGH FREQUENCY RE-ADJUSTMENT—Turn the tuning condenser plates out of mesh as far as they will go and set the signal generator at 1550 K. C. Then adjust the high frequency padder (16) again for maximum reading on the output meter.

Remove the generator lead from the 78 R. F. tube.

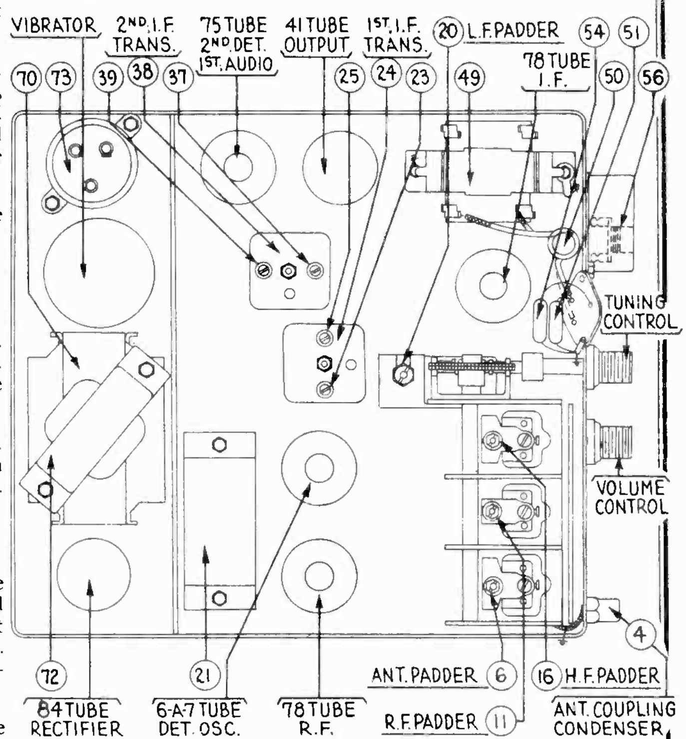
ANTENNA—Connect the generator lead to the antenna cable assembly (made up of Part No. L1915 loom, 1-27-7133 terminal and 40 inches of 16 strand No. 30 wire), using a 200 mmfd. condenser in series between the two leads. Place the connector plug in the antenna socket on the Receiver. Plug the cable into the antenna socket.

Turn the tuning condenser in mesh to 580 K. C., and adjust the signal generator at 580 K. C. Adjust the Antenna coupling condenser (4) for maximum reading.

Turn the tuning condenser to 1400 K. C. and set the generator at 1400 K. C. Adjust the padders (11) and (6) for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. The signal generator output lead should be connected to a wire placed near the car antenna but not connected to it.

When installing the radio in a car, follow the installation instructions carefully. The correct connector must be used in the antenna lead connector in the Receiver and the antenna coupling condenser must be adjusted to the car antenna.



MODEL 818
Schematic, Chassis
Notes, Parts

PHILCO RADIO & TELEV. CORP.

No.	Description	Part No.	Description	Part No.
	Connector Plug	29-6423	Speaker Cable Assembly (overhead speaker)	41-3189
	Fuse	7227	Distributor Resistor	33-1196
	Fuse Insulator	27-7729	Interference Cond. (.5 mfd.)	30-4007
	"Tee" Bolt (Rec. Mtg.)	28-6161	Condenser Connector	30-4412
	Nut (Rec. Mtg.)	W518A		

NOTE: When receiver is installed in a car having top, under-car, spare wheel, or antenna's having similar lo-relative capacitance (50mmf.-450mmf.) use connector plug in "A". When installed in a car having a metal insert top, insulated door, insulated trunk cover, or antenna's having similarly hi-relative capacitance (450mmf.-2500mmf.) use condenser plug in "B".

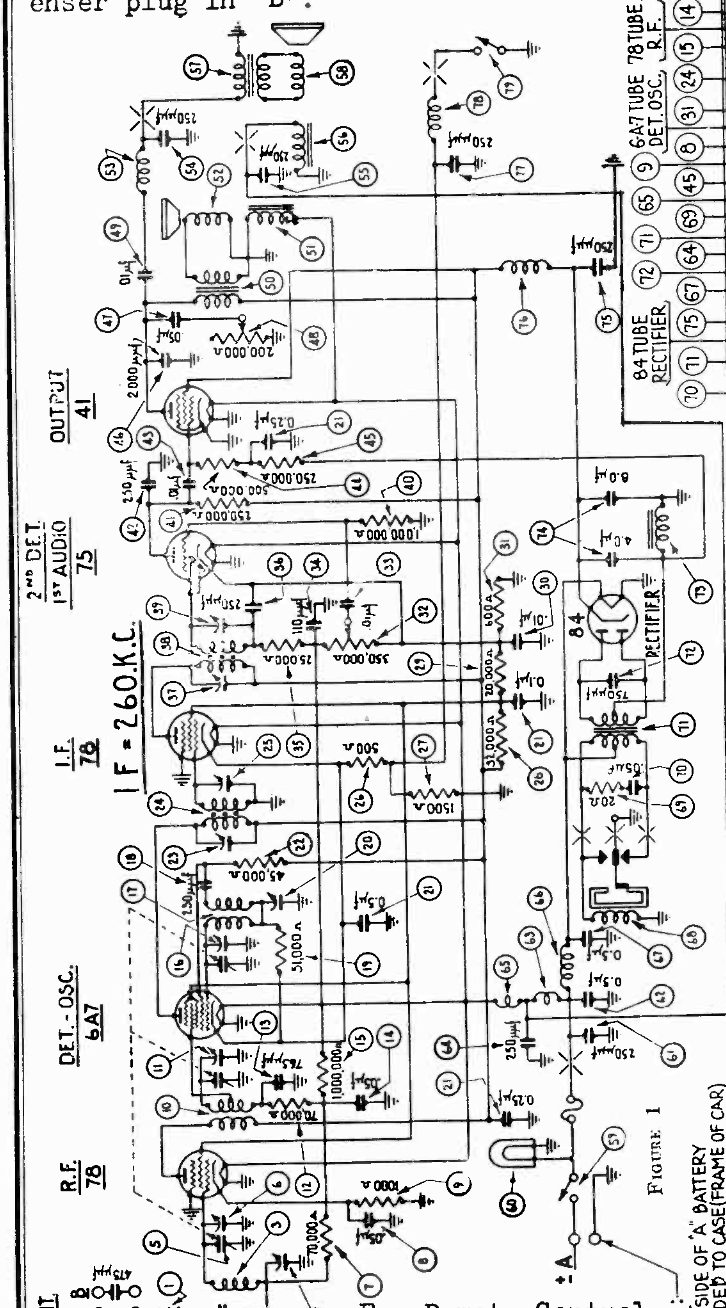


FIGURE 1

NOTE: OTHER SIDE OF "A" BATTERY GROUNDED TO CASE (FRAME OF CAR)

For Remote Control Parts List, see Index

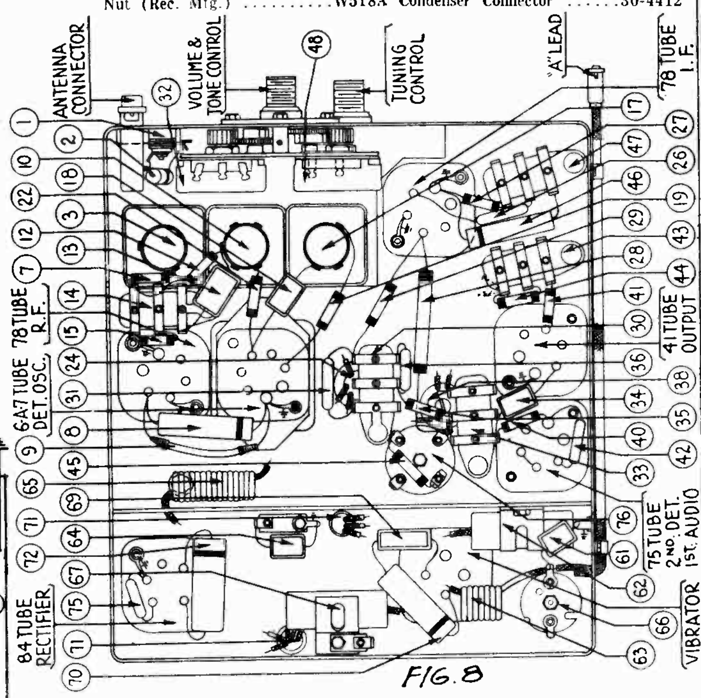


FIG. 8

MODEL 818 — PARTS LIST

No.	Description	Part No.
1	Antenna Choke	38-7516
2	Condenser (6000 mmfd.)	30-41258
3	Antenna Transformer	32-1984
4	Antenna Coupling Condenser	31-6082
5	Tuning Condenser	31-1769
6	First Padder (on tun. cond.)	....
7	Resistor (70,000 ohms)	33-370334
8	Condenser (.05 mfd.)	30-4020
9	Resistor (1000 ohms)	33-3017
10	R. F. Transformer	32-1985
11	Second Padder (on tun. cond.)	....
12	Resistor (70,000 ohms)	33-370334
13	Condenser (765 mmfd.)	30-1069
14	Condenser (.05 mfd.)	3615-OSG
15	Resistor (1,000,000 ohms)	33-510344
16	Third Padder (on tun. cond.)	....
17	Oscillator Transformer	32-1986
18	Condenser (250 mmfd.)	30-1032
19	Resistor (51,000 ohms)	33-351344
20	Low Frequency Padder	31-6083
21	Condenser (.1-.25-.25-.5 mfd.)	30-4415
22	Resistor (45,000 ohms)	33-345344
23	Padder (Pri. 1st I. F. Trans.)	....
24	First I. F. Transformer	32-2026
25	Padder (Sec. 1st I. F. Trans.)	....
26	Resistor (500 ohms)	33-1213
27	Resistor (1500 ohms)	33-215334
28	Resistor (32,000 ohms)	33-332434
29	Resistor (20,000 ohms)	33-320334
30	Condenser (.01 mfd.)	3903-OSG
31	Resistor (600 ohms)	33-1212
32	Volume Control (350,000 ohms)	33-5149
33	Condenser (.01 mfd.)	3903-OSU
34	Condenser (110 mmfd.)	30-1031
35	Resistor (25,000 ohms)	33-325344
36	Condenser (250 mmfd.)	30-1032
37	Padder (Pri. 2nd I. F. Trans.)	....
38	Second I. F. Transformer	32-2027
39	Padder (Sec. 2nd I. F. Trans.)	....
40	Resistor (1,000,000 ohms)	33-510344
41	Resistor (250,000 ohms)	33-424344
42	Condenser (250 mmfd.)	30-1032
43	Condenser (.01 mfd.)	3903-OSU
44	Resistor (500,000 ohms)	33-449344
45	Resistor (250,000 ohms)	33-424344
46	Condenser (2000 mmfd.)	30-4177
47	Condenser (.05 mfd.)	8326-OSU
48	Tone Control (200,000 ohms)	33-5150
49	Condenser (.01 mfd.)	30-4381
50	Output Transformer	32-7495
51	Field Coil Assembly	36-3597
52	Cone and Voice Coil	36-3586
53	Choke	32-1930
54	Condenser (250 mmfd.)	30-1032
55	Condenser (250 mmfd.)	30-1032
56	Field Coil Assembly (overhead speaker)	32-9236
57	Output Transformer (overhead speaker)	32-7507
58	Cone and Voice Coil (overhead speaker)	36-3526
59	"On-Off" Switch	42-1160
60	Pilot Lamp	34-2039
61	Condenser (250 mmfd.)	30-1032
62	Condenser (.5 mfd.)	30-4015
63	"A" Choke	32-1432
64	Condenser (250 mmfd.)	30-1032
65	Filament Choke	32-2038
66	Vibrator Choke	32-2039
67	Condenser (.5 mfd.)	30-4015
68	Vibrator	41-3170D
69	Resistor (20 ohms)	33-020133
70	Condenser (.05 mfd.)	30-4020
71	Power Transformer	32-7550
72	Condenser (750 mmfd.)	30-4420
73	Filter Choke	32-7545
74	Filter Condenser (4-8 mfd.)	30-2150
75	Condenser (250 mmfd.)	30-1032
76	"B" Choke	32-1281
77	Condenser (250 mmfd.)	30-1032
78	Choke	32-2063
79	Local-Distance Switch	42-1160
	Four Prong Socket	27-6044
	Five Prong Socket	27-6035
	Six Prong Socket	27-6036
	Seven Prong Socket	27-6037
	CB Speaker	36-1203
	Idler Gear	28-7176
	Pinion Gear	28-7178
	Control Assembly	42-5537
	Tuning Control Shaft	28-8495
	Volume Control Shaft	28-8499
	Pilot Lamp Assembly	38-7213
	Tuning and Volume Knob	27-4288

MODEL 818K
Schematic, Chassis
Notes, Parts List

PHILCO RADIO & TELEV. CORP.

For Remote Control Parts List, see Index

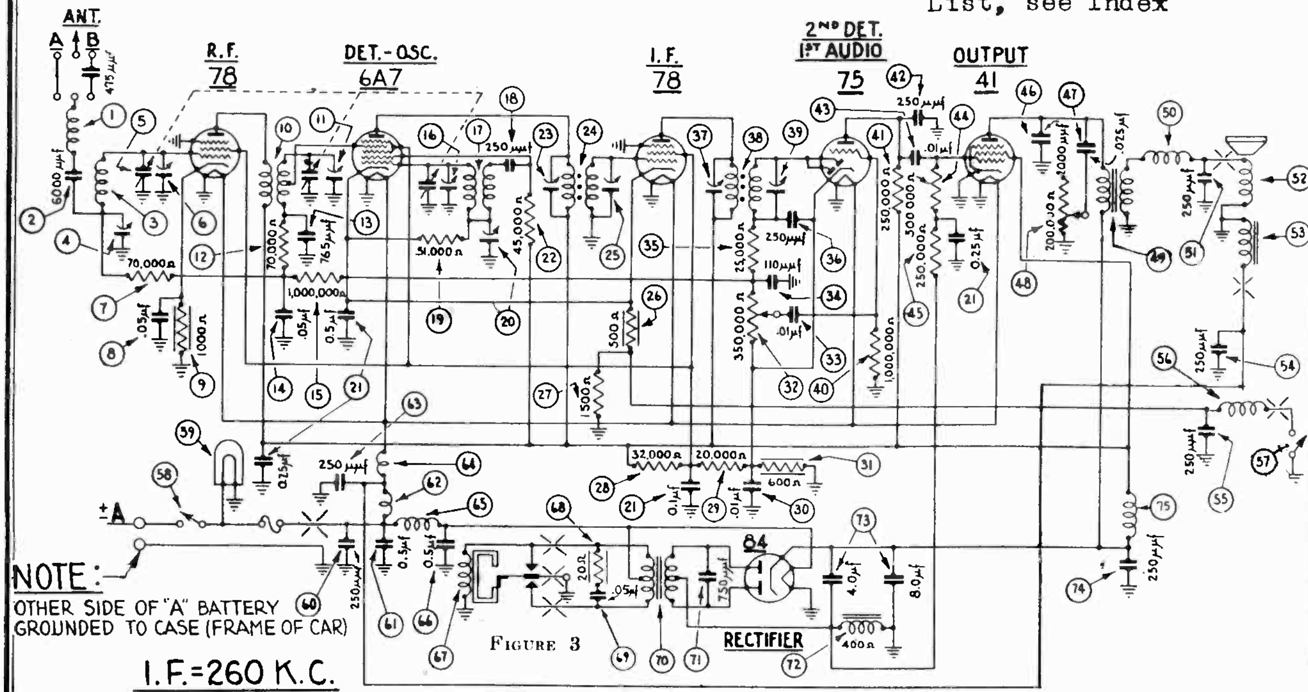


FIGURE 3

NOTE: When the Receiver is installed in a car having a top antenna, under-car antenna, spare wheel antenna or antenna having a similarly low relative capacitance (50 mmf. to 450 mmf.) use connector plug in "A". When the Receiver is installed in a car having a metal insert top antenna, insulated door antenna, insulated trunk cover antenna or antenna having similarly high relative capacitance (450 mmf. to 2500 mmf.) use condenser plug in "B".

No.	Description	Part No.	No.	Description	Part No.
1	Antenna Shoke	38-7516	48	Tone Control (200,000 ohms)	33-5150
2	Condenser (6000 mmfd.)	30-4125S	49	Output Transformer	32-7562
3	Antenna Transformer	32-1984	50	Choke	32-2038
4	Antenna Coupling Condenser	31-6082	51	Condenser (250 mmfd.)	30-1032
5	Tuning Condenser	31-1769	52	Cone and Voice Coil	36-3159
6	First Padder (on tun. cond.)	....	53	Field Coil Assembly	02795
7	Resistor (70,000 ohms)	33-370334	54	Condenser (250 mmfd.)	30-1032
8	Condenser (.05 mfd.)	30-4020	55	Condenser (250 mmfd.)	30-1032
9	Resistor (1000 ohms)	33-3017	56	Choke	32-2063
10	R. F. Transformer	32-1985	57	Local-Distance Switch	42-1160
11	Second Padder (on tun. cond.)	....	58	On and Off Switch	42-1160
12	Resistor (70,000 ohms)	33-370334	59	Pilot Lamp	34-2039
13	Condenser (765 mmfd.)	30-1069	60	Condenser (250 mmfd.)	30-1032
14	Condenser (.05 mfd.)	3615-0SG	61	Condenser (.5 mfd.)	30-4015
15	Resistor (1,000,000 ohms)	33-510344	62	"A" Choke	32-1432
16	Third Padder (on tun. cond.)	....	63	Condenser (250 mmfd.)	30-1032
17	Oscillator Transformer	32-1986	64	Filament Choke	32-2038
18	Condenser (250 mmfd.)	30-1032	65	Vibrator Choke	32-2039
19	Resistor (51,000 ohms)	33-351344	66	Condenser (.5 mfd.)	30-4015
20	Low Frequency Padder	31-6083	67	Vibrator	41-3170D
21	Condenser (.1-.25-.25-.5 mfd.)	30-4415	68	Resistor (20 ohms)	33-020133
22	Resistor (45,000 ohms)	33-345344	69	Condenser (.05 mfd.)	30-4020
23	Padder (Pri. 1st I. F. Trans.)	....	70	Power Transformer	32-7550
24	First I. F. Transformer	32-2026	71	Condenser (750 mmfd.)	30-4420
25	Padder (Sec. 1st I. F. Trans.)	....	72	"B" Choke	32-7545P
26	Resistor (500 ohms)	33-1213	73	Filter Choke (4-8 mfd.)	30-2150
27	Resistor (1500 ohms)	33-215334	74	Condenser (250 mmfd.)	30-1032
28	Resistor (32,000 ohms)	33-332434	75	"B" Choke	32-1281
29	Resistor (20,000 ohms)	33-320334		Four Prong Socket	27-6044
30	Condenser (.01 mfd.)	3903-0SG		Five Prong Socket	27-6035
31	Resistor (600 ohms)	33-1212		Six Prong Socket	27-6036
32	Volume Control (350,000 ohms)	33-5149		Seven Prong Socket	27-6037
33	Condenser (.01 mfd.)	3903-0SU		Control Assembly	42-5537
34	Condenser (110 mmfd.)	30-1031		Pilot Lamp Assembly	38-7213
35	Resistor (25,000 ohms)	33-325344		Tun. and Vol. Knob	27-4288
36	Condenser (250 mmfd.)	30-1032		Tuning Control Shaft	28-8495
37	Padder (Pri. 2nd I. F. Trans.)	....		Volume Control Shaft	28-8499
38	Second I. F. Transformer	32-2027		Scale Assembly	42-5539
39	Padder (Sec. 2nd I. F. Trans.)	....		Distributor Resistor	33-1196
40	Resistor (1,000,000 ohms)	33-510344		Intereference Condenser (.5 mfd.)	30-4007
41	Resistor (250,000 ohms)	33-424344		Condenser Connector	30-4412
42	Condenser (250 mmfd.)	30-1032		Connector Plug	29-6423
43	Condenser (.01 mfd.)	3903-0SU		Fuse	7227
44	Resistor (500,000 ohms)	33-449344		Fuse Insulator	27-7729
45	Resistor (250,000 ohms)	33-424344		"Tee" Bolt (Rec. Mtg.)	28-6161
46	Condenser (2000 mmfd.)	30-4177		Nut (Rec. Mtg.)	W518A
47	Condenser (.025 mfd.)	7653-0SU		Stud (Speaker Mtg.)	6122

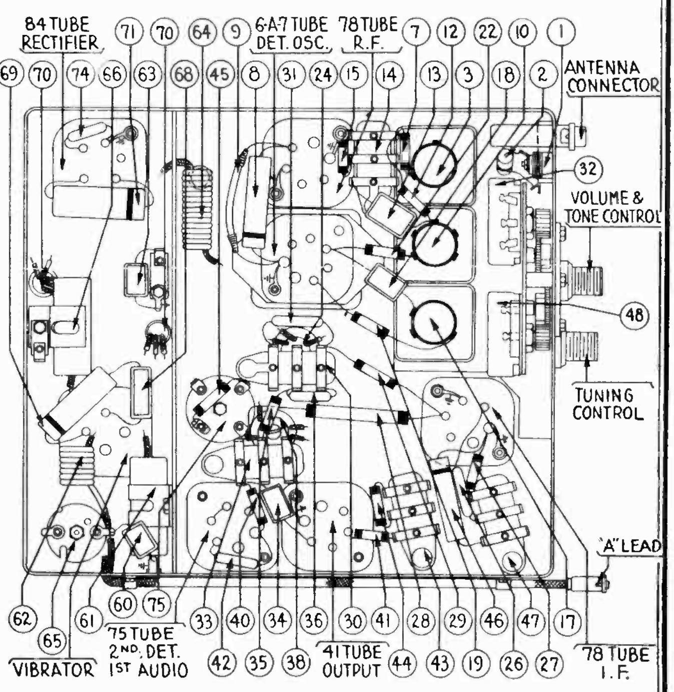


FIGURE 4

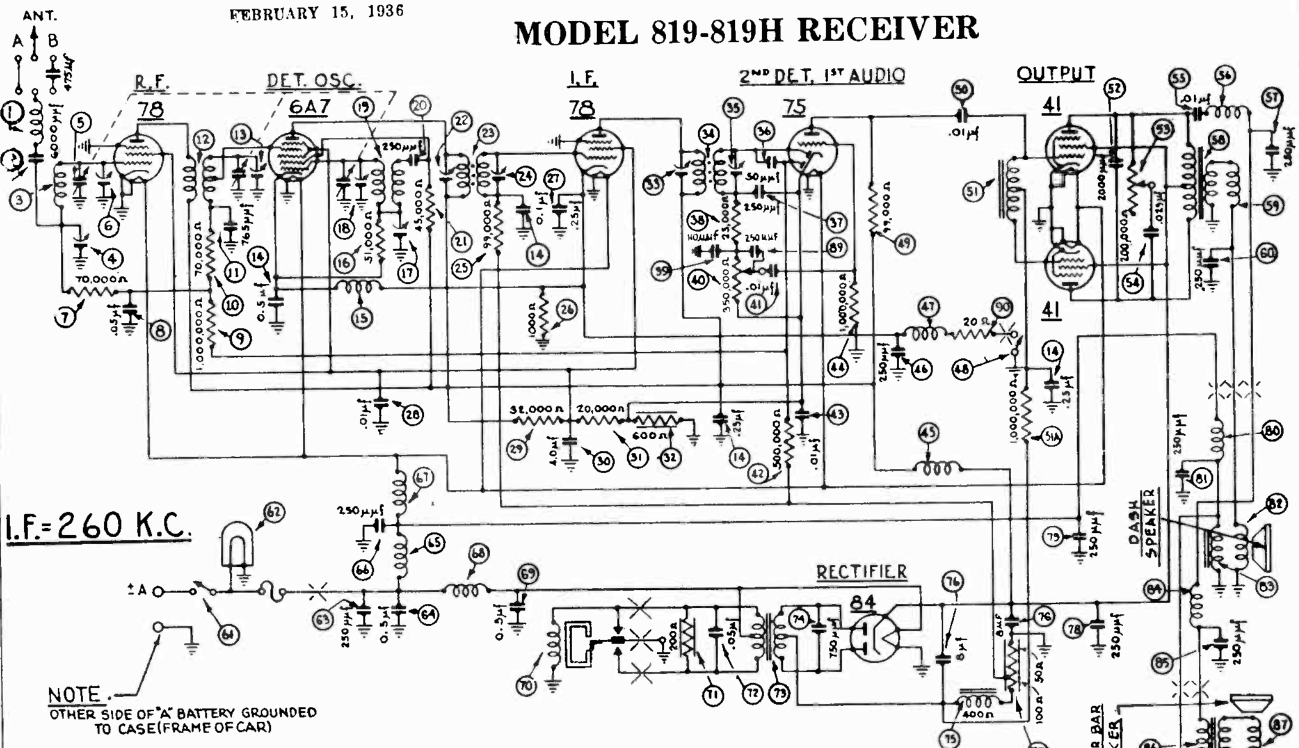
No.	Description	Part No.	No.	Description	Part No.
	Nut (Speaker Mtg.)	W55A		Pinion Gear	28-7178
	Idler Gear	28-7176		Complete Speaker A36	36-1206

MODELS 819,819H
Schematic,Chassis
Notes,Parts List

PHILCO RADIO & TELEV. CORP.

FEBRUARY 15, 1936

MODEL 819-819H RECEIVER



NOTE: When the Receiver is installed in a car having a top antenna, under-car antenna, spare wheel antenna or antenna having a similarly low relative capacitance (50 mmf. to 450 mmf.) use connector plug in "A".

When the Receiver is installed in a car having a metal insert top antenna, insulated door antenna, insulated trunk cover antenna or antenna having similarly high relative capacitance (450 mmf. to 2500 mmf.) use condenser plug in "B".

For Remote Control Parts List, see Index

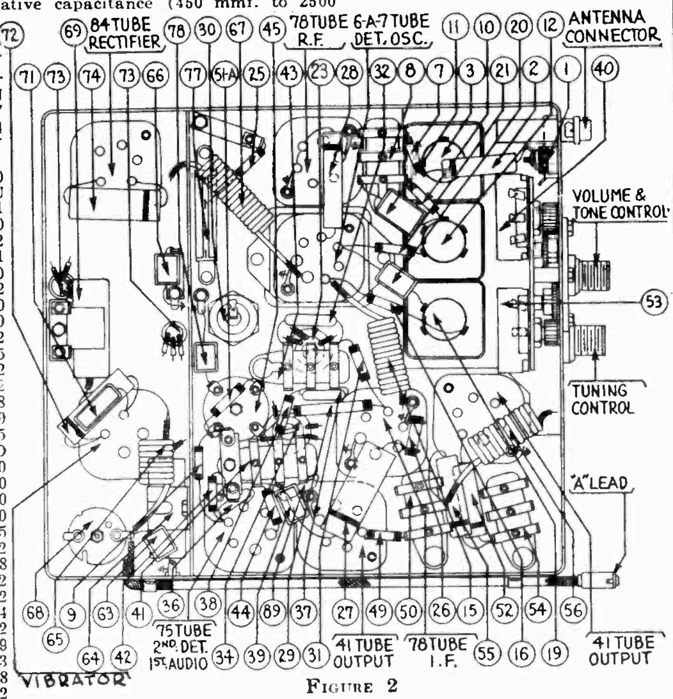


FIGURE 2

No.	Description	Part No.
1	Antenna Choke	38-7516
2	Condenser (6000 mmfd.)	30-4125
3	Antenna Transformer	32-1984
4	Antenna Coupling Condenser	31-6082
5	Tuning Condenser	31-1769
6	First Padder (on tun. cond.)	....
7	Resistor (70,000 ohms)	33-370334
8	Condenser (.05 mfd.)	3615-OSG
9	Resistor (1,000,000 ohms)	33-510344
10	Resistor (70,000 ohms)	33-370334
11	Condenser (765 mmfd.)	30-1069
12	R. F. Transformer	32-1985
13	Second Padder (on tun. cond.)	....
14	Condenser (.1-.25-.25-.5 mfd.)	30-4415
15	Choke	32-2063
16	Resistor (51,000 ohms)	33-351344
17	Low Frequency Padder	31-6083
18	Third Padder (on tun. cond.)	....
19	Oscillator Transformer	32-1986
20	Condenser (250 mmfd.)	30-1032
21	Resistor (45,000 ohms)	33-345344
22	Padder (Pri. 1st I. F. Trans.)	....
23	First I. F. Transformer	32-2050
24	Padder (Sec. 1st I. F. Trans.)	....
25	Resistor (99,000 ohms)	33-399344
26	Resistor (1,000 ohms)	33-210334
27	Condenser (.25 mfd.)	30-4146
28	Condenser (.01 mfd.)	30-4124
29	Resistor (32,000 ohms)	33-332434
30	Condenser (4 mfd.)	30-2151
31	Resistor (20,000 ohms)	33-320334
32	Resistor (600 ohms)	33-1212
33	Padder (Pri. 2nd I. F. Trans.)	....
34	Second I. F. Transformer	32-2034
35	Padder (Sec. 2nd I. F. Trans.)	....
36	Condenser (50 mmfd.)	30-1029
37	Condenser (250 mmfd.)	30-1032
38	Resistor (25,000 ohms)	33-325344
39	Condenser (110 mmfd.)	30-1031
40	Volume Control (350,000 ohms)	33-5149
41	Condenser (.01 mfd.)	3903-OSU
42	Resistor (500,000 ohms)	33-449344
43	Condenser (.01 mfd.)	3903-OSG
44	Resistor (1,000,000 ohms)	33-510344
45	"B" Choke	32-1281
46	Condenser (250 mmfd.)	30-1032
47	Choke	32-2063
48	Local-Distance Switch	42-1160
49	Resistor (99,000 ohms)	33-399344

No.	Description	Part No.
50	Condenser (.01 mfd.)	3903-OSU
51	Audio Choke	32-7547
51a	Resistor (1,000,000 ohms)	33-510344
52	Condenser (2000 mmfd.)	30-4177
53	Tone Control (200,000 ohms)	33-5150
54	Condenser (.025 mfd.)	7653-OSU
55	Condenser (.01 mfd.)	30-4381
56	Choke	32-1930
57	Condenser (250 mmfd.)	30-1032
58	Output Transformer	32-7551
59	Choke	32-1930
60	Condenser (250 mmfd.)	30-1032
61	On-Off Switch Assembly	42-1160
62	Pilot Lamp	34-2039
63	Condenser (250 mmfd.)	30-1032
64	Condenser (.5 mfd.)	30-4015
65	"A" Choke	32-1432
66	Condenser (250 mmfd.)	30-1032
67	Filament Choke	32-2038
68	Vibrator Choke	32-2039
69	Condenser (.5 mfd.)	30-4015
70	Vibrator	41-3170D
71	Resistor (200 ohms)	33-1210
72	Condenser (.05 mfd.)	30-4020
73	Power Transformer	32-7550
74	Condenser (750 mmfd.)	30-4420
75	Filter Choke	32-7545
76	Filter Condenser (8-8 mfd.)	30-2152
77	Resistor (100-50 ohms)	33-3238
78	Condenser (250 mmfd.)	30-1032
79	Condenser (250 mmfd.)	30-1032
80	Choke	32-1644
81	Condenser (250 mmfd.)	30-1032
82	Cone and Voice Coil	36-3159
83	Field Coil Assembly	36-3513
84	Choke	32-2038
85	Condenser (250 mmfd.)	30-1032
86	Output Transformer (overhead speaker)	32-7507
87	Cone and Voice Coil (overhead speaker)	36-3526
88	Field Coil Assembly (Overhead Speaker)	32-9236
89	Condenser (250 mmfd.)	30-1032
90	Resistor (20 ohms)	33-020133
	Four Prong Socket	27-6044
	Five Prong Socket	27-6035
	Six Prong Socket	27-6036
	Seven Prong Socket	27-6037
	Idler Gear	28-7176

No.	Description	Part No.	No.	Description	Part No.
	Pinion Gear	28-7178		Distributor Resistor	33-1196
	Dash Speaker Complete (A37)	36-1207		Interference Condenser (.5 mfd.)	30-4007
	Dash Speaker Only	36-1212		Condenser Connector	30-4412
	Overhead Speaker (AD)	36-1211		Connector Plug	29-6423
	Control	42-5537		Fuse	7227
	Pilot Lamp Assembly	38-7213		Fuse Insulator	27-7729
	Tuning and Volume Knob	27-4288		"Tee" Bolt (Rec. Mtg.)	28-6161
	Tuning Shaft	28-8495		Nut (Rec. Mtg.)	W518A
	Volume Shaft	28-8499		Stud (Speaker Mtg.)	6122
	Scale Assembly	42-5539		Nut (Speaker Mtg.)	W55A

MODELS 819,819H
Socket,Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

I. F. TRANSFORMERS AND PADDERS

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Figure 4).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure 3.

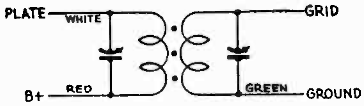


FIGURE 3

If replacements are ever necessary, replace the entire coil assembly, 32-2050 for the first I. F. stage and 32-2034 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

MODEL 819-819H ADJUSTMENTS

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

General

OUPTUT METER—The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

SIGNAL GENERATOR—With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

Procedure

I. F.—Set the signal generator at exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube (without removing the grid cap) in series with a .1 mfd. condenser.

Adjust the secondary screw padder (35) on the second I. F transformer for maximum reading on the output meter. Then adjust the primary screw padder (33) for maximum reading. (See Figure 4 for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser (without removing the grid cap). Adjust the secondary screw padder (24) on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (22) for maximum reading. (See Figure 4 for location of padders).

HIGH FREQUENCY AND R. F.—After padding the first I. F. stage remove the generator lead from the 6A7 tube.

Set the signal generator at 1550 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser (without removing the grid cap).

Turn the tuning condenser plates out of mesh as far as they will go. With the tuning condenser in this position, adjust the high frequency padder (18) and the R. F. padder (13) until the maximum reading is obtained on the output meter. This is the true setting for 1550 K. C., 155 on the dial scale.

LOW FREQUENCY—Turn the tuning condenser plates in mesh to approximately 580 K. C., 58 on the dial scale and set the signal generator at 580 K. C. Roll the tuning condenser and adjust the low frequency padder screw (17) for maximum reading on the output meter.

HIGH FREQUENCY RE-ADJUSTMENT—Turn the tuning condenser plates out of mesh as far as they will go and set the signal generator at 1550 K. C. Then adjust the high frequency padder (18) again for maximum reading on the output meter.

Remove the generator lead from the 78 RF tube.

ANTENNA—Connect the generator lead to the antenna cable assembly (made up of Part No. L1915 loom, 1-27-7133 terminal and 40 inches of 16 strand No. 30 wire), using a 200 mmfd. condenser in series between the two leads. Place the connector plug in the antenna socket on the Receiver. Plug the cable into the antenna socket.

Turn the tuning condenser in mesh to 580 K. C., and adjust the signal generator at 580 K. C. Adjust the Antenna coupling condenser (4) for maximum reading.

Turn the tuning condenser to 1400 K. C. and set the generator at 1400 K. C. Adjust the padders (13) and (6) for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. The signal generator output lead should be connected to a wire placed near the car antenna but not connected to it.

When installing the radio in a car, follow the installation instructions carefully. The correct connector must be used in the antenna lead connector in the Receiver and the antenna coupling condenser must be adjusted to the car antenna.

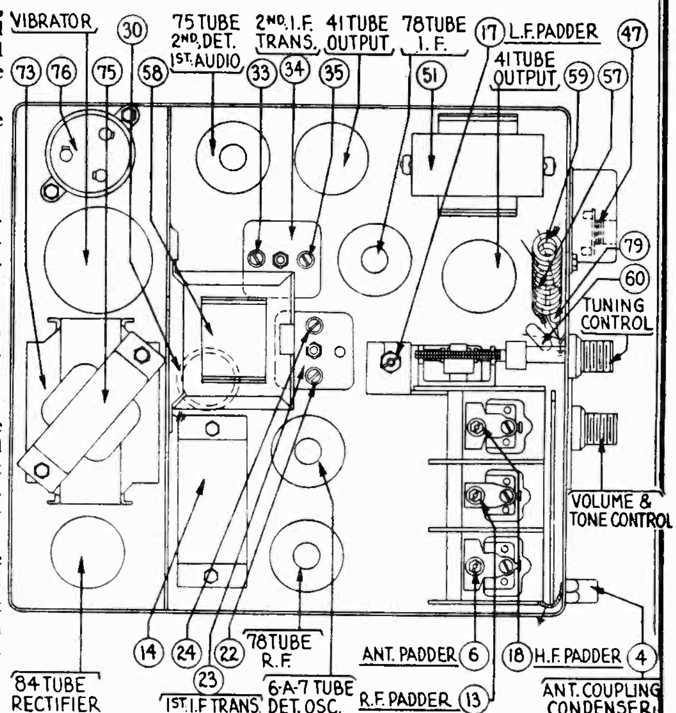
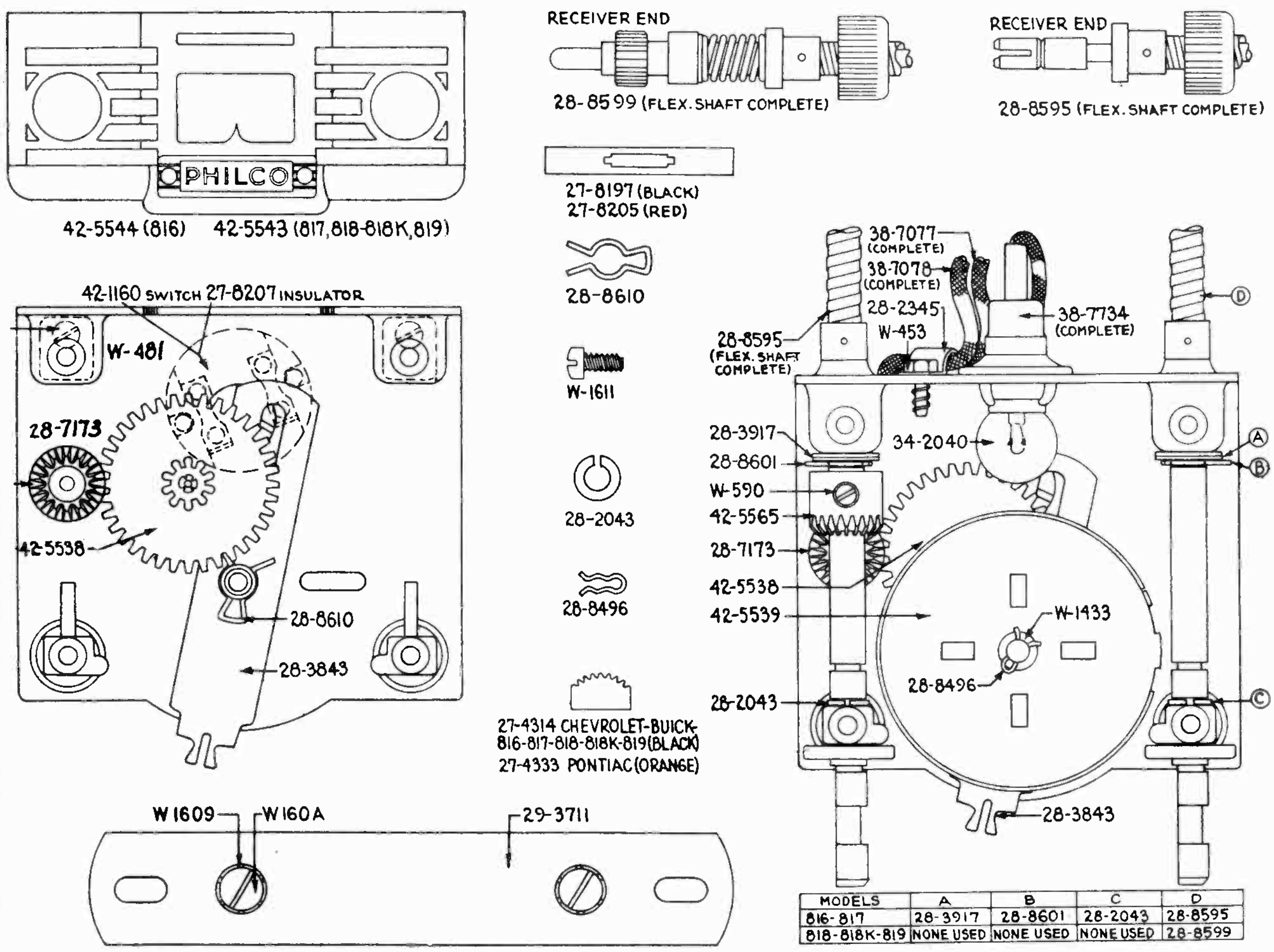


FIGURE 4

PHILCO RADIO & TELEV. CORP.

MODELS 816,817,818
818K,819
Remote Controls
Parts List,Part 1

MODEL 816 - 817 - 818 - 818K - 819 CONTROLS



MODELS	A	B	C	D
816-817	28-3917	28-8601	28-2043	28-8595
818-818K-819	NONE USED	NONE USED	NONE USED	28-8599

PARTS LIST AND PRICES

(Prices Subject to Change Without Notice)

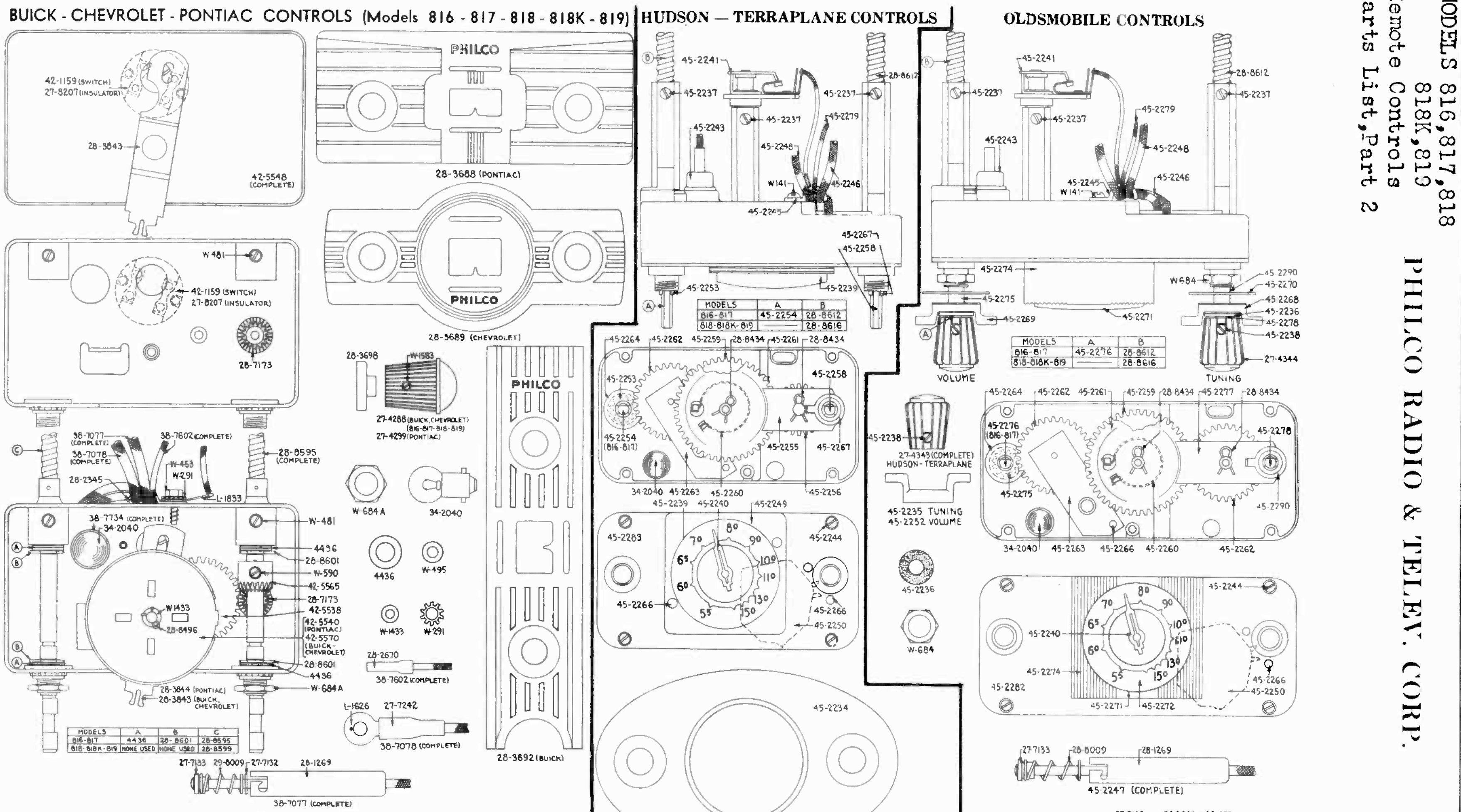
PART NUMBER	DESCRIPTION		LIST PRICE
L-1626	Lug		$ .01
L-1833	Lug	per 100	.30
W160A	Screw	per 100	.25
W291	Lockwasher	per 100	.40
W453	P. K. Screw	per 100	1.80
W481	Screw	per 100	2.00
W495	Washer	per 100	.25
W590	Screw	per 100	2.00
W684A	Nut	per 100	1.25
W1433	Washer	per 100	.15
W1583	Screw	per 100	.75
W1609	Lockwasher	per 100	.50
W1611	Screw	per 100	.25
4436	Washer	per 100	1.50
27-4288	Knob		.15
27-4299	• Knob		.20
27-4314	Knob		.04
27-4333	Knob		.10
27-7132	Insulator	per 100	.40
27-7133	Ferule		.01
27-7242	Sleeve	per 100	.40
27-8197	Light Shield		.03
27-8205	Light Shield	per 100	.50
27-8207	Insulator	per 100	.50
28-1269	Fuse Housing		.01
28-2043	Washer	per 100	.25
28-2345	Clamp	per 100	.52
28-2670	Prong	per 100	.75
28-3688	Bezel Plate		.45
28-3689	Bezel Plate		.45
28-3692	Bezel Plate		.45
28-3698	Knob Base		.04
28-3843	Switch Lever		.05

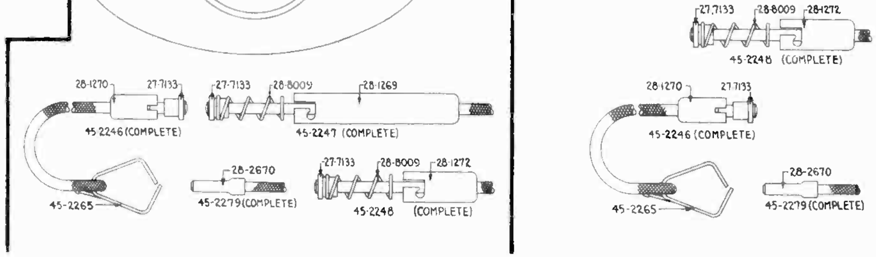
*Prices not available at this time.

PART NUMBER	DESCRIPTION		LIST PRICE
28-3844	Switch Lever		.10
28-3917	Washer	per 100	.40
28-7173	Meter Gear		.10
28-8496	Spring		.05
28-8595	Flexible Shaft		*
28-8599	Flexible Shaft		*
28-8601	Spring		.04
28-8610	Spring		.03
29-3711	Bracket		.03
29-8009	Spring	per 100	.50
34-2040	Pilot Lamp		.14
38-7077	Fuse Lead Assembly		.15
38-7078	Ammeter Lead Assembly		.15
38-7602	Tone Control Lead		.10
38-7734	Pilot Lamp Assembly		.35
42-1159	On and Off Switch		.25
42-1160	On and Off Switch		.25
42-5534	Control Assembly (816)		6.75
42-5536	Control Assembly (817)		7.50
42-5537	Control Assembly (818-818K-819)		7.50
42-5538	Intermediate Gear Assembly		.15
42-5539	Scale Assembly		.50
42-5540	Scale Assembly		.50
42-5543	Cover Assembly		1.10
42-5544	Cover Assembly		.65
42-5548	Cover Assembly		.65
42-5561	Control Assembly (816-817 Buick), (816-817 Chevrolet)		6.75
42-5562	Control Assembly (816-817 Pontiac)		6.75
42-5565	Miter Gear Assembly		.15
42-5570	Scale Assembly		.50
42-5580	Control Assembly (818-818K-819 Buick), (818-818K-819 Chevrolet)		6.75
42-5582	Control Assembly (818-818K-819 Pontiac)		6.75

MODELS 816,817,818
818K,819
Remote Controls
Parts List,Part 2

PHILCO RADIO & TELEV. CORP.





PARTS LIST

Part No.	Description
W-141	Screw (clamp mtg.)
W-504	Lockwasher
W-684	Nut (Control mtg.)
27-4343	Knob & set screw assembly
27-4344	Knob & set screw assembly
27-7133	Terminal
28-1269	Fuse Housing
28-1270	Receptacle
28-1272	Receptacle
28-8009	Spring
28-8434	Hair pin spring
28-8612	Flexible shaft (816-817)
28-8616	Flexible shaft (818-819)
28-2670	Prong
34-2040	Pilot lamp
42-5577	Control assembly (816-817)
42-5578	Control assembly (816-817)
42-5583	Control assembly (818-819)
42-5584	Control assembly (818-819)
45-2234	Bezel
45-2235	Wing knob (tuning)
45-2236	Felt washer
45-2237	Set screw
45-2238	Knob set screw
45-2239	Crystal
45-2240	Pointer
45-2241	Rear switch
45-2243	Pilot lamp assembly
45-2244	Screw (cover mtg.)
45-2245	Clamp
45-2246	Ammeter fuse lead (ammeter end)
45-2247	Ammeter fuse lead (control end)
45-2248	Receiver lead assembly (from controls)
45-2249	Dial
45-2250	On & Off switch
45-2252	Wing knob (volume)
45-2253	Pinion gear (volume)
45-2254	Volume shaft (in head)
45-2255	Guide plate (tuning side)
45-2256	Intermediate gear
45-2257	Pin (shaft retainer)
45-2258	Tuning shaft (in head)
45-2259	Gear & shaft assembly
45-2260	Anti-backlash spring
45-2261	Tuning gear (loose-flat)
45-2262	Idler gear
45-2263	Guide plate assembly (volume)
45-2264	Spacer
45-2265	Ammeter connector (bronze)
45-2266	Drive screw
45-2267	Hub & switch lever
45-2268	Wing knob (tuning)
45-2269	Wing knob (volume)
45-2270	Chrome washer
45-2271	Crystal
45-2272	Dial
45-2273	Washer (volume shaft)
45-2274	Bezel
45-2275	Pinion gear (volume)
45-2276	Volume shaft (in head)
45-2277	Guide plate assembly (tuning)
45-2278	Tuning shaft (in head)
45-2279	Pin plug & lead assembly
45-2281	Screw (switch mtg.)
45-2282	Cover assembly
45-2283	Cover assembly
45-2290	Hub and Lever assembly

PHILCO RADIO & TELEV. CORP.

MODEL 37-675(Codes 121,122)
Schematic,Coil & Switch Data

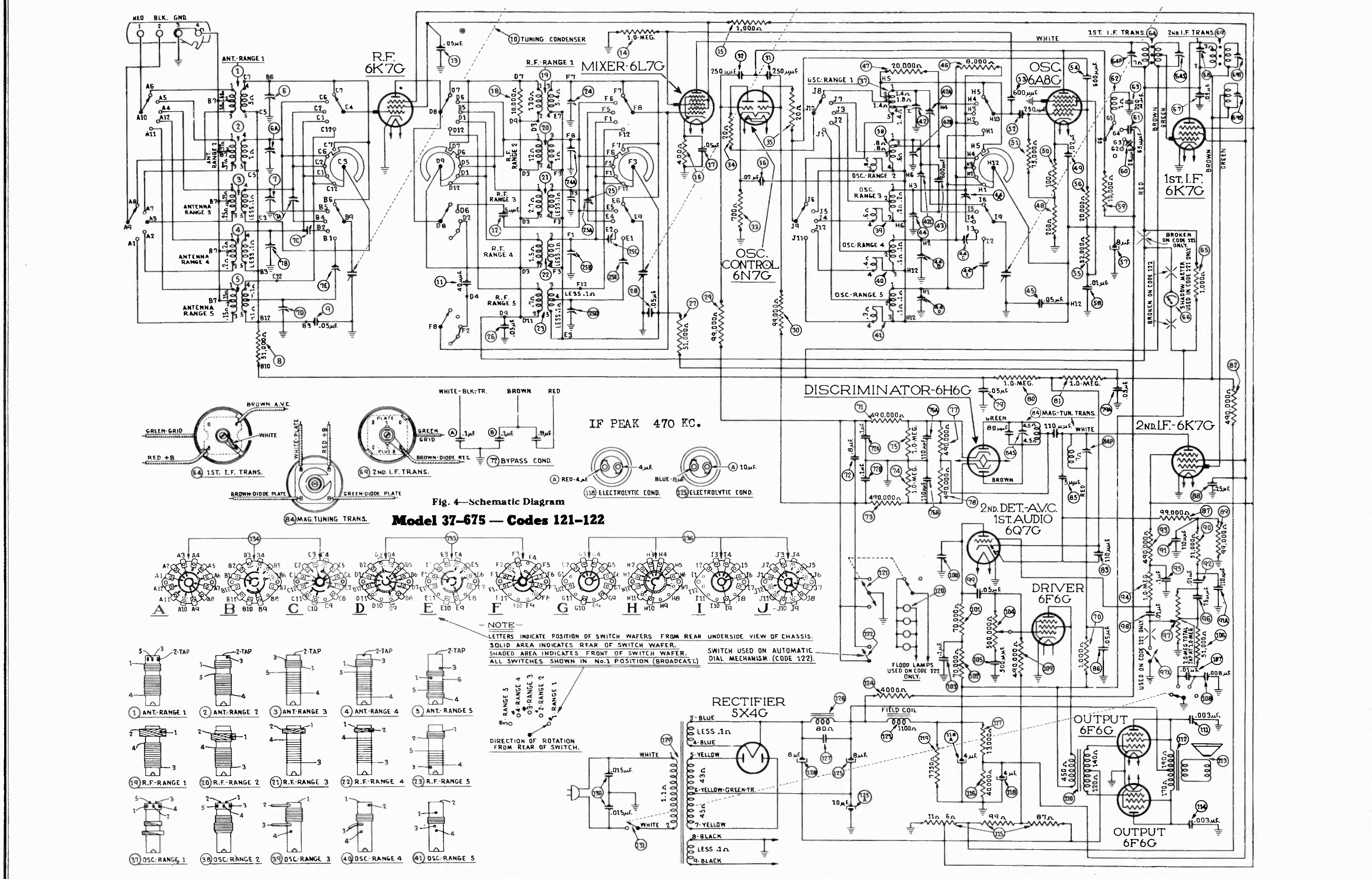


Fig. 4—Schematic Diagram

Model 37-675 — Codes 121-122

PHILCO RADIO & TELEV. CORP.

MODEL 37-675
Codes 121,122
Trimmers, Alignment

Alignment of the Compensators

To accurately adjust this receiver precision test equipment is necessary. The locations of the various compensators are shown in Figs. 5 and 6.

NOTE—The receiver should be allowed to heat for at least 15 minutes before adjusting the compensators.

OUTPUT METER

The 025 Output Meter is connected to the plate and cathode terminals of the 6F6G driver tube. Adjust the meter to use the (0-30) Volt Scale.

INTERMEDIATE FREQUENCY CIRCUIT

Frequency 470 K. C.

IMPORTANT — Before adjusting the compensators, calibrate tuning dial as given on Page 1.

1. Connect the 088 Signal Generator output lead in series with a .1 mfd. condenser to the grid of the 6K7G tube, 2nd I.F., and the ground connection of the output lead to the chassis.
2. Set the receiver volume control in the maximum position; tone control counter-clockwise; Magnetic Tuning Switch "Off" (counter-clockwise); range switch in position No. 1 (Broadcast); bass compensation switch on first tap from "off" position, and the receiver dial to approximately 580 K. C. Adjust the signal generator for 470 K. C.
3. Now adjust compensator **(84P)** for maximum output.
4. Remove the signal generator output lead with the .1 mfd. condenser from the 6K7G 2nd I.F. grid and connect them to the 6K7G, 1st I.F. grid.
5. Turn compensator **(69T)** clockwise until it is tight, then adjust compensators **(68)** and **(69S)** for maximum output. Now adjust compensator **(69T)** for maximum output. Caution: Do not adjust compensators **(68)** and **(69S)** unless compensator **(69T)** is turned to the extreme clockwise position.
6. Remove the signal generator output lead and condenser from the 6K7G, 1st I.F. tube and connect them to the grid of the 6L7G tube, 1st detector, and adjust compensators **(64P)** and **(64S)** for maximum output.

RADIO FREQUENCY CIRCUIT

Tuning Range 11.5-18.2 M. C.

1. The signal generator output lead with the .1 mfd. condenser, is connected to terminal No. 1 on the aerial input panel (rear of chassis) and the generator ground lead to terminal No. 3. Terminals 2 and 3 must be connected with the shorting link provided on the panel.
2. Set the magnetic tuning control in the "off" position. Set the range switch in position No. 5 (11.5 to 18.2 M. C.). Turn the receiver and signal generator dials to 18 M. C. and adjust the generator attenuator for a readable indication on the output meter. Now adjust compensator **(44D)** by turning the screw (clockwise) to the maximum capacity position, then slowly turn it counter-clockwise until a second maximum peak is reached on the output meter. The first peak from maximum capacity is the image signal and the receiver *must not* be adjusted to this signal. On some receivers, however, only one peak will be found, therefore, adjust compensator **(44D)** to this peak. If the above procedure is correctly performed, the image signal will be found at 17.06 M. C. by advancing the signal generator input, and turning the receiver dial to this frequency mark on the scale.
3. Leaving the signal generator and receiver dials at 18 M. C. the antenna and R. F. compensators **(7D)** and **(25D)** are now adjusted by connecting a variable condenser (Philco Part No. 45-2325) across the oscillator compensator **(44D)** contact (first contact from the left side of the receiver facing rear underside view of the chassis) and ground. Now tune the added condenser until the second harmonic of the receiver oscillator beats against the signal from the generator, resulting in a maximum indication on the output meter. Note: it may be necessary to increase the signal generator output to obtain a signal of sufficient strength for reading on the output meter. Compensators **(7D)** and **(25D)** are now adjusted for maximum output. After these adjustments, remove the external condenser and readjust compensator **(44D)** as given in paragraph 2 above.
4. Turn the signal generator and receiver dials to 12 M. C. and adjust compensators **(44E)**, **(25E)** and **(7E)** for maximum output.
5. Readjust compensator **(44D)** as given in paragraph 2 above, for maximum output.
6. Readjust compensators **(7D)**, **(25D)** and **(44D)** as given in paragraph 3 above. This readjustment is to correct any variation that the low frequency compensator may have caused in the high end of this range.

Tuning Range (7.35-11.6 M. C.)

1. Turn selector switch to Range 4. Set the signal generator and receiver dials to 11.0 M. C. Now adjust compensator **(44B)** for maximum output. Check for image at 10.06 M. C.
2. Leaving signal generator and receiver dial turned to 11.0 M. C., connect the external variable condenser across the oscillator compensator **(44B)** contact (third contact from left side of the receiver facing rear underside view of chassis) and ground. Tune the added condenser for maximum output, then adjust compensators **(7B)** and **(25B)** for maximum output. Remove the added condenser and adjust **(44B)** for maximum.
3. Turn the signal generator and receiver dials to 7.5 M. C. and adjust compensators **(44C)**, **(25C)** and **(7C)** for maximum output.
4. Readjust compensator **(44B)** as given in paragraph 1 above.
5. Readjust compensators **(7B)**, **(25B)** and **(44B)** as given in paragraph 2 above.

Tuning Range (4.7 to 7.4 M. C.)

1. Turn selector switch to range 3. Set the signal generator and receiver dials for 7.0 M. C. and adjust compensators **(44)**, **(25)** and **(7)** for maximum output.
2. Rotate the signal generators and receiver dials to 5.0 M. C., then adjust compensators **(44A)**, **(25A)** and **(7A)** for maximum output.
3. Readjust compensators **(44)**, **(25)** and **(7)** on the 7.0 M. C. signal.

Tuning Range (1.58 to 4.75 M. C.)

1. Turn the selector switch to range 2. Set the signal generator and receiver dials to 4.5 M. C. Now adjust compensators **(42B)**, **(24A)** and **(6A)** for maximum output.
2. Rotate the signal generator and receiver dials to 1.7 M. C. Compensator **(42C)** Osc. series is now adjusted for maximum output as follows:
   First tune compensator **(42C)** for maximum output, then vary the tuning condenser of the receiver for maximum output about the 1.7 M. C. dial mark. Now turn compensator **(42C)** slightly to the right or left and vary the receiver tuning condenser for maximum output. If the output reading increases, turn compensator **(42C)** in the same direction a trifle more, and again vary the tuning condenser for maximum output. If the output decreases, set the compensator in the opposite direction. This procedure of first setting the compensator and then varying the tuning condenser is continued until there is no further gain in output reading.
3. Readjust compensators **(42B)**, **(24A)** and **(6A)** for maximum output as given in paragraph 1 above.

Tuning Range (530 to 1600 K. C.)

1. Set selector switch in range 1. Rotate the signal generator and receiver dial to 1500 K. C. Adjust compensators **(42)**, **(24)** and **(6)** for maximum output.
2. Turn the signal generator and receiver dials to 580 K. C. Compensator **(42A)** Osc. series is now adjusted, using the same procedure as given in paragraph 2 under Tuning Range (1.58 to 4.75 M. C.). The only difference in the two adjustments is the frequency and compensator used.
3. Readjust compensator **(42)**, on 1500 K. C. and compensators **(24)** and **(6)** on a 1400 K. C. signal.

ADJUSTMENT OF THE MAGNETIC TUNING CONTROL

1. Leaving the selector switch in position 1. Set the Magnetic tuning switch in the "out" position. Turn the signal generator and dial to 1000 K. C., then adjust the receiver dial for maximum output.
   NOTE: It is very important to accurately adjust the receiver tuning condenser for peak output, also, adjust the signal generator attenuator to maximum output position.
2. Turn the (Magnetic Tuning Control) to the "on" position (clockwise). Compensator **(84S)** Sec. of magnetic tuning transformer is now adjusted for maximum output. If the indicator of the output meter goes off scale, turn the volume control of the receiver toward the miminum position until a readable indication is obtained.
3. The above adjustment is now checked for accuracy, by turning the magnetic tuning control "off". When this is done there should be no change in the tone of the received signal. If a change of tone or hiss develops, it indicates a shift in frequency and the adjustment must be made again.

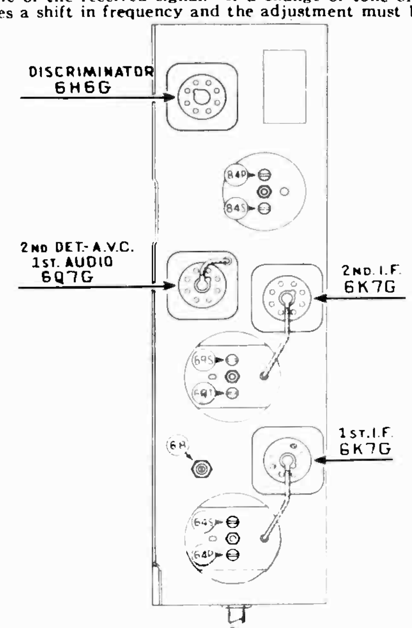


Fig. 5—Locations of I.F. Compensators Top of I.F. Unit

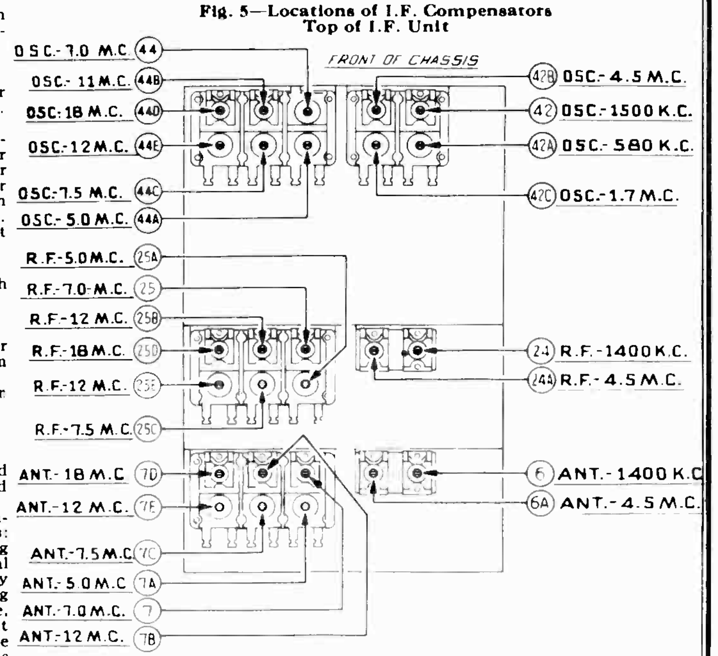


Fig. 6—Locations of R.F. Compensators Underside of Chassis View

MODEL 37-675
Codes 121,122
Chassis Views

PHILCO RADIO & TELEV. CORP.

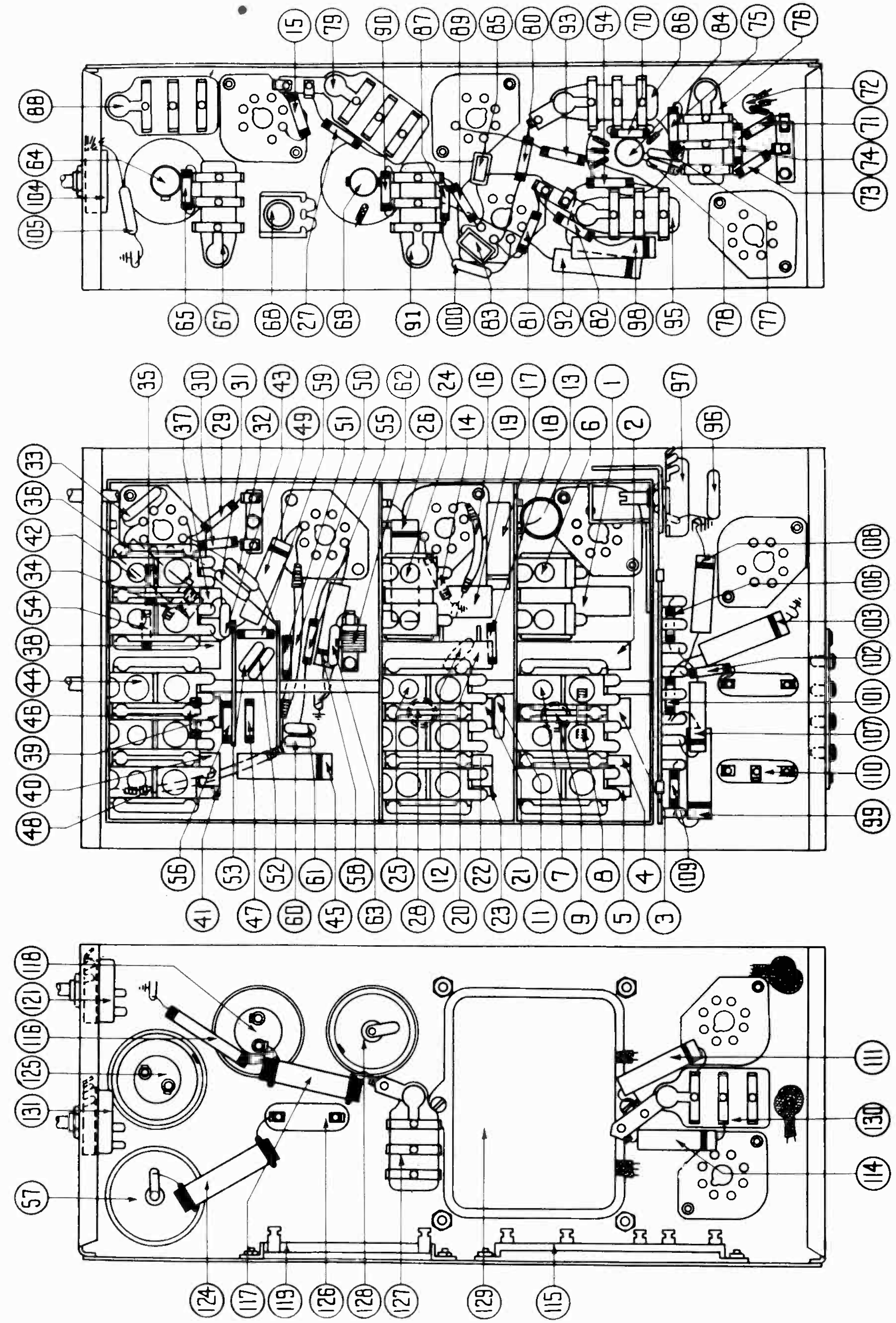


Fig. 3—Parts locations. Underside of Chassis

MODEL 37-675
Codes 121,122
Voltage, Speaker
Adjustments

PHILCO RADIO & TELEV. CORP.

Electrical Specifications

Type of Circuit: Superheterodyne with Magnetic Tuning; Spread-band dial; Philco Foreign Tuning System, and a class "A" Audio Output Circuit. Code 122 receiver has the Philco Automatic Dial tuning system.

Power Supply: 115 Volts A.C. 50 to 60 cycles or 25 to 40 cycle. Power transformer Part Numbers for the different voltage and frequency ranges are listed on Page 5.

Power Consumption: 155 Watts.

Intermediate Frequency: 470 K.C

Undistorted Output: 10 Watts. **Speaker:** U-15.

Tuning Ranges: Five—Range 1—530 to 1600 K.C.; Range 2—1.58 to 4.75 M.C.; Range 3—4.7 to 7.4 M.C.; Range 4—7.35 to 11.6 M.C.; Range 5—11.5 to 18.2 M.C.

Aerial Connections

To obtain the full advantage of the sensitivity of this receiver the Philco High Efficiency Aerial supplied with the receiver must be used. The connections for the aerial are as follows:

The red and black leads of the High-Efficiency Aerial "transmission line" are connected to terminals 1 and 2 respectively, of the terminal panel provided on the rear of the chassis. Connect the jumper on the terminal panel across terminals 3 and 4.

If a temporary aerial is used, the jumper should be across terminals 2 and 3. The aerial connects to terminal 1 and the ground lead to terminal 3. A good ground connection is desirable in all installations.

DIAL CALIBRATION

In order to adjust this receiver correctly the dial must be aligned to track properly with the tuning condenser. To do this proceed as follows:

1. Loosen the set screws on the shaft coupling of the tuning condenser. Then turn the tuning condenser until the plates are in the maximum capacity position. Now set the glowing beam indicator on the index line at the low frequency end of the broadcast band. With dial and tuning condenser in this position tighten set screws.
2. Turn the tuning condenser control until the indicator is on the first division from the index line.
3. With the dial in this position, loosen the shaft coupling set screws. Then turn the dial until the indicator is again on the index line. Tighten the set screws in this position.

NOTE: Be careful when turning the dial that the position of the tuning condenser is not disturbed.

REPLACING AUTOMATIC DIAL CONTROL SCREWS
Code 122

See Bulletin 258 for the procedure on removal of the Automatic Dial Control screws.

REPLACING THE DIAL OR MASK ARM ASSEMBLY
Code 122

To replace the dial or mask arm assembly, remove the chassis from the cabinet. Then remove the dial tuning knobs. Take off the control handle cover by removing the three screws holding it to the handle hub. When the metal cover is removed, two screws will be noted holding the control handle to the rotary hub. Remove the screws and detach the handle.

Now remove the five screws holding the dial escutcheon plate to the dial body and lift the escutcheon from the dial body. With these parts removed, the dial may be detached.

MASK ASSEMBLY—Code 122

With the dial removed, two fibre rings and one metal ring will be found around the outer side of the dial housing. Take off these rings and slip the mask from the housing.

SHADOWMETER ADJUSTMENT—Code 121

Remove aerial and allow tubes to warm up. Then adjust shadow meter as follows:

1. Move the shadow meter coil backwards and forwards, until the opposite edges of the shadow are 1/8 of an inch from end of the shadow screen, measuring along the bottom edge of the screen. Adjustment of the shadow meter light bracket may be necessary for perfect centering.
2. Remove the rectifier tube from its socket, and rotate coil until shadow reaches minimum width. This width must not exceed 3/32 of an inch.
3. Replace the 5X4G rectifier tube in its socket. The shadow should then widen to not more than 3/16 inch or less than 1/16 inch from each side of the screen measuring along the bottom edge. If these limits are not obtained readjust the shadow meter as given in paragraphs 1 and 2 until they are reached.

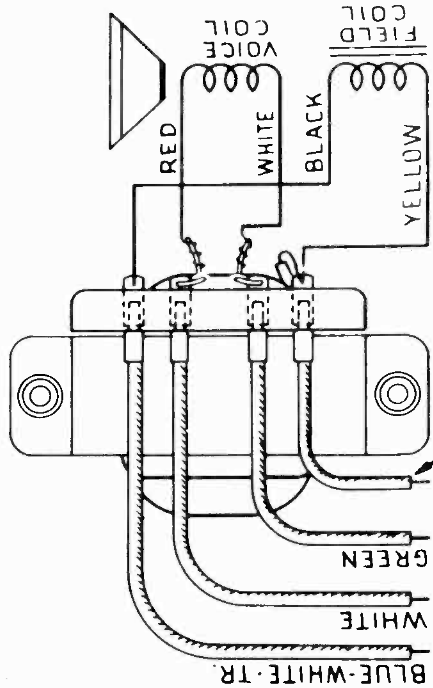


Fig. 2—U15 Speaker Wiring

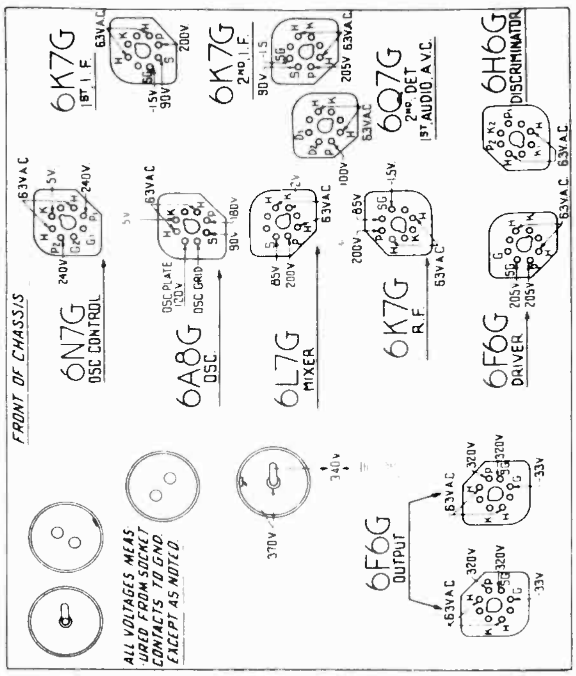


Fig. 1—Socket Voltages, Measured from Underside of Chassis

The voltages indicated by the arrows were measured with a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A.C.

MODEL 37-675
Codes 121,122
Parts List

PHILCO RADIO & TELEV. CORP.

Replacement Parts—Model 37-675—Codes 121-122

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (Range 1)	32-2108	$0.80
2	Antenna Transformer (Range 2)	32-2146	.80
3	Antenna Transformer (Range 3)	32-2183	.60
4	Antenna Transformer (Range 4)	32-2185	.70
5	Antenna Transformer (Range 5)	32-2175	.80
6	Compensator (2 sections)	31-6093	.40
7	Compensator (6 sections)	31-6112	1.40
8	Resistor (51000 ohms, ½ watt)	33-351339	.20
9	Condenser (.05 mfd. tubular)	30-4020	.20
10	Tuning Condenser	31-1892	3.75
11	Condenser (40 mmfd. mica)	30-1076	.20
12	Condenser (5 mmfd. mica)	30-1077	.20
13	Condenser (.05 mfd. tubular)	30-4123	.20
14	Resistor (1 megohm ½ watt)	33-510339	.20
15	Resistor (1000 ohms ½ watt)	33-210339	.20
16	Resistor (400 ohms wirewound)	33-3016	.20
17	Condenser (.05 mfd. tubular)	30-4444	.20
18	Resistor (10000 ohms ½ watt)	33-310339	.20
19	R. F. Transformer (Range 1)	32-2105	.75
20	R. F. Transformer (Range 2)	32-2147	.60
21	R. F. Transformer (Range 3)	32-2177	.60
22	R. F. Transformer (Range 4)	32-2178	.60
23	R. F. Transformer (Range 5)	32-2176	.70
24	Compensator (2 sections)	31-6093	.40
25	Compensator (6 sections)	31-6113	1.40
26	Condenser (.05 mfd. tubular)	30-4123	.20
27	Resistor (51000 ohms ½ watt)	33-351339	.20
28	Condenser (.05 mfd. tubular)	30-4020	.20
29	Resistor (99000 ohms ½ watt)	33-399339	.20
30	Resistor (99000 ohms ½ watt)	33-399339	.20
31	Condenser (250 mmfd. mica)	30-1032	.25
32	Condenser (250 mmfd. mica)	30-1032	.25
33	Resistor (700 ohms wirewound)	33-170339	.20
34	Resistor (20 ohms ½ watt)	33-020339	.20
35	Resistor (20 ohms ½ watt)	33-020339	.20
36	Condenser (.02 mfd. tubular)	30-4481	
37	Osc. Transformer (Range 1)	32-2191	.80
38	Osc. Transformer (Range 2)	32-2194	.80
39	Osc. Transformer (Range 3)	32-2197	.50
40	Osc. Transformer (Range 4)	32-2198	.50
41	Osc. Transformer (Range 5)	32-2199	.50
42	Compensator (4 sections)	31-6124	1.00
43	Condenser (600 mmfd. mica)	30-1049	.25
44	Compensator (6 section)	31-6117	1.20
45	Condenser (.05 mfd. tubular)	30-4123	.20
46	Resistor (8000 ohms ½ watt)	33-280339	.20
47	Resistor (20000 ohms ½ watt)	33-320339	.20
48	Resistor (200 ohms wirewound)	7217	.20
49	Condenser (.02 mfd. tubular)	30-4481	
50	Resistor (100 ohms wirewound)	33-3023	.25
51	Resistor (75000 ohms ½ watt)	33-375339	.20
52	Condenser (250 mmfd. mica)	30-1032	.25
53	Condenser (600 mmfd. mica)	30-1049	.25
54	Condenser (600 mmfd. mica)	30-1049	.25
55	Resistor (32000 ohms ½ watt)	33-332339	.20
56	Resistor (20000 ohms ½ watt)	33-320339	.20
57	Electrolytic Condenser (8 mfd.)	30-2024	1.10
58	Condenser (.01 mfd. tubular)	30-4169	.20
59	Resistor (10000 ohms ½ watt)	33-310339	.20
60	Condenser (25 mmfd. mica)	30-1067	.20
61	Condenser (55 mmfd. mica)	30-1045	.20
62	Coil (6A8G plate)	32-2242	.25
63	Condenser (200 mmfd. mica)	30-1047	.25
64	1st I. F. Transformer	32-2209	
65	Resistor (1000 ohms ½ watt)	32-210339	.20
66	Shadowmeter (Code 121 only)	45-2189	2.50
67	Condenser (.05 mfd. bakelite)	3615-SG	.35
68	Compensator (Pri. 2nd I.F. Trans.)	31-6079	
69	2nd I. F. Transformer	32-2211	
70	Resistor (1000 ohms ½ watt)	33-210339	.20
71	Resistor (490000 ohms ½ watt)	33-449339	.20
72	Condenser (.1-.1-.8 mfd. metal case)	30-4470	1.40
73	Resistor (490000 ohms ½ watt)	33-449339	.20
74	Resistor (1 megohm ½ watt)	33-510339	.20
75	Resistor (1 megohm ½ watt)	33-510339	.20
76	Condenser (110 mfd. dual bakelite)	8035-DG	.25
77	Resistor (490000 ohms ½ watt)	33-449339	.20
78	Resistor (490000 ohms ½ watt)	33-449339	$0.20
79	Condenser (.05 mfd. dual bakelite)	3615-DG	.40
80	Resistor (1.0 megohm ½ watt)	33-510339	.20
81	Resistor (1.0 megohm ½ watt)	33-510339	.20
82	Resistor (490000 ohms ½ watt)	33-449339	.20
83	Condenser (110 mmfd. mica)	30-1031	.20
84	Magnetic Tuning Transformer	32-2217	2.40
85	Condenser (5 mmfd. mica)	30-1083	
86	Condenser (.05 mfd. bakelite)	3615-SG	.35
87	Resistor (99000 ohms ½ watt)	33-399339	.20
88	Condenser (.25 mfd. bakelite)	6287-DG	.40
89	Resistor (99000 ohms ½ watt)	33-399339	.20
90	Resistor (51000 ohms ½ watt)	33-351339	.20
91	Condenser (110 mmfd. dual bakelite)	8035-DG	.25
92	Condenser (.01 mfd. tubular)	30-4124	.25
93	Resistor (490000 ohms ½ watt)	33-449339	.25
94	Resistor (1 megohm ½ watt)	33-510339	.25
95	Condenser (.1 mfd. bakelite)	4989-SG	.35
96	Condenser (75 mmfd. mica)	30-1053	.20
97	Volume Control	33-5158	1.00
97X	Ring & Contact Assem. (For shorting volume control Code 122 dial)	45-2350	
98	Condenser (.01 mfd. tubular)	30-4124	.25
99	Condenser (.05 mfd. tubular)	30-4449	.20

Schem. No.	Description	Part No.	List Price
100	Condenser (110 mmfd. mica)	30-1031	
101	Resistor (70000 ohms ½ watt)	33-370339	.20
102	Resistor (70000 ohms ½ watt)	33-370339	.20
103	Condenser (.1 mfd. tubular)	30-4455	.25
104	Tone Control	33-5173	
105	Condenser (500 mmfd. mica)	30-1086	
106	Resistor (51000 ohms ½ watt)	33-351339	.20
107	Condenser (.01 mfd. tubular)	30-4169	.20
108	Condenser (.008 mfd. tubular)	30-4112	.20
109	Resistor (490000 ohms ½ watt)	33-449339	.20
110	Transformer (Audio Input)	32-7057	
111	Condenser (.003 mfd. tubular)	30-4469	.20
112	Output Transformer	32-7685	2.00
113	Cone-Voice Coil U-15	36-3631	1.75
114	Condenser (.003 mfd. tubular)	30-4469	.20
115	Resistor (203 ohms 3 taps wirewound)	33-3290	.60
116	Resistor (40000 ohms 1 watt)	33-340439	.20
117	Resistor (13000 ohms 2 watt)	33-313539	.30
118	Electrolytic Condenser (2 sections 4-4 mfd.)	30-2170	1.50
119	Resistor (7750 ohms wirewound)	33-3279	.55
120	Flood Lamp	34-2039	.07
121	Magnetic Tuning Switch (Chassis)	42-1216	.75
122	Magnetic Tuning Switch (Code 122 dial assembly)	45-2330	
123	Field Coil Assembly U-15	36-3162	8.00
124	Resistor (4000 ohms 2 watts)	33-240539	.30
125	Electrolytic Condenser (2 sections 8-10 mfd.)	30-2046	1.85
126	Choke	32-7056	2.20
127	Condenser (.15 mfd. dual bakelite)	6287-DU	.40
128	Electrolytic Condenser (8 mfd.)	30-2025	1.10
129	Power Transformer 115 V, 50-60 cycles	32-7699	7.50
	Power Transformer 115 V, 25-40 cycles	32-7700	
	Power Transformer 220 V, 50-60 cycles	32-7701	
130	Condenser (twin bakelite .015 mfd.)	3793-DG	.40
131	Base Compensation & A. C. Switch	42-1196	.75
132	Pilot Lamp (Dial)	34-2039	.07
133	Shadowmeter Lamp (Code 121 only)	34-2039	.07
134	Range Switch (Ant.)	42-1211	1.60
135	Range Switch (R. F.)	42-1212	1.60
136	Range Switch (Osc.)	42-1217	2.00
	Used on Code 121 and 122		
	Brace (Drive Mtg.)	28-4119	.05
	Coupling Assembly (drive)	31-1907	.45
	Shaft & Index Plate (Range Switch)	42-1208	.50
	Volume Control Shaft	38-8061	
	Retaining Clip	28-4394	.01
	Spring	28-4117	.40 C
	Socket (8 prong)	27-6058	.11
	Socket (7 prong)	27-6057	.11
	Socket (Power Transformer)	27-6061	
	Tube Shield	28-2726	10
	Tube Shield Base	28-3898	$0.03
	Tube Shield (6N7G)	8005	.10
	Tube Shield Base (6N7G)	8004	.03
	Mtg. Grommet (R. F. Unit)	27-4317	.04
	Mtg. Sleeve (R. F. Unit)	28-2257	.01
	Mtg. Screw (R. F. Unit)	W-729	.45 C
	Mtg. Spacer (R. F. Unit) code 121	27-8339	.40 C
	Mtg. Spacer (R. F. Unit) code 122	27-7807	.50 C
	Mtg. Washer	28-3927	.01
	Mtg. Rubber (Tuning Condenser)	27-4325	.02
	Mtg. Rubber (Chassis)	3558	.03
	Mtg. Bushing	27-4360	.04
	Mtg. Plate (R. F. Transformer)	28-3808	.02
	Mtg. Spacer (R. F. Transformer)	27-8228	.01
	Mtg. Screw (R. F. Transformer)	W-1635	.30 C
	Terminal Panel (Ant.)	38-7714	.15
	Terminal Cover (Speaker)	36-3672	.15
	Knob (Tuning)	27-4330	.10
	Knob, Vernier	27-4331	.10
	Knob, Tone & Volume	27-4332	.10
	Knob, Range Switch	27-4326	.10
	Cable (Speaker)	41-3223	
	A. C. Plug & Cord	L-2288	.40
	Fuses	45-2046	.05
	Bottom Shield Plate	38-8143	
	Snap Fasteners	28-4279	.75 C
	Speaker (U-15)	36-1252	16.00
	CODE 121		
	Dial	27-5249	.40
	Hub	28-7187	.12
	Clamp	28-2837	.10
	Set Screw	W-1641	.02
	Dial Screen Holder Assembly	31-1945	
	Drive Mtg. Assembly	31-1901	1.80
	Vernier Drive	31-1895	
	Gear (Dial)	28-7185	.10
	Thrust Spring	28-8611	.01
	Thrust Washer	28-3976	.30 C
	"C" Washer	28-3904	.01
	Gear (Drive)	31-1884	.25
	Mask	27-5206	.30
	Mask Arm & Link Assembly	31-1899	.50
	Mask Washer	27-8318	.50 C
	Mask Guide & Bracket	38-7876	.25
	Pilot Lamp Assembly	38-7909	.40
	Bezel Frame & Plate Assembly	40-5948	.80
	Glass	27-8300	.06
	Ring	28-3988	.45
	Gasket	27-8313	.01

Schem. No.	Description	Part No.	List Price
	CODE 122		
	Dial Escutcheon Assembly	45-2324	
	Auto Dial Tuning Assembly Complete	31-1886	25.00
	Dial Scale	27-5207	.80
	Dial Screen Holder Assembly	31-1946	
	Gasket (Dial Scale)	27-8398	.01
	Mask & Link Assembly	45-2328	
	Mask Guide	28-4118	.25
	Ring (Retaining Mask Assembly)	28-7195	.20

Description	Part No.	
Spring (Retaining Mask Assembly)	28-8629	.04
Control Screw	31-1898	
Range Switch Shaft Coupling	28-7198	.15
Felt Washer	27-8399	.30 C
Washer	W-495	.30 C
Snap Fastener	28-4279	.75 C
Control Handle	45-2329	
Cover (Handle)	28-4077	.25

Description	Part No.	
Set Screws (Handle)	28-6493	.02
Screws (Cover)	W-1669	.40 C
Flood Lamp Assembly (single)	38-7937	
Pilot Lamp Assembly	38-8051	.35
Bezel Assembly	40-5980	1.00
Bezel Gasket	27-8517	
Screws	W-480	.55 C
Station Tab Kit	40-6013	.90
Insulator Ring and Contact Assembly	27-8351	

Figures in black type indicate circled figures in Base View. Prices Subject to Change Without Notice.

Parts List
Schematic, Chassis

PHILCO RADIO & TELEV. CORP.

MODEL P-1421
Packard

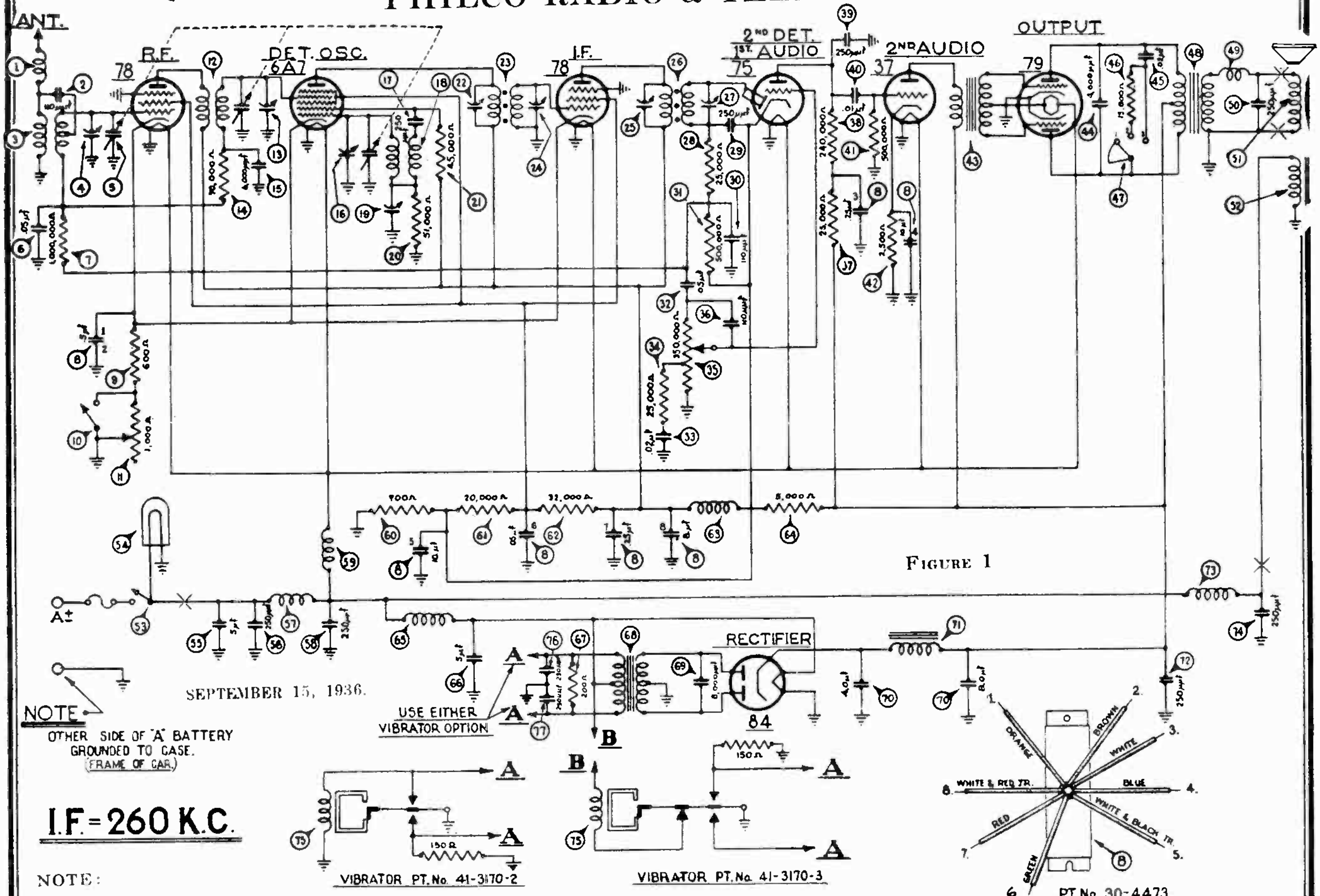


FIGURE 1

NOTE:

The items marked with an asterisk are rarely required for service and in many cases will not be carried in stock by the local service station. In such cases it will be necessary to order these parts from Philco Transitone. Philadelphia — Chicago or San Francisco.

No.	Description	Part No.
1	Antenna Choke	38-8074
2	Condenser (110 mmfd.)	30-1031
3	Antenna Transformer	32-2230
4	First Padder (on tun. cond.)	
*5	Tuning Condenser	31-1913
6	Condenser (.05 mfd.)	30-4444
7	Resistor (1,000,000 ohms)	33-510344
8	Condenser (.05-.25-.25-.5-8-10-10 mfd.)	30-4473
9	Resistor (600 ohms)	33-1212
10	Sensitivity Control Switch	42-1225
11	Sensitivity Control	33-5129
12	R. F. Transformer	32-2231
13	Second Padder (on tun. cond.)	
14	Resistor (70,000 ohms)	33-370344
15	Condenser (6000 mmfd.)	30-4445
16	Third Padder (on tun. cond.)	
17	Condenser (250 mmfd.)	30-1032
18	Oscillator Transformer	32-2232
*19	Low Frequency Padder	31-6056
20	Resistor (51,000 ohms)	33-351344
21	Resistor (45,000 ohms)	33-345344
22	Padder (Pri. 1st I. F. trans.)	
23	First I. F. Transformer	32-2252
24	Padder (Sec. 1st I. F. Trans.)	
25	Padder (Pri. 2nd I. F. Trans.)	
26	Second I. F. Transformer	32-2167
27	Padder (Sec. 2nd I. F. Trans.)	
28	Resistor (25,000 ohms)	33-325344
29	Condenser (250 mmfd.)	30-1032
30	Condenser (110 mmfd.)	30-1031
31	Resistor (500,000 ohms)	33-449344
32	Condenser (.05 mfd.)	30-4444
33	Condenser (.02 mfd.)	30-4215
34	Resistor (25,000 ohms)	33-325344
35	Volume Control & Coupling Assembly (350,000 ohms)	38-7968
36	Condenser (110 mmfd.)	30-1031
37	Resistor (25,000 ohms)	33-325344
38	Resistor (240,000 ohms)	33-424344
39	Condenser (250 mmfd.)	30-1032
40	Condenser (.01 mfd.)	30-4145
41	Resistor (500,000 ohms)	33-449344
42	Resistor (2500 ohms)	33-225344
*43	Input Transformer	32-7681
44	Condenser (4000 mmfd.)	30-4185
45	Condenser (.02 mfd.)	30-4419
46	Resistor (15,000 ohms)	33-315344
*47	Tone control switch	42-1139
48	Output Transformer	32-7684
49	Choke	32-2269
50	Condenser (250 mmfd.)	30-1032
51	Cone & Voice Coil	36-3159
*52	Field Coil Assembly	36-3513
53	On & Off Switch	42-1156
54	Pilot Lamp	34-2040
55	Condenser (.5 mfd.)	30-4474
56	Condenser (250 mmfd.)	30-1032
57	"A" Choke	32-1374
58	Condenser (250 mmfd.)	30-1032
59	Filament Choke	32-1374
60	Resistor (700 ohms)	33-1220
61	Resistor (20,000 ohms)	33-320344
62	Resistor (32,000 ohms)	33-332543
63	"B" Choke	32-1932
64	Resistor (5000 ohms)	33-250543
65	Vibrator Choke	32-2249
66	Condenser (.5 mfd.)	30-4474
67	Resistor (200 ohms)	33-120334
68	Power Transformer	32-7683
69	Condenser (8000 mmfd.)	30-4420
70	Filter Condenser (4-8 mfd.)	30-2167
71	"B" Filter Choke	32-7710
72	Condenser (250 mmfd.)	30-1032
73	Choke	32-2268
74	Condenser (250 mmfd.)	30-1032
75	Vibrator — Optional	41-3170-2 / 41-3170-3
76	Condenser (250 mmfd.)	30-1032
77	Condenser (250 mmfd.)	30-1032
	*Four Prong Socket	27-6043
	*Five Prong Socket	27-6035
	*Six Prong Socket	27-6036
	*Seven Prong Socket	27-6037
	*Speaker Socket	27-6030
	Inductive Suppressor	32-2250
	Interference Condenser (gen.)	30-4475
	Interference Condenser (dome light)	30-4476
	Interference Condenser	30-4477
	*Dial	27-5247
	*Tuning Shaft	28-8656

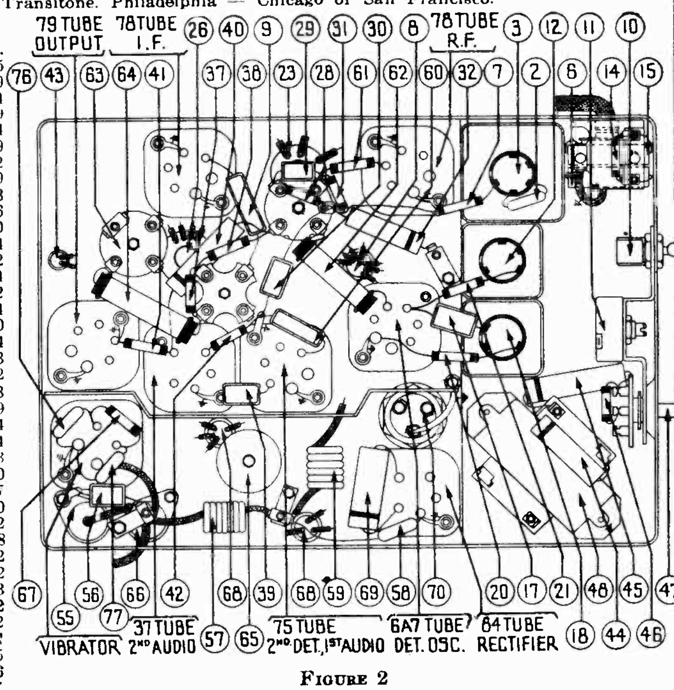


FIGURE 2

No.	Description	Part No.
	*Volume Shaft	28-8657
	*Pilot Lamb Assembly	38-6750
	Fuse	7227
	Fust Insulator	27-7729
	*Switch & Lead Assembly	41-3217
	*Antenna Lead	L-2259
	*Ammeter Lead	38-6595
	Rivet (switch mtg.)	W-1589
	Studs	28-6231
	Nuts	W-55A
	Washer	4486
	Receiver Housing	38-7997

MODEL P-1421
Packard
Socket, Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

I. F. TRANSFORMERS AND PADDERS

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Figure 4).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure 3.

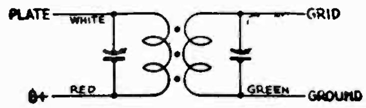


Figure 3

If replacements are ever necessary, replace the entire coil assembly, 32-2252 for the first I. F. stage and 32-2167 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

MODEL P-1421 ADJUSTMENTS

All padding adjustments are carefully made at the factory and ordinarily no readjustments are necessary. However, when readjustments are required, the procedure given below must be followed in detail.

Equipment

Fully charged heavy duty storage battery or 6-volt power pack, 048A Philco Set Tester, 3164 Padding wrench, 27-7159 Padding screw driver.

General

OUTPUT METER—The output meter must be connected by means of an adapter to the plate of the type 79 output tube and to the Receiver chassis.

SIGNAL GENERATOR—With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

Procedure

I. F.—Set the signal generator at exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser (without removing the grid cap).

Adjust the secondary screw padder (27) on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (25) for maximum reading (See Figure 4 for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser (without removing the grid cap). Adjust the secondary screw padder (24) on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder (22) for maximum reading. Readjust padders (25) and (27) with the generator lead connected to the type 6A7 tube. (See Figure 4 for location of padders).

HIGH FREQUENCY AND R. F.—After padding the first I. F. stage remove the generator lead from the 6A7 tube.

Set the signal generator at 1550 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser (without removing the grid cap).

Using a piece of paper approximately .006" thick as a gauge between the heel of the rotor plates and the stator plates, turn the rotor plates in mesh until they strike against the paper.

With the tuning condenser in this position, adjust the high frequency padder (16) and the R. F. padder (13) until the maximum reading is obtained on the output meter. This is the true setting for 1550 K. C., 155 on the dial scale.

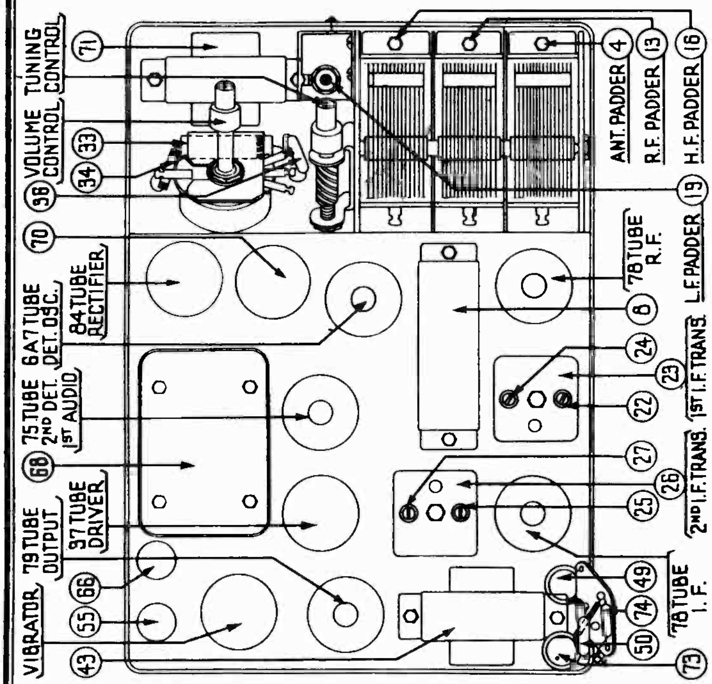


Figure 4

LOW FREQUENCY—Turn the tuning condenser plates in mesh to approximately 600 K. C., 60 on the dial scale and set the signal generator at 600 K. C. Roll the tuning condenser and adjust the low frequency padder screw (19) for maximum reading on the output meter.

HIGH FREQUENCY READJUSTMENT—Turn the tuning condenser plates out of mesh to 1550 K. C. and set the signal generator at 1550 K. C. Then adjust the high frequency padder (16) again for maximum reading on the output meter.

Remove the generator lead from the 78 R. F. tube.

ANTENNA — WHEN PADDING THE ANTENNA STAGE IT IS EXTREMELY IMPORTANT THAT THE PROPER DUMMY ANTENNA BE USED.

Connect the signal generator lead to the antenna lead on the Receiver using a 280 mmfd. condenser in series between the two leads.

Turn the tuning condenser to 1400 K. C. and set the generator at 1400 K. C. Adjust the paddders (13) and (4) for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. Connect the signal generator output lead to a wire placed near the car antenna but not connected to it.

MODEL S-1431
Studebaker
Schematic, Chassis
Parts List

PHILCO RADIO & TELEV. CORP.

STUDEBAKER — PHILCO MODEL S-1431, TWO UNIT RECEIVER

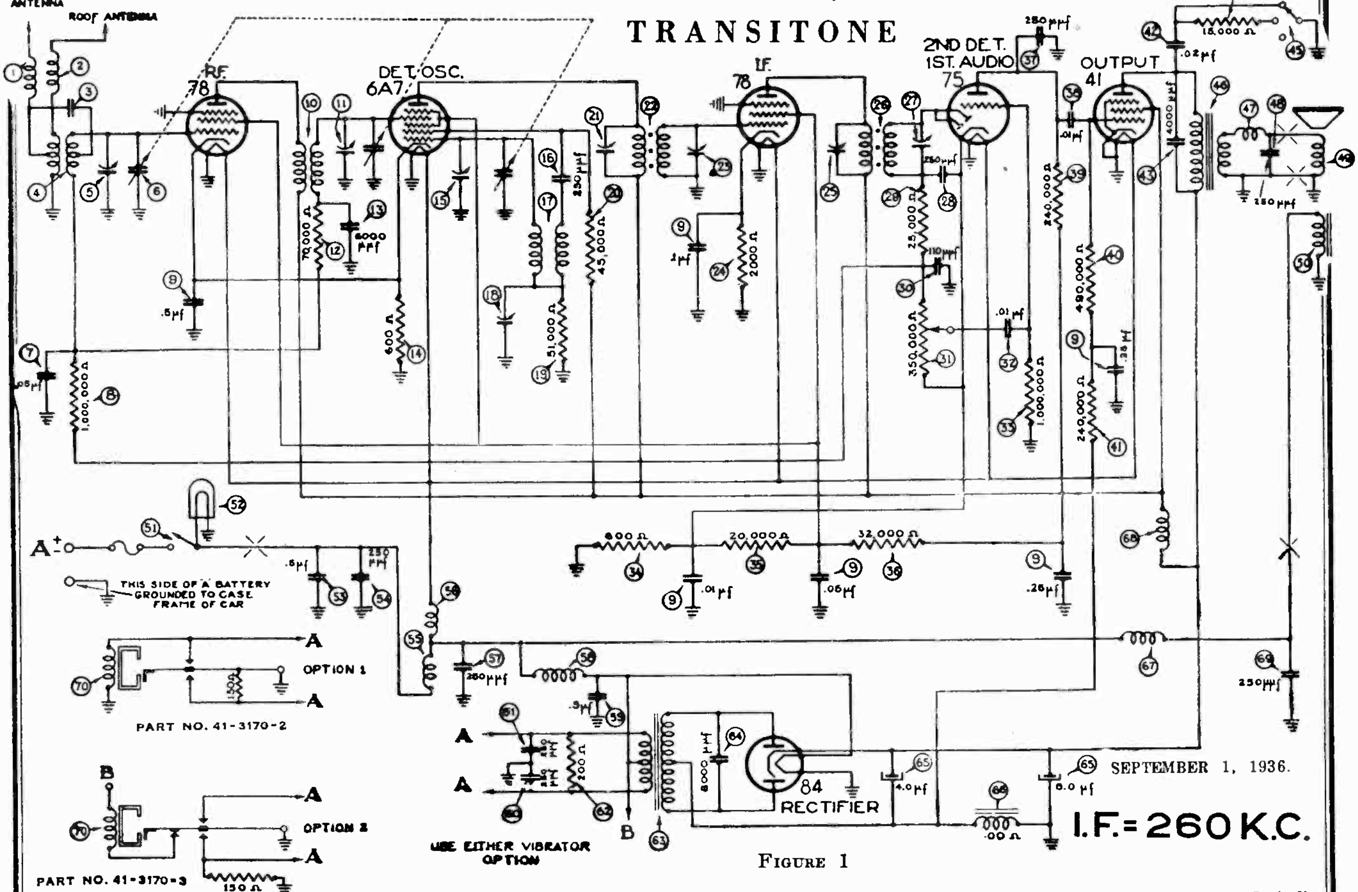


FIGURE 1

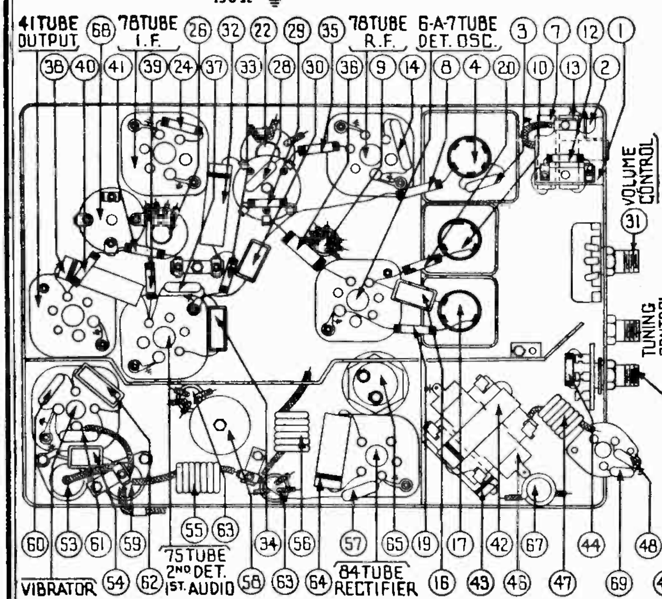


FIGURE 2

Description	Part No.	No.	Description	Part No.
Speaker Cable	41-3231		Volume Shaft	28-8667
Ground Strap	38-7425		Tone Control Shaft	28-8668
Tuning and Volume Knob	28-7211		Scale Assembly	42-5630
Tone Control Knob	28-7212		Receiver Housing	38-1727
Tuning Shaft	28-8666			

No.	Description	Part No.
1	Antenna Choke	38-8106
2	Antenna Choke	38-8106
3	Condenser (70 mmfd.)	30-1068
4	Antenna Transformer	32-2281
5	First Padder (on tun. cond.)	
6	Tuning Condenser	31-1912
7	Condenser (.05 mfd.)	30-4444
8	Resistor (1,000,000 ohms)	33-510344
9	Condenser (.01-.05-.1-.25-.25-.5 mfd.)	30-4478
10	R. F. Transformer	32-2231
11	Second padder (on tun. cond.)	
12	Resistor (70,000 ohms)	33-370344
13	Condenser (6,000 mmfd.)	30-4445
14	Resistor (600 ohms)	33-1212
15	Third Padder (on tun. cond.)	
16	Condenser (250 mmfd.)	30-1032
17	Oscillator Transformer	32-2232
18	Low Frequency Padder	31-6056
19	Resistor (51,000 ohms)	33-351344
20	Resistor (45,000 ohms)	33-345344
21	Padder (Pri. 1st I. F. Trans.)	
22	First I. F. Transformer	32-2286
23	Padder (Sec. 1st I.F. Trans.)	
24	Resistor (2,000 ohms)	33-220334
25	Padder (Pri. 2nd I. F. Trans.)	
26	Second I. F. Transformer	32-2167
27	Padder (Sec. 2nd I. F. Trans.)	
28	Condenser (250 mmfd.)	30-1032
29	Resistor (25,000 ohms)	33-325344
30	Condenser (110 mmfd.)	30-1031
31	Volume Control (350,000 ohms)	33-5139
32	Condenser (.01 mfd.)	30-4479
33	Resistor (1,000,000 ohms)	33-510344
34	Resistor (600 ohms)	33-1212
35	Resistor (20,000 ohms)	33-320334
36	Resistor (32,000 ohms)	33-332444
37	Condenser (250 mmfd.)	30-1032
38	Condenser (.01 mfd.)	30-4145
39	Resistor (240,000 ohms)	33-424344
40	Resistor (490,000 ohms)	33-449344
41	Resistor (240,000 ohms)	33-424344
42	Condenser (.02 mfd.)	30-4419
43	Condenser (4,000 mmfd.)	30-4185
44	Resistor (15,000 ohms)	33-315344
*45	Tone Control Switch	42-1247
*46	Output Transformer	32-7495
47	Choke	32-1374
48	Condenser (250 mmfd.)	30-1032
49	Cone and Voice Coil	36-3526
*50	Field Coil Assembly	32-9236
*51	On and Off Switch Assembly	42-5617
52	Pilot Lamp	34-2039
53	Condenser (.5 mfd.)	30-4474
54	Condenser (250 mmfd.)	30-1032
55	"A" Choke	32-1374
56	Filament Choke	32-1561
57	Condenser (250 mmfd.)	30-1032
58	Vibrator Choke	32-2249
59	Condenser (.5 mfd.)	30-4474
60	Condenser (250 mmfd.)	30-1032
61	Condenser (250 mmfd.)	30-1032
62	Resistor (200 ohms)	33-120344
63	Power Transformer	32-7720
64	Condenser (8,000 mmfd.)	30-4420
65	Filter Condenser (4-8 mfd.)	30-2168
66	Filter Choke	32-7722
67	Choke	32-2269
68	"B" Choke	32-1281
69	Condenser (250 mmfd.)	30-1032
70	Vibrator (Optional)	41-3170-2
	Vibrator (Optional)	41-3170-3
	Four-prong socket	27-6044
	Five-prong socket	27-6035
	Six-prong Socket	27-6036
	Seven-prong Socket	27-6037
	Distributor Inductor	32-2250
	Interference Condenser	30-4007
	Distributor Condenser	30-1087
	Fuse	7227
	Fuse Insulator	27-7729
	Static Collector (Pres.)	28-3584
	Static Collector (Dict.)	38-7405
	Tee Bolt (Rec. mtg.)	28-6161
	Nut (Rec. Mtg.)	W518A

The items marked with an asterisk are rarely required for service and in many cases will not be carried in stock by the local service station. In such cases it will be necessary to order these parts from Philco Transitone, Philadelphia or Chicago.

MODEL S-1431
Studebaker
Socket, Trimmers
Alignment

PHILCO RADIO & TELEV. CORP.

MODEL S-1431 ADJUSTMENTS

SIGNAL GENERATOR—With the Receiver and signal generator set up for operation at the prescribed frequency, turn the Receiver volume control on full and set the signal generator attenuator so that a half scale reading is obtained on the output meter. The signal in the speaker should be audible but not loud.

The shielding on the signal generator output lead must be connected to the Receiver housing.

Procedure

I. F.—Set the signal generator at exactly 260 K. C. Connect the generator lead to the grid cap of the 78 I. F. tube in series with a .1 mfd. condenser (without removing the grid cap).

Adjust the secondary screw padder 27 on the second I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder 25 for maximum reading. (See Figure 4 for location of padders).

Remove the generator lead from the 78 tube.

Connect the generator lead to the grid cap of the 6A7 tube in series with a .1 mfd. condenser (without removing the grid cap). Adjust the secondary screw padder 23 on the first I. F. transformer for maximum reading on the output meter. Then adjust the primary screw padder 21 for maximum reading. (See Figure 4 for location of padders).

HIGH FREQUENCY AND R. F.—After padding the first I. F. stage remove the generator lead from the 6A7 tube.

Set the signal generator at 1550 K. C. and then connect the generator lead to the grid cap of the 78 R. F. tube in series with a .1 mfd. condenser (without removing the grid cap).

Using a piece of paper approximately .006" thick as a gauge between the heel of the rotor plates and the stator plates, turn the rotor plates in mesh until they strike against the paper.

With the tuning condenser in this position, adjust the high frequency padder 15 and the R. F. padder 11 until the maximum reading is obtained on the output meter. This is the true setting for 1550 K. C., 155 on the dial scale.

LOW FREQUENCY—Turn the tuning condenser plates in mesh to approximately 600 K. C., 60 on the dial scale and set the signal generator at 600 K. C. Roll the tuning condenser and adjust the low frequency padder screw 18 for maximum reading on the output meter.

HIGH FREQUENCY READJUSTMENT—Turn the tuning condenser plates out of mesh to 1550 K. C. and set the signal generator at 1550 K. C. Then adjust the high frequency padder 15 again for maximum reading on the output meter.

Remove the generator lead from the 78 R. F. tube.

ANTENNA—When padding the antenna stage it is extremely important that the proper dummy antenna be constructed and used.

Connect the signal generator lead to the antenna cable assembly (made up of Part No. L-2520 lead, and a 64 mmfd. condenser in series between the lead and the signal generator. Plug the cable into the ROOF ANTENNA CONNECTOR on the end of the Receiver.

Follow this padding procedure regardless of whether the Receiver is used with the Roof or Under-car antenna.

Turn the tuning condenser to 1400 K. C. and set the generator at 1400 K. C. Adjust the padders 11 and 5 for the maximum reading on the output meter.

When the antenna stage adjustment is made with the Receiver installed in the car, the Receiver antenna lead must be connected to the car antenna in the usual manner. Connect the signal generator output lead to a wire placed near the car antenna but not connected to it.

I. F. TRANSFORMERS AND PADDERS

The I. F. transformers are assembled complete with padding condensers.

Both the primary and the secondary padders are placed side by side in the top of the transformer shield can. The adjusting screws are accessible thru the holes in the top of the shield. (See Figure 4).

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Figure 3.

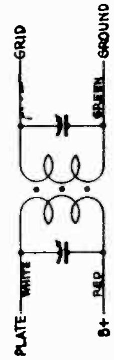


FIGURE 3

If replacements are ever necessary, replace the entire coil assembly, 32-2286 for the first I. F. stage and 32-2167 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

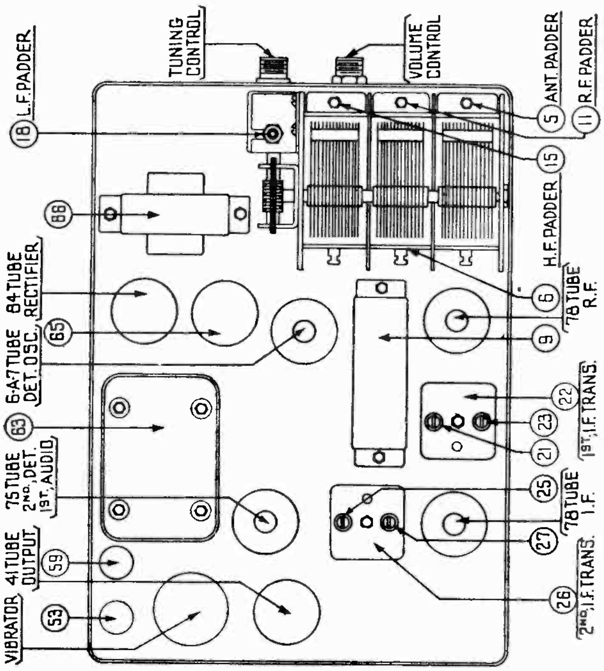


FIGURE 4

OUTPUT METER—The output meter must be connected by means of an adapter to the plate of the type 41 output tube and to the Receiver chassis.

PHILCO RADIO & TELEV. CORP.

CHANGES IN MODELS

Since Publication of Each Service Bulletin

Grouped under each model and arranged according to date . . . All models included . . . August 1st to December 31st, 1935.

The second column on each page gives the "Run Number" of the set at the time of the change (where this information was available from our records). The Run Number is stamped on the top of the chassis with a rubber stamp and is the lefthand number in the rectangle.

The Code Number of the set is given on the chassis name plate or name label (at rear of chassis).

MODEL 29

Approximate Date of Change	Run No.	CHANGES
11-1-35		No. (34) on base view of Fig. 4 should be (35). No. (33) next to (30) on base view of Fig. 4 should be (34).

MODEL 54

Approximate Date of Change	Run No.	CHANGES
9-1-35	14	

	Old Part No.	New Part
Condenser (36)	3793-AG	3793-AM
Condenser (44)	3615-BF	3615-BY
Condenser (31)	8035-F	8035-T

MODEL 60

Approximate Date of Change	Run No.	CHANGES
10-1-35	11	Tube Shield and Tube Shield Base Nos. 28-2726 and 28-2725 for the 6A7 Tube will no longer be necessary.

	Old Part No.	New Part No.
Resistor (21)	5872 (½ watt) 2 meg.	33-1025 (¼ watt)
Resistor (31)	4409 (½ watt) 1 meg.	33-1096 (¼ watt)
Resistor (22)	4411 (½ watt) 99,000 ohms	6099 (¼ watt)
Resistor (34), (36)	5385 (½ watt) 70,000 ohms	33-1115 (¼ watt)

MODEL 116 (Code 121 and 122)

Approximate Date of Change	Run No.	CHANGES
8-1-35	..	Adjustment of high frequency end of broadcast band should be made at 1500 K. C. (1.5 M. C. on the Philco 088 scale) instead of 1600 K. C.
	5	There will be an addition of resistor and condenser assembly. Replace Condenser No. 6237DU (99) with 6287-ODU. The latter is impregnated with the new high melting point wax.

Remove	No. on Schematic Code 121	No. on Schematic Code 122	Install
30-4336 (.00125 mfd.)	(40)	(40)	38-6978
5837 (1000 ohms)	(22)	(22)	
33-1114 (8000 ohms)	(59)	(59)	
30-1028 (.003 mfd.)	(71)	(74)	7301

Approximate Date of Change	Run No.	CHANGES
9-1-35	9	This change made to eliminate frequency drift.

	Old Part No.	New Part No.
2nd I. F. Transformer (51)	32-1734	32-1865

	Run No.	CHANGES
	8	Code 122 only

	Old Part No.	New Part No.
Condenser (104)	30-2011	30-2069
Insulator	27-7195	27-7194

MODEL 116 (Code 121 and 122)

Approximate Date of Change	Run No.	CHANGES
11-1-35	..	Code 122
	..	The grid lead from the 6A3 power tube near the front of the chassis is changed to run over to and parallel with the end of the chassis down as far as condenser (95) then over to the input transformer. Change made to prevent audio oscillation.

Code 121, Run No. 9 Code 122, Run No. 11

Part	Schematic No.	Removed
Resistor	(Code 121) (73) (Code 122) (80)	6984 (2000 ohms) ½ watt

	Run No.	
	10	Code 121
	8	Code 122

Schematic No.	Old Part	New Part
Tuning Condenser Assembly (25)	31-1606	31-1607
Dial Mask and Hub Assembly	31-1575	29-5136

12-1-35

Code 121, Run No. 12

Code 122, Run No. 10

Input Transformer	(92)	32-7447	32-7057

Change (104) Resistor (10,000 ohm) to (104)a

September Change Notices indicated a change in the 2nd I. F. Transformer (50). The Part No. of the new Transformer is 32-1865 and the corresponding Compensating Condenser Part No. is 31-6067.

MODEL 116X and 116B

Approximate Date of Change	Run No.	CHANGES
8-1-35	..	Add bezel frame gasket No. 27-7973. Remove Rubber Bumper No. 27-4160 to prevent microphonics. Remove Bezel Light Guard No. 27-8001 on Codes 121 and 122.

MODEL 610

Approximate Date of Change	Run No.	CHANGES
8-1-35	7	Tube Shield and Tube Shield Base on the 6A7 tube will not be necessary. Remove Part No. 28-2726 and 28-2725.
10-1-35	8	Part No. 6096 (5000 ohms) (3) Resistor and Part No. 33-1206 (20 ohms) (9) Resistor will not be used. In eliminating Resistor (9), shunt a wire across the terminals from which it is disconnected.
11-1-35	..	Reverse numbers (41) and (54) shown in Figure 8.

MODELS 610B,610F,611F PHILCO RADIO & TELEV. CORP.
611(121),620, 620(121),623 Changes

MODEL 610F

Approximate Date of Change	Run No.	CHANGES
8-1-35	..	Remove 27-7981 Bezel Glass Gasket and install 27-8036. Add Bezel Frame Gasket, Part No. 27-7972 to 610-F.

MODEL 610B

8-1-35	..	Add Part No. 27-7971 Bezel Frame Gasket.

MODEL 611-F

9-1-35	..	Remove bezel glass gasket, Part No. 27-7981, and install Part No. 27-8036.

MODEL 611 (Code 121)

9-1-35 — 2 — The new condensers are impregnated with the high melting point wax.

	Old Part	New Part
Condenser ⑮	8035-DU	8035-ODU
Condenser ⑭	3793-SU	3793-OSU
Condenser ㉕	6287-DU	6287-ODU
Condenser ㊳	3903-SU	3903-OSU
Condenser ㊲	4989-FU	4989-OFU
Condenser ㊵	4989-DU	4989-ODU
Condenser ㊸	3615-SU	3615-OSU
Tone Control ㊼	30-4345	30-4377

10-1-35 — 2

	Old Part	New Part
Resistor ㊵	4237 (1 watt) 51,000 ohms	4518 (½ watt)
Condenser ⑲	30-1055 .00225 mfd. mica	30-1042

Resistor ⑥ Part No. 33-1001 (5000 ohm) no longer necessary.

12-1-35 — 4 — The Oscillator Circuit was changed to series feed.
The Oscillator Plate is disconnected from the lead connecting Condenser ⑨ and Resistor ㊶ and connected to the top of the lower primary winding. The bottom end of this primary is disconnected from Condenser ⑬ and ⑲ and connected to the lead , connecting Condenser ⑨ and Resistor ⑪. The lead from Resistor ⑩ to the top of the primary is changed so that it connects to the bottom of the secondary. Resistor ⑩ is removed from the circuit. Resistor ⑱ is changed so that it connects from the 6A7 cathode to the switch side of Condenser ⑨. Resistor ⑲ is removed. The following are necessary part changes:

Part	Schematic No.	Remove Old Part No.	Add New Part No.
Resistor	⑩	33-1128 (120.000 ohm)	
Osc. Transformer	⑪	32-1831	32-1973
Resistor	⑩	33-1206 (20 ohm)	

The Dial Mask Assembly was changed to the Glowing Arrow Wave Band Indicator Type.

Part	Schematic No.	Remove Old Part No.	Add New Part No.
Tuning Condenser	⑰	31-1528	31-1740
Glowing Arrow Mask			27-5167
Glowing Arrow Screen			27-5166
Mask Arm			29-3274
Link			29-3285
Coupling			29-3586
Screen Brcket			31-1751
Hub and Set Screw Assy.		31-1550	31-1724

MODEL 620 (Code 121)

8-1-35 — Add the following parts:
1 No. 27-7972 Bezel Frame Gasket.
1 No. 27-8036 Bezel Glass Gasket
Remove No. 27-7981 Bezel Glass Gasket

MODEL 620 B

Add No. 27-7971 Bezel Frame Gasket

10-1-35 — 5

	Old Part	New Part
Resistor ㊸	5837 (½ watt) 1,000 ohms	33-1028 (¼ watt)
Resistor ㊽	5385 (½ watt) 70.000 ohms	33-1115 (¼ watt)
Resistor ㊿	4411 (½ watt) 99.000 ohms	6099 (¼ watt)

MODEL 620 (Code 121)—

Approximate Date of Change	Run No.	CHANGES
11-1-35	5	A condenser, Part No. 30-4310 (.001 mf.) was connected from the center terminal of condenser ㊻ to the ground terminal of condenser ㊿. Tube Shield, Part No. 28-2726 and Tube Shield Base, Part No. 28-2725. for 6A7 tube no longer necessary.

MODEL 620

12-1-35 — 9

	Schematic No.	Old Part No.	New Part No.
Ant. Transformer	③	32-1699	32-1867
Det. Transformer	⑦	32-1636	32-1868
Osc. Transformer	⑪	32-1637	32-1869

MODEL 623

9-1-35 — .. — Remove pilot light reflector No. 28-2979 and replace with reflector No. 28-3237. Change made to increase light intensity through dial scale.

	Old Part	New Part
Input Transformer ㊷	32-7454	32-7480

10-1-35 — 4 — Change made to increase sensitivity.

	Old Part	New Part
1st I. F. Transformer ㉓	32-1793	32-1671
	34 I. F. Tube	1A4 Tube

8 — Connect bottom terminal (ordinarily grounded) to positive terminal of filament supply.

	Old Part	New Part
Volume Control ㉛	33-5115	33-5142

11-1-35 — 6 — 10,000 ohm Resistor, part ④, Part No. 33-1000, no longer necessary.

12-1-35 — .. — The Dial Mask Assembly was changed to the Glowing Arrow Wave Band Indicator Type.

Part	Schematic No.	Old Part No.	New Part No.
Wave Switch	③	42-1112	42-1155
Tuning Condenser	⑲	31-1526	31-1740
Glowing Arrow Mask			27-5167
Glowing Arrow Screen			27-5166
Mask Arm			29-3274
Link			29-3285
Coupling			29-3586
Screen Bracket			31-1751
Hub Assembly		31-1550	31-1724

9 — The Oscillator Circuit was changed to series feed.

Part	Remove Old Part No.	Schematic No.	Add New Part No.
Condenser	30-1033 (.00015 mf.)	㊾	30-1049 (.0006 mf.)
Resistor	6097 (490.000 ohm)	㉞	
Resistor	33-1013 (25,000 ohm)	⑲	
Oscillator Trans.	32-1831	⑩	32-1973
Resistor	33-1206 (20 ohm)	⑨	
Condenser	6359 (.006 mf.)	㊿	30-1031 (.00011 mf.)

PHILCO RADIO & TELEV. CORP

Changes

MODEL 623 (Continued)

Approximate Date of Change	Run No.	CHANGES
..	9	**S. W. SECTION OF OSC. TRANSFORMER** Condenser (49) and Resistor (50) were removed and the wires connected to the ends of these parts were connected together. The wires between the police tap at the left of Switch Section No. 2 and the joint in the wire just above that was broken and Condenser No. 30-1049 inserted. The connection between the bottom (S. W.) primary and secondary of the Oscillator Transformer was broken and condensers (14) and (15) connected between the bottom of the secondary and ground. Resistor (16) removed. The lead connected to the top of the primary disconnected and brought down to the bottom of the secondary. Resistor (9) also removed. A lead from the bottom of the primary was connected to the lead running from Condenser (8) to Resistor (20). The oscillator plate wire was disconnected from this lead and brought down to the top of the primary. **BROADCAST AND POLICE SECTION OF OSC. TRANSFORMER** Resistor (17) was disconnected from the bottom of the upper section of the Osc. Transformer and connected to the switch side of the Condenser (8).

MODEL 623-B and 623-F

9-1-35	..	Remove bezel glass gasket, Part No. 27-7981, and replace with Part No. 27-8036.

Model 630 (Code 121)

10-1-35	4	

	Old Part	New Part
Resistor (56)	33-1040 (½ watt) 4.000 ohms	33-1031 (¼ watt)
Resistor (50)	6650 (½ watt) 20.000 ohms	6649 (1 watt)

11-1-35	7	Remove Shadowmeter Shunt Resistor (56), Part No. 33-1040 (4,000 ohms).

Part	Schematic No.	Old Part	New Part
Shadowmeter	(55)	45-2086	45-2083

MODEL 630

	Schematic No.	Old Part No.	New Part No.
Ant. Transformer	(8)	32-1699	32-1867
Det. Transformer	(7)	32-1636	32-1868
Osc. Transformer	(11)	32-1637	32-1869

MODEL 640 (Code 121)

		Replace Resistor (5), Part No. 6650 (20,000 ohms) with Part No. 33-1177.
8-1-35	6	Replace speaker plug socket, No. 27-6033 with No. 27-6043.
	4	Replace 1st I. F. Transformer, Part No. 32-1835 with No. 32-1917 to prevent microphonics. Remove rubber bumper, No. 27-4150 to prevent microphonics. Remove Bezel Light Guard No. 27-8001. Part (59) on base view in bulletin should be 2nd I. F. Part (47), 1st I. F. Replace Bezel Glass Gasket No. 27-7981 with No. 27-8036. Add No. 27-7972 Bezel Frame Gasket.

11-1-35	9	

Part	Schematic No.	Old Part	New Part
Tuning Condenser	(51)	31-1556	31-1671
Run No. 10			
Shadow Meter	(61)	45-2080	45-2083
Resistor	(62)	33-1040	Removed

MODEL 640-B

Approximate Date of Change	Run No.	CHANGES
9-1-35	..	Uses K31 instead of K21 Speaker.

MODEL 641

9-1-35	..	Connect an 8,000 ohm resistor, Part No. 33-1114, across shadow meter.
		Corrections in Replacement Parts List
10-1-35	..	Part (62) .015 mf. Condenser is part of (64-A). Part (31) should be .03 mf. and the correct Part Number is 30-4025. Part (53) should be 3615-DG. Referring to bottom view of chassis, condenser marked (65) should be (10) and condenser (10) changed to (65). Capacity of sections in (63) is (.05 — .2 — .75 — .09 — .25). Part Number of B-C Resistor is 33-3214. List Price 25c. Price of No. 27-4225 Waveband Knob, List 10c.

11-1-35	..	

Part	Old Part	New Part
Bezel Assembly	40-5722	40-5724

12-1-35	2	A .00011 Mf. Condenser, Part No. 30-1031 is connected from the plate of the 85 Detector Tube to the Cathode Circuit.

MODEL 642

		Old Part	New Part
9-1-35	Tone Control (49)	30-4316	30-4332

12-1-35	2	The Dial and Mask Assembly were changed to the Glowing Arrow Wave Band Indicator Type.

Part	Schematic No.	Old Part No.	New Part No.
Tuning Condenser	(18)	31-1526	31-1741
Hub and Set Screw Assembly		31-1550	31-1724
Mask Assembly			27-5137
Glowing Arrow Screen			27-5166
Screen Bracket			31-1760
Glowing Arrow Mask			27-5167
Mask Arm			29-3274
Link			29-3285
Coupling			29-3586
Pilot Lamp Assembly		38-7032	
Wave Switch	(2)	42-1107	42-1152

MODEL 643

9-1-35	..	Filament current reads (point) .750MA., it should read 750MA. Part No. 33-5119 (53) in Model 643. Bulletin No. 226, listed at $1.10 changed to $1.45.
12-1-35	..	Change Chassis Mounting Washer (rubber) listed as 27-4021 to 27-4201. Pilot Lamp (59), Part No. 5316, should be Part No. 34-2065.
11-1-35	3	

Part	Schematic No.	Old Part	New Part
Condenser	(40)	6359 (.006 mf.)	30-1031 (.00011 mf.)

MODEL 650

11-1-35	13	

Part	Schematic No.	Old Part	New Part
Tuning Condenser	(51)	31-1556	31-1671
Code 121, Run No. 15.			
Code 122, Run No. 13.			
Shadow Meter	(64)	45-2086 & 45-2082	45-2083
Resistor	(65)	6096	Removed

MODELS 650,660,680(122)
Parts Catalog PHILCO RADIO & TELEV. CORP.
Changes

MODEL 650

Approximate Date of Change	Run No.	CHANGES
8-1-35	9	Add Part No. 27-8001 Bezel Light Guard. Part (39) on base view in bulletin should be 2nd I. F., Part (47), 1st I. F. PRICE CORRECTION— Part No. 33-3211 (72) resistor; correct list price is $.65 instead of $1.60. Part No. 30-4185 tubular condenser (used in several models) price changed from $0.40 to $0.25 list. Effective July 15. 1935.

Part	Remove	Schematic No.	Install
1st I. F. Transformer	32-1835	(39)	32-1917
Condenser	3615-DG		3615-DU
Rubber Bumper	27-4150		
Bezel Glass Gasket	27-7981		27-8036
Bezel Frame Gasket			27-7972
Conversion Code 121 to 123 (RX) —			
Electrolytic Condenser	30-2025	(78)	7464
Dial Assembly	31-1533		31-1651
Line Cord	L-943A		
Antenna Power Cord			41-3104
Shadow Meter	45-2086	(54)	45-2082
Tone Control	30-4343	(56)	30-4378
By-Pass Condenser	3615-SU	(63)	3615-OSU
By-Pass Condenser	6287-DU	(80)	6287-ODU
By-Pass Condenser	3615-SG	(19)	3615-OSG
By-Pass Condenser	3793-DG	(62)	3793-ODU
By-Pass Condenser	3615-DU	(44)	3615-ODU
By-Pass Condenser	8035-DG	(50)	8035-ODG

9-1-35	12	Replace Part No. 30-4351 (56) Tone Control with Part No. 30-4379 . 110 mmfd. condenser, Part No. 30-1031 (62) removed.

Code 123, Run No. 8. Code 151, Run No. 11.
Code 121, Run No. 12. Code 122, Run No. 9.

Part	Old Part		New Part
Resistor (64)	5385	(70,000 ohms)	33-1115
Resistor (70)	6208	(15,000 ohms)	33-1177
Resistor (58)	5310	(5,000 ohms)	6096
Resistor (45)	5837	(1,000 ohms)	33-1028
	Wiring Panel		38-6151

These changes made to reduce hum.

MODEL 660

9-1-35	8	Remove rubber bumper, Part No. 31-1706, (to prevent microphonics). B. C. Resistors (79), Part No. 33-2020, in Bulletin No. 223, should be 33-3020. Compensating Condenser No. (29) in Fig. 2 is labelled "standard," it should be "police"; also Condenser No. (27) is labelled "police" and shoud be "standard."

Part	Old Part	New Part
Tone Control (Code 121)	30-4343	30-4378
2nd I. F. Transformer (50)	32-1734	32-1865
Tone Control (Code 122)	30-4351	30-4379

11-1-35	..	Shadow meter shunt resistor (2000 ohms) Part (47), Part No. 6984, removed. Reverse Numbers (29) and (27) shown in Fig. 2.

Part	Schematic No.		Old Part	New Part
Condenser	5	(19)	30-4123 (.05 mf.)	30-4170 (.1 mf.)
Tuning Condenser	3	(33)	31-1706	31-1683
Dial Hub Assembly			31-1575	31-1724

12-1-35	..	September Change Notices indicated a change of the 2nd I. F. Transformer (59). The Part Number of the new Transformer is 32-1865 and the corresponding Compensating Condenser Number is 31-6067.

MODEL 680 (Code 122)

Approximate Date of Change	Run No.	CHANGES
11-1-35	4	240,000 ohm resistor, Part No. 33-1097, added, connected from wiper arm (center terminal) to bottom terminal of bass control. The correct Part Number (163) on Parts List is 30-4113. Part No. of Large (H Type) Acoustic Clarifier is 36-1158.
12-1-35	5	Shadow Meter (120), Part No. 45-2088 is replaced with No. 45-2083. Shunt Resistor (121), Part No. 7352 (6,000 ohms) removed.
	6	Sensitivity Control (85), Part No. 33-5124 is replaced with Part No. 33-5144. The correct number and price for Input Transformer (157) is 32-7447 at $3.00.

U-7 SPEAKER

9-1-35	..	The correct cone assembly number for the type U-7 speaker is 36-3381.

CORRECTIONS IN 1936 PHILCO PARTS CATALOG

Tubular Paper Condenser 30-4346 should be 30-4336, working voltage, 1000.

Tubular Condenser Kit (page 13), Part No. 45-1109 should be 45-1139.

Tuning Condenser 31-1039 should be 31-1106, list $5.30.

Tuning Condenser 31-1006 should be 31-1005, list $4.00.

Potentiometer, Part No. 33-5511 should be 33-5111.

I. F. Amplifier Kit, Part No. 38-6685 should be 38-7453, list $6.15.

I. F. Amplifier Kit complete should be Part No. 40-5814, list $8.81.

Headphones only should be Part No. 45-2098 instead of 8303.

Filter Choke (in short-wave section) should be Part No. 5643 instead of 5463.

Power Amplifier Output Transformer 32-7055 should be 32-7255, list $15.00 instead of $4.50.

Heavy Duty Resistor, Part No. 33-3134 should be 33-3176.

Heavy Duty Resistor, Part No. 33-3135 should be 33-3175.

Knobs, Part No. 24-4051 should be 27-4051.

Cones, replacement for K-13 and K-17 speakers should be 36-3159, list $0.80 instead of 02996 (list $0.90).

Field Coil, S-15 Speaker should be 36-3519 instead of 36-3579.

PRICE CORRECTIONS IN 1936 CATALOG

		Price Listed	Correct Price
30-2073	Elec. Cond.	$5.75	$3.15
30-2077	Elec. Cond.	3.15	5.75
4234	Power Trans.	7.50	7.00
3868	Power Trans.	7.50	9.00
32-7067	Amp. Power Trans.	30.00	34.00
32-7032	Amp. Power Trans.	36.00	35.00
38-6057	Vibrator	6.00	5.00
L-1640	Wire (per 100 feet)	2.50	2.00
907-000	Wire (per 100 feet)	1.50	1.85

PHILCO RADIO & TELEV. CORP. Data

Dial Drive Assemblies

Model	Type Drive	Illus.	Complete Drive Assy.	Drive Cord	Drive Cord Spring	Dial	Inverted Dial	Dial Hub Assy.	Drive Bracket	Drive Ring and Hub
4	Friction		03011			03890				
14	Cable		31-1065	04834	7776	31-1066	31-1118			
15	Cable		4016A	4020A	7776	4276				
16 (Code 121-2-3)	Friction (Rubber)	"R"	45-2149			31-1058	31-1115			
16 (Code 125-6-7)	Cable & Vernier	"B"	31-1280	31-1352	28-8245	31-1363	31-1420			
17	Cable		31-1065	04834	7776	31-1066	31-1095			
18	Cable		31-1065	04834	7776	31-1066 31-1207*	31-1241			
19	Cable		31-1119	06920	7776	31-1025	31-1024			
20-21	Friction		45-2150			4209B				
28	Cable & Vernier	"D"	31-1186	31-1457	7776	31-1208				
28CSX	Cable	"C"	31-1276	31-1457	7776		31-1481			
29	Cable & Vernier	"A"	31-1187	31-1457	7776	31-1208				
29	Cable & Vernier	"C"	31-1276	31-1457	7776	31-1245	31-1481			
30	Cable		4016A	3484A	3012	4139 (Scale)				
32	Cable		31-1074	31-1457	7776	31-1025				
34	Friction (Rubber)	"R"	45-2149			31-1162				
35-36	Friction		03011			03031				
37	Friction		03430			05811				
38	Vernier	Types "O," "S," and "T" used on this model—see illustration				31-1084				
39	Vernier	Types "O," "S," and "T" used on this model—see illustration				31-1471				
40-41-42	Cable		3393A	3484A	3012	3794				
43	Cable		05365	4020A	7776	05418				
44	Friction (Rubber)	"R"	45-2149			31-1107				
45	Cable & Vernier	"D"	31-1186	31-1457	28-8252	31-1208				
45	Cable & Vernier	"F"	31-1275	31-1457	28-8252	31-1208				
46	Friction		45-2150			4209B				
47	Cable		04835	04834	7776	04832				
48	Friction		45-2151			05811				
49	Cable & Vernier	"J"	45-2152	31-1456	7776	31-1205				
50	Friction		06522			03322				
51-52	Friction		45-2150			04031				
54	Vernier	Types "P" and "Q" used on this model—see illustration.				27-5008				
58-59	Vernier	Types "P" and "Q" used on this model—see illustration.				27-5051				

INVERTED DIAL SCALES ARE USED ON ALL MODELS HAVING CABINET INDENTIFICATION AS FOLLOWS: CSX; LZX; LZ; RX; AND MODEL 660L.

* Covers Police Frequencies.

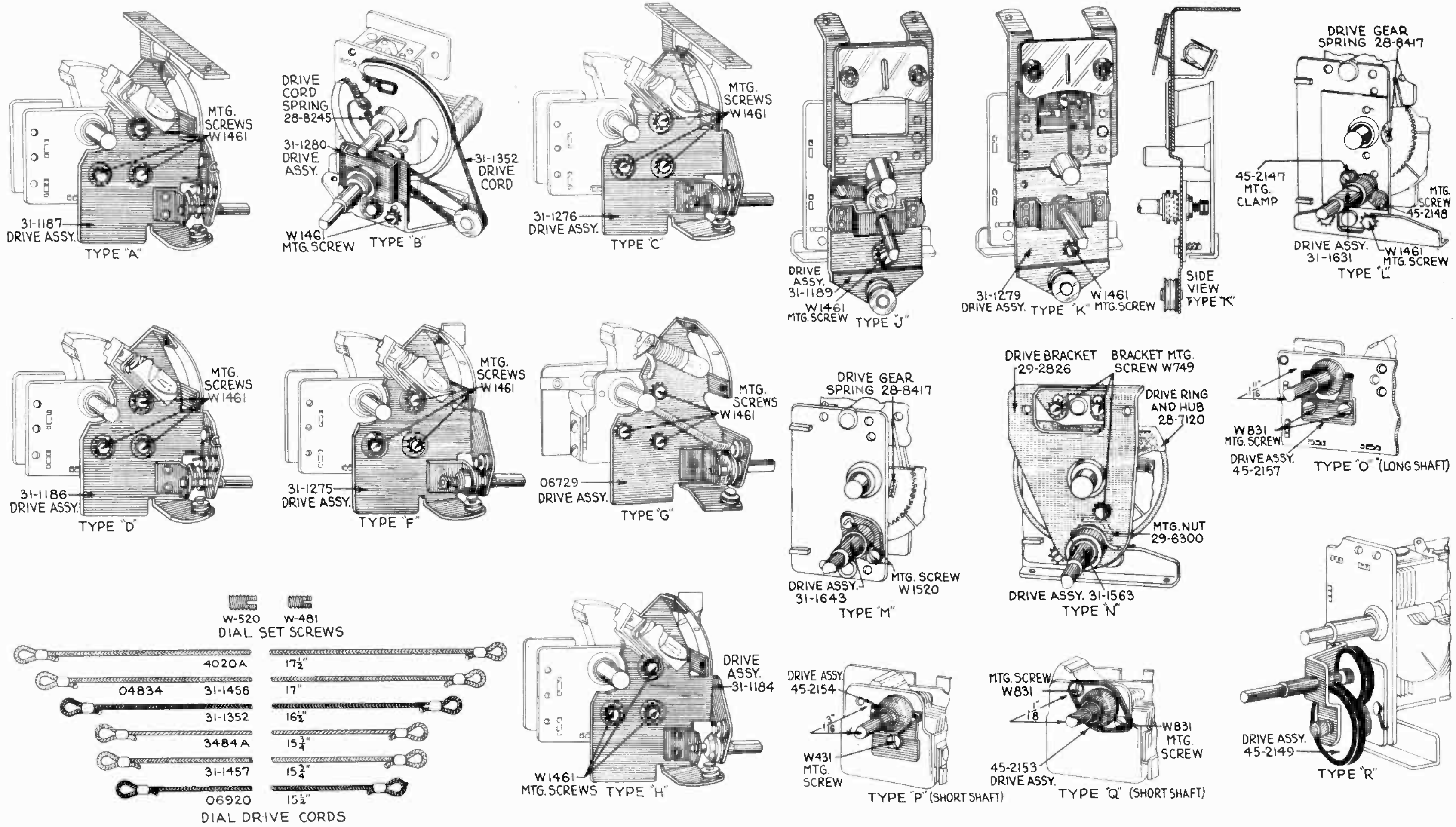
Model	Type Drive	Illus.	Complete Drive Assy.	Drive Cord	Drive Cord Spring	Dial	Inverted Dial	Dial Hub Assy.	Drive Bracket	Drive Ring and Hub
60	Vernier	Types "O," "S," and "T" used on this model—see illustration				31-1090 31-1472A				
65	Cable		3393A	3484A	3012	3398 (Scale)				
66	Vernier	Types "O," "S," and "T" used on this model—see illustration				31-1234				
70	Friction		03011			03031				
71	Friction		04835			04832	05992			
76	Cable		3393A	3484A	3012	3794 (Scale)				
77	Cable		4016A	4020A	3012	4118				
86-87	Cable		4016A	3484A	7776	3047 (Scale)¶				
89	Cable	"G"	06729-06802‡	31-1157	7776	06697				
89	Cable	"H"	31-1184	31-1157	3012	31-1590				
90	Friction		03011			03031				
91	Cable		04836	04834	7776	04832	31-1026			
95	Cable		3393A	3484A	3012	3794 (Scale)				
96	Cable		4016A	4020A	7776	4118				
97	Cable & Vernier	"B"	31-1280	31-1352	28-8245	31-1513				
111-112	Cable		4016A	4020A	7776	4276				
116	Vernier	"N"	31-1563			27-5107		28-7129	29-2826	
118	Cable & Vernier	"J"	45-2152	31-1456	7776	31-1205	31-1241			
118	Cable & Vernier	"K"	31-1279	31-1456	7776	31-1414				
144	Cable & Vernier	"B"	31-1280	31-1352	28-8245	31-1206				
200	Cable		31-1065	31-1456	7776	31-1255				
201	Cable & Vernier		31-1382	31-1456	7776	31-1205				
610	Vernier	"L" or "M"	31-1643			27-5131		31-1550		
611	Vernier	"L" or "M"	31-1643			27-5097		31-1550		
620	Vernier	"L" or "M"	31-1631			27-5098		31-1550		
623	Vernier	"L" or "M"	31-1643			27-5097		31-1550		
624	Vernier	"L" or "M"	31-1643			27-5163		31-1724		
625	Vernier	"L" or "M"	31-1631			27-5098		31-1550		
630-635	Vernier	"L" or "M"	31-1631			27-5098	27-5121	31-1550		
640	Vernier	"N"	31-1563			27-5103	27-5122	31-1550	29-2826	28-7120
641	Vernier	"N"	31-1563			27-5125		31-1550	29-2826	28-7120
642	Vernier	"L" or "M"	31-1631			27-5098		31-1550		
643	Vernier	"N"	31-1563			27-5124		31-1550	29-2826	28-7120
645	Vernier	"N"	31-1563			27-5165		31-1724	29-2826	28-7120
650	Vernier	"N"	31-1563			27-5103	27-5122	31-1550	29-2826	28-7120
651	Vernier	"N"	31-1563			27-5170		31-1724	29-2826	28-7120
655	Vernier	"N"	31-1563			27-5165		31-1724	29-2826	28-7120
660-665	Vernier	"N"	31-1563			27-5115	27-5123	28-7129	29-2826	28-7120
680	Vernier	"N"	31-1563			27-5127		28-7129	29-2826	28-7120

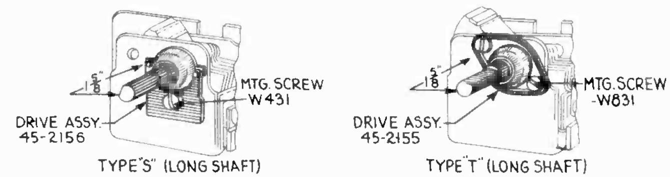
‡ With shadow meter bracket.
¶ Model 87—Dial scale No. 3398.

January, 1936

Dial Drive Assemblies
Details, Notes

PHILCO RADIO & TELEV. CORP.





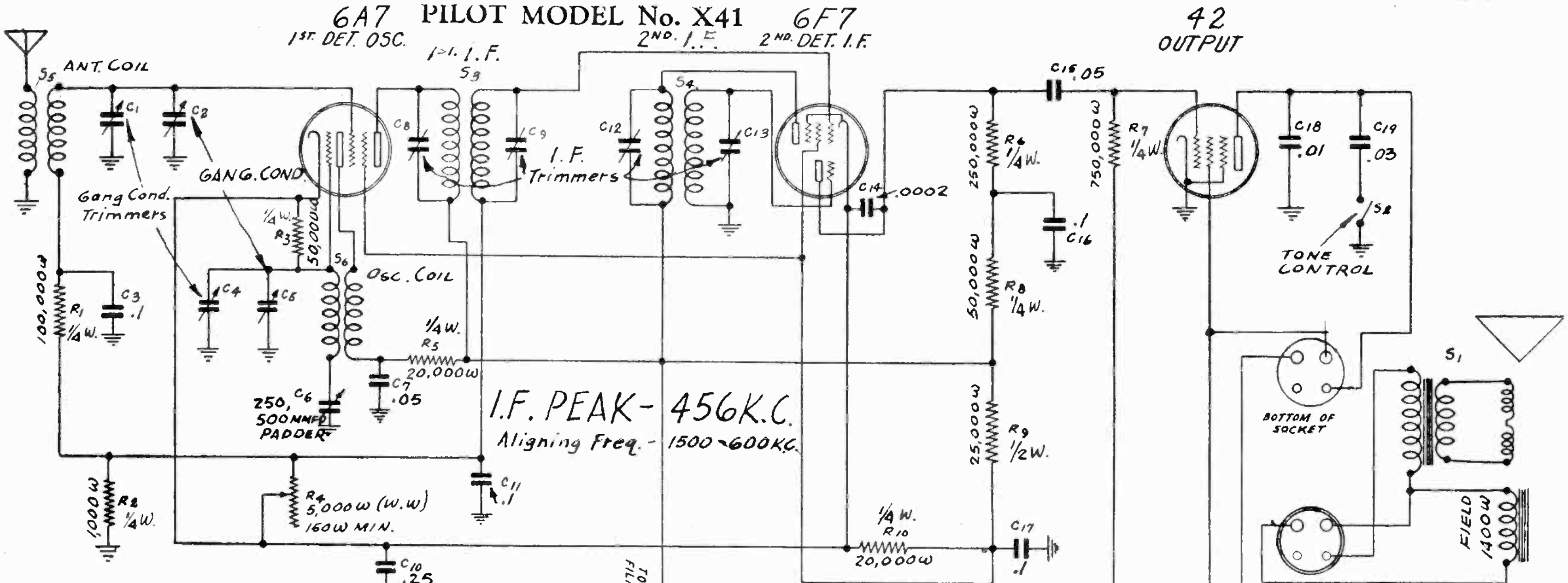
Here is complete information on dial drives for all Philco Models. This bulletin also contains a list of other miscellaneous parts such as dials, dial set screws, mounting screws and drive cords.

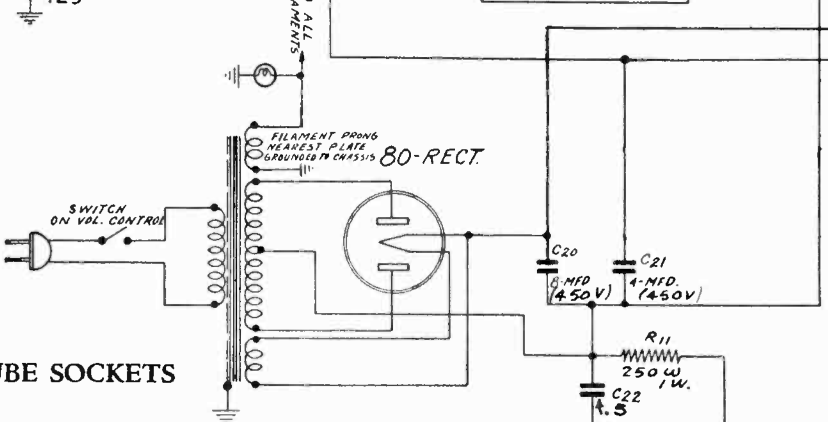
Illustrations of the various types of drives are provided to facilitate selecting the correct replacement assembly for models on which more than one type drive was used. These illustrations are listed by letters in the third column of the table.

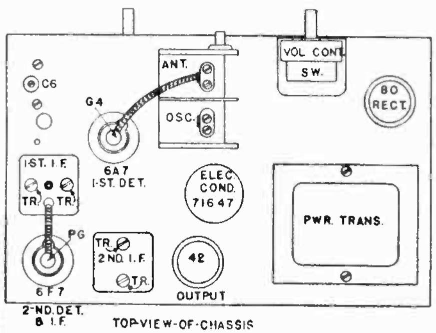
To use this bulletin correctly, first locate the model number of the set being repaired. It will be found in the first column. If the model has more than one type drive, it will be listed more than once. Next, follow across to the third column for the number of the illustration. If no illustration is shown, use the assembly number in the fourth column. If an illustration is indicated, refer to pages 2 and 3, and use the assembly number of the drive that is identical to the drive assembly being repaired.

We recommend the replacement of the entire drive assembly in all cases if it is defective. This will insure a smooth working dial, plus long life.

PILOT RADIO CORP.







VOLTAGES MEASURED AT TUBE SOCKETS

	Det. Osc. 6A7	Audio Output 42	Amp. Det. 6F7	Rectifier 80
PLATE	220	210	220	335 Volts D.C. from Filament to transformer center tap.
SCREEN	66	237	66	
CATHODE	18	*16	18	
FILAMENT	6.3	6.3	6.3	4.9

Speaker field volts—85 volts.
Anode grid of 6A7—150 volts.
Triode plate of 6F7—95 volts.

*Measured across 250 ohm resistor, R-11.
Measurements made with voltmeter of 1,000 ohms per volt.

Plate and screen voltages measured to cathode.
Cathode voltages measured to chassis frame.

I. F. ALIGNMENT: When aligning the intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The tuning condenser should be set at maximum capacity. Connect the antenna lead of the external oscillator to the control grid of the type 6F7 tube in the I. F. Amplifier stage through a 0.1 mfd. fixed condenser. Connect the ground lead of the external oscillator to the receiver ground clip. The I. F. alignment capacitors are located at the top of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 2 slowly until maximum output is noted. On completion of this operation, remove the external oscillator leads from the type 6F7 I. F. Amplifier tube and connect it in the same manner to the control grid at the top of the type 6A7 tube.

Now rotate each adjustment screw on I. F. Unit No. 1 for maximum output. During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. Amplifier, it is essential to repeat the alignment process in both I. F. units with the external oscillator leads connected across the control grid of the 6A7 tube.

BROADCAST ALIGNMENT: After the I. F. Amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground leads, this time with a .0002 mfd. condenser in the antenna lead. Adjust the tuning control pointer at the 1500 kc. mark. Adjust the broadcast band oscillator trimmer to maximum response. Adjust the signal section trimmer in the same manner.

Next adjust the 600 kc. padder condenser. Set the external oscillator at 600 kc. Rotate the receiver tuning control until resonance is indicated. Then rock the tuning control back and forth about this resonance position, and at the same time adjust the padder condenser for the highest resonance peak.

Now repeat the 1500 kc. trimmer adjustment, following in every detail the procedure previously described.

MODELS 108,109
Socket,Trimmers
Voltage,Alignment

PILOT RADIO CORP.

MODELS 213,215
Voltage,Alignment

SERVICE INFORMATION
MODELS 213, 215

REMOVAL OF CHASSIS FROM CABINET:

To remove the chassis from the cabinet proceed as follows:

Be certain that the line cord is removed from the power outlet socket.

Remove the "slip-on" knobs and felt washers from the controls on the front panel.

Remove the speaker plug from the socket at the rear of the chassis.

Remove the four mounting screws, located underneath the cabinet.

REALIGNMENT: Should the receiver require re-alignment, the outlined procedure below should be followed. For best results an external modulated oscillator with adequate frequency range, and a visual output meter, should be used.

Before connecting the chassis to the power line, reconnect the speaker cable in its socket at the rear of the chassis.

The location of the R. F. alignment trimmer condensers is on the side of the band switch. The trimmers in the lowest row are those for aligning Band 1. Those in the second row from the bottom are for Band 2. Those in the third row up are for the Broadcast. In the Model 215 there is an additional row of trimmers located immediately above those for the Broadcast.

The padder condenser is located under the rear section of the band switch. In the Model 215 an additional padder for the Longwave range is located at the right of the Broadcast padder. Access to the padder condenser is made through a hole provided in the rear of the chassis frame.

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Selector Switch should be in the position marked "Broadcast", and the tuning condenser should be set at maximum capacity. Connect the "antenna" lead of the external oscillator to the control grid of the type 6K7 tube in the I. F. Amplifier stage through a .1 mfd. fixed condenser. Connect the "ground" lead of the external oscillator to the receiver ground lead. The I. F. alignment capacitors are located at the side of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 2 slowly until maximum output is noted. On completion of this operation, remove the external oscillator lead from the type 6K7 I. F. amplifier tube and connect it in the same manner to the control grid at the top of the type 6A8 tube.

Now rotate each adjustment screw on I. F. Unit No. 1 for maximum output. During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. amplifier, it is essential to repeat the alignment process in both I. F. Units.

BROADCAST ALIGNMENT: After the I. F. amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground leads. Set the Band Selector Switch in the "Broadcast" position and place the tuning control pointer at the 1500 kc. mark. Adjust the broadcast band oscillator trimmer.

Next adjust the interstage alignment trimmer for maximum response. Finally adjust the antenna section trimmer in the same manner.

Next adjust the 600 kc. padder condenser, located in the lower rear section of the band switch, under the chassis. Set the external oscillator at 600 kc. Rotate the receiver tuning control until resonance is indicated. Then rock the tuning control back and forth about this resonance position, and at the same time adjust the padder condenser for the highest resonance peak.

Now repeat the 1500 kc. trimmer adjustment, following in every detail the procedure previously described.

ALIGNMENT OF THE SHORT WAVE-BANDS: The procedure in aligning the short wave-bands is identical with that for the broadcast with the exception of the adjustment of the padder condenser. The alignment frequencies are as follows:

Band 2: 50 Meters (6,000 kc.)
Band 1: 16.6 Meters—(18,000 kc.)

When aligning Band 2, set the Band Selector Switch in the position marked "Band 2". Set the tuning control pointer at the 50 meters. Adjust the oscillator alignment capacitor on Band 2 for maximum output. Next adjust the interstage and antenna section alignment capacitors for maximum output.

To align Band 1, set the Band Selector Switch in the position marked "Band 1". Set the tuning control pointer at the 16.6 meter mark. Set the external oscillator at 16.6 meters. Adjust the oscillator section alignment capacitor on Band 1 for maximum output.

Proceed next to align the interstage section of Band 1. In doing this, it is essential to rock the tuning control back and forth about the resonance position and at the same time to adjust the trimmer for the highest resonance peak. Next align the antenna section for maximum sensitivity.

NOTE.

The above alignment positions refer to the Model 213 only, which is calibrated in frequency. The alignment points for the Model 215, which is calibrated in meters only, is as follows:

Longwave	Align at 750 meters.
	Pad at 2,000 meters.
Broadcast	Align at 200 meters.
	Pad at 500 meters.
Band 2	Align at 49 meters.
Band 1	Align at 17 meters.

REMOVAL OF BAND SELECTOR SWITCH ASSEMBLY: Should it be necessary to remove the switch assembly, this is easily done by removing the supporting screws. Before doing this, however, it is essential to unsolder the leads between the switch and the chassis.

It is advisable to realign the receiver after reinstalling the switch assembly.

CAUTION: When making repairs on the receiver, use only ROSIN CORE SOLDER. NEVER USE SOLDERING PASTE OR ACID FLUXES OF ANY TYPE.

RECEIVER DESCRIPTION

Operating Voltages—115, 125, 150, 220, 240 volts, Alternating Current.
Frequency Rating —50 to 60 cycles.
Power Consumption—70 Watts.
Circuit —One stage of Tuned Radio Frequency amplification for all frequencies, electron-coupled oscillator-modulator, diode detector, class "A" pentode output stage, automatic volume control.
Wavelength Range—From 550 meters to 16 meters (545 kc. to 18,800 kc.).
Undistorted power output—3 watts.
Intermediate Frequency—456 kc.
Tube Functions —Type 6K7: R. F. amplifier for all bands.
Type 6A8: Electron emission control oscillator-detector.
Type 6K7: I. F. amplifier.

VOLTAGES

The D. C. voltages measured at the tube sockets of the set should be read with a high resistance voltmeter of at least 1000 ohms per volt.

	R. F. Type 6K7	Osc. Det. Type 6A8	I. F. Type 6K7	Diode Det. Type 6H6	Aud. Driv. Type 6J7	Pow. Pent. Type 6F6	Rectifier Type 5Z4
Plate	260	260*	260	——	60**	235	——
Cathode	3.5	5.	3.5	——	3	15	——
Screen	90	90	90	——	70**	260	——
Filament	6.3	6.3	6.3	6.3	6.3	6.3	5.

Speaker field—100 volts.
* Anode Grid—190 volts.
** Measured through resistor.
All plate, screen and cathode voltages measured to ground.

MODELS 108, 109

SERVICE INFORMATION

I. F. ALIGNMENT: When aligning the intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Switch should be in the position marked "Broadcast," and the tuning condenser should be set at maximum capacity. Connect the "antenna" lead of the external oscillator to the control grid of the type 6D6 tube in the I. F. Amplifier stage through a .002 mfd. fixed condenser. Connect the "ground" lead of the external oscillator to the receiver ground lead. The I. F. alignment capacitors are located at the top of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 2 slowly until maximum output is noted. On completion of this operation, remove the external oscillator leads from the type 6D6 I. F. Amplifier tube and connect it in the same manner to the control grid at the top of the type 6A7 tube.

Now rotate each adjustment screw on I. F. Unit No. 1 for maximum output. During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. Amplifier, it is essential to repeat the alignment process in both I. F. units with the external oscillator leads connected across the control grid of the 6A7 tube.

BROADCAST ALIGNMENT: After the I. F. amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground leads. Set the Band Switch in the "Broadcast" position and place the tuning control pointer at the 1400 kc. mark. Adjust the broadcast band oscillator trimmer to maximum response. Adjust the signal section trimmer in the same manner.

Next adjust the 600 kc. padder condenser. Set the external oscillator at 600 kc. Rotate the receiver tuning control until resonance is indicated. Then rock the tuning control back and forth about this resonance position, and at the same time adjust the padder condenser for the highest resonance peak.

Now repeat the 1400 kc. trimmer adjustment, following in every detail the procedure previously described.

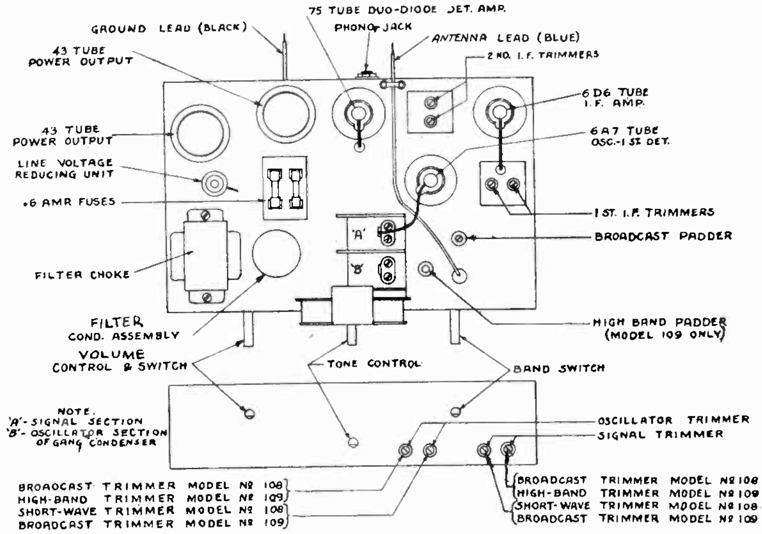
ALIGNMENT OF THE SHORT-WAVE BANDS: The procedure in aligning the short wave-bands is identical with that for the broadcast with the exception of the adjustment of the padder condenser. The alignment frequency is;
16.8 Meters—(17,800 kc.)

Turn the Band Switch to the short wave position. Tune the external oscillator to 16.8 meters. Tune the receiver so that the dial pointer is in a position coincidental with the 16.8 meter indication on the dial scale. Adjust the short wave oscillator trimmer for maximum response. Next adjust the signal circuit trimmer for maximum resonance. Repeat all adjustments to assure correct alignment, rocking the gang condenser to right or left for maximum gain.

THE HIGH BAND ALIGNMENT: Procedure in the Model 105 is similar to the Broadcast section of that receiver. Align at 375 k.c. Adjust the padder at 160 k.c.

Should it be necessary to remove the band switch assembly, it is advisable to realign the receiver after reinstalling.

TOP VIEW OF CHASSIS MODELS No. 108-109



ELECTRICAL SPECIFICATIONS

Line voltage	115 Volt D. C.
Line current	.44 Amp D. C.
Power Consumption	50 Watts
Undistorted Power output	2 Watts

VOLTAGES

The D. C. Voltages measured at the tube sockets of the set should be read with a high resistance voltmeter of at least 1000 ohms per volt.

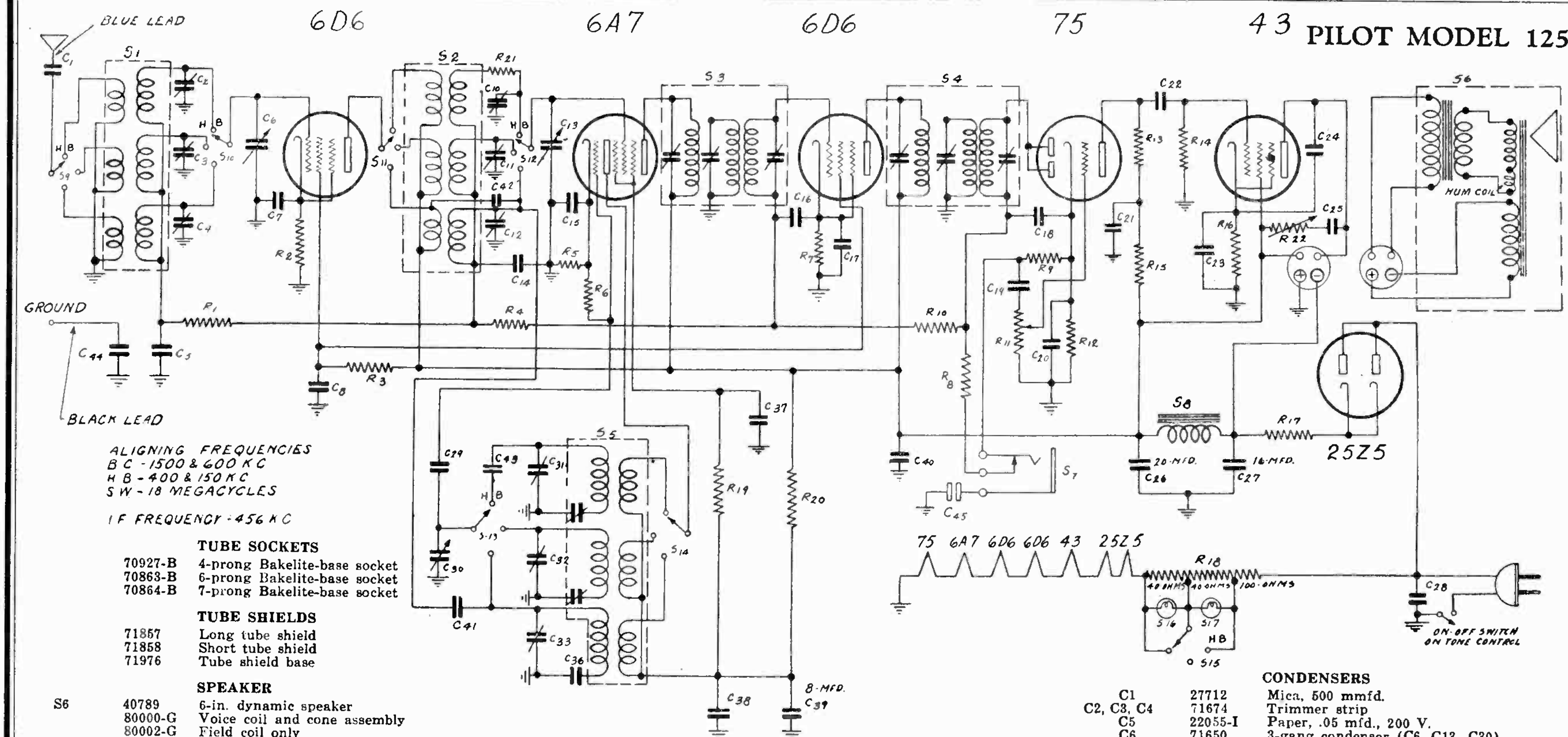
	No. 6A7 OSC. DET.	No. 6D6 I. F.	No. 75 DIODE DET.	No. 43 PWR. PENTODES
Plate	100	100	60*	85
Cathode	2.8	2.5	.6	**
Screen	65	65	....	95
Filament	6.3	6.3	6.3	25.

*Voltages measured through 500,000 ohm plate resistor.
**Grid-bias voltage for No. 43 tube 15 volts, (obtained across S-2 Filter choke).
Anode grid of 6A7 to cathode—90 volts.
All plate voltages measured to cathode.
All screen voltages measured to cathode. All cathode voltages measured to chassis frame. Speaker field voltage 105 volts.

MODEL 125
Schematic
Parts

PILOT RADIO CORP.

PILOT MODEL 125



TUBE SOCKETS

	70927-B	4-prong Bakelite-base socket
	70863-B	6-prong Bakelite-base socket
	70864-B	7-prong Bakelite-base socket

TUBE SHIELDS

	71857	Long tube shield
	71858	Short tube shield
	71976	Tube shield base

SPEAKER

S6	40789	6-in. dynamic speaker
	80000-G	Voice coil and cone assembly
	80002-G	Field coil only
	80001-G	Transformer only

TUNING EQUIPMENT

S3	71679	1st I. F. transformer
S4	71678	2nd I. F. transformer
	71650	3-gang tuning condenser
	71703	Condenser drive assembly
	71725	Drive disc assembly
	71704-B	Dial and pilot light bracket assembly
	78525	Dial pointer
	642	Pointer holding screw
	78526	Dial pointer spacing washer
	71182	Dial crystal
S16, S17	71282	Dial light bulb, 6.3v., .3A, bayonet base
	71561	Dial light socket assembly

SWITCHES AND CONTROLS

	72113	Band switch assembly, Model 125
R22	70954	Tone control and switch
R11	70955	Volume control
S7	70950	Phonograph jack

KNOBS

	72176	Knob for volume and tone controls
	72178	Knob for tuning

ESCUTCHEON PLATES

	70953-I	Band switch escutcheon, Model 125
	71145	Dial escutcheon
	70953-H	Tone control escutcheon

RESISTORS

R1	13031	Carbon, 100,000 ohms, ¼ w.
R2	13115	Carbon, 400 ohms, ¼ w.
R3	13149	Carbon, 6,000 ohms, ¼ w.
R4	13031	Carbon, 100,000 ohms, ¼ w.
R5	13115	Carbon, 400 ohms, ¼ w.
R6	13164	Carbon, 50,000 ohms, ¼ w.
R7	13115	Carbon, 400 ohms, ¼ w.
R8	13164	Carbon, 50,000 ohms, ¼ w.
R9	13147	Carbon, 300,000 ohms, ¼ w.
R10	13001	Carbon, 1 megohm, ¼ w.
R11	70955	Volume control, 750,000 ohms
R12	13116	Carbon, 12,000 ohms, ¼ w.
R13, R14	13024	Carbon, 500,000 ohms, ¼ w.
R15	13164	Carbon, 50,000 ohms, ¼ w.
R16	13146	Carbon, 600 ohms, ½ w.
R17	13172	Carbon, 30 ohms, ½ w.
R18	71683	Wire-wound, 180 ohms
R19	13149	Carbon, 6,000 ohms, ¼ w.
R20	13073	Carbon, 3,000 ohms, ½ w.
R21	13029	Carbon, 250 ohms, ¼ w.
R22	70954	Tone control, 100,000 ohms

CHOKE COIL

S8	42007-B	Choke coil

COILS

S5	71696	Oscillator coil with can, Model 125
S2	71697	Detector coil with can, Model 125
S1	71698	Antenna coil with can, Model 125

CONDENSERS

C1	27712	Mica, 500 mmfd.
C2, C3, C4	71674	Trimmer strip
C5	22055-I	Paper, .05 mfd., 200 V.
C6	71650	3-gang condenser (C6, C13, C30)
C7	22055-M	Paper, .1 mfd., 200 V.
C8	22055-P	Paper, .05 mfd., 400 V.
C10, C11, C12	71674	Trimmer strip
C13	Refer to	C6
C14	22055-I	Paper, .05 mfd., 200 V.
C15	22055-M	Paper, .1 mfd., 200 V.
C16	22055-I	Paper, .05 mfd., 200 V.
C17	22055-M	Paper, .1 mfd., 200 V.
C18	27701-W	Mica, 250 mmfd.
C19	22055-A	Paper, .01 mfd., 600 V.
C20	71675	Electrolytic, 10. - 10. mfd., 25 V. (C20, C23)
C21	22055-L	Paper, .1 mfd., 400 V.
C22	22055-A	Paper, .01 mfd., 600 V.
C23	Refer to	C20
C24	22055-R	Paper, .005 mfd., 1,000 V.
C25	22055-P	Paper, .05 mfd., 400 V.
C26, C27	71676	Electrolytic (C26, 8 mfd., C27, 16. mfd. C39, 20 mfd., 150 V.)
C28	22055-A	Paper, .01 mfd., 600 V.
C29	27723-W	Mica, 50 mmfd.
C30	Refer to	C6
C31, C32, C33	71674	Trimmer strip
C36	27745-W	Mica, .0025 mfd.
C37, C38	22055-P	Paper, .05 mfd., 400 V.
C39	Refer to	C26
C40	22055-L	Paper, .1 mfd., 400 V.
C41	71525-A	Neutralizing condenser
C42	27737-O	Mica, 10 mmfd.
C43	22055-W	Paper, .01 mfd., 400 V.
C44	22055-R	Paper, .005 mfd., 1,000 V.
C45	22055-M	Paper, .1 mfd., 200 V.

PILOT RADIO CORP.

Model 125 Short, Medium & Longwave Receiver

Range: 16-51 Meters (18,800-5,860 kc.) 182-555 Meters (1,650-540 kc.) 731-2,140 Meters (410-140 kc.)

(for sale in European area only)

	R.F. AMP.	OSC.-1st DET.	I.F. AMP.	2nd DET. DIODE	AUDIO OUTPUT	DUAL RECTIFIER
	6D6	6A7	6D6	75	43	25Z5
PLATE	96	96	96	45*	91	—
SCREEN	80	65	80	—	95	—
CATHODE	2.6	2.25	2.6	.5	12.5	120**
FILAMENT	6.3	6.3	6.3	6.3	25	25

NOTE: The D.C. voltages measured at the tube sockets of the set should be read with a high resistance voltmeter of at least 1,000 ohms per volt.

All voltages measured to chassis.
Speaker field voltage 118 volts.
Anode Grid of 6A7 81 volts.
* Measured through Plate Resistor.
** Cathode to chassis.

NOTE: These measurements should be made with the volume control turned to the right, and with the tuning adjusted at "No signal" position on dial.

Power Consumption .... 50 Watts

Line Volts .... 110-125 volts A.C.-D.C.

I. F. Frequency .... 456 Kc.

Power Output .... 1 Watt

REALIGNMENT: Should the receiver require realignment, the outlined procedure below should be followed. In the schematic wiring diagram the location and function of the various alignment capacitors are clearly illustrated. For best results an external modulated oscillator with adequate frequency range, and a visual output meter should be used.

Before connecting the chassis to the power line, reconnect the speaker cable in its socket at the top of the chassis.

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Selector Switch should be in the position marked "Broadcast", and the tuning condenser should be set at maximum capacity. Connect the "antenna" lead of the external oscillator to the control grid of the type 6D6 tube in the I. F. Amplifier stage through a .1 mfd. fixed condenser. Connect the "ground" lead of the external oscillator to the receiver chassis. The I. F. alignment capacitors are located at the side of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 2 slowly until maximum output is noted. On completion of this operation, remove the external oscillator lead from the type 6D6 I. F. amplifier tube and connect it in the same manner to the control grid at the top of the type 6A7 tube.

Now rotate each adjustment screw on I. F. Unit No. 1 for maximum output. During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. Amplifier, it is essential to repeat the alignment process in both I. F. Units, with the external oscillator connected to the 6A7 tube.

BROADCAST ALIGNMENT: After the I. F. Amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground this time with a 200 mmf. condenser in the antenna lead. Set the Band Selector Switch in the "Broadcast" position and place the tuning control pointer at the 1500 kc. mark. Adjust the broadcast band oscillator trimmer to maximum response.

Next adjust the interstage alignment trimmer for maximum response. Finally adjust the antenna section trimmer in the same manner.

Next adjust the 600 kc. padder condenser, located on the top of the oscillator coil. Set the external oscillator at 600 kc. Rotate the receiver tuning control until resonance is indicated. Then rock the tuning control back and forth about this resonance position, and at the same time adjust the padder condenser for the highest response.

Now repeat the 1500 kc. trimmer adjustment, following in every detail the procedure previously described.

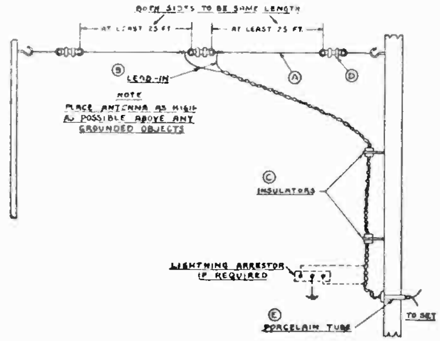
ALIGNMENT OF THE SHORT WAVE BAND: The procedure in aligning the short wave band is identical with that for the broadcast with the exception of the adjustment of the padder condenser. The alignment frequency is 16.8 Meters—(17,800 kc.).

Turn the Band Switch to the right. Tune the external oscillator to 16.8 meters. Tune the receiver so that the dial pointer is in a position coincidental with the 16.8 meter indication on the dial scale. Adjust the short wave oscillator trimmer for maximum response. Next adjust the signal circuit trimmer for maximum resonance. Repeat all adjustments to assure correct alignment, rocking the gang condenser to right or left for maximum gain.

THE HIGH BAND ALIGNMENT: Procedure in the Model 125 is similar to the Broadcast section of that receiver. Align at 375 kc. Adjust the padder at 160 kc.

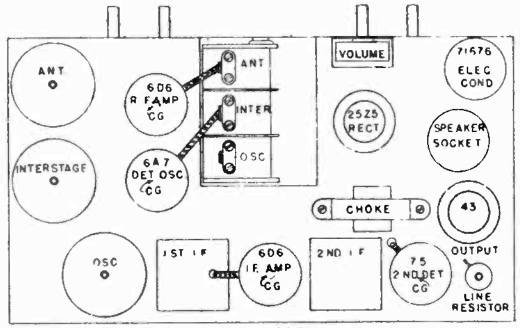
Should it be necessary to remove any part of the band switch assembly, it is advisable to realign the receiver after reinstalling.

ALL-WAVE ANTENNA SYSTEM

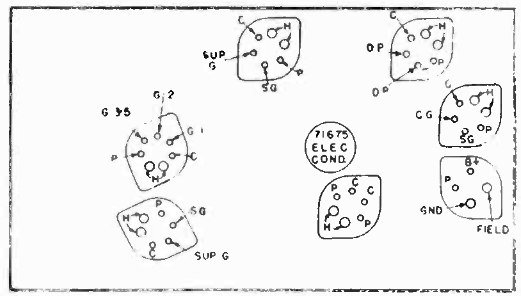


CONTENTS OF PILOT KIT

2—75 ft. lengths of No. 14 enameled, copper wire..........A
100 ft. twisted pair lead-in wire..........B
2—Insulated stand-off insulators..........C
8—Porcelain insulators..........D
2—Porcelain tubes..........E
6—Insulated staples



TOP VIEW OF CHASSIS

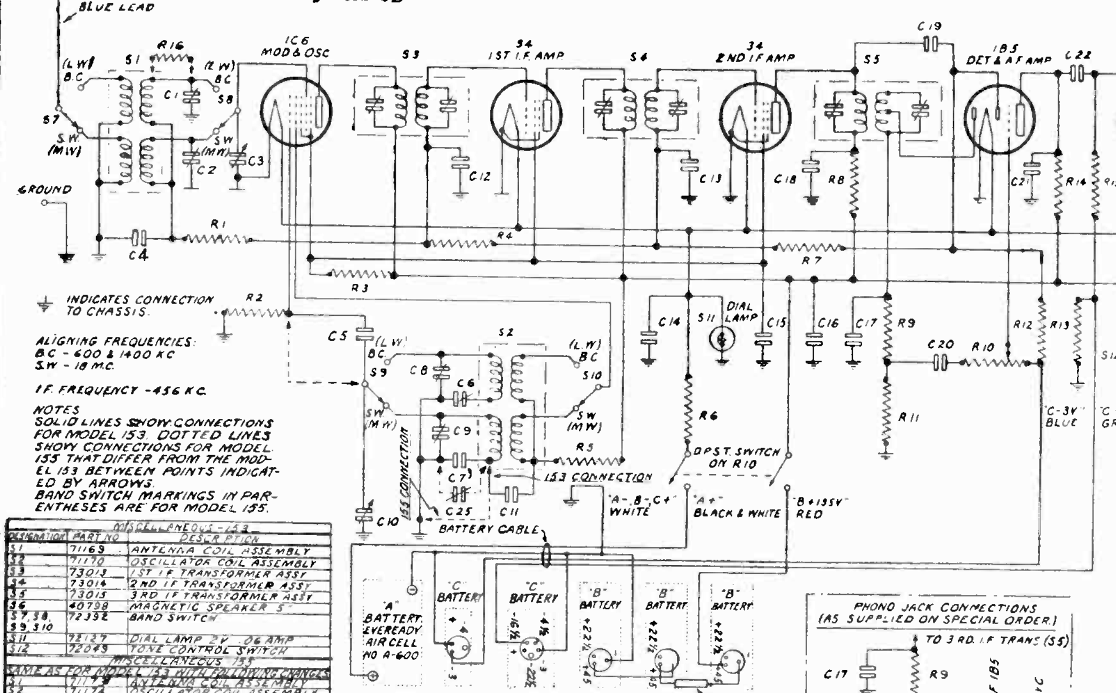


BOTTOM VIEW-ARRANGEMENT OF SOCKETS

Trimmers, Voltage Alignment, Parts

PILOT RADIO CORP.

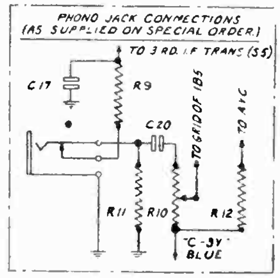
MODELS 153, 155 Schematic, Socket

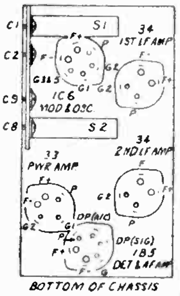


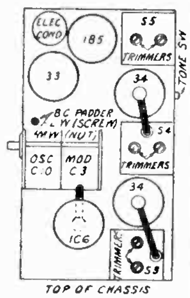
MISCELLANEOUS - 153		
DESIGNATION	PART NO	DESCRIPTION
S1	71169	ANTENNA COIL ASSEMBLY
S2	71170	OSCILLATOR COIL ASSEMBLY
S3	73013	1ST IF TRANSFORMER ASSY
S4	73014	2ND IF TRANSFORMER ASSY
S5	73015	3RD IF TRANSFORMER ASSY
S6	40798	MAGNETIC SPEAKER 5"
S7, S8, S9, S10	72392	BAND SWITCH
S11	72127	DIAL LAMP 2V .06 AMP
S12	72049	TONE CONTROL SWITCH
MISCELLANEOUS - 155		
SAME AS FOR MODEL 153 WITH FOLLOWING CHANGES		
S1	71173	ANTENNA COIL ASSEMBLY
S2	71174	OSCILLATOR COIL ASSEMBLY

CONDENSERS - 153		
DESIGNATION	PART NO	DESCRIPTION
C1, C2, C8, C9	71529	TRIMMER AND PANEL ASSY
C3, C10	71181-B	405 MMFDS 2 GANG VARIABLE
C4, C11, C12, C13, C18	22055-I	.05 MFD 200 V PAPER
C5	27723-W	50 MMFDS MICA
C6	71503-E	SINGLE PADDER 300-500 MMFDS
C7	27734-N	6000 MMFDS MICA
C14	22055-AK	1.0 MFD 200 V PAPER
C15	22055-F	.25 MFD 200 V PAPER
C16	71203	8 MFD 200 V ELECTROLYTIC
C17, C21	27701-W	250 MMFDS MICA
C19	27723-O	50 MMFDS. MICA
C20, C22	22055-A	.01 MFD 600 V PAPER
C23, C24	22055-R	.005 MFD 1000 V PAPER
CONDENSERS - 155		
SAME AS FOR MODEL 153 WITH FOLLOWING CHANGES		
C5, C7		NOT USED IN MODEL 155
C6, C25	72555-H	DUAL PADDER 300-600 & 20-80 MMFDS

RESISTORS - 153		
DESIGNATION	PART NO	DESCRIPTION
R1, R4	13031	100,000 OHMS 1/4 WATT
R2, R3	13164	50,000 OHMS 1/4 WATT
R3	13075	15,000 OHMS 1/2 WATT
R5	13113	4000 OHMS 1/4 WATT
R6	13182	36 OHM FLEX WIRE WOUND
R7, R12	13001	1 MEGOHM 1/4 WATT
R8	13149	6000 OHMS 1/4 WATT
R10	72398	750 000 OHMS VOLUME CONTROL & DPST. SWITCH
R11	13147	300,000 OHMS 1/4 WATT
R13	13183	36,000 OHMS 1/4 WATT
R14	13171	250,000 OHMS 1/4 WATT
R15	13024	500,000 OHMS 1/4 WATT
RESISTORS - 155		
SAME AS FOR MODEL 153 WITH FOLLOWING ADDITION		
R16	13060	50 OHMS 1/4 WATT







MODEL 153 MODEL 155

Tube	1C6	34	1B5	33
Plate	140*	140	95	125
Screen	75	75	—	140
Fil.	2.1	2.1	2.1	2.1

*Anode grid of 1C6 is 125 V.

Batteries Required: One Eveready Air Cell or 2.2-volt storage battery, three 45-volt B batteries, one 22½-volt C battery, and one 4½-volt C battery.

Tubes: Two 34's, one 1C6, one 33, one 1B5.

Wavelength Range: 16-52 m. and 178-550 m. or 18,800-5,700 kc. and 1,680-545 kc.

Undistorted Power Output: .7 watt.

I. F. Alignment Frequency: 456 kc.

Circuit: Short wave and broadcast superheterodyne.

Output: Class A pentode amplifier.

Air Cell Life: When operating a Pilot 153, the No. A-600 Air Cell will have a total operating life of approximately 1,000 hours.

REALIGNMENT: Should the receiver require realignment, the procedure outlined below should be followed. In the service information sheet, the location and function of the various alignment capacitors are clearly illustrated. For best results an external modulated oscillator with adequate frequency range, and a visual output meter, should be used.

Before connecting the chassis to the power line, reconnect the speaker cable in its socket at the rear of the speaker.

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Switch should be in the position marked "Broadcast", and the tuning condenser should be set at maximum capacity. When aligning the receiver on all positions, the volume control and the tone control should be turned to the maximum clockwise position. Connect the antenna lead of the external oscillator to the control grid of the 34 tube in the 2nd I. F. Amplifier through .1 mfd. fixed condenser. Connect the ground lead of the external oscillator to the receiver ground lead. The I. F. alignment trimmers are located at the top of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 3 slowly until maximum output is noted. On completion of this operation, remove the external oscillator lead from the 34 2nd I. F. amplifier tube and connect it in the same manner to the control grid of the 34 1st I. F. amplifier tube. Now rotate each adjustment screw on I. F. Unit No. 2 for maximum output. Following this, connect the external oscillator leads to the control grid of the 1C6 tube. Adjust each trimmer on the I. F. Unit No. 1 for maximum gain.

During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. amplifier, it is essential to repeat the alignment process in all I. F. Units, with the external oscillator leads connected across the control grid of the 1C6 tube.

BROADCAST ALIGNMENT: After the I.F. amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground leads with a .0002 mfd. condenser in the antenna lead. Set the Band Switch in the "Broadcast" position and place the tuning control pointer at the 1400 kc. mark. Adjust the broadcast band oscillator trimmer to maximum response. Adjust the signal section trimmer in the same manner.

Next adjust the 600 kc. padder condenser. Set the external oscillator at 600 kc. Rotate the receiver tuning control until resonance is indicated. Then rock the tuning control back and forth about this resonance position, and at the same time adjust the padder condenser for the highest resonance peak.

Now repeat the 1400 kc. trimmer adjustment, following in every detail the procedure previously described.

ALIGNMENT OF THE SHORT-WAVE BAND: The procedure in aligning the short-wave bands is identical with that for the broadcast with the exception of the adjustment of the padder condenser. Insert a 400-ohm non-inductive resistor in the signal generator antenna lead. The alignment frequency is 16.8 meters—(17,800 kc.)

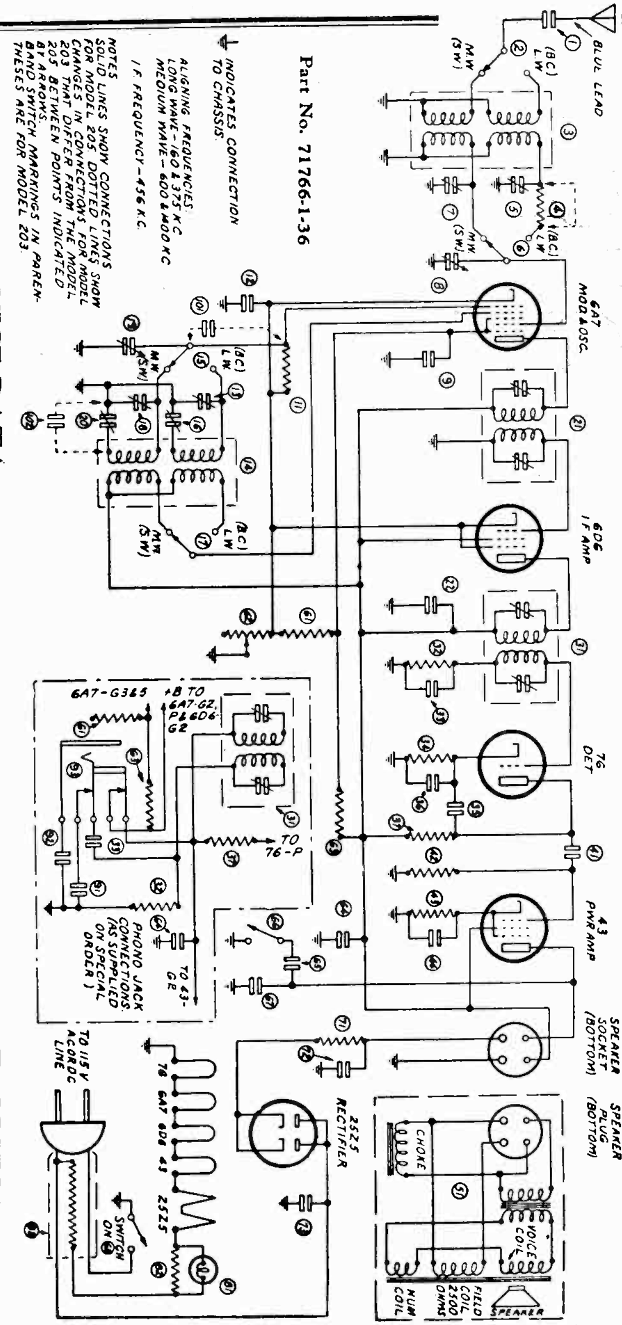
Turn the Band Switch to the right. Tune the external oscillator to 16.8 meters. Tune the receiver so that the dial pointer is in a position coincidental with the 16.8 meter indication on the dial scale. Adjust the short wave oscillator trimmer for maximum response. Next adjust the signal circuit trimmer for maximum resonance. Repeat all adjustments to assure correct alignment, rocking the gang condenser to right or left for maximum gain.

THE LONG WAVE ALIGNMENT: Procedure in the Model 155 is similar to the Broadcast section of that receiver. Align at 375 kc. Adjust the padder at 160 kc.

Should it be necessary to remove the band switch assembly, it is advisable to realign the receiver **after reinstalling.**

MODELS 203,205
Schematic,Voltage
Socket,Trimmers
Alignment,Parts

PILOT RADIO CORP.



SERVICE DATA

Line Voltage: 115-125 volts, A.C. or D.C.
Power Consumption: 45 watts.
Wavelength Range: 178-550 meters, 789-2142 meters.
Undistorted Power Output: 1 watt.
Intermediate Frequency: 456 kc.

MODEL 203 SUPERHETERODYNE
MODEL 205 (Sold in the European Area only)

Voltages: Read tube socket voltages with meter having resistance of at least 1,000 ohms per volt. All voltages measured to chassis.

Type	6A7	6D6	76	43	25Z5
Plate	95	95	30*	90	—
Cathode	2.8	2.8	2.5	13	116
Screen	50	95	—	95	—
Heater	6.3	6.3	6.3	25	25

*Voltage measured through plate resistor.
Speaker field voltage, 115 volts.
Anode grid of 6A7, 95 volts.

REALIGNMENT: Should the receiver require realignment, the outlined procedure below should be followed. In the service information sheet, the location and function of the various alignment capacitors are clearly illustrated. For best results an external modulated oscillator with adequate frequency range, and a visual output meter, should be used.

Before connecting the chassis to the power line, reconnect the speaker cable in its socket at the rear of the speaker.

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Switch should be in the position marked "Broadcast", and the tuning condenser should be set at maximum capacity. Connect the "antenna" lead of the external oscillator to the control grid of the type 6D6 tube in the I.F. Amplifier stage through a .1 mfd. fixed condenser. Connect the "ground" lead of the external oscillator to the receiver ground lead. The I.F. alignment capacitors are located at the top of the shielded I.F. Transformers. Rotate the adjusting screw of each capacitor on I.F. Unit No. 2 slowly until maximum output is noted. On completion of this operation, remove the external oscillator leads from the type 6D6 I.F. Amplifier tube and connect it in the same manner to the control grid at the top of the type 6A7 tube.

Now rotate each adjustment screw on I.F. Unit No. 1 for maximum output. During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I.F. Amplifier, it is essential to repeat the alignment process in both I.F. units with the external oscillator leads connected across the control grid of the 6A7 tube.

BROADCAST ALIGNMENT: After the I.F. amplifier is completely realigneo, connect the external oscillator leads to the receiver antenna and ground leads with a .0002 mfd. condenser in the antenna lead. Set the Band Switch in the "Broadcast" position and place the tuning control pointer at the 1400 kc. mark. Adjust the broadcast band oscillator trimmer to maximum response. Adjust the signal section trimmer in the same manner.

Next adjust the 600 kc. padder condenser. Set the external oscillator at 600 kc. Rotate the receiver tuning control until resonance is indicated. Then rock the tuning control back and forth about this resonance position, and at the same time adjust the padder condenser for the highest resonance peak.

Now repeat the 1400 kc. trimmer adjustment, following in every detail the procedure previously described.

SHORT-WAVE ALIGNMENT: The procedure in aligning the short-wave bands is identical with that for the broadcast with the exception of the adjustment of the padder condenser. The alignment frequency is 16.8 Meters—(17,800 kc.) Turn the Band Switch to the right. Tune the external oscillator to 16.8 meters. Tune the receiver so that the dial pointer is in a position coincidental with the 16.8 meter indication on the dial scale. Adjust the short wave oscillator trimmer for maximum response. Next adjust the signal circuit trimmer for maximum resonance. Repeat all adjustments to assure correct alignment, rocking the gang condenser to right or left for maximum gain.

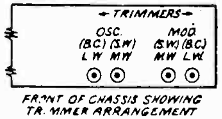
THE LONG WAVE ALIGNMENT: Procedure in the Model 205 is similar to the Broadcast section of that receiver. Align at 375 kc. Adjust the padder at 160 kc.

Should it be necessary to remove the band switch assembly, it is advisable to realign the receiver after reinstalling.

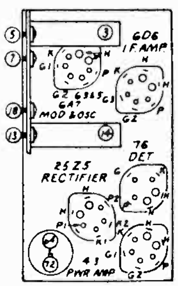
CONDENSERS - 205		
DIAGRAM Nº	PART Nº	DESCRIPTION
1	27712-W	500 MMFDS MICA
5,7,13,18	71529	TRIMMER & PANEL ASSEMBLY
8,19	71181-B	405 MMFDS 2 GANG VARIABLE
9	22055-P	.05 MFD. 400 V PAPER
12,33,36, 91,92	22055-M	.1 MFD. 200 V. PAPER
16, 20	72355-H	DUAL PADDER 20-80 MMFDS / 300-600 MMFDS
22	22055-L	.1 MFD 400 V PAPER
35	27701-W	250 MMFDS MICA
41,67	22055-A	.01 MFD 600 V PAPER
44	22481	10 MFDS 25 V ELECTROLYTIC
64, 72	72382	8 MFDS 150 V ELECTROLYTIC / 16 MFDS 150 V ELECTROLYTIC
65	22055-AJ	.03 MFD 600 V PAPER
73	22055-U	.01 MFD. 1000 V PAPER
CONDENSERS - 203		
SAME AS FOR MODEL 205 WITH FOLLOWING CHANGES		
101	27723-O	50 MMFDS MICA (ADDITIONAL)
16	71503-E	SINGLE PADDER 300-600 MMFDS
102	27734-W	6000 MMFDS MICA (REPLACES 20)

MISCELLANEOUS		
DIAGRAM Nº	PART Nº	DESCRIPTION
2,6,15,17	72392	BAND SWITCH
3	71173	ANTENNA COIL ASSEMBLY
14	71174	OSCILLATOR COIL ASSEMBLY
21	73016	1ST I.F. TRANSFORMER ASSY
31	73017	2ND I.F. TRANSFORMER ASSY
51	40797	5" SPEAKER & CHOKE ASSY
66	72049	TONE CONTROL SWITCH
81	72151	DIAL LAMP 6.3V .15 AMP.
83	78500	LINE CORD - 150 OHMS, 15 WATTS
93	72199	PHONO JACK
MISCELLANEOUS - 203		
SAME AS FOR MODEL 205 WITH FOLLOWING CHANGES		
3	71169	ANTENNA COIL ASSEMBLY
14	71170	OSCILLATOR COIL ASSY

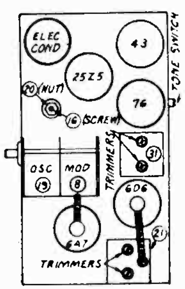
RESISTORS - 205		
DIAGRAM Nº	PART Nº	DESCRIPTION
4	13080	50 OHMS 1/4 WATT
11,34	13164	50,000 OHMS 1/4 WATT
32	13001	1 MEGOHM 1/4 WATT
37,42	13024	500,000 OHMS 1/4 WATT
43	13146	600 OHMS 1/2 WATT
61	13013	10,000 OHMS 1/2 WATT
62	72383	3,000 OHMS VOLUME CONTROL & SWITCH
63	13149	6,000 OHMS 1/4 WATT
71	13172	30 OHMS 1/2 WATT
82	13184	40 OHMS 1 WATT WIRE WOUND
RESISTORS - 203		
SAME AS FOR MODEL 205 EXCEPT "4" IS NOT USED		



FRONT OF CHASSIS SHOWING TRIMMER ARRANGEMENT



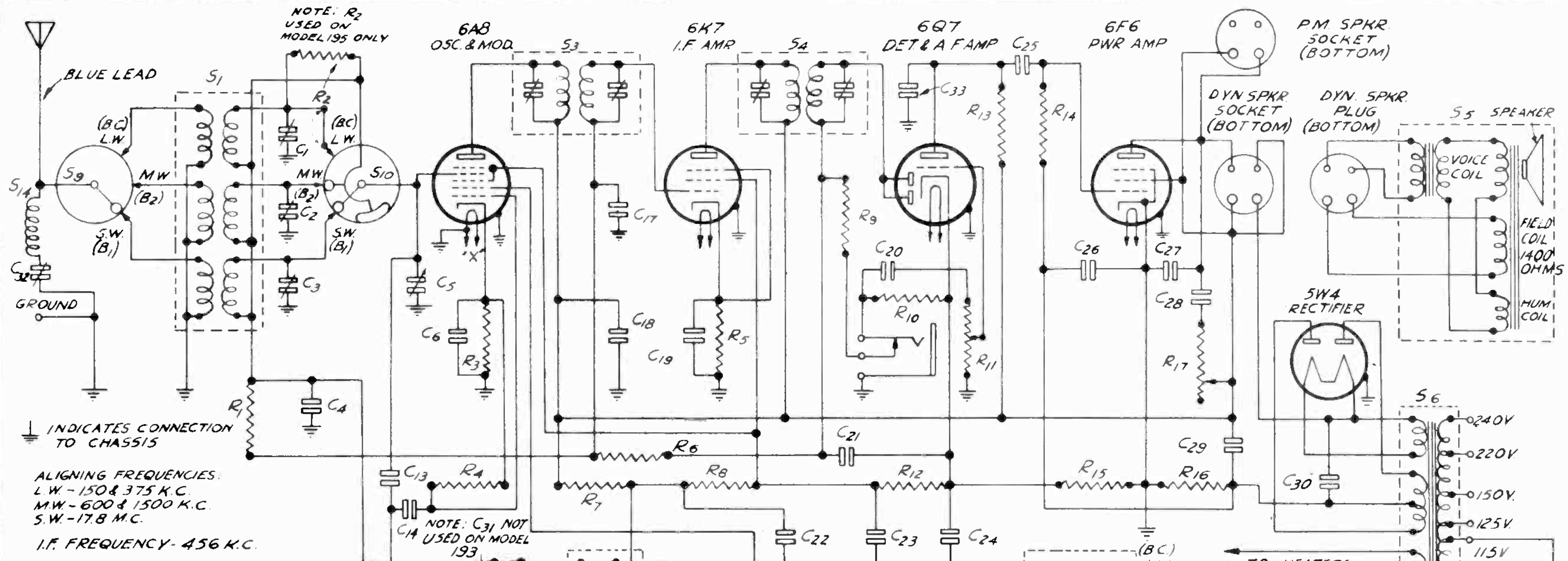
BOTTOM OF CHASSIS

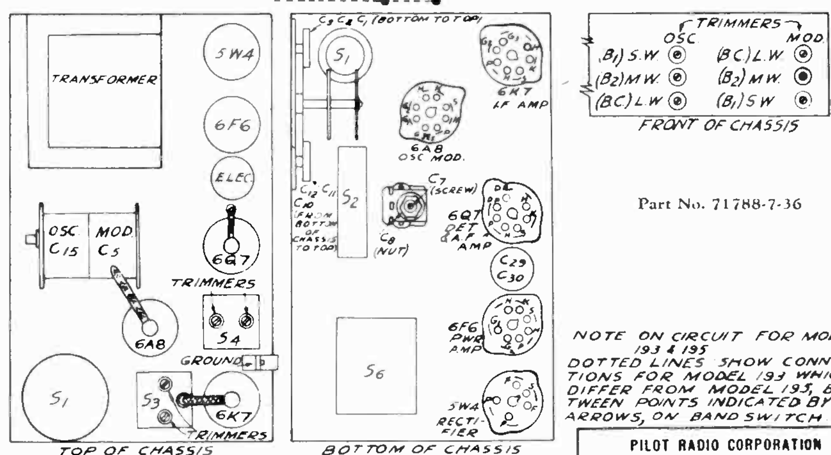


TOP OF CHASSIS

MODELS 193,195
Schematic, Socket
Trimmers, Parts

PILOT RADIO CORP.





Part No. 71788-7-36

NOTE ON CIRCUIT FOR MODELS 193 & 195
DOTTED LINES SHOW CONNECTIONS FOR MODEL 193 WHICH DIFFER FROM MODEL 195, BETWEEN POINTS INDICATED BY ARROWS, ON BAND SWITCH

MISCELLENEOUS FOR MODEL 195		
S_1	73046	ANT COIL ASS'Y
S_2	73045	OSC COIL ASS'Y
S_3	72060	1ST I.F. TRANSF'R
S_4	71167	2ND I.F. TRANSF'R
S_5	40799	8" SPEAKER
S_6	71668-R	PWR. TRANSF ASSY 60CY 115V
	71336	" " " 60CY UNI. V.
	71579	" " " 25CY UNI. V.
S_7 S_8	78889	DIAL LAMPS 6.3V. .2 AMP
$S_9 S_{10} S_{11} S_{12} S_{13}$	72367-B	BAND SWITCH
S_{14}	73029	WAVE TRAP COIL ASS'Y

MISC FOR MODEL 193 SAME AS FOR 195 WITH FOLLOWING EXCEPTIONS		
S_1	73026	ANT COIL ASS'Y
S_2	73027	OSC COIL ASS'Y

CONDENSERS FOR MODEL 195		
$C_1 C_2 C_3$	72363	TRIMMER
$C_4 C_{17}$	22055-I	.05 MFD 200V PAPER
$C_5 C_{15}$	78851	405 MMFD 2 GANG VAR.
$C_6 C_{19}$	22055-M	.1 MFD 200V PAPER
$C_7 C_8$	72355-G	PADDER 3-150 & 300-600 mmfd
C_9	27734-W	6000 mmfd. MICA
$C_{10} C_{11} C_{12}$	72363	TRIMMER
C_{13}	71525-A	NEUTRALIZING ASS'Y
C_{14}	27723-W	50 mmfd MICA
C_{16}	22055-C	.05 mfd 600V PAPER
C_{18}	22055-AB	.1 mfd 600V "
$C_{20} C_{25}$	22055-A	.01 mfd 600V "
$C_{21} C_{33}$	27701-W	250 mmfd MICA
C_{22}	72353	ELEC 4 mfd 475V.
C_{23}	22055-P	.05 mfd 400V PAPER
C_{24}	22055-F	.25 mfd 200V PAPER
C_{26}	22055-S	.5 mfd 200V "
C_{27}	22055-R	.005 mfd 1000V. "
C_{28}	22055-E	.05 mfd 1000V "
$C_{29} C_{30}$	71045-A	ELEC. 8-8 mfd 475V.
C_{31}	27736-O	25 mmfd MICA
C_{32}	71503-F	TRIMMER 15-100 mmfd

CONDENSERS FOR MODEL 193 SAME AS 195 WITH FOLLOWING EXCEPTIONS		
C_7	71503-A	PADDER 250-500 mmfd
C_8	27732-W	1600 mmfd MICA
C_{31}	27736-O	NOT USED ON 193

RESISTORS FOR MODEL 195		
R_1	13031	100,000 OHMS 1/4 WATT
R_2 R_{14}	13024	500,000 " 1/4 "
R_3 R_5	13113	400 " 1/4 "
R_4 R_9	13164	50,000 " 1/4 "
R_6	13001	1 MEGOHM 1/4 "
R_7	13073	3000 OHMS 1/2 "
R_8	13129	15000 OHMS 1 "
R_{10}	13147	300,000 " 1/4 "
R_{11}	78845	750,000 " VOL. CONT. & SW.
R_{12}	13148	30,000 OHMS 1/4 WATT
R_{13}	13171	250,000 " 1/4 "
R_{15}	13130	420 " 1/4 "
R_{16}	13059	250 " 1/4 "
R_{17}	78846	100,000 OHMS TONE CONTR

R_2 — 13024 — NOT USED ON MODEL 193
ALL OTHER RESISTORS ARE THE SAME FOR BOTH MODELS, 193 & 195

PILOT MODELS 193 AND 195

ALTERATIONS		FINISH
CLASSIFICATION	THIS PRINT SUPERSEDES ALL OTHERS PRIOR TO [redacted]	

PILOT RADIO CORPORATION
LONG ISLAND CITY, N. Y. U. S. A.
SCHEMATIC CIRCUIT DIAGRAM & CHASSIS LAYOUT FOR MODELS 193 & 195
SCALE
DRAWN BY
CHECKED BY T.S.L.
APPROVED BY
DATE 6-23-36
DRWG. NO. 25131

MODELS 193,195
Voltage,Alignment

PILOT RADIO CORP.

MODELS 253,255
Alignment

AC MODELS 193 and 195

(MODEL 195 IS SOLD OUTSIDE THE U. S. A. ONLY)

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Switch should be in the position marked "Broadcast," and the tuning condenser should be set at maximum capacity. Connect the "antenna" lead of the external oscillator to the control grid of the type 6K7 tube in the I. F. Amplifier stage through a .1 mfd. fixed condenser. Connect the "ground" lead of the external oscillator to the receiver ground lead. The I. F. alignment capacitors are located at the top of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 2 slowly until maximum output is noted. On completion of this operation, remove the external oscillator leads from the type 6K7 I. F. Amplifier tube and connect it in the same manner to the control grid at the top of the type 6A8 tube.

Now rotate each adjustment screw on I. F. Unit No. 1 for maximum output. During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. Amplifier, it is essential to repeat the alignment process in both I. F. units with the external oscillator leads connected across the control grid of the 6A8 tube.

WAVE TRAP ADJUSTMENT: With the oscillator still set at 456 kc., connect the oscillator to the antenna and ground. Then adjust the wave trap condenser to minimum deflection on the output meter.

BROADCAST ALIGNMENT: After the I. F. Amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground leads, through a .0002 mfd. condenser. Set the Band Switch in the "Broadcast" position and place the tuning control pointer at the 1500 kc. mark. Adjust the broadcast band oscillator trimmer to maximum response. Adjust the signal section trimmer in the same manner.

Next adjust the 600 kc. padder condenser. Set the external oscillator at 600 kc. Rotate the receiver tuning control until resonance is indicated. Then rock the tuning control back and forth about this resonance position, and at the same time adjust the padder condenser for the highest resonance peak.

Now repeat the 1500 kc. trimmer adjustment, following in every detail the procedure previosuly described.

ALIGNMENT OF THE SHORT-WAVE BANDS: The procedure in aligning the short-wave bands is identical with that for the broadcast with the exception of the adjustment of the padder condenser whch is of fixed value and requires no adjustment. The alignment frequency is 16.6 Meters—(18,000 kc.)

Turn the Band Switch to the right. Tune the external oscillator to 16.6 meters. Tune the receiver so that the dial pointer is in a position coincidental with the 16.6 meter indication on the dial scale. Adjust the short wave oscillator trimmer for maximum response. Next adjust the signal circuit trmmer for maximum resonance. Repeat all adjustments to assure correct alignment, rocking the gang condenser to right or left for maximum gain.

Model 193 is aligned in the same manner at 6,000 kc. with the switch in Band 2 position.

LONG WAVE ALIGNMENT: Procedure in the Model 195 is similar to the Broadcast section of that receiver. Align at 375 kc. Adjust the padder at 160 kc.

Should it be necessary to remove the band switch assembly, it is advisable to realign the receiver after reinstalling.

Frequency Rating —50 to 60 cycles.
Power Consumption—60 Watts.
Tubes —1 type 6A8, 1 type 6K7, 1 type 6Q7, 1 type 6F6, 1 type 5W4.
Undistorted power output—3 watts.
Intermediate Frequency—456 kc.

VOLTAGES

The D. C. Voltages measured at the tube sockets of the set should be read with a high resistance voltmeter of at least 1000 ohms per volt.

	OSC. DET. Type 6A8	I. F. Type 6K7	POWER DIODE DET. Type 6Q7	PENTODE Type 6F6	RECTIFIER Type 5W4
Plate	230	230	105*	205	***
Cathode	4.	3.	1.5	**	
Screen	85	85	6.3	230	
Filament	6.3	6.3	6.3	6.3	

*Voltages measured through 250,000 ohm resistor.

Speaker field voltage 90 volts. All plate voltages measured to cathode. All screen voltages measured to cathode. All cathode voltages measured to chassis frame.

**Grid bias voltage for No. 42 tube obtained across R-16 (250 ohms resistor).

***Filament to chassis ground 315 volts D. C.

Anode grid of 6A7 to cathode—195 volts.

Models 253 and 255 All-Wave,

(MODEL 255 IS SOLD IN THE EUROPEAN AREA ONLY)

The location of the R. F. alignment trimmer condensers is on the side of the band switch. The trimmers in the lowest row are those for aligning Band 1. Those in the second row from the bottom are for Band 2. Those in the third row up are for the Broadcast. In the Model 255 there is an additional row of trimmers located immediately above those for the Broadcast.

The padder condenser is located under the rear section of the band switch. In the Model 255 an additional padder for the long wave range is located at the right of the Broadcast padder. Access to the padder condenser is made through a hole provided in the rear of the chassis frame.

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Selector Switch should be in the position marked "Broadcast", and the tuning condenser should be set at maximum capacity. Connect the "antenna" lead of the external oscillator to the control grid of the type 6D6 tube in the I. F. Amplifier stage through a 1 mfd. fixed condenser. Connect the "ground" lead of the external oscillator to the receiver ground lead. The I. F. alignment capacitors are located at the side of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 2 slowly until maximum output is noted. On completion of this operation, remove the external oscillator lead from the type 6D6 I. F. amplifier tube and connect it in the same manner to the control grid at the top of the type 6A7 tube.

Now rotate each adjustment screw on I. F. Unit No. 1 for maximum output. During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. amplifier, it is essential to repeat the alignment process in both I. F. Units with the external oscillator leads connected across the control grid of the 6A7 tube.

BROADCAST ALIGNMENT:

See Models 193 & 195

ALIGNMENT OF THE SHORT WAVE-BANDS:— The procedure in aligning the short wave-bands is identical with that for the broadcast with the exception of the adjustment of the padder condenser. The alignment frequencies are as follows:

Band 2: 50 Meters—(6,000 kc.)
Band 1: 16.6 Meters—(18,000 kc.)

A 400 ohm resistor should be used in series with the antenna lead in place of the condenser used on Broadcast.

When aligning Band 2, set the Band Selector Switch in the position marked "Band 2." Set the tuning control pointer at 50 meters. Adjust the oscillator alignment capacitor on Band 2 for maximum output. Next adjust the interstage and antenna section alignment capacitors for maximum output.

To align Band 1, set the Band Selector Switch in the position marked "Band 1". Set the tuning control pointer at the 16.6 meter mark. Set the external oscillator at 16.6 meters. Adjust the oscillator section alignment capacitor on Band 1 for maximum output.

Proceed next to align the interstage section of Band 1. In doing this, it is essential to rock the tuning control back and forth about the resonance position and at the same time to adjust the trimmer for the highest resonance peak. Next align the antenna section for maximum sensitivity.

LONG WAVE MODEL 255

The above alignment positions refer to the Model 253 only, which is calibrated in frequency. The alignment points for the Model 255, which is calibrated in meters only, is as follows:

High Band	Align at 750 meters.
	Pad at 2,000 meters.
Broadcast	Align at 200 meters.
	Pad at 500 meters.
Band 2	Align at 49 meters.
Band 1	Align at 17 meters.

The Model No. 253 is an all wave superheterodyne receiver with a frequency range extending from 18,800 kc. to 545 kc. (16 meters to 550 meters). The Model No. 255 is similar to the Model No. 253 but has an additional long wave range embracing the wavelengths from 750 meters to 2000 meters (400 kc. to 150 kc.)

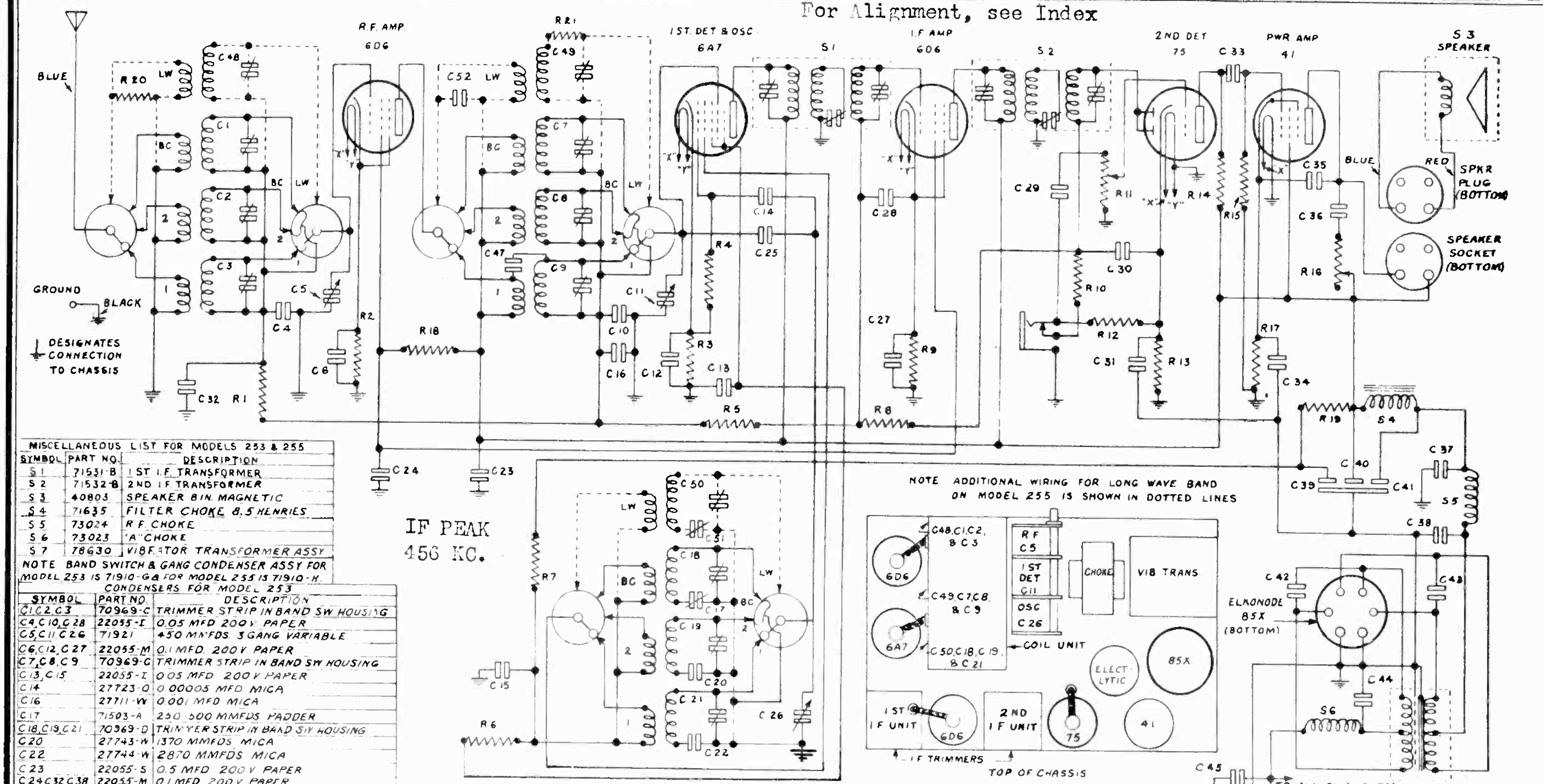
This receiver is designed to operate entirely from a six volt storage battery. A 100-ampere-hour battery is recommended. Connections to the battery are made by means of the RED and the BLACK rubber covered leads. A large clip is attached to each lead. Connect the RED lead to the POSITIVE terminal of the battery. *Connect the BLACK lead to the NEGATIVE terminal.

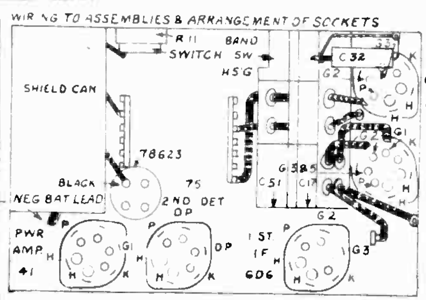
CAUTION: BE CERTAIN OF THE POLARITY OF THE BATTERY BEFORE CONNECTING THE RECEIVER TO IT, OR SERIOUS DAMAGE TO THE RECEIVER MAY RESULT.

MODELS 253,255
Schematic, Socket
Trimmers, Voltage

PILOT RADIO CORP.

For Alignment, see Index





ALIGNING FREQUENCIES: LONG WAVE 400 & 160 K.C.; BROADCAST -1500 & 600 K C; BAND 2 - 6 MEGACYCLES; BAND 1 - 18

MISCELLANEOUS LIST FOR MODELS 253 & 255

SYMBOL	PART NO.	DESCRIPTION
S 1	71531-B	1ST I.F. TRANSFORMER
S 2	71532-B	2ND I.F. TRANSFORMER
S 3	40803	SPEAKER 8 IN. MAGNETIC
S 4	71635	FILTER CHOKE 8.5 HENRIES
S 5	73024	R.F. CHOKE
S 6	73023	"A" CHOKE
S 7	78630	VIBRATOR TRANSFORMER ASSY

NOTE BAND SWITCH & GANG CONDENSER ASSY FOR MODEL 253 IS 71910-G & FOR MODEL 255 IS 71910-H.

CONDENSERS FOR MODEL 253

SYMBOL	PART NO.	DESCRIPTION
C1, C2, C3	70969-C	TRIMMER STRIP IN BAND SW HOUSING
C4, C10, C28	22055-I	0.05 MFD 200V PAPER
C5, C11, C26	71921	450 MMFDS. 3 GANG VARIABLE
C6, C12, C27	22055-M	0.1 MFD. 200V PAPER
C7, C8, C9	70969-C	TRIMMER STRIP IN BAND SW HOUSING
C13, C15	22055-I	0.05 MFD 200V PAPER
C14	27723-O	0.00005 MFD. MICA
C16	27711-W	0.001 MFD MICA
C17	71503-A	250-500 MMFDS PADDER
C18, C19, C21	70969-D	TRIMMER STRIP IN BAND SW HOUSING
C20	27743-W	1370 MMFDS MICA
C22	27744-W	2870 MMFDS MICA
C23	22055-S	0.5 MFD 200V PAPER
C24, C32, C38	22055-M	0.1 MFD 200V PAPER
C25	71525-B	NEUTRALIZING CONDENSER
C29, C33	22055-A	0.01 MFD 600V PAPER
C30	27701-W	0.00025 MFD MICA
C31, C34	22481	10 MFDS 25V ELECTROLYTIC
C35	22055-R	0.005 MFD 1000V PAPER
C36	22065-C	0.05 MFD 600V PAPER
C37	22055-F	0.25 MFD 200V PAPER
C39	78623	4 MFDS. 200V ELECTROLYTIC
C40, C41		8 MFDS 200V ELECTROLYTIC
C42, C44	22490-A	0.5 MFD 200V H.F. PAPER
C43	22490-C	0.01 MFD 1600V H.F. PAPER
C45	27712-W	0.0005 MFD MICA
C46	22490-B	0.01 MFD 200V H.F. PAPER
C47	27737-O	0.00001 MFD MICA

CONDENSERS FOR MODEL 255

SAME AS FOR MODEL 253 WITH FOLLOWING CHANGES

SYMBOL	PART NO.	DESCRIPTION
C1, C2, C3, C48	70969-A	TRIMMER STRIP IN BAND SW HOUSING
C7, C8, C9, C49	70969-A	TRIMMER STRIP IN BAND SW HOUSING
C17, C51	71577-C	DUAL PADDER 250-500 & 30-150 MMFDS
C18, C19, C21, C50	70969-B	TRIMMER STRIP IN BAND SW HOUSING
C52	27701-O	0.00025 MFD MICA

RESISTORS FOR MODEL 253

SYMBOL	PART NO.	DESCRIPTION
R1, R5	13031	100,000 OHMS 1/4 WATT CARBON
R2, R3, R9	13115	400 OHMS 1/4 WATT CARBON
R4, R10	13164	50,000 OHMS 1/4 WATT CARBON
R6	13068	30,000 OHMS 1/2 WATT CARBON
R7	13086	2,000 OHMS 1/2 WATT CARBON
R8	13001	1 MEGOHM 1/4 WATT CARBON
R11	78647	250,000 OHMS VOLUME CON & SW
R12	13147	300,000 OHMS 1/4 WATT CARBON
R13	13116	12,000 OHMS 1/4 WATT CARBON
R14	13171	250,000 OHMS 1/4 WATT CARBON
R15	13024	500,000 OHMS 1/4 WATT CARBON
R16	78648	100,000 OHMS TONE CONTROL
R17	13187	1,000 OHMS 1 WATT CARBON
R18, R19	13052	6,000 OHMS 1/2 WATT CARBON

RESISTORS FOR MODEL 255

SAME AS FOR MODEL 253 WITH ADDED ONES BELOW

SYMBOL	PART NO.	DESCRIPTION
R20	13164	50,000 OHMS 1/4 WATT CARBON
R21	13029	250 OHMS 1/4 WATT CARBON

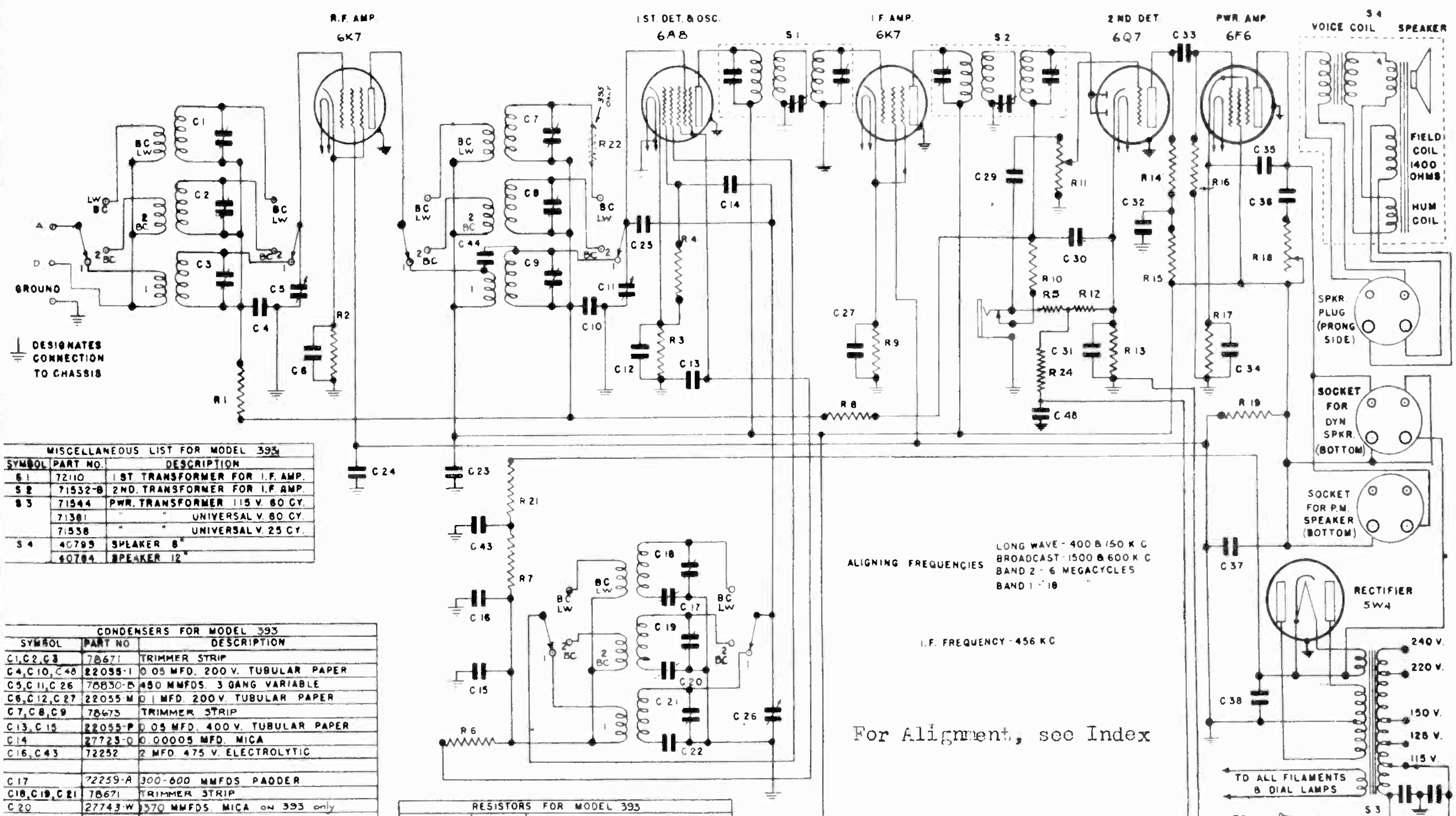
VOLTAGES

D.C. voltages should be read at the tube sockets with a high resistance voltmeter.

	R.F. 6D6	Osc.Det. 6A7	I.F. 6D6	Diode 75	Pent. 41
Plate	135	135	135	60	118
Cath.	4	1.8	4	1	10
Screen	100	50	100	--	125
Fil.	6	6	6	6	6

PILOT RADIO CORP.

MODELS 393,395
Schematic,Parts



MISCELLANEOUS LIST FOR MODEL 393		
SYMBOL	PART NO.	DESCRIPTION
S 1	72110	1 ST. TRANSFORMER FOR I.F. AMP.
S 2	71532-B	2ND. TRANSFORMER FOR I.F. AMP.
S 3	71544	PWR. TRANSFORMER 115 V. 60 CY.
	71381	" UNIVERSAL V. 60 CY.
	71538	" UNIVERSAL V. 25 CY.
S 4	40799	SPEAKER 8"
	40784	SPEAKER 12"

CONDENSERS FOR MODEL 393		
SYMBOL	PART NO	DESCRIPTION
C1,C2,C3	78671	TRIMMER STRIP
C4,C10,C48	22055-I	0.05 MFD. 200 V. TUBULAR PAPER
C5,C11,C26	76830-B	450 MMFDS. 3 GANG VARIABLE
C6,C12,C27	22055-M	0.1 MFD. 200 V. TUBULAR PAPER
C7,C8,C9	78673	TRIMMER STRIP
C13,C15	22055-P	0.05 MFD. 400 V. TUBULAR PAPER
C14	27723-O	0.00005 MFD. MICA
C16,C43	72252	2 MFD. 475 V. ELECTROLYTIC
C17	72259-A	300-600 MMFDS. PADDER
C18,C19,C21	78671	TRIMMER STRIP
C20	27743-W	370 MMFDS. MICA on 393 only
C22	27742-W	2300 MMFDS. MICA on 393
C23	22055-AP	0.25 MFD. 600 V TUBULAR PAPER
C24,C32	22055-AB	0.1 MFD. 600 V TUBULAR PAPER
C25	71525-A	NEUTRALIZING CONDENSER
C29,C33	22055-A	0.01 MFD. 600 V TUBULAR PAPER
C30	27701-W	0.00025 MFD. MICA
C31,C34	22481	10 MFDS. 25 V ELECTROLYTIC
C37,C38	71045	8 MFDS 475 V. ELECTROLYTIC
C35	22055-R	0.005 MFD 1000 V TUBULAR PAPER
C36	22055-C	0.05 MFD. 600 V TUBULAR PAPER
C44	27737-O	10 MMFD. MICA
C46,C47	78503	DUAL .01 MFD. 1000 V PAPER
CONDENSERS FOR MODEL 395		
SAME AS FOR MODEL 393 EXCEPT ONES GIVEN BELOW		
C22	27745-W	2300 MMFDS MICA
C17-C-20	78692 G	DUAL PADDER 430-460 & 100-125 MMFDS.

RESISTORS FOR MODEL 393		
SYMBOL	PART NO.	DESCRIPTION
R1,R5,R15	13031	100,000 OHMS 1/4 WATT CARBON
R2,R3,	13115	400 OHMS 1/4 WATT CARBON
R4 R10	13164	50,000 OHMS 1/4 WATT CARBON
R6	13068	30,000 OHMS 1/2 WATT CARBON
R7,R21	13053	10,000 OHMS 1 WATT CARBON
R8,R24,R25	13001	1 MEGOHM 1/4 WATT CARBON
R11	78714	1 MEGOHM VOLUME CONTROL
R12	13147	300,000 OHMS 1/4 WATT CARBON
R13	13113	4,000 OHMS 1/4 WATT CARBON
R14	13171	250,000 OHMS 1/4 WATT CARBON
R16	13024	500,000 OHMS 1/4 WATT CARBON
R17	13108	410 OHMS 1 WATT CARBON
R18	78715	100,000 OHMS TONE CONTROL & SWITCH
R19	13092	30,000 OHMS 1 WATT CARBON
R9	13131	600 OHMS 1/4 WATT CARBON
RESISTORS FOR MODEL 395		
SAME AS FOR MODEL 393 WITH ADDED ONES BELOW		
R22	13029	250 OHMS 1/4 WATT CARBON

MODELS
393-395

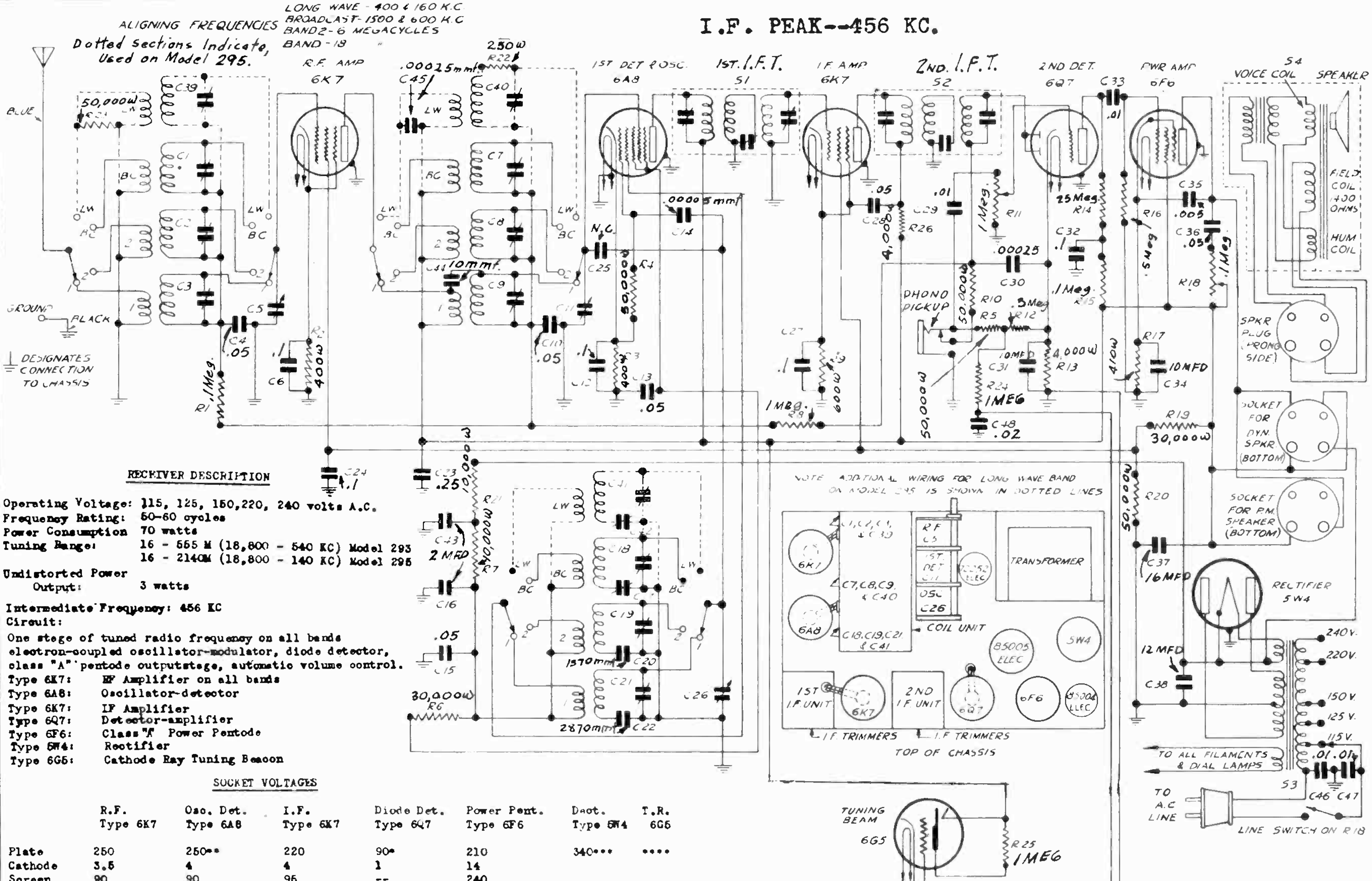
THIS PRINT SUPERSEDES ALL OTHERS
PRIOR TO [redacted]

PILOT RADIO CORPORATION
LONG ISLAND CITY N. Y. U. S. A.
SCHEMATIC CIRCUIT DIAGRAM AND CHASSIS LAYOUT FOR MODELS 393-395
SCALE
DRAWN BY J. P. H.
CHECKED BY
APPROVED BY
DATE MAY 22 1936
DRWG. NO. 25129

MODELS 293,295
Schematic, Socket
Trimmers, Voltage

PILOT RADIO CORP.

I.F. PEAK--456 KC.



RECEIVER DESCRIPTION

Operating Voltage: 115, 125, 150, 220, 240 volts A.C.
Frequency Rating: 50-60 cycles
Power Consumption: 70 watts
Tuning Range: 16 - 555 M (18,800 - 540 KC) Model 293
16 - 2140M (18,800 - 140 KC) Model 295
Undistorted Power Output: 3 watts
Intermediate Frequency: 456 KC
Circuit:
One stage of tuned radio frequency on all bands electron-coupled oscillator-modulator, diode detector, class "A" pentode outputstage, automatic volume control.

Type 6K7: RF Amplifier on all bands
Type 6A8: Oscillator-detector
Type 6K7: IF Amplifier
Type 6Q7: Detector-amplifier
Type 6F6: Class "A" Power Pentode
Type 5W4: Rectifier
Type 6G5: Cathode Ray Tuning Beacon

SOCKET VOLTAGES

	R.F. Type 6K7	Osc. Det. Type 6A8	I.F. Type 6K7	Diode Det. Type 6Q7	Power Pent. Type 6F6	Dect. Type 5W4	T.R. 6G5
Plate	250	250**	220	90*	210	340***	****
Cathode	3.5	4	4	1	14		
Screen	90	90	95	--	240		
Filament	6.3	6.3	6.3	6.3	6.3	5.	6.3

D.C. Voltages measured at the tube sockets should be read with a high resistance voltmeter of at least 1000 ohms per volt.
Plate and Screen Voltages measured to cathode. Cathode Voltages measured to chassis. Speaker Field Voltage 90 volts.
* Measured through 350000 ohms.
** Anode Grid of 6A8 tube 180 volts
*** Measured from filament to chassis.
**** Target voltage 250 volts.

27737-O WAS 27737-C
ALTERATIONS: CATHODE OF 6E5 WAS CONNECTED TO CATHODE OF 6Q7. 6G5 WAS 6E5. C48, VALUE ADDED. CATHODE REMOVED FROM 5W4

CLASSIFICATION: MODELS 293-295
THIS PRINT SUPERSEDES ALL OTHERS PRIOR TO [redacted]
DO NOT SCALE THIS PRINT

PILOT RADIO CORPORATION
LONG ISLAND CITY N. Y. U. S. A.
SCHEMATIC CIRCUIT DIAGRAM AND CHASSIS LAYOUT FOR MODELS 293-295
DATE 5/29-1936
DWG NO 25128-3

PILOT RADIO CORP.

Model 293
16 - 550 m. (18,800 - 545 kc.)

Model 295
16 - 550 m. (18,800 - 545 kc.)
750 - 2000 m. (400 - 150 kc.)

(MODEL 295 IS SOLD OUTSIDE THE U. S. A. ONLY)

REMOVAL OF CHASSIS FROM CABINET:

To remove the chassis from the cabinet proceed as follows:

Be certain that the line cord is removed from the power outlet socket.

Remove the "slip-on" knobs and felt washers from the controls and loosen the set screw on the tuning knob.

Remove the speaker plug from the socket at the rear of the chassis.

Remove the four mounting screws, located underneath the cabinet.

Remove the tuning beam plug from the socket at the front of the chassis.

REALIGNMENT: Should the receiver require re-alignment, the procedure outlined below should be followed. For best results an external modulated oscillator with adequate frequency range, and a visual output meter, should be used.

Before connecting the chassis to the power line, reconnect the speaker cable in its socket at the rear of the chassis.

The location of the R. F. alignment trimmer condensers is on the side of the band switch. The trimmers in the lowest row are those for aligning Band 1. Those in the second row from the bottom are for Band 2. Those in the third row up are for the Broadcast. In the Model 295 there is an additional row of trimmers located immediately above those for the Broadcast.

The padder condenser is located under the rear section of the band switch. In the Model 295 an additional padder for the long wave range is located at the right of the Broadcast padder. Access to the padder condenser is made through a hole provided in the rear of the chassis frame.

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Selector Switch should be in the position marked "Broadcast", and the tuning condenser should be set at maximum capacity. Connect the "antenna" lead of the external oscillator to the control grid of the type 6K7 tube in the I. F. Amplifier stage through a .1 mfd. fixed condenser. Connect the "ground" lead of the external oscillator to the receiver ground lead. The I. F. alignment capacitors are located at the side of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 2 slowly until maximum output is noted. On completion of this operation, remove the external oscillator lead from the type 6K7 I. F. amplifier tube and connect it in the same manner to the control grid at the top of the type 6A8 tube.

Now rotate each adjustment screw on I. F. Unit No. 1 for maximum output. During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. amplifier, it is essential to repeat the alignment process in both I. F. Units.

BROADCAST ALIGNMENT: After the I. F. amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground leads. Insert a 200 mmf. condenser in series with the antenna lead. Set the Band Selector Switch in the "Broadcast" position and place the tuning control pointer at the 1500 kc. mark. Adjust the broadcast band oscillator trimmer.

Next adjust the interstage alignment trimmer for maximum response. Finally adjust the antenna section trimmer in the same manner.

Next adjust the 600 kc. padder condenser, located in the lower rear section of the band switch, under the chassis. Set the external oscillator at 600 kc. Rotate the receiver tuning control until resonance is indicated. Then rock the tuning control back and forth about this resonance position, and at the same time adjust the padder condenser for the highest resonance peak.

Now repeat the 1500 kc. trimmer adjustment, following in every detail the procedure previously described.

ALIGNMENT OF THE SHORT WAVE-BANDS:– The procedure in aligning the short wave-bands is identical with that for the broadcast with the exception of the adjustment of the padder condenser. Insert a 400 ohm non-inductive resistor in series with the antenna lead. The alignment frequencies are as follows:

Band 2: 50 Meters—(6,000 kc.)
Band 1: 16.6 Meters—(18,000 kc.)

When aligning Band 2, set the Band Selector Switch in the position marked "Band 2". Set the tuning control pointer at 50 meters. Adjust the oscillator alignment capacitor on Band 2 for maximum output. Next adjust the interstage and antenna section alignment capacitors for maximum output.

To align Band 1, set the Band Selector Switch in the position marked "Band 1". Set the tuning control pointer at the 16.6 meter mark. Set the external oscillator at 16.6 meters. Adjust the oscillator section alignment capacitor on Band 1 for maximum output.

Proceed next to align the interstage section of Band 1. In doing this, it is essential to rock the tuning control back and forth about the resonance position and at the same time to adjust the trimmer for the highest resonance peak. Next align the antenna section for maximum sensitivity.

LONG WAVE MODEL 295

The above alignment positions refer to the Model 293 only, which is calibrated in frequency. The alignment points for the Model 295, which is calibrated in meters only, is as follows:

Long Wave	Align at 750 meters.
	Pad at 2,000 meters.
Broadcast	Align at 200 meters.
	Pad at 500 meters.
Band 2	Align at 49 meters.
Band 1	Align at 17 meters.

The Long Wave alignment procedure is similar to that for the Broadcast. A 200 mmf. condenser should be used in series with the antenna lead in aligning this band.

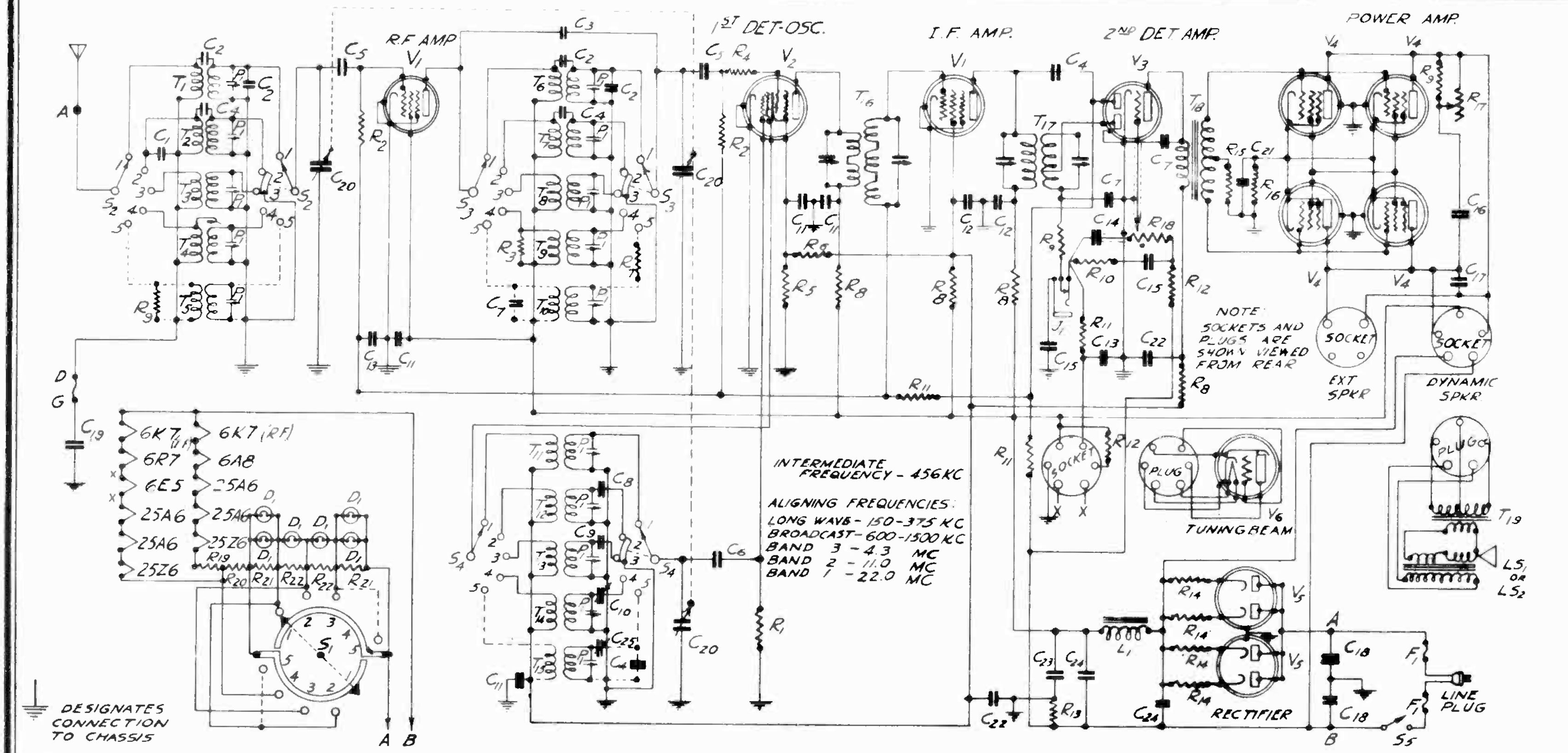
REMOVAL OF BAND SELECTOR SWITCH ASSEMBLY: Should it be necessary to remove the switch assembly, this is easily done by removing the supporting screws. Before doing this, however, it is essential to unsolder the leads between the switch and the chassis.

It is advisable to realign the receiver after reinstalling the switch assembly.

CAUTION: When making repairs on the receiver, use only ROSIN CORE SOLDER. NEVER USE SOLDERING PASTE OR ACID FLUXES OF ANY TYPE.

MODELS 304,305
Schematic,Parts

PILOT RADIO CORP.



R_1	72212	50,000 OHMS, 1/4 WATT I.R.C.
R_2	72213	500,000 " " " "
R_3	72211	5000 " " " "
R_4	78804	15 OHMS, 1/4 WATT FLEX'LE
R_5	13074	20,000 OHMS 1/4 WATT CARB
R_6	13149	6000 " " "
R_7	13029	250 " " "
R_8	13028	1,000 " " "
R_9	13164	50,000 " " "
R_{10}	13147	300,000 " " "
R_{11}	13007	2 MEGOHMS " "
R_{12}	13001	1 " " "
R_{13}	13188	23 OHMS, 1 WATT CARB
R_{14}	13189	30 " " "
R_{15}	13044	10,000 " , 1/4 WATT "
R_{16}	13190	200 " , 3 WATTS "
R_{17}	78668	100,000 " TONE CONTROL
R_{18}	78669	2 MEGOHMS VOL "
R_{19}		20 OHMS } VITREOUS ENAMELED RESISTOR
R_{20}	78700	23 " } VITREOUS ENAMELED RESISTOR
R_{21}		28 " } VITREOUS ENAMELED RESISTOR

R_{22}		14 OHMS PART OF $R_{19,20,21}$
P_1	72226 (304) 72227 (305)	R.F. COIL TRIM'R ASSY 3-35 mmf
C_1	28016-O	.0001 MF MICA COND, TYPE O
C_2	27737-O	.00001 " " " "
C_3		.000002 MF
C_4	27736-O	.000025 MF MICA COND, TYPE O
C_5	27701-O	.00025 " " " "
C_6	28016-W	.0001 " " " W
C_7	27701-W	.00025 " " " "
C_8	27747-W	.00267 " " " "
C_9	27748-W	.00130 " " " "
C_{10}	71503D	300-700 mmf MICA PADDER
C_{11}	22055Z	.02 MF, 400V PAPER COND
C_{12}	22055W	.01 " " " "
C_{13}	22055I	.05 " 200V " "
C_{14}	22055H	.02 " " " "
C_{15}		.5 " " " "

C_{16}	22055C	.05 MF, 600V PAPER COND
C_{17}	22055R	.005 " , 1000V " "
C_{18}	78503	DUAL .01 MF, 1000V " "
C_{19}	22055U	" " " " "
C_{20}	72146B	10-450 mmf VAR AIR COND
C_{21}	85002	30 MF, 25 V ELECTR. "
C_{22}	78688	10-10 MF, 150V " "
C_{23}	78688	20 " " " "
C_{24}	78689	30-30 " " " "
C_{25}	71577C	PART OF C_{10} IN MOD. 305 (30-150 mmf) (250-500 mmf)
T_1, T_3	73032	BANDS 1 & 3 ANT. COILS
T_2, T_4	73035	" 2 & 4 " "
T_5	73038	" 5 " "
T_6, T_8	73033	" 1 & 3 DET. "
T_7, T_9	73036	" 2 & 4 " "
T_{10}	73039	" 5 " "
T_{11}, T_{13}	73034	" 1 & 3 OSC. "
T_{12}, T_{14}	73037	" 2 & 4 " "
T_{15}	73040	" 5 " "

T_{16}	73030	1ST IF TRANSFORMER (WITH COND)
T_{17}	73031	2ND " " "
T_{18}	78664	AUDIO INPUT " , 1:4
T_{19}	PART OF 40806-07	OUTPUT TRANSFORMER (ON LOUD SPEAKER)
S_1	78755 (MOD. 304) OR 78754 (MOD. 305)	LIGHTING (FRONT) SECT. BAND SW
S_2	78755 (MOD. 304) OR 78754 (MOD. 305)	ANTENNA (2ND) " " "
S_3	78755 (MOD. 304) OR 78754 (MOD. 305)	DETECTOR (3RD) " " "
S_4	78755 (MOD. 304) OR 78754 (MOD. 305)	OSCILLATOR (REAR) " " "
S_5	PART OF 78669	LINE SWITCH (ON VOL CONT)
J_1	70950	PHONOGRAPH INPUT JACK

L_1	78675	POWER FILTER CHOKE 8H, 100Ω
V_1	71966	TYPE 6K7 VACUUM TUBE
V_2	71961	" 6A8 " "
V_3	81961	" 6R7 " "
V_4	81960	" 25A6 " "
V_5	71968	" 25Z6 " "
V_6	71993	" 6E5 " " (FOR 100V OPER'N)
F_1	70053A	2 AMP. FUSE
D_1	71282	6 V, .25A PILOT LAMP (BLUE BEAD)
LS_1	40806	10" DYNAMIC (LOUD SPEAKER) (500Ω FIELD)
LS_2	40807	12" " " "

$T_5(P_1)$, $T_{10}(P_1)$, $T_{15}(P_1)$, $1-C_4$, $1-C_5$, R_7, $1-R_9$, C_{25} TO BE OMITTED IN MODEL 304

NOTE: ADDITIONAL WIRING FOR LONG WAVE BAND ON MODEL 305 IS SHOWN IN DOTTED LINES

ALTERATIONS

FINISH

CLASSIFICATION 300

THIS PRINT SUPERSEDES ALL OTHERS PRIOR TO [redacted]

PILOT RADIO CORPORATION
LONG ISLAND CITY, N. Y. U. S. A.

SCHEMATIC CIRCUIT DIAGRAM FOR MODELS 304-305

MATERIAL
SCALE
DATE 5/27/36
DRAWN BY EM
CHECKED BY
APPROVED BY [signature]
DRWG. NO. 25130

MODEL Wasp 3-SW
Schematic
MODELS 304,305
Voltage,Alignment

PILOT RADIO CORP.

MODELS 393,395
Alignment

PILOT MODELS 304 AND 305

MODEL 305 IS SOLD OUTSIDE THE U. S. A. ONLY)

Undistorted power output—4 watts.
I. F.—456 kc.

Type of Circuit — All wave Superheterodyne with TRF stage on all bands, A. V. C., Class "A" push pull parallel power output stage.

VOLTAGES

The D. C. Voltages measured at the tube sockets of the set should be read with a high resistance voltmeter of at least 1,000 ohms per volt.

	R.F. 6K7	Osc. & 1st Det. 6A8		I.F. 6K7	2nd Det. & Amp. 6R7	Pwr. Pent. 25A6	Pwr. Pent. 25A6	Pwr. Pent. 25A6	Pwr. Pent. 25A6	Rect. 25Z6	Rect. 25Z6	T.B. 6E5
Plate	91	80	88	83	73	80	80	80	80	.....	—	*6
Screen	91	.....	49	80	—	90	90	90	90	.....	—	—
Cathode	0	0	0	0	0	12.5	12.5	12.5	12.5	99	99	—
Filament	6.3	6.5	—	6.3	6.3	26	26	26	26	26	26	6.3

Speaker field—99 Volts. Tuning Beam—Target 90 volts to ground.

A 6E5 tuning beam should be plugged into the tuning beam socket on the chassis, whenever the receiver is operated outside the cabinet.

* Measured through 1 megohm.

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Switch should be in the position marked "Broadcast", and the tuning condenser should be set at maximum capacity. When aligning the receiver on all positions, the volume control and the tone control should be turned to the maximum clockwise position. Connect the antenna lead of the external oscillator to the control grid of the 6K7 tube in the I. F. Amplifier through a .1 mfd. fixed condenser. Connect the ground lead of the external oscillator to the chassis. The I. F. alignment trimmers are located at the top of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 2 slowly until maximum output is noted. Following this, connect the external oscillator leads to the control grid of the 6A8 tube. Adjust each trimmer on I. F. Unit No. 1 for maximum gain.

During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. amplifier, it is essential to repeat the alignment process in all I. F. Units, with the external oscillator leads connected to the control grid of the 6A8 tube.

BROADCAST ALIGNMENT: After the I. F. amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground leads through a .0002 mfd. condenser. Leave the Band Switch in the "Broadcast" position and place the tuning control pointer at the 1500 kc. mark. Tune the external oscillator to 1500 kc. Adjust the broadcast band oscillator trimmer to maximum response.

Next adjust the interstage alignment trimmer for maximum response. Finally adjust the antenna section trimmer in the same manner.

Next adjust the 600 kc. padder condenser, located in the lower rear partition of the band switch, under the chassis. Set the external oscillator at 600 kc. Rotate the receiver tuning control to the resonance position, and at the same time adjust the padder condenser for the highest peak.

Now repeat the 1500 kc. trimmer adjustment, following in every detail the procedure previously described.

The alignment frequencies are as follows:
Band 5—150 and 375 kc.—2000 and 800 m.
Band 4—600 and 1500 kc.—500 and 200 m.
Band 3—69.7 meters— 4,300 kc.
Band 2—27.2 meters—11,000 kc.
Band 1—13.6 meters—22,000 kc.

When aligning Band 3, set the Band Switch in the position marked Band 3. Rotate the tuning condenser to the 4300 kc. indication on the dial scale. Set the external oscillator at 4300 kc. Adjust the Band 3 oscillator trimmer for maximum sensitivity. Next adjust the interstage and antenna trimmer condensers for maximum sensitivity. Check the overall sensitivity of the band at several points along the dial scale.

Align Band 2 in a similar manner using a 400-ohm non-inductive resistor in place of the .0002 mfd. condenser. The alignment frequency is 11,000 kc. (27.2 meters).

The alignment of Band 1 requires greater care due to the higher frequencies covered by this band. The tracking characteristic of Band 1 of this receiver differs from that of the other bands, in that the 1st detector and T.R.F. circuits resonate on the high frequency side of the oscillator. This condition applies only to Band 1. The alignment frequency is 22,000 kc. or 13.6 meters. Set the external oscillator at 22,000 kc. Rotate the tuning condenser of the receiver until the dial pointer is co-incidental with the 22,000 kc. indication on the dial scale. Adjust the oscillator trimmer condenser for maximum sensitivity. Proceed next to align the interstage section. In doing this it is essential to rock the tuning control back and forth about the resonance position and at the same time to adjust the trimmer for the highest resonant peak. Next align the antenna section for minimum sensitivity.

Part No. 71786-6-36

THE LONG WAVE ALIGNMENT procedure in the Model 305 is similar to that of the broadcast. Turn the Band Switch to the Long Wave position. The alignment frequency is 375 kc. Adjust the padder condenser at 150 kc. Use a .0002 mfd. condenser in the antenna lead from the external oscillator.

Pilot engineers recommend the doublet antenna. When using a doublet, connect one lead-in wire to the blue lead at the rear of the set, and the other one to the yellow lead. Next, connect the black lead to the ground.

If you use an ordinary single-wire antenna, connect the antenna to the blue lead on the set. Then connect the yellow and black leads together, and to the ground.

PHONOGRAPH PICK-UP: A jack is provided at the rear of the chassis for plugging in an electric phonograph pick-up, in order that records can be reproduced by the loudspeaker, through the high-quality amplifier with which this set is equipped. The pick-up should be of the high-impedance type.

EXTRA SPEAKER: At the rear of the chassis there is a socket for plugging in an extra speaker, which can be located in the kitchen, in one of your up-stairs rooms, or down cellar in the game room. This will give you the equivalent of an extra radio, at the small expense of the extra speaker. We recommend a permanent magnet dynamic speaker of 10,000 ohms. These speakers operate without any field exciting current.

PILOT MODELS 393 AND 395

MODEL 395 IS SOLD OUTSIDE THE U. S. A. ONLY

The location of the R. F. alignment trimmer condensers is at the right end of the chassis underneath the deck.

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Selector Switch should be in the position marked "Broadcast", and the tuning condenser should be set at maximum capacity. Connect the "antenna" lead of the external oscillator to the control grid of the type 6K7 tube in the I. F. Amplifier stage through a .1 mfd. fixed condenser. Connect the "ground" lead of the external oscillator to the receiver ground lead. The I. F. alignment capacitors are located at the side of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 2 slowly until maximum output is noted. On completion of this operation, remove the external oscillator lead from the type 6K7 I. F. amplifier tube and connect it in the same manner to the control grid at the top of the type 6A8 tube.

Now rotate each adjustment screw on I. F. Unit No. 1 for maximum output. During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. amplifier, it is essential to repeat the alignment process in both I. F. Units.

BROADCAST ALIGNMENT: After the I. F. amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground leads. Insert a 200 mmf. condenser in series with the antenna lead. Set the Band Selector Switch in the "Broadcast" position and place the tuning control pointer at the 1500 kc. mark. Adjust the broadcast band oscillator trimmer.

Next adjust the interstage alignment trimmer for maximum response. Finally adjust the antenna section trimmer in the same manner.

Next adjust the 600 kc. padder condenser, located on the top of the oscillator coil. Set the external oscillator at 600 kc. Rotate the receiver tuning control until resonance is indicated. Then rock the tuning control back and forth about this resonance position, and at the same time adjust the padder condenser for the highest resonance peak.

Now repeat the 1500 kc. trimmer adjustment, following in every detail the procedure previously described.

ALIGNMENT OF THE SHORT WAVE-BANDS:– The procedure in aligning the short wave-bands is identical with that for the broadcast with the exception of the adjustment of the padder condenser. Insert a 400 ohm non-inductive resistor in series with the antenna lead. The alignment frequencies are as follows:

Band 2: 50 Meters—(6,000 kc.)
Band 1: 16.6 Meters—(18,000 kc.)

When aligning Band 2, set the Band Selector Switch in the position marked "Band 2". Set the tuning control pointer at 50 meters. Adjust the oscillator alignment capacitor on Band 2 for maximum output. Next adjust the interstage and antenna section alignment capacitors for maximum output.

To align Band 1, set the Band Selector Switch in the position marked "Band 1". Set the tuning control pointer at the 16.6 meter mark. Set the external oscillator at 16.6 meters. Adjust the oscillator section alignment capacitor on Band 1 for maximum output.

Proceed next to align the interstage section of Band 1. In doing this, it is essential to rock the tuning control back and forth about the resonance position and at the same time to adjust the trimmer for the highest resonance peak. Next align the antenna section for maximum sensitivity.

LONG WAVE MODEL 395

The above alignment positions refer to the Model 393 only, which is calibrated in frequency. The alignment points for the Model 395, which is calibrated in meters only, is as follows:

Long Wave	Align at 750 meters.
	Pad at 2,000 meters.
Broadcast	Align at 200 meters.
	Pad at 500 meters.
Band 2	Align at 49 meters.
Band 1	Align at 17 meters.

The Long Wave alignment procedure is similar to that for the Broadcast. A 200 mmf. condenser should be used in series with the antenna lead in aligning this band.

For Phonograph Pickup & Extra Speaker Data See Models 304 & 305

Pilot engineers recommend the doublet antenna. To connect this set to a doublet, first remove the link across the D and G terminals at the rear of the chassis. Then connect one wire of the doublet lead to post A, and the other wire to post D.

If you use a single-wire antenna, leave the link across D and G. Connect the lead-in to A, and the ground wire to either D or G.

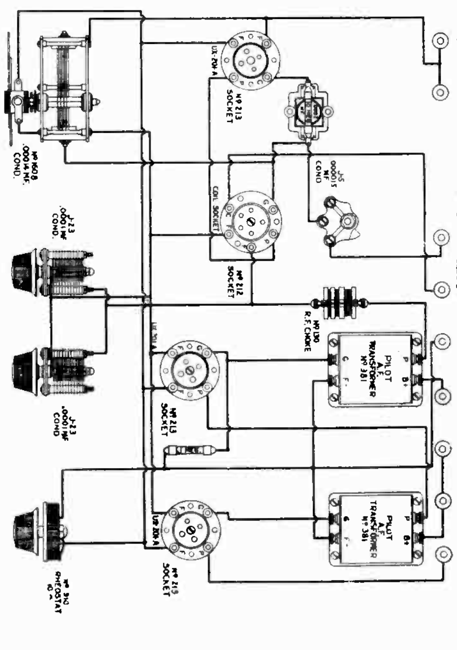
APRIL 1928

PILOT WASP

10,000 MILE SHORT WAVE RECEIVER, TYPE 3-SW
17 TO 500 METERS

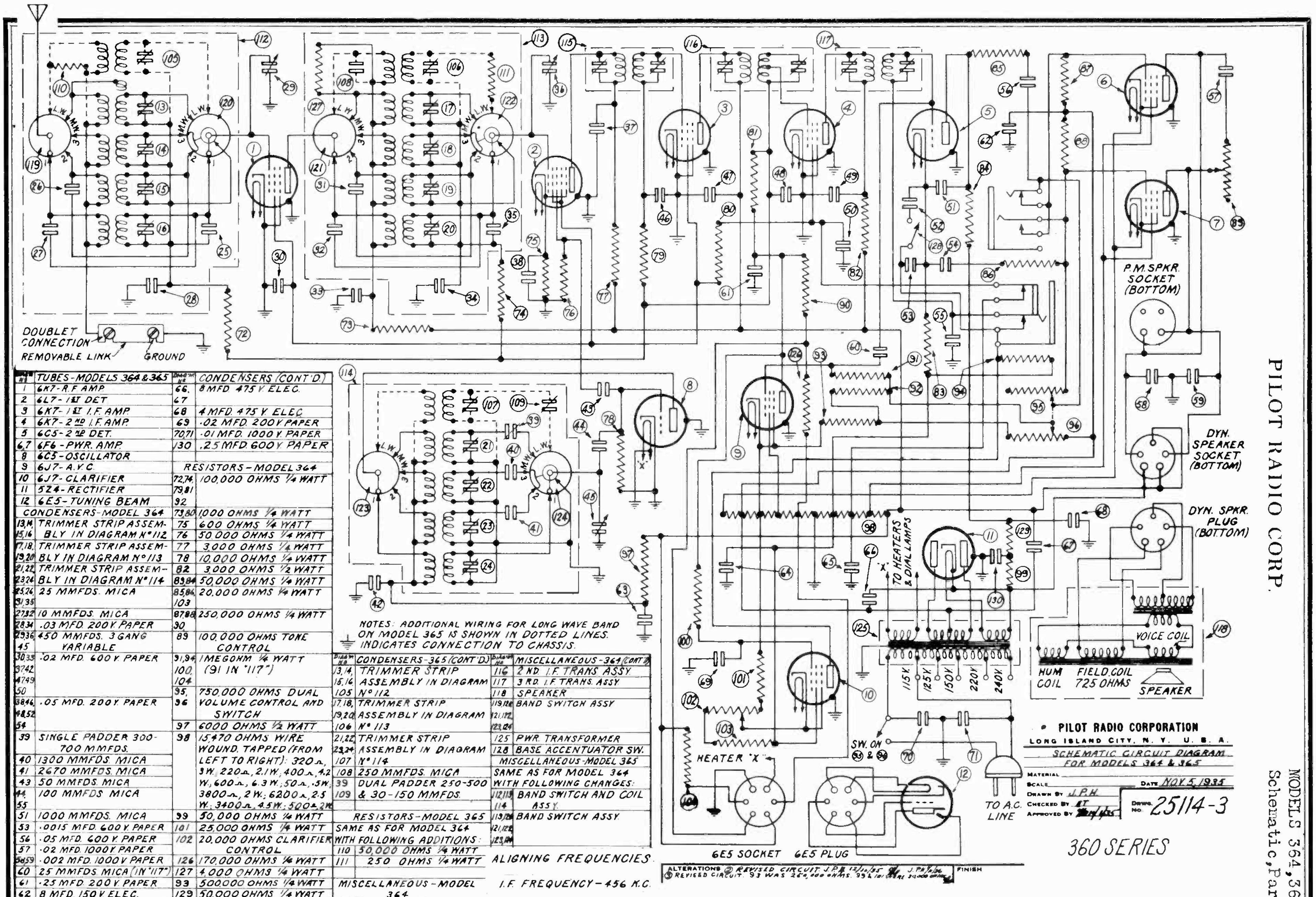
ASSEMBLY NOTES: Front panel 7x14 inches, base panel 7x13 inches. Mount base panel with No. 35 PILOT brackets, with top of base panel 1½ inches above bottom of front panel. Make all lines as short as possible.

To control regeneration on short waves, put upper midget condenser at zero, and adjust with lower midget. Use same method on broadcast waves, but put upper midget at full capacity. Use PILOT plug-in coil as follows: Red ring, 20-meter band; Orange ring, 40-meter band; Yellow ring, 80-meter band; Green ring, 160-meter band; Blue ring, broadcast band.



MODELS 364, 365
Schematic, Parts

PILOT RADIO CORP.



NOTES: ADDITIONAL WIRING FOR LONG WAVE BAND ON MODEL 365 IS SHOWN IN DOTTED LINES. ⏚ INDICATES CONNECTION TO CHASSIS.

Diag. No.	TUBES-MODELS 364 & 365	Diag. No.	CONDENSERS (CONT'D.)
1	6K7-R.F. AMP.	66, 67	8 MFD. 475 V. ELEC.
2	6L7-1ST DET		
3	6K7-1ST I.F. AMP.	68	4 MFD. 475 V. ELEC.
4	6K7-2ND I.F. AMP.	69	.02 MFD. 200 V. PAPER
5	6C5-2ND DET.	70,71	.01 MFD. 1000 V. PAPER
6,7	6F6-PWR. AMP.	130	.25 MFD. 600 V. PAPER
8	6C5-OSCILLATOR		
9	6J7-A.V.C.		RESISTORS-MODEL 364
10	6J7-CLARIFIER	72,74, 79,81, 92	100,000 OHMS 1/4 WATT
11	5Z4-RECTIFIER		
12	6E5-TUNING BEAM		
	CONDENSERS-MODEL 364	73,80	1000 OHMS 1/4 WATT
13,14, 15,16	TRIMMER STRIP ASSEMBLY IN DIAGRAM No. 112	75	600 OHMS 1/4 WATT
		76	50,000 OHMS 1/4 WATT
17,18, 19,20	TRIMMER STRIP ASSEMBLY IN DIAGRAM No. 113	77	3,000 OHMS 1/4 WATT
		78	10,000 OHMS 1/4 WATT
21,22, 23,24	TRIMMER STRIP ASSEMBLY IN DIAGRAM No. 114	82	3000 OHMS 1/2 WATT
		83,84	50,000 OHMS 1/4 WATT
25,26, 31,35	25 MMFDS. MICA	85,86, 103	20,000 OHMS 1/4 WATT
27,32	10 MMFDS. MICA	87,88, 90	250,000 OHMS 1/4 WATT
28,34	.03 MFD. 200 V. PAPER		
29,36, 45	450 MMFDS. 3 GANG VARIABLE	89	100,000 OHMS TONE CONTROL
30,33, 37,42, 47,49, 50	.02 MFD. 600 V. PAPER	91,94, 100, 104	1 MEGOHM 1/4 WATT (91 IN "117")
		95, 96	750,000 OHMS DUAL VOLUME CONTROL AND SWITCH
38,46, 48,52, 54	.05 MFD. 200 V. PAPER	97	6000 OHMS 1/2 WATT
39	SINGLE PADDER 300-700 MMFDS.	98	15,470 OHMS WIRE WOUND. TAPPED (FROM LEFT TO RIGHT): 320 Ω, 3 W.; 220 Ω, 2.1 W.; 400 Ω, 4.2 W.; 600 Ω, 6.3 W.; 50 Ω, .5 W.; 3800 Ω, 2 W.; 6200 Ω, 2.5 W.; 3400 Ω, 4.5 W.; 500 Ω, 2 W.
40	1300 MMFDS. MICA		
41	2670 MMFDS. MICA		
43	50 MMFDS. MICA		
44, 55	100 MMFDS. MICA		
51	1000 MMFDS. MICA	99	50,000 OHMS 1/4 WATT
53	.0015 MFD. 600 V. PAPER	101	25,000 OHMS 1/4 WATT
56	.05 MFD. 600 V. PAPER	102	20,000 OHMS CLARIFIER CONTROL
57	.02 MFD. 1000 V. PAPER		
58,59	.002 MFD. 1000 V PAPER	126	170,000 OHMS 1/4 WATT
60	25 MMFDS. MICA (IN "117")	127	4,000 OHMS 1/4 WATT
61	.25 MFD. 200 V. PAPER	93	500,000 OHMS 1/4 WATT
62	8 MFD. 150 V. ELEC.	129	50,000 OHMS 1/4 WATT
63	2 MFD. 475 V. ELEC.		CONDENSERS-MODEL 365
64	2 MFD. 475 V. ELEC.		SAME AS FOR MODEL 364
65	4 MFD. 475 V. ELEC.		WITH FOLLOWING CHANGES:

Diag. No.	CONDENSERS-365 (CONT'D.)	Diag. No.	MISCELLANEOUS-364 (CONT'D.)
13,14, 15,16, 105	TRIMMER STRIP ASSEMBLY IN DIAGRAM No. 112	116	2ND I.F. TRANS ASSY.
		117	3RD I.F. TRANS. ASSY.
		118	SPEAKER
17,18, 19,20, 106	TRIMMER STRIP ASSEMBLY IN DIAGRAM No. 113	119,120, 121,122, 123,124	BAND SWITCH ASSY.
21,22, 23,24, 107	TRIMMER STRIP ASSEMBLY IN DIAGRAM No. 114	125	PWR. TRANSFORMER
		128	BASE ACCENTUATOR SW.
			MISCELLANEOUS-MODEL 365
108	250 MMFDS. MICA		SAME AS FOR MODEL 364 WITH FOLLOWING CHANGES:
39, 109	DUAL PADDER 250-500 & 30-150 MMFDS.	112,113, 114	BAND SWITCH AND COIL ASSY.
	RESISTORS-MODEL 365	119,120, 121,122, 123,124	BAND SWITCH ASSY.
	SAME AS FOR MODEL 364 WITH FOLLOWING ADDITIONS:		
110	50,000 OHMS 1/4 WATT		
111	250 OHMS 1/4 WATT		
	MISCELLANEOUS-MODEL 364		
112,113, 114	BAND SWITCH AND COIL ASSEMBLY		
115	1ST. I.F. TRANS. ASSY.		

ALIGNING FREQUENCIES

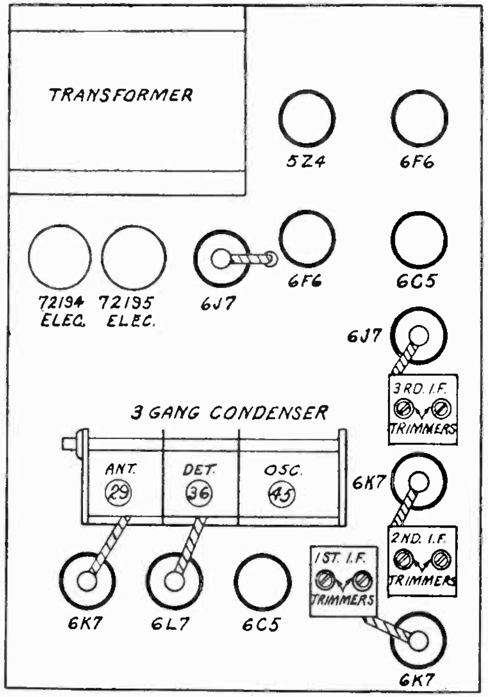
I.F. FREQUENCY-456 K.C.

L.W.-150 & 380 K.C., M.W.-570 & 1500 K.C., BAND 3-4.3 M.C., BAND 2-12 M.C., BAND 1-23 M.C.

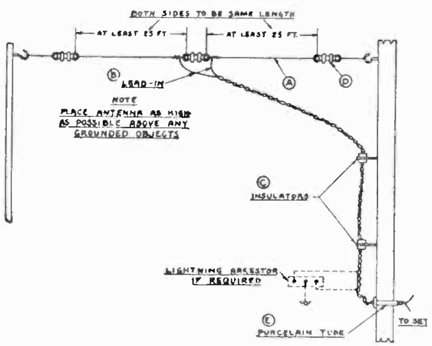
ALTERATIONS: ② REVISED CIRCUIT J.P.H. 12/10/35; REVISED CIRCUIT 93 WAS 250,000 OHMS

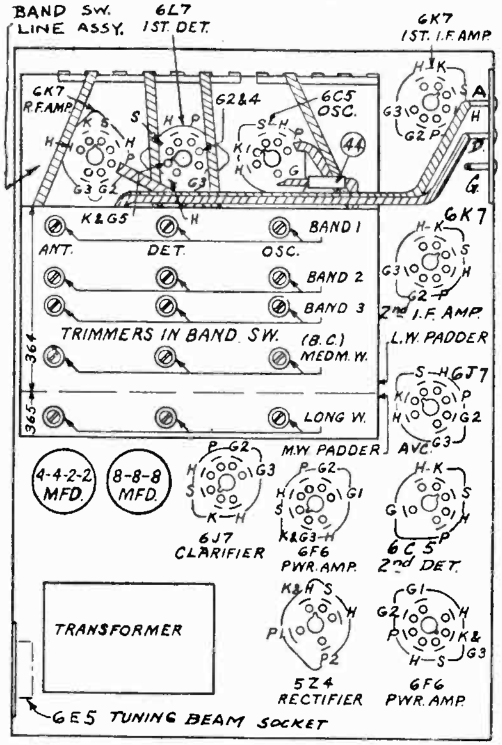
MODELS 364,365
Socket, Trimmers
Voltage, Alignment

PILOT RADIO CORP.



ALL-WAVE ANTENNA SYSTEM





WIRING TO BAND SWITCH & ARRANGEMENT OF SOCKET TERMINALS.

SERVICE INFORMATION

REALIGNMENT: Should the receiver require alignment, the outlined procedure below should be followed. In the service information sheet, the location and function of the various alignment capacitors are clearly illustrated. For best results, an external modulated oscillator with adequate frequency range and a visual output meter, should be used.

Before connecting the chassis to the power line, reconnect the speaker cable in its socket at the rear of the chassis, and reinsert the tuning beam cable plug in the socket at the front of the chassis.

RECEIVER DESCRIPTION

Operating Voltages—115, 125, 150, 220, 240 Volts—Alternating Current 50-60 Cycles.
Power Consumption 125 Watts.
Wavelength range —From 13 to 565 meters (23,000 kc. to 530 kc.)
Undistorted power output—8 Watts.
I. F. —456 kc.
Type of Circuit —All wave Superheterodyne with TRF stage on all bands, A. V. C., Class "A" push pull power output stage.

I. F. ALIGNMENT: When aligning the Intermediate Frequency Amplifier, the external oscillator must be set at 456 kc. The Band Switch should be in the position marked "Broadcast", and the tuning condenser should be set at maximum capacity. When aligning the receiver on all positions, the volume control and the tone control should be turned to the maximum clockwise position. Connect the antenna lead of the external oscillator to the control grid of the 6K7 tube in the 2nd I. F. Amplifier through a .1 mfd. fixed condenser. Connect the ground lead of the external oscillator to the receiver ground lead. The I. F. alignment trimmers are located at the top of the shielded I. F. Transformers. Rotate the adjusting screw of each capacitor on I. F. Unit No. 3 slowly until maximum output is noted. On completion of this operation, remove the external oscillator lead from the 6K7 2nd I. F. amplifier tube and connect it in the same manner to the control grid of the 6K7 1st I. F. amplifier tube. Now rotate each adjustment screw on I. F. Unit No. 2 for maximum output. Following this, connect the external oscillator leads to the control grid of the 6L7 tube. Adjust each trimmer on the I. F. Unit No. 1 for maximum gain.

During these operations, use the least possible input to prevent broadening of the resonance peaks.

In order to obtain the most accurate realignment of the I. F. amplifier, it is essential to repeat the alignment process in all I. F. Units, with the external oscillator leads connected across the control grid of the 6L7 tube.

BROADCAST ALIGNMENT: After the I. F. amplifier is completely realigned, connect the external oscillator leads to the receiver antenna and ground leads through a .0002 mfd. condenser. Set the Band Switch in the "Broadcast" position and place the tuning control pointer at the 1500 kc. mark. Tune the external oscillator to 1500 kc. Adjust the broadcast band oscillator trimmer to maximum response.

Next adjust the interstage alignment trimmer for maximum response. Finally adjust the antenna section trimmer in the same manner.

Next adjust the 570 kc. padder condenser, located in the lower rear section of the band switch, under the chassis. Set the external oscillator at 570 kc. Rotate the receiver tuning control to the resonance position, and at the same time adjust the padder condenser for the highest peak.

Now repeat the 1500 kc. trimmer adjustment, following in every detail the procedure previously described.

The alignment frequencies are as follows:
Band 3—69.73 meters— 4,300 kc.
Band 2—26.07 meters—11,500 kc.
Band 1—13. meters—23,000 kc.

When aligning Band 3, set the Band Switch in the position marked Band 3. Rotate the tuning condenser to the 4300 kc. indication on the dial scale. Set the external oscillator at 4300 kc. Adjust the Band 3 oscillator trimmer for maximum sensitivity. Next adjust the interstage and antenna trimmer condensers for maximum sensitivity. Check the overall sensitivity of the band at several points along the dial scale.

Align Band 2 in a similar manner using a 400-ohm non-inductive resistor in place of the .0002 mfd. condenser. The alignment frequency is 11,500 kc. (26.07 meters).

The alignment of Band 1 requires greater care due to the higher frequencies covered by this band. The tracking characteristic of Band 1 of this receiver differs from that of the other bands, in that the 1st detector and T.R.F. circuits resonate on the high frequency side of the oscillator. This condition applies only to Band 1. The alignment frequency is 23000 kc. or 13 meters. Set the external oscillator at 13 meters. Rotate the tuning condenser of the receiver until the dial pointer is co-incidental with the 13 meter indication on the dial scale. Adjust the oscillator trimmer condenser for maximum sensitivity. Proceed next to align the interstage section. In doing this it is essential to rock the tuning control back and forth about the resonance position and at the same time to adjust the trimmer for the highest resonant peak. Next align the antenna section for maximum sensitivity.

THE LONG WAVE ALIGNMENT procedure in the Model 365 is similar to that of the broadcast. Turn the Band Switch to the Long Wave position. The alignment frequency is 380 kc. Adjust the padder condenser at 150 kc. Use a .0002 mfd. condenser in the antenna lead from the external oscillator.

VOLTAGES

Volume Control—Turn to right during measurements. Speaker field—104 Volts.

The D. C. Voltages measured at the tube sockets of the set should be read with a high resistance voltmeter of at least 1,000 ohms per volt.

Tuning Beam—Target 200 Volts to ground.

	R.F. 6K7	Osc. 6C5	1st Det. 6L7	1st I.F. 6K7	2nd I.F. 6K7	2nd Det. 6C5	6F6 Pwr. Pent.	Pwr. Pent. 6F6	A.V.C. 6J7	Clar. 6J7	Rect. 5Z4	T.B. 6E5
Plate	185	130	187	190	170	235	190	190	—1	20	......	10
Screen	100	......	100	100	108	......	182	182	—38	40	......	......
Cathode	......	......	3.3	......		52	—58	—58	—64	9	300	—3
Filament	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	5.	6.5

MODELS 364 and 365 PILOT
ALL-WAVE SUPERHETERODYNES

Model 365 is sold in European area only

RCA MFG. CO., INC.

MODEL 4T
Schematic, Socket
Chassis Wiring, Trimmers
Loud Speaker, Transformer

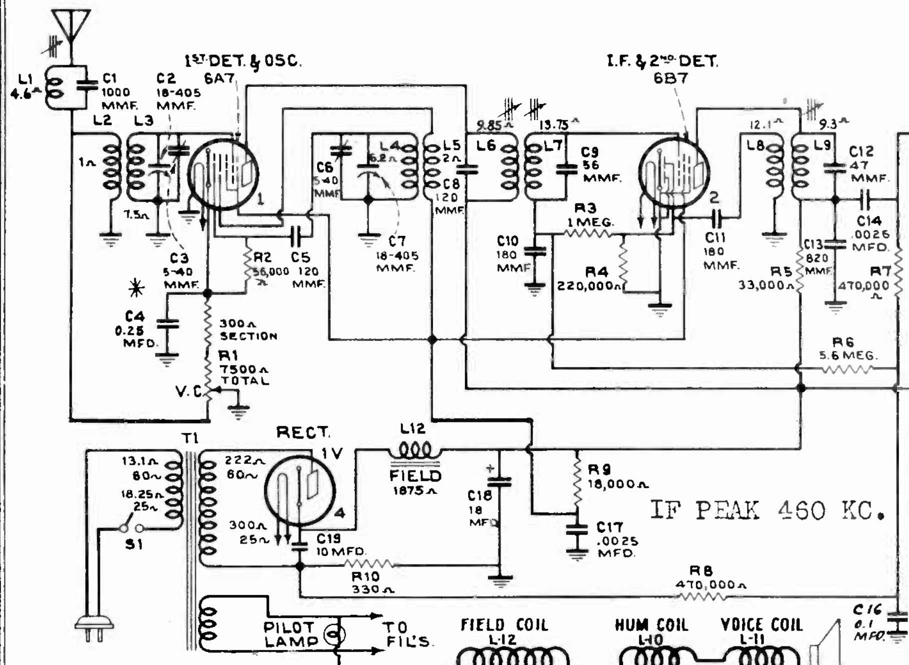


Figure 1—

Schematic Circuit Diagram

* On some instruments C-4 is .05 mfd.

Make all replacements with Stock No. 4840.

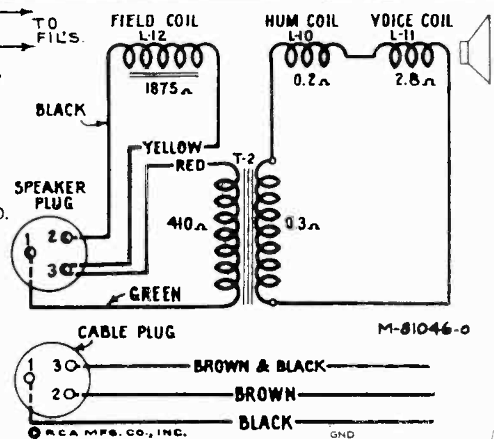


Figure 6—
Loudspeaker Wiring

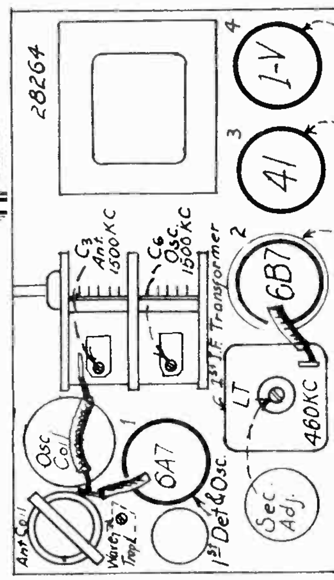


Figure 3—Radiotron, Coil, and Trimmer Locations

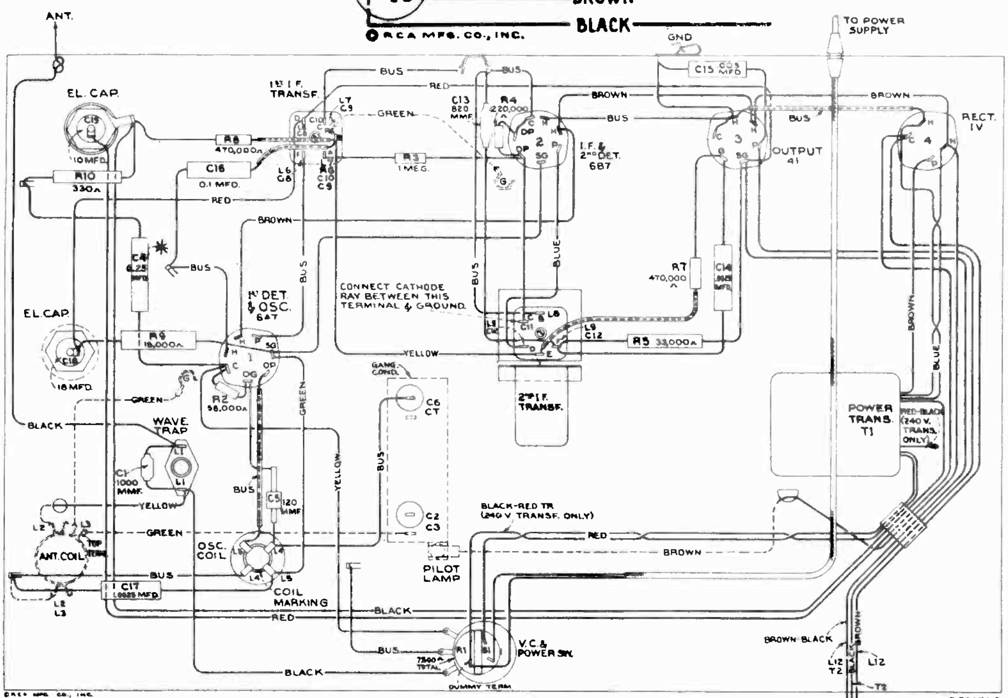
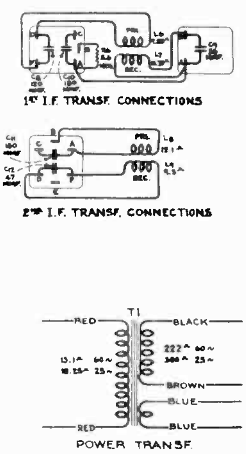


Figure 2—Chassis Wiring Diagram



MODEL 4T
Voltage, Resistance
Transformer

RCA MFG. CO., INC.

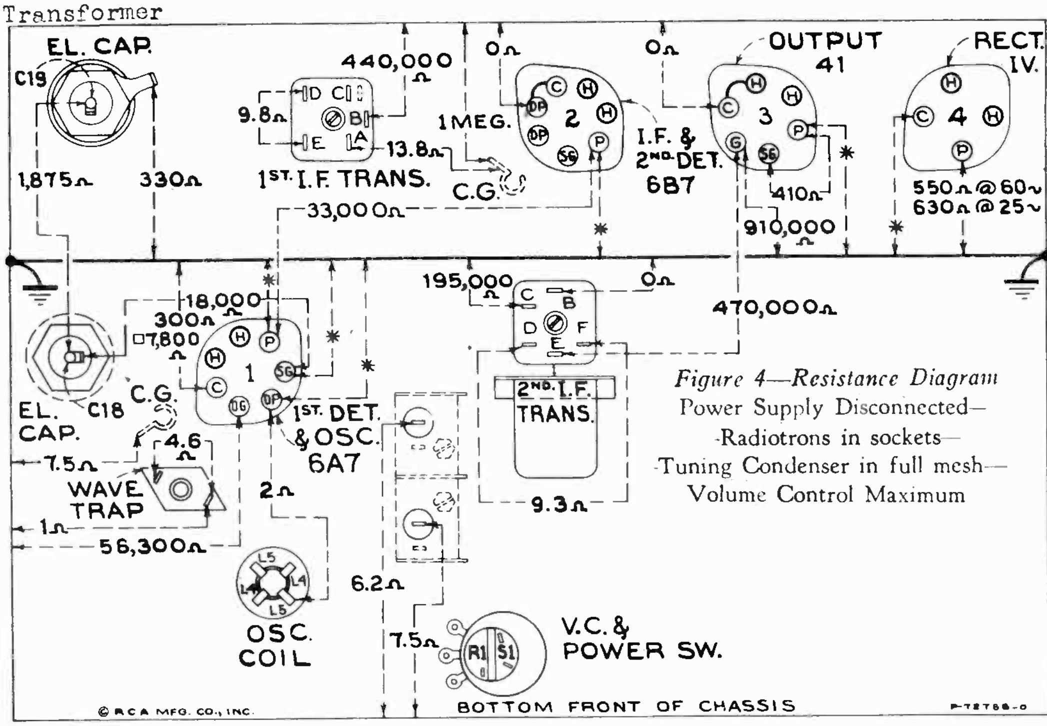


Figure 4—Resistance Diagram
Power Supply Disconnected—
Radiotrons in sockets—
Tuning Condenser in full mesh—
Volume Control Maximum

NOTE: □ VOLUME CONTROL AT "MIN." POSITION.
* OPEN CIRCUIT (LEAKAGE OF ELECTROLYTIC CAPACITORS ONLY).

Resistance Measurement

The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and receiver chassis ground, on Figure 4, have been carefully selected so as to facilitate a rapid continuity check of the circuits. The use of this diagram in conjunction with the Schematic Circuit Diagram, Figure 1, and Chassis Wiring Diagram, Figure 2, will permit the location of certain troubles which might otherwise be difficult to ascertain. Each value as specified should hold within ±20%. Variations in excess of this limit will usually be indicative of trouble in circuit under test. Resistance values were measured with the Radiotrons in sockets; tuning condenser in full mesh; and volume control set at maximum except where otherwise noted. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative terminal of the resistance meter to chassis-ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

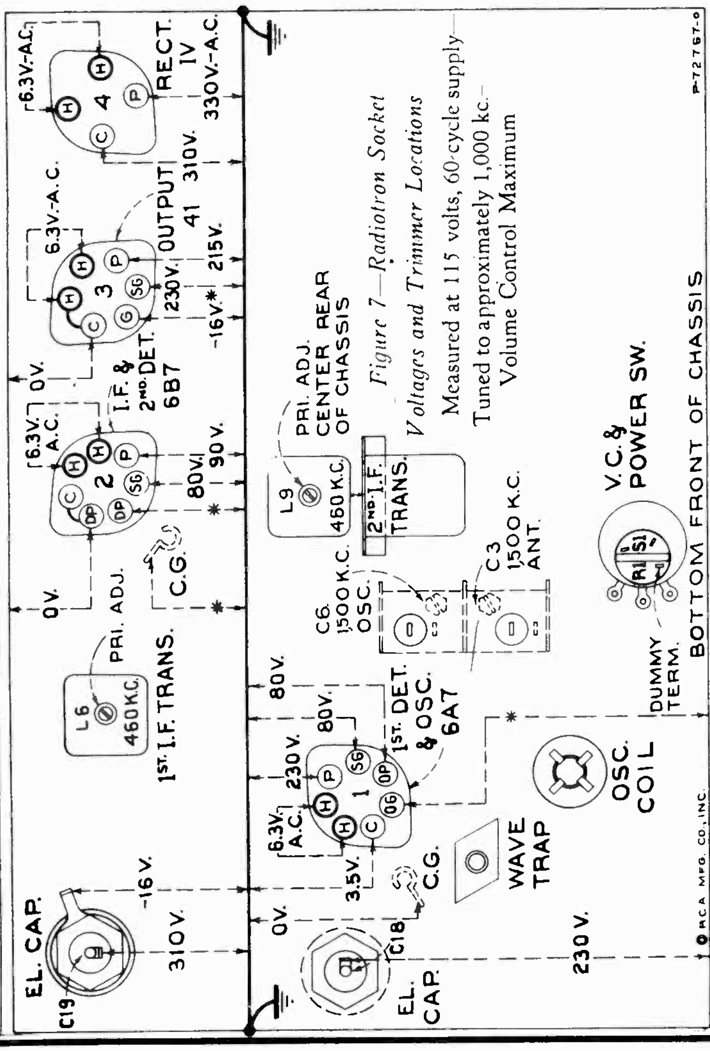


Figure 7—Radiotron Socket Voltages and Trimmer Locations
Measured at 115 volts, 60-cycle supply—
Tuned to approximately 1,000 kc.—
Volume Control Maximum

* CANNOT BE MEASURED WITH ORDINARY VOLTMETER.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground on Figure 7 will assist in locating cause for faulty operation. Each value as specified should hold within ±20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with receiver tuned to approximately 1,000 kc., no signal being received and volume control set at maximum. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm-per-volt d-c meter, having ranges of 10, 50, 250, and 500 volts. Use the nearest range above the voltage to be measured. A-C voltages were measured with a corresponding a-c meter.

Primary Resistance - 23.6 ohms Total
Secondary Resistance - 180 ohms Total

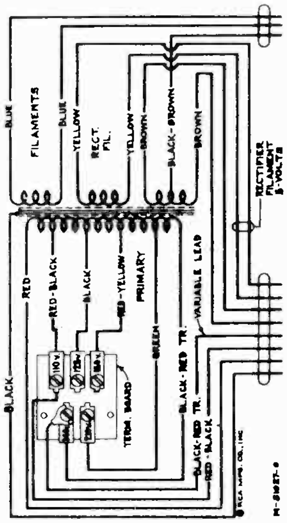


Figure 5—Universal Transformer

RCA MFG. CO., INC.

MODEL 4T
Circuit Data, Alignment
Parts List

GENERAL FEATURES

This model contains a four-tube chassis mounted in a table-type cabinet. The superheterodyne circuit is used, incorporating such features of design as automatic volume control, magnetite core adjusted i-f transformers, diode detection, reflexed audio system, electrodynamic speaker, and improved antenna wavetrap. The frequency range extends from 540 to 1,720 kc. which covers the regular broadcast band and includes police calls in the 1,600 to 1,720 kc. portion of the range.

CIRCUIT DESCRIPTION

Four Radiotrons are associated in combination with a superheterodyne circuit. Two of the Radiotrons are applied so as to obtain plural functions. The first tube, an RCA-6A7 pentagrid converter tube, is employed as a combination first detector and oscillator. The second tube, an RCA-6B7, performs the functions of i-f amplification, diode detection, audio amplification, and automatic volume control. A power-amplifier pentode, RCA-41, is used in the output stage.

Half-wave rectification is used in the power supply stage. The speaker field winding serves as a reactor in the filter circuit.

The radio-frequency and intermediate-frequency stages are intercoupled by means of transformers. The antenna transformer couples directly into the first detector, having its secondary tuned by one section (front) of the two-gang tuning condenser. The oscillator system is tuned by the second (rear) section of the condenser. Adjustable magnetite-core trimmers are provided for adjusting the inductance of the windings of the input i-f transformer (primary and secondary) and the output transformer (primary) so as to resonate at 460 kc. with the fixed capacitors shunting these respective coils. The i-f signal originating in the first-detector circuit is transferred to the control grid of the RCA-6B7, amplified in the pentode section, coupled back to the diode section of this same tube where it is rectified before passing through resistor R-4. A fraction of the audio component developed across resistor R-4 appears across resistor R-6 from whence it is transferred to the control grid of the Radiotron 6B7 through winding L-7; L-7 and capacitor C-10 offering low and high reactance respectively to audio frequencies. The amplified audio signal, in the plate circuit of the RCA-6B7, developed across resistor R-5 is coupled to the control grid of the power-output tube for final amplification. The output of this stage is coupled to the loudspeaker through the output transformer T-4. The d-c signal component, of the diode rectified current, developed across R-4, increases the bias of the RCA-6B7, thereby reducing its gain and giving A.V.C. action.

SERVICE DATA

NOTE: Oscillation may occur in receiver if external ground connection is not used.

The various diagrams of this booklet contain such information as will be needed to locate causes for defective operation if such develops. The values of resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams.

Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistance only. Ratings of less than one ohm are generally omitted.

ALIGNMENT PROCEDURE

There are two alignment trimmers provided in the antenna coil and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of three screws attached to molded magnetite cores.

All of the adjustable circuits of this receiver have been properly aligned at the factory to give correct performance and their settings should remain intact indefinitely when the receiver is used under ordinary conditions. However, necessity for re-adjustment may occasionally occur from continued extremes of temperature, climate, tampering or purported alteration for services, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the impairment of sensitivity, selectivity, and tone quality. Such conditions will usually exist simultaneously.

In re-adjusting the tuned circuits, it is important to apply a definite procedure, and to use adequate and reliable test equipment. A standard test oscillator such as the RCA Stock No. 9595 will be required as the source of the signal at the specified alignment frequencies. Visual indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. The RCA Stock No. 4317 Neon Output Indicator is especially suitable for this use.

The following procedure should be observed in adjusting the various trimming capacitors and molded magnetite cores:

I-F Core Adjustments

The three adjustment screws (one on top and one on bottom of first i-f transformer and one on bottom of second i-f transformer) are located as shown by Figures 5 and 7. Each circuit must be aligned to a basic frequency of 460 kc. To do this, attach the output indicator across the loudspeaker voice coil or across the output transformer primary. Connect the output of the test oscillator to the RCA-6A7 control grid, the ground of the test oscillator being connected to the receiver ground terminal. Adjust the test oscillator to 460 kc. Advance the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or local oscillator. Set the volume control to its maximum position. Increase the output of the test oscillator until a slight indication is apparent on the output indicator. Adjust the bottom screw of the second i-f transformer to produce maximum (peak) indicated receiver output. Then adjust the two screws of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device.

During these adjustments, regulate the test oscillator output so the indication is always as low as possible. By doing so, broadness of tuning, due to A.V.C. action, will be avoided. It is advisable to repeat the adjustment of all i-f screws to assure that the interaction between them has not disturbed the original adjustment.

Wave-Trap Adjustment

Attach the output of the test oscillator to the black antenna lead through a 300-ohm resistor, the ground connection of the test oscillator remaining the same. Leave the test oscillator adjusted to 460 kc. as before. Turn the rotor plates of the two-gang tuning condenser completely out of mesh. Then adjust the wave-trap trimmer to the point which causes maximum suppression of the 460 kc. signal.

R-F Trimmer Adjustments

Calibrate the tuning dial by first loosening its set screw and then rotating dial until the extreme end calibration mark (beyond 55 on dial) is in alignment with the dial shadow-indicator while the two-gang tuning condenser plates are in full mesh. Re-tighten set screw.

The output meter should be left connected to the output system. The connections for the test oscillator remain the same as for "Wave-trap adjustment."

Adjust the test oscillator to 1,500 kc. and set the receiver tuning control to a dial reading of 1,500 kc. Leave the volume control at its maximum position. Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the two trimming capacitors C-6 and C-3 of the oscillator and antenna coils, Figure 5, so that each produces maximum (peak) receiver output.

REPLACEMENT PARTS

STOCK NO.	DESCRIPTION	LIST PRICE
	Receiver Assemblies	
6956	Cap--Radiotron shield top for Stock No. 3942	.15
12118	Cap--Grid contact cap--Package of 5	.15
12405	Capacitor--47 Mmfd. (C12)	.26
12629	Capacitor--56 Mmfd. (C9)	.20
12404	Capacitor--120 Mmfd. (C8)	.26
12654	Capacitor--120 Mmfd. (C5)	.20
12406	Capacitor--180 Mmfd. (C10, C11)	.26
12536	Capacitor--820 Mmfd. (C13)	.25
12655	Capacitor--1000 Mmfd. (C1)	.25
5107	Capacitor--.0025 Mfd. (C14, C17)	.16
4838	Capacitor--.005 Mfd. (C15)	.20
4841	Capacitor--0.1 Mfd. (C16)	.22
4840	Capacitor--0.25 Mfd. (C4)	.30
11240	Capacitor--10 Mfd. (C19)	1.08
5212	Capacitor--18 Mfd. (C18)	1.16
11661	Coil--Antenna coil (L2, L3)	.52
11662	Coil-Oscillator coil (L4, L5)	.56
12624	Condenser--2 gang variable tun. condenser (C2, C3, C6, C7)	2.50
12006	Core-Core and stud assembly for Stock Nos. 12627, 12630 and 12631	.22
12632	Dial--Indicator dial scale	.45
12626	Indicator--Tuning indicator for Stock No. 12625--Package of 10	.22
4340	Lamp--Dial lamp--Package of 5	.60
11670	Resistor--330 ohms, carbon type, 1 watt (R10)--Package of 5	1.10
11671	Resistor--18,000 ohms, carbon type, 2 watt (R9)	.22
11669	Resistor--33,000 ohms carbon type, 1 watt (R5) Package of 5	1.10
12286	Resistor--56,000 ohms. Insulated, 1/4 watt (R2) Package of 5	1.00
12264	Resistor--220,000 ohms, Insulated, 1/4 watt (R4) Package of 5	1.00
12285	Resistor--470,000 ohms, Insulated, 1/4 watt (R7, R8)-Package of 5	1.00
12200	Resistor--1 megohm, Insulated, 1/4 watt (R3)-Package of 5	1.00
12628	Resistor--5.6 megohm, carbon type, 1/10 watt (R6) Package of 5	.75
12633	Screw--set screw for dial Stock No. 12632--Package of 10	.18
12008	Shield--First I.F. transformer shield	.28
12607	Shield--First I.F. transformer shield cap	.30
11126	Shield--Oscillator coil shield	.12
3942	Shield--Radiotron shield	.18
12408	Shield--Second I.F. transformer shield	.28

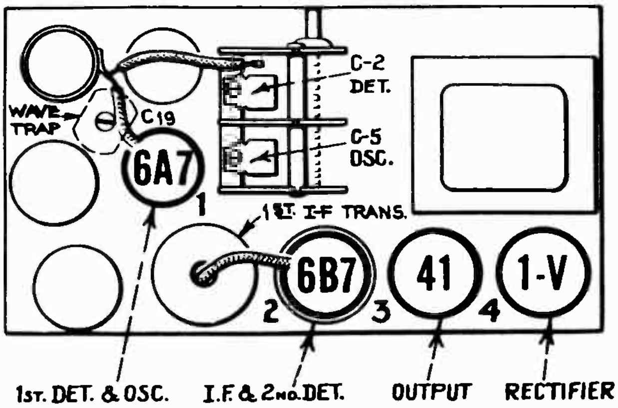
STOCK NO.	DESCRIPTION	LIST PRICE
4794	Socket--4-contact rectifier RCA-1V Radiotron socket	.15
4786	Socket--6-contact RCA-41 Radiotron socket	.15
4787	Socket--7-contact RCA-6A7 or RCA-6B7 Radiotron socket	.15
12625	Socket--Dial lamp socket, bracket and indicator	.28
12007	Spring--Retaining spring for Stock No. 12006--Package of 10	.36
12627	Transformer--First I.F. transformer (L6, L7, C8, C9, C10, R6)	1.84
11664	Transformer--Power transformer, 105-125 volts 50-60 cycles (T1)	3.60
11665	Transformer--Power transformer, 105-125 volts, 25-60 cycles (T1)	5.06
11666	Transformer--Power transformer, 100-130, 140-160 195-250 volts, 40-60 cycles	3.80
12630	Transformer--Second I.F. transformer (L8, L9, C11, C12)	1.44
12631	Trap--Wave trap (L1)	.65
11663	Volume Control--Volume control and operating switch (R1, S1)	1.20
	REPRODUCER ASSEMBLIES	
12446	Coil--Neutralizing coil (L10)	.22
12576	Coil--Reproducer field coil (L12)	1.70
12574	Cone--Reproducer cone complete (L11)	1.35
5118	Connector--3-contact male connector plug for reproducer	.25
5119	Connector--3-contact female connector plug for reproducer	.25
9698	Reproducer, complete	5.70
12575	Transformer--Output transformer (T2)	1.60
	MISCELLANEOUS ASSEMBLIES	
11347	Knob--Station selector knob Package of 5	.75
12638	Knob--Volume control knob Package of 5	.58
11349	Spring--Retaining spring for knob, Stock Nos. 11347 and 12638--Package of 5	.15

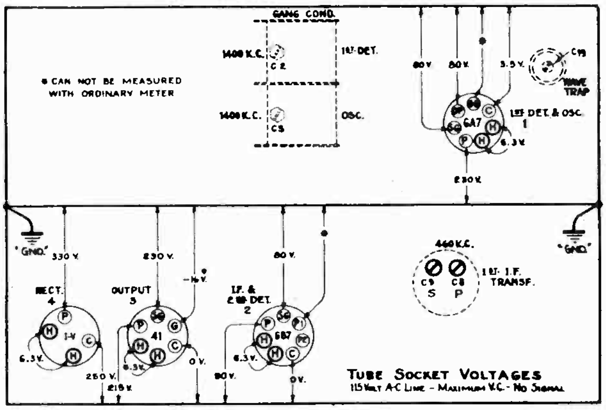
The prices quoted above are subject to change without notice

MODELS T4-8A,T4-9A
Voltage,Socket,Data
Parts List

RCA MFG. CO., INC.

These instruments are similar to Models T 4-8 and T 4-9 except for several circuit modifications. The major differences include:—rearrangement of wave-trap circuit, removal of oscillator low frequency trimmer, replacement of the RCA-6F7 with an RCA-6B7, and reflexing of the i-f stage for additional audio amplification. The intermediate frequency remains at 460 kc. The antenna and oscillator coils are to be aligned only at 1400 kc. Refer to T 4-8 and T 4-9. Service Notes for loudspeaker data, power ratings and specifications.





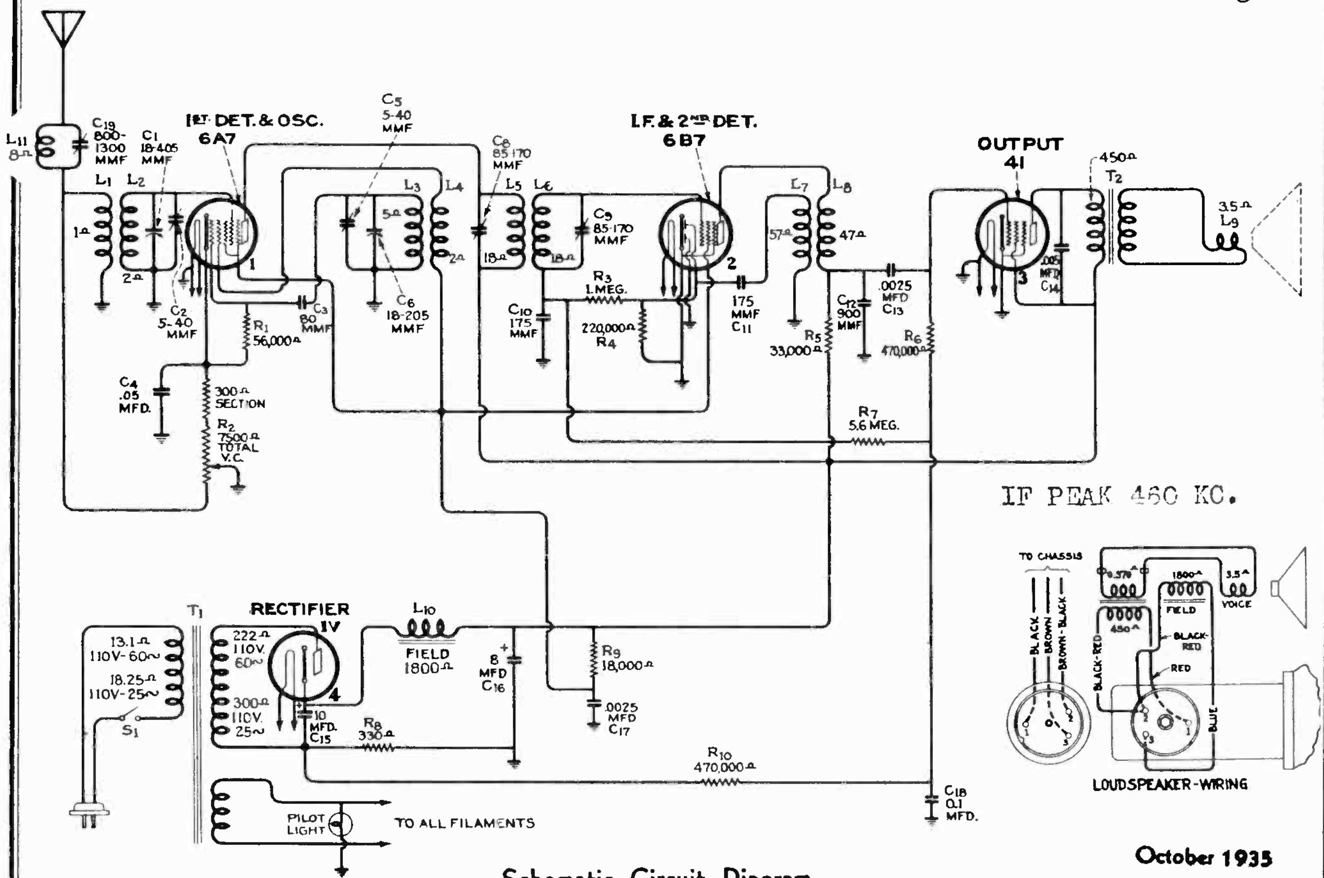
REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	Description	List Price
	Receiver Assemblies	
4244	Cap—Grid contact cap—Package of 5	$ 0.20
6956	Cap—Second detector Radiotron shield cap	.15
4246	Capacitor—80 mmfd. (C3)	.24
5116	Capacitor—175 mmfd. (C10)	.18
11500	Capacitor—175 mmfd. (C11)	.18
3784	Capacitor—900 mmfd. (C12)	.30
5107	Capacitor—.0025 mfd. (C13, C17)	.16
4868	Capacitor—.005 mfd. (C14)	.20
4836	Capacitor—.05 mfd. (C4)	.30
4841	Capacitor—0.1 mfd. (C18)	.22
11497	Capacitor—8 mfd. (C16)	1.04
11240	Capacitor—10 mfd. (C15)	1.08
11661	Coil—Antenna coil (L1, L2)	.52
11662	Coil—Oscillator coil (L3, L4)	.56
11660	Condenser—Two gang variable tuning condenser (C1, C2, C5, C6)	2.50
11659	Dial—Station selector dial	.35
11670	Resistor—330 ohms—carbon type—1 watt (R8)—Package of 5	1.10
11671	Resistor—18,000 ohms—carbon type—2 watts (R9)	.22
11669	Resistor—33,000 ohms—carbon type—1 watt (R5)—Package of 5	1.10
5029	Resistor—56,000 ohms—carbon type—¼ watt (R1)—Package of 5	1.00
5158	Resistor—220,000 ohms—carbon type—¼ watt (R4)—Package of 5	1.00
11172	Resistor—470,000 ohms—carbon type—¼ watt (R6, R10)—Package of 5	1.00
3033	Resistor—1 Megohm—carbon type—¼ watt (R3)—Package of 5	1.00
11668	Resistor—5.6 Megohms—carbon type—¼ watt (R7)—Package of 5	1.00
11126	Shield—Oscillator coil shield	.12
3942	Shield—Second detector Radiotron shield	.18
11390	Shield—First intermediate frequency transformer shield	.25
4340	Lamp—Dial lamp—Package of 5	.60
5152	Transformer—First intermediate frequency transformer (L5, L6, C8, C9)	1.68
7955	Transformer—Second intermediate frequency transformer (L7, L8)	.85
11665	Transformer—Power transformer—105-125 volts 25-50 cycles	5.06
11666	Transformer—Power transformer—100-130/140-160/195-250 volts 40-60 cycles	3.80
11664	Transformer—Power transformer—105-125 volts 50-60 cycles—(T1)	3.60
11667	Trap—Wave trap (L11, C19)	1.22
11663	Volume control (R2, S1)	1.20
	Reproducer Assemblies	
11672	Coil—Field coil, magnet and cone support assembly (L10)	3.45
9588	Cone—Reproducer cone (L9)—Package of 5	3.55
5119	Connector—Three-contact female connector for reproducer cable	.25
5118	Connector—Three-contact male connector for reproducer	.25
9630	Reproducer—Complete	5.50
4893	Transformer—Output transformer (T2)	1.48

MODELS T4-8A, T4-9A
Schematic
Chassis Wiring

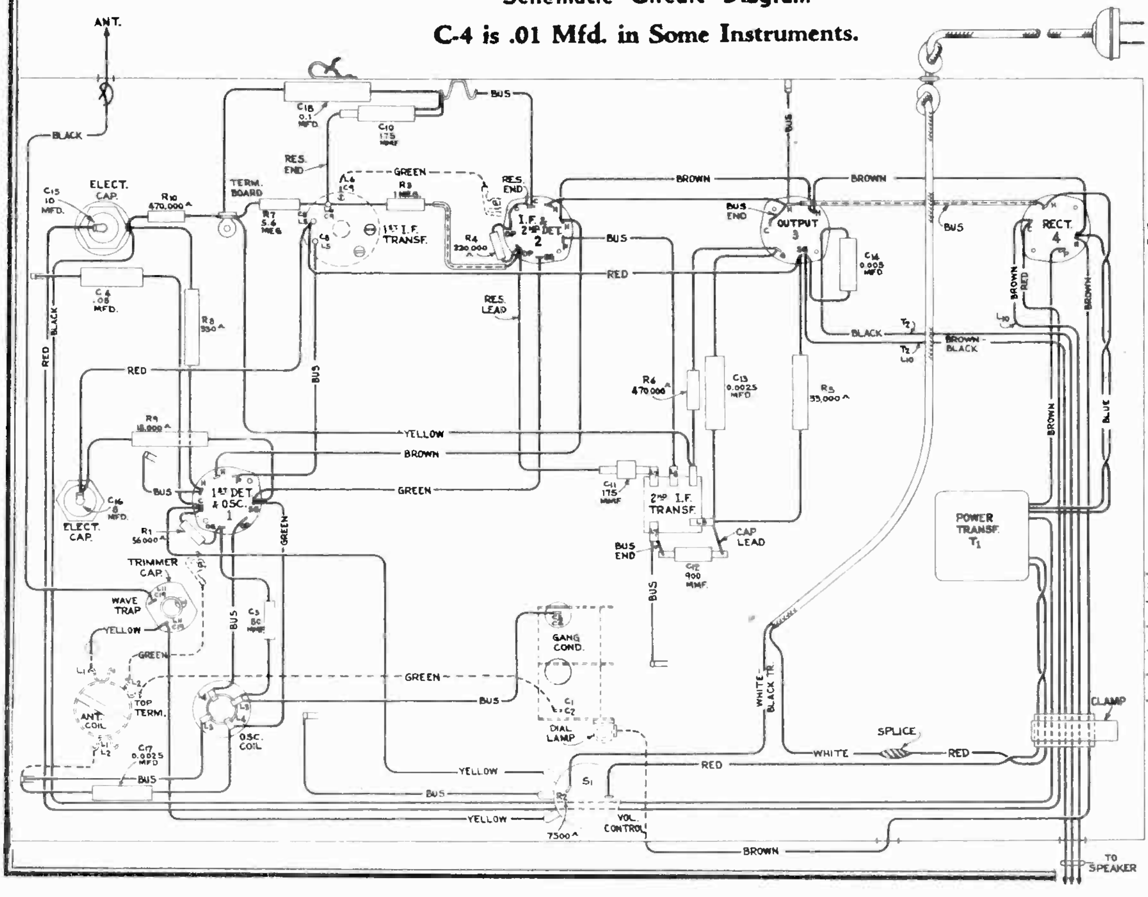
RCA MFG. CO., INC.

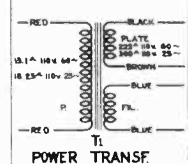


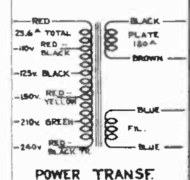
October 1935

Schematic Circuit Diagram

C-4 is .01 Mfd. in Some Instruments.







MODELS 4X, 4X3, 4X4
Circuit Data
Alignment, Parts

RCA MFG. CO., INC.

General Features

Each model contains a four-tube chassis mounted in a table-type cabinet. The superheterodyne type of circuit is used, with such features of design as magnetite core adjusted i-f transformers, improved core adjusted antenna wave-trap, illumination of full-vision dial scale, resistance-coupled audio system, and an electrodynamic loudspeaker. The tuning range covers from 540 to 1,720 kc which includes the standard-broadcast and one police band.

Circuit Arrangement

The conventional superheterodyne type of circuit, consisting of a combined first-detector–oscillator stage, a combined i-f amplifier and second detector stage, an audio power-output stage, and a half-wave rectifier stage, is used.

Tuned Circuits

The antenna and oscillator coils are tuned by a variable two-section gang condenser having trimming capacitors in shunt with each section. A wave-trap is employed and is connected in series with the antenna to reduce undesirable signals in the range of the i-f amplifier. It is tuned to 460 kc by means of a screw attached to the molded magnetite core.

The intermediate-frequency amplifier system consists of the pentode section of the RCA-6F7 in a transformer-coupled circuit. This stage operates at a basic frequency of 460 kc. Adjustable mangetite cores are provided for adjusting the inductance of the first i-f transformer primary and secondary, and the second i-f transformer secondary windings to 460 kc.

Second Detector and Audio System

The second-detector circuit uses the triode-portion of the RCA-6F7 in a conventional three-element power-detector circuit. The output of this stage is resistance-capacitance coupled to an RCA-43 power-output tube which, in turn, is transformer-coupled to the dynamic speaker.

Rectifier

The plate, grid, cathode, and the loudspeaker field voltages required for the operation of this receiver are supplied by the RCA-25Z5 tube operating as a half-wave rectifier.

SERVICE DATA

Alignment Procedure

There are two alignment trimmers provided in the antenna-coil and oscillator-coil tuned circuits. The i-f transformer adjustments are made by means of three screws attached to molded magnetite cores. The wave-trap is likewise adjusted by a screw attached to its molded core. Re-adjustment may occasionally occur from continued extremes of climate, tampering, purported alteration for services, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the impairment of sensitivity, selectivity, and tone quality. Such conditions will usually exist simultaneously.

In re-adjusting the tuned circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as the RCA Stock No. 9595, will be required as the source of the signal at the specified alignment frequencies. Visual indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. The **RCA Stock No. 4317 Neon Output Indicator** is especially suitable for this use.

The procedure outlined below should be followed in adjusting the various trimming capacitors and molded magnetite cores:

I-F Core Adjustments

The three adjustment screws (one on top and one on bottom of first i-f transformer and one on bottom of second i-f transformer) are located as shown by figures 2 and 4. Each circuit must be aligned to a basic frequency of 460 kc. To do this, attach the output indicator across the loudspeaker voice coil. Connect the output of the test oscillator through a .05-mfd. capacitor to the RCA-6A7 control grid, the ground of the test oscillator being connected to the receiver chassis. Set the test oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from broadcast stations or the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator.

Adjust the bottom core screw of the second i-f transformer to produce maximum (peak) indicated receiver output. Then adjust the two core screws of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device.

It is advisable to repeat the adjustment of all i-f core screws to assure that the inter-action between them has not disturbed the original adjustment.

Wave-Trap Adjustment

Attach the output of the test oscillator to the "Antenna terminal" (see wave-trap, top view chassis, figure 2) through an 80-mmfd. capacitor, the ground connection of the test oscillator and receiver chassis being connected as before. Receiver **"Antenna wire" should be reeled up for this and the following r-f adjustments.**

Leave the test oscillator adjusted to **460 kc** as before. Then adjust the wave-trap trimmer to the point which causes maximum suppression of the 460 kc signal.

R-F Trimmer Adjustments

Since the dial is mounted on the cabinet, it will be necessary to perform the operations, in sequence, as follows:

Place the receiver in its cabinet. Set the gang tuning condenser to its maximum capacity (full-mesh) position and place the tuning knob on the gang tuning condenser shaft. Tighten the knob set screw with the dial pointer set to the low-frequency calibration line beyond 550 kc (beyond "55" on the dial). Turn the tuning knob until the dial pointer indicates **1,500 kc.** Remove the tuning knob from shaft and receiver from cabinet, being careful not to disturb the setting of the gang condenser.

With the test oscillator and output indicator connected as specified under "Wave-trap adjustment" and receiver volume control in its maximum position, tune the test oscillator to **1,500 kc** and regulate its output to produce a suitable indication on the output indicator. Adjust the oscillator and antenna trimmers **C8** and **C4** for maximum (peak) output.

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed either permanently by cutting it away with a sharp knife, or by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground, on figure 4, will assist in locating cause for faulty operation. Each value as specified should hold within ±20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with set tuned to approximately 550 kc, no signal being received, and volume control set to maximum. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm-per-volt d-c meter, having ranges of 10, 50, and 250 volts. Use nearest range above voltage to be measured. A-c voltages were measured with a corresponding a-c meter.

Resistance Measurements

The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and receiver chassis ground, on figure 3, have been carefully selected so as to facilitate a rapid check of the circuit for defective parts, bad joints, etc. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 1, and the Chassis Wiring Diagram, figure 2, will permit the location of certain troubles which would otherwise be difficult to ascertain. Each value as specified should hold within ±20%. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. Resistance values were measured with the Radiotrons in sockets, power supply disconnected, tuning condenser in full-mesh, and volume control set at maximum except where otherwise noted. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative (−) terminal of the resistance meter to the chassis ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

REPLACEMENT PARTS

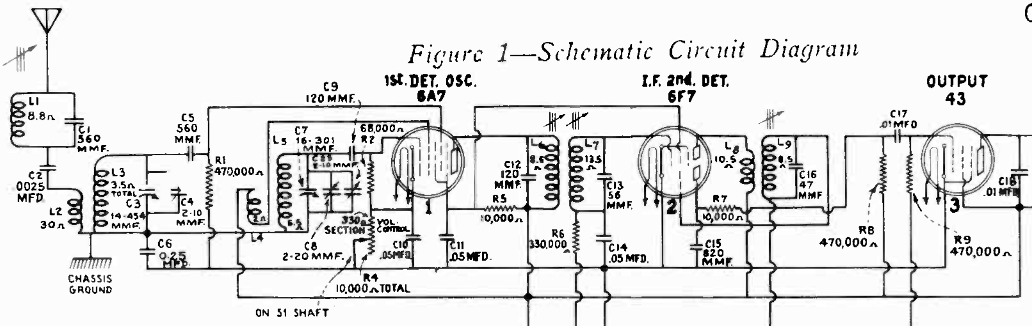
Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
12118	Cap—Grid contact cap—Package of 5	.15
12405	Capacitor—47 Mmfd. (C16)	.26
12629	Capacitor—56 Mmfd. (C13)	.20
12404	Capacitor—120 Mmfd. (C12)	.26
12724	Capacitor—120 Mmfd. (C9)	.28
12537	Capacitor—560 Mmfd. (C1, C5)	.20
12536	Capacitor—820 Mmfd. (C15)	.25
5107	Capacitor—.0025 Mfd. (C2)	.16
4858	Capacitor—.01 Mfd. (C17, C18)	.25
4836	Capacitor—.05 Mfd. (C10, C11, C14, C22, C24)	.30
4886	Capacitor—.05 Mfd. (C19)	.20
4840	Capacitor—0.25 Mfd. (C23)	.30
12484	Capacitor—0.25 Mfd. (C6)	.24
12844	Capacitor—Pack comprising 2 sections each 16 Mfd. (C20, C21)	2.55
12837	Coil—Antenna coil (L2, L3)	1.50
12838	Coil—Oscillator coil (L4, L5)	.85
12842	Condenser—2-gang variable tuning condenser (C3, C4, C7, C8)	2.30
12847	Cord—Power cord, 153 ohm resistance (R14)	.95
12006	Core—Adjustable core and stud for Stock No. 12497, 12839 and 12840	.22
4340	Lamp—Dial lamp, 6.3 volt—Package of 5	.60
12409	Lead—Antenna lead approximately 20 feet long	.35
12843	Reactor—Iron core reactor (L13)	1.00
12848	Resistor—47 ohm—insulated—1/4 watt—Package of 5 (R11)	1.00
12841	Resistor—390 ohm—carbon type—1/10 watt—Package of 5 (R10)	.75
12265	Resistor — 10,000 ohm — insulated — 1/4 watt—Package of 5 (R5, R7)	1.00
12412	Resistor—47,000 ohm—insulated—1/4 watt—Package of 5 (R12)	1.00
12696	Resistor—68,000 ohm—insulated—1/4 watt—Package of 5 (R2)	1.00
11297	Resistor—330,000 ohm—carbon type—1/10 watt—Package of 5 (R6)	.75
11452	Resistor—470,000 ohm—carbon type—1/10 watt—Package of 5 (R1)	.75
12285	Resistor—470,000 ohm — insulated — 1/4 watt—Package of 5 (R8, R9)	1.00
12013	Resistor—1 meg—carbon type—1/10 watt—Package of 5 (R13)	.75
12845	Resistor—Wire wound 40 ohms (R3)	.40
12008	Shield—I.F. transformer shield for Stock No. 12839	.28
12408	Shield—I.F. transformer shield for Stock No. 12840	.28
12218	Shield—Radiotron shield	.15
12607	Shield—Shield top for Stock No. 12839	.30
12007	Spring—Retaining spring of core Stock No. 12006—Package of 10	.36
4786	Socket—6-contact 43 or 25Z5 radiotron socket	.15
4787	Socket—7-contact 6A7 or 6F7 radiotron socket	.15
12846	Socket—Dial lamp socket	.25
12839	Transformer—First I.F. transformer complete (L6, L7, C12, C13, R6, R10)	2.30
12840	Transformer — Second I.F. transformer complete (L8, L9, C16, R13)	1.50
12497	Trap—Wave trap (L1)	.70
12836	Volume Control and power switch (R4, S1)	1.10
	REPRODUCER ASSEMBLIES (M80864-1)	
12499	Coil—Field coil (L12)	1.60
12731	Coil—Neutralizing coil (L11)	.22
12498	Cone—Reproducer cone and dust cap (L10)	1.20
9684	Reproducer Complete	2.25
12500	Transformer—Output transformer (T1)	1.60
	REPRODUCER ASSEMBLIES (M80864-2)	
13149	Coil—Reproducer field coil (L12)	1.60
13150	Coil—Reproducer neutralizing coil (L11)	.25
13148	Cone—Reproducer cone complete (L10)	1.25
9750	Reproducer—Speaker complete	5.50
13151	Transformer—Output transformer (T1)	1.60
	MISCELLANEOUS ASSEMBLIES	
12834	Dial—Station selector dial scale (4X and 4X3)	.50
12935	Dial—Station selector dial scale (Used on 4X4 only)	.55
12833	Knob—Station selector knob—Package of 5 (4X and 4X3)	.50
12934	Knob—Station selector knob—Package of 5 (4X4 only)	.45
12933	Knob—Volume control knob—Package of 5 (4X4 only)	.45
12673	Knob—Volume control knob—Package of 5 (4X and 4X3)	.58
12835	Screw — Chassis mounting screw and washers—Package of 10	.30
4119	Screw—Set screw for knob Stock No. 12673, 12833, 12933 and 12934—Package of 20	.38

The prices quoted above are subject to change without notice.

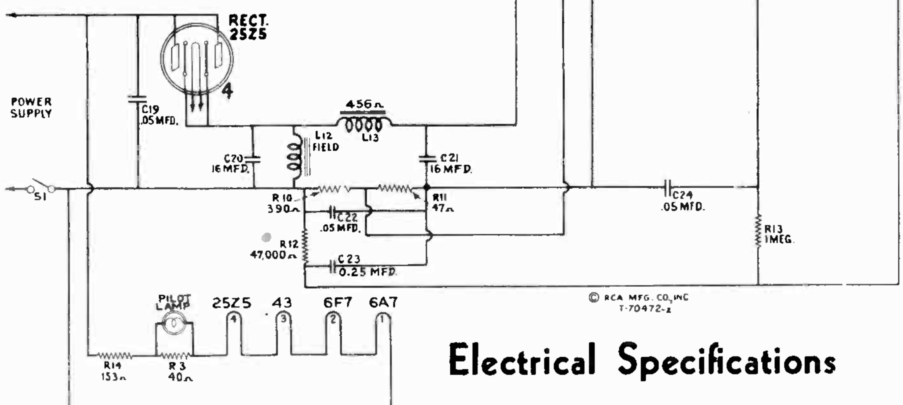
MODELS 4X,4X3,4X4
Schematic,Data
Chassis Wiring

RCA MFG. CO., INC.

Figure 1—Schematic Circuit Diagram



Intermediate Frequency........460 kc



Electrical Specifications

LOUDSPEAKER
Type...........................Electrodynamic
Impedance (v.c.) {M80864-1, 4.5 ohms} at 400 cycles
{M80864-2, 3.0 ohms}

POWER OUTPUT
Undistorted..........0.3 watts A.C., 0.25 watts D.C.
Maximum...............0.8 watts A.C., 0.6 watts D.C.

FREQUENCY RANGE
"Standard Broadcast" (A).......... 540-1,720 kc

ALIGNMENT FREQUENCIES
"Standard Broadcast" (A)...1,500 kc (osc. and ant.)

RADIOTRON COMPLEMENT
(1) RCA-6A7............First Detector-Oscillator
(2) RCA-6F7...........I. F. and Second Detector
(3) RCA-43.......................Power Output
(4) RCA-25Z5...............Half-wave Rectifier

Pilot Lamp...........Mazda No. 40, 6.3 volts, 0.15 ampere
Power Supply Rating (105-125 volts)...50-60 cycles—55 watts, D.C.—50 watts

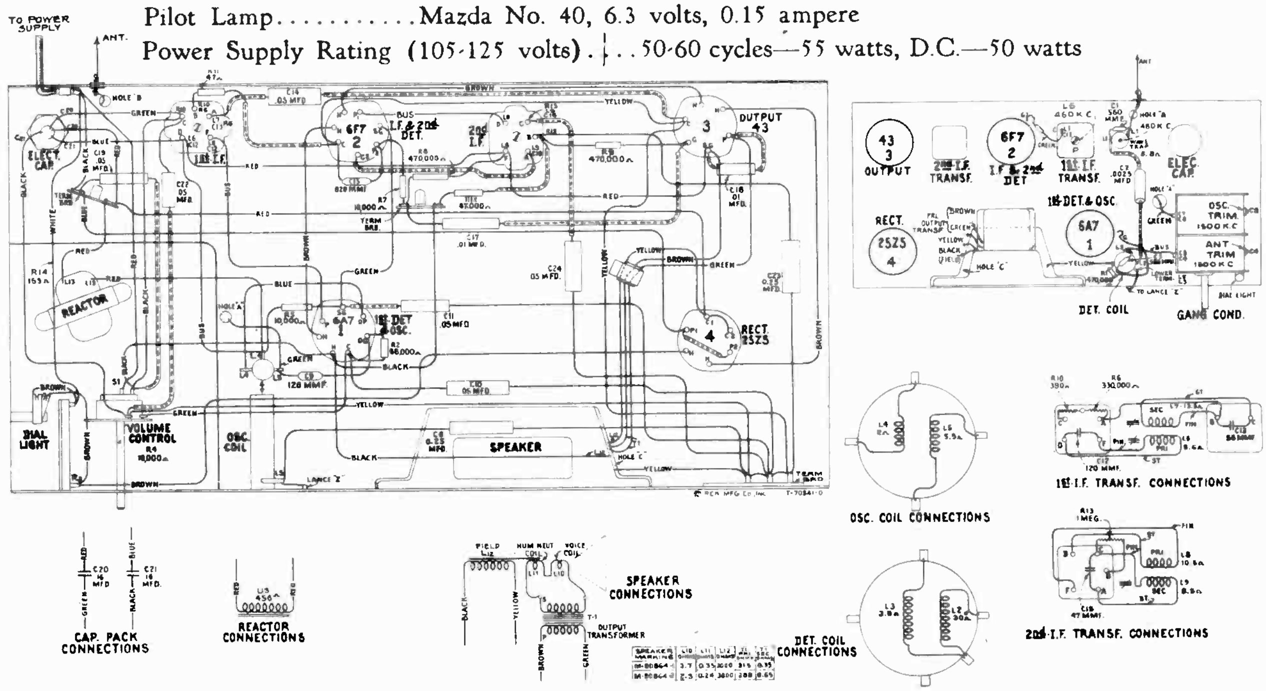


Figure 2—Chassis Wiring Diagram, Radiotron, Coil, and Trimmer Locations

MODELS 4X,4X3,4X4
Socket,Trimmers
Voltage,Resistance

RCA MFG. CO., INC.

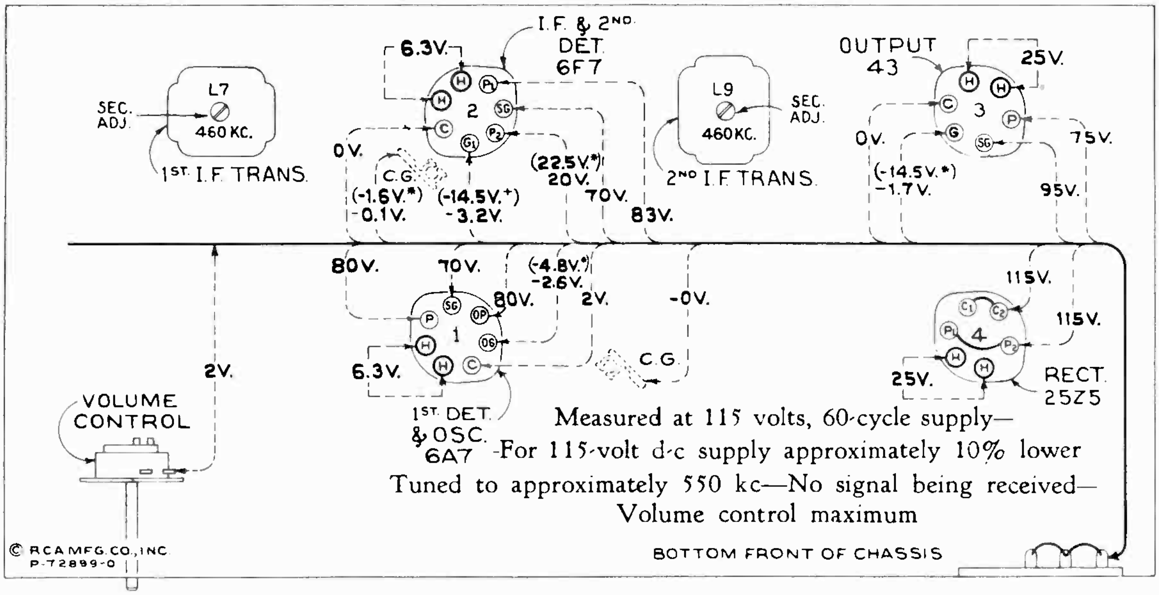


Figure 4—Radiotron Socket Voltages and Trimmer Locations

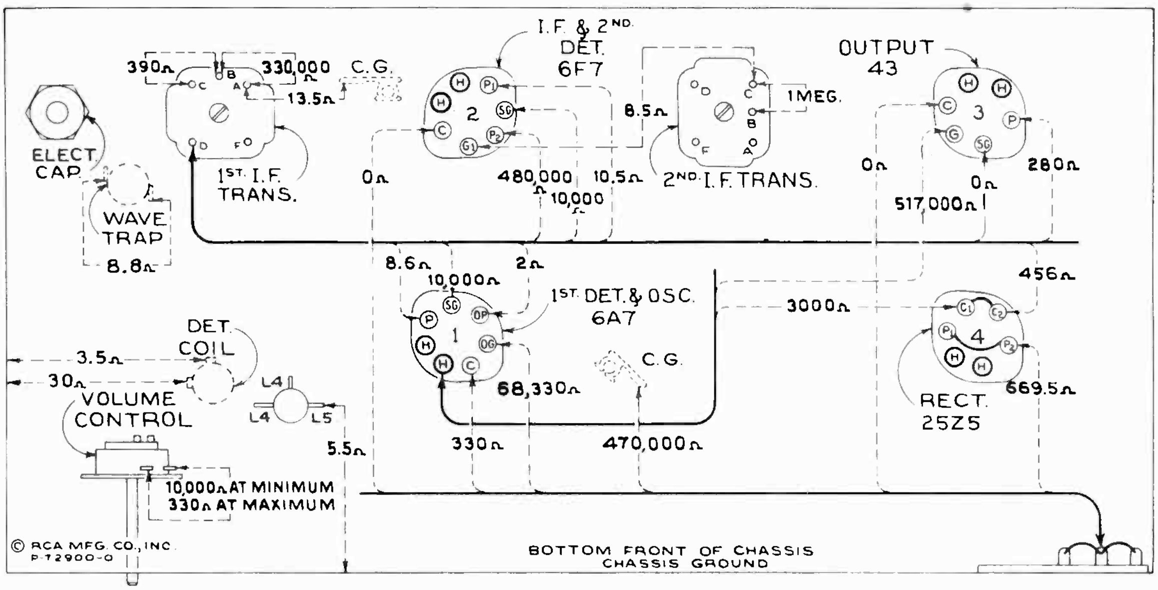


Figure 3—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full-mesh
Volume control maximum

Mechanical Specifications

CABINET DIMENSIONS	MODEL 4X	MODEL 4X3	MODEL 4X4
Height	10⅞ inches	12 inches	10½ inches
Width	8$\frac{5}{16}$ inches	7½ inches	7⅜ inches
Depth	5⅝ inches	5⅛ inches	5⅝ inches
WEIGHTS			
Net	9 pounds	9 pounds	8½ pounds
Shipping	11 pounds	11 pounds	10½ pounds

Chassis Base Dimensions.......................9¼ inches x 4⅝ inches x 1½ inches
Over-all Height of Chassis.......................5¾ inches
Operating Controls.......................(1) Power Switch-Volume, (2) Tuning

Socket Trimmers

MODEL 5M
Schematic

RCA MFG. CO., INC.

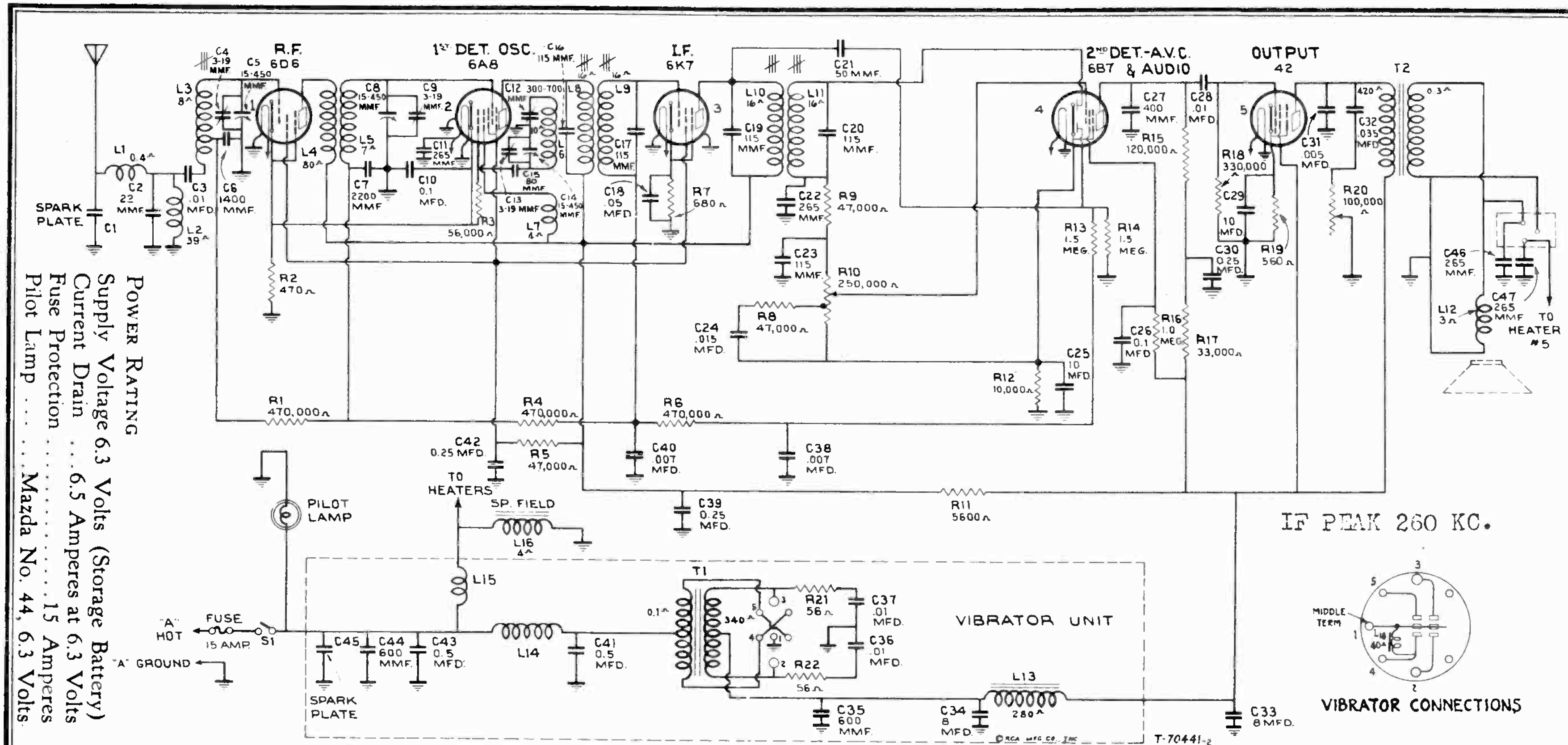


Figure 1—Schematic Circuit Diagram

Certain automobile installations require change of value of capacitor C-3. See note in text under "Service Data."

POWER RATING

Supply Voltage 6.3 Volts (Storage Battery)
Current Drain ...6.5 Amperes at 6.3 Volts
Fuse Protection ....15 Amperes
Pilot Lamp ... ...Mazda No. 44, 6.3 Volts

Electrical Specifications

RADIOTRON COMPLEMENT

(1) RCA-6D6..........Radio Frequency Amplifier
(2) RCA-6A8............First Detector–Oscillator
(3) RCA-6K7.............Intermediate Amplifier
(4) RCA-6B7..Second Det., A-F Amp., and A.V.C.
(5) RCA-42......................Power Output

Tuning Range ....540 to 1,600 kc.

OUTPUT RATING

Maximum ....4 Watts
Undistorted ....2.25 Watts

LOUDSPEAKER

Type ....Electrodynamic
Impedance (V. C.)..........3 Ohms at 400 Cycles

ALIGNMENT FREQUENCIES

I. F. Transformers ....260 kc.
Oscillator Coil ....600 kc. and 1,400 kc.
Detector Coil ......1,400 kc.
Antenna Coil ......1,400 kc.

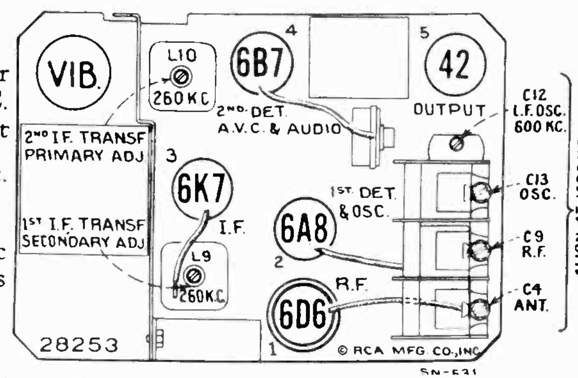


Figure 3—Radiotron, Coil, and Trimmer Locations

MODEL 5M
Chassis Wiring

RCA MFG. CO., INC.

WEIGHT

Receiver and Accessories Complete .... 23½ pounds
Complete Equipment Packed for Shipment .... 26 pounds

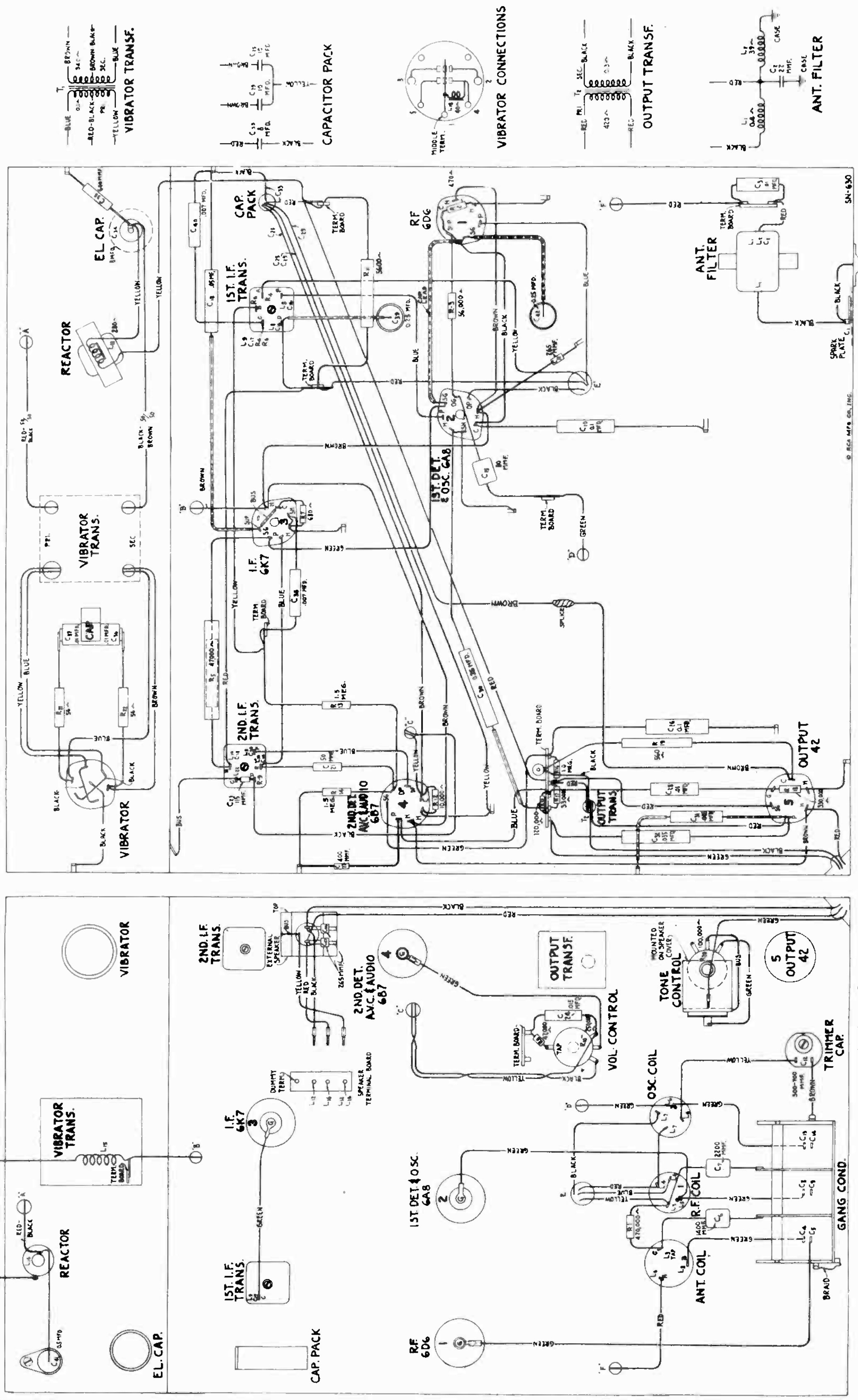


Figure 2—Chassis Wiring Diagram

Mechanical Specifications

RECEIVER CASE DIMENSIONS

Height .... 7 Inches Width .... $10\frac{1}{16}$ Inches Depth .... $7\frac{1}{8}$ Inches

OPERATING CONTROLS .... (1) Power Switch-Volume, (2) Tuning, (3) High-Frequency Tone

TUNING DRIVE RATIO 12-to-1

MODEL 5M
Socket,Voltage
Loudspeaker,Trimmers

RCA MFG. CO., INC.

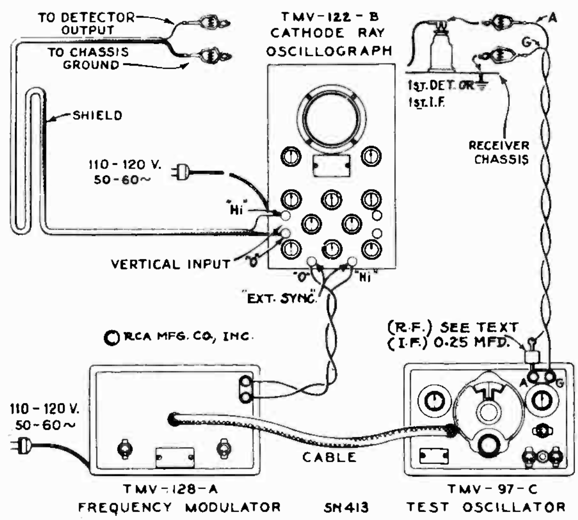


Figure 4—Alignment Apparatus Connections

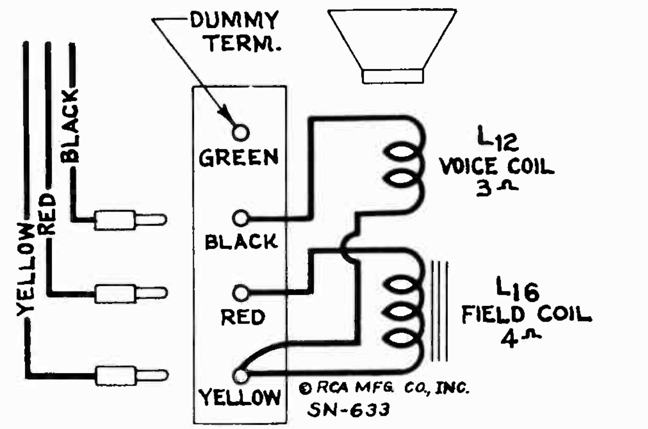
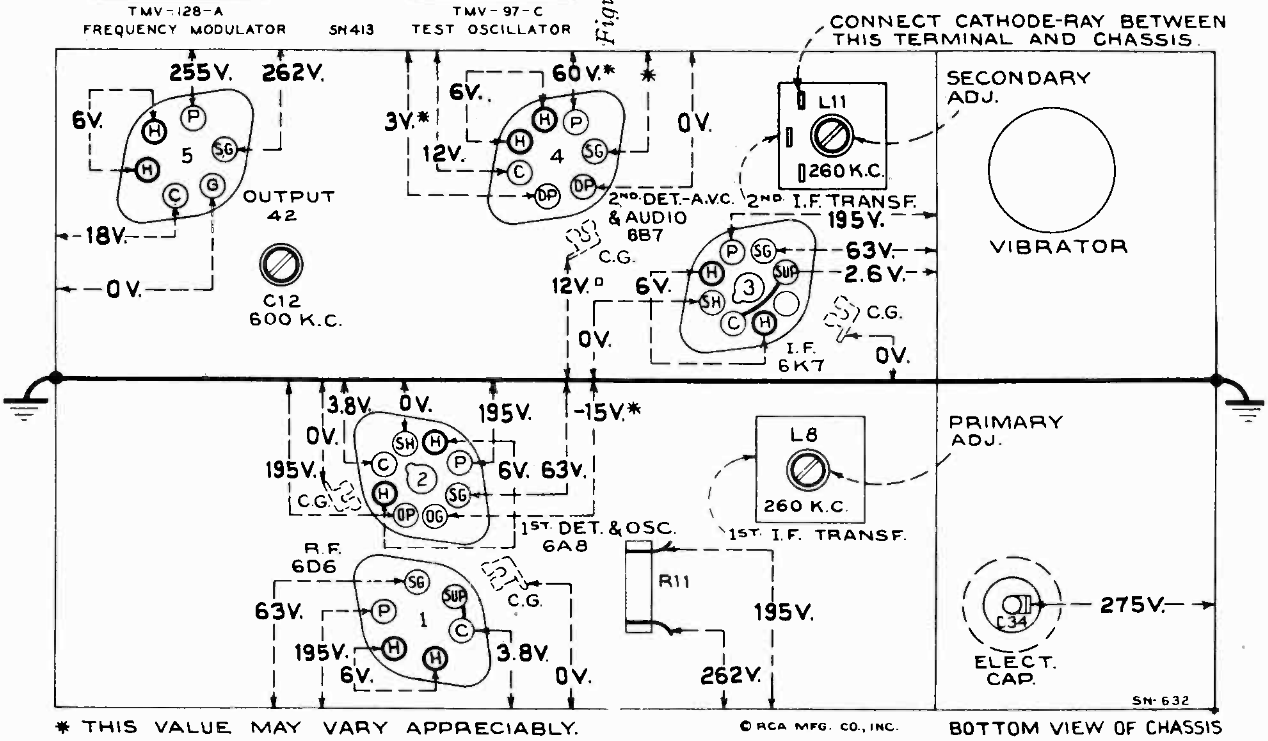


Figure 6—Loudspeaker Schematic and Wiring



* THIS VALUE MAY VARY APPRECIABLY.
□ VOLUME CONTROL AT MINIMUM SETTING.

Figure 5—Radiotron Socket Voltages and Trimmer Locations
(Measured at 6.3 volts battery supply—Volume Control Maximum—No Signal)

Radiotron Socket Voltages

Operating conditions of the basic circuits of this instrument may be determined by measuring the voltages applied to the tube elements. Figure 5 shows the voltage values from the socket contacts to ground and appearing across the heater contacts (H-H). Each value as specified should hold within ±20% when this instrument is normally operative, with all tubes intact and rated voltage applied. Variations in excess of this limit will usually be indicative of trouble.

The voltages given on this diagram are actual measured voltages, and are obtained with the voltmeter load in the circuit.

To fulfill the conditions under which the d-c voltages were measured requires a 1,000-ohm-per-volt d-c voltmeter having ranges of 10, 50, 250, and 500 volts. Voltages below 10 volts should be measured on the 10-volt scale; between 10 and 50 on the 50-volt scale; between 50 and 250 on the 250-volt scale; and above 250 on the 500-volt scale.

For meters of the 1,000-ohm-per-volt type, but ranges other than above, use the nearest ranges to those specified. If the range is higher the voltage may be higher, if the range is lower the voltage may be lower; either condition depending on the percentage of circuit current drawn by the meter.

MODEL 5M
Circuit Data
Alignment, Notes

RCA MFG. CO., INC.

General Description

Model 5M is a single-unit receiver containing the radio chassis, power conversion system, and loudspeaker all in one housing. A convenient three-contact loudspeaker receptacle installed on the chassis case permits the addition of a remote dynamic loudspeaker if desired.

Engineering features incorporated in this instrument are: The inclusion of ignition suppression means within the circuits of the receiver; reduction of power line modulation in antenna circuit; improved high-gain molded core antenna coil; permeability tuned intermediate frequency transformers; continuously variable high frequency tone control, and a "plug-in" type of synchronous rectifier-vibrator for obtaining high-voltage supply. Correct arrangement of parts, adequate shielding, and the ingenious insertion of filters at proper points in the circuit insure minimum disturbances from apparatus associated with the electrical circuits of the automobile and from adjacent power lines.

This receiver is housed in a substantial metal case. Removable covers permit ready access to the under and top sides of the chassis. Flexible shafts interconnect the operating head to the controlled devices within the receiver housing. The unit is adaptable for mounting on either the left-hand or the right-hand side of the firewall as local conditions demand.

Circuit Arrangement

The schematic and wiring layouts of the electrical circuit are shown in Figures 1 and 2, respectively. From these diagrams it may be seen that five Radiotrons are incorporated in the basic superheterodyne circuit. In sequence, there is an r-f stage, a dual first-detector-oscillator stage, a single i-f stage, a second detector audio-amplifier a.v.c. stage, and a pentode power output stage. The power supply system contains a mechanical interrupter and rectifier. The following circuit features are of particular importance:

Noise Filter—Reduction of ignition interference and similar disturbances are brought about by filter arrangements in the antenna input circuit and the "A" battery input lead. This antenna filter, L-1, C-1, and C-2, is a "low-pass" type, having an acceptance band below 1,600 kc. The inductance L-2 is for the purpose of shunting out power line hum pickup.

Tuned Circuits—There are seven resonant circuits in the radio frequency end of the receiver. The r-f, first detector, and oscillator grid circuits are tuned by a three-gang tuning condenser. The remaining tuned circuits consist of the primary and secondary windings of the i-f transformers which resonate with fixed condensers and are tuned by molded cores to a nominal frequency of 260 kilocycles.

Detection—Detection takes place as the result of the rectifying action of one of the diodes of the RCA-6B7 tube, the current being developed through resistors R-9 and R-10. The audio and d-c components of the detected signal are selected from the manual volume control resistor (R-10) by its movable arm, and applied to the control grid of the RCA-6B7, amplification results and the signal passes on to the power output stage. The d-c applied to the grid prevents overload as the volume control is advanced.

A.V.C.—The a.v.c. diode of the RCA-6B7 tube is coupled through capacitor C-21 to the primary of the second i-f transformer. Due to the rectifying action of this diode, a current is developed through resistor R-14. The d-c voltage drop in this resistor is used for automatically regulating the control grid bias of the r-f, first detector, and i-f stages, the voltage being applied through a suitable filter network. Due to the fact that the a.v.c. diode returns through resistor R-14 to a point which is 12 volts negative with respect to its cathode, the a.v.c. action is delayed until the input signal reaches a predetermined level. This gives more uniform output for widely varying signal strengths into the antenna.

Audio System—As mentioned under "Detection" the audio component of the detected signal is selected from the manual volume control and applied to the control grid of the RCA-6B7 tube. The plate circuit of this tube is connected through capacitor C-28 to the control grid of the pentode power output tube, RCA-42. This tube is coupled through the output transformer T-2 to the loudspeaker.

SERVICE DATA

NOTE: *Certain models of* 1936 *automobiles are equipped with* **"high-capacitance type"** *(*400 **mmfd.** *or greater) built-in antennas. The* 1936 *models of Dodge, De Soto, and Chrysler are examples of automobiles so equipped. Installation of receiver in automobiles with such* **"high-capacity"** *antennas necessitates the following modification of the antenna circuit of the receiver to suit the characteristics of the antenna installation:*

Remove the tubular paper-covered capacitor **C-3** *(*.01 **mfd.***), Figure 2, and replace with the small molded type capacitor (*500 **mmfd.***) furnished with Escutcheon Kit for respective model of automobile.*

The various diagrams of this booklet contain such information as will be needed to locate causes for defective operation when such develops. The ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Ratings of less than one ohm are generally omitted.

Alignment Procedure

There are four alignment trimmers provided in the antenna, coil, detector coil, and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of four screws attached to molded cores.

NOTE: *The antenna coil has a molded core which is adjusted at the factory for the correct inductance.* **This adjustment should not be disturbed.**

All of the adjustable circuits of this receiver have been properly aligned at the factory to give correct performance and their settings should remain intact indefinitely when the receiver is used under ordinary conditions. However, necessity for re-adjustment may occasionally occur from continued extremes of climate, tampering, purported alteration for service purposes, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the receiver to be insensitive, non-selective, and subnormal in respect to tone quality. Such indications will usually exist simultaneously.

In re-adjusting the tuned circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as the RCA Stock No. 9595, will be required as the source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. Two indication methods are applicable—one requires use of the cathode-ray oscillograph, and the other requires a voltmeter or glow-type indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave image which represents the resonance characteristics of the circuits being tuned. This type of alignment is possible through use of apparatus such as the RCA Stock No. 9558 Frequency Modulator and the RCA Stock No. 9545 Cathode-Ray Oscillograph. Alignment by the output meter method should be indicated by an instrument such as the RCA Stock No. 4317 Neon Glow Indicator. The two procedures are outlined as follows:

CATHODE-RAY ALIGNMENT

Attach the cathode-ray oscillograph vertical input terminals to the second detector output, with the "Hi" connected to the junction of the two resistors, R-9 and R-10, and the "0" connected to the receiver chassis. Advance the vertical amplifier gain control of the oscillograph to full-on, allowing it to remain at such position for all adjustments. Turn the vertical "A" amplifier to "On." Set the oscillograph power switch to "On" and adjust the intensity and focusing controls to give a sharply defined spot on the screen. Interconnect the frequency modulator impulse generator terminals to the oscillograph "Ext. Sync." terminals, as shown by Figure 4.

I-F Adjustments

(a) Connect the output of the test oscillator to the control grip cap of the i-f tube (RCA-6K7) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Tune the oscillator to 260 kc., place its modulation switch to "On" and its output range switch to "Hi." The frequency modulator must not be connected to the oscillator for the preliminary adjustments.

(b) Set the cathode-ray oscillograph horizontal "B" amplifier to "Timing" and the synchronizing switch (timing) to "Int." Place the synchronizing input and frequency controls to about their mid-positions. Turn the range switch to its No. 1 position.

(c) Increase the output of the oscillator until a deflection is noticeable on the oscillograph screen. The figure obtained represents several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave image formed (400-cycle waves) to be spread completely across the screen by advancing the horizontal "B" gain control. The image should be synchronized and made to remain motionless by adjustment of the synchronizing input and frequency controls.

(d) Adjust the two screws (attached to molded cores) of the second i-f transformer, one on top and one on bottom, to produce maximum vertical deflection of the oscillographic wave which is present on the screen. This adjustment places the transformer in exact resonance with the 260 kc signal.

(e) The sweeping operation should follow using the frequency modulator. Shift the oscillograph synchronizing switch to "Ext.", change its range switch to No. 2 position and set the frequency control to its mid-position. Place the frequency modulator in operation, with its sweep range switch in the "Lo" position. Interconnect the test oscillator and frequency modulator with the special shielded patch cord provided. Turn the oscillator modulation switch to "Off."

(f) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. These waves will be identical in shape, but will be totally disconnected and appearing in reversed positions. They will have a common base line which is discontinuous. Adjust the frequency and synchronizing input controls of the oscillograph to get the proper waves and to make them remain motionless on the screen. Continue increasing the oscillator frequency until the forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will obtain at an oscillator setting of approximately 360 kc.

(g) With the images established as in (f), re-adjust the two screws on the second i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(h) Without altering the adjustments of the apparatus, shift the output connections of the oscillator to the input of the i-f system, i. e., between the first detector (RCA-6A8) control grid and ground. Regulate its output so that the amplitude of the oscillographic image is approximately the same as used above for adjustment (g) of the second i-f transformer.

(i) The two first i-f transformer adjustment screws, one on top and one on bottom, should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

NOTE: *Before making r-f adjustments, it may be advisable to replace the bottom cover to eliminate vibrator interference.*

(a) Adjust the dial pointer on the remote control head by the following procedure. Rotate tuning knob to its extreme clockwise position irrespective of location of pointer on dial. Now turn the pointer adjusting screw in the center of the back of the control unit until the pointer is at the end calibration mark beyond the 55 on dial scale.

(b) Attach the output of the test oscillator to the receiver input, i. e., between the antenna and ground terminals, with a 175 **mmfd.** capacitor in series with antenna lead.

NOTE: *For r-f alignment of receivers in which the tubular paper condenser* **C-3** *(*.01 **mfd.***) has been replaced by the small molded condenser,* 500 **mmfd.** *(change easily identified by reference to Figure 2 and bottom of chassis), use a* .001 **mfd.** *capacitor instead of the* 175 **mmfd.** *capacitor in series with the antenna lead and test oscillator.*

There shouuld be a shunt capacitor of 50 or 60 **mmfd.** from the antenna lead at the receiver to ground. Accurately tune the oscillator to 1,400 kc. The oscillograph should be left connected to the second detector output circuit as for the above i-f adjustments. Return the synchronizing switch to its "Int." position and turn the range switch to its No. 1 position.

(c) Tune the receiver to a dial reading of 1,400 kc. Then regulate the oscillator output so as to increase the amplitude of the waves on the oscillograph screen to a conveniently observable size. The several waves of detected signal, as appearing on the screen, should be synchronized by operation of the synchronizing and frequency controls. Trimmers, C-13, C-9, and C-4, of the oscillator, detector, and antenna coils should then be adjusted so that each causes maximum vertical deflection (amplitude) of the images.

(d) The oscillator modulation should then be turned to "Off" and the frequency modulator placed in operation, connected to the oscillator with the shielded patch cord. Change the oscillograph synchronizing switch to "Ext.", set its range switch to its No. 2 position and the frequency control slightly above its mid-position.

(e) Increase the frequency of the test oscillator gradually, until the point is reached where the two similar, distinct, and separate wave images appear on the screen and become coincident at their highest points. This will occur at an oscillator setting of approximately 1,500 kc. These waves should be synchronized on the oscillograph screen by careful re-adjustment of the synchronizing and frequency controls. Re-adjust trimmers, C-13, C-9, and C-4, to produce complete coincidence at maximum amplitude of the two waves.

(f) Disconnect the frequency modulator from the oscillator. Place the modulation switch of the oscillator to "On" and tune the oscillator to 600 kc. Set the synchronizing switch of the oscillograph to "Int." and turn the range switch to No. 1 position.

(g) Tune the receiver station selector control so as to pick up the 600 kc. signal, disregarding the dial reading at which it is best received.

(h) Change the oscillograph synchronizing switch to "Ext." and place the oscillator modulation switch to "Off." Interconnect the frequency modulator and oscillator with the special shielded patch cord. Return the range control of the oscillograph to its No. 2 position and set the frequency control slightly above its mid-position.

(i) Shift the test oscillator to its 200-400 kc range and tune it to the point at which the forward and reverse waves show on the oscillograph screen. This condition will obtain at an oscillator setting of approximately 230 kc. The signal obtained from the oscillator for this adjustment will be the third harmonic of 200 kc. An increase in the oscillator output may be necessary. The trimmer C-12 should then be adjusted to the point which produces maximum amplitude of the oscillographic images. It will not be necessary to rock the tuning control for this adjustment, inasmuch as the frequency modulator is varying the signal in an equivalent manner.

(j) Retune trimmers C-13, C-9, and C-4 as in (c), (d), and (e) to correct for any change in high-frequency alignment which may have been caused by the adjustment of C-12.

After the receiver has been replaced in the car, it may be necessary to make a final correction of the dial pointer by tuning in a station of known frequency and adjusting the pointer by means of the slotted screw head on the rear of the control head.

OUTPUT METER ALIGNMENT

Place the receiver in operation with its two covers removed. Attach the output indicator across the loudspeaker voice coil circuit or across the output transformer primary. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test oscillator output control so that the signal level is as low as possible and still observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the output of the test oscillator to the control grid cap of the i-f tube (RCA-6K7) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Adjust the frequency of the oscillator to 260 kc. Tune the receiver to a point where no interference is received from the heterodyne oscillator or local stations.

(b) Adjust the two screws (attached to molded cores) of the second i-f transformer, one on top and one on bottom, until maximum output is produced by the indicating device.

(c) Remove the oscillator from the i-f tube input and connect it between the control grid cap of the first detector tube (RCA-6A8) and chassis-ground, using the 0.25 mfd. capacitor as previously. Allow its tuning to remain at 260 kc. Tune the receiver to avoid interference as in (a).

(d) Adjust the two screws of the first i-f transformer for maximum (peak) receiver output. The indication for this adjustment will be broad, due to the "flat-top" characteristic of the i-f system. The two screws should, therefore, be very carefully adjusted so that the indicator remains fixed at maximum as the oscillator is shifted through a range 2 kc. above and below its normal setting of 260 kc. An irregular double-peaked indication is to be avoided.

R-F Adjustments

NOTE: *Before making r-f adjustments, it may be advisable to replace the bottom cover to eliminate vibrator interference.*

(a) Adjust the dial pointer on the remote control head by the following procedure. Rotate tuning knob to its extreme clockwise position irrespective of location of pointer on dial. Now turn the pointer adjusting screw in the center of the back of the control unit until the pointer is at the end calibration mark beyond the 55 on dial scale.

(b) Connect the output of the test oscillator to the antenna-ground terminals of the receiver with a 175 **mmfd.** capacitor in series with the antenna lead.

NOTE: *For r-f alignment of receivers in which the tubular paper condenser* **C-3** *(*.01 **mfd.***) has been replaced by the small molded condenser,* 500 **mmfd.** *(change easily identified by reference to Figure 2 and bottom of chassis), use a* .001 **mfd.** *capacitor instead of the* 175 **mmfd.** *capacitor in series with the antenna lead and test oscillator.*

There should be a shunt capacitor of 50 or 60 **mmfd.** from the antenna lead at the receiver to ground. Tune the oscillator to 1,400 kc. Allow the output indicator to remain attached to the receiver output.

(c) Tune the receiver so that the **dial** reading is 1,400 kc. Then adjust the oscillator, detector, and antenna coil trimmers, C-13, C-9, and C-4 respectively, tuning each to the point producing maximum indicated receiver output.

(d) Shift the oscillator frequency to 600 kc and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. The oscillator series trimmer, C-12, should then be adjusted, simultaneously rocking the receiver tuning control backward and forward through the signal until maximum (peak) receiver output results from the combined operations. The adjustment of C-13, C-9, and C-4 should be repeated as in (c) to correct for any change in its alignment due to the adjustment of C-12.

Final Tuning Dial Adjustment

Final adjustment of the dial pointer may be made during operation after the receiver is installed in automobile. To do this tune in a station of known frequency (say 760 kc.—approximately 76 on dial) as accurately as possible. Now reset the dial pointer to exactly 76 on the dial by means of the adjusting screw at center rear of operating head.

Interrupter

The mechanical interrupter used in the power system is constructed with a plug-in base, so as to be easily removed from the receiver. Its adjustments have been correctly set during manufacture by means of special equipment. In cases of faulty operation of the interrupter, a renewal should be made.

The symmetrical plug-in base on this device permits the unit to be placed in its socket so as to give correct output voltage polarity on an automobile with either a positive or negative "A" ground. For installation with positive "A" ground, insert vibrator so positive (+) symbol is nearest label on vibrator compartment partition; for negative "A" ground, insert with negative (–) symbol nearest label.

Radiotrons

Deterioration of tubes and their approach to failure is usually evidenced by noisy or intermittent operation, loss of sensitivity and distorted tone quality. When suspected as faulty, the tubes should be removed from the receiver and checked with standard tube testing apparatus. It is not feasible to test the tubes while in the receiver, due to measurement inaccuracies which would result from the effects of the circuits.

Tuning Condenser Drive

Smooth control should be obtained over the entire tuning range of the variable condenser. If irregularity is present, check the action of the gear mechanism for binding or backlash at every point within the tuning range. A bind may be due to improper mesh between the worm gear and the large gears on the condenser shaft. To correct such a condition, loosen the three screws holding the gear plate and adjust the mesh of the gears to a position which gives smooth operation. Gear backlash is prevented by the small compression spring between the two large gears on the rotor shaft.

Receiver Housing

The screws holding the receiver chassis to the case must all be in place and tightly installed, inasmuch as they appreciably affect the ground resistance of the assembly and will consequently have a bearing on the amount of ignition noise received.

Volume Control and Power Switch

This adjustment is made by turning the small control knob fully clockwise and then fully counterclockwise. This places the friction clutch mechanism on the volume control in proper alignment.

RCA MFG. CO., INC.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
12511	Cap—Grid contact cap—Package of 5	$0.15
11130	Capacitor—Adjustable capacitor—(C12)	.40
11289	Capacitor—50 Mmfd.—(C21)	.25
12270	Capacitor—80 Mmfd.—(C15)	.28
8076	Capacitor—115 Mmfd.—(C23)	.20
11998	Capacitor—115 Mmfd.—(C16, C17, C19, C20)	.28
11181	Capacitor—265 Mmfd.—(C11, C22, C46, C47)	.20
11171	Capacitor—400 Mmfd.—(C27)	.22
4210	Capacitor—600 Mmfd.—(C35)	.25
4094	Capacitor—690 Mmfd.—(C44)	.26
12268	Capacitor—1,400 Mmfd.—(C6)	.34
12269	Capacitor—2,200 Mmfd.—(C7)	.42
5148	Capacitor—.007 Mfd.—(C38, C40)	.20
4838	Capacitor—.005 Mfd.—(C31)	.20
4858	Capacitor—.01 Mfd.—(C3, C28)	.25
11315	Capacitor—.015 Mfd.—(C24)	.20
5196	Capacitor—.035 Mfd.—(C32)	.18
4836	Capacitor—.05 Mfd.—(C18)	.30
4839	Capacitor—0.1 Mfd.—(C26)	.28
4841	Capacitor—0.1 Mfd.—(C10)	.22
12237	Capacitor—.25 Mfd.—(C39, C42)	1.02
12484	Capacitor—.25 Mfd.—(C30)	.24
5019	Capacitor—0.5 Mfd.—(C41)	.42
12234	Capacitor—8 Mfd.—(C34)	1.34
12233	Capacitor Pack—Comprising 2 sections each, .01 Mfd.—(C36, C37)	1.02
12238	Capacitor Pack—Comprising one 8 Mfd. and two 10 Mfd. sections—(C25, C29, C33)	2.30
12223	Coil—Antenna coil—(L3)	.94
12235	Coil—Choke coil—(L14)	.50
12225	Coil—Oscillator coil—(L6, L7)	.80
12224	Coil—R. F. coil—(L4, L5)	1.32
12220	Condenser—3-gang variable tuning condenser—(C4, C5, C8, C9, C13, C14)	4.50
12006	Core—Adjustable core for I. F. transformer Stock No. 12228 and No. 12229	.22
12289	Coupling—Station selector flexible shaft coupling	.20
12239	Filter—Antenna filter—(L1, L2, C2)	$1.28
12221	Gear—Variable tuning condenser shaft drive gear	.36
12222	Gear—Variable tuning condenser worm gear	.36
12242	Guide—Station selector shaft guide	.18
12483	Pin—Contact pin for speaker leads—Package of 5	.15
12485	Pin—Contact pin for tone control lead—Package of 5	.15
12232	Reactor—Filter reactor—iron core—(L13)	1.10
5034	Resistor—56 ohm—carbon type, ½ watt—(R21, R22)—Package of 5	1.00
12512	Resistor—470 ohm—insulated, ¼ watt—(R2)—Package of 5	1.00
11845	Resistor—560 ohm—carbon type, 1 watt—(R19)—Package of 5	1.10
12262	Resistor—680 ohm—insulated, ¼ watt—(R7)—Package of 5	1.00
8097	Resistor—5,600 ohm—carbon type, 2 watt—(R11)	.25
12288	Resistor—10,000 ohm—insulated, ¼ watt—(R12)—Package of 5	1.00
12454	Resistor—33,000 ohm—insulated, ¼ watt—(R17)—Package of 5	1.00
5132	Resistor—47,000 ohm—carbon type, 1/10 watt—(R8, R9)—Package of 5	.75
12073	Resistor—47,000 ohm—carbon type, 1 watt—(R5)—Package of 5	1.10
12286	Resistor—56,000 ohm—insulated, ¼ watt—(R3)—Package of 5	1.00
12455	Resistor—120,000 ohm—insulated, ¼ watt—(R15)—Package of 5	1.00
12452	Resistor—330,000 ohm—insulated, ¼ watt—(R18)—Package of 5	1.00
11452	Resistor—470,000 ohm—carbon type, 1/10 watt—(R4, R6)—Package of 5	.75
12285	Resistor—470,000 ohm—insulated, ¼ watt—(R1)—Package of 5	1.00
12200	Resistor—1 megohm—insulated, ¼ watt—(R16)—Package of 5	1.00
12287	Resistor—1.5 megohm—insulated, ¼ watt—(R13, R14)—Package of 5	$1.00
3584	Ring—Retaining ring for R. F. or oscillator coil—Package of 5	.40
5129	Ring—Radiotron shield ring—Package of 5	.10
3623	Shield—R. F. or oscillator coil shield	.30
12290	Shield—Radiotron shield	.18
4786	Socket—6-contact 6D6 or 42 Radiotron socket	.15
4787	Socket—7-contact 6B7 Radiotron socket	.15
12227	Socket—8-contact 6A8 or 6K7 Radiotron socket	.18
12241	Socket—Vibrator socket	.18
12226	Stud—Variable tuning condenser mounting stud assembly—Package of 4	.22
12228	Transformer—First I. F. transformer—(L8, L9, C16, C17, R4, R6)	2.24
12364	Transformer—Output transformer—(T2)	1.48
12229	Transformer—Second I. F. transformer—(L10, L11, C19, C20, C22, R9)	2.02
12231	Transformer—Vibrator power transformer—(T1)	3.42
12236	Vibrator—Vibrator complete	4.55
12365	Volume Control—(R10)	1.12
	CONTROL BOX AND FLEXIBLE SHAFT ASSEMBLIES	
12505	Box—Control box complete—less flexible shafts	6.35
12578	Dial—Station selector indicator dial (standard)	.50
12579	Knob—Station selector (tuning) knob (standard)	.28
12580	Knob—Volume control knob (standard)	.28
11891	Lamp—Control box dial lamp—Package of 5	.65
12504	Shaft—Tuning control flexible shaft complete, approx. 21½ in. long	1.20
12503	Shaft—Volume control flexible shaft complete, approx. 21½ in. long	1.20
	REPRODUCER ASSEMBLIES	
12482	Board—Reproducer terminal board	.30
12450	Coil—Field coil—(L16)	1.60
12451	Cone—Reproducer cone complete—(L12)	1.60
9687	Reproducer—Reproducer complete	5.65
	MISCELLANEOUS ASSEMBLIES	
12288	Resistor—10,000 ohm—insulated, ¼ watt—(R12)—Package of 5	1.00
12454	Resistor—33,000 ohm—insulated, ¼ watt—(R17)—Package of 5	1.00
12509	Button—Plug button for receiver housing	$0.16
12444	Cable—Shielded antenna cable, approx. 8 in. long, complete with female section of connector	.58
12473	Cable—Shielded antenna lead-in cable, approx. 31 in. long, complete with 2 male sections of connector	1.12
4288	Cap—Male connector cap for "A" lead or antenna cable—Package of 10	.36
5025	Capacitor—Generator capacitor	.40
4293	Capacitor—Ammeter capacitor	.60
11418	Capacitor—.5 Mfd.—(C43)	.50
4291	Clip—"A" lead ammeter clip—Package of 10	.70
12443	Cover—Receiver housing top cover	.64
12442	Cover—Receiver housing bottom cover assembly	.60
12247	Fastener—Receiver housing top cover fastener—Package of 10	.30
4286	Ferrule—Antenna cable or "A" lead connector ferrule and bushing—Package of 10	.38
5023	Fuse—"A" lead fuse—15 amp.—Package of 5	.40
12449	Grille—Speaker grille assembly	.88
12441	Housing—Receiver housing complete	4.58
4290	Insulator—Fuse connector insulator—Package of 10	.35
4323	Knob—Tone control knob—Package of 5	.70
12445	Lead—"A" lead (set end), approx. 8 in. long, complete with male section of connector	.26
12501	Plate—Name plate and mounting screws	.20
12447	Screw—Speaker mounting assembly—Comprising 1 screw, 1 nut, and 1 lockwasher to mount speaker in case—Package of 4	.26
12252	Screw—No. 8 self-tapping hex. head screw—used on receiver housing—Package of 10	.20
12248	Socket—3-contact socket and bracket assembly for reproducer cable	.20
12502	Socket—Pin socket and bracket assembly for tone control lead	.30
4284	Spring—Antenna cable connector spring—Package of 10	.30
12448	Stud—Receiver mounting stud assembly—Comprising 1 stud, 1 washer, 1 lockwasher and 1 nut	.20
5024	Suppressor—Distributor suppressor	.38
12249	Tone Control—(R20)	.88
4285	Washer—Antenna cable connector insulating washer—Package of 10	.22

MODEL 5T
Parts List

RCA MFG. CO., INC.

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable condenser mounting bushing assembly—Package of 3	$0.43
11591	Button—Chassis plug button	.10
12118	Cap—Grid contact cap—Package of 5	.15
11465	Capacitor—Adjustable capacitor (C8)	.48
12659	Capacitor—12 Mmfd. (C5)	.20
12661	Capacitor—56 Mmfd. (C1)	.20
12946	Capacitor—133 Mmfd. (C11, C15, C16, C17)	.20
12406	Capacitor—180 Mmfd. (C18)	.26
12662	Capacitor—220 Mmfd. (C21)	.20
12660	Capacitor—1,350 Mmfd. (C10)	.28
4868	Capacitor—.005 Mfd. (C9, C25)	.20
4858	Capacitor—.01 Mfd. (C19, C20, C22)	.25
11451	Capacitor—.017 Mfd. (C26)	.18
4841	Capacitor—.1 Mfd. (C4, C12, C23, C30, C31)	.22
4840	Capacitor—.25 Mfd. (C13, C24)	.30
5170	Capacitor—.25 Mfd. (C14)	.25
11240	Capacitor—10 Mfd. (C28)	1.08
5212	Capacitor—18 Mfd. (C29)	1.16
12648	Coil—Antenna coil—less shield (L2, L3, L4, L5)	1.35
12649	Coil—Oscillator coil—less shield (L6, L7)	1.20
12643	Condenser—2-gang variable tuning condenser (C2, C3, C6, C7)	3.46
5119	Connector—3-contact female speaker cable connector	.25
12006	Core—Adjustable core and stud assembly for I.F. transformer, Stock Nos. 12652 and 12653	.22
12664	Core—Adjustable core and stud assembly for wave trap, Stock No. 12654	.22
12658	Dial—Station selector dial	.65
12656	Drive—Variable condenser drive shaft and pinion	.58
12655	Gear—Large gear located on variable condenser shaft	.34
12657	Indicator—Station selector indicator	.20
5226	Lamp—Dial lamp—Package of 5	.70
12663	Mask—Dial light diffuser, complete with red and green colored screen	.30
12647	Range Switch (S2)	.68
12206	Resistor—270 ohm, carbon type, ¼ watt—Package of 5 (R19)	1.00
12261	Resistor—390 ohm, insulated, ¼ watt—Package of 5 (R20)	1.00
8070	Resistor—22,000 ohm, carbon type, ½ watt—Package of 5 (R3)	1.00
11400	Resistor—27,000 ohm, carbon type, ¼ watt—Package of 5 (R9)	1.00
12011	Resistor—27,000 ohm, carbon type, 1 watt—Package of 5 (R4)	1.10
11282	Resistor—56,000 ohm, carbon type, 1/10 watt—Package of 5 (R6)	.75
5029	Resistor—56,000 ohm, carbon type, ¼ watt—Package of 5 (R1)	1.00
11454	Resistor—6,800 ohm, carbon type, ¼ watt—Package of 5 (R2)	1.00
5145	Resistor—100,000 ohm, carbon type, ¼ watt—Package of 5 (R10, R12)	1.00
11398	Resistor—220,000 ohm, carbon type, 1/10 watt—Package of 5 (R7)	.75
11323	Resistor—270,000 ohm, carbon type, ¼ watt—Package of 5 (R11)	1.00
11172	Resistor—470,000 ohm, carbon type, ¼ watt—Package of 5 (R13)	1.00
11626	Resistor—2.2 megohm, carbon type, ¼ watt—Package of 5 (R5)	1.00
12004	Resistor—Voltage divider resistor—Comprising one 216 ohm, one 27 ohm and one 22 ohm sections (R16, R17, R18)	.45
12650	Shield—Antenna coil shield	.22
12735	Shield—Dial lamp shield—Package of 5	.25
12607	Shield—First I.F. transformer shield top	.30
12008	Shield—First or second I.F. transformer shield	.28
12651	Shield—Oscillator coil shield	.22
12581	Shield—Second I.F. transformer shield top	.36
3950	Shield—6D6 Radiotron shield	.26
3682	Shield—6A7 or 75 Radiotron shield	.22
4794	Socket—4-contact rectifier Radiotron socket	.15
4786	Socket—6-contact 42, 75 and 6D6 Radiotron socket	.15
4787	Socket—7-contact 6A7 Radiotron socket	.15
11199	Socket—Dial lamp socket	.14
12007	Spring—Retaining spring for core, Stock Nos. 12006 and 12664—Package of 10	.36
11460	Tone Control and Switch (S1, S3)	.95
13106	Transformer—First I.F. transformer, complete (L8, L9, C11, C15)	1.60
12644	Transformer—Power transformer, 115 volt, 60 cycle (T1)	4.00
12645	Transformer—Power transformer, 115 volt, 25 cycle (T1)	5.90
12646	Transformer—Power transformer, 240-210-150-125-110 volts, 60 cycle (T1)	6.88
13107	Transformer—Second I.F. transformer, complete (L10, L11, C16, C17, C18, R6, R7)	2.06
12654	Trap—Wave trap (L1)	.75
11237	Volume Control (R8)	1.20
	REPRODUCER ASSEMBLIES	
12641	Board—3-contact reproducer terminal board	.15
12640	Bracket—Output transformer mounting bracket	.18
12012	Coil—Field coil (L14)	1.85
11469	Coil—Neutralizing coil (L12)	.20
12642	Cone—Reproducer cone and dust cap (L13)	.94
5118	Connector—3-contact male speaker cable connector	.25
9699	Reproducer, complete	6.38
11253	Transformer—Output transformer (T2)	1.56
11886	Washer—Spring washer to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
12639	Escutcheon—Station selector escutcheon and crystal assembly	1.02
12638	Knob—Station selector knob—Package of 5	.58
11347	Knob—Tone control, volume control or range switch knob—Package of 5	.75
11586	Screw—Chassis mounting screw No. 14x1 in.—Package of 10	.22
11349	Spring—Retaining spring for knob, Stock Nos. 11347 and 12638—Package of 5	.15

Prices quoted above are subject to change without notice.

MODEL 5T
Schematic
Chassis Wiring
Transformer

RCA MFG. CO., INC.

Power Output Rating
Undistorted.............. 2.0 watts
Maximum.............. 4.5 watts

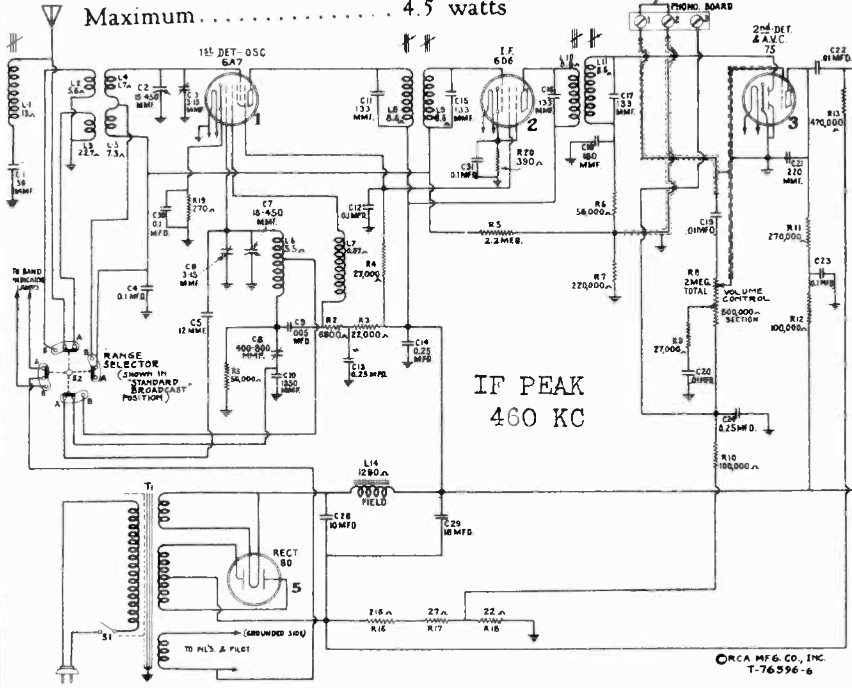


Figure 1—Schematic Circuit Diagram

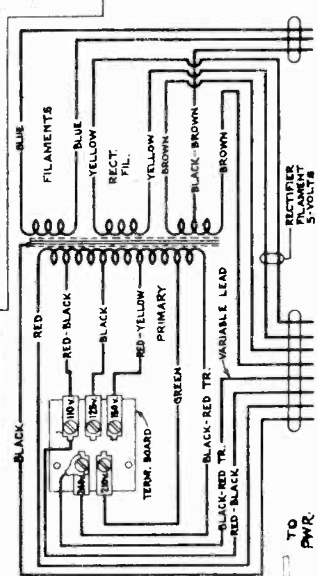


Figure 5—Universal Transformer

Primary resistance—10.1 ohms total
Secondary resistance—226 ohms total

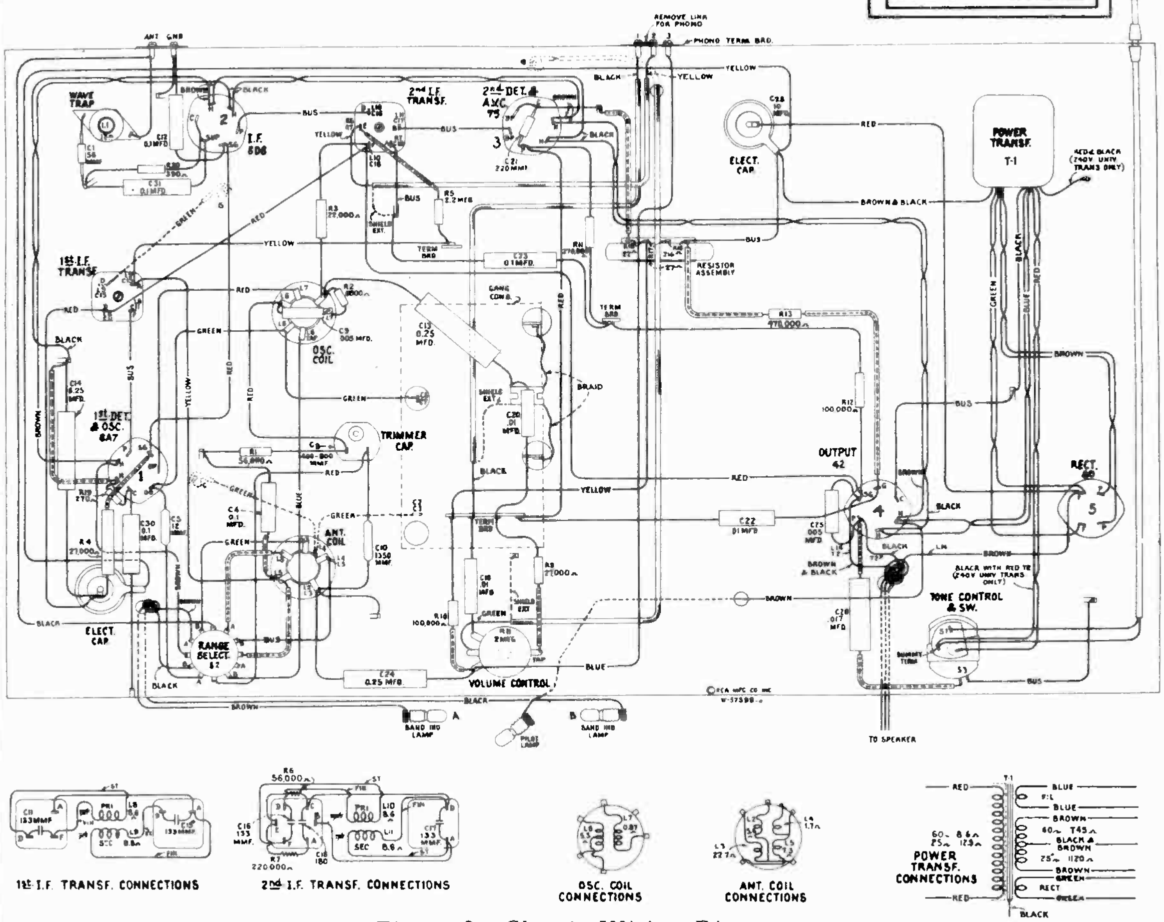


Figure 2—Chassis Wiring Diagram

Alignment Frequencies
"Standard broadcast" (A)........ 600 kc. (osc.), 1,700 kc. (osc., ant.)
"Short wave" (B).................. None required

Frequency Ranges
"Standard broadcast" (A)...... 540-1,820 kc.
"Short wave" (B).............. 1,820-6,600 kc.

MODEL 5T
Socket,Trimmers
Voltage,Resistance
Loudspeaker,Pickup

RCA MFG. CO., INC.

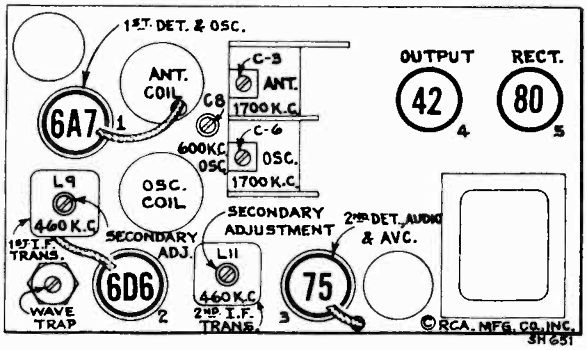


Figure 3—Radiotron, Coil, and Trimmer Locations

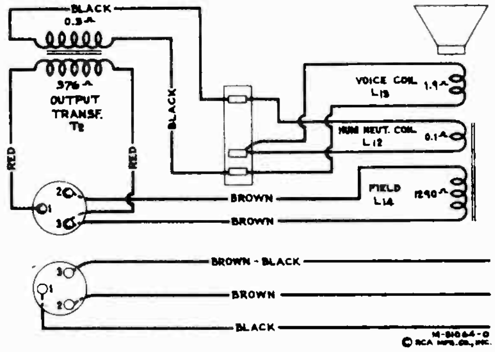


Figure 6—Loudspeaker Wiring

Voice Coil Impedance. 2.2 ohms at 400 cycles

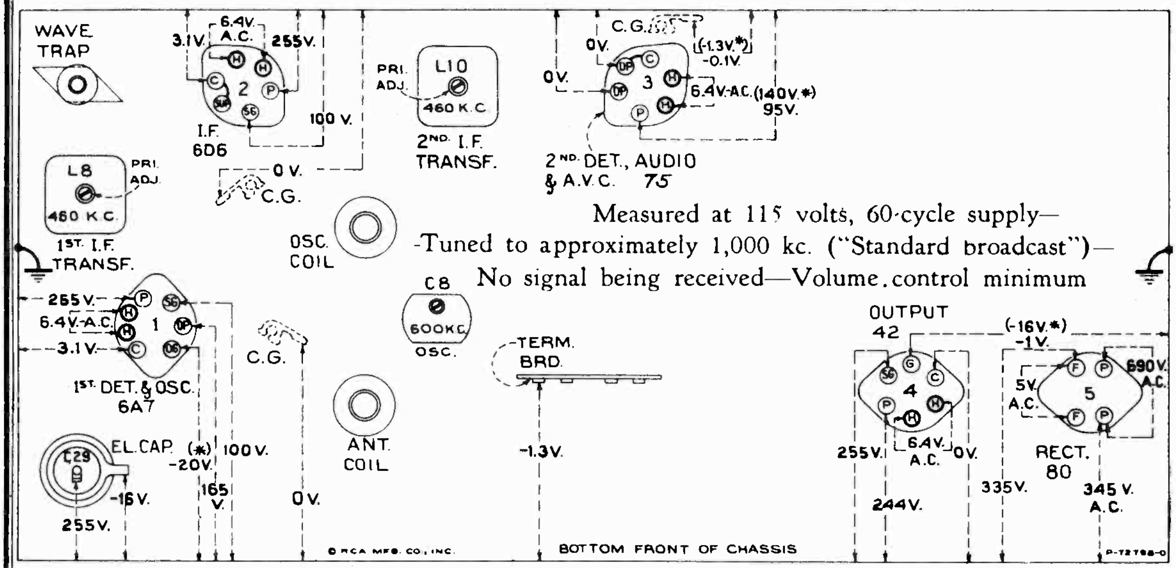
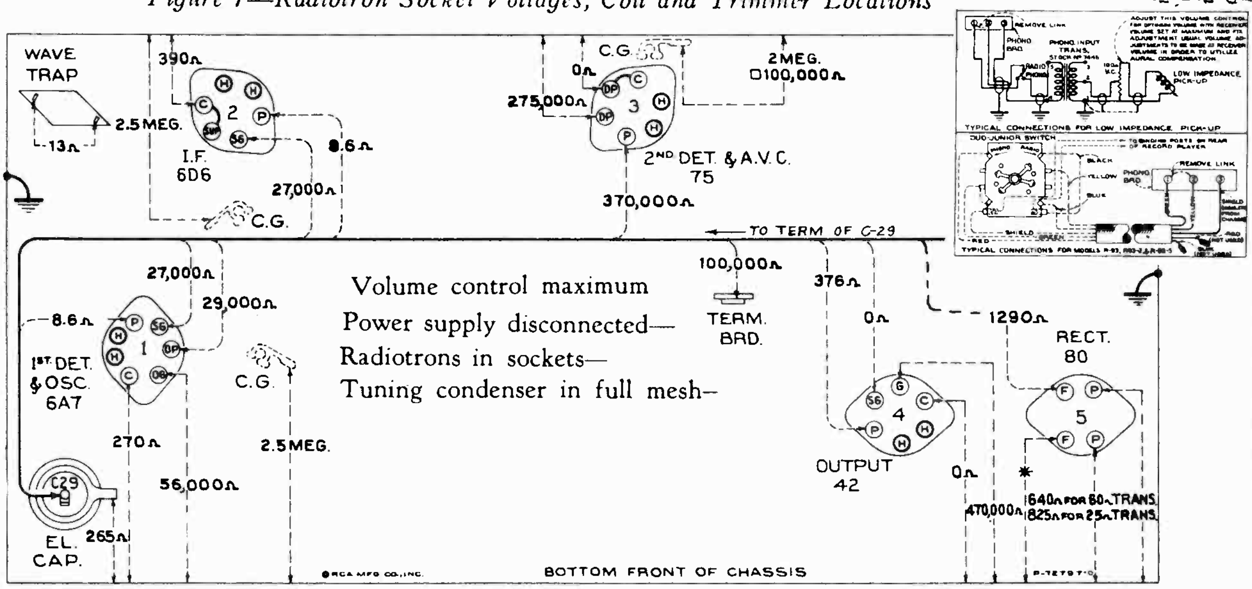


Figure 7—Radiotron Socket Voltages, Coil and Trimmer Locations

***Note:** Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.*



*OPEN CIRCUIT (LEAKAGE OF ELECTROLYTIC CONDENSERS ONLY) □ VOLUME CONTROL AT "MINIMUM" POSITION

Figure 4—Resistance Diagram

RCA MFG. CO., INC.

General Features

This receiver is of the superheterodyne type and has many distinctive features. Its design includes magnetite core adjusted i-f transformers and wave trap, aural compensated volume control, tone control, resistance coupled audio system, phonograph terminal board, band selective illumination of dial scales, and an 8-inch dust-proof electrodynamic loudspeaker.

Tuning is continuous through the "Standard broadcast" and "Short wave" bands (including 49 meters).

The "Short wave" position of this extensive range also includes channels assigned for police, amateur, and aviation communication. Trimming adjustments are located at accessible points. Their number is reduced to the least that is consistent with efficient operation. The tuning dial ratio of ten to one permits ease of tuning, especially in the "Short wave" band.

Circuit Arrangement

The first detector and oscillator functions are accomplished in a single tube, an RCA-6A7. The input of this tube is coupled to the antenna through a tuned transformer. A shunt (magnetite core adjusted) wave trap is connected across the primary of this transformer to prevent signals of intermediate frequency (460 kc.) from being introduced into the first stage as interference. The two-section gang condenser, which tunes the antenna transformer secondary and the heterodyne oscillator coil, has adjustable trimmers for obtaining exact alignment. Each of these coils is tapped so that the range switch increases the range of tuning by decreasing the amount of inductance.

The intermediate frequency stage is coupled to the RCA-6A7 and to the RCA-75 by means of tuned transformers. These transformers resonate with fixed capacitors and are adjusted by molded magnetite cores to tune to 460 kc.

The modulated signal as obtained from the output of the i-f system is detected by one of the diodes of the RCA-75 tube. Audio frequency secured by this process is passed on to the control grid of this same tube for amplification before final reproduction. The d-c voltage, which results from detection of the signal, is used for automatic volume control. This voltage, which develops across resistor R7, is applied as automatic control grid bias to the first detector and i-f tubes through a suitable resistance filter. Minimum operating bias for the RCA-6A7 and RCA-6D6 tubes is developed across resistors R19 and R20 respectively.

Manual volume control is effected by means of an acoustically tapered potentiometer connected as a variable coupling element between the output of the second detector and the first audio control grid. After amplification by the RCA-75, the audio signal is transmitted by resistance-capacitance coupling to the input of the RCA-42 power output stage, which, in turn, is transformer-coupled to the dynamic speaker. High-frequency tone control is provided by means of a shunt capacitor across the plate circuit of the output tube, which may be cut in or out of the circuit with a control switch S3.

The power supply system consists of an RCA-80 rectifier tube which is supplied from an efficiently designed power transformer and which works into a suitable filter. The various potentials required for the plate, screen, control grid, and cathode circuits are obtained from the output of the filter. The electrodynamic loudspeaker field coil is used as a filter reactor.

SERVICE DATA

The various diagrams of this booklet contain such information as will be needed to isolate causes for defective operation if such develops. The ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R3, L2, C1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Ratings of less than one ohm are generally omitted.

Alignment Procedure

There are three alignment trimmers provided in the antenna transformer and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of screws attached to molded magnetite cores. All of these circuits have been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions or altered during servicing. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment.

The correct performance of this receiver can only be obtained when the aligning has been done with adequate and reliable apparatus. The manufacturer of this receiver has available, for sale through its distributors and dealers, a complete assortment of such service equipment as may be needed for the alignment operation.

A test oscillator, such as the RCA Stock No. 9595, is required as a source of the specified alignment frequencies. Visual indication of receiver output during the adjustment is necessary and should be accomplished by the use of an indicator such as the RCA Stock No. 4317 Neon Output Indicator.

The procedure outlined below should be followed in adjusting the various trimmer capacitors and molded cores:

I-F Core Adjustments

The four adjustment screws (attached to molded magnetite cores) of the two i-f transformers (one on top and one on bottom of each i-f transformer) are located as shown by figures 3 and 7. Each circuit must be aligned to a basic frequency of 460 kc. To do this, attach the output indicator across the loudspeaker voice coil or across the output transformer primary.

Connect the output of the test oscillator to the control grid of the RCA-6A7 through a .05 mfd. capacitor. Connect the test oscillator ground terminal to the ground terminal of the receiver chassis. Range selector should be in "Short wave" position. Tune the oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point, within its range, where no interference is encountered either from local broadcast stations or from the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is present on the output indicator. Adjust the two magnetite core screws of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two magnetite core screws of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i-f magnetite core screws to assure that the interaction between them has not disturbed the original adjustment.

Wave-Trap Adjustment

Attach the output of the test oscillator to the receiver "Antenna" terminal through a 200 mmfd. (important) capacitor. The ground connections remain connected together. Leave the test oscillator adjusted to 460 kc. and range selector in "Short wave" position as before. Then adjust the wave-trap screw to the point which causes maximum suppression of the 460 kc. signal.

R-F Trimmer Adjustments

Calibrate the tuning dial by setting the pointer to a horizontal position (53 on "Standard broadcast" scale) with the two-gang tuning condenser in full mesh. The output indicator should be left connected to the system. Connections for the test oscillator remain the same as for "Wave-trap adjustment." Adjust the test oscillator to 1,700 kc. and set the receiver tuning control to a dial reading of 1,700 kc. Leave the volume control of the receiver at its maximum position. Make sure that the range selector is at its broadcast position. Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the two trimmers, C6 and C3, of the oscillator and antenna transformer coils (mounted on the variable condenser) so that each produces maximum (peak) receiver output. After this maximum has been accurately obtained, shift the test oscillator to 600 kc. Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then, adjust the receiver oscillator series trimmer, C8, simultaneously rocking the tuning control backward and forward through the signal until maximum receiver output results from these combined operations. The adjustment at 1,700 kc. should then be repeated to correct for any change which may have been caused by the oscillator series trimmer adjustment.

Phonograph Attachment

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. Typical methods of connecting a low-impedance pick-up, or the RCA Victor Models R-93, R-93-2, and R-93S phonographs are shown on the schematic diagram (figure 1).

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed either permanently by cutting it away with a sharp knife, or by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

Resistance Measurement

The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and receiver chassis ground, on figure 4, have been carefully selected so as to facilitate a rapid continuity check of the circuits. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 1, and Chassis Wiring Diagram, figure 2, will permit the location of certain troubles which might otherwise be difficult to ascertain. Each value as specified should hold within ±20%. Variations in excess of this limit will usually be indicative of trouble in circuit under test. Resistance values were measured with the Radiotrons in sockets; tuning condenser in full mesh, and volume control set at maximum except where otherwise noted. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative terminal of the resistance meter to chassis-ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground on figure 7 will assist in locating cause for faulty operation. Each value as specified should hold within ±20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with receiver tuned to approximately 1,000 kc., no signal being received and volume control set at minimum. To duplicate the conditions under which the voltages were measured requires a 1,000 ohm-per-volt d-c meter, having ranges of 10, 50, 250, and 500 volts. Use the nearest range above the voltage to be measured. A-C voltages were measured with a corresponding a-c meter.

Mechanical Specifications

Height	18½ inches
Width	13¼ inches
Depth	7⅞ inches
Weight (Net)	21 pounds
Weight (Shipping)	26 pounds
Chassis Base Dimensions	12 inches x 7 inches x 2½ inches
Over-all Chassis Height	7½ inches
Operating Controls	(1) Power Switch—Tone, (2) Tuning, (3) Volume, (4) Range Selector
Tuning Drive Ratio	10 to 1

RADIOTRON COMPLEMENT

(1) RCA-6A7	First Det.—Oscillator
(2) RCA-6D6	Intermediate Amplifier
(3) RCA-75	Second Det., A-F Amp. and A.V.C.
(4) RCA-42	Audio Power Amplifier
(5) RCA-80	Full-Wave Rectifier

Pilot Lamps (3) .... Mazda No. 46, 6.3 volts, 0.25 amperes

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 80 watts
Rating B	105-125 volts, 25-60 cycles, 80 watts
Rating C	100-130/140-160/195-250 volts, 40-60 cycles, 80 watts

MODELS 5X, 5X3, 5X4
Circuit Data
Alignment, Parts

RCA MFG. CO., INC.

Circuit Arrangement

The conventional superheterodyne type of circuit, consisting of a combined first-detector–oscillator stage, a single i-f stage, a diode-detector–automatic-volume-control stage, an audio voltage amplifier stage, an audio power output stage, and a half-wave rectifier power supply stage, is used.

Tuned Circuits

The antenna coil system consists of two series-connected primary and two series-connected secondary windings to provide the two ranges of tuning. The oscillator coil is similarly wound on a single form.

A range selector switch, consisting of S2, S3, S4, and S5, is used to connect the various sections of these coil systems and to illuminate the proper dial scale for the band in operation. The coils are tuned by a variable two-section gang condenser having trimming capacitors in shunt with each section. A series trimming capacitor is also associated with the "Standard broadcast" oscillator coil.

The intermediate frequency amplifier system consists of an RCA-78 in a transformer coupled circuit. This stage operates at a basic frequency of 460 kc. Adjustable magnetite cores are provided for adjusting inductance of the input i-f transformer (primary and secondary) and the output transformer (primary) windings.

Detector and A. V. C.

The modulated signal, as obtained from the output of the i-f stage is detected by one of the diodes in the RCA-75 tube. The audio frequency component, secured by this process, is transferred from the movable arm of the volume control R6 through coupling capacitor C17 to the control grid of the RCA-75 for voltage amplification. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage which develops across resistor R6 is applied as automatic control grid bias to the first-detector and i-f tube through a suitable resistance filter circuit.

Audio System

The audio frequency component, mentioned under "Detection and a.v.c.," transferred to the control grid of the RCA-75, is amplified in the tube and then coupled to the control grid of the power output tube RCA-43 through capacitor C20. The output of the power amplifier is transformer coupled into the dynamic loudspeaker.

Rectifier

The plate, grid, cathode and the loudspeaker field voltages required for the operation of this receiver are supplied by the RCA-25Z5 tube operating as a half-wave rectifier.

SERVICE DATA

Caution: Certain tests (e. g. alignment and voltage measurement) require operation of receiver with the chassis removed from the cabinet. To permit such operation on models using interlock switch, it will be necessary to hold the interlock switch (see figure 5) closed either by inserting a screwdriver, rod, or pencil through the small interlock hole at rear of chassis, or by temporarily unhooking the interlock tension spring and pushing the interlock bar towards the front of the chassis. ***Avoid external grounding of receiver or associated equipment*** *since the power supply is connected to the receiver chassis. Carelessness may cause serious damage to equipment.* ***Replace interlock tension spring upon completion of test.***

Alignment Procedure

There are three alignment trimmers provided in the antenna coil and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of three screws attached to molded magnetite cores. Re-adjustment may occasionally occur from continued extremes of climate, tampering, purported alteration for services, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the impairment of sensitivity, selectivity, and tone quality. Such conditions will usually exist simultaneously.

In re-adjusting the tuned circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as the **RCA Stock No. 9595** will be required as the source of the signal at the specified alignment frequencies. Visual indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. The **RCA Stock No. 4317 Neon Output Indicator** is especially suitable for this use.

The procedure outlined below should be followed in adjusting the various trimming capacitors and molded magnetite cores.

I-F Core Adjustments

The three adjustment screws (one on top and one on bottom of first i-f transformer and one on bottom of second i-f transformer) are located as shown by figures 2 and 5. Each circuit must be aligned to a basic frequency of **460 kc.** To do this attach the output indicator across the loudspeaker voice coil or across the output transformer primary. Connect the output of the test oscillator through a **.05 mfd.** capacitor to the RCA-6A7 control grid, the ground of the test oscillator being connected to the receiver chassis through a **.05 mfd.** capacitor. Set the test oscillator to **460 kc.** Set the range selector to "Short-wave" position. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator.

Adjust the bottom core screw of the second i-f transformer to produce maximum (peak) indicated receiver output. Then adjust the two core screws of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device.

During these adjustments regulate the test oscillator output so the indication is always as low as possible. By doing so, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i-f core screws to assure that the interaction between them has not disturbed the original adjustment.

Wave-Trap Adjustment

Attach the output of the test oscillator to the "Antenna Terminal" (see wave-trap, top view chassis, figure 2) through an **80 mmfd.** capacitor, the ground connection of the test oscillator and receiver chassis being connected through capacitor as before. **Receiver "Antenna Wire" should be reeled up for this and the following r-f adjustments.**

Leave the test oscillator adjusted to 460 kc. and range selector in "Short wave" position as before. Then adjust the wave-trap trimmer to the point which causes **maximum suppression of the 460 kc.** signal.

R-F Trimmer Adjustments

Roughly calibrate the tuning dial by setting the pointer to the bottom horizontal line at the low frequency end of the broadcast scale with the two-gang tuning condenser at its maximum capacity. The output indicator should be left connected to the output system. The connections for the test oscillator remain the same as for "Wave-trap" adjustment. Volume control should be in maximum position. Make sure range selector is set to "Standard broadcast."

Set oscillator and antenna trimming capacitors **C11** and **C5**, respectively, to a position near minimum capacitance (plates near out). Adjust the test oscillator to **1,700 kc.**

Tune the receiver to pick up this signal (near **1,700 kc.** on dial) for maximum response disregarding dial reading. Always keep test oscillator output as low as is possible and still obtain visual indication. Adjust trimming capacitors **C11** and **C5** so that each produces maximum (peak) receiver output, re-adjusting receiver tuning slightly if necessary, but using the minimum trimming capacitance possible to obtain peaks. Adjust the dial pointer (without disturbing gang tuning condenser) to a dial reading of **1,700 kc.** Shift the test oscillator to **600 kc.** Tune the receiver to receive the signal disregarding the dial reading at which it is best received. Then adjust the oscillator series capacitor, **C8**, simultaneously rocking the tuning control backward and forward through the signal until maximum receiver output results from these combined operations. The adjustment at **1,700 kc.** should then be repeated to correct for any change which may have been caused by the oscillator series trimming capacitor adjustment.

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed either permanently by cutting it away with a sharp knife, or by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors and terminals to receiver chassis ground on figure 5 will assist in locating cause for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with set tuned to approximately 1,000 kc. ("Standard broadcast" range), no signal being received and volume control setting optional. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm-per-volt d-c meter, having ranges of 10, 50 and 250 volts. Use nearest range above voltage to be measured. A-C voltages were measured with a corresponding a-c meter.

REPLACEMENT PARTS

Stock No.	Description	List Price
11409	Band—Tube shield rubber band—Package of 5	$0 10
12118	Cap—Grid contact cap—Package of 5	.15
11465	Capacitor—Adjustable capacitor (C8)	.48
12535	Capacitor—13 Mmfd (C6)	.18
12405	Capacitor—47 Mmfd. (C15)	.26
12404	Capacitor—120 Mmfd. (C13, C14)	.26
12406	Capacitor—180 Mmfd. (C16)	.26
12537	Capacitor—360 Mmfd. (C1)	.20
12536	Capacitor—820 Mmfd. (C18)	.25
12534	Capacitor—1,170 Mmfd (C9)	.28
5107	Capacitor—.0025 Mfd. (C2)	.16
4868	Capacitor—.005 Mfd. (C7)	.20
4858	Capacitor—.01 Mfd. (C17, C20, C21)	.25
4836	Capacitor—.05 Mfd (C4)	.30
4886	Capacitor—.05 Mfd (C12)	.20
4839	Capacitor—.1 Mfd (C22)	.28
4835	Capacitor—.1 Mfd (C19)	.28
4840	Capacitor—.25 Mfd (C25)	.30
12398	Capacitor Pack—Comprising two 16 Mfd. and one 10 Mfd section (C23, C24, C26)	2.72
4358	Clamp—Mounting clamp for capacitor Stock No. 12398	.15
12495	Coil—Antenna coil (L2, L3, L4, L5)	1.30
12496	Coil—Oscillator coil (L6, L7, L8)	.80
13128	Cord—Power cord (130 ohm resistor R14) (Models without interlock switch only)	1.00
12006	Core—Adjustable core for Stock Nos. 12403, 12407 and 12497	.22
4340	Lamp—Dial lamp—Package of 5	.60
12409	Lead — Antenna lead, approximately 20 feet long	.35
12397	Reactor—Filter reactor (L16)	1.14
12453	Resistor—27 ohm — insulated, ¼ watt (R11)—Package of 5	1.00
12415	Resistor—39 ohm — insulated, ¼ watt (R12)—Package of 5	1.00
12414	Resistor—560 ohm — insulated, ¼ watt (R13)—Package of 5	1.00
12265	Resistor—6,800 ohm—insulated, ¼ watt (R4)—Package of 5	1.00
12410	Resistor—15,000 ohm—insulated, ¼ watt (R2)—Package of 5	1.00
12412	Resistor—47,000 ohm—insulated, ¼ watt (R5)—Package of 5	1.00
12286	Resistor—56,000 ohm—insulated, ¼ watt (R1)—Package of 5	1.00
12263	Resistor—100,000 ohm —insulated, ¼ watt (R8)—Package of 5	1.00
12285	Resistor—470,000 ohm—insulated, ¼ watt (R9)—Package of 5	1.00
12413	Resistor—680,000 ohm—insulated, ¼ watt (R10)—Package of 5	1.00
12411	Resistor—2.2 megohm—insulated, ¼ watt (R3, R7)—Package of 5	1.00
12399	Resistor—Comprising one 130 ohm and one 42 ohm sections (R14, R15) (Models with interlock switch only)	1.40
12845	Resistor—40 ohm—wire wound (R15) (Models without interlock switch only)	.40
4786	Socket—6-contact 78, 75, 43 or 25Z5 Radiotron socket	.15
4787	Socket—7-contact 6A7 Radiotron socket	.15
12400	Socket—Dial lamp socket	.22
12008	Shield—First I.F. transformer shield	.28
12607	Shield—First I.F. transformer shield top	.30
12408	Shield—Second I.F. transformer shield	.28
12396	Shield—75 or 78 Radiotron shield	.25
3404	Spring—Power switch spring—Package of 10	.50
12007	Spring—Retaining spring for core Stock No. 12006—Package of 10	.36
12402	Switch—Interlocking switch and cover	1.74
12395	Switch—Range switch (S2, S3, S4, S5)	.68
12403	Transformer—First intermediate frequency transformer, complete with shield (L9, L10, C13, C14)	1.62
12407	Transformer—Second intermediate frequency transformer, complete with shield (L11, L12, C15, C16)	1.45
12497	Trap—Wave trap (L1)	.70
12394	Volume Control — Volume control and power switch (R6, S1)	1.06
	REPRODUCER ASSEMBLIES (M80864-1)	
12499	Coil—Reproducer field coil (L15)	1.60
12731	Coil—Reproducer neutralizing coil (L13)	.22
12498	Cone—Reproducer cone, complete (L14)	1.20
9684	Reproducer—Speaker, complete	5.16
12500	Transformer—Output transformer (T1)	1.60
	REPRODUCER ASSEMBLIES (M80864-2)	
13149	Coil—Reproducer field coil (L15)	1.60
13150	Coil—Reproducer neutralizing coil (L13)	.25
13148	Cone—Reproducer cone, complete (L14)	1.25
9750	Reproducer—Speaker, complete	5.50
13151	Transformer—Output transformer (T1)	1.60
	DRIVE ASSEMBLIES	
12401	Condenser—2-gang variable tuning condenser (C3, C5, C10, C11)	2.35
12420	Cord—Variable tuning condenser drive cord—Package of 5	.20
12608	Dial—Dial scale—Used on Models 5X and 5X3 only	.45
13071	Dial—Dial scale — Used on Model 5X4 only	.45
12419	Indicator—Station selector indicator pointer	.15
12416	Pulley—Indicator pointer drive pulley and shaft	.24
12417	Pulley—Variable tuning condenser shaft pulley, with set screws	.24
12418	Screw—8-32x3/16 in. milled head, cupped point set screw for condenser drive pulley Stock No 12417—Package of 10	.18
12422	Shaft—Variable tuning condenser drive (knob) shaft	.26
12421	Spring—Variable tuning condenser drive cord tension spring—Package of 10	60
	MISCELLANEOUS ASSEMBLIES	
12548	Crystal—Station selector crystal and bezel—Used on Models 5X and 5X3 only	1.06
12936	Crystal—Station selector crystal and bezel—Used on Model 5X4 only	90
12673	Knob—Station selector, volume control or range switch knob — Package of 5 — Used on Models 5X and 5X3 only	.58
12937	Knob—Station selector, volume control or range switch knob — Package of 5 — Used on Model 5X4 only	.65
4119	Screw—Set screw for knob Stock No. 12673 and 12937—Package of 20	.38

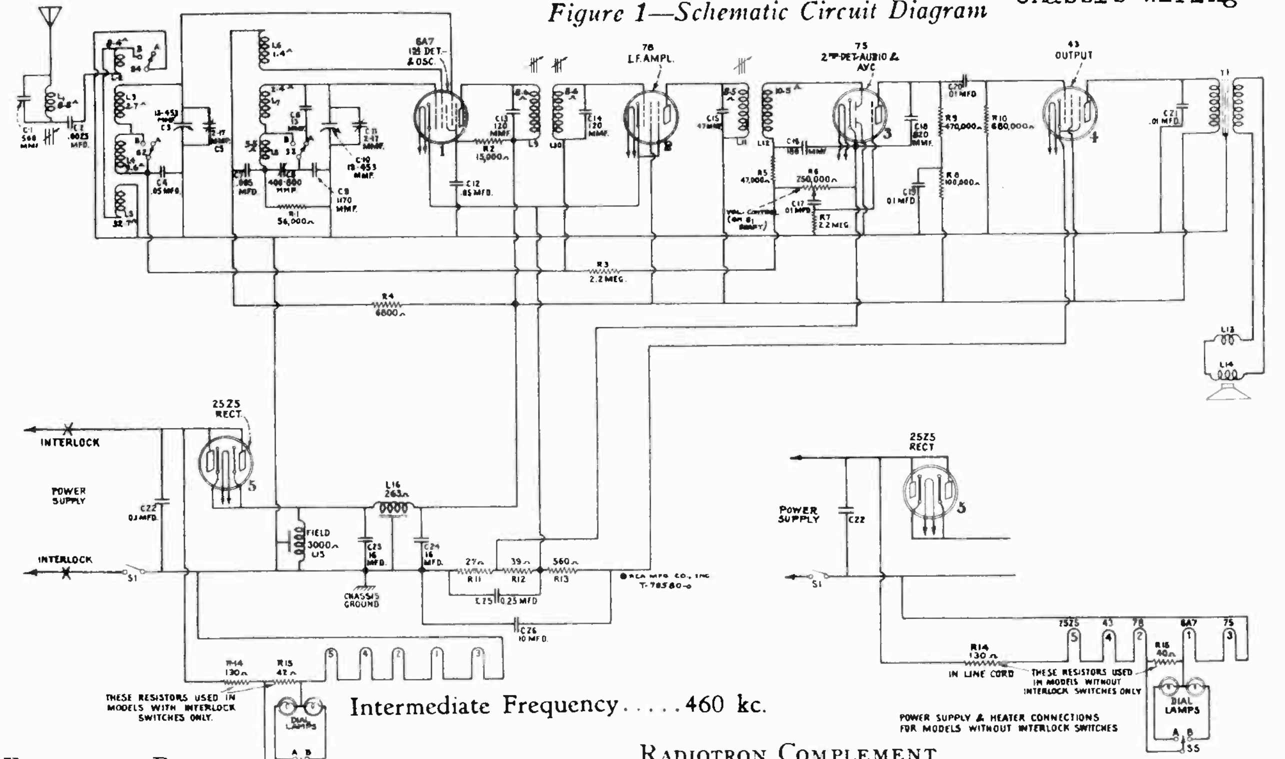
The prices quoted above are subject to change without notice.

For Alignment and Parts List, see Index

RCA MFG. CO., INC.

MODELS 5X, 5X3, 5X4
Schematic
Chassis Wiring

Figure 1—Schematic Circuit Diagram



Intermediate Frequency.....460 kc.

Frequency Ranges

"Standard Broadcast" (A).........540-1,800 kc.
"Short Wave" (B)...............1,800-6,500 kc.

Alignment Frequencies

"Standard Broadcast" (A)
600 kc. (osc.); 1,700 kc. (osc. and ant.)
"Short Wave" (B)...............None required

Power Output

Undistorted...........0.4 watts AC, 0.3 watts DC
Maximum.............0.9 watts AC, 0.8 watts DC

Radiotron Complement

(1) RCA-6A7...........First Detector–Oscillator
(2) RCA-78..............Intermediate Amplifier
(3) RCA-75.....Second Detector, A-F, and A.V.C.
(4) RCA-43.....................Power Output
(5) RCA-25Z5.......................Rectifier

Loudspeaker

Type..........................Electrodynamic
Impedance (v.c.) {M80864-1, 4.5 ohms; M80864-2, 3.0 ohms} at 400 cycles

Power Supply Rating (105-125 volts)........50-60 cycles—60 watts, D-C—50 watts

Pilot Lamps (2)......Mazda No. 40, 6.3 volts, 0.15 amperes

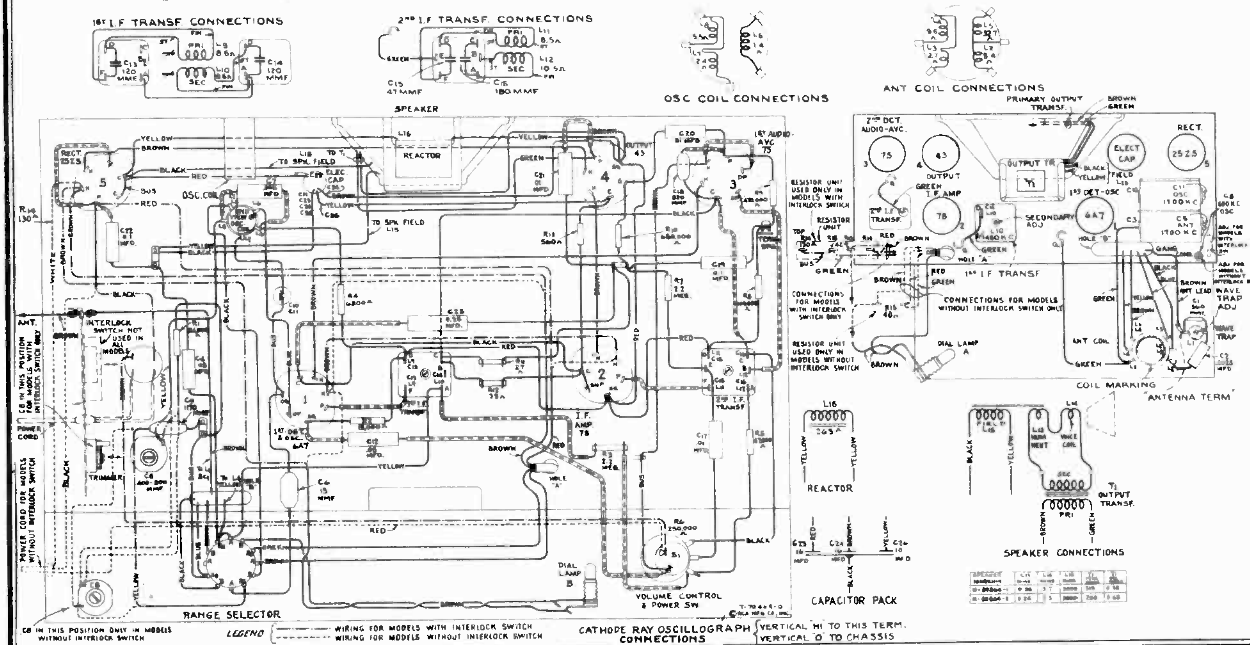


Figure 2—Chassis Wiring Diagram, Radiotron, Coil, and Trimmer Locations

MODELS 5X, 5X3, 5X4
Socket, Trimmers
Voltage, Resistance
Drive Mechanism

RCA MFG. CO., INC.

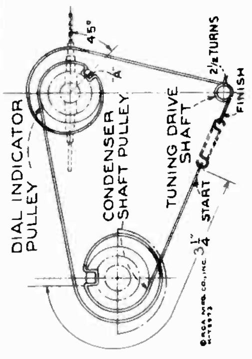


Figure 3—Tuning Drive Cord Mechanism

Rear view of drive assembly showing threading of drive cord with variable condenser plates in full mesh. To perform this operation, unsolder the four leads (connected between antenna coil and range selector switch) from the range selector switch, unsolder antenna lead-in wire from wave-trap terminal, unsolder lead from rear section of gang tuning condenser, and remove the four screws which secure the tuning drive frame to the chassis proper. This frame with gang tuning condenser still attached may now be easily removed for the threading operation. The relative position of the parts and method of threading are shown on the above diagram. In case the cord is too long for proper tension, it may be effectively shortened by first releasing finish end of cord, inserting a match or other shim under the cord at point "A" and then re-hooking the end of the cord to the tension spring. Replace drive assembly and re-solder leads.

Resistance Measurements

The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and receiver chassis ground, on figure 4 have been carefully selected so as to facilitate a rapid check of the circuit for defective parts, bad joints, etc. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 1, and the Chassis Wiring Diagram, figure 2, will permit the location of certain troubles which would otherwise be difficult to ascertain. Each value as specified should hold within ± 20%. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. Resistance values were measured with the Radiotrons in sockets, power supply disconnected, tuning condenser in full mesh, and volume control set at maximum except where otherwise noted. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative (–) terminal of the resistance meter to the chassis ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

Mechanical Specifications

Operating Controls

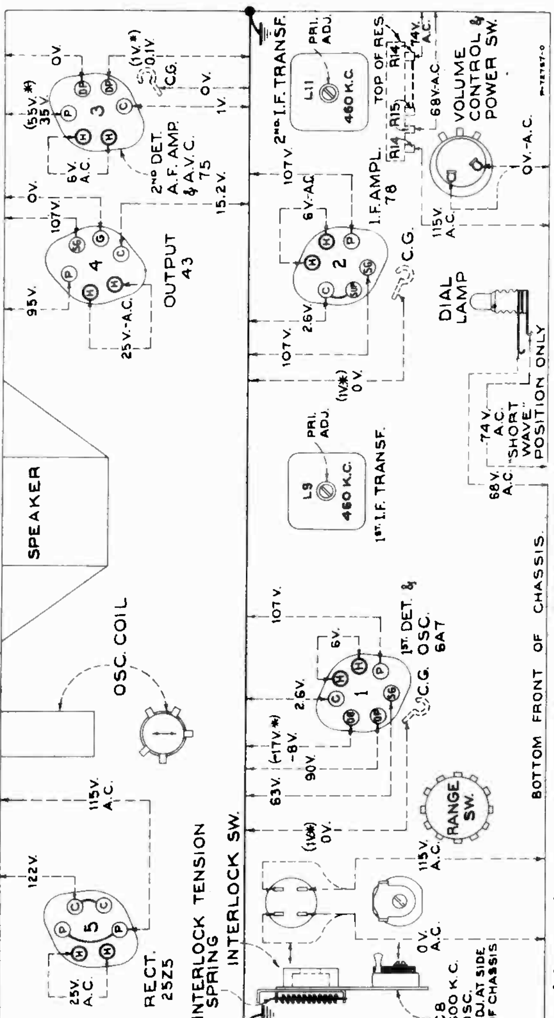
(1) Power Switch–Volume,

(2) Tuning,

(3) Range Selector

Cabinet Dimensions	Model 5X	Model 5X3	Model 5X4
Height	9⅜ inches	9⅝ inches	7⅝ inches
Width	12 5/16 inches	10⅜ inches	10⅝ inches
Depth	6 inches	6 inches	6 inches
Weights			
Net	11 pounds	10½ pounds	9¾ pounds
Shipping	13½ pounds	13½ pounds	12¾ pounds

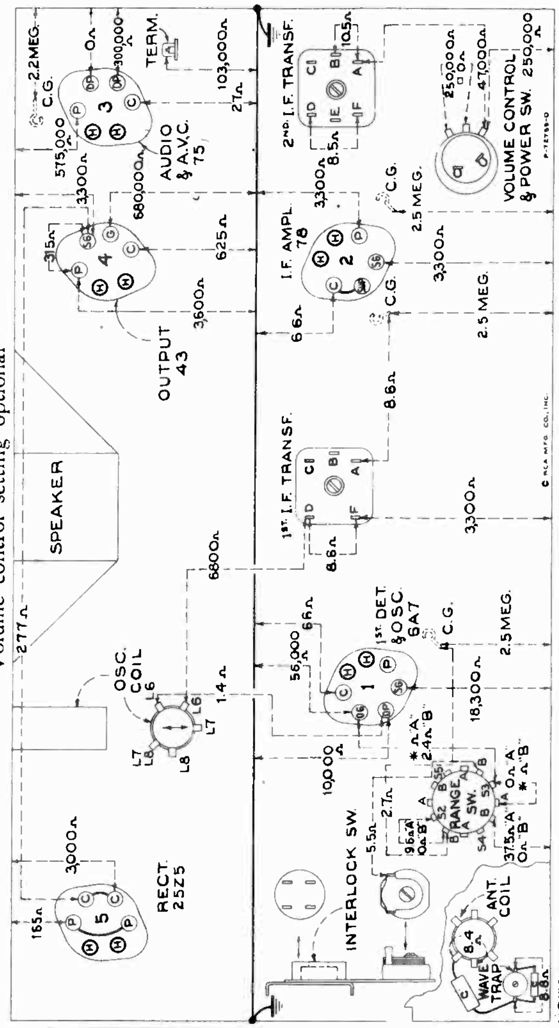
Figure 5—Radiotron Socket Voltages and Trimmer Locations



Measured at 115 volts, 60-cycle supply—For 115-volt d-c supply approximately 10% lower

Tuned to approximately 1,000 kc. ("Standard broadcast" range)—No signal being received—Volume control setting optional

Figure 4—Resistance Diagram



NOTE:–
□ VOLUME CONTROL-MIN. POSITION. "A" RANGE SW. IN "STANDARD BROADCAST" POSITION.
* OPEN CIRCUIT (LEAKAGE OF ELECTROLYTIC CAPACITORS ONLY). "B" RANGE SW. IN "SHORT WAVE" POSITION.

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full mesh
Range selector "Standard broadcast"—Volume control maximum

MODEL 5X2
Schematic
Chassis Wiring
Socket, Trimmers
Loudspeaker

RCA MFG. CO., INC.

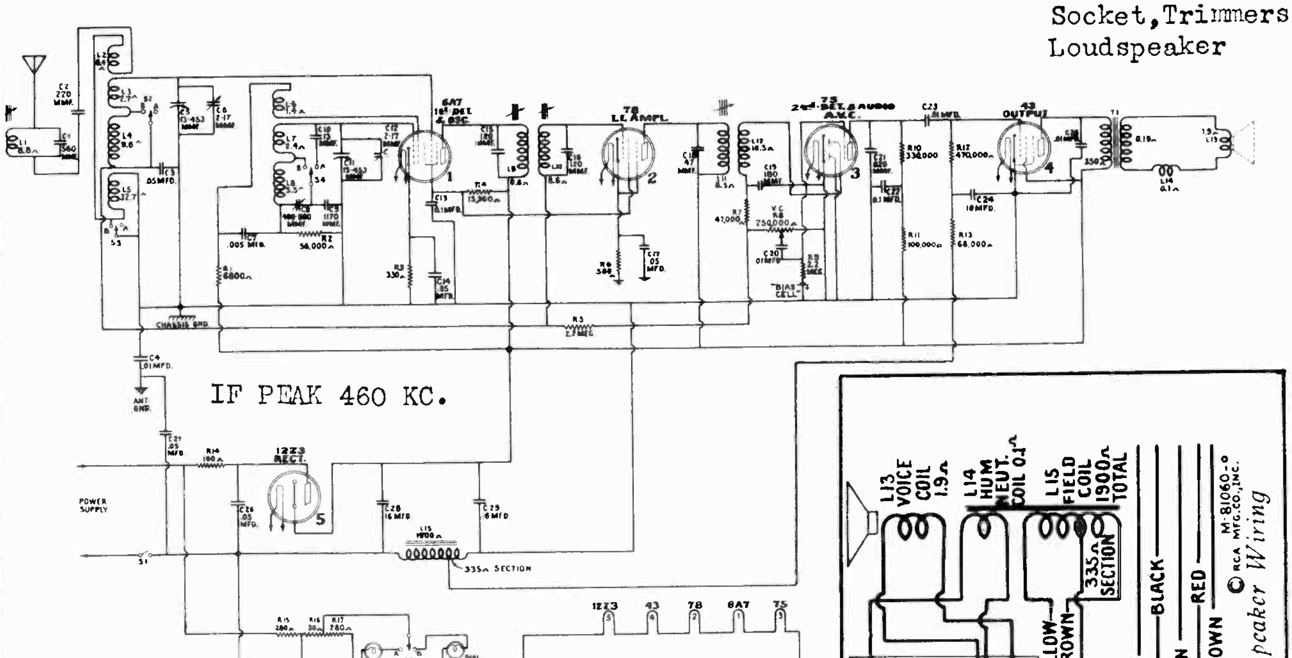


Figure 1—Schematic Circuit Diagram

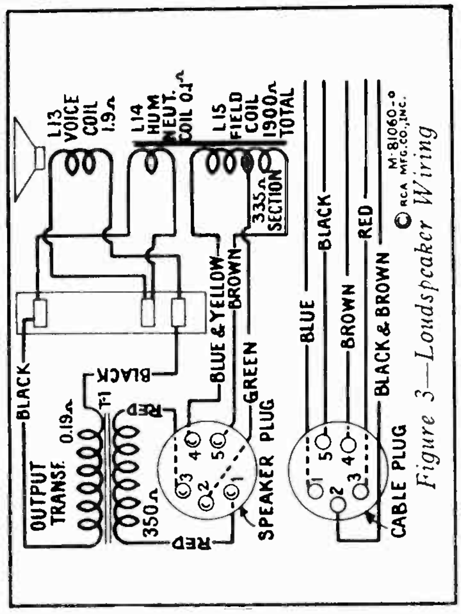


Figure 3—Loudspeaker Wiring

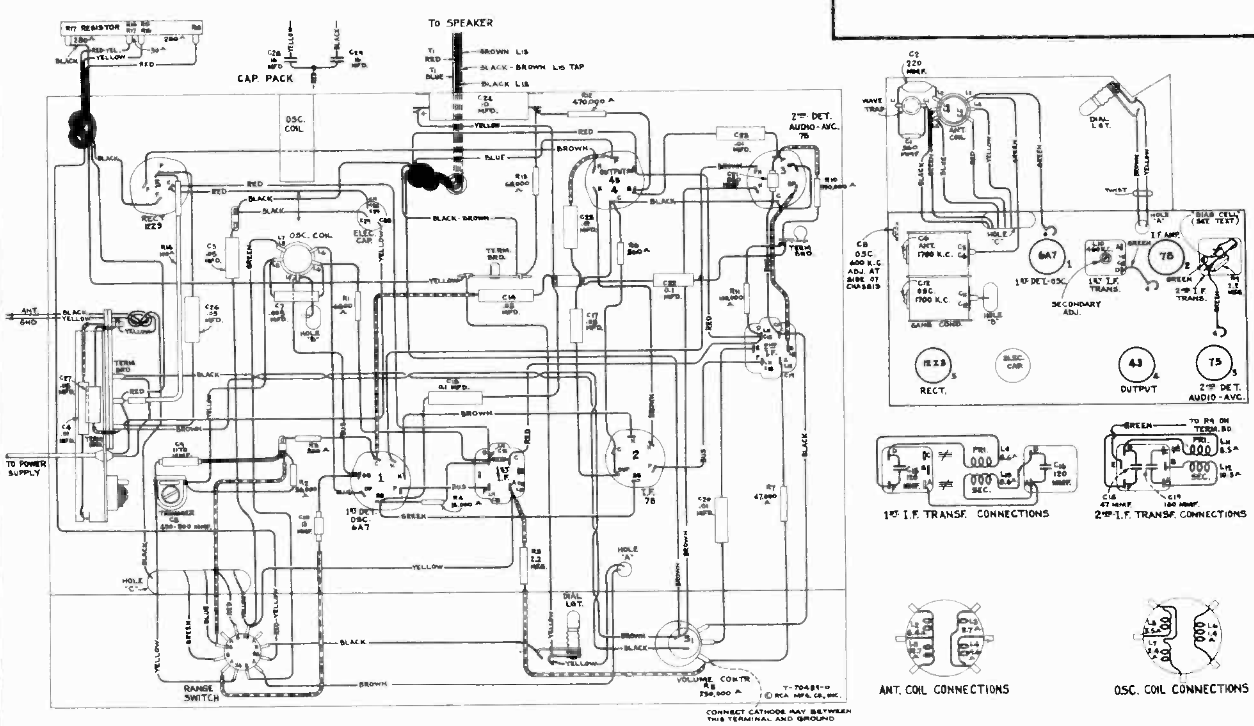
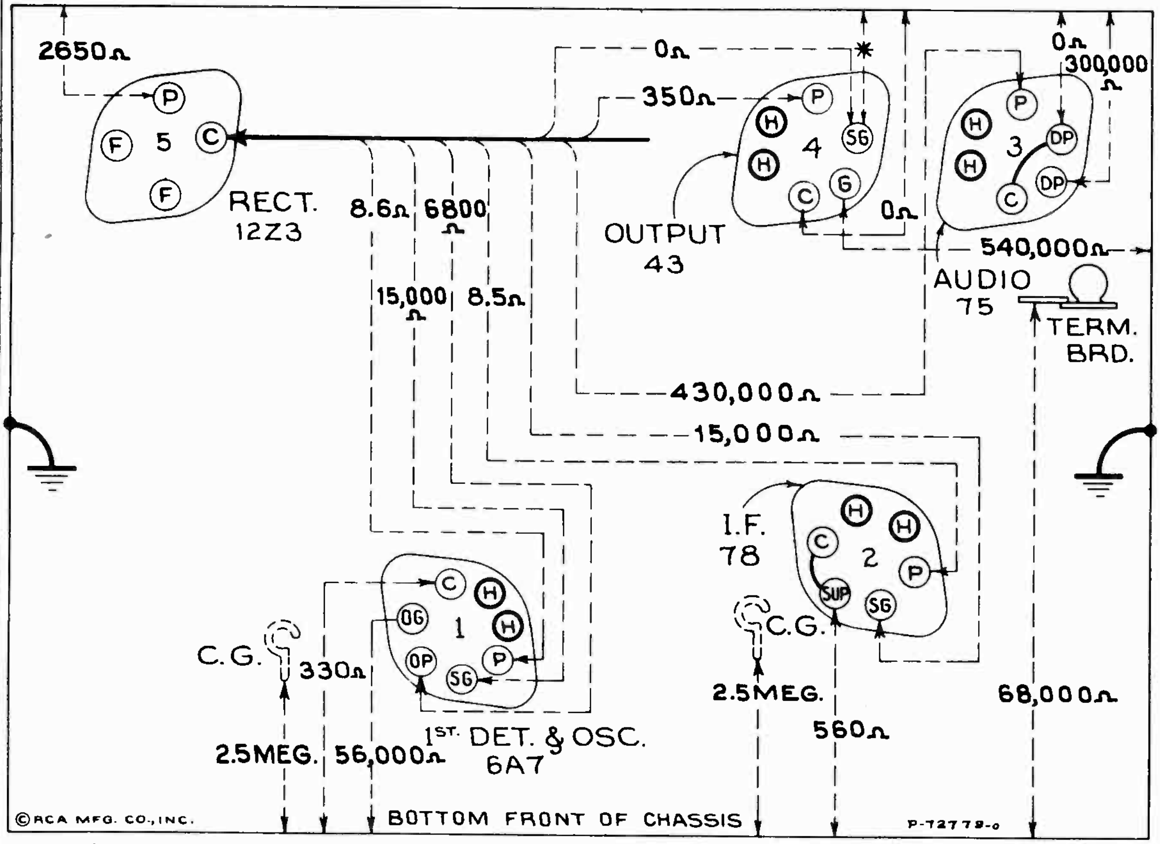


Figure 2—Chassis Wiring Diagram, Radiotron, Coil, and Trimmer Locations

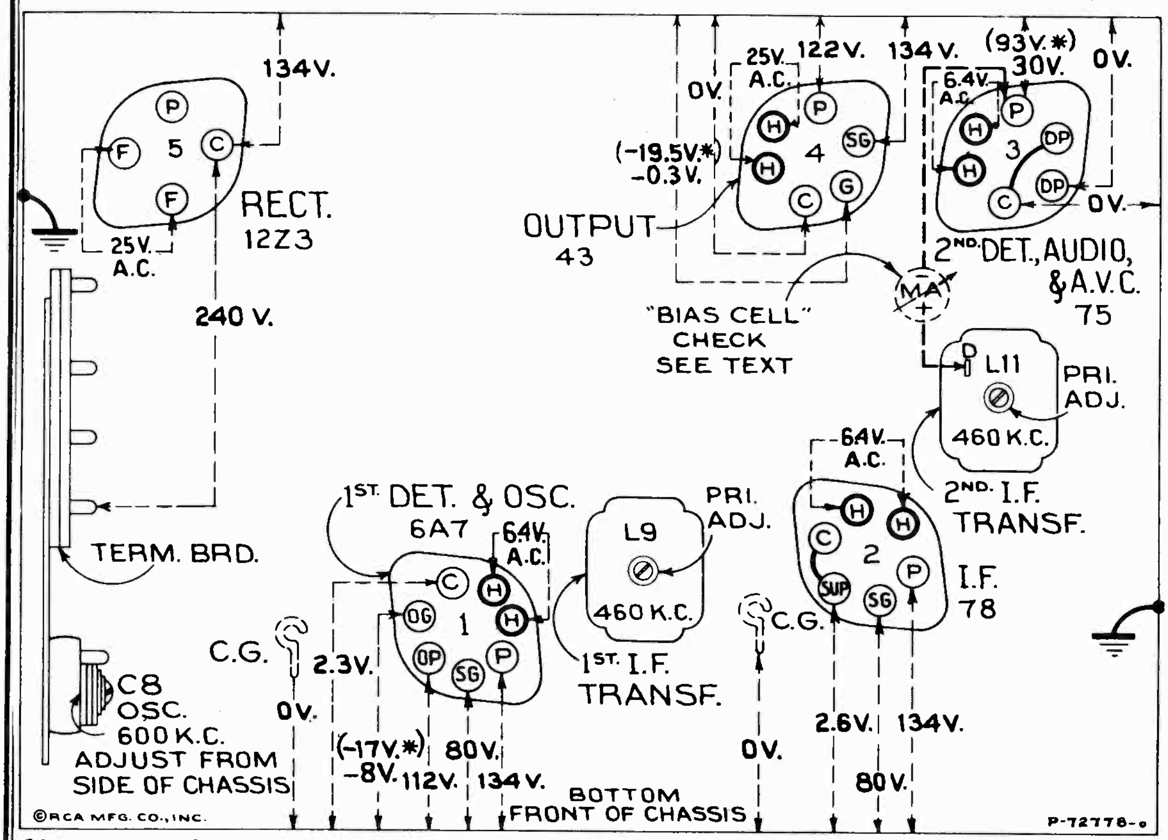
MODEL 5X2
Voltage, Resistance

RCA MFG. CO., INC.



CAUTION: REMOVE BIAS CELL BEFORE MAKING RESISTANCE MEASUREMENTS.
NOTE: * OPEN CIRCUIT (LEAKAGE ELECTROLYTIC CAPACITORS ONLY).

Figure 5—Resistance Diagram
Power supply disconnected—Tuning condenser in full mesh—
Volume control at maximum Radiotrons in sockets



CAUTION: NEVER CONNECT VOLTMETER TO CONTROL GRID OF TUBE Nº 3 (RCA-75)-SEE TEXT.

Figure 6—Radiotron Socket Voltages and Trimmer Locations
Measured at 230 volts, 60 cycle supply—For 230 volt D-C approximately
10% lower Tuned to approximately 1,000 kc. ("Standard broadcast" position)
—No signal being received— Volume control setting optional

MODEL 5X2
Circuit Data
Alignment,Parts
Drive Mechanism

RCA MFG. CO., INC.

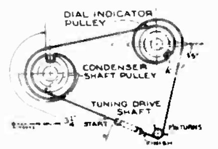


Figure 4—Tuning Drive Cord Mechanism

Rear view of drive assembly showing threading of drive cord with variable condenser plates in full mesh. To perform this operation, unsolder the four leads (connected between antenna coil and range selector switch) from the range selector switch, unsolder antenna lead-in wire from wave-trap terminal, unsolder lead from rear section of gang tuning condenser, and remove the four screws which secure the tuning drive frame to the chassis proper. This frame with gang tuning condenser still attached may now be easily removed for the threading operation. The relative position of the parts and method of threading are shown on the above diagram. In case the cord is too long for proper tension, it may be effectively shortened by first releasing finish end of cord, inserting a match or other shim under the cord at point "A" and then re-hooking the end of the cord to the tension spring. Replace drive assembly and re-solder leads.

Circuit Arrangement

Tuned Circuits

The antenna coil system consists of two series-connected primary and two series-connected secondary windings to provide the two ranges of tuning. The oscillator coil is similarly wound on a single form. A multi-pole range selector switch, consisting of S2, S3, S4, and S5, is used to connect the various sections of these coil systems and to illuminate the proper tuning dial scale for the band in operation. The coils are tuned by a variable two-section gang condenser having trimming capacitors in shunt with each section. A series trimming capacitor is also associated with the "Standard broadcast" oscillator coil.

The intermediate frequency amplifier system consists of an RCA-78 in a transformer coupled circuit. This stage operates at a basic frequency of **460 kc.** Adjustable magnetite cores are provided for adjusting inductance of the input i-f transformer (primary and secondary) and the output transformer (primary) windings.

Detector and A.V.C.

The modulated signal, as obtained from the output of the i-f stage, is detected by one of the diodes in the RCA-75 tube. The audio frequency component, secured by this process, is transferred from the movable arm of the volume control R8 through coupling capacitor C20 to the control grid of the RCA-75 for voltage amplification. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage which develops across resistor R8 is applied as automatic control grid bias to the first-detector and i-f tube through a suitable resistance filter circuit.

Audio System

The audio frequency component, mentioned under "Detection and A.V.C.," transferred to the control grid of the RCA-75, is amplified in the tube and then coupled to the control grid of the power output tube RCA-43 through capacitor C23. The output of the power amplifier is transformer coupled into the dynamic loudspeaker. A single "Bias Cell," see figures 1 and 2, is used for supplying bias voltage to the control grid of the RCA-75 tube.

Rectifier

The plate, grid, cathode, and loudspeaker field voltages required for the operation of this receiver are supplied by the RCA-12Z3 tube operating as a half-wave rectifier.

SERVICE DATA

CAUTION: Certain tests (e.g. alignment and voltage measurement) require operation of receiver with chassis removed from cabinet. Avoid external grounding of receiver chassis or associated equipment since the power supply is now connected to receiver chassis through the speaker field. Carelessness may cause serious damage to equipment.

Alignment Procedure

There are three alignment trimmers provided in the antenna coil and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of three screws attached to molded magnetite cores.

Improper alignment usually causes the impairment of sensitivity, selectivity, and tone quality. Such conditions will usually exist simultaneously.

In re-adjusting the tuned circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as the **RCA Stock No. 9595** will be required as the source of the signal at the specified alignment frequencies. Visual indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. The **RCA Stock No. 4317 Neon Output Indicator** is especially suitable for this use.

The procedure outlined below should be followed in adjusting the various trimming capacitors and molded magnetite cores.

I-F Core Adjustments

The three adjustment screws (one on top and one on bottom of first i-f transformer and one on bottom of second i-f transformer) are located as shown by figures 2 and 6. Each circuit must be aligned to a basic frequency of **460 kc.** To do this attach the output indicator across the loudspeaker voice coil or across the output transformer primary. Connect the output of the test oscillator through a **.05 mfd.** capacitor to the RCA-6A7 control grid, the ground of the test oscillator being connected to the receiver external yellow ground lead. Set the test oscillator to **460 kc.** Place the range selector in "Short wave" position. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator.

Adjust the bottom magnetite core screw of the second i-f transformer to produce maximum (peak) indicated receiver output. Then adjust the two magnetite core screws of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device.

During these adjustments regulate the test oscillator output so the indication is always as low as possible. By doing so, broadness of tuning due to A.V.C. action will be avoided. It is advisable to repeat the adjustment of all i-f magnetite core screws to assure that the interaction between them has not disturbed the original adjustment.

Wave-Trap Adjustment

Attach the output of the test oscillator to the black antenna lead through a **200 mmfd.** capacitor, the ground connection of the test oscillator and receiver being connected as before.

Leave the test oscillator adjusted to **460 kc.,** and range selector in "Short wave" position as before. Then adjust the wave-trap trimmer to the point which causes maximum suppression of the **460** kc. signal.

R-F Trimmer Adjustments

Roughly calibrate the tuning dial by setting the pointer to the bottom horizontal line at the low frequency end of the broadcast scale with the two-gang tuning condenser at its maximum capacity. The output indicator should be left connected to the output system. The connections for the test oscillator remain the same as for "Wave-trap" adjustment. Volume control should be in maximum position.

Set range selector to "Standard broadcast" position.

Set oscillator and antenna trimming capacitors **C12** and **C6**, respectively, to a position near minimum capacitance (plates near out). Adjust the test oscillator to 1,700 kc.

Tune the receiver to pick up this signal (near 1,700 kc. on dial) for maximum response disregarding dial reading. Always keep test oscillator output as low as is possible and still obtain visual indication. Adjust trimming capacitors **C12** and **C6** so that each produces maximum (peak) receiver output, re-adjusting receiver tuning slightly if necessary, but using the minimum trimming capacitance possible to obtain peaks. Adjust the dial pointer (without disturbing gang tuning condenser) to a dial reading of **1,700 kc.** Shift the test oscillator to **600 kc.** Tune the receiver to receive the signal disregarding the dial reading at which it is best received. Then adjust the oscillator series capacitor, **C8**, simultaneously rocking the tuning control backward and forward through the signal until maximum receiver output results from these combined operations. The adjustment at 1,700 kc. should then be repeated to correct for any change which may have been caused by the oscillator series trimming capacitor adjustment.

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed either permanently by cutting it away with a sharp knife, or by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

Radiotron Socket Voltages

Note: *Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.*

CAUTION: The voltage between the RCA-75 control grid and ground should never be measured. All ordinary meters will paralyze the "Bias Cell," see figures 1 and 2, in this circuit for a period of approximately one to two hours. To check "Bias Cell," connect 0-1 M.A. milliammeter as shown on figure 6. A satisfactory cell should give a steady reading on the meter between 0.3 and 0.65 M.A. when used with a good RCA-75 tube.

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors and terminals to receiver chassis ground on figure **6** will assist in locating cause for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with set tuned to approximately 1,000 kc. ("Standard broadcast" range); no signal being received and volume control setting optional. To duplicate the conditions under which the voltages were measured requires a 1,000 ohm-per-volt d-c meter, having ranges of 10, 50 and 250 volts. Voltages between 0 and 10 read on 10-volt scale, between 10 and 50 on 50-volt scale, and between 50 and 250 on 250-volt scale. A-C voltages were measured with a corresponding a-c meter.

CAUTION: The "Bias Cell," see figures 1 and 2, should be carefully removed before any resistance measurements are made. Do not allow the spring contact clips to short-circuit "Bias Cell" during its removal or insertion.

The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and receiver chassis ground, on figure 5 have been carefully selected so as to facilitate a rapid check of the circuit for defective parts, bad joints, etc. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 1, and the Chassis Wiring Diagram, figure 2, will permit the location of certain troubles which would otherwise be difficult to ascertain. Each value as specified should hold within ± 20%. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. Resistance values were measured with the Radiotrons in sockets; power supply disconnected; tuning condenser in full mesh, and volume control set at maximum except where otherwise noted. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative (−) terminal of the resistance meter to the chassis ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
11409	Band—Rubber band for first I.F. Transformer—Package of 5	.10
12118	Cap—Grid contact cap—Package of 5	.15
11978	Capacitor—Adjustable capacitor (C8)	.50
12535	Capacitor—13 Mmfd. (C10)	.18
12405	Capacitor—47 Mmfd. (C18)	.26
12404	Capacitor—120 Mmfd. (C15, C16)	.26
12406	Capacitor—180 Mmfd. (C19)	.26
12694	Capacitor—220 Mmfd. (C2)	.22
12537	Capacitor—560 Mmfd. (C1)	.20
12536	Capacitor—820 Mmfd. (C21)	.25
12534	Capacitor—1,170 Mmfd. (C9)	.28
4868	Capacitor—.005 Mfd. (C7)	.20
4858	Capacitor—.01 Mfd. (C4, C20, C23, C25)	.25
4836	Capacitor—.05 Mfd. (C3, C14, C17)	.30
12078	Capacitor—.05 Mfd. (C26, C27)	.30
4841	Capacitor—0.1 Mfd. (C13, C22)	.22
12682	Capacitor—10 Mfd. (C24)	.70
12677	Capacitor—2 Sections each 16 Mfd. (C28, C29)	3.12
12681	Cell—Bias cell for Stock No. 12676	.30
12495	Coil—Antenna coil (L2, L3, L4, L5)	1.30
12680	Coil—Coil windings and form only for second I.F. transformer Stock No. 12676 (L11, L12)	.60
12496	Coil—Oscillator coil (L6, L7, L8)	.80
12006	Core—Adjustable core for Stock No. 12403, 12497 and 12676	.22
4140	Lamp—Dial lamp 6.3 volt—Package of 5	.60
12409	Lead—Antenna lead—approximately 20 feet long	.35
12395	Range Switch—(S2, S3, S4, S5)	.68
12697	Resistor—100 ohm, flexible type (R14)—Package of 5	.65
12481	Resistor—330 ohm, insulated, ¼ watt, (R3)—Package of 5	1.00
12414	Resistor—560 ohm, insulated ¼ watt, (R6)—Package of 5	1.00
12265	Resistor—6,800 ohm, insulated, ¼ watt, (R1)—Package of 5	1.00
12695	Resistor—15,000 ohm, insulated, ¼ watt, (R4)—Package of 5	1.00
12412	Resistor—47,000 ohm, insulated, ¼ watt, (R7)—Package of 5	1.00
12286	Resistor—56,000 ohm, insulated, ¼ watt, (R2)—Package of 5	1.00
12696	Resistor—68,000 ohm, insulated, ¼ watt, (R13)—Package of 5	1.00
12263	Resistor—100,000 ohm, insulated, ¼ watt, (R11)—Package of 5	1.00
12452	Resistor—330,000 ohm, insulated, ¼ watt, (R10)—Package of 5	1.00
12285	Resistor—470,000 ohm, insulated, ¼ watt, (R12)—Package of 5	1.00
12679	Resistor—2.2 Megohm, insulated, ¼ watt, (R5, R9)—Package of 5	1.00
12008	Shield—First I.F. transformer shield	.28
12607	Shield—First I.F. transformer shield top	.30
12218	Shield—Radiotron shield	.15
12678	Shield—Second I.F. transformer shield complete with bias cell holder	.38
12400	Socket—Dial lamp socket	.22
4794	Socket—4-contact 12Z3 Radiotron socket	.15
4786	Socket—6-contact 43, 75, or 78 Radiotron socket	.15
4787	Socket—7-contact 6A7 Radiotron socket	.15
12007	Spring—Retaining spring for Stock No. 12006—Package of 10	.36
12403	Transformer—First I.F. transformer with shield (L9, L10, C15, C16)	1.62
12676	Transformer—Second I.F. transformer complete with shield (L11, L12, C18, C19, R3)	1.72
12497	Trap—Wave trap (L1)	.70
12394	Volume Control—Control and power switch (R8, S1)	1.06
	DRIVE ASSEMBLY	
12401	Condenser—2-gang variable tuning condenser (C5, C6, C11, C12)	2.35
12420	Cord—Variable tuning condenser drive cord—Package of 5	.20
12608	Dial—Station selector dial scale	.45
12419	Indicator—Station selector indicator pointer	.15
12416	Pulley—Indicator pointer shaft and pulley	.24
12417	Pulley—Variable tuning condenser pulley and set screws	.24
12418	Screw—8-32x3/16 milled head, cupped point, set screw for pulley Stock No. 12417—Package of 10	.18
12422	Shaft—Variable condenser tuning knob shaft	.26
12421	Spring—Drive cord tension spring—Package of 10	.60
	REPRODUCER ASSEMBLY	
12641	Board—Reproducer terminal board	.15
12640	Bracket—Output transformer mounting bracket	.18
12674	Coil—Reproducer field coil (L15)	1.70
11469	Coil—Reproducer neutralizing coil (L14)	.20
12642	Cone—Reproducer cone and dust cap (L13)	.94
12493	Connector—5-contact female connector for reproducer cable	.20
12567	Connector—5-contact male connector for reproducer cable	.22
9711	Reproducer complete	6.42
11828	Transformer—Output transformer (T1)	1.46
11886	Washer—Spring washer to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLY	
12548	Crystal—Dial escutcheon and crystal	1.06
12673	Knob—Station selector, volume control or range switch knob—Package of 5	.58
12672	Resistor—Wire wound ballast and line resistor comprising two 280 ohm sections and one 42 ohm section (R15, R16, R17)	1.55
11210	Screw—Chassis mounting screw assembly comprising 1 screw, 1 lockwasher and 1 washer—Package of 4	.28
4119	Screw—Set screw for knob Stock No. 12673—Package of 20	.38

Prices quoted above are subject to change without notice.

Electrical Specifications

FREQUENCY RANGES
"Standard broadcast" .... 540-1,800 kc.
"Short-wave" .... 1,600-6,500 kc.

ALIGNMENT FREQUENCIES
"Standard broadcast" .... 600 kc. (osc.); 1,700 kc. (osc. and ant.)
"Short-wave" .... None Required

Intermediate Frequency .... 460 kc.

RADIOTRON COMPLEMENT
(1) RCA-6A7 .... First Detector-Oscillator
(2) RCA-78 .... Intermediate Amplifier
(3) RCA-75 .... Second Detector, A-F, and A.V.C.
(4) RCA-43 .... Power Output
(5) RCA-12Z3 .... Rectifier

POWER SUPPLY
200-250 volts, 50-100 cycles .... 120 watts
200-250 volts, D-C .... 110 watts

POWER OUTPUT
Undistorted .... 0.9 watts A-C, 0.7 watts D-C
Maximum .... 2 watts A-C, 1.6 watts D-C

LOUDSPEAKER
Type .... Electrodynamic
Voice Coil Impedance .... 2.2 ohms at 400 cycles

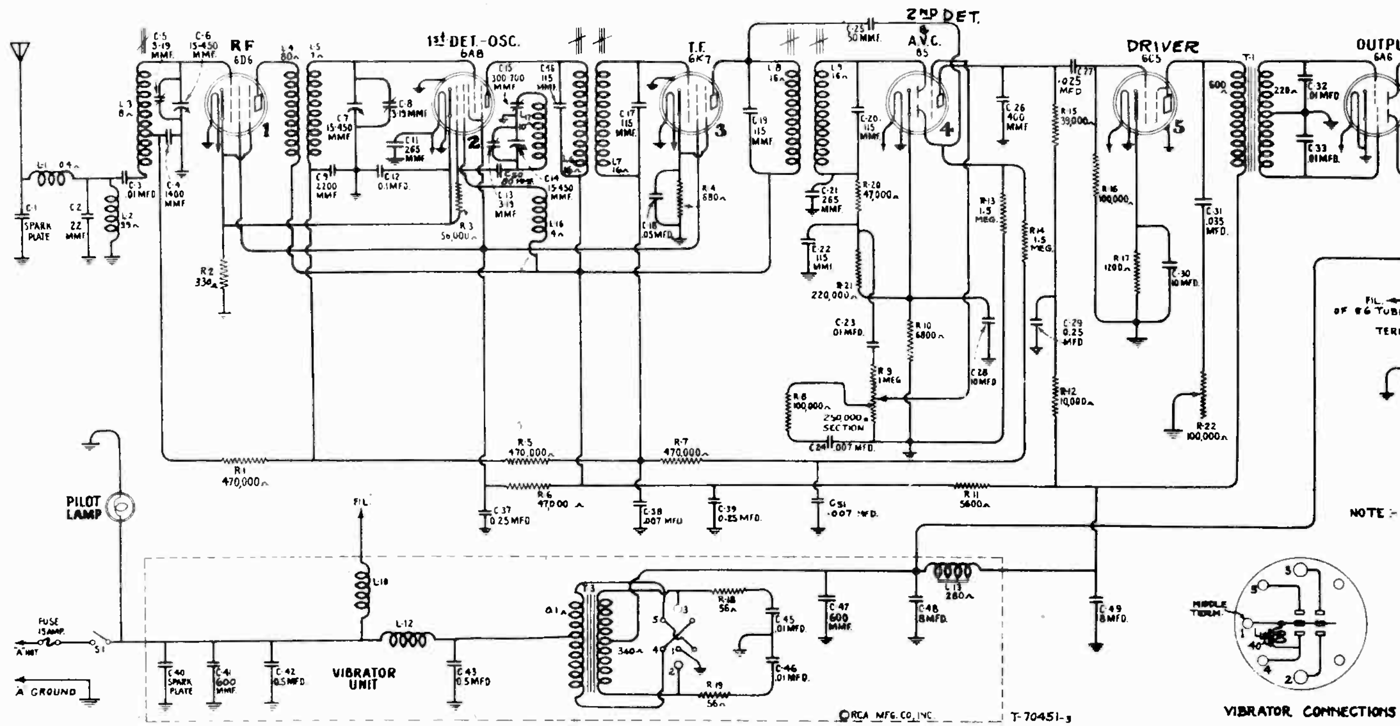
Pilot Lamps (2) .... Mazda No. 40, 6.3 volts, 0.15 amperes

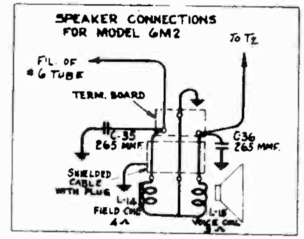
Mechanical Specifications

CABINET DIMENSIONS
Height .... 9¼ inches Width .... 12⅛ inches Depth .... 5½ inches
Weight (Net) .... 16 pounds Weight (Shipping) .... 20 pounds
Chassis Base Dimensions .... 9⅛ inches x 4¾ inches x 1⅞ inches
Over-all Height of Chassis .... 6⅛ inches
Tuning Drive Ratio .... 5 to 1
Operating Controls .... (1) Power Switch–Volume, (2) Tuning, (3) Range Selector

MODELS 6M, 6M2
Schematic, Socket
Trimmers, Speaker

RCA MFG. CO., INC.





IF PEAK 260 KC.

Figure 1—Schematic Circuit Diagram

Certain automobile installations require change of value of capacitor C-3. See note in text under "Service Data."

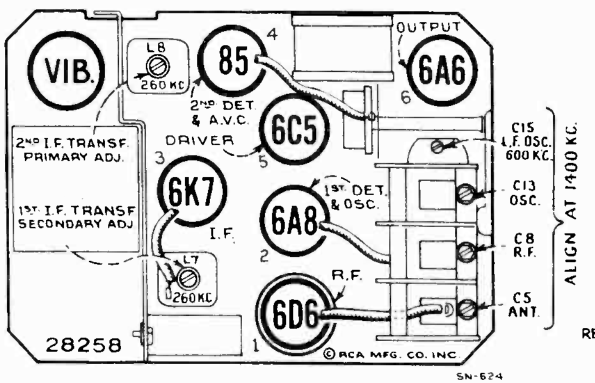


Figure 3—Radiotron, Coil, and Trimmer Locations

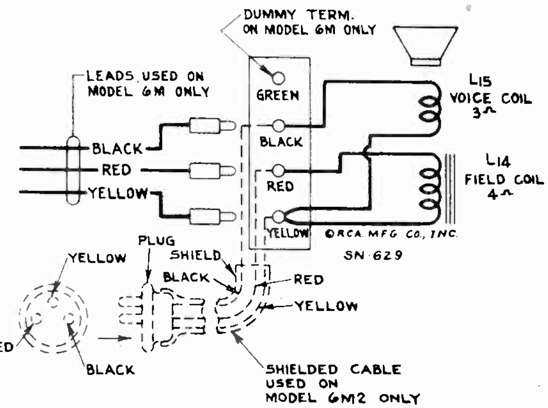


Figure 6—Loudspeaker Schematic and Wiring

POWER RATING

Supply Voltage	6.3 Volts (Storage Battery)
Current Drain	7.3 Amperes at 6.3 Volts
Fuse Protection	15 Amperes
Pilot Lamp	Mazda No. 44, 6.3 Volts

OUTPUT RATING

Maximum	9.0 Watts
Undistorted	6.0 Watts

Tuning Range .....540 to 1,600 kc.

RCA MFG. CO., INC.

MODELS 6M,6M2
Voltage,Data
Visual Alignment

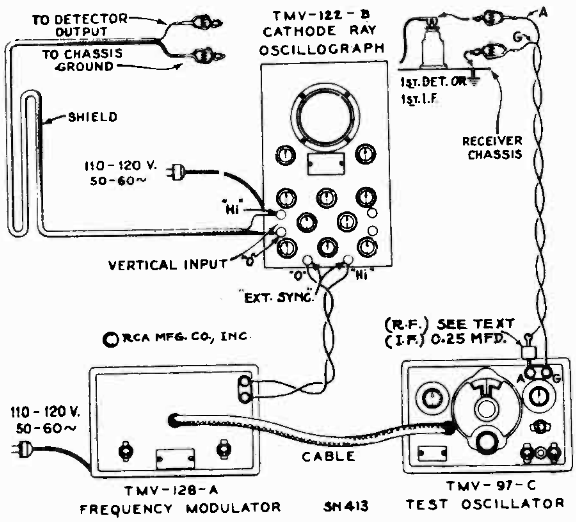


Figure 4—Alignment Apparatus Connections

RADIOTRON COMPLEMENT

(1) RCA-6D6..........Radio-Frequency Amplifier
(2) RCA-6A8............First Detector–Oscillator
(3) RCA-6K7..............Intermediate Amplifier

(4) RCA-85.....Second Detector, A-F, and A.V.C.
(5) RCA-6C5.............................Driver
(6) RCA-6A6............Power Output Amplifier

ALIGNMENT FREQUENCIES

I. F. Transformers.......................260 kc.
Oscillator Coil..............600 kc. and 1,400 kc.

Detector Coil........................1,400 kc.
Antenna Coil.........................1,400 kc.

LOUDSPEAKER

Type............................Electrodynamic
Impedance (v. c.)..........3 Ohms at 400 Cycles

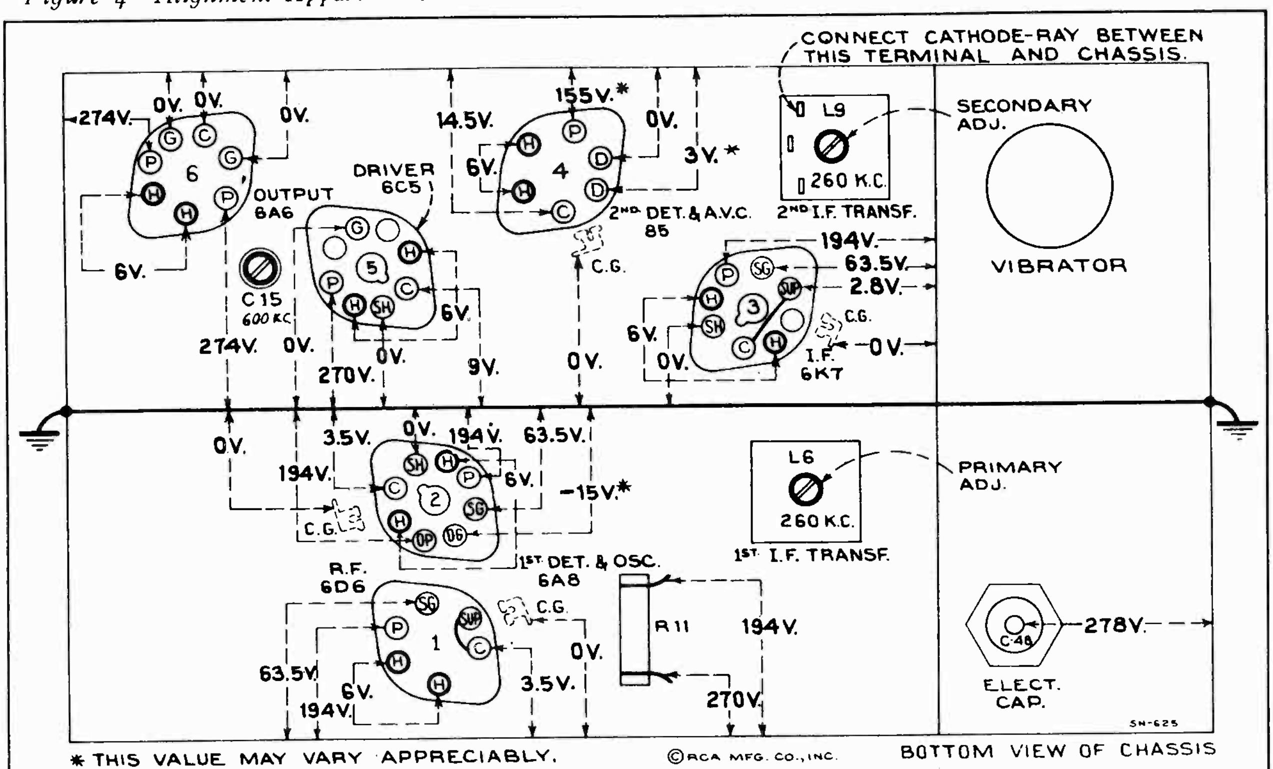


Figure 5—Radiotron Socket Voltages and Trimmer Locations
(Measured at 6.3 volts battery supply—Volume Control Maximum—No Signal)

Radiotron Socket Voltages

Operating conditions of the basic circuits of this instrument may be determined by measuring the voltages applied to the tube elements. Figure 5 shows the voltage values from the socket contacts to ground and appearing across the heater contacts (H-H). Each value as specified should hold within ±20% when this instrument is normally operative with all tubes intact and rated voltage applied. Variations in excess of this limit will usually be indicative of trouble.

The voltages given on this diagram are actual measured voltages, and are obtained with the voltmeter load in the circuit.

To fulfill the conditions under which the d-c voltages were measured requires a 1,000-ohm-per-volt d-c voltmeter having ranges of 10, 50, 250, and 500 volts. Voltages below 10 volts should be measured on the 10-volt scale; between 10 and 50 on the 50-volt scale; between 50 and 250 on the 250-volt scale; and above 250 on the 500-volt scale.

MODELS 6M, 6M2
Chassis Wiring

RCA MFG. CO., INC.

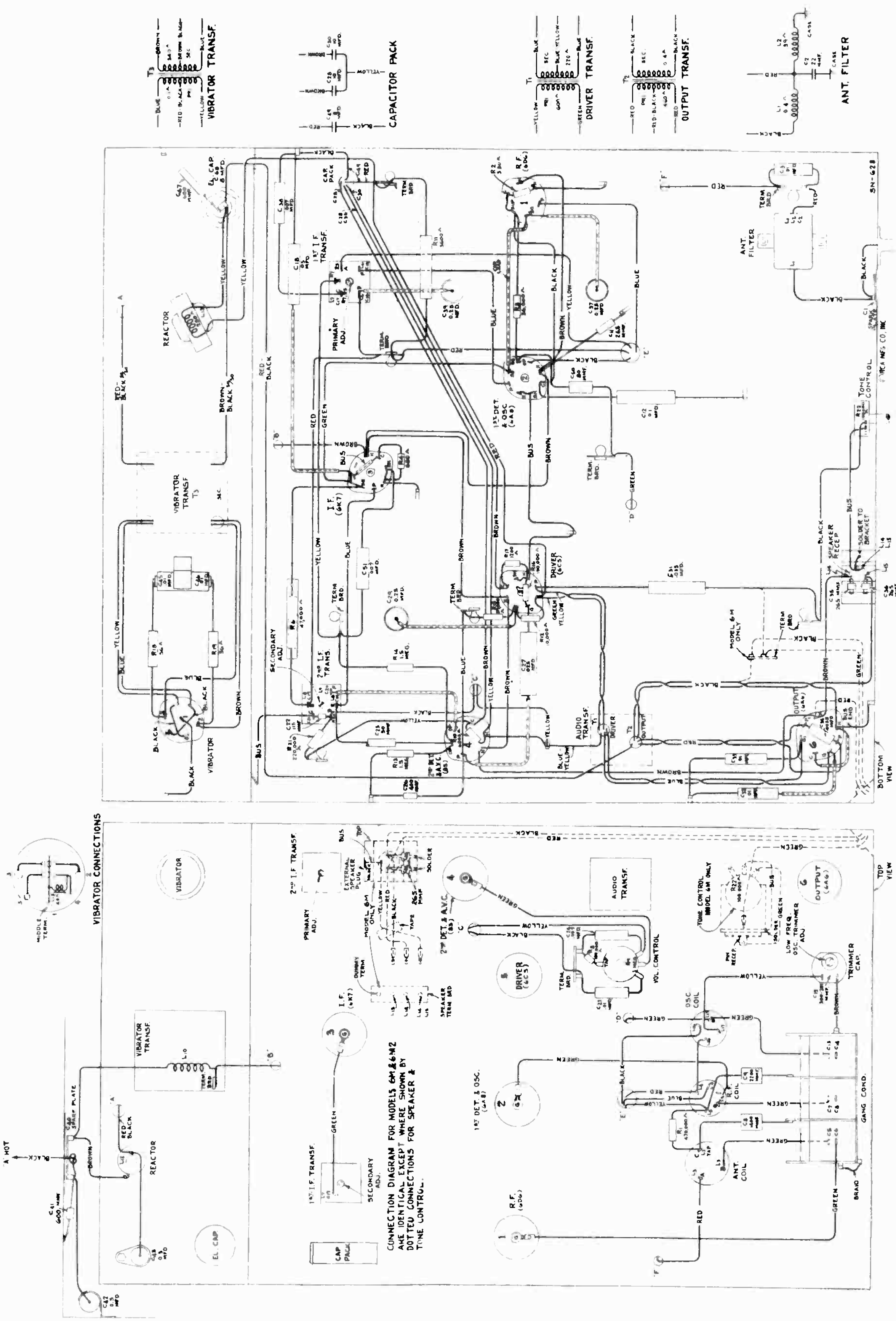


Figure 2—Chassis Wiring Diagram

RCA MFG. CO., INC.

General Description

These two automobile receivers represent the results of thorough development, design, and substantial manufacture. Noteworthy technical improvements have been applied in achieving marked advantages of installation, operation, and efficiency of performance.

Model 6M is a single-unit receiver containing the radio chassis, power conversion system, and loudspeaker all in one housing. A convenient three-contact loudspeaker receptacle installed on the chassis case permits the addition of a remote dynamic loudspeaker if desired.

Model 6M2 is a double-unit receiver utilizing a chassis and its power conversion equipment similar to the Model 6M, assembled together in one case, with its loudspeaker mounted individually in a separate cylindrical housing.

Engineering features incorporated in these instruments are: The inclusion of ignition suppression means within the circuits of the receiver; reduction of power line modulation in antenna circuit; improved high-gain molded core antenna coil; permeability tuned intermediate frequency transformers; continuously variable high-frequency tone control; and a "plug-in" type of synchronous rectifier-vibrator for obtaining high-voltage supply.

Correct arrangement of parts, adequate shielding, and the ingenious insertion of filters at proper points in the circuit insure minimum disturbances from apparatus associated with the electrical circuits of the automobile and from outside sources.

Both receivers are compactly housed in substantial metal cases. Removable covers permit ready access to the under and top sides of the chassis. Flexible shafts interconnect the operating head to the controlled devices within the receiver housing. These units are adaptable for mounting on either the right-hand or the left-hand side of the engine firewall as local conditions demand.

Circuit Arrangement

The schematic and wiring layouts of the electrical circuit are shown in Figures 1 and 2 respectively. From these diagrams it may be seen that six Radiotrons are incorporated in the basic superheterodyne circuit. In sequence, there is an r-f stage, a dual first detector–oscillator stage, a single i-f stage, a second detector audio amplifier–a.v.c. stage, a driver stage, and a class "B" output stage. The power supply system contains a mechanical interrupter and rectifier. The following circuit features are of particular importance:

Noise Filter—Reduction of ignition interference and similar disturbances are brought about by filter arrangements in the antenna input circuit and the "A" battery input lead. This antenna filter, L-1, C-1, and C-2, is a "low-pass" type, having an acceptance band below 1,600 kc. The inductance L-2 is for the purpose of shunting out power line hum pickup.

Tuned Circuits—There are seven resonant circuits in the radio frequency end of the receiver. The r-f, first detector, and oscillator grid circuits are tuned by a three-gang tuning condenser. The remaining tuned circuits consist of the primary and secondary windings of the i-f transformers, which resonate with fixed condensers and are tuned by molded cores to a nominal frequency of 260 kilocycles.

Detection—Detection takes place as a result of the rectifying action of one of the diodes of the RCA-85 tube, the current being developed through resistors R-20 and R-21. The audio component of this current is coupled through capacitor C-23 to the one megohm volume control R-9. The arm of this volume control is connected to the grid of the RCA-85 tube, thus giving a means of continuously varying the voltage input to the audio amplifier.

A.V.C.—The a.v.c. diode of the RCA-85 tube is coupled through capacitor C-25 to the primary of the second i-f transformer. Due to the rectifying action of this diode, a current is developed through resistor R-13. The d-c voltage drop in this resistor is used for automatically regulating the control grid bias of the r-f, first detector, and i-f stages, the voltage being applied through a suitable filter network. Due to the fact that the a.v.c. diode returns through resistor R-13 to a point which is 15 volts negative with respect to its cathode, the a.v.c. action is delayed until the input signal reaches a predetermined level. This gives more uniform output for widely varying signal strengths into the antenna.

Audio System—As mentioned under "Detection", the audio component of the detected signal is selected from the manual volume control and applied to the control grid of the RCA-85 tube. The plate circuit of this tube is connected through capacitor C-27 to the control grid of the driver tube, an RCA-6C5. The plate circuit of the driver tube is coupled through the driver transformer T-1 to the control grids of the class "B" output tube, RCA-6A6. This tube is coupled through the output transformer T-2 to the loudspeaker.

SERVICE DATA

NOTE: Certain models of 1936 automobiles are equipped with "high-capacitance type" (400 mmfd. or greater) built-in antennas. The 1936 models of Dodge, De Soto, and Chrysler are examples of automobiles so equipped. Installation of receiver in automobiles with such "high-capacity" antennas necessitates the following modification of the antenna circuit of the receiver to suit the characteristics of the antenna installation:

Remove the tubular paper-covered capacitor C-3 (.01 mfd.), Figure 2, and replace with the small molded type capacitor (500 mmfd.) furnished with Escutcheon Kit for respective model of automobile.

Alignment Procedure

There are four alignment trimmers provided in the antenna coil, detector coil, and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of four screws attached to molded cores.

NOTE: *The antenna coil has a molded core which is adjusted at the factory for the correct inductance.* ***This adjustment should not be disturbed.***

In readjusting the tuned circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as the RCA Stock No. 9595, will be required as the source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to accurately shown when the correct point of adjustment is reached. Two indication methods are applicable—one requires use of the cathode-ray oscillograph, and the other requires a voltmeter or glow-type indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave image which represents the resonance characteristics of the circuits being tuned. This type of alignment is possible through use of apparatus such as the RCA Stock No. 9558 Frequency Modulator and the RCA Stock No. 9545 Cathode-Ray Oscillograph. Alignment by the output meter method should be indicated by an instrument such as the RCA Stock No. 4317 Neon Glow Indicator. The two procedures are outlined as follows:

CATHODE-RAY ALIGNMENT

Attach the cathode-ray oscillograph vertical input terminals to the second detector output, with the "Hi" connected to the junction of the two resistors, R-20 and R-21, and the "0" connected to the receiver chassis. Advance the vertical amplifier gain control of the oscillograph to full-on, allowing it to remain at such position for all adjustments. Turn the vertical "A" amplifier to "On." Set the oscillograph power switch to "On" and adjust the intensity and focusing controls to give a sharply defined spot on the screen. Interconnect the frequency modulator impulse generator terminals to the oscillograph "Ext. Sync." terminals, as shown by Figure 4.

I-F Adjustments

(a) Connect the output of the test oscillator to the control grid cap of the i-f tube (RCA-6K7) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Tune the oscillator to 260 kc., place its modulation switch to "On" and its output range switch to "Hi." The frequency modulator must not be connected to the oscillator for the preliminary adjustments.

(b) Set the cathode-ray oscillograph horizontal "B" amplifier to "Timing" and the synchronizing switch (timing) to "Int." Place the synchronizing input and frequency controls to about their mid-positions. Turn the range switch to its No. 1 position.

(c) Increase the output of the oscillator until a deflection is noticeable on the oscillograph screen. The figure obtained represents several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave image formed (400-cycle waves) to be spread completely across the screen by advancing the horizontal "B" gain control. The image should be synchronized and made to remain motionless by adjustment of the synchronizing input and frequency controls.

(d) Adjust the two screws (attached to molded cores) of the second i-f transformer, one on top and one on bottom, to produce maximum vertical deflection of the oscillographic wave which is present on the screen. This adjustment places the transformer in exact resonance with the 260 kc. signal.

(e) The sweeping operation should follow using the frequency modulator. Shift the oscillograph synchronizing switch to "Ext.", change its range switch to No. 2 position and set the frequency control to its mid-position. Place the frequency modulator in operation, with its sweep range switch in the "Lo" position. Interconnect the test oscillator and frequency modulator with the special shielded patch cord provided. Turn the oscillator modulation switch to "Off."

(f) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. These waves will be identical in shape, but will be totally disconnected and appearing in reversed positions. They will have a common base line, which is discontinuous. Adjust the frequency and synchronizing input controls of the oscillograph to get the proper waves and to make them remain motionless on the screen. Continue increasing the oscillator frequency until the forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will obtain at an oscillator setting of approximately 360 kc.

(g) With the images established as in (f), readjust the two screws on the second i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(h) Without altering the adjustments of the apparatus, shift the output connections of the oscillator to the input of the i-f system, i. e., between the first detector (RCA-6A8) control grid and ground. Regulate its output so that the amplitude of the oscillographic image is approximately the same as used above for adjustment (g) of the second i-f transformer.

(i) The two first i-f transformer adjustment screws, one on top and one on bottom, should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

NOTE: Before making r-f adjustments, it may be advisable to replace the bottom cover to eliminate vibrator interference.

(a) Adjust the dial pointer on the remote control head by the following procedure. Rotate tuning knob to its extreme clockwise position irrespective of location of pointer on dial. Now turn the pointer adjusting screw in the center of the back of the control unit until the pointer is at the end calibration mark below the 55 on dial scale.

(b) Attach the output of the test oscillator to the receiver input, i. e., between the antenna and ground terminals, with a 175 mmfd. capacitor in series with antenna lead.

NOTE: For r-f alignment of receivers in which the tubular paper condenser C-3 (.01 mfd.) has been replaced by the small molded condenser 500 mmfd. (change easily identified by reference to Figure 2 and bottom of chassis), use a .001 mfd. capacitor instead of the 175 mmfd. capacitor in series with the antenna lead and test oscillator.

There should be a shunt capacitor of 50 or 60 mmfd. from the antenna lead at the receiver to ground. Accurately tune the oscillator to 1,400 kc. The oscillograph should be left connected to the second detector output circuit as for the above i-f adjustments. Return the synchronizing switch to its "Int." position and turn the range switch to its No. 1 position.

(c) Tune the receiver to a dial reading of 1,400 kc. Then regulate the oscillator output so as to increase the amplitude of the waves on the oscillograph screen to a conveniently observable size. The several waves of detected signal, as appearing on the screen, should be synchronized by operation of the synchronizing and frequency controls. Trimmers, C-13, C-8, and C-5, of the oscillator, detector, and antenna coils should then be adjusted so that each causes maximum vertical deflection (amplitude) of the images.

(d) The oscillator modulation should then be turned to "Off" and the frequency modulator placed in operation, connected to the oscillator with the shielded patch cord. Change the oscillograph synchronizing switch to "Ext.", set its range switch to its No. 2 position and the frequency control slightly above its mid-position.

(e) Increase the frequency of the test oscillator gradually, until the point is reached where the two similar, distinct, and separate wave images appear on the screen and become coincident at their highest points. This will occur at an oscillator setting of approximately 1,500 kc. These waves should be synchronized on the oscillograph screen by careful readjustment of the synchronizing and frequency controls. Readjust trimmers, C-13, C-8, and C-5, to produce complete coincidence at maximum amplitude of the two waves.

(f) Disconnect the frequency modulator from the oscillator. Place the modulation switch of the oscillator to "On" and tune the oscillator to 600 kc. Set the synchronizing switch of the oscillograph to "Int." and turn the range switch to No. 1 position.

(g) Tune the receiver station selector control so as to pick up the 600 kc. signal, disregarding the dial reading at which it is best received.

(h) Change the oscillograph synchronizing switch to "Ext." and place the oscillator modulation switch to "Off." Interconnect the frequency modulator and oscillator with the special shielded patch cord. Return the range control of the oscillograph to its No. 2 position and set the frequency control slightly above its mid-position.

(i) Shift the test oscillator to its 200-400 kc. range and tune it to the point at which the forward and reverse waves show on the oscillograph screen. This condition will obtain at an oscillator setting of approximately 230 kc. The signal obtained from the oscillator for this adjustment will be the third harmonic of 200 kc. An increase in the oscillator output may be necessary. The trimmer C-15 should then be adjusted to the point which produces maximum amplitude of the oscillographic images. It will not be necessary to rock the tuning control for this adjustment, inasmuch as the frequency modulator is varying the signal in an equivalent manner.

(j) Retune trimmers C-13, C-8, and C-5 as in (c), (d), and (e) to correct for any change in high-frequency alignment which may have been caused by the adjustment of C-15.

OUTPUT METER ALIGNMENT

Place the receiver in operation with its two covers removed. Attach the output indicator across the loudspeaker voice coil circuit or across the output transformer primary. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test oscillator output control so that the signal level is as low as possible and still observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the output of the test oscillator to the control grid cap of the i-f tube (RCA-6K7) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Adjust the frequency of the oscillator to 260 kc. Tune the receiver to a point where no interference is received from the heterodyne oscillator or local stations.

(b) Adjust the two screws (attached to molded cores) of the second i-f transformer, one on top and one on bottom, until maximum output is produced by the indicating device.

(c) Remove the oscillator from the i-f tube input and connect it between the control grid cap of the first detector tube (RCA-6A8) and chassis-ground, using the 0.25 mfd. capacitor as previously. Allow its tuning to remain at 260 kc. Tune the receiver to avoid interference as in (a).

(d) Adjust the two screws of the first i-f transformer for maximum (peak) receiver output. The indication for this adjustment will be broad due to the "flat-top" characteristic of the i-f system. The two screws should, therefore, be very carefully adjusted so that the indicator remains fixed at maximum as the oscillator is shifted through a range 2 kc. above and below its normal setting of 260 kc. An irregular double-peaked indication is to be avoided.

R-F Adjustments

NOTE: Before making r-f adjustments, it may be advisable to replace the bottom cover to eliminate vibrator interference.

(a) Adjust the dial pointer on the remote control head by the following procedure. Rotate tuning knob to its extreme clockwise position irrespective of location of pointer on dial. Now turn the pointer adjusting screw in the center of the back of the control unit until the pointer is at the end calibration mark below the 55 on dial scale.

(b) Connect the output of the test-oscillator to the antenna-ground terminals of the receiver with a 175 mmfd. capacitor in series with the antenna lead.

NOTE: For r-f alignment of receivers in which the tubular paper condenser C-3 (.01 mfd.) has been replaced by the small molded condenser 500 mmfd. (change easily identified by reference to Figure 2 and bottom of chassis), use a .001 mfd. capacitor instead of the 175 mmfd. capacitor in series with the antenna lead and test oscillator.

There should be a shunt capacitor of 50 or 60 mmfd. from the antenna lead at the receiver to ground. Tune the oscillator to 1,400 kc. Allow the output indicator to remain attached to the receiver output.

(c) Tune the receiver so that the dial reading is 1,400 kc. Then adjust the oscillator, detector, and antenna coil trimmers, C-13, C-8, and C-5 respectively, tuning each to the point producing maximum indicated receiver output.

(d) Shift the oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. The oscillator series trimmer, C-15, should then be adjusted, simultaneously rocking the receiver tuning control backward and forward through the signal until maximum (peak) receiver output results from the combined operations. The adjustment of C-13, C-8 and C-5 should be repeated as in (c) to correct for any change in its alignment due to the adjustment of C-15.

MODELS 6M, 6M2
Data, Parts List

RCA MFG. CO., INC.

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
12511	Cap—Grid contact cap—Package of 5	$0.15
11130	Capacitor—Adjustable capacitor—(C15)	.40
11289	Capacitor—50 Mmfd.—(C25)	.26
12270	Capacitor—80 Mmfd.—(C50)	.28
8076	Capacitor—115 Mmfd.—(C22)	.20
11998	Capacitor—115 Mmfd.—(C16, C17, C19, C20)	.28
11181	Capacitor—265 Mmfd.—(C11, C21, C35, C36)	.20
11171	Capacitor—400 Mmfd.—(C26)	.22
4210	Capacitor—600 Mmfd.—(C47)	.25
4094	Capacitor—690 Mmfd.—(C41)	.26
12268	Capacitor—1,400 Mmfd.—(C4)	.34
12269	Capacitor—2,200 Mmfd.—(C9)	.42
5005	Capacitor—.0035 Mfd.—(C34)	.16
5148	Capacitor—.007 Mfd.—(C24, C38, C51)	.20
4858	Capacitor—.01 Mfd.—(C3, C23, C32, C33)	.25
4870	Capacitor—.025 Mfd.—(C27)	.20
5196	Capacitor—.035 Mfd.—(C31)	.18
4836	Capacitor—.05 Mfd.—(C18)	.30
4841	Capacitor—0.1 Mfd.—(C12)	.22
12237	Capacitor—.25 Mfd.—(C29, C37, C39)	1.02
5019	Capacitor—0.5 Mfd.—(C43)	.42
12234	Capacitor—8 Mfd.—(C48)	1.34
12233	Capacitor Pack—Comprising 2 sections each .01 Mfd.—(C45, C46)	1.02
12238	Capacitor Pack—Comprising one 8 Mfd. and two 10 Mfd. sections—(C28, C30, C49)	2.30
12.23	Coil—Antenna coil—(L3)	.94
12235	Coil—Choke coil—(L12)	.50
12225	Coil—Oscillator coil—(L16, L17)	.80
12224	Coil—R. F. coil—(L4, L5)	1.32
12220	Condenser—3-gang variable tuning condenser—(C5, C 6,C7, C8, C13, C14)	4.50
12006	Core—Adjustable core for I. F. transformer Stock No. 12228 and No. 12229	.22
12289	Coupling—Station selector flexible shaft coupling	.20
12239	Filter—Antenna filter—(L1, L2, C2)	1.28
12221	Gear—Variable tuning condenser shaft drive gear	.36
12222	Gear—Variable tuning condenser worm gear	.36
12242	Guide—Station selector shaft guide	.18
12483	Pin—Contact pin for speaker leads (used in 6M only)—Package of 5	.15
12485	Pin—Contact pin for tone control lead (used in 6M only)—Package of 5	.15
12232	Reactor—Filter reactor—iron core—(L13)	1.10
5034	Resistor—56 ohm—carbon type, ½ watt—(R18, R19)—Package of 5	1.00
12481	Resistor—330 ohm—insulated, ¼ watt—(R2)—Package of 5	1.00
12262	Resistor—680 ohm—insulated, ¼ watt—(R4)—Package of 5	1.00
12267	Resistor—1.200 ohm—insulated, ¼ watt—(R17)—Package of 5	1.00
8097	Resistor—5,600 ohm—carbon type, 2 watt—(R11)	.25
12265	Resistor—6,800 ohm—insulated, ¼ watt—(R10)—Package of 5	1.00
12288	Resistor—10.000 ohm—insulated, ¼ watt—(R12)—Package of 5	1.00
12266	Resistor—39,000 ohm—insuated, ¼ watt—(R15)—Package of 5	$1.00
5132	Resistor—47,000 ohm—carbon type, 1/10 watt—(R20)—Package of 5	.75
12073	Resistor—47,000 ohm—carbon type, 1 watt—(R6)—Package of 5	1.10
12286	Resistor—56,000 ohm—insulated, ¼ watt—(R3)—Package of 5	1.00
12263	Resistor—100,000 ohm—insulated, ¼ watt—(R16)—Package of 5	1.00
11281	Resistor—100,000 ohm—carbon type, 1/10 watt—(R8)—Package of 5	.75
12264	Resistor—220,000 ohm—insulated, ¼ watt—(R21)—Package of 5	1.00
11452	Resistor—470,000 ohm—carbon type, 1/10 watt—(R5, R7)—Package of 5	.75
12285	Resistor—470,000 ohm—insulated, ¼ watt—(R1)—Package of 5	1.00
12287	Resistor—1.5 megohm—insulated, ¼ watt—(R13, R14)—Package of 5	1.00
3584	Ring—Retaining ring for R. F. or oscillator coil—Package of 5	.40
5129	Ring—Radiotron shield ring—Package of 5	.10
3623	Shield—R. F. or oscillator coil shield	.30
12290	Shield—Radiotron shield	.18
4786	Socket—6-contact 6D6 or 85 Radiotron socket	.15
12243	Socket—7-contact 6A6 Radiotron socket	.18
12227	Socket—8-contact 6A8, 6C5 or 6K7 Radiotron socket	.18
12241	Socket—Vibrator socket	.18
12226	Stud—Variable tuning condenser mounting stud assembly—Package of 4	.22
12228	Transformer—First I. F.—(L6, L7, C16, C17, R5, R7)	2.24
12230	Transformer—Output transformer—(T1, T2)	2.95
12229	Transformer—Second I. F. transformer—(L8, L9, C19, C20, C21, R20)	2.02
12231	Transformer—Vibrator power transformer—(T3)	3.42
12236	Vibrator complete	4.55
12240	Volume Control—(R9)	1.14
	CONTROL BOX AND FLEXIBLE SHAFT ASSEMBLIES	
12505	Box—Control box complete—less flexible shafts	6.35
12578	Dial—Station selector indicator dial (standard)	.50
12579	Knob—Station selector (tuning) knob (standard)	.28
12580	Knob—Volume control knob (standard)	.28
11891	Lamp—Control box dial lamp—Package of 5	.65
12504	Shaft—Tuning control flexible shaft complete—approx. 21½ in. long	1.20
12503	Shaft—Volume control flexible shaft complete—approx. 21½ in. long	1.20
	REPRODUCER ASSEMBLIES, MODEL 6M	
12482	Board—Reproducer terminal board	.30
12450	Coil—Field coil—(L14)	1.60
12451	Cone—Reproducer cone complete—(L15)	1.60
9687	Reproducer—Reproducer complete	5.65
	REPRODUCER ASSEMBLIES, MODEL 6M2	
12526	Board—2-contact reproducer terminal board	$0.20
12525	Cable—Shielded reproducer cable complete with 3-contact male connector	1.08
12524	Coil—Field coil—(L14)	1.85
12523	Cone—Reproducer cone—(L15)	1.65
12527	Housing—Reproducer housing complete	2.65
9691	Reproducer—Reproducer complete	11.38
12528	Screw—Reproducer housing screw—Package of 5	.14
	MISCELLANEOUS ASSEMBLIES	
4287	Body—Antenna cable female connector body—Package of 10	.40
4289	Body—"A" lead fuse connector body—Package of 10	.35
12510	Button—Plug button for receiver housing (used on 6M only)	.16
12444	Cable—Shielded antenna cable approx. 8 in. long, complete with female-section of connector	.58
12473	Cable—Shielded antenna lead-in cable, approx. 31 in. long, complete with 2 male connections of connector	1.12
4288	Cap—Male connector cap for "A" lead or antenna cable—Package of 10	.36
5025	Capacitor—Generator capacitor	.40
4293	Capacitor—Ammeter capacitor	.60
11418	Capacitor—.5 Mfd.—(C42)	.50
4291	Clip—"A" lead ammeter clip—Package of 10	.70
12457	Cover—Receiver housing top cover (used on 6M only)	.65
12458	Cover—Receiver housing bottom cover assembly (used on 6M only)	.60
12461	Cover—Receiver case bottom cover (used in 6M2 only)	.60
12462	Cover—Receiver case top cover (used in 6M2 only)	.62
12532	Fastener—Receiver housing top cover fastener—Package of 10	.30
4286	Ferrule—Antenna cabl eor "A" lead connector ferrule and bushing—Package of 10	.38
5023	Fuse—"A" lead fuse—15 amp.—Package of 5	.40
12449	Grille—Speaker grille assembly (used on 6M only)	$0.88
12456	Housing—Receiver housing complete (used on 6M only)	4.60
12460	Housing—Receiver case complete (used on 6M2 only)	4.58
4290	Insulator—Fuse connector insulator—Package of 10	.35
4323	Knob—Tone control knob (used on 6M only)—Package of 5	.70
4132	Knob—Tone control knob (used on 6M2 only)—Package of 5	.55
12445	Lead—"A" lead (set end), approx. 8 in. long, complete with male section of connector	.26
12506	Plate—Name plate and mounting screws (used in 6M only)	.28
12507	Plate—Name plate and mounting screws (used in 6M2 only)	.28
12508	Plate—RCA monogram and rivets (used on 6M2 only)	.28
12609	Ring—Rubber ring for speaker mounting (used on 6M2 only)	.28
12459	Screw—Speaker mounting screw assembly, consisting of 1 screw, 1 nut, and 1 lockwasher to mount speaker in case (used on 6M only)—Package of 4	.20
12533	Screw—Self-tapping slotted hex. head, ¼ in. long, used in receiver housing—Package of 10	.16
4393	Screw—Set screw for tone control knob Stock No. 4132 (used on 6M2 only)—Package of 10	.25
12248	Socket—3-contact socket and bracket assembly for reproducer cable	.20
12502	Socket—Pin socket and bracket assembly for tone control lead	.30
4284	Spring—Antenna cable connector spring—Package of 10	.30
12448	Stud—Receiver mounting stud assembly, comprising 1 stud, 1 washer, 1 lockwasher and 1 nut	.20
12254	Stud—Speaker mounting stud assembly, comprising 1 stud, 1 spacer, 1 washer and 2 nuts (used in 6M2 only)	.24
5024	Suppressor—Distributor suppressor	.38
12249	Tone Control—(R22)	.88
4285	Washer—Antenna cable connector insulating washer—Package of 10	.22

The prices quoted above are subject to change without notice.

Tuning Condenser Drive

Smooth control should be obtained over the entire tuning range of the variable condenser. If irregularity is present, check the action of the gear mechanism for binding or backlash at every point within the tuning range. A bind may be due to improper mesh between the worm gear and the large gears on the condenser shaft. To correct such a condition, loosen the three screws holding the gear plate and adjust the mesh of the gears to a position which gives smooth operation. Gear backlash is prevented by the small compression spring between the two large gears on the rotor shaft.

Interrupter

The mechanical interrupter used in the power system is constructed with a plug-in base, so as to be easily removed from the receiver. Its adjustments have been correctly set during manufacture by means of special equipment. In cases of faulty operation of the interrupter, a renewal should be made.

The symmetrical plug-in base on this device permits the unit to be placed in its socket so as to give correct output voltage polarity on an automobile with either a positive or negative "A" ground. For installation with positive "A" ground, insert vibrator so positive (+) symbol is nearest label on vibrator compartment partition; for negative "A" ground, insert with negative (–) symbol nearest label.

Radiotrons

Deterioration of tubes and their approach to failure is usually evidenced by noisy or intermittent operation, loss of sensitivity, and distorted tone quality. When suspected as faulty, the tubes should be removed from the receiver and checked with standard tube testing apparatus. It is not feasible to test the tubes while in the receiver, due to measurement inaccuracies which would result from the effects of the circuits.

Receiver Housing

The screws holding the receiver chassis to the case must all be in place and tightly installed, inasmuch as they appreciably affect the ground resistance of the assembly and will consequently have a bearing on the amount of ignition noise received.

Final Tuning Dial Adjustment

Final adjustment of the dial pointer may be made during operation after the receiver is installed in automobile. To do this, tune in a station of known frequency (say 760 kc.—approximately 76 on dial) as accurately as possible. Now reset the dial pointer to exactly 76 on the dial by means of the adjusting screw at center rear of operating head.

Volume Control and Power Switch

This adjustment is made by turning the small control knob fully clockwise and then fully counterclockwise. This places the friction clutch mechanism on the volume control in proper alignment.

OPERATING CONTROLS (1) Power Switch-Volume, (2) Tuning, (3) High-Frequency Tone

TUNING DRIVE RATIO 12-to-1

WEIGHT

	Model 6M2	Model 6M
Receiver and Accessories Complete	29 Pounds	24¼ Pounds

RCA MFG. CO., INC.

MODELS 6BT, 6BK, 6BT6, 6BK6
Schematic, Socket
Pickup Connections
Battery Cable

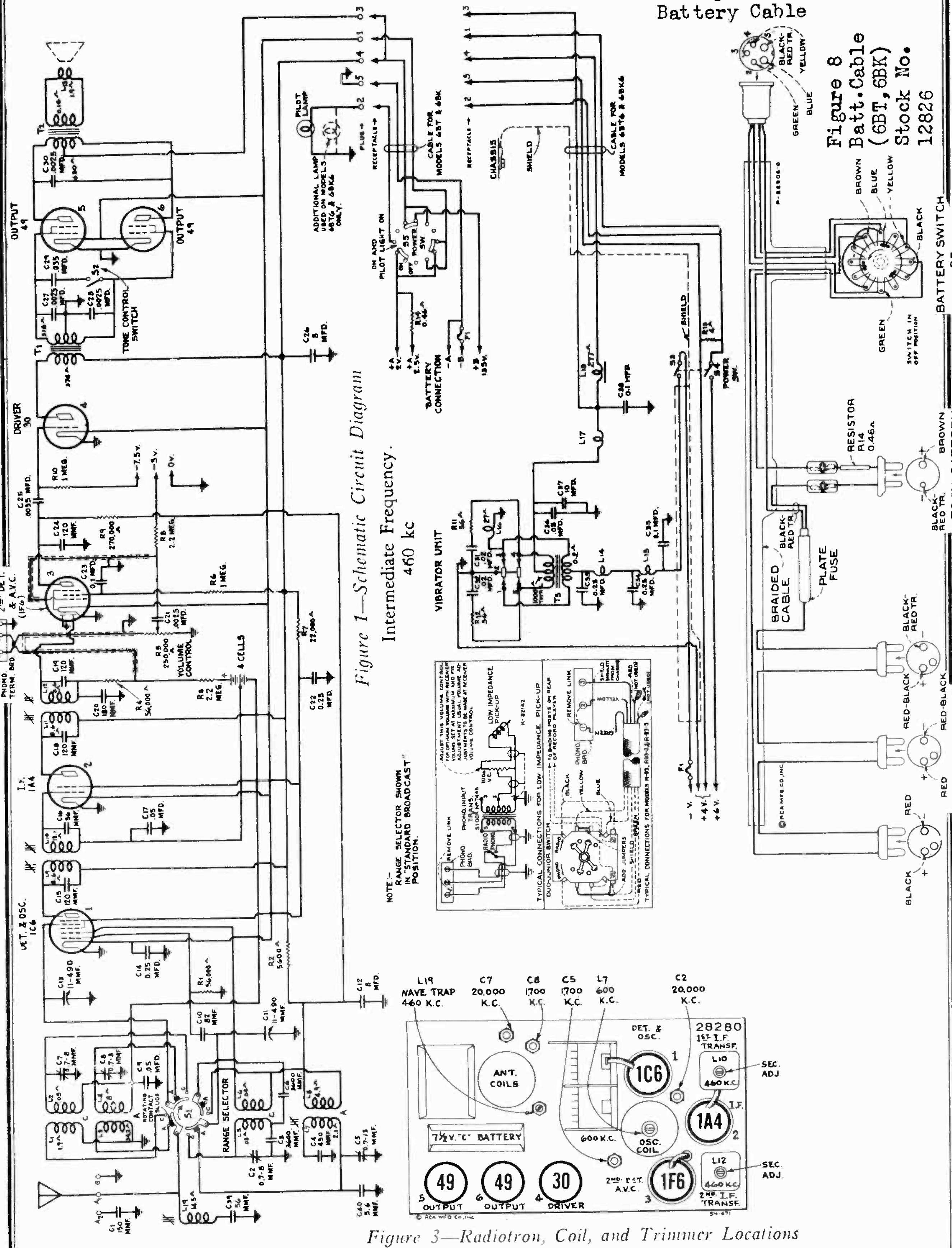


Figure 1—Schematic Circuit Diagram

Figure 8
Batt. Cable
(6BT, 6BK)
Stock No.
12826

Figure 3—Radiotron, Coil, and Trimmer Locations

MODELS 6BT, 6BK, 6BT6, 6BK6
Chassis Wiring, Coil Data

RCA MFG. CO., INC.

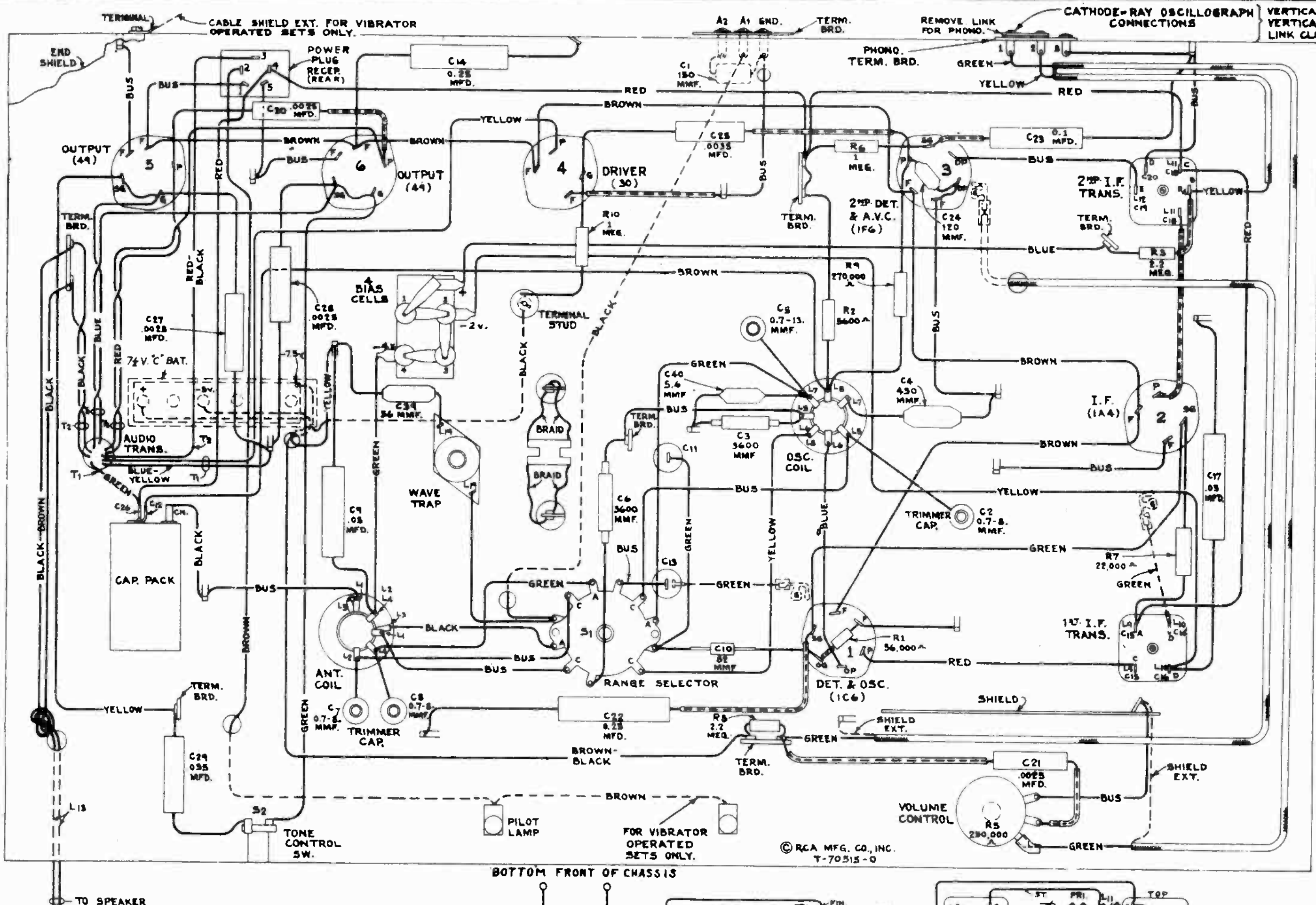
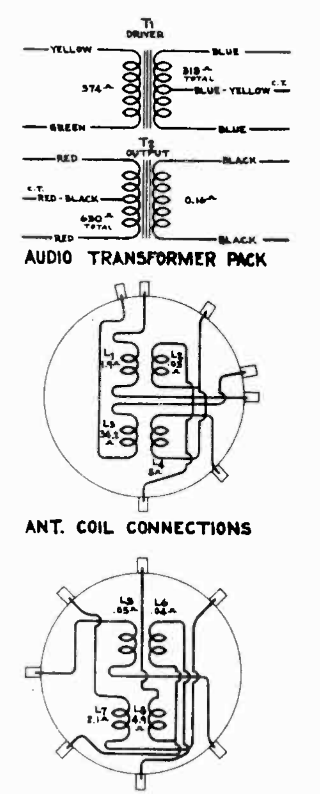
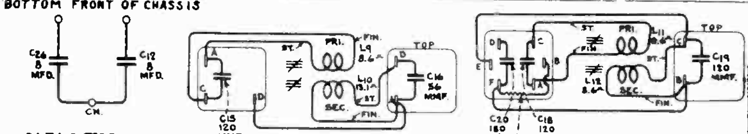


Figure 2—Chassis Wiring Diagram





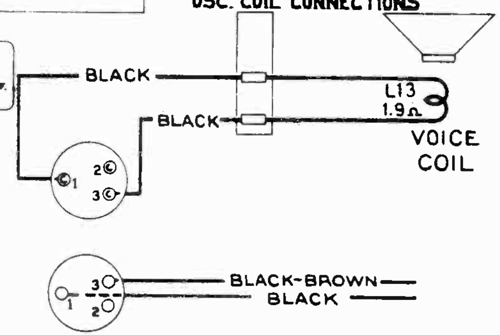


Figure 6—Loudspeaker Wiring

ALIGNMENT FREQUENCIES
"Standard Broadcast" (A) .... 600 kc (osc.), 1,700 kc (osc., ant.)
"Short Wave" (C) .... 20,000 kc (osc., ant.)

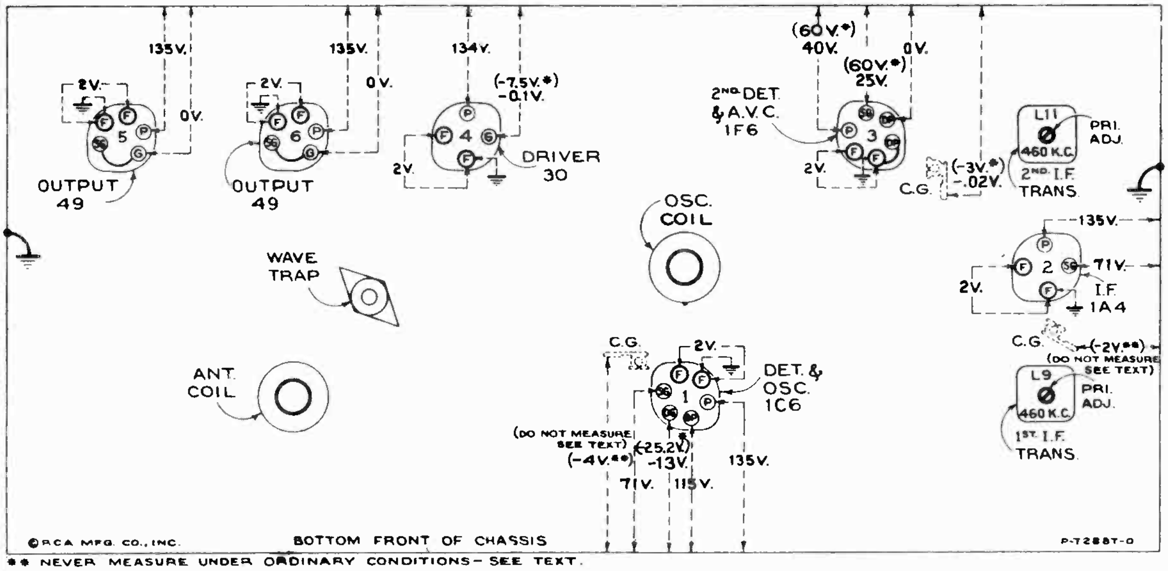
FREQUENCY RANGES
"Standard Broadcast" (A) ..... 530-1,900 kc
"Short Wave" (C) .... 5,800-21,600 kc

CURRENT CONSUMPTION	6BT or 6BK	6BT6 or 6BK6
"A" at 2 volts	0.52 amp. (pilot lamp off)	
"A" at 2 volts	0.58 amp. (pilot lamp on)	
"A" at 6.0 volts		1.35 amps.
"A" at 6.3 volts		1.40 amps.
"B" at 135 volts	.19 ma. (Supplied from vibrator)	

Power Unit Wiring

MODELS 6BT, 6BK, 6BT6, 6BK6

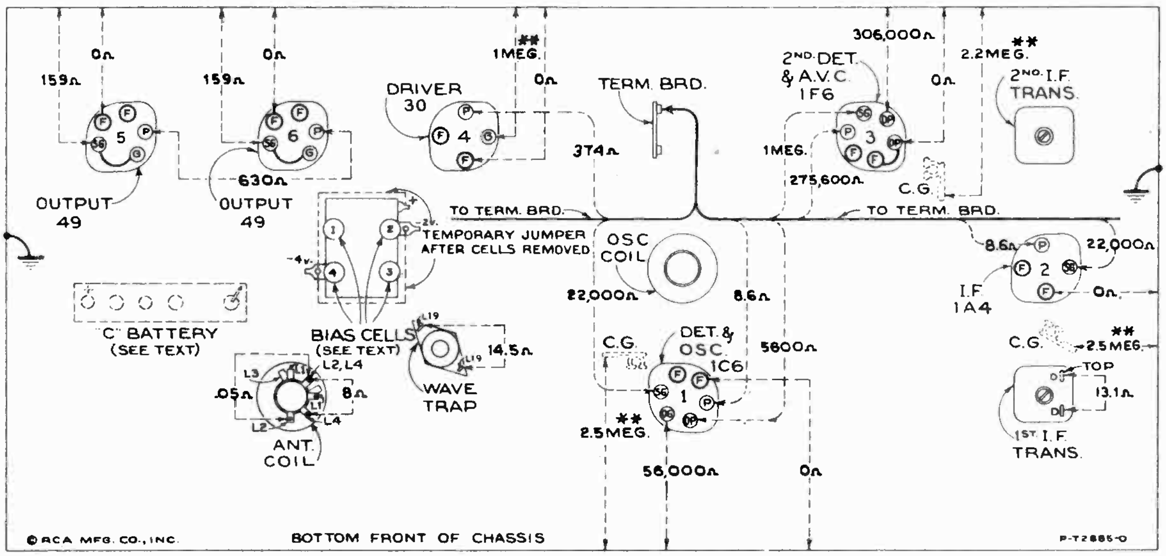
RCA MFG. CO., INC. Voltage, Resistance, Trimmers



** NEVER MEASURE UNDER ORDINARY CONDITIONS—SEE TEXT.

Measured with all batteries at normal voltage—Tuned to approximately 1,000 kc ("Standard broadcast")—No signal being received—Volume control optional

Figure 7—Radiotron Socket Voltages, Coil, and Trimmer Locations



Power-supply cable disconnected—Radiotrons in sockets—Tuning condenser in full-mesh—Bias cells and "C" battery removed—Volume setting optional

Figure 5—Resistance Diagram

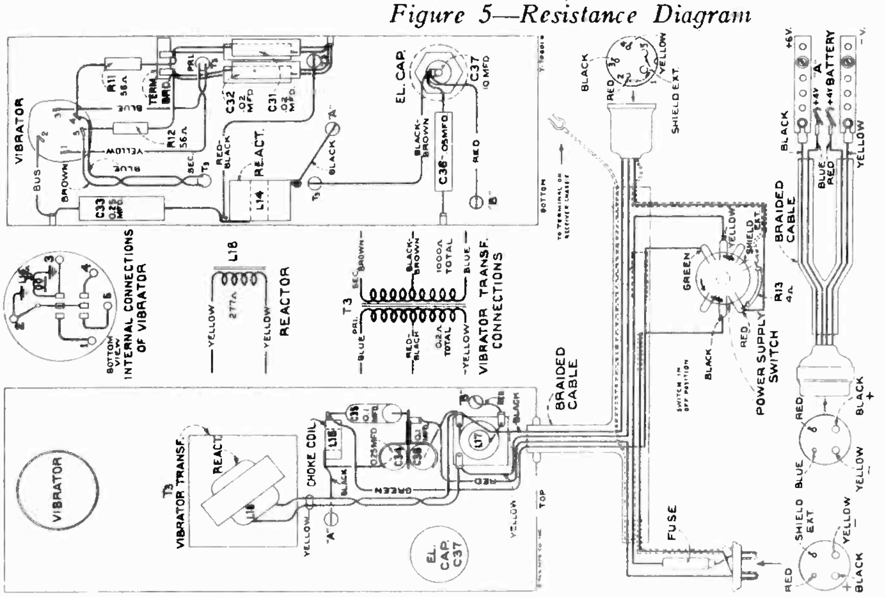


Figure 4—Power Unit Wiring (6BT6 and 6BK6)

Radiotron Plate Current Readings

Measured with Milliammeter Connected at Tube Socket Plate Terminals under Conditions Similar to Those of Voltage Measurements

(1) RCA-1C6—1st. Det. .... 1.2 ma.
—Osc. .... 3.7 ma.
(2) RCA-1A4—I.F. .... 3.4 ma.
(3) RCA-1F6—2nd Det.—A.F.—A.V.C. .... 0.3 ma.
(4) RCA-30—Driver .... 4.0 ma.
(5) RCA-49—Output .... 1.6 ma.
(6) RCA-49—Output .... 1.6 ma.

MODELS 6BT,6BK,6BT6,6BK6
Circuit Data,Alignment
Notes, Battery,Parts List

RCA MFG. CO., INC.

General Features

These receivers employ the same type chassis. The table models 6BT and 6BT6 each employ an eight-inch, dust-proof, permanent-magnet, dynamic loudspeaker while the console Models 6BK and 6BK6 each employ a twelve-inch, dust-proof, permanent-magnet, dynamic loudspeaker. Models 6BT and 6BK obtain their plate supply from "B" batteries and their filament supply from either a 2½-volt Air-cell or a 2-volt storage battery. Models 6BT6 and 6BK6 obtain their plate supply from a compact, vibrator power-supply unit, which, in turn, is operated from a 6-volt storage battery. One cell (2 volts) of this same storage battery is used to supply filament voltage to the Radiotrons. The vibrator is of the "plug-in" type which permits ready removal or replacement. Models 6BT and 6BK have a pilot-lamp switch combined with the main power switch so that the pilot lamp may be turned off, after the receiver is tuned in, to conserve battery current.

The circuit used in these receivers is of the superheterodyne type with such design features as magnetite core adjusted i-f transformers, improved core-adjusted antenna wave-trap, high-frequency tone control, automatic volume control, phonograph terminal board, new edge-lighted dial, plunger-type air trimming capacitors, and built-in antenna coupler.

SERVICE DATA

The first-detector and oscillator functions are combined in the RCA-1C6 tube. The input of this tube is coupled to the antenna through a tuned r-f transformer. A series wave-trap, tuned by means of an adjustable magnetite core, is connected from antenna to ground to prevent signals of intermediate frequency (460 kc) from being introduced into the first stage as interference. Both the oscillator and antenna circuits employ separate coils for each band. These coils are tuned by means of individual plunger-type air trimming capacitors.

The intermediate-frequency stage is coupled to the RCA-1C6 and to the RCA-1F6 by means of tuned transformers. These transformers resonate with fixed capacitors and are adjusted by molded magnetite cores to tune to 460 kc.

The modulated signal as obtained from the output of the i-f system is detected by one of the diode plates of the RCA-1F6. The audio component of this rectified signal, which develops across the volume control R5, is fed thru coupling capacitor C21 to the control grid of this same RCA-1F6 for audio voltage amplification. The d-c component resulting from the detection process is fed thru resistance-capacitance filters to the control grid returns of the RCA-1C6 and RCA-1A4 tubes as automatic volume control bias. Bias cells are connected in these grid circuits to provide bias voltage under conditions of little or no signal. The output of the RCA-1F6 is resistance-capacitance coupled to the RCA-30 driver which, in turn, is transformer-coupled to the two RCA-49 tubes used for push-pull class B output. The output of this push-pull stage is transformer-coupled into the permanent-magnet dynamic loudspeaker. A two-position, high-frequency tone control, consisting of C29 and S2, is connected across the secondary of the driver transformer T1.

Models 6BT6 and 6BK6 obtain their plate supply from a vibrator-type power unit. The vibrator together with the power transformer T3 combine the functions of generating alternating current and rectification. Filter chokes and capacitors are built into this unit to eliminate interference (noise) which would otherwise be introduced into the receiver circuits.

The various diagrams in this booklet contain such information as will be needed to isolate causes for defective operation if such develops. The ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as C1, L1, R1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistance only. Ratings of less than one ohm are generally omitted.

Caution: The four bias cells are used only for the purpose of supplying bias potential and should never be measured with an ordinary voltmeter or other device which draws any current. A simple check on these cells may be made by connecting a milliammeter in the plate circuit of the RCA-1C6 tube and noting the plate current reading. Then remove the two bias cells (3 and 4), being careful that the spring contact clips do not short-circuit them during removal. Connect a 4-volt battery between the + and — 4v. terminals of the bias cell board, and again note the plate current reading. If the first reading obtained (with bias cells) is more than 40% from the latter reading (with 4-volt battery), all bias cells should be replaced. This 40% difference is equivalent to a change of approximately 25% battery voltage.

Alignment Procedure

There are five alignment adjustments provided in the antenna and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of screws attached to molded magnetite cores. All of these circuits have been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions or altered during servicing. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment.

The correct performance of this receiver can only be obtained when the aligning has been done with adequate and reliable apparatus. The manufacturer of this receiver has available, for sale through its distributors and dealers, a complete assortment of such service equipment as may be needed for the alignment operation.

A test oscillator, such as the **RCA Stock No. 9595**, is required as a source of the specified alignment frequencies. Visual indication of receiver output during the adjustments is necessary and should be accomplished by the use of an indicator such as the **RCA Stock No. 4317 Neon Output Indicator.**

Attach the output indicator across the loudspeaker voice coil. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test-oscillator output so that the signal level is as low as possible and still be observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

The four adjustment screws (attached to molded magnetite cores) of the two i-f transformers (one on top and one on bottom of each i-f transformer) are located as shown by figures 3 and 7. Each circuit must be aligned to a basic frequency of **460 kc.**

Connect the "Ant." output of the test-oscillator to the control grid of the RCA-1C6 through a **.05 mfd.** capacitor. Connect the test oscillator "Gnd." terminal to the ground terminal of the receiver chassis. The receiver range selector should be in its "Short wave" position. Tune the test oscillator to **460 kc.** Adjust the receiver tuning control to a point, within its range, where no interference is encountered either from broadcast stations or from the heterodyne oscillator.

Adjust the two magnetite core screws **L12** and **L11** of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two magnetite core screws **L10** and **L9** of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. It is advisable to repeat the adjustment of all i-f magnetite core screws to assure that the interaction between them has not disturbed the original adjustments.

R-F Adjustments

Calibrate the tuning dial by adjusting the scale pointer to the extreme low-frequency end calibration mark (530 kc) on "Standard Broadcast" scale while the gang tuning condenser plates are in their full-mesh position. Alignment should be made in sequence of "Wave trap," "Standard broadcast," and "Short wave" respectively.

Wave-Trap Adjustment

Attach the "Ant." output of the test oscillator to the receiver antenna terminal "A1" through a **200-mmfd. (important)** capacitor. The ground connections remain connected together. Leave the test oscillator adjusted to 460 kc and range selector in "Short wave" position as before. Then adjust the wave-trap screw to the point which causes maximum suppression of the 460 kc signal.

"Standard Broadcast" Band

Connections for the test oscillator remain the same as for "Wave-trap adjustment." Adjust the test oscillator to 1,700 kc and set the receiver tuning control to a dial reading of 1,700 kc with its range selector changed to "Standard broadcast" position. Leave the volume control of the receiver at its maximum position. Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the two plunger-type air trimmers, **C5** and **C8**, of the oscillator and antenna coils so that each produces maximum (peak) receiver output. After this maximum has been accurately obtained, shift the test oscillator frequency to **600 kc.** Tune the receiver to pick up this signal near 600 kc, disregarding the dial reading at which it is best received. Then, adjust the oscillator magnetite core screw **L7** (top of oscillator coil) simultaneously rocking the receiver tuning control backward and forward thru the signal until maximum receiver output results from these combined operations. The adjustments at **1,700 kc** should then be repeated to correct for any change which may have been caused by the **600 kc** oscillator adjustment. Tighten lock nuts on **C5** and **C8.**

"Short Wave" Band

Connect the "Ant." output of the test oscillator to the receiver antenna terminal "A1" through a **300-ohm** resistor, leaving the ground connections as before. Place the receiver range selector to its "Short wave" position and set the dial pointer to **20,000 kc.** Adjust test oscillator to **20,000 kc.** Adjust the oscillator air trimmer **C2** to produce maximum (peak) output. Two positions of this trimmer may be found which produce maximum output. The position of minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust the antenna air trimmer **C7** to produce maximum (peak) output while slightly rocking the gang tuning condenser back and forth thru the signal. Two positions may be found on this trimmer which produce maximum output. The position of maximum capacitance (plunger near in) should be used. Tighten lock nut. Check for image signal by changing the receiver dial setting to **19,080 kc.** If the oscillator air trimmer C2 has been correctly adjusted, the image signal will be received at this position. No adjustments should be made while checking for the image signal.

Phonograph Attachment

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. Typical methods of connecting a low-impedance pickup, or the RCA Victor Models R-93, R-93-2, and R-93-S Record Players are shown on the schematic diagram (figure 1).

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover should be cemented back in place with ambroid upon completion of adjustment.

Power Supply (Models 6BT and 6BK)

Filament voltage for these receivers is obtained from either a 2½-volt Air-cell or a 2-volt storage battery. When the Air-cell is used, the 0.46-ohm resistor R14 must be connected in series with the A-battery lead as shown on figure 8. When operating on a 2-volt storage battery, this resistor R14 should be removed. Plugs are provided on the battery cable (see figure 8) for plugging in the Air-cell and B batteries. The A-battery plug should be removed when operating on a 2-volt storage battery. The 7½-volt C battery is located on the top-side of the chassis and securely held in place by a metal cover (see figure 3). The four bias cells are located underneath the chassis (see figures 2 and 5).

Power Supply (Models 6BT6 and 6BK6)

The vibrator power unit supplies the necessary plate, grid, and cathode voltages for proper operation of these receivers. It contains a plug-in type vibrator, step-up transformer, and an efficient filter system. Rectification of the high voltage is accomplished by means of the synchronous vibrator. The complete unit is acoustically shielded to prevent noise. The vibrator-power-unit chassis should be insulated from the receiver chassis, when removed for service, to avoid vibrator buzz. The vibrator unit has been carefully adjusted by means of special equipment to insure quiet operation over an extensive period of life. No adjustments should be attempted on a vibrator suspected of being in a defective condition, but a renewal installed. The plug-in arrangement affords easy removal or replacement.

A 6-volt storage battery supplies power for the vibrator and for the tube filaments. Four connections are required to the 6-volt battery. The + 6-volt (black) lead and the + 4-volt (blue) lead supply filament voltage to the receiver, while the + 4-volt (red) lead and — volt (yellow) lead supply voltage to the vibrator power unit. The two 4-volt leads (blue and red) should make separate connections to the same battery strap to avoid against vibrator buzz which might otherwise result if these two leads are joined together or touch each other. The 7½-volt C battery is located on the top-side of the receiver chassis and securely held in place by a metal cover (see figure 3). The four bias cells are located underneath the receiver chassis (see figures 2 and 5).

Resistance Measurements

***Before making any resistance measurements, remove the four bias cells and connect jumpers on bias-cell board as shown. Also, remove the "C" battery and connect the two leads (—7½ v. and —3 v.) to chassis ground. After measurements are completed, remove jumpers from bias-cell board and then carefully insert bias cells. Next, insert "C" battery and restore leads to their respective positions.*

Radiotron Socket Voltages

CAUTION: Do not attempt to measure voltages on control grids of RCA-1C6 or RCA-1A4, with any conventional voltmeter, due to presence of bias cells. See "Caution" under "Service data" for method of measuring these cells.

Note: Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground on figure 7 will assist in locating cause for faulty operation. Each value as specified should hold within ±20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits.

BATTERIES REQUIRED: Models 6BT or 6BK - "A"-one plug-in 2.5-volt Air-cell (Eveready A-600 or equivalent) or one 2-volt storage battery; "B" three 45-volt batteries (Burgess #21308, Eveready #486 or equivalent); "C" one 7.5-volt C battery (Burgess #5540, Eveready #773 or equivalent) and four bias cells (Stock #12681)
Models 6BT6 or 6BK6 - "A", one 6-volt storage battery; "B", none needed; "C", one 7.5-volt C battery (Burgess #5540, Eveready #773, or equivalent) and four bias cells (Stock #12681).

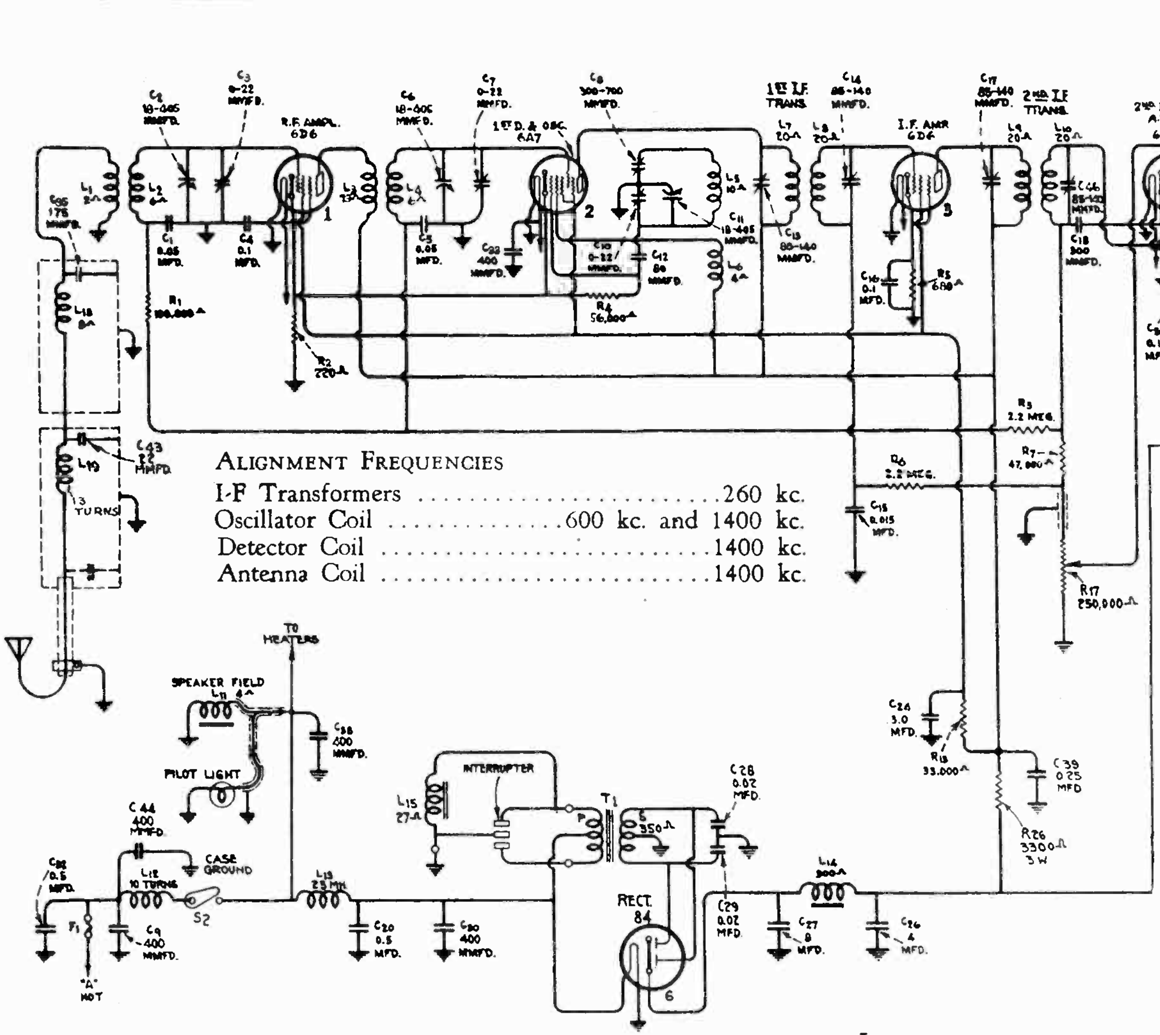
REPLACEMENT PARTS

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
12806	Board—3-contact antenna and ground terminal board and bracket, assembled	$0.25
12717	Board—3-contact phonograph terminal board	.22
5237	Bushing—Variable condenser mounting bushing, assembly—Package of 3	.43
12118	Cap—Grid contact cap—Package of 5	.15
12714	Capacitor—Adjustable trimmer (C5)	.35
12807	Capacitor—Adjustable trimmer (C2, C7, C8)	.35
12814	Capacitor—5.6 Mmfd. (C40)	.20
12723	Capacitor—56 Mmfd. (C39)	.20
12629	Capacitor—56 Mmfd. (C16)	.20
12813	Capacitor—82 Mmfd. (C10)	.20
12404	Capacitor—120 Mmfd. (C15, C18, C19)	.26
12724	Capacitor—120 Mmfd. (C24)	.28
12725	Capacitor—150 Mmfd. (C1)	.28
12406	Capacitor—180 Mmfd. (C20)	.26
12812	Capacitor—450 Mmfd. (C4)	.25
12811	Capacitor—3,600 Mmfd. (C3, C6)	.35
5005	Capacitor—.0035 Mfd. (C25)	.16
5107	Capacitor—.0025 Mfd. (C21, C27, C28, C30)	.16
5196	Capacitor—.035 Mfd. (C29)	.18
12702	Drive—Vernier drive, complete, for variable tuning condenser	.68
12808	Holder—Bias cell holder	.35
12657	Indicator—Station selector indicator pointer	.20
4348	Lamp—Dial lamp—2-volt	.38
12810	Mask—Dial light diffuser	.15
11647	Resistor—5,600 ohm, carbon type, ¼ watt—Package of 5 (R2)	1.00
11305	Resistor—22,000 ohm, carbon type, ¼ watt—Package of 5 (R7)	1.00
11282	Resistor—56,000 ohm, carbon type, 1/10 watt—Package of 5 (R4)	.75
12286	Resistor—56,000 ohm, insulated type, ¼ watt—Package of 5 (R1)	1.00
11323	Resistor—270,000 ohm, carbon type, ¼ watt—Package of 5 (R9)	1.00
3033	Resistor—1 meg., carbon type, ¼ watt—Package of 5 (R6)	1.00
12200	Resistor—1 meg., insulated type, ¼ watt—Package of 5 (R10)	1.00
11626	Resistor—2.2 meg., carbon type, ¼ watt—Package of 5 (R8)	1.00
12679	Resistor—2.2 meg., insulated type, ¼ watt—Package of 5 (R3)	1.00
12651	Shield—Coil shield for Stock No. 12797	.22
12799	Shield—Coil shield for Stock No. 12798	.15
12008	Shield—I. F. transformer shield for Stock Nos. 12801 and 12802	.28
12581	Shield—I. F. transformer shield top for Stock No. 12802	.36
12607	Shield—I. F. transformer shield top for Stock No. 12801	.30
3682	Shield—Radiotron shield	.22
4794	Socket—4-contact 1A4 or 30 Radiotron socket	.15
4814	Socket—5-contact 49 Radiotron socket	.15
4786	Socket—6-contact 1C6 or 1F6 Radiotron socket	.15
11199	Socket—Dial lamp socket	.14
12007	Spring—Retaining spring for core, Stock Nos. 12800, 12006 and 12664—Package of 10	.36
12796	Switch—Range switch (S1)	1.00
12795	Switch—Tone control switch (S2)	.50
12803	Transformer—Audio transformer pack (T1, T2)	3.55
12801	Transformer—1st I. F. transformer, complete (L9, L10, C15, C16)	1.70
12802	Transformer—2nd I. F. transformer, complete (L11, L12, C18, C19, C20, R4)	2.00
12654	Trap—Wave-trap (L19)	.75
11589	Volume Control (R5)	.85
	REPRODUCER ASSEMBLIES Console Model 6BK — 6BK6	
12667	Cone—Reproducer cone and dust cap (L13)	1.00
5118	Plug—3-contact male connector for reproducer	.25
9713	Reproducer—Complete	14.85
	REPRODUCER ASSEMBLIES Table Model 6BT — 6BT6	
12642	Cone—Reproducer cone and dust cap (L13)	.94
5118	Plug—3-contact male connector for reproducer	.25
9712	Reproducer—Complete	6.60
12788	Connector—4-volt battery connector for Stock No. 12786—Package of 2 (6BT6-6BK6)	.20
12790	Connector—4-contact female connector for cable, Stock No. 12786	.45
12791	Connector—5-contact female connector and cover for power cable (6BT-6BK)	.30
12787	Connector—6-volt battery connector for Stock No. 12786—Package of 2 (6BT6-6BK6)	.20
12785	Crystal—Station selector dial escutcheon and crystal	1.00
4286	Ferrule—Fuse connector ferrule and bushing—Package of 10 (6BT-6BK)	.38
3748	Fuse—⅓ amp—Package of 5 (6BT-6BK) (F1)	.40
4290	Insulator—Fuse connector body insulator—Package of 10 (6BT-6BK)	.35
12699	Knob—Station selector knob (large)—Package of 5	.68
12700	Knob—Station selector vernier knob (small)—Package of 5	.58
4836	Capacitor—.05 Mfd. (C9, C17)	.30
4841	Capacitor—0.1 Mfd (C23)	.22
4840	Capacitor—0.25 Mfd. (C14, C22)	.30
12804	Capacitor—Pack, comprising 2 sections, 8 Mfd. each (C12, C26)	1.70
12681	Cell—Bias cell	.30
12797	Coil—Antenna coil and shield, complete (L1, L2, L3, L4)	1.30
12798	Coil—Oscillator coil and shield, complete (L5, L6, L7, L8)	1.65
12701	Condenser—2-gang variable tuning condenser (C11, C13)	4.00
5119	Connector—3-contact female connector for speaker cable	.25
12805	Connector—5-contact male receptacle, located on rear of receiver chassis for power cable	.20
12800	Core—Adjustable core and stud for Stock No. 12798	.20
12006	Core—Adjustable core and stud for Stock Nos 12801 and 12802	.22
12664	Core—Adjustable core and stud for Stock No. 12654	.22
12809	Dial—Station selector dial	.65
	VIBRATOR ASSEMBLIES 6BT6 — 6BK6	
4289	Body—Fuse connector female body—Package of 10	.35
12822	Cable—Power cable (set end), approximately 63 in. long, complete with one 5-contact female connector and one 4-contact male connector — less power switch—Used in Table Model only	4.50
12823	Cable—Power cable (set end), approximately 44 in. long, complete with one 5-contact female connector and one 4-contact male connector — less power switch—Used in Console Model only	4.00
4288	Cap—Fuse connector male cap—Package of 10	.36
4836	Capacitor—.05 Mfd. (C36)	.30
4937	Capacitor—.01 Mfd. (2 used in parallel) (C31, C32)	.25
4841	Capacitor—0.1 Mfd. (C35)	.22
12821	Capacitor—0.1 Mfd (C38)	.40
12820	Capacitor—0.25 Mfd (C34)	.45
4840	Capacitor—0.25 Mfd (C33)	.30
11387	Capacitor—10 Mfd. (C37)	.86
12819	Coil—Vibrator choke coil and terminal board assembly (L17)	.40
12179	Coil—Vibrator choke coil (L15)	.45
12793	Connector—4-contact male connector for power cable	.25
12791	Connector—5-contact female connector and cover for power cable	.30
4286	Ferrule—Fuse connector ferrule and bushing—Package of 10	.38
10907	Fuse—3 amp—Package of 5 (F1)	.40
4290	Insulator—Fuse connector body insulator—Package of 10	.35
12815	Reactor—Air core reactor (L14)	.80
12818	Reactor—Iron core (L18)	.95
12825	Resistor—4 ohm, flexible type (R13)	.25
5034	Resistor—56 ohm, carbon type, ½ watt—Package of 5 (R11, R12)	1.00
4814	Socket—5-contact vibrator socket	.15
4284	Spring—Fuse connector spring—Package of 10	.30
12824	Switch—Power switch (S3, S4)	1.00
12816	Transformer—Vibrator transformer (T3)	3.00
12817	Vibrator—Complete (L16)	4.85
4285	Washer—Fuse connector insulating washer—Package of 10	.22
	MISCELLANEOUS ASSEMBLIES	
4289	Body—Fuse connector female body—Package of 10 (6BT-6BK)	.35
12826	Cable—Power cable (set end), approximately 60 in. long, complete with four 2-contact male connectors and one 5-contact female connector—less power switch (6BT-6BK)	5.30
12786	Cable—Power cable (battery section), complete with battery connectors and female section of 4-contact connector (6BT6-6BK6)	2.00
4288	Cap—Fuse connector male cap—Package of 10 (6BT-6BK)	.36
12827	Connector—2-contact and guide pin male connector and cover for power cable (6BT-6BK)	.30
12828	Connector—2-contact male connector for power cable (6BT-6BK)	.20
11347	Knob—Volume control, range switch, tone switch or power switch knob—Package of 5	.75
12830	Resistor—0.46 ohm, flexible type—Package of 5 (R14) (6BT-6BK only)	.80
11377	Screw—Chassis mounting screw assembly for table model only—Package of 4	.12
11210	Screw—Chassis mounting screw assembly for console model only—Package of 4	.28
12789	Screw—Cone point set screw for connector, Stock No. 12788—Package of 10 (6BT6-6BK6 only)	.20
4284	Spring—Fuse connector spring—Package of 10 (6BT-6BK only)	.30
11349	Spring—Retaining spring for knob, Stock Nos. 11847 and 12700—Package of 5.	.25
4982	Spring—Retaining spring for knob, Stock No. 12699—Package of 10	.30
12829	Switch—Power switch (6BT-6BK only) (S5)	1.05
4285	Washer—Fuse connector insulating washer—Package of 10 (6BT-6BK only)	.22

The prices quoted above are subject to change without notice.

MODEL H-6 Hudson
Schematic
Visual Alignment

RCA MFG. CO., INC.



ALIGNMENT FREQUENCIES

I-F Transformers	260 kc.
Oscillator Coil	600 kc. and 1400 kc.
Detector Coil	1400 kc.
Antenna Coil	1400 kc.

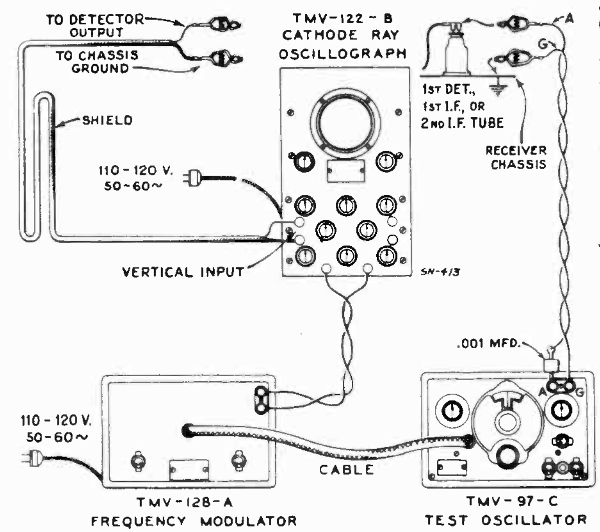


Figure 5—Alignment Apparatus Connections

OUTPUT RATING

Maximum	3.50 Watts
Undistorted	1.75 Watts

LOUDSPEAKER

Type	Electrodynamic
Impedance (v.c.)	3.4 ohms at 400 cycles

POWER RATING

Supply Voltage	6.3 Volts (Storage Battery)
Current Drain	6.55 Amperes at 6.3 Volts
Fuse Protection	15 Amperes

PILOT LAMP .... Mazda No. 51, 7.5 Volts

MODEL H-6 Hudson
Chassis Wiring
Socket

RCA MFG. CO., INC.

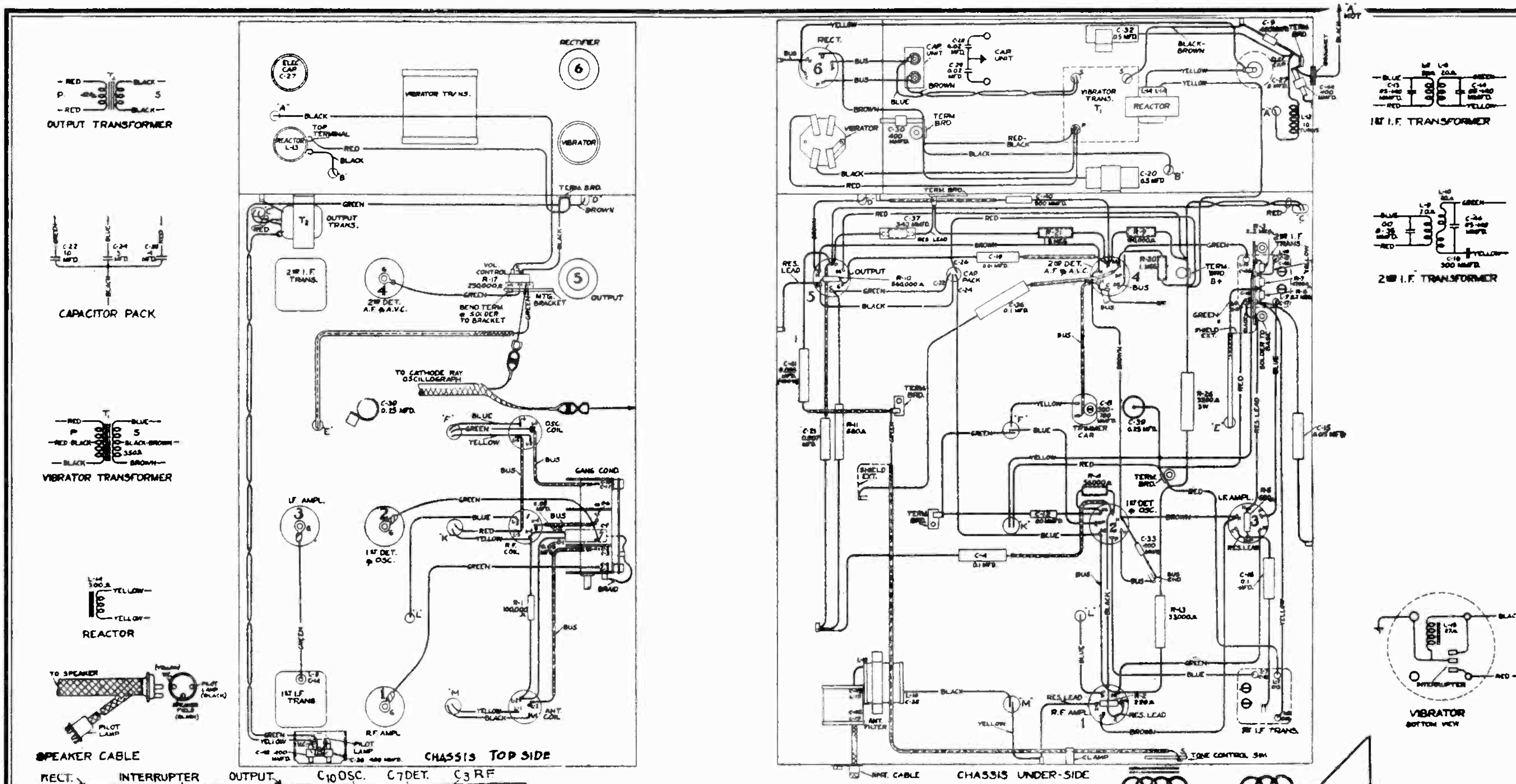


Figure 3—Chassis Wiring Diagram

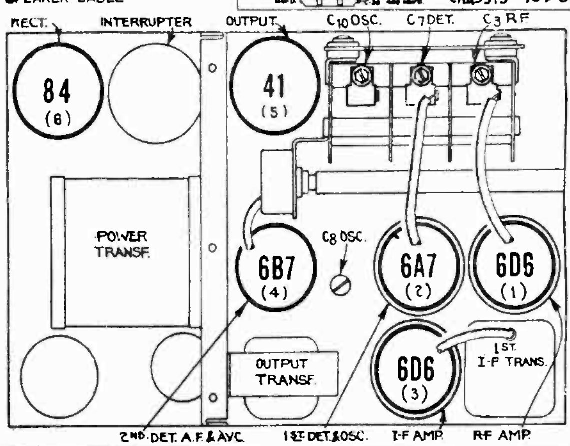


Figure 1—Radiotron Locations

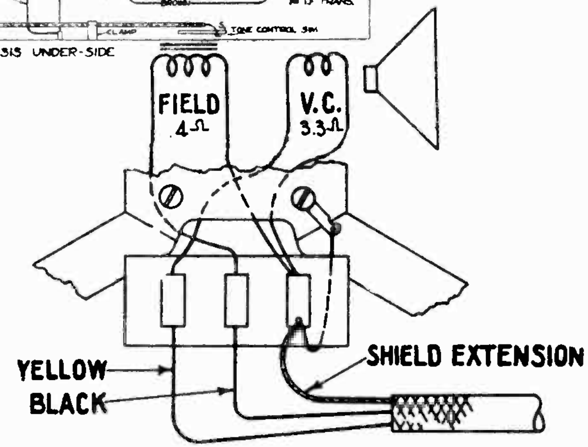


Figure 4—Loudspeaker Schematic and Wiring

RCA MFG. CO., INC.

MODEL H-6 Hudson
Circuit Data
Alignment

CIRCUIT ARRANGEMENT

The schematic and wiring layouts of the electrical circuit are shown in Figures 2 and 3, respectively. From these diagrams it may be seen that six Radiotrons are incorporated in the basic Superheterodyne circuit. In sequence, there is an r-f stage, a dual first detector-oscillator stage, a single i-f stage, a second detector audio amplifier-a.v.c. stage, and a pentode output stage. The power supply system contains a mechanical interrupter and an RCA-84 rectifier Radiotron. The following circuit features are of particular importance:

Noise Filter—Reduction of ignition interference and similar disturbances is brought about by a filter arrangement in the antenna input circuit. This filter is a "band-pass" type, having an acceptance band between 540 kc. and 1600 kc., and sharply defined cut-off below and above these two limits. Primary to secondary capacity coupling in the first r-f transformer has been minimized to further suppress interference.

Tuned Circuits—There are seven resonant circuits in the radio frequency end of the receiver. The r-f, first detector and oscillator grid circuits are tuned by a three-gang tuning condenser. The remaining tuned circuits consist of the primary and secondary windings of the i-f transformers which are resonated by trimmers to a nominal frequency of 260 kilocycles.

Detection-A.V.C.—Detection takes place as a result of the rectifying action of the diodes of the RCA-6B7 tube and develops a current through resistors R-7 and R-17. The d-c voltage drop in the resistors R-7 and R-17 due to the detected signal is used for automatically regulating the control grid bias of the r-f and first detector stages. The amplification of these stages thus becomes dependent upon the signal's strength. This process (a.v.c.) compensates for fading signals and reduction of signals due to change of antenna direction, shielding effects of buildings, bridges, etc. A smaller portion of the d-c voltage obtained by detection is tapped from the juncture of R-7 and R-17 and carried to the control grid of the i-f stage. This voltage likewise furnishes automatic volume control.

Audio System—The audio and d-c components of the detected signal are selected from the manual volume control resistor (R-17) by its movable arm and are applied to the control grid of the RCA-6B7. The d-c applied to this grid increases the bias as the a.f. is increased and prevents overload as the volume control is advanced. By virtue of an effect of a high series resistance in the screen grid circuit, the cut-off of the operating characteristic is extended as the control grid bias is increased, thereby preventing distortion. After amplification by the 6B7, the audio signal is transmitted to the output stage and thence to the loudspeaker for final reproduction.

Power—The heaters of all tubes are supplied directly from the battery of the car through efficient filters within the receiver housing. High voltage d-c plate and bias supply is obtained from the six volt battery by use of a mechanical interrupter and a tube rectifier. The interrupter is adapted for convenient removability by having its base constructed for "plug-in" mounting.

Grounding—The wiring of the receiver chassis is so arranged that sensitive circuits are grounded at points predetermined by careful test. This procedure reduces noise induction caused by interference circulating in the receiver case. Several of the circuits are grouped and grounded at a single point to further eliminate such trouble. The resistance of the chassis, the receiver housing and the shielded cable has been kept as low as possible in order to minimize ignition noise.

SERVICE DATA

Regular maintenance will assure proper operation of this receiver over an extensive period of life. It should therefore receive the same routine inspections and adjustments as are accorded the mechanical and electrical systems of the car. The following service information suggests procedure to be applied in locating and repairing faults which may develop and affect the operation of the receiver.

Defects External To Receiver

Interference—Failure or disconnection of spark suppressing capacitors at gas gauge, temperature indicator, and generator will allow the ignition interference produced at such points to be radiated and picked up by the receiver. Defects in the ignition system not only affect operation of the car but will produce radio interference as well. The system should therefore be thoroughly checked and repaired if necessary. The three pairs of bonding fingers attached to the floor boards which contact the transmission control cover, and the bonding strap from muffler front bracket to chassis frame side member for noise reduction, may develop loose connections and cause intermittent noise level in the receiver. In checking the receiver for noisy operation, it is also wise to make sure that interference is not being caused by disturbing electrical devices which are not part of but are in vicinity of the car.

Battery—Corroded terminals at the storage battery will usually result in low voltage at the receiver and consequent low sensitivity. Noise may also be generated by this condition. Battery conditions will be reflected in the motor operation as well as that of the radio.

Antenna—Vibration may occasionally cause the antenna connections to become loose or broken. These should be carefully checked and repaired if necessary. Corrosion due to weather is also deleterious at these points. Each connection should be thoroughly cleaned to assure solid contact at all times. The grounding point of the antenna lead shield is at the front, left, running board bracket. This point of connection should not be changed, since its position on the car is very critical in regard to interference. The ground connection to the case of the receiver should be kept in secure connection to the frame of the car at all times; if loose, it may cause intermittent operation of the receiver, loss of sensitivity or will produce noisy reception.

Defects Within Receiver

Total Inoperation—Failure to operate may be due to one or more causes. When a receiver is found in such condition, its parts should be checked as follows:

(a) FUSE—May be burned out or making poor contact. In case of burnout, replace with a fuse of equivalent rating. If second fuse fails, remove receiver from car and investigate condition of interrupter and receiver circuits.

(b) TUBES—Dismount the receiver and remove top cover. Check to see that all tubes are correctly placed in their proper sockets. One or more tubes may be defective. To determine their condition, remove them from the receiver and test with standard tube-testing equipment. If such equipment is unavailable, substitute the tubes with others known to be in good condition. It is not advisable to test the tubes while in the receiver due to measurement errors which would result from the associated circuits.

(c) INTERRUPTER—Improper operation of the power supply interrupter is usually evidenced by reception of "sputtering noise." To check, remove the antenna connection and advance the receiver volume control (engine off). An increase in noise will usually indicate that the interrupter is in poor condition. Further investigation should be made by substitution of the interrupter with one known to be in good condition. No adjustments should be attempted on this unit. The operation of the interrupter and the associated rectifier system may also be proved normal by measurement of the filter output voltage, which should read steady at approximately 245 volts (d.c.). The points of test are indicated by Figure 6.

(d) CIRCUIT—Failures within the basic circuits of the receiver may be isolated by a systematic test procedure. The receiver and speaker should be removed from the car and placed where they will be readily accessible. Covers of the top and bottom of the receiver housing should be removed. Continuity tests should be made to ascertain the condition of the speaker voice coil and field circuits as well as that of the cable interconnecting the receiver and speaker. Battery should then be applied to the equipment, the operating switch turned to "On" and voltage measurements made at the receiver circuits to determine whether or not the power system is functioning properly. If no voltage or incorrect voltage is indicated at the filter output, individual tests should be made on the "A-Hot" wiring, rectifier tube, power transformer, interrupter and filter reactor to locate the defective part. If proper voltage is indicated at the filter output, then a thorough voltage analysis of the receiver circuit is in order. Figure 6 gives the values which should be obtained on a receiver in normal operating condition. Deviations from the specified values may be as much as ± 20% before the operation of the receiver is appreciably affected. The absence or erratic reading of one or more of the voltages will indicate a fault in the particular circuit under test, in which case, each transformer, resistor, capacitor, choke and conductor of the circuit should be individually checked for open circuit, short circuit and grounding. Reference to the diagram Figure 2 will give the values of the circuit elements and their schematic relations. Figure 3 illustrates the physical locations of the parts and the color coding of the wiring. Defective parts should be renewed only with genuine factory tested replacements.

Intermittent Operation—Operation may sometimes be irregular. In the majority of cases, the source of such trouble is at a connection or within a tube. Exchange of the tubes is the most definite method of tracing tube defects of this sort. A connection which is intermittent can not be readily disclosed by regular test methods. Each connection of the complete system of wiring should be carefully inspected and checked to assure that it is secure. Intermittent or distorted reception may occasionally be caused by a partially defective resistor, capacitor, or winding. This type of defect is difficult to isolate; however, the suspected parts should be carefully checked for proper value, leakage, shorted turns, etc. Should it be impossible to locate the fault by such a method, the receiver should be placed in operation and allowed to operate at full volume for several hours. The weakened or defective part will generally fail completely under such condition and its identification can be established by the regular continuity or voltage tests.

Alignment Procedure

There are a total of eight trimmer adjustments provided. Four of these are involved with the i-f system and the remainder are associated with the antenna, oscillator and first detector coils. They are precisely adjusted at the factory to give the correct performance. Their settings should remain intact indefinitely when the receiver is used under ordinary conditions, however, necessity for re-adjustment may occasionally occur from continued extremes of climate, tampering, purported alteration for service purposes, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the receiver to be insensitive, non-selective, and subnormal in respect to tone quality. Such indications will usually exist simultaneously.

In re-adjusting the trimmers to their normal settings, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator such as the RCA Stock No. 9595, will be required as the source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. Two indication methods are applicable. One requires use of Cathode-Ray Oscillograph equipment and the other requires a voltmeter or glow type of indicator. The Cathode-Ray alignment method is advantageous in that the indication provided is in the form of a wave image which represents the resonance characteristics of the circuits being tuned. This type of alignment is possible through use of apparatus such as the RCA Stock No. 9558 Frequency Modulator and the RCA Stock No. 9545 Cathode Ray Oscillograph. Alignment by the output meter method should be indicated by an instrument such as the RCA Stock No. 4317 Neon Glow Indicator. The two procedures are outlined as follows:

OUTPUT METER ALIGNMENT

Place the receiver in operation with its two covers removed. Attach the Output Indicator across the loudspeaker voice coil circuit or across the output transformer primary. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each trimming operation, regulate the test Oscillator output control so that the signal level is as low as possible and still observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the output of the test Oscillator between the control grid cap of the i-f tube (RCA-6D6) and chassis ground. Adjust the frequency of the Oscillator to 260 kc. Tune the receiver to a point where no interference is received from the heterodyne oscillator or local stations.

(b) Adjust the trimmers, C-46 and C-17, of the second i-f transformer so that each produces maximum (peak) receiver output as shown by the indicating device.

(c) Remove the Oscillator from the i-f tube input and connect it between the control grid cap of the first detector tube (RCA-6A7) and chassis-ground. Allow its tuning to remain at 260 kc. Tune the receiver to avoid interference as in (a).

(d) Adjust the trimmers, C-14 and C-13, of the first i-f transformer for maximum (peak) receiver output. The indication for this adjustment will be broad due to the "flat-top" characteristic of the i-f system. The two trimmers, C-14 and C-13, should, therefore, be very carefully aligned so that the indicator remains fixed at maximum as the Oscillator is shifted through a range 2 kc. above and below its nominal setting of 260 kc. *An irregular double peaked indication is to be avoided.*

R-F Adjustments

(a) Check the calibration of the dial scale of the remote control unit by rotating the tuning control until the variable condenser plates are in full mesh (maximum capacity). This will carry the dial pointer to its minimum frequency position. The knurled shaft at the rear of the control box should then be turned until the dial pointer sets exactly on the last graduation at the low frequency end of the dial scale.

(b) Connect the output of the test Oscillator to the antenna-ground terminals of the receiver with a 100 mmfd. capacitor in series with the antenna lead. Tune the Oscillator to 1400 kc. Allow the Output Indicator to remain attached to the receiver output.

(c) Tune the receiver so that the dial reading is 1400 kc. Then adjust the oscillator, detector and antenna coil trimmers, C-10, C-7 and C-3 respectively, tuning each to the point producing maximum indicated receiver output.

(d) Shift the Oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. The oscillator series trimmer, C-8, should then be adjusted, simultaneously rocking the receiver tuning control backward and forward through the signal until maximum (peak) receiver output results from the combined operations. The adjustment of C-10 should be repeated as in (c) to correct for any change in its alignment due to the adjustment of C-8.

CATHODE-RAY ALIGNMENT

Place the receiver in operation with its two covers removed. Attach the Cathode-Ray Oscillograph vertical input terminals to the second detector output, with the "Hi" connected to the high side of the volume control potentiometer and the "O" connected to the receiver chassis. Advance the vertical amplifier gain control of the Oscillograph to full-on, allowing it to remain at such position for *all* adjustments. Turn the vertical "A" amplifier to "On". Set the Oscillograph power switch to "On" and adjust the intensity and focusing controls to give a sharply defined spot on the screen. Interconnect the Frequency Modulator impulse generator terminals to the Oscillograph "Ext. Sync." terminals as shown by Figure 5.

I-F Adjustments

(a) Connect the output of the test Oscillator between the control grid cap of the i-f tube (RCA-6D6) and chassis-ground. Tune the Oscillator to 260 kc., place its modulation switch to "On" and its output range switch to "Hi". The Frequency Modulator must not be connected to the Oscillator for the preliminary adjustments.

(b) Set the Cathode-Ray Oscillograph horizontal "B" amplifier to "Timing" and the synchronizing switch (timing) to "Int". Place the synchronizing input and frequency controls to about their mid-positions. Turn the range switch to its No. 1 position.

(c) Increase the output of the Oscillator until a deflection is noticeable on the Oscillograph screen. The figure obtained represents several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave image formed (400 cycle waves) to be spread completely across the screen by advancing the horizontal "B" gain control. The image should be synchronized and made to remain motionless by adjustment of the synchronizing input and frequency controls.

(d) Adjust trimmers C-46 and C-17 of the second i-f transformer to produce maximum vertical deflection of the oscillographic wave which is present on the screen. This adjustment places the transformer in exact resonance with the 260 kc. signal.

(e) The sweeping operation should follow, using the Frequency Modulator. Shift the Oscillograph synchronizing switch to "Ext", change its range switch to No. 2 position and set the frequency control to its midposition. Place the Frequency Modulator in operation with its sweep range switch in the "Lo" position. Interconnect the test Oscillator and Frequency Modulator with the special shielded patch cord provided. Turn the Oscillator modulation switch to "Off".

(f) Increase the frequency of the test Oscillator by slowly turning its tuning control until two separate, distinct and similar waves appear on the screen. These waves will be identical in shape but will be totally disconnected and appearing in reversed positions. They will have a common base line which is discontinuous. Adjust the frequency and synchronizing input controls of the Oscillograph to get the proper waves and to make them remain motionless on the screen. Continue increasing the Oscillator frequency until the forward and reverse curves move together and overlap with their highest points exactly coincident. This condition will obtain at an Oscillator setting of approximately 280 kc.

(g) With the images established as in (f), retune the second i-f trimmers, C-46 and C-17, so that they cause the curves on the Oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(h) Without altering the adjustments of the apparatus, shift the output connections of the Oscillator to the input of the i-f system, i.e., between the first detector (RCA-6A7) control grid and ground. Regulate its output so that the amplitude of the oscillographic image is approximately the same as used above for adjustment (g) of the second i-f transformer.

(i) The first i-f transformer trimmers, C-14 and C-13, should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

(a) Calibrate the scale of the receiver by rotating the tuning control until the variable condenser is at full mesh, and then turning the knurled shaft at the rear of the control box to bring the dial pointer to the last graduation at the low frequency end of the scale.

(b) Attach the output of the test Oscillator to the receiver input, i.e., between the antenna and ground terminals with a 100 mmfd. capacitor in series with antenna lead. Accurately tune the Oscillator to 1400 kc. The Oscillograph should be left connected to the second detector output circuit as for the above i-f adjustments. Return the synchronizing switch to its "Int" position and turn the range switch to its No. 1 position.

(c) Tune the receiver to a dial reading of 1400 kc. Then regulate the Oscillator output so as to increase the amplitude of the waves on the Oscillograph screen to a conveniently observable size. The several waves of detected signal, as appearing on the screen, should be synchronized by operation of the synchronizing and frequency controls. Trimmers, C-10, C-7 and C-3, of the oscillator, detector and antenna coils should then be adjusted so that each causes maximum vertical deflection (amplitude) of the images.

(d) The Oscillator modulation should then be turned to "Off" and the Frequency Modulator placed in operation connected to the Oscillator with the shielded patch cord. Change the Oscillograph synchronizing switch to "Ext", set its range switch *to its No. 2 position and the frequency control slightly above its mid-position.*

(e) Increase the frequency of the test Oscillator gradually, until the point is reached where the two similar, distinct and separate wave images appear on the screen and become coincident at their highest points. This will occur at an Oscillator setting of approximately 1500 kc. These waves should be synchronized on the Oscillograph screen by careful re-adjustment of the synchronizing and frequency controls. Re-adjust trimmers C-10, C-7 and C-3 to produce complete coincidence at maximum amplitude of the two waves.

(f) Disconnect the Frequency Modulator from the Oscillator. Switch the modulation switch of the Oscillator to "On" and tune the Oscillator to 600 kc. Set the synchronizing switch of the Oscillograph to "Int" and turn the range switch to No. 1 position.

(g) Tune the receiver station selector control so as to pick up the 600 kc. signal, disregarding the dial reading at which it is best received.

(h) Change the Oscillograph synchronizing switch to "Ext", and place the Oscillator modulation switch to "Off". Interconnect the Frequency Modulator and Oscillator with the special shielded patch cord. Return the range control of the Oscillograph to its No. 2 position and set the frequency control slightly above its mid-position.

(i) Shift the test Oscillator to its 200-400 kc. range and tune it to the point at which the forward and reverse waves show on the Oscillograph screen. This condition will obtain at an Oscillator setting of approximately 230 kc. The signal obtained from the Oscillator for this adjustment will be the third harmonic of 200 kc. An increase in the Oscillator output may be necessary. The trimmer C-8 should then be adjusted to the point which produces maximum *amplitude* of the oscillographic images. It will not be necessary to rock the tuning control for this adjustment, inasmuch as the Frequency Modulator is varying the signal in an equivalent manner.

(j) Retune trimmers C-10, C-7 and C-3 as in (c), (d) and (e) to correct for any change in high frequency alignment which may have been caused by the adjustment of C-8.

Tuning Condenser Drive

Smooth control should be obtained over the entire tuning range of the variable condenser. If irregularity is present, check the action of the gear mechanism for binding or backlash at every point within the tuning range. A bind may be due to improper mesh between the small pinion gear and the large gears on the condenser shaft. To correct such a condition, remove the insulating coupling on the pinion of the tuning gear, loosen the two screws holding the gear plate and adjust the mesh of the gears to a position which gives smooth operation.

Gear backlash is prevented by the small compression spring between the two large gears on the rotor shaft. To check for this backlash, rotate the pinion slowly in both directions, observing the free gear (on rotor shaft) carefully to determine if it shifts without turning the rotor. If backlash is apparent, the large gear assembly should be removed and the free gear moved (against spring compression) 2 to 3½ teeth in relation to the fixed gear, and the assembly slid in place on the shaft and in mesh with the pinion. The set screws holding the large gears should be securely tightened.

Interrupter

The mechanical interrupter used in combination with a tube rectifier in the power system is constructed with a plug-in base so as to be easily removed from the receiver. Its adjustments have been correctly set during manufacture by means of special equipment. In cases of faulty operation of the interrupter, a renewal should be made.

MODEL H-6 Hudson
Voltage,Parts
Installation

RCA MFG. CO., INC.

Radiotrons

Deterioration of tubes and their approach to failure is usually evidenced by noisy or intermittent operation, loss of sensitivity and distorted tone quality. When suspected as faulty, the tubes should be removed from the receiver and checked with standard tube testing apparatus. It is not feasible to test the tubes while in the receiver due to measurement inaccuracies which would result from the effects of the circuits.

A "lasso" formed with a strong cord will be found helpful in removing the tubes from their sockets. The loop in the cord should be placed over the tube and tightened around the tube base. A direct pull upward will disengage the tube.

Circuit Voltages

The voltages indicated at the socket contacts on Figure 6 will serve to assist in analyzing defective circuit conditions. Each value as specified should hold within ± 20% when the receiver is normally operative at rated supply voltage. They are actual operating values and do not take into account measurement inaccuracies which may be due to the loading effect of a voltmeter's internal resistance. For the majority of readings a meter having an internal resistance of 1000 ohms per volt will be satisfactory when the range used for each check is chosen as high as possible, consistent with good readability. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance.

Receiver Housing

The screws holding the receiver chassis to the case and those securing the covers must all be in place and tightly installed, inasmuch as they appreciably affect the ground resistance of the assembly and will consequently have a bearing on the amount of ignition noise received.

REPLACEMENT PARTS

Prices subject to change without notice.

Hudson Stock No.	RCA Stock No.	Description
		RECEIVER ASSEMBLIES
BO 151312	11409	Band—Tube shield rubber band—Package of 5
BO 151313	11425	Cable—Antenna cable—Receiver end
BO 151314	11415	Cap—Radiotron shield (slotted) cap
BO 151315	11130	Capacitor—Adjustable capacitor—C8
BO 151316	5021	Capacitor—80 Mmfd.—C12
BO 151317	11175	Capacitor—400 Mmfd.—C9, C30, C33, C38, C42, C44
BO 151318	11413	Capacitor—400 Mmfd.—C37
BO 151319	11633	Capacitor—900 Mmfd.—C40
BO 151320	5148	Capacitor—.007 Mfd.—C21
BO 151321	4883	Capacitor—.01 Mfd.—C19
BO 151322	4792	Capacitor—.015 Mfd.—C15
BO 151323	11483	Capacitor—.02—.02 Mfd.—C28, C29
BO 151324	5196	Capacitor—.035 Mfd.—C41
BO 151325	5016	Capacitor—.05—.05 Mfd.—C1, C5
BO 151326	4841	Capacitor—0.1 Mfd.—C4, C16
BO 151327	11414	Capacitor—0.1 Mfd.—C36
BO 151328	4967	Capacitor—0.25 Mfd.—C39
BO 151329	11418	Capacitor—0.5 Mfd.—C20
BO 151330	11471	Capacitor—0.5 Mfd.—C32
BO 151331	4961	Capacitor—8 Mfd.—C27
BO 151332	4958	Capacitor pack—Comprising one 3 Mfd., one 4. Mfd. and one 10 Mfd.—C22, C24, C26
BO 151333	5068	Clip—Vibrator (Ground cup) clip
BO 151334	11472	Coil—Antenna coil—L1, L2
BO 151484	4968	Coil—Choke coil—L12
BO 151335	11422	Coil—Oscillator coil—L5, L6
BO 151336	11629	Coil—R.F. coil—L3, L4
BO 151337	11421	Condenser—3 gang variable tuning condenser—C2, C3, C6, C7, C10, C11
BO 151338	11419	Coupling—Tuning condenser drive coupling—Short
BO 151339	11420	Coupling—Volume control drive coupling—Long
BO 151340	11405	Filter—Antenna filter—L18, L19, C35, C43
BO 151341	11424	Gear—Variable condenser drive gear—Located on condenser shaft and meshes with pinion Stock #11423
BO 151343	11484	Lead—Lead assembly "A" plus lead chassis end
BO 151342	11423	Pinion—Variable condenser drive pinion meshes with gear—Stock #11424
BO 151344	11628	Plug—Bracket and speaker plug complete
BO 151345	4963	Reactor—Filter reactor—L14
BO 151346	11408	Reactor—Filter reactor—L13
BO 151347	11174	Resistor—220 ohms—Carbon type—¼ watt (R2) Package of 5
BO 151348	5031	Resistor—680 ohms—Carbon type—¼ watt (R5) Package of 5
BO 151349	5026	Resistor—680 ohms—Carbon type—1 watt (R11) Package of 5
BO 151350	5032	Resistor—3300 ohms—Carbon type—2 watt (R26)
BO 151351	5033	Resistor—33,000 ohms—Carbon type—1 watt (R13) Package of 5
BO 151352	5132	Resistor—47,000 ohms—Carbon type—1/10 watt—R7—Package of 5
BO 151353	5029	Resistor—56,000 ohms—Carbon type—¼ watt (R4) Package of 5
BO 151354	3118	Resistor—100,000 ohms—Carbon type—¼ watt (R1) Package of 5
BO 151355	5027	Resistor—150,000 ohms—Carbon type—¼ watt (R9) Package of 5
		VIBRATOR ASSEMBLIES
BO 151333	5068	Clip—Vibrator clip (grounding cup)
BO 151366	6980	Socket—4 contact vibrator socket
BO 151391	5067	Vibrator complete—L15
		REPRODUCER ASSEMBLIES
BO 151392	11441	Cable—Reproducer cable
BO 151485	11675	Coil—Field coil—L11
BO 151393	11442	Cone—Reproducer cone—L16
BO 151394	11444	Housing—Reproducer housing complete—Less speaker
BO 151206	9625	Reproducer complete
BO 151395	11443	Stud—Reproducer mounting stud assembly—Comprising—1 stud, 1 nut, 1 lockwasher and 3 flat washers
		MISCELLANEOUS ASSEMBLIES
BO 151402		
BO 151401	11447	Capacitor—Gas gauge capacitor
	11632	Capacitor—Temperature gauge capacitor
BO 151403	11846	Capacitor—0.5 Mfd. generator or ammeter capacitor
BO 151396	6116	Connector—Fuse connector complete

Hudson Stock No.	RCA Stock No.	Description
BO 151356	5035	Resistor—560,000 ohms—Carbon type—¼ watt (R10) Package of 5
BO 151357	3033	Resistor—1 Megohm—Carbon type—¼ watt (R20) Package of 5
BO 151358	5028	Resistor—1.8 Megohm—Carbon type—¼ watt (R21) Package of 5
BO 151359	11151	Resistor—2.2 Megohm—Carbon type ¼ watt—Package of 5—R3, R6
BO 151360	3584	Ring—Antenna, RF or Oscillator coil retaining ring—Package of 5
BO 151361	4955	Shield—First intermediate frequency transformer shield
BO 151362	4956	Shield—Second intermediate frequency transformer shield
BO 151363	3623	Shield—Antenna, RF or oscillator coil shield
BO 151364	11416	Shield—Radiotron shield (long) Less cap
BO 151365	11417	Shield—Radiotron shield (short) Less cap
BO 151366	6980	Socket—4 contact vibrator socket
BO 151367	5058	Socket—5 contact Radiotron socket
BO 151368	4946	Socket—6 contact Radiotron socket
BO 151369	4947	Socket—7 contact Radiotron socket
BO 151370	11411	Switch—Tone control switch—(S1)
BO 151371	5064	Stud—Variable condenser mounting stud assembly—Comprising 1 stud, 1 washer, 1 lockwasher and 1 bushing
BO 151372	11402	Transformer—First intermediate frequency transformer—(L7, L8, C13, C14)
BO 151373	11407	Transformer—Output transformer—(T2)
BO 151374	11403	Transformer—Second intermediate frequency transformer—(L9, L10, C17, C18, C46)
BO 171375	11412	Transformer—Vibrator transformer—(T1)
BO 171376	11406	Volume control—(R17, S2)
		CONTROL HEAD AND FLEXIBLE SHAFT ASSEMBLIES
BO 151377	11434	Bezel—Station selector dial bezel
BO 151378	11431	Cover—Control head rear cover
BO 151379	11436	Crystal—Station selector dial crystal
BO 151380	11428	Dial—Tuning dial and bushing
BO 151381	11430	Gear—Station selector idler gear—Meshes with gear Stock #11429
BO 151382	11429	Gear and shaft—Tuning dial pointer shaft and gear assembly
BO 151204	11440	Head—Control head complete
BO 151383	11437	Indicator—Station selector indicator pointer
BO 71641	11765	Lamp—Dial lamp
BO 151384	11435	Retainer—Station dial crystal retainer
BO 151385	11427	Shaft—Tuning condenser flexible drive shaft assembly
BO 151386	11426	Shaft—Volume control flexible drive shaft assembly
BO 151387	11432	Shaft—Volume control drive shaft—Located in control head
BO 151388	11433	Shaft and gear—Tuning dial station selector drive shaft and gear assembly—Located in control head
BO 151389	11439	Spring—Volume or tuning control shaft holding spring—Package of 10
BO 151390	11438	Washer—Tuning dial pointer shaft spring tension washer—Package of 10
BO 71406	5023	Fuse—15 ampere fuse—F1—Package of 5
BO 151397	4132	Knob—Tone control knob—Package of 5
BO 151398	11445	Knob—Tuning control knob—Package of 4
BO 151207	11448	Lead—"A" lead and female section of fuse connector with clip—Approximately 24" long
BO 151399	11446	Suppressor—Distributor suppressor
BO 150688		Antenna & Lead-in Wire Assembly
BO 151208		Lead-in Wire and Shielding Loom Assy.
BO 48757		Antenna Insulator
BO 48758		Antenna Clip
BO 48760		Antenna Anchor Clip
BO 18447		Lead-in Wire Clip Bolt
BO 48673		Lead-in Wire Clip Bolt Nut
BO 71073		Ground Strap Assy. (Muffler Bracket to Frame
BO 151210		Ground Fork (Trans. opening Floor Cover)
BO 151435		Ground Fork Spacer
BO 71648		Ground Fork Screw
BO 151436		Ground Fork Tapping Plate

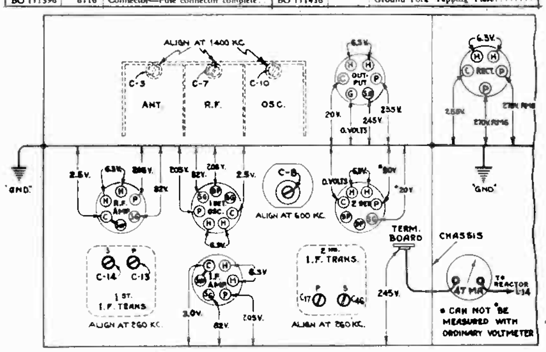


Figure 6—Radiotron Socket Voltages to Chassis

(Measured at 6.3 volts battery supply—Volume Control Maximum—No Signal)

Radio Installation-Operation

1—Lift floor mat and install three ground forks (Part No. 151210) to front, rear and left of floor board opening so that spring fingers contact transmission control housing. (See Insert EE.) The paint must be removed from the floor panel and transmission tower to provide good electrical contact. A spacer (Part No. 151435) should be placed under each ground fork and the parts secured to the floor board with two sheet metal screws (Part No. 71648) and three tapping plates (Part No. 151436).

2—Remove finish plate from center of instrument panel—attached with studs and nuts on back of panel.

3—Put the Radio Receiver in place on top of the steering column support bracket with the control shaft connections E and F on the right, and secure with two cap screws "A." On right-hand drive models, the receiver is mounted with the control shaft connections to the left. NOTE: There are three threaded holes in the bottom of the receiver so that it can be mounted in 1934 and 1935 models as well as 1936.

4—Punch a hole through the front dash pad, using the ⅝" hole located just above the center of the dash reinforcement ribs as a guide.

5—Place wooden spacer on speaker mounting stud and insert stud through hole in dash and dash pad, securing with a washer and nut on the engine side of dash.

6—Remove the control knobs from the control head, and also the nuts located behind the knobs. Insert control head from back of panel, securing by replacing nuts, and then replace control knobs.

7—Insert the driving tongue of the control cable from the right (tuning) knob into the rear (front on right-hand drive) socket F and tighten nut and the driving tongue of the control cable from the left (volume) knob into the forward (rear on right-hand drive) socket and tighten nut. NOTE: On right-hand drive installations the long control cable should be attached to the volume (left) control knob.

8—Insert speaker lead plug "J" into case. The plug has three prongs, unequally spaced—be sure they are aligned with the sockets in the case.

9—Insert pilot light in control head.

10—Attach feed wire to Battery Terminal of the ignition lock "N" and connect to socket "M," being sure that fuse is in place in socket.

11—Lay out antenna on floor under car with lead-in end at front of left running board. Remove all twist and kinks. Attach hook at lead-in to front hole in left running board, second hook to front hole in right running board, continuing back and forth until all but the last hook has been put in place. Start at the right front and work backward, drawing the antenna wire tight to take up slack and permit the last hook to be attached to the right running board.

—Insert the lead-in through the hole in body floor panel in line with left front door, front pillar post, leading up behind kick panel behind radio receiver and connect to socket "L."

13—Attach one small condenser on gasoline tank gauge unit with one unit mounting screw, attaching condenser terminal to gauge unit terminal. (Insert "DD")

14—Attach one small condenser to upper rear cap screw in engine water manifold and attach condenser terminal to terminal of water temperature gauge element. (Insert "CC") NOTE: This condenser not required on Terraplane models.

15—Attach large condenser to cap screw at rear of generator and connect condenser terminal to generator battery terminal. (Insert "AA")

16—Install 48763 ground strap from the front muffler bracket to chassis frame. The paint must be removed from points of attachment to insure good electrical contact.

17—Install suppressor in central terminal of distributor.

18—When installing radio on Terraplane Special models with air cooled generator, mount generator charge regulator in place of relay with two screws to two threaded holes in dash provided for the purpose. Fuse cap bar should be on upper face. Remove ground cup from generator "F" terminal. See illustration inserts for wiring diagram. Connect "F" terminal on side of charge regulator to "F" terminal (engine side) of generator. Adjust generator output to 22 amps. cold—17 amps., warm.

19—Turn on volume and tune set to a known local station. Adjust the dial hand to give correct dial reading by turning knurled knob on back of control head.

Radio Kit—1936—Hudson and Terraplane

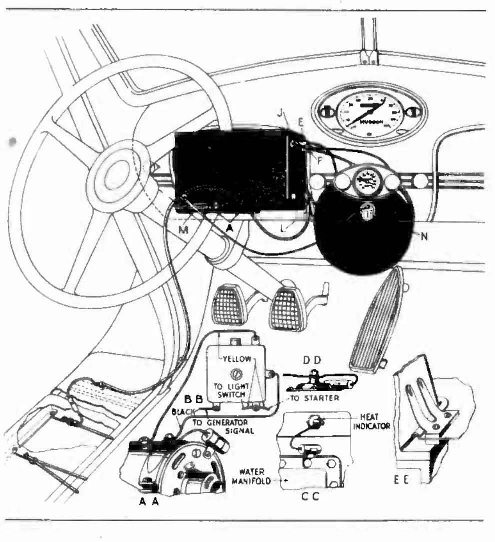


Figure A—Mounting Details and Connections

The Radio Kit, Part No. 47734 Includes:—

1—Receiver Complete
1—Speaker Complete
1—Control Head complete with cables
1—Pilot Light Bulb
1—Feed Cable Assembly and Fuse
1—Aerial Assembly
1—Aerial Lead In with shield and clip
1—Distributor Suppressor
2—Small Condensers (one required on Terraplane Deluxe Models)
1—Large Condenser
1—Ground Strap
3—Ground Forks
Bolts, Nuts, Screws and Lock Washers for mounting units

In order to complete the installation on Terraplane Deluxe Models, a Charge Control (Part No. 47979) is required in addition to the Radio Kit.

MODELS 6T, 6K
Schematic
Chassis Wiring

RCA MFG. CO., INC.

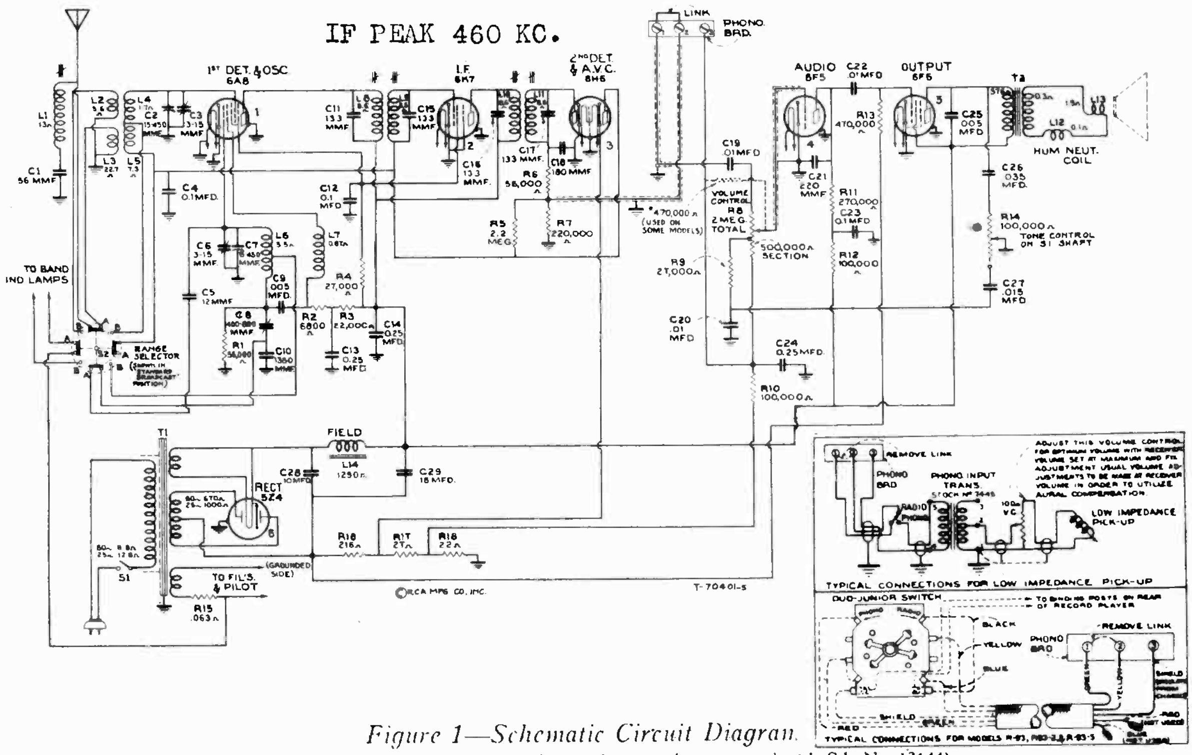


Figure 1—Schematic Circuit Diagram

(* 470,000-ohm resistor not required when replacing volume control with Stk. No. 13144)

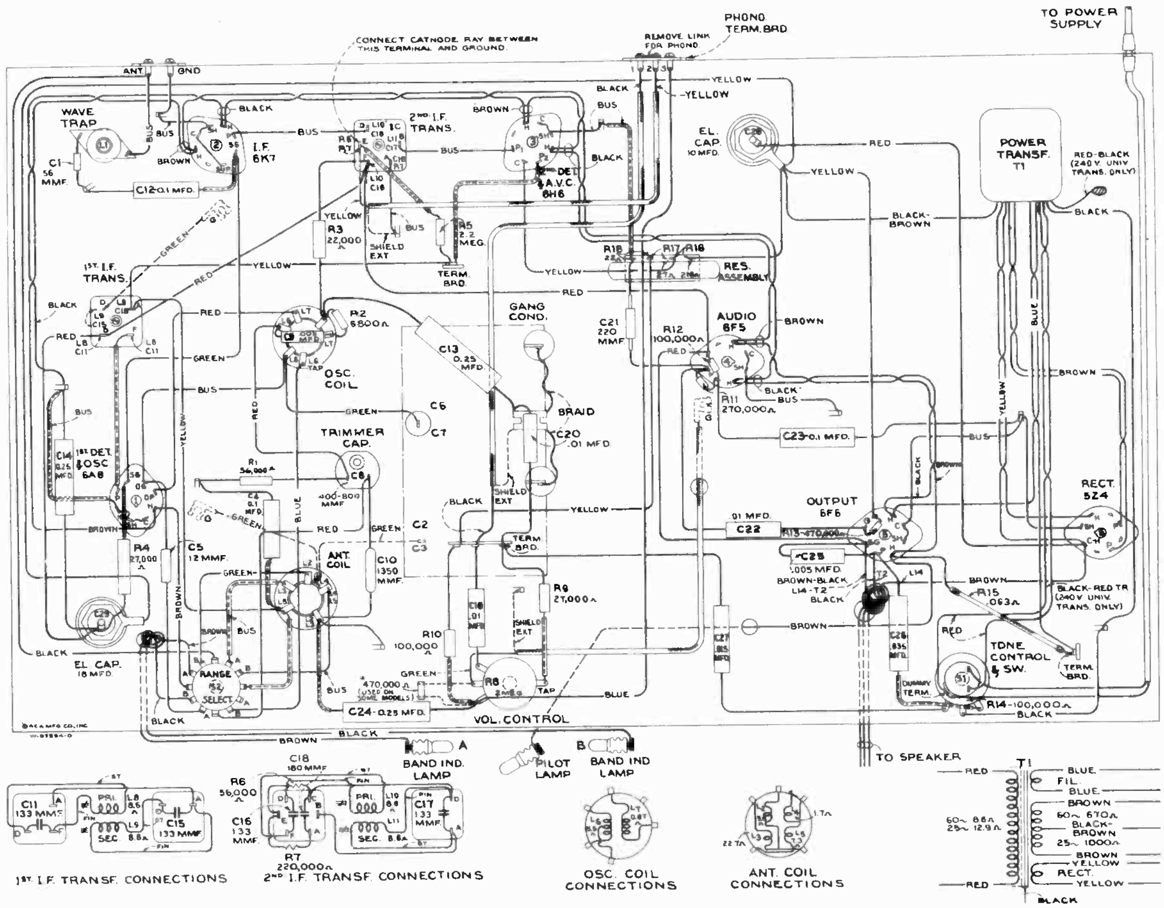


Figure 2—Chassis Wiring Diagram

MODELS 6T, 6K
Socket, Trimmers
Resistance, Data

RCA MFG. CO., INC.

Electrical Specifications

FREQUENCY RANGES
"Standard broadcast" (A) .... 540-1,820 kc.
"Short wave" (B) .... 1,820-6,600 kc.

ALIGNMENT FREQUENCIES
"Standard broadcast" (A) .... 600 kc. (osc.), 1,700 kc. (osc., ant.)
"Short wave" (B) .... None required

Intermediate Frequency .... 460 kc.

RADIOTRON COMPLEMENT
(1) RCA-6A8 .... First Det.—Oscillator
(2) RCA-6K7 .... Intermediate Amplifier
(3) RCA-6H6 .... Second Det.—A.V.C.
(4) RCA-6F5 .... Audio Voltage Amplifier
(5) RCA-6F6 .... Power Output
(6) RCA-5Z4 .... Full-wave Rectifier

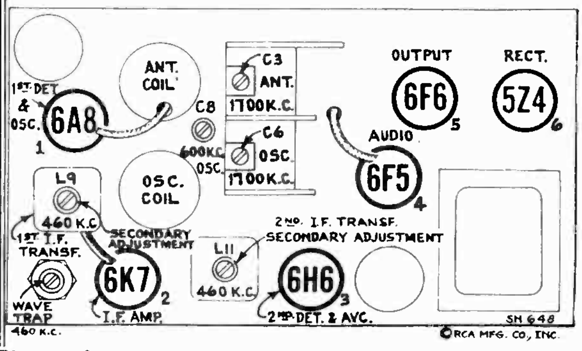


Figure 3—Radiotron, Coil, and Trimmer Locations

Pilot Lamps (3) .... Mazda No. 46, 6.3 volts, 0.25 amperes

POWER SUPPLY RATINGS
Rating A .... 105-125 volts, 50-60 cycles, 80 wat
Rating B .... 105-125 volts, 25-60 cycles, 80 wat
Rating C . 100-130/140-160/195-250 volts, 40-60 cycles, 80 wat

POWER OUTPUT RATING
Undistorted .... 2.0 watts
Maximum .... 4.5 watts

LOUDSPEAKER
Type .... Electrodynamic
Voice Coil Impedance ...... 2.2 ohms at 400 cycles

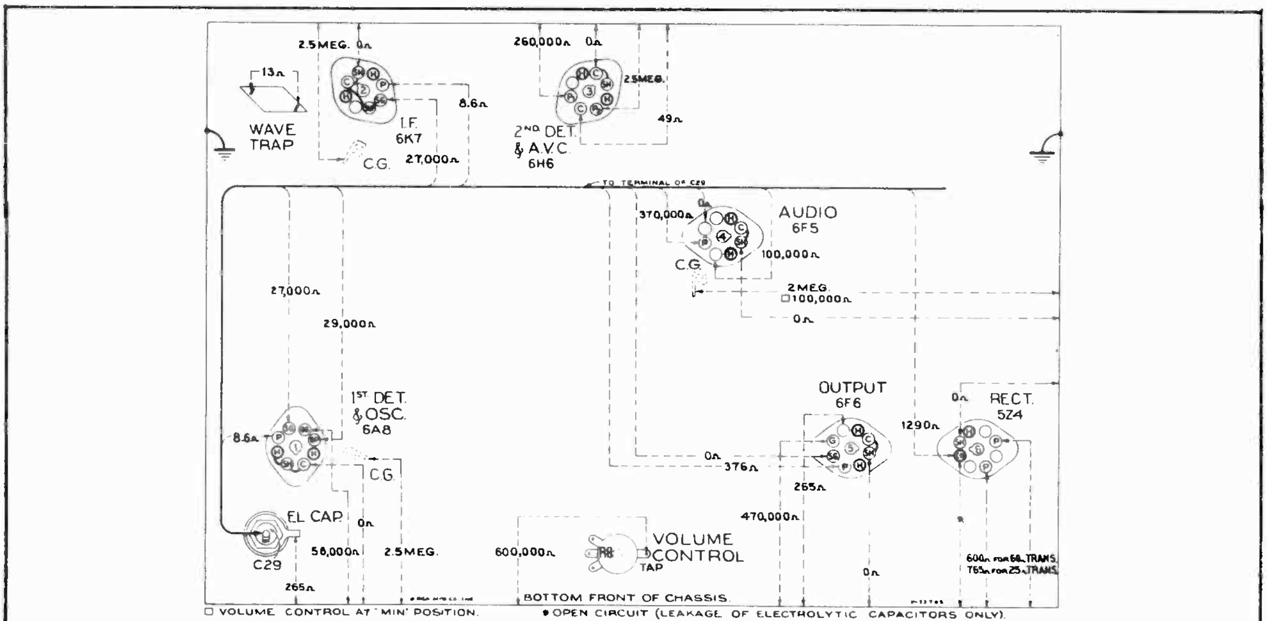


Figure 4—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full mesh—Volume control maximum

Resistance Measurement

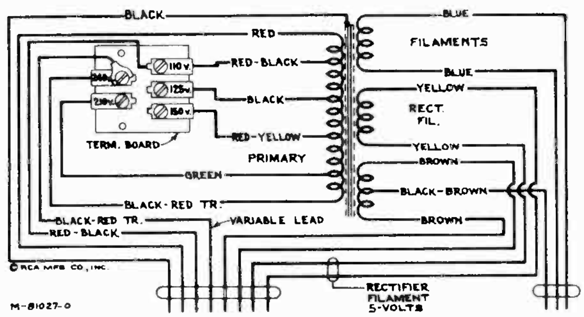
The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and receiver chassis ground, on figure 4, have been carefully selected so as to facilitate a rapid continuity check of the circuits. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 1, and Chassis Wiring Diagram, figure 2, will permit the location of certain troubles which might otherwise be difficult to ascertain. Each value as specified should hold within ±20%. Variations in excess of this limit will usually be indicative of trouble in circuit under test. Resistance values were measured with the Radiotrons in sockets; tuning condenser in full mesh, and volume control set at maximum except where otherwise noted. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative terminal of the resistance meter to chassis-ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

RCA MFG. CO., INC.

MODELS 6T,6K
Voltage,Loudspeaker
Universal Trsnaformer

Phonograph Attachment

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. Typical



Primary Resistance—24.5 ohms Total
Secondary Resistance—668 ohms Total

Figure 5—Universal Transformer

methods of connecting a low-impedance pick-up, or the RCA Victor Models R-93, R-93-2, and R-93S Record Players are shown on the schematic diagram (figure 1).

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers

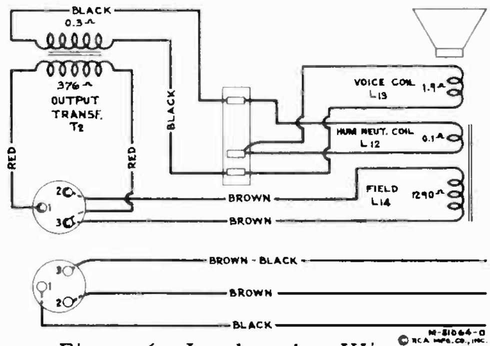


Figure 6—Loudspeaker Wiring

after first removing the front paper dust cover. This may be removed either permanently by cutting it away with a sharp knife, or by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

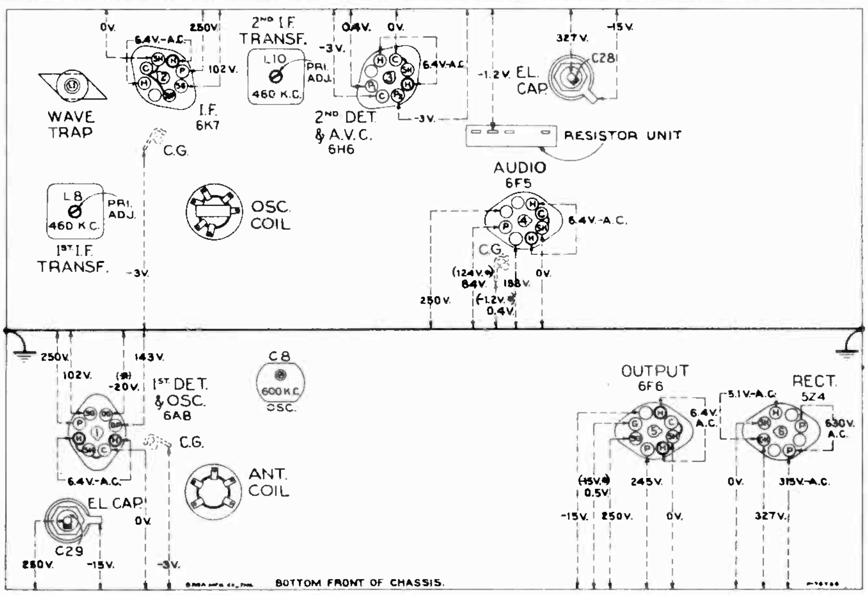


Figure 7—Radiotron Socket Voltages, Coil and Trimmer Locations

Measured at 115 volts, 60-cycle supply—Tuned to approximately 1,000 kc. ("Standard broadcast")—No signal being received—Volume control minimum

Radiotron Socket Voltages

Note: *Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.*

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground on figure 7 will assist in locating cause for faulty operation. Each value as specified should hold within $\pm 20\%$ when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with receiver tuned to approximately 1,000 kc, no signal being received, and volume control set at minimum. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm-per-volt d-c meter, having ranges of 10, 50, 250, 500, and 1,000 volts. Use the nearest range above the voltage to be measured. A-c voltages were measured with a corresponding a-c meter.

MODELS 6T, 6K
Circuit Data
Alignment, Parts

RCA MFG. CO., INC.

Mechanical Specifications

Cabinet Dimensions	Model 6T	Model 6K
Height	19 inches	37½ inches
Width	13⅜ inches	23 inches
Depth	8¾ inches	11 inches
Weights (Net)	22 pounds	43 pounds
Weights (Shipping)	27 pounds	55 pounds

Operating Controls................(1) Power Switch—Tone, (2) Tuning, (3) Volume, (4) Range Selector
Tuning Drive Ratio........10 to 1

Chassis Base Dimensions 12 inches x 7 inches x 2½ inches
Over-all Chassis Height.......................... 7½ inches

General Features

These receivers employ the same chassis and have many distinctive features. Model 6T employs an 8-inch dynamic loudspeaker and Model 6K employs a 12-inch dynamic loudspeaker. The superheterodyne circuit is used with such features of design as: magnetite core adjusted i-f transformers, improved core adjusted antenna wave-trap, aural compensated volume control, continuously variable tone control with music-voice switch, automatic volume control, resistance coupled audio system, phonograph terminal board, band selective illumination of dial scales, and a dust-proof loudspeaker.

Tuning is continuous through the "Standard broadcast" and "Short wave" bands (including 49 meters). The "Short wave" position of this extensive range also includes channels assigned for police, amateur, and aviation communication. Trimming adjustments are located at accessible points. Their number is reduced to the least that is consistent with efficient operation. The tuning dial ratio of ten to one permits ease of tuning, especially in the "Short wave" band.

Circuit Arrangement

The first detector and oscillator functions are accomplished in a single tube, an RCA-6A8. The input of this tube is coupled to the antenna through a tuned transformer. A shunt (magnetite core adjusted) wave-trap is connected across the primary of this transformer to prevent signals of intermediate frequency (460 kc) from being introduced into the first stage as interference. The two-section gang condenser, which tunes the antenna transformer secondary and the heterodyne oscillator coil, has adjustable trimmers for obtaining exact alignment. Each of these coils is tapped so that the range switch increases the range of tuning by decreasing the amount of inductance.

The intermediate-frequency stage is coupled to the RCA-6A8 and to the RCA-6H6 by means of tuned transformers. These transformers resonate with fixed capacitors and are adjusted by molded magnetite cores to tune to 460 kc.

The modulated signal, as obtained from the output of the i-f system, is detected by one of the diodes of the RCA-6H6 tube. Audio frequency secured by this process is passed on to the control grid of the RCA-6F5 for amplification before final reproduction. The d-c voltage, which results from detection of the signal, is used for automatic volume control. This voltage, which develops across resistor R7, is applied as automatic control grid bias to the first detector and i-f tubes through a suitable resistance filter. The second diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This auxiliary diode, under such conditions, draws current which flows through resistors R5 and R7, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias diode ceases to draw current and the a.v.c. diode takes over the biasing function.

Manual volume control is effected by means of an acoustically tapered potentiometer connected as a variable coupling element between the output of the second detector and the first audio control grid. After amplification by the RCA-6F5, the audio signal is transmitted by resistance-capacitance coupling to the input of the RCA-6F6 power-output stage, which, in turn, is transformer-coupled to the dynamic speaker.

Continuously variable tone control is effected by means of capacitor C26 and variable resistor R14 shunting the plate circuit of the output tube. Extreme clockwise rotation of this tone control disconnects the resistor R14 from the circuit and places an additional capacitor C27 in shunt with capacitor C20, thereby reducing the low-frequency response of the amplifier. This point is known as the "Speech" position and provides optimum intelligibility of speech.

The power-supply system consists of an RCA-5Z4 rectifier tube which is supplied from an efficiently designed power transformer and which works into a suitable filter. The various potentials required for the plate, screen, control grid, and cathode circuits are obtained from the output of the filter. The electrodynamic loudspeaker field coil is used as a filter reactor.

SERVICE DATA

The various diagrams of this booklet contain such information as will be needed to isolate causes for defective operation if such develops. The ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R3, L2, C1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Ratings of less than one ohm are generally omitted.

Alignment Procedure

There are three alignment trimmers provided in the antenna transformer and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of screws attached to molded magnetite cores. All of these circuits have been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions or altered during servicing. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment.

The correct performance of this receiver can only be obtained when the aligning has been done with adequate and reliable apparatus. The manufacturer of this receiver has available, for sale through its distributors and dealers, a complete assortment of such service equipment as may be needed for the alignment operation.

A test oscillator, such as the **RCA Stock No. 9595**, is required as a source of the specified alignment frequencies. Visual indication of receiver output during the adjustment is necessary and should be accomplished by the use of an indicator such as the **RCA Stock No. 4317 Neon Output Indicator.**

The procedure outlined below should be followed in adjusting the various trimmer capacitors and molded cores:

I-F Core Adjustments

The four adjustment screws (attached to molded magnetite cores) of the two i-f transformers (one on top and one on bottom of each i-f transformer) are located as shown by figures 3 and 7. Each circuit must be aligned to a basic frequency of **460 kc.** To do this, attach the output indicator across the loudspeaker voice coil.

Connect the output of the test oscillator to the control grid of the RCA-6A8 through a .05 mfd. capacitor. Connect the test oscillator ground terminal to the ground terminal of the receiver chassis. Range selector should be in "Short wave" position. Tune the oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point, within its range, where no interference is encountered either from local broadcast stations or from the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is present on the output indicator. Adjust the two magnetite core screws of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two magnetite core screws of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i-f magnetite core screws to assure that the interaction between them has not disturbed the original adjustment.

Wave-Trap Adjustment

Attach the output of the test oscillator to the receiver "Antenna" terminal through a 200 mmfd. (important) capacitor. The ground connections remain connected together. Leave the test oscillator adjusted to 460 kc and range selector in "Short wave" position as before. Then adjust the wave-trap screw to the point which causes maximum suppression of the 460 kc signal.

R-F Trimmer Adjustments

Calibrate the tuning dial by setting the pointer to a horizontal position (53 on "Standard broadcast scale) with the two-gang tuning condenser in full mesh. The output indicator should be left connected to the system. Connections for the test oscillator remain the same as for "Wave-trap adjustment." Adjust the test oscillator to 1,700 kc and set the receiver tuning control to a dial reading of 1,700 kc. Leave the volume control of the receiver at its maximum position. Make sure that the range selector is at its broadcast position. Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the two trimmers, C6 and C3, of the oscillator and antenna transformer coils (mounted on the variable condenser) so that each produces maximum (peak) receiver output. After this maximum has been accurately obtained, shift the test oscillator to 600 kc. Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then, adjust the receiver oscillator series trimmer, C8, simultaneously rocking the tuning control backward and forward through the signal until maximum receiver output results from these combined operations. The adjustment at 1,700 kc should then be repeated to correct for any change which may have been caused by the oscillator series trimmer adjustment.

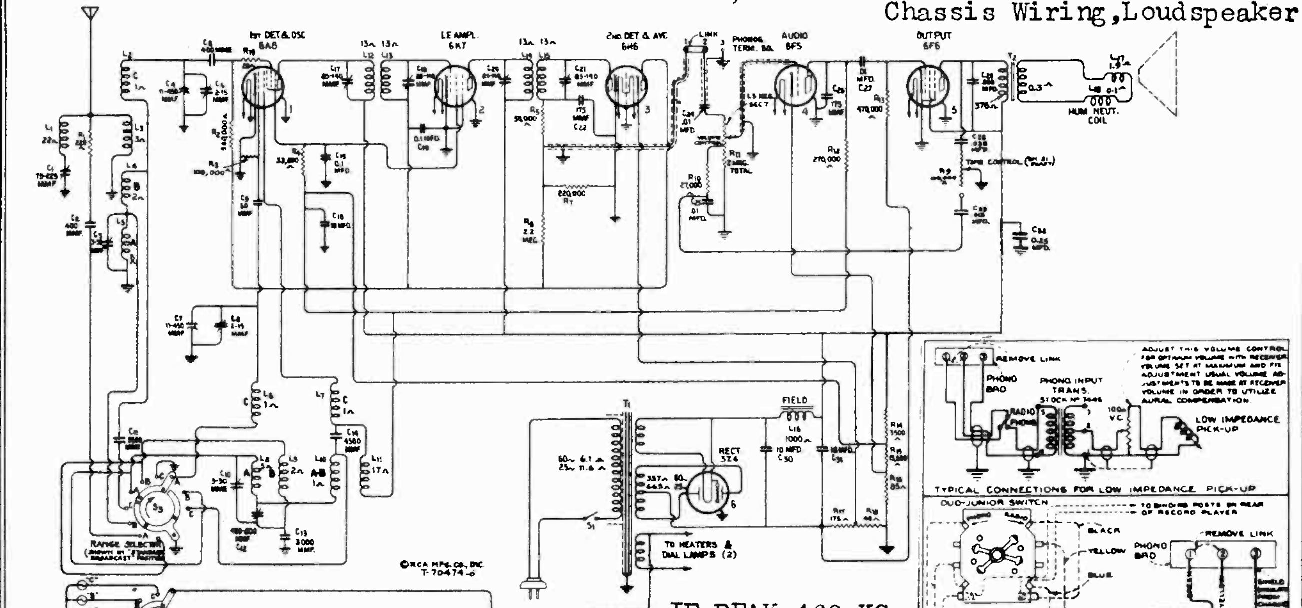
REPLACEMENT PARTS

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable condenser mounting bushing assembly—Package of 3	$0.43
12511	Cap—Grid contact cap—Package of 5	.15
11465	Capacitor—Adjustable capacitor (C8)	.48
12659	Capacitor—12 Mmfd. (C5)	.20
12661	Capacitor—56 Mmfd. (C1)	.20
12946	Capacitor—133 Mmfd. (C11, C15, C16, C17)	.20
12406	Capacitor—180 Mmfd. (C18)	.26
12662	Capacitor—220 Mmfd. (C21)	.20
12660	Capacitor—1,350 Mmfd. (C10)	.28
4868	Capacitor—.005 Mfd. (C9, C25)	.20
11315	Capacitor—.015 Mfd. (C27)	.20
12670	Capacitor—.035 Mfd. (C26)	.20
4858	Capacitor—.01 Mfd. (C19, C20, C22)	.25
4841	Capacitor—0.1 Mfd. (C4, C23)	.22
11414	Capacitor—0.1 Mfd. (C12)	.20
4840	Capacitor—0.25 Mfd. (C13, C24)	.30
5170	Capacitor—0.25 Mfd. (C14)	.25
11240	Capacitor—10 Mfd. (C28)	1.08
5212	Capacitor—18 Mfd. (C29)	1.16
12648	Coil—Antenna coil less shield (L2 L3, L4, L5)	1.35
12649	Coil—Oscillator coil with shield (L6, L7)	1.20
12643	Condenser—2-gang variable tuning condenser (C2, C3, C6, C7)	3.46
5119	Connector—3-contact female speaker cable connector	.25
12006	Core—Adjustable core and stud for I.F. transformer, Stock Nos. 12652 and 12653	.22
12664	Core—Adjustable core and stud for wave trap, Stock No. 12654	.22
12658	Dial—Station selector dial	.65
12656	Drive—Variable condenser drive shaft and pinion	.58
12655	Gear—Large gear located on variable condenser shaft	.34
12657	Indicator—Station selector indicator	.20
5226	Lamp—Dial lamp—Package of 5	.70
12663	Mask—Dial light diffuser, complete with red and green colored screen	.30
12647	Range Switch (S2)	.68
12669	Resistor—.063 ohm, flexible type (R15)	.20
11454	Resistor—6,800 ohm, carbon type, ¼ watt—Package of 5 (R2)	1.00
8070	Resistor—22,000 ohm, carbon type, ½ watt—Package of 5 (R3)	1.00
11400	Resistor—27,000 ohm, carbon type, ¼ watt—Package of 5 (R9)	1.00
12011	Resistor—27,000 ohm, carbon type, 1 watt—Package of 5 (R4)	1.10
5029	Resistor—56,000 ohm, carbon type, ¼ watt—Package of 5 (R1)	1.00
11282	Resistor—56,000 ohm, carbon type, 1/10 watt—Package of 5 (R6)	.75
12263	Resistor—100,000 ohm, insulated, ¼ watt—Package of 5 (R12)	1.00
3118	Resistor—100,000 ohm, carbon type, ¼ watt—Package of 5 (R10)	1.00
11398	Resistor—220,000 ohm, carbon type, 1/10 watt—Package of 5 (R7)	.75
11453	Resistor—270,000 ohm, carbon type, 1/10 watt—Package of 5 (R11)	.75
11452	Resistor—470,000 ohm, carbon type, 1/10 watt—Package of 5 (R13)	.75
11626	Resistor—2.2 megohms carbon type, ¼ watt—Package of 5 (R5)	1.00
12004	Resistor—Voltage divider resistor—Comprising one 216 ohm, one 27 ohm and one 22 ohm sections (R16, R17, R18)	.45
12008	Shield—First or second I.F. transformer shield	.28
12650	Shield—Antenna coil shield	.22
12735	Shield—Dial lamp shield—Package of 5	.25
12607	Shield—First I.F. transformer shield top	.30
12651	Shield—Oscillator coil shield	.22
12581	Shield—Second I.F. transformer shield top	.36
11199	Socket—Dial lamp socket	14
11195	Socket—5-contact 5Z4 radiotron socket	.15
11198	Socket—7-contact 6F5, 6H6 or 6K7 radiotron socket	.28
11196	Socket—8-contact 6A8 or 6F6 radiotron socket	.22
12007	Spring—Retaining spring for core Stock No. 12006 and 12664—Package of 10	.36
12668	Tone Control and Switch (R14, S1)	1.22
13106	Transformer—First I.F. transformer, complete (L8, L9, C11, C15)	1.60
11999	Transformer—Power transformer, 105-125 volt, 50-60 cycle (T1)	3.80
12132	Transformer—Power transformer, 105-125 volt, 25-50 cycle (T1)	5.48
12133	Transformer—Power transformer, 100-250 volt, 40-60 cycle (T1)	6.25
13107	Transformer—Second I.F. transformer, complete (L10, L11, C16, C17, C18, R6, R7)	2.06
12654	Trap—Wave trap (L1)	.75
13144	Volume Control (R8)	1.00
	REPRODUCER ASSEMBLIES	
12641	Board—3-contact reproducer terminal board	.15
12640	Bracket—Output transformer mounting bracket and clamp	.18
12012	Coil—Field coil (L14)	1.85
11469	Coil—Neutralizing coil (L12)	.20
12642	Cone—Reproducer cone and dust cap (L13) (Model 6T)	.94
12667	Cone—Reproducer cone and dust cap (L13) (Model 6K)	1.00
5118	Connector—3-contact male speaker cable connector	.25
12666	Cover—Speaker cover (Model 6K)	.65
9696	Reproducer complete (Model 6K)	6.90
9699	Reproducer complete (Model 6T)	6.38
11253	Transformer—Output transformer (T2)	1.56
11886	Washer—Spring washer to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
12639	Escutcheon—Station selector escutcheon and crystal	1.02
12638	Knob—Station selector knob—Package of 5	.58
11582	Knob—Tone control knob—Package of 5	.50
11347	Knob—Volume control or range switch knob—Package of 5	.75
11586	Screw—Receiver mounting screw No. 14x1 in.—Package of 10	.22
11349	Spring—Retaining spring for knob, Stock Nos. 11347, 11582, and 12638—Package of 5	.15

Prices quoted above are subject to change without notice.

MODELS 6T2, 6K2
Schematic, Socket, Pickup
Chassis Wiring, Loudspeaker

RCA MFG. CO., INC.



IF PEAK 460 KC.

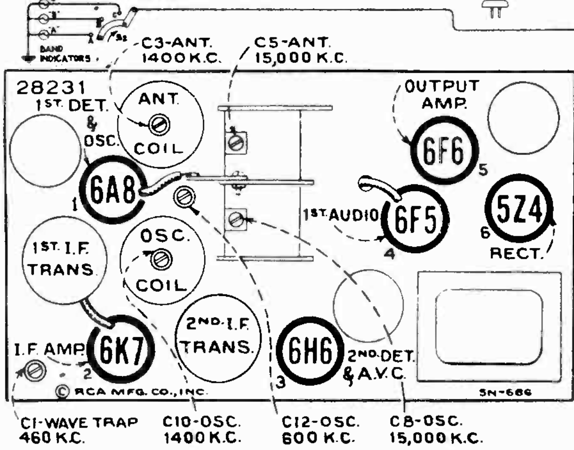


Figure 3—Radiotron, Coil and Trimmer Locations

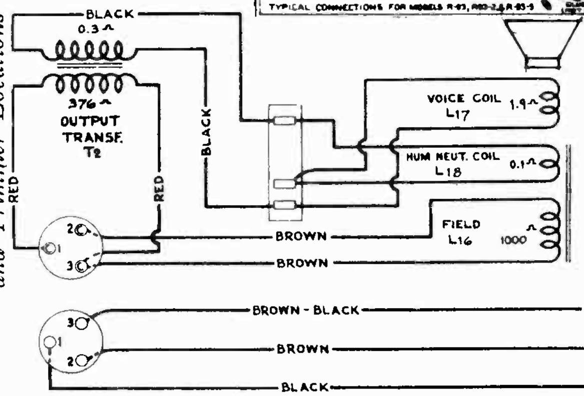


Figure 6—Loudspeaker Wiring

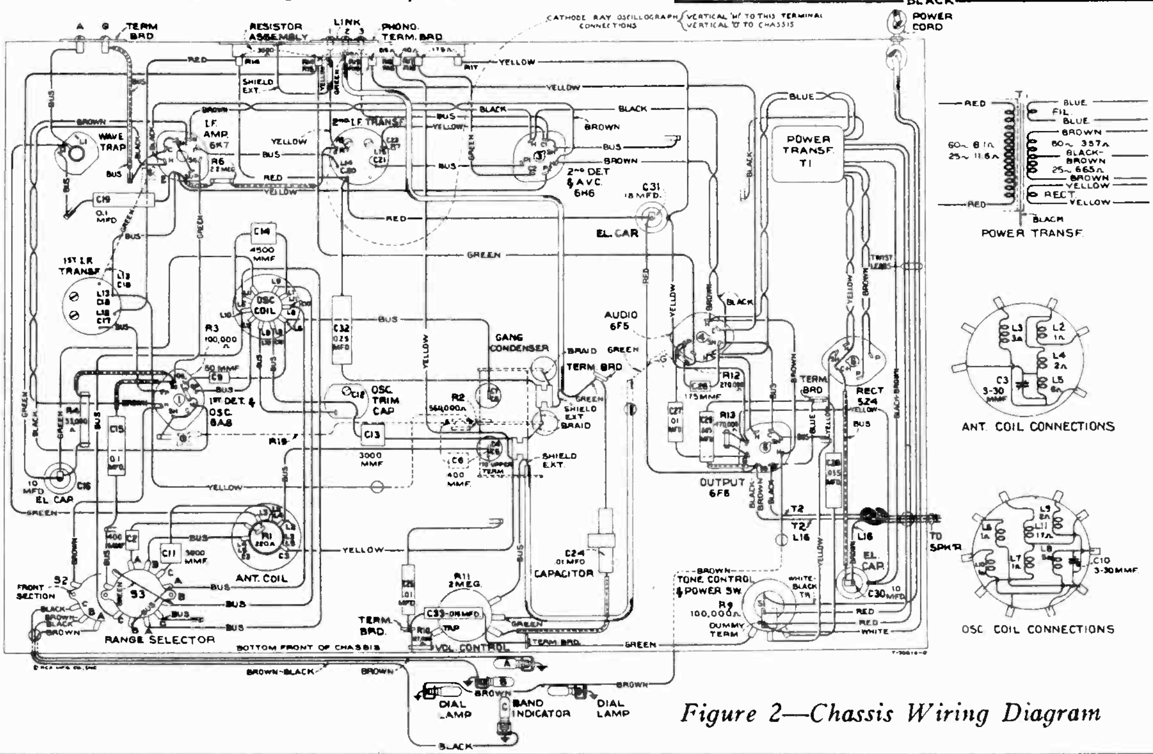


Figure 2—Chassis Wiring Diagram

MODELS 6T2, 6K2
Voltage, Socket

RCA MFG. CO., INC.

Trimmers, Resistance
Transformer Data

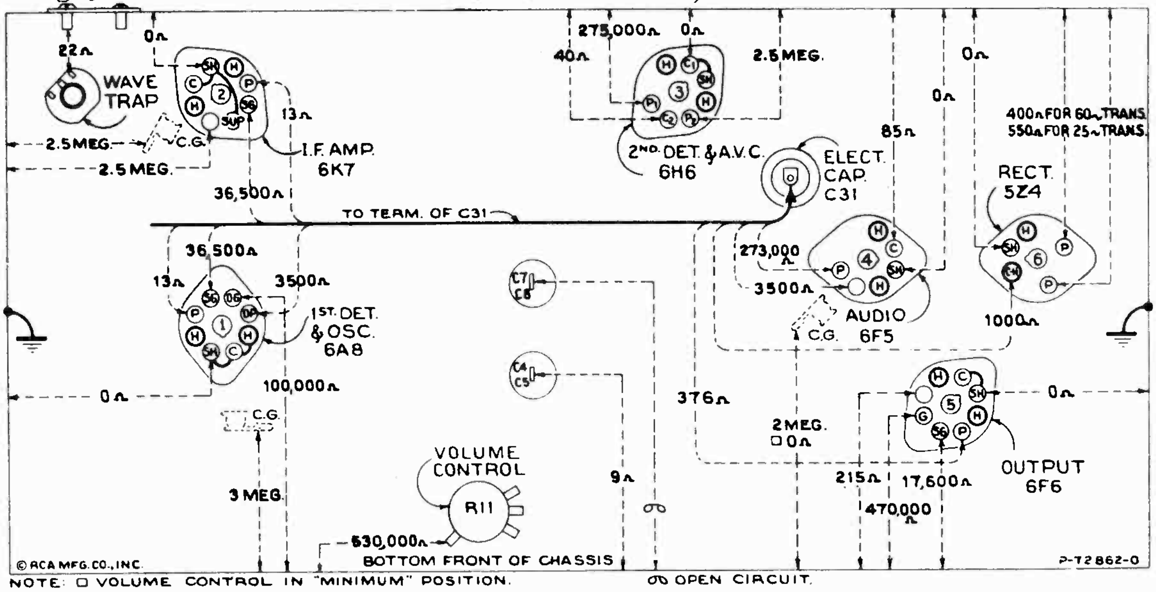


Figure 4—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full mesh—Range selector "Standard broadcast"—Volume control maximum

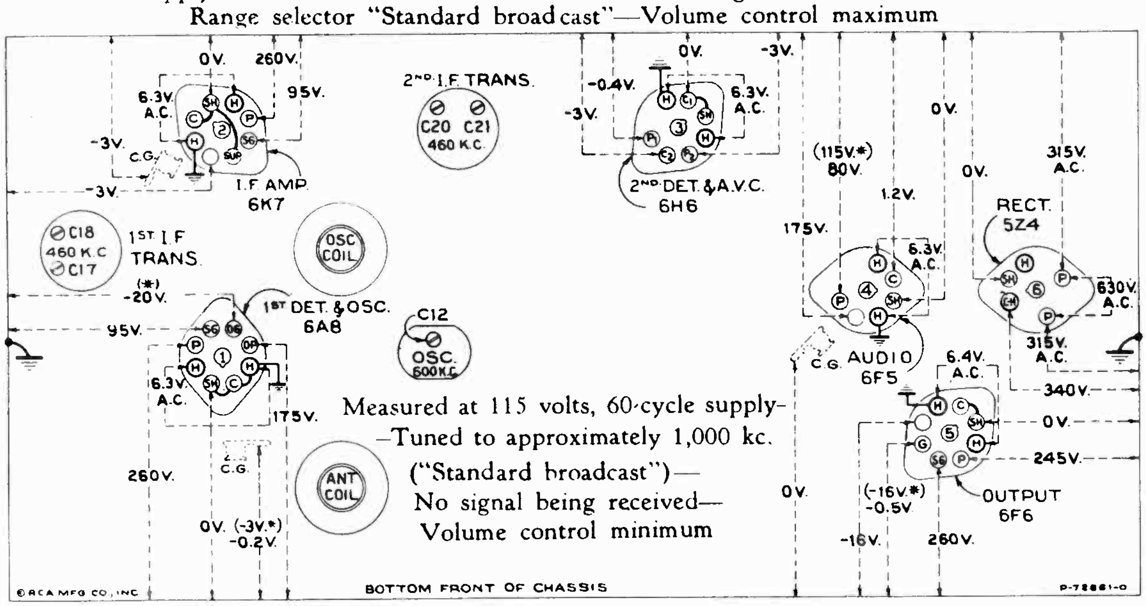
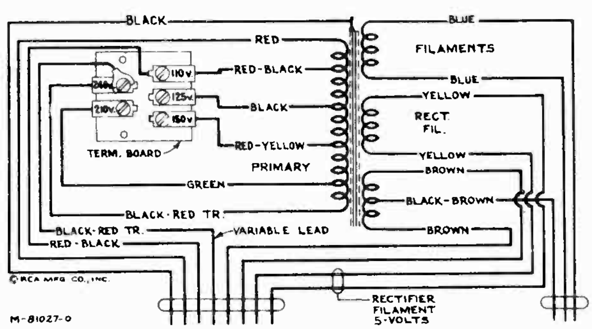


Figure 7—Radiotron Socket Voltages, Coil, and Trimmer Locations

***Note:** Two voltage values are shown for some readings. The higher value shown in parentheses with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.*

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground on figure 7 will assist in locating cause of faulty operation. Each value as specified should hold within ±20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with receiver tuned to approximately 1,000 kc., no signal being received, and volume control set at minimum. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm-per-volt d-c meter, having ranges of 10, 50, 250, 500, and 1,000 volts. Use the nearest range above the voltage to be measured. A-c voltages were measured with a corresponding a-c meter.



Primary Resistance—17.3 ohms total
Secondary Resistance—355 ohms total

Figure 5—Universal Transformer

RCA MFG. CO., INC.

General Features

These receivers employ the same chassis and have many distinctive features. Model 6T2 employs an 8-inch dynamic loudspeaker and Model 6K2 employs a 12-inch dynamic loudspeaker. The superheterodyne circuit is used with such features of design as: Antenna wave-trap, aural compensated volume control, continuously variable tone control with music-voice switch, automatic volume control, resistance coupled audio system, phonograph terminal board, and band selective indication of dial scales. The tuning range is continuous through the "Standard broadcast" band, "Medium wave" band, and the "Short wave" band. It includes domestic broadcast, police, aircraft and amateur services, and also the important foreign short-wave broadcast bands at 49, 31, 25, 19, and 16 meters.

Circuit Arrangement

The first detector and oscillator functions are accomplished in a single tube, an RCA-6A8. The input of this tube is coupled to the antenna through a tuned transformer. This transformer consists of a single primary and three series-connected secondary windings to provide the three ranges of tuning. The oscillator coil system is similarly wound on a single form. A range-selector switch S3 is used for connecting the various sections of these two coil systems into the circuit to provide operation on the band desired. The coils are tuned by a variable two-section gang condenser having trimming capacitors in shunt with each section. There are additional trimming capacitors across the section of each coil used for the "Standard broadcast" band. A series trimming capacitor is also associated with the "Standard broadcast" oscillator coil.

The intermediate-frequency stage is coupled to the RCA-6A8 and to the RCA-6H6 by means of tuned transformers. The windings of these transformers (both primary and secondary) are resonated with adjustable trimming capacitors to tune to 460 kc.

The modulated signal as obtained from the output of the i-f system is detected by an RCA-6H6 twin-diode tube. Audio frequency secured by this process is passed on to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage which develops across resistor R7 is applied as automatic control-grid bias to the first detector and i-f tubes. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R6 and R7, thereby maintaining the desired operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current, and the a.v.c. diode takes over the biasing function.

Manual volume control is effected by means of an acoustically tapered potentiometer connected as a variable coupling element between the output of the second detector and the first audio control grid. After amplification by the RCA-6F5, the audio signal is transmitted by resistance capacitance coupling to the input of the RCA-6F6 power-output stage, which, in turn, is transformer-coupled to the dynamic loudspeaker.

Continuously variable tone control is effected by means of the combination of a capacitor C28 and variable resistor R9 shunting the plate circuit of the output tube. Extreme clockwise rotation of the tone control disconnects the resistor R9 from the circuit and places an additional capacitor, C33, in shunt with capacitor C25, thereby reducing the low-frequency response of the amplifier. This point is known as the "Speech" position and provides optimum intelligibility of speech.

The power-supply system consists of an RCA-5Z4 rectifier tube, which is supplied from an efficiently designed power transformer, and which works into a suitable filter. The various potentials required for the plate, screen, control grid, and cathode circuits, are obtained from the output of the filter. The electrodynamic loudspeaker field coil is used as a filter reactor.

Phonograph Attachment

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. Typical methods of connecting a low-impedance pickup, or the RCA Victor Models R-93, R-93-2, and R-93-S Record Players are shown on the schematic diagram (figure 1).

SERVICE DATA
Alignment Procedure

There are six adjustments required for the alignment of the antenna, oscillator, and wave-trap tuned circuits. The i-f transformer adjustments are made by four trimming capacitor screws. Improper alignment usually causes the impairment of sensitivity, selectivity, and tone quality. Such conditions will usually exist simultaneously.

A standard test oscillator, such as the **RCA Stock No. 9595**, will be required as a source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to show when the correct point of adjustment is reached. The **RCA Stock No. 4317 Neon Glow Indicator** is designed for this purpose.

Attach the output indicator across the loudspeaker voice coil. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test-oscillator output control so that the signal level is as low as possible and still be observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the test oscillator to the grid cap of the RCA-6A8 through a **.001 mfd.** capacitor, and connect the test oscillator ground to the receiver chassis. Set test oscillator to **460 kc.**

(b) Adjust the two trimming capacitors (**C20** and **C21**) of the second i-f transformer to produce maximum (peak) output.

(c) Adjust the two trimming capacitors (**C17** and **C18**) of the first i-f transformer, to produce maximum (peak) output.

It is advisable to repeat the adjustment of all i-f trimming capacitors a second time to assure that the interaction between them has not disturbed the original adjustment.

R-F Adjustments

Calibrate the tuning dial by adjusting the scale pointer to the extreme end calibration mark (beyond 55 on dial) while the two-gang tuning condenser plates are in full mesh. Alignment (see figure 3 for location of trimming adjustments) of "Wave-trap," "Short wave" band and "Standard broadcast" band should be made in the following order and sequence.

"Wave-Trap"

(a) Connect the output of the test oscillator to the antenna terminal through a **200 mmfd. (important)** capacitor, leaving the test oscillator ground connected to the receiver chassis. With the range selector in its "Standard broadcast" position, set the receiver dial to position of no extraneous signals, near **600 kc.** (60 on dial). Set the test oscillator to **460 kc.** Adjust the wave-trap trimming capacitor **C1** to a point which causes minimum amplitude of output. An increase of the test oscillator output may be necessary before the point of minimum amplitude, obtained by adjustment of wave-trap screw, becomes apparent on the output indicator.

"Short Wave" Band

(a) Connect the output of the test oscillator to the antenna terminal through a **300-ohm** resistor, leaving the test oscillator ground connected as before.

(b) Set the range selector to its "Short wave" position. Set receiver dial pointer to **15,000 kc.** (15 on dial). Adjust the test oscillator to **15,000 kc.** Adjust the oscillator trimming capacitor **C8** to the point which produces maximum (peak) output. Two points may be found, each of which produces a maximum. The one of maximum trimmer capacitance (most clockwise) is correct and should be used.

(c) Adjust the antenna trimming capacitor **C5** of the variable condenser, simultaneously rocking the receiver tuning control backward and forward through the **15,000 kc.** input signal, until maximum (peak) output results from these combined operations.

"Standard Broadcast" Band

(a) Connect the output of the test oscillator to the antenna terminal through a **200 mmfd.** capacitor, leaving test oscillator ground connected as before.

(b) Set the range selector to its "Standard broadcast" position. Set the receiver dial pointer to **1,400 kc.** (140 on dial). Adjust the test oscillator to **1,400 kc.** Adjust the oscillator and antenna trimming capacitors, **C10** and **C3** respectively, to the points where each produces maximum (peak) output.

(c) Shift the test oscillator frequency to **600 kc.** and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(d) Adjust the low-frequency oscillator trimming capacitor, **C12**, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum (peak) output results from these combined operations. Repeat adjustments in (b) to compensate for any changes caused by the adjustment of the low-frequency oscillator coil trimming capacitor.

Electrical Specifications

FREQUENCY RANGES
"Standard broadcast" (A) .... 540- 1,625 kc
"Medium wave" (B) .... 1,625- 5,700 kc.
"Short wave" (C) .... 5,700-18,000 kc.

ALIGNMENT FREQUENCIES
"Standard broadcast" (A) .... 600 kc. (osc.), 1,400 kc. (osc. and ant.)
"Medium wave" (B) .... None required
"Short wave" (C) .... 15,000 kc. (osc. and ant.)

Intermediate Frequency .... 460 kc

RADIOTRON COMPLEMENT
(1) RCA-6A8 .... First-detector-oscillator
(2) RCA-6K7 .... Intermediate amplifier
(3) RCA-6H6 .... Second-detector-a.v.c.
(4) RCA-6F5 .... Audio voltage amplifier
(5) RCA-6F6 .... Audio power amplifier
(6) RCA-5Z4 .... Full-wave rectifier

Pilot Lamps (5) .... Mazda No. 46, 6.3 volts, 0.25 amperes

POWER SUPPLY RATINGS
Rating A .... 105-125 volts, 50-60 cycles, 90 watts
Rating B .... 105-125 volts, 25-60 cycles, 90 watts
Rating C .... 100-130/140-160/195-250 volts, 40-60 cycles, 90 watts

POWER OUTPUT
Undistorted .... 2.0 watts
Maximum .... 4.5 watts

LOUDSPEAKER
Type .... Electrodynamic
Impedance (v.c.) .... 2.2 ohms at 400 cycles

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
12930	Board—Antenna and ground terminal board	$0.20
12717	Board—Phonograph terminal board	.22
12772	Bracket—Top dial lamp socket bracket	.30
5237	Bushing—Variable turning condenser mounting bushing assembly—Package of 3	.43
11350	Cap—Grid contact cap used on resistor—Stock No. 11624—Package of 5	.20
12511	Cap—Grid contact cap—Package of 5	.15
11465	Capacitor—Adjustable capacitor—(C12)	.48
11289	Capacitor—50 Mmfd.—(C9)	.26
11623	Capacitor—175 Mmfd.—(C22, C26)	.18
11290	Capacitor—400 Mmfd. (C2, C6)	.25
11622	Capacitor—3000 Mmfd.—(C13)	.36
11621	Capacitor—3600 Mmfd.—(C11)	.38
11287	Capacitor—4500 Mmfd.—(C14)	.30
4868	Capacitor—.005 Mfd.—(C29)	.20
11395	Capacitor—.01 Mfd.—(C24)	.18
4858	Capacitor—.01 Mfd.—(C25, C27)	.25
11315	Capacitor—.015 Mfd.—(C33)	.20
12670	Capacitor—.035 Mfd.—(C28)	.20
4841	Capacitor—0.1 Mfd.—(C19)	.22
11414	Capacitor—0.1 Mfd.—(C15)	.20
5170	Capacitor—0.25 Mfd.—(C32)	.25
11387	Capacitor—10 Mfd.—(C16)	.86
11240	Capacitor—10 Mfd.—(C30)	1.08
5212	Capacitor—18 Mfd.—(C31)	1.16
11617	Coil—Antenna coil less shield—(L2, L3, L4, L5, C3, R1)	1.68
11618	Coil—Oscillator coil less shield—(L6, L7, L8, L9, L10, L11, C10)	2.22
12767	Condenser—2-gang variable tuning condenser—(C4, C5, C7, C8)	4.10
5119	Connector—3-contact female connector for speaker cable	.25
12792	Dial—Station selector dial	.85
12768	Drive—Variable tuning condenser vernier drive	1.30
1619	Foot—Chassis mounting foot and bracket—Package of 2	.65
12770	Holder—Dial scale holder and lamp bracket assembly less bracket for top dial lamp socket	.55
12712	Indicator—Station selector indicator pointer	.22
5226	Lamp—Dial lamp—6.3 volt—Package of 5	.70
12718	Mask—Dial light diffuser complete with red, orange and green-colored screen	.40
11466	Resistor—Voltage divider resistor—comprising one 3,500-ohm, one 13,000-ohm, one 85-ohm, one 40-ohm and one 175-ohm sections—(R14, R15, R16, R17, R18)	.95
11624	Resistor—22 ohms—Flexible type complete with grid contact cap—(R19)	.22
11620	Resistor—220 ohms—Carbon type—1/10 watt—(R1)—Package of 5	.75
11400	Resistor—27,000 ohms—Carbon type—¼ watt—(R10)—Package of 5	1.00
8072	Resistor—33,000 ohms—Carbon type—½ watt—(R4)—Package of 5	1.00
11282	Resistor—56,000 ohms—Carbon Type—1/10 watt—(R5)—Package of 5	.75
3118	Resistor—100,000 ohms—Carbon type—¼ watt—(R3)—Package of 5	1.00
11398	Resistor—220,000 ohms—Carbon type—1/10 watt—(R7)—Package of 5	.75
11453	Resistor—270,000 ohms—Carbon type—1/10 watt—(R12)—Package of 5	.75
11452	Resistor—470,000 ohms—Carbon type—1/10 watt—(R13)—Package of 5	.75
11397	Resistor—560,000 ohms—Carbon type—1/10 watt—(R2)—Package of 5	$0.75
11626	Resistor—2.2 megohms—Carbon type—¼ watt—(R6)—Package of 5	1.00
11390	Shield—I. F. transformer shield for Stock Nos. 11388 and 11389	.25
11603	Shield—Coil shield for Stock Nos. 11617 and 11618	.26
12735	Shield—Dial lamp shield—Package of 5	.25
12771	Socket—Dial lamp socket—Located at top of dial scale	.25
11199	Socket—Dial lamp socket	.14
11195	Socket—5-contact 5Z4 Radiotron socket	.15
11198	Socket—7-contact 6F5, 6H6 Radiotron socket	.15
11196	Socket—8-contact 6A8, 6F6 or 6K7 Radiotron socket	.15
12769	Switch—Range switch—(S2, S3)	1.25
12668	Tone Control—Control and power switch—(R9, S1)	1.22
11388	Transformer—First I. F. transformer less shield—(L12, L13, C17, C18)	1.90
11848	Transformer—Power transformer—105-125-volt, 50-60-cycle—(T1)	4.40
11849	Transformer—Power transformer—105-125-volt, 25-40-cycle—(T1)	5.70
11850	Transformer—Power transformer—105-250-volt, 40-60-cycle—(T1)	8.00
11389	Transformer—Second I. F. transformer less shield—(L14, L15, C20, C21, C22, R5, R7)	3.02
11391	Trap—Wave trap—(L1, C1)	1.22
13144	Volume control—(R11)	1.00
	REPRODUCER ASSEMBLIES	
11232	Board—Reproducer terminal board	.18
8060	Bracket—Output transformer mounting bracket and clamp	.14
11470	Coil—Field coil—(L16)	2.16
11469	Coil—Neutralizing coil—(L18)	.20
11235	Cone—Reproducer cone complete—(L17)—Package of 5 (Model 6T2)	3.50
11258	Cone—Reproducer cone complete—(L17)—Package of 5 (Model 6K2)	3.85
5118	Connector—3-contact male connector for speaker cable	.25
12666	Cover—Speaker cover (Model 6K2)	.65
9621	Reproducer complete (Model 6T2)	6.85
9622	Reproducer complete (Model 6K2)	7.16
11253	Transformer—Output transformer—(T2)	1.56
11886	Washer—Spring washer to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
12698	Crystal—Station selector crystal and escutcheon	1.02
11582	Knob—Range switch knob—Package of 5	.50
11610	Knob—Station selector knob—includes large and small knob—Package of 5	1.00
11347	Knob—Tone control or volume control knob—Package of 5	.75
11377	Screw—Chassis mounting screw assembly used on Model 6T2—Package of 4	.12
11210	Screw—Chassis mounting screw assembly—Used on Model 6K2—Package of 4	.28
11349	Spring—Retaining spring for knob—Stock No. 11347, No. 11582 and small knob of Stock No. 11610—Package of 5	.15
4982	Spring—Retaining spring for large knob of Stock No. 11610—Package of 10	.26

Prices quoted above are subject to change without notice.

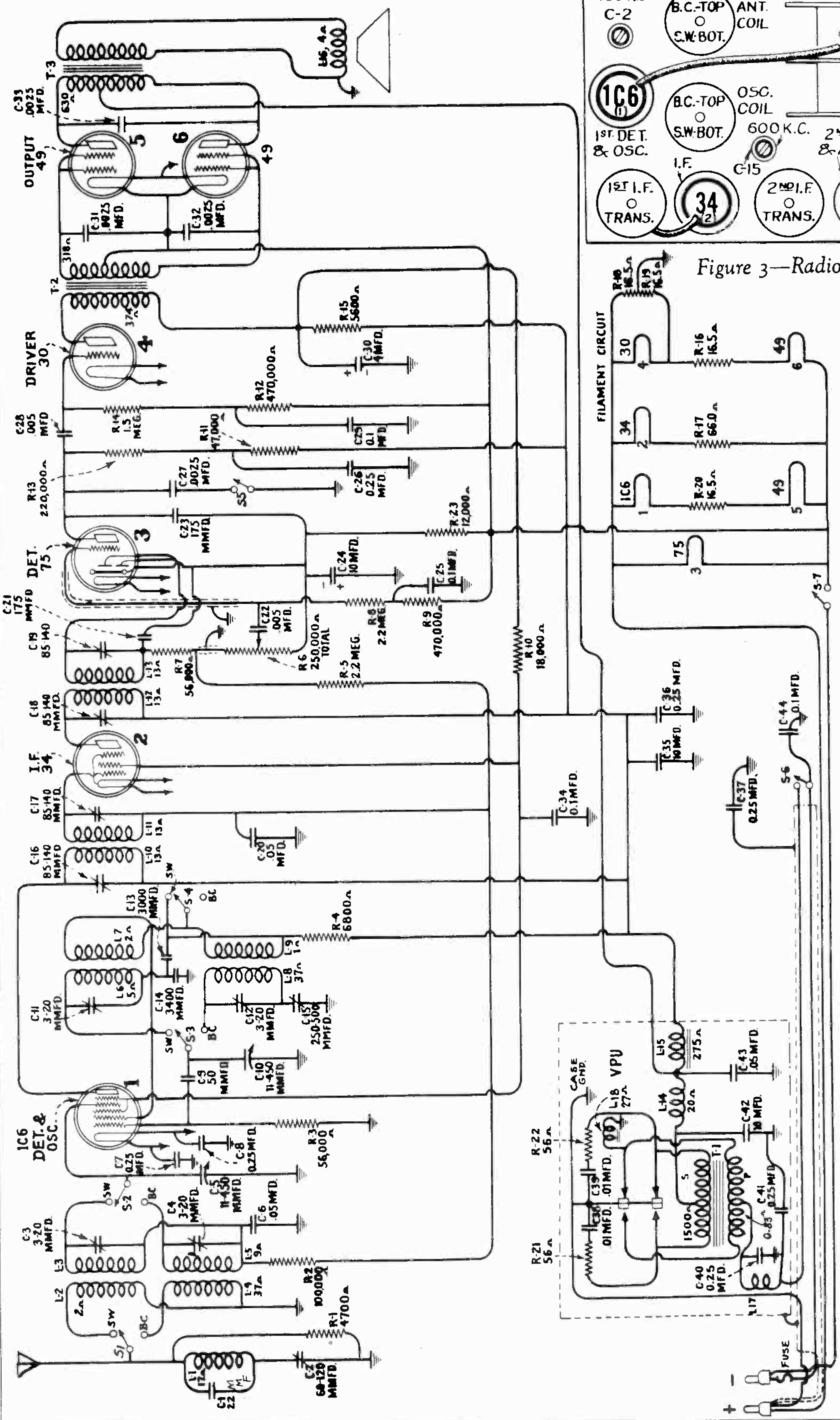
Mechanical Specifications

	Model 6T2	Model 6K2
Height	19⅞ inches	38 inches
Width	13¾ inches	23⅛ inches
Depth	8½ inches	11⅞ inches
Weight (net)	24 pounds	46 pounds
Weight (shipping)	29 pounds	58 pounds

Chassis Base Dimensions .... 12 inches x 7 inches x 2½ inches
Over-all Chassis Height .... 8 inches
Operating Controls .... (1) Power switch-tone, (2) Tuning, (3) Volume, (4) Range selector
Tuning Drive Ratios .... 10 to 1 and 50 to 1

MODELS BT6-5, BC6-6
Schematic, Socket
Trimmers

RCA MFG. CO., INC.



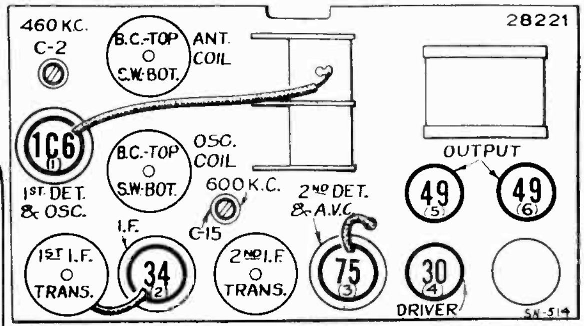


Figure 3—Radiotron and Coil Locations

ALIGNMENT FREQUENCIES

Band A........600 kc. (osc.); 1,720 kc. (osc., ant.)
Band C......................18,000 kc. (osc., ant.)
Intermediate Frequency......................**460 kc.**

FREQUENCY RANGES

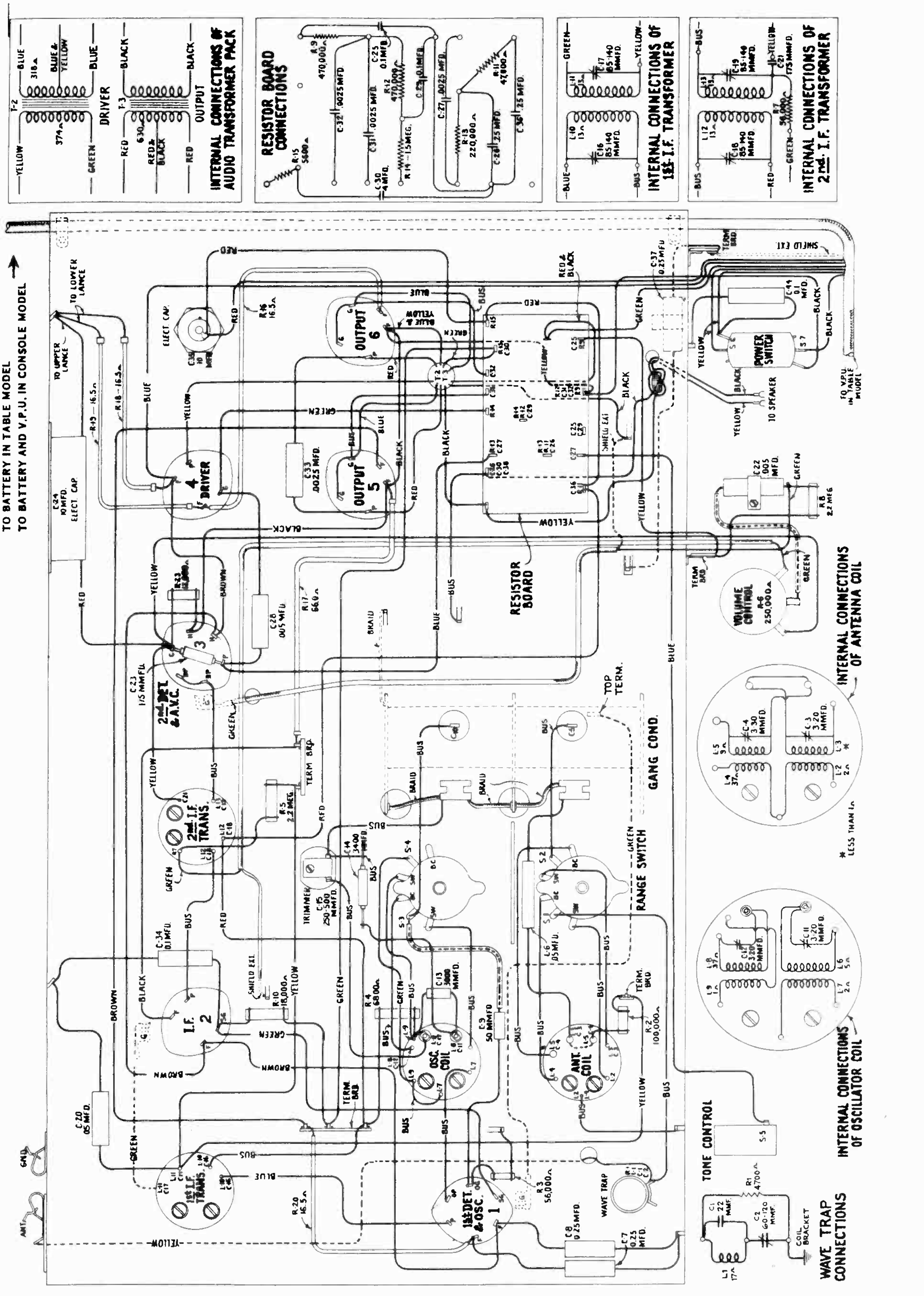
Band A....................540-1,720 kc.
Band C....................5,600-18,000 kc.

POWER OUTPUT

Undistorted..................0.8 Watt
Maximum......................1.2 Watts

MODELS BT6-5,BC6-6
Chassis Wiring

RCA MFG. CO., INC.



MODELS BT6-5,BC6-6
Voltage,Trimmers
Vibrator Data

RCA MFG. CO., INC.

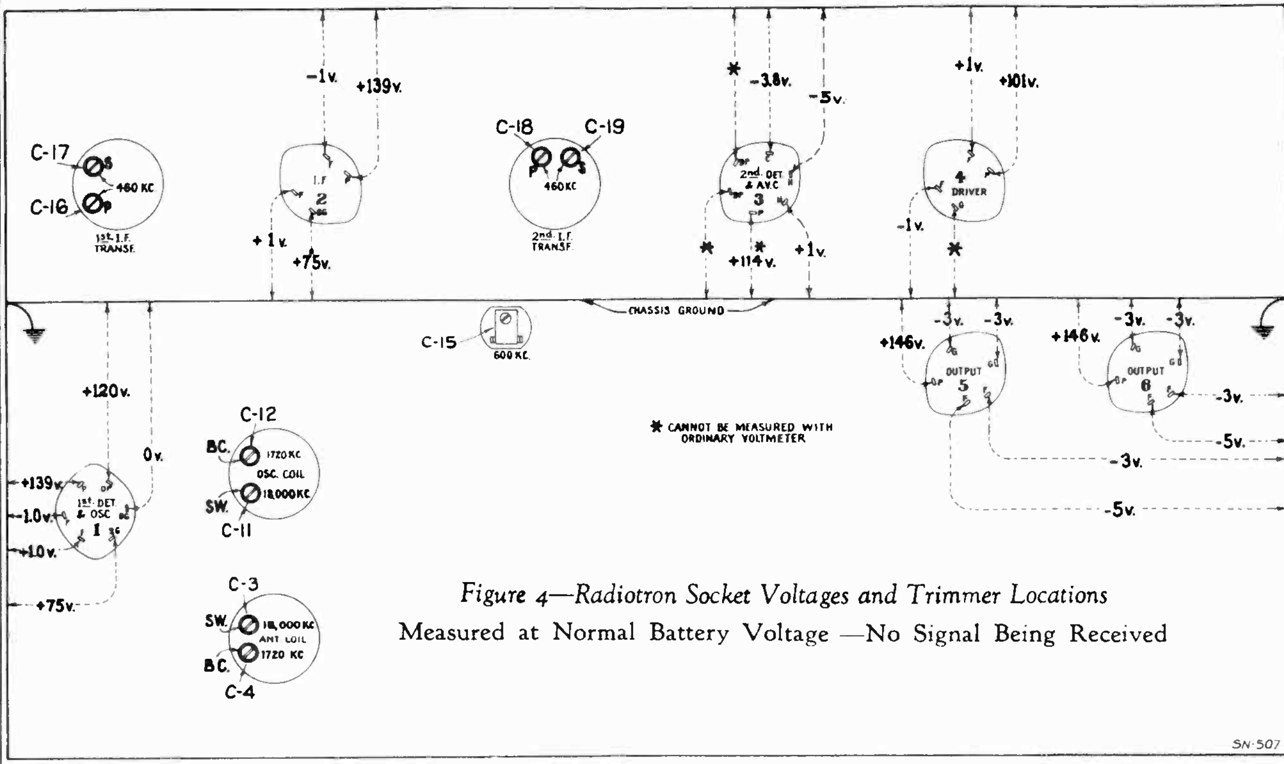
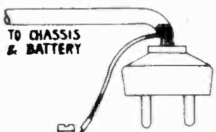
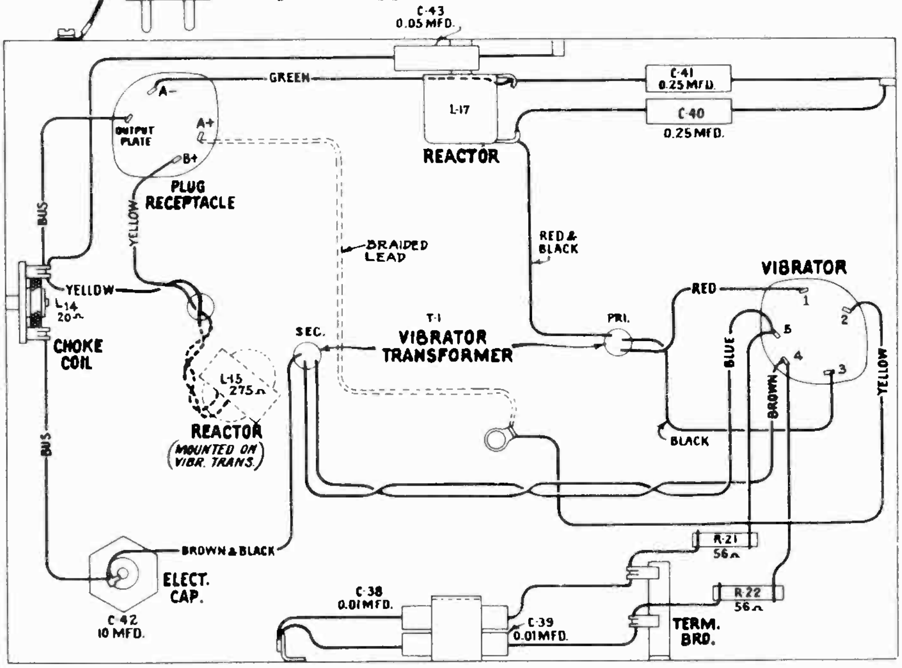


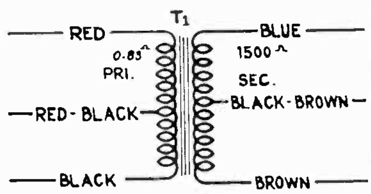
Figure 4—Radiotron Socket Voltages and Trimmer Locations

Measured at Normal Battery Voltage —No Signal Being Received

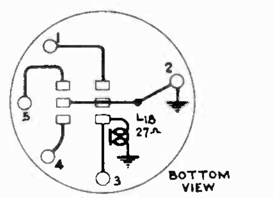
	BT 6-5	BC 6-6
Height	$20\frac{3}{16}$ inches	38 inches
Width	$14\frac{7}{16}$ inches	24 inches
Depth	9¾ inches	12 inches
Chassis Base	13 inches x 7½ inches x 2½ inches	
Weight (Net)	33½ pounds	40 pounds
Weight (Shipping)	59 pounds	74 pounds







VIBRATOR TRANSF.



INTERNAL CONNECTIONS OF VIBRATOR

Figure 5—Vibrator Power Unit Wiring

MODELS BT6-5, BC6-6
Alignment, Parts

RCA MFG. CO., INC.

Circuit Arrangement

The conventional Superheterodyne circuit is used. The first stage combines the local oscillator and first detector functions in one tube, an RCA-1C6. Coils of the detector input and oscillator are tuned by a two-section variable condenser and are aligned by a total of five adjustable trimmers. Selection of the individually wound coil systems is made by the range selector. The oscillator operates at a fundamental frequency which is at all times above the incoming signal by **460 kc.**

An RCA-34 is employed as an i-f amplifier. Its input and output are coupled by transformers to the first detector and second detector, respectively. Each transformer has both its secondary and primary windings tuned to **460 kc.** by adjustable trimmer capacitors.

The modulated signal, as obtained from the output of the i-f system, is detected by the diode section of the RCA-75. The a-f voltage appearing across the diode load resistor, R-6, is selected by the variable arm of the volume control (R-6) and passed on to the a-f system for amplification and final reproduction. The d.c. which occurs in resistor R-6 due to signal detection, is used for automatic volume control by varying the control-grid bias on the first detector and i-f tubes.

Resistance-capacitance coupling is used between the RCA-75 and the RCA-30 driver tube. A high-frequency tone control, consisting of a switch in series with a condenser, is shunted across the plate circuit of the RCA-75. When this switch is closed, the high a-f frequencies are reduced.

The power output stage is arranged for Class "B" operation. The high level of power afforded is fed to the permanent magnet dynamic speaker through an output transformer.

Battery "On-Off" control is by means of a double pole switch, one side of which controls the filament and bias circuits, while the other side controls the vibrator power unit circuit. A fuse is provided in the V. P. U. circuit.

General Description

These instruments each employ a synchronous type vibrator and require only one 6-volt storage battery for power supply.

The receiver chassis of both models are identical. An 8-inch loudspeaker is used in the table model (BT 6-5) and a 10-inch loudspeaker is used in the console model (BC 6-6).

The tuning range afforded by these instruments includes (1) the standard 540-1,600 kc. broadcast band which extends to cover the 1,700 kc. police channels, and (2) a shortwave band from 5,600-18,000 kc. which covers the principal shortwave broadcast stations on the 49, 31, 25, 19, and 16 meter bands.

Outstanding features include automatic volume control, two-point tone control, antenna wave trap, airplane type dial, dual ratio tuning drive, class "B" output stage, and vibrator power unit (V.P.U.)

REPLACEMENT PARTS

Stock No.	Description	List Price
11648	Foot—Chassis foot and bracket assembly—Package of 2	.64
11134	Resistor—16.5 ohms—Flexible type—(R16, R20)—Package of 5	.68
11611	Resistor—16.5 ohms—Flexible type—(R18, R19)—Package of 5	.68
11473	Resistor—66 ohms—Flexible type—(R17)—Package of 5	.68
11650	Resistor—4700 ohms—Carbon type—1/10 watt—(R1)—Package of 5	.75
11647	Resistor—5600 ohms—Carbon type—¼ watt—(R15)—Package of 5	1.00
11726	Resistor—6800 ohms—Carbon type—¼ watt—(R4)—Package of 5	1.00
5109	Resistor—12,000 ohms—Carbon type—¼ watt—(R23)—Package of 5	1.00
11175	Resistor—18,000 ohms—Carbon type—¼ watt—(R10)—Package of 5	1.00
11646	Resistor—47,000 ohms—Carbon type—¼ watt—(R11)—Package of 5	1.00
5029	Resistor—56,000 ohms—Carbon type—¼ watt—(R3)—Package of 5	1.00
11281	Resistor—100,000 ohms—Carbon type—1/10 watt—(R2)—Package of 5	.75
5158	Resistor—220,000 ohms—Carbon type—¼ watt—(R13)—Package of 5	1.00
11172	Resistor—470,000 ohms—Carbon type—¼ watt—(R9, R12)—Package of 5	1.00
4241	Resistor—1.5 megohms—Carbon type—¼ watt—(R14)—Package of 5	1.00
11626	Resistor—2.2 megohms—Carbon type—¼ watt—(R5, R8)—Package of 5	1.00
11641	Shield—Antenna or oscillator coil shield	.34
11390	Shield—Intermediate frequency transformer shield	.25
3682	Shield—Radiotron (1C6 or 75) shield	.22
3056	Shield—Radiotron (34) shield—Package of 2	.40
4794	Socket—4-contact Radiotron (30 or 34) socket	.15
4814	Socket—5-contact Radiotron (49) socket	.15
4786	Socket—6-contact Radiotron (1C6 or 75) socket	.15
11643	Switch—Power switch—(S6, S7)	.60
11642	Switch—Range switch—(S1, S2, S3, S4)	1.52
11644	Switch—Tone control switch—(S5)	.30
5238	Terminal—Antenna terminal board with clip, insulating strip and rivets	.14
11594	Transformer—Audio driver and output transformer pack—(T2, T3)	4.10
11592	Transformer—First intermediate frequency transformer—(L10, L11, C16, C17)	2.55
11593	Transformer—Second intermediate frequency transformer—(L12, L13, C18, C19, C21, R7)	2.75
11649	Trap—Wave trap—(L1, C1, C2, R1)	1.15
11589	Volume control—(R6)	.85
	DRIVE ASSEMBLIES	
10194	Ball—Steel ball for drive assembly—Package of 20	.25
4422	Clutch—Tuning condenser drive clutch assembly—comprising drive shaft, balls, ring, spring and washers assembled	1.00
11674	Dial—Station selector dial	.30
11651	Drive—Variable tuning condenser drive assembly	1.84
4520	Indicator—Station selector indicator pointer	.18
4669	Screw—No. 8-32x5/32-in. set screw for condenser assembly—Package of 10	.25
	POWER UNIT ASSEMBLIES	
11654	Capacitor—.01 Mfd.—(C38, C39)	.16
4836	Capacitor—.05 Mfd.—(C43)	.30
4840	Capacitor—.25 Mfd.—(C40, C41)	.30
11387	Capacitor—10 Mfd.—(C42)	.86
11655	Coil—Choke coil—(L14)	.38
11657	Reactor—Filter reactor—(L15)	.96
11652	Reactor—(L17)	1.28
5034	Resistor—56 ohms—Carbon type—½ watt—(R21, R22)—Package of 5	1.00
4794	Socket—4-contact socket for cable plug connector	.15
4814	Socket—5-contact vibrator socket	.15
11653	Transformer—Vibrator transformer—(T1)	6.50
11656	Vibrator	5.92
	MISCELLANEOUS ASSEMBLIES	
4289	Body—Fuse connector body—Package of 10	.35
11635	Cable—Battery cable complete with four-contact male connector, fuse connector and two-contact pins—for table model	2.30
11636	Cable—Battery cable complete with four-contact male connector, fuse connector, and two-contact pins—for console model	2.60
4288	Cap—Fuse connector cap—Package of 10	.36
11634	Connector—Clip and strap connector assembly for storage battery—Package of 2	.26
6516	Connector—Fuse connector—complete	.16
11570	Connector—Four-contact male connector for battery cable	.32
11337	Escutcheon—Station selector escutcheon	.70
4286	Ferrule—Fuse connector ferrule and bushing—Package of 10	.38
5023	Fuse—15 Ampere fuse—Package of 5	.40
6614	Glass—Station selector dial glass	.30
4290	Insulator—Fuse connector insulator—Package of 10	.35
11346	Knob—Station selector knob—Package of 5	.75
11455	Knob—Volume control, tone control, range switch or power switch knob—Package of 5	.48
11637	Pin—Contact pin—for battery cable—colored black—Package of 5	.10
11658	Pin—Contact pin—for battery cable—colored red—Package of 5	.10
4678	Ring—Station selector dial glass retaining ring—Package of 5	.34
5210	Screw—Chassis mounting screw assembly—Package of 4	.16
11348	Screw—No. 8-32x7/16-in. headless cupped point set screw—for knob, stock No. 11346—Package of 10	.32
4284	Spring—Fuse connector spring—Package of 10	.30
11349	Spring—Retaining spring for knob, stock No. 11455—Package of 5	.15
4285	Washer—Fuse connector insulating washer—Package of 10	.22
	REPRODUCER ASSEMBLIES Table Model	
9539	Cone—Reproducer cone (L9)—Package of 5	4.30
9540	Magnet Assembly—Comprising cone bracket, core and magnet	5.72
9538	Reproducer—Complete	7.65
	REPRODUCER ASSEMBLIES Console Model	
9432	Cone—Reproducer cone—complete with voice coil—(L9)	1.88
7820	Magnet—Cone housing and magnet assembly	8.98
7819	Reproducer—Complete	12.18

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	$0.43
11223	Capacitor—Adjustable capacitor—(C15)	.46
11292	Capacitor—22 MMfd.—(C1)	.24
11289	Capacitor—50 MMfd.—(C9)	.26
5116	Capacitor—175 MMfd.—(C23)	.18
11622	Capacitor—3000 MMfd.—(C13)	.36
4439	Capacitor—3400 MMfd.—(C14)	.35
5107	Capacitor—.0025 Mfd.—(C27, C31, C32, C33)	.16
4868	Capacitor—.005 Mfd.—(C28)	.20
5242	Capacitor—.005 Mfd.—(C22)	.52
4836	Capacitor—.05 Mfd.—(C6, C20)	.30
4841	Capacitor—0.1 Mfd.—(C25, C29, C34, C44)	.22
4840	Capacitor—0.25 Mfd.—(C7, C8, C26, C36, C37)	.30
6832	Capacitor—4 Mfd.—(C30)	.85
11387	Capacitor—10 Mfd.—(C35)	.86
11645	Capacitor—10 Mfd.—(C24)	1.08
11639	Coil—Antenna coil—(L2, L3, L4, L5, C3, C4)	2.40
11640	Coil—Oscillator coil—(L6, L7, L8, L9, C11, C12)	2.46
11638	Condenser—Two-gang variable tuning condenser (C5, C10)	3.05

Power Output
Undistorted .... 0.8 Watt   Maximum .... 1.2 Watts

Loudspeaker
Table Model .... 8 inch Permanent Magnet   Console Model .... 10 inch Permanent Magnet

SERVICE DATA

Alignment Procedure

In readjusting the trimmers to their normal settings, it is quite important to apply a definite procedure and to use adequate and reliable test equipment. A standard source of the specified alignment frequencies is required. It is recommended that such a source consist of an **RCA Stock No. 9595 Full-Range Test Oscillator.** Means for indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. This indication should be obtained by means of such an instrument as the **RCA Stock No. 4317 Neon Glow Indicator.** Proceed with the alignment as follows:

Place the receiver in operation where it will be easily accessible. Attach the output indicator across the loudspeaker voice coil circuit, or across the output transformer primary. Advance the receiver volume control to its maximum position, letting it remain in such position for *all* adjustments. For each trimming operation, regulate the test oscillator output control so that the signal level is as low as possible and still observable at the receiver output. Use of such a small signal will avoid broadness of tuning which would otherwise result from A.V.C. action on a stronger one.

I-F Adjustments

(a) Connect the output of the test oscillator between the control-grid cap of the first detector tube (RCA-1C6) and chassis-ground. Adjust the frequency of the oscillator to **460 kc.** Tune the receiver to a point where no interference is received from the heterodyne oscillator or local station.

(b) Adjust the trimmers, C-19 and C-18, of the second i-f transformer, and C-17 and C-16 of the first i-f transformer, so that each produces maximum (peak) receiver output as shown by the indicating device. This completes the i-f trimmer adjustments.

R-F Adjustments

(a) Check the calibration of the dial scale by rotating the tuning control until the variable condenser plates are in full mesh. (Maximum capacity.) Then adjust the dial pointer until it points to the *horizontal* line at the low frequency end of the broadcast band scale.

(b) Connect the output of test oscillator to the antenna-ground terminals of the receiver. Adjust the receiver range switch to its Band A (broadcast) position. Tune the oscillator to **1,720 kc.** Allow the output indicator to remain attached to the receiver output.

(c) Tune the receiver so that the dial reading is **1,720 kc.** Then adjust the oscillator and antenna coil trimmers, **C-12** and **C-4** respectively, tuning each to the point producing maximum indicated receiver output.

(d) Shift the oscillator frequency to **600 kc.** and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. The oscillator series trimmer, **C-15,** should then be adjusted, simultaneously rocking the receiver tuning control backward and forward through the signal until maximum receiver output results from the combined operations. The adjustment of **C-12** should be repeated as in (c) to correct for any changes in its alignment due to the adjustment of C-15.

(e) Shift the oscillator frequency to **18,000 kc.** Adjust the receiver range switch to its Band C (shortwave) position, and set the receiver dial to a reading of **18,000 kc.** The oscillator and antenna trimmers, **C-11** and **C-3,** should then be adjusted for maximum indicated receiver output.

Retune receiver to **17,080 kc.** and check for image signal. If **C-11** has been correctly aligned, the **18,000 kc.** signal will be received. It may be necessary to increase the oscillator output for this indication of the "image." ***No adjustments should be made during this check.***

Vibrator Power Unit

The Vibrator Power Unit supplies the necessary plate, screen, and cathode voltage for proper operation of the receiver. It contains a plug-in type vibrator, step-up transformer, and an efficient filter system. Rectification of the high voltage is by means of the synchronous vibrator. The complete unit is acoustically shielded to prevent noise. ***The radio chassis is 1 volt negative with respect to the vibrator chassis and, therefore, it is necessary to insulate the vibrator power unit from the chassis when they are removed for service purposes.*** The vibrator unit has been carefully adjusted by means of special equipment to insure quiet operation over an extensive period of life. No adjustments should be attempted on a vibrator suspected of being in a defective condition, but a renewal installed. A convenient plug-in base is provided for effecting a quick replacement.

Radiotron Socket Voltages

Voltage values indicated at the Radiotron socket contacts on Figure 4 form a reference basis for test of the receiver. All voltages are given in respect to chassis-ground. The values shown are obtainable when the receiver is in normal operating condition. They do not take into account inaccuracies caused by current consumed in the voltmeter used for the tests. The lower the meter resistance, the lower will be the degree of accuracy. Allowances must therefore be made, dependent upon the type of test instrument used, for the loading effect of the voltmeter on the circuit.

Wave-Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference.

Batteries Required
"A" Supply .... Storage Battery (6-volt)
"B" Supply .... None
"C" Supply .... None

Current Drain
"A" Battery .... 1.5 Amperes

Fuse Rating .... 15 Amperes

Radiotron Complement
(1) RCA-1C6 .... First Detector and Oscillator
(2) RCA-34 .... Intermediate Amplifier
(3) RCA-75 .... Second Det., A.F., and A.V.C.
(4) RCA-30 .... Audio Driver Amplifier
(5) RCA-49 .... Power Output Amplifier
(6) RCA-49 .... Power Output Amplifier

MODELS T6-7,C6-8
Schematic

RCA MFG. CO., INC.

Power Supply Ratings

Rating A	105-125 Volts,	50-100 Cycles,	60 Watts
	105-125 Volts,	D-C	50 Watts
Rating B	105-125 Volts,	25-100 Cycles,	80 Watts
	105-125 Volts,	D-C	50 Watts

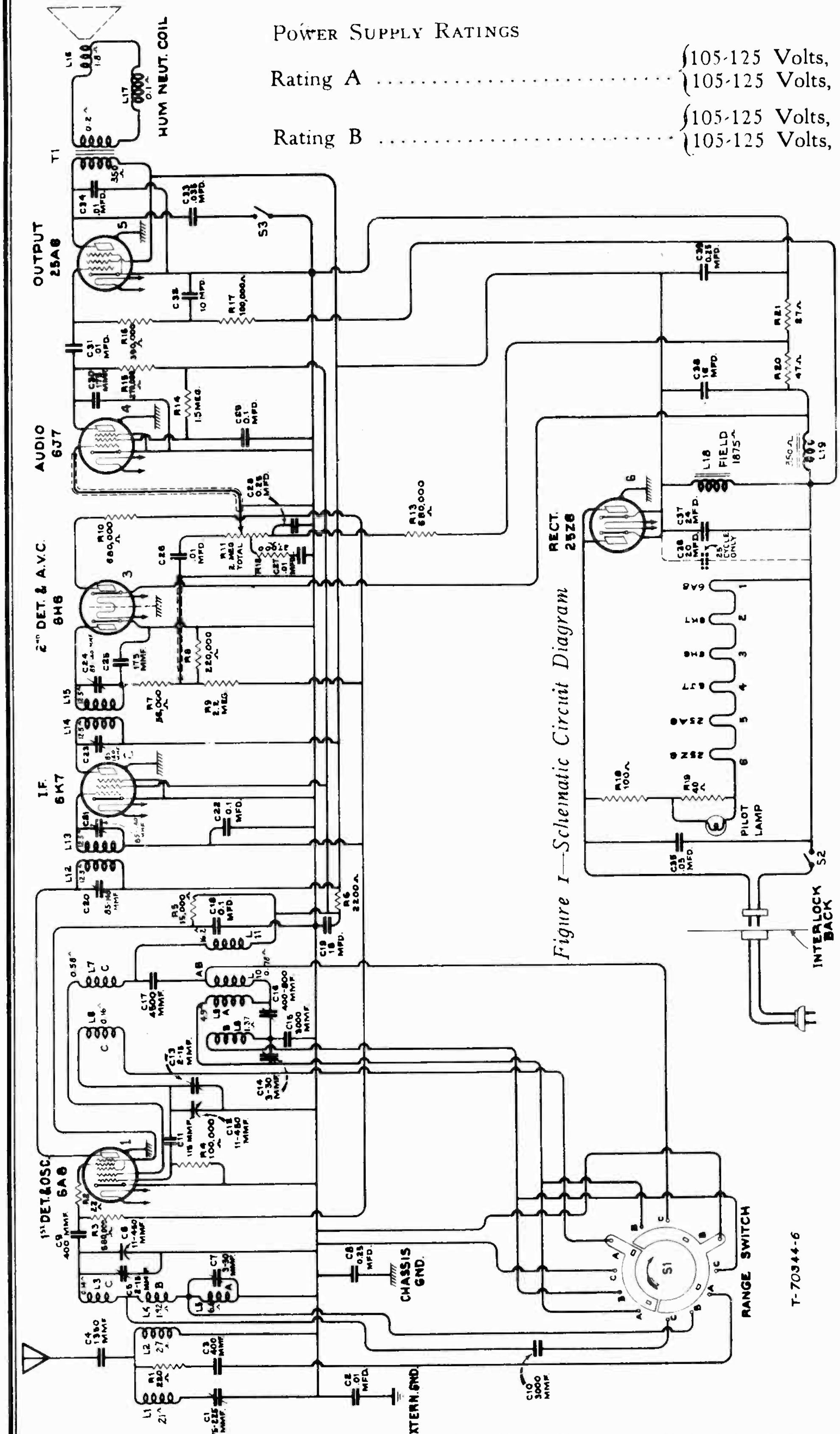


Figure 1—Schematic Circuit Diagram

Frequency Ranges
Band A .... 540- 1,600 kc.
Band B .... 1,600- 5,500 kc.
Band C .... 5,500-18,000 kc.
Intermediate Frequency .... **460 kc.**

Alignment Frequencies
Band A .... 600 kc. (osc.), 1,400 kc. (osc., ant.)
Band B .... None required
Band C .... 18,000 kc. (osc., ant.)

Power Output (125 V. Line)
Undistorted .. 0.5 Watt (A-C) .... 0.4 Watt (D-C)
Maximum .... 1.2 Watts (A-C) .... 1.0 Watt (A-C)

Loudspeaker
Type .... Electrodynamic
Voice Coil Impedance .... 2.25 Ohms—400 Cycles

RCA MFG. CO., INC.

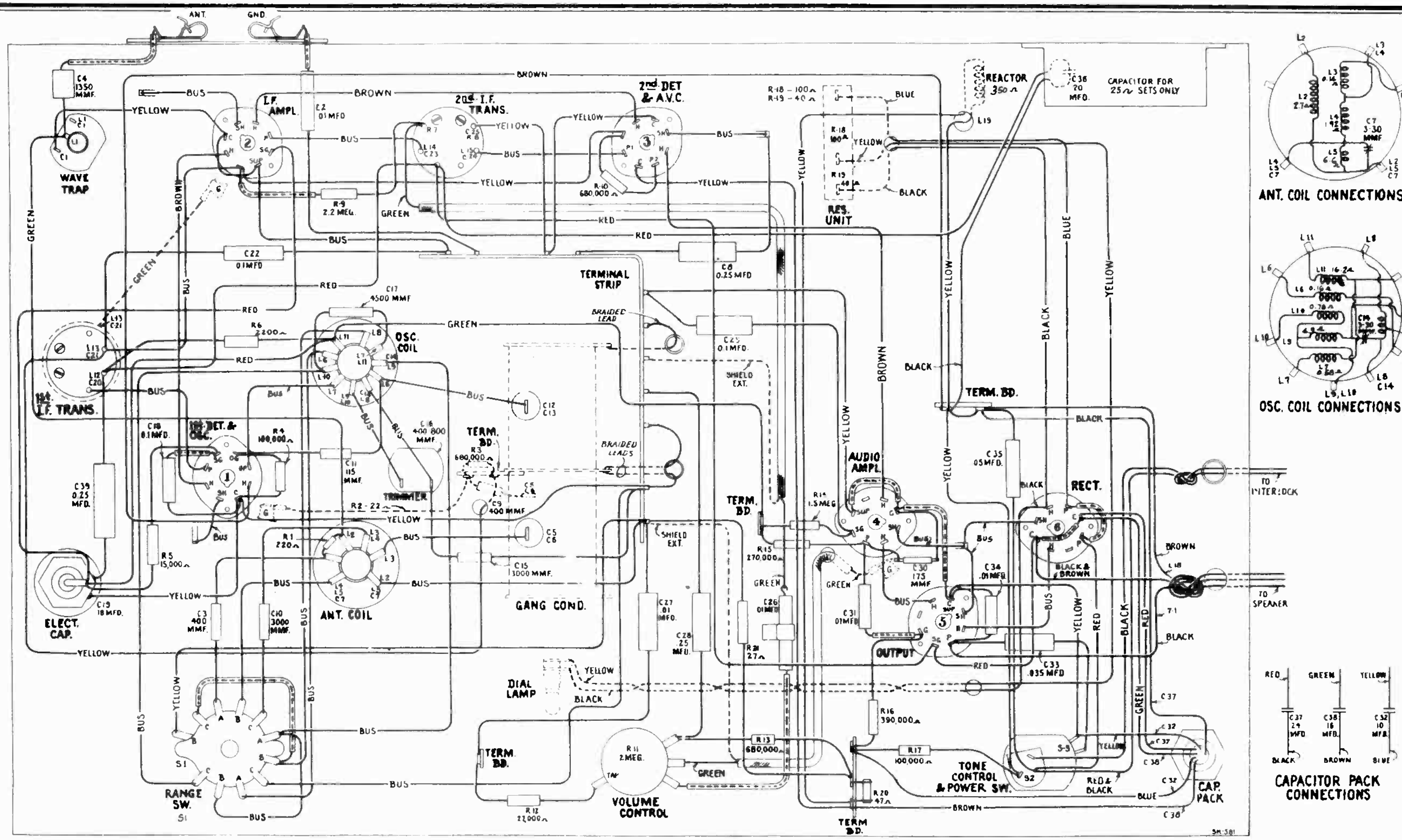


Figure 2—Chassis Wiring Diagram

Mechanical Specifications

Chassis Base Dimensions .... 12 inches x 7 inches x $2\frac{1}{2}$ inches
Tuning Drive Ratio .... 10-to-1 and 50-to-1

MODEL T 6-7		MODEL C 6-8	
Height	$19\frac{1}{8}$ inches	Height	$37\frac{1}{4}$ inches
Width	$13\frac{5}{8}$ inches	Width	$23\frac{1}{2}$ inches
Depth	$8\frac{1}{2}$ inches	Depth	11 inches
Weight (Net)	17 pounds	Weight (Net)	$39\frac{1}{2}$ pounds
Weight (Shipping)	22 pounds	Weight (Shipping)	54 pounds

MODELS T6-7,C6-8
Voltage,Socket
Trimmers,Loudspeaker

RCA MFG. CO., INC.

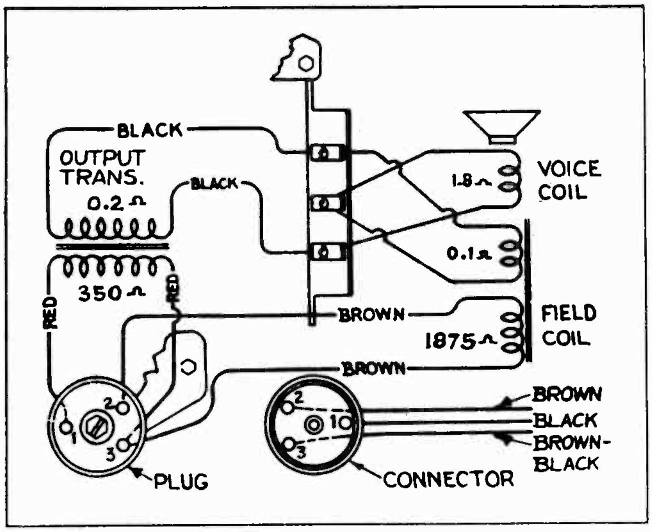


Figure 5—Loudspeaker Wiring

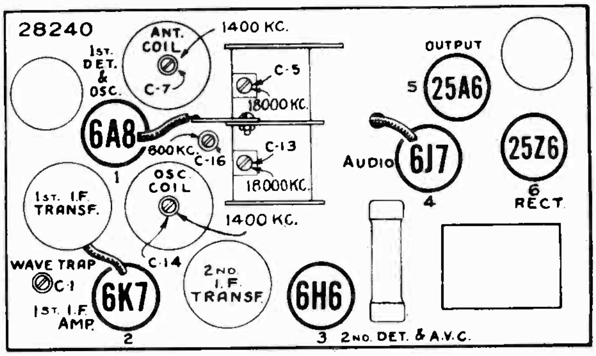


Figure 3—Radiotron, Coil and Trimmer Locations —R. F. Trimmer Adjustment

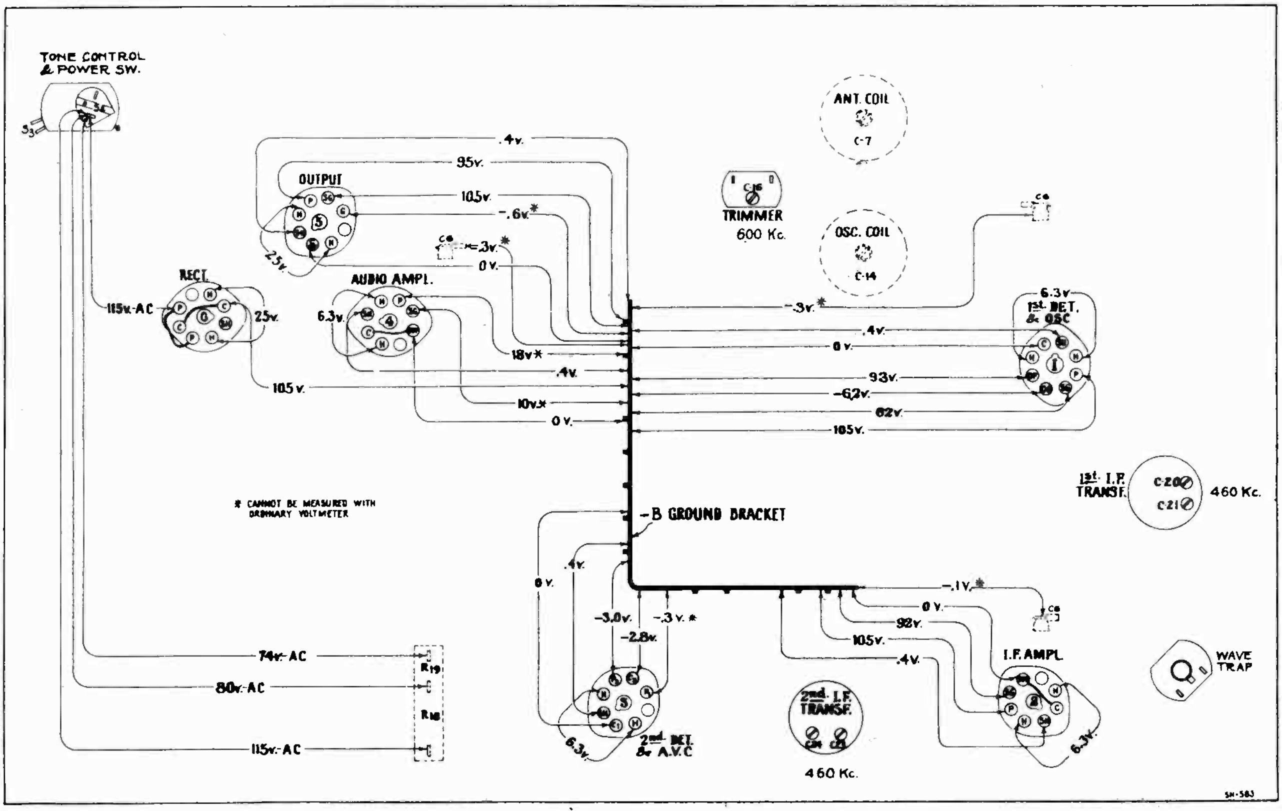


Figure 4—Radiotron Socket Voltages

Measured at 115 volts, 60-cycle supply—For 115 volt D-C approximately 5% lower

Tuned to approximately 900 kc. (Band A)—No Signal Being Received—Volume control set at minimum

NOTES

(1) Beat notes or heterodyning (whistles) may be encountered in some instances on these receivers due to excessive antenna capacitance. This condition may be corrected by reducing the size of the antenna or by inserting a 150 mmfd. capacitor in series with the antenna lead at the antenna terminal. Interference in the form of "beats" from a combination of local stations may frequently be remedied by tuning the wave trap to one of the interfering stations.

RCA MFG. CO., INC.

General Features

These two models each employ the same six-tube chassis. They have the new metallic tubes. The tuning range is from 540 to 18,000 kc. The coverage includes domestic broadcast, police, aircraft and amateur services, and also the important foreign short-wave broadcast bands at 49, 31, 25, 19 and 16 meters. Chassis features include automatic volume control, high-frequency tone control, antenna wave trap and audio tone compensation. The table model (T 6-7) uses an 8-inch dynamic speaker, and the console model (C 6-8) uses an improved 12-inch dynamic speaker. The tuning dial is an illuminated semi-airplane type. Positions of the range selector knob are marked on the control panel to show which tuning band is in use. The tuning control is of the dual-ratio type, which permits rough tuning through a 10-1 drive ratio and vernier tuning through a 50-1 drive ratio. The latter is especially advantageous for accurate tuning of the short-wave stations.

Circuit Arrangement

The conventional superheterodyne type of circuit, consisting of a combined first detector-oscillator stage, a single i-f stage, a diode detector-automatic volume control stage, an audio voltage amplifier stage, an audio power output stage and a half-wave rectifier power supply stage, is used.

Tuned Circuits

The antenna coil system consists of a single primary and three series-connected secondary windings to provide the three ranges of tuning. The oscillator coil system is similarly wound on a single form. A range selector switch (S-1) is used for connecting the various sections of these two coil systems into the circuit to provide operation on the band desired. The coils are tuned by a variable two-section gang condenser having trimmer capacitors in shunt with each section. There are additional trimmer capacitors across the section of each coil used for Band "A." A series trimmer is also associated with the Band "A" oscillator coil.

The intermediate frequency amplifier system consists of an RCA-6K7 in a transformer-coupled circuit. This stage operates at a basic frequency of 460 kc. Each winding of both i-f transformers (input and output) is tuned by an adjustable trimmer.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f stage is detected by an RCA-6H6 twin-diode tube. The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R-8, is applied as automatic control grid bias to the first detector and i-f tubes through a suitable resistance filter circuit. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R-8, R-9 and R-10, thereby maintaining the desired minimum operating bias on such tubes. As soon as the rectified signal current develops sufficient voltage across resistor R-8, in opposition to that across resistors R-20 and R-21, current ceases to flow in the auxiliary diode circuit and the signal A.V.C. diode takes over the biasing function.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector diode and the input grid of the audio voltage amplifier tube. This control has a tone compensating filter connected to it, so that the correct aural balance will be obtained at different volume settings.

Resistance-capacitance coupling is used between the first audio stage and the power output stage. The output of the power amplifier is transformer-coupled into the dynamic loudspeaker. High-frequency tone control is effected by a capacitor across the plate circuit of the output tube. This capacitor may be cut in or out of the circuit as desired by means of a switch (S-3).

Rectifier

The plate, grid, and cathode voltages required for the operation of this receiver are supplied by the RCA-25Z6 rectifier (plates and cathodes connected in parallel respectively) in series with the supply line operating as a half-wave rectifier. The field of the loudspeaker is connected across the input to the filter. The filter circuit consists of reactor L-19 and capacitors C-37 and C-38. An additional capacitance C-36 is connected in parallel with C-37 in models designed for 25-cycle operation.

The filaments of all six tubes are connected in series and are fed direct from the supply line, the voltage being dropped to the required value by resistors R-18 and R-19. The correct operating voltage for the pilot lamp is developed across resistor R-19. This voltage across the pilot lamp will be slightly high when the set is first turned on, but will quickly drop to a normal value as soon as the tube filaments reach their operating temperature.

SERVICE DATA

CAUTION: *Grid caps, tuning condenser, and resistor on top of chassis may be hot with respect to external ground and should be avoided when servicing, unless due precautions are taken.*

The various diagrams of this bulletin contain such information as will be needed to isolate causes for defective operation when such a condition develops. Ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the diagrams and the replacement parts list. Locating of the parts in the schematic circuit is facilitated by the fact that the numerical titles increase from left to right on the diagram. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only.

Alignment Procedure

Precise alignment is vital to the proper functioning of this receiver. There are four trimming adjustments provided in the i-f system, three in the oscillator coil system and two in the antenna coil system. These trimmers have been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions of climate, or have been altered for service purposes. Incorrect alignment is usually evidenced by loss of sensitivity, improper tone quality and poor selectivity. These indications will generally be present together.

The correct performance of the receiver can only be obtained when the alignment is performed with adequate and reliable test apparatus. The manufacturer of this instrument has a complete assortment of such service equipment available. This equipment may be purchased from authorized distributors and dealers.

An oscillator (signal generator) is required as a source of the specified alignment frequencies. Visual indication of receiver output during the adjustment is necessary to enable the serviceman to obtain an accuracy of alignment which is not possible by listening to the signal. The RCA Victor Stock No. 9595 Full Range Oscillator and the RCA Victor Stock No. 4317 Neon Output Indicator are especially suitable and fulfill the above requirements.

The following procedure should be followed in adjusting the various trimmer capacitors:

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 4. Each must be aligned to a basic frequency of 460 kc. To do this, attach the output indicator across the voice coil circuit or across the output transformer primary. Connect the output of the test oscillator through a .05 mfd. condenser to the RCA-6A8 control grid. Tune the oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator. Then adjust the two trimmers, C-23 and C-24, of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two trimmers, C-20 and C-21, of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to A.V.C. action will be avoided. It is advisable to repeat the adjustment of all i-f trimmers a second time to assure that the interaction between them has not disturbed the original adjustment.

R-F Trimmer Adjustments

The two trimmers, which are at all times directly in shunt with the variable tuning condenser, necessitate that the high-frequency range (Band C) be aligned first. The range selector switch should, therefore, be turned to its Band C position for the initial adjustment. The output indicator should be left connected to the output system and the volume control kept at maximum. Attach the output terminals of the test oscillator to the antenna and ground terminals of the receiver input.

Calibrate the dial by rotating the tuning control until the variable condenser plates are in their full mesh (maximum capacity) position and adjusting the dial pointer so that its end points to the **horizontal** graduation (approximately 530 kc.) at the low-frequency end of the Band A scale.

Proceed further as follows:

(a) Adjust the test oscillator to **18,000 kc.** and set the receiver tuning control to a dial reading of **18,000 kc.**

(b) Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the trimmer C-13 on the oscillator section of the variable condenser to the point at which it produces maximum indicated receiver output. Two points may be found, each of which produces such a maximum. The one of *maximum trimmer capacitance* is correct and should be used. (The oscillator will be 460 kc. below the signal frequency at this adjustment point.)

(c) Adjust the trimmer C-5 of the antenna section of the variable condenser, simultaneously rocking the receiver tuning control backward and forward through the **18,000 kc.** input signal, until maximum receiver output results from these combined operations. Rocking of the variable condenser will prevent inaccurate adjustment, which would otherwise be caused by the interaction between the heterodyne oscillator circuit and the antenna tuned circuit.

(d) Change the receiver range selector to its Band A position and set the receiver tuning control to a dial reading of **1400 kc.** Tune the test oscillator to this same frequency and regulate its output to produce a slight indication on the receiver output indicating device.

(e) Adjust the high-frequency trimmers of the Band A oscillator and antenna coils, C-14 and C-7 respectively, to the points at which each produces maximum indicated receiver output.

(f) Shift the test oscillator frequency to **600 kc.** and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(g) Tune the low-frequency trimmer C-16 of the oscillator Band A coil, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum indicated receiver output results from these combined operations. The adjustment of C-14 and C-7 should be corrected at **1400 kc.** to compensate for any changes caused by the adjustment of the low-frequency oscillator coil trimmer.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts and grid caps to –B ground bracket on Figure 4 will assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with set tuned to approximately 900 kc. (Band A) no signal being received and volume control at minimum. To duplicate the conditions under which the voltages were measured requires a 1000-ohm-per-volt d-c meter, having ranges of 10, 50 and 250 volts. Voltages below 10 read on 10-volt scale, between 10 and 50 on 50-volt scale, and between 50 and 250 on 250-volt scale. A-C voltages were measured with a corresponding a-c meter.

Wave Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference.

MODELS T6-7,C6-8 **RCA MFG. CO., INC.** Parts List

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	$0.43
11350	Cap—Grid contact cap—Package of 5	.20
11465	Capacitor—Adjustable capacitor—(C16)	.48
11291	Capacitor—115 Mmfd.—(C11)	.24
5116	Capacitor—175 Mmfd.—(C30)	.18
11290	Capacitor—400 Mmfd.—(C3, C9)	.25
11449	Capacitor—1350 Mmfd.—(C4)	.26
11622	Capacitor—3000 Mmfd.—(C10, C15)	.36
11287	Capacitor—4500 Mmfd.—(C17)	.30
5196	Capacitor—.035 Mfd.—(C33)	.18
4858	Capacitor—.01 Mfd.—(C2, C27, C31, C34)	.25
11395	Capacitor—.01 Mfd.—(C26)	.18
4886	Capacitor—.05 Mfd.—(C35)	.20
4840	Capacitor—0.25 Mfd.—(C28)	.30
5170	Capacitor—0.25 Mfd.—(C8, C35)	.25
4839	Capacitor—0.1 Mfd.—(C18)	.28
4841	Capacitor—0.1 Mfd.—(C22, C29)	.22
5212	Capacitor—18 Mfd.—(C19)	1.16
11821	Capacitor Pack—Comprising one 24 Mfd., one 16 Mfd., and one 10 Mfd. sections—(C32, C37, C38)	3.60
11617	Coil—Antenna coil—(L2, L3, L4, L5, C7, R1)	1.68
11618	Coil—Oscillator coil—(L6, L7, L8, L9, L10, L11, C14)	2.22
11612	Condenser—2-gang variable tuning condenser—(C5, C6, C12, C13)	3.80
11979	Connector—2-contact male connection plug	.30
11974	Dial—Station selector dial scale	.65
11613	Drive—Variable tuning condenser drive	1.00
11893	Indicator—Station selector indicator pointer	.28
4340	Lamp—Dial lamp—Package of 5	.60
11818	Reactor—Filter reactor—(L19)	1.85
11977	Resistor—Wire wound—Comprising one 100- and one 40-ohm section—(R18, R19)	$0.58
11624	Resistor—22 ohms—Flexible type—complete with contact cap—(R2)	.22
11955	Resistor—27 ohms—Carbon type—¼ watt—(R21)—Package of 5	1.00
11372	Resistor—47 ohms—Carbon type—¼ watt—(R20)—Package of 5	1.00
5159	Resistor—2,200 ohms—Carbon type—¼ watt—(R6)—Package of 5	1.00
3998	Resistor—15,000 ohms—Carbon type—¼ watt—(R5)—Package of 5	1.00
11400	Resistor—27,000 ohms—Carbon type—¼ watt—(R12)—Package of 5	1.00
3118	Resistor—100,000 ohms—Carbon type—¼ watt—(R4, R17)—Package of 5	1.00
11323	Resistor—270,000 ohms—Carbon type—¼ watt—(R15)—Package of 5	1.00
11847	Resistor—390,000 ohms—Carbon type—¼ watt—(R16)—Package of 5	1.00
11811	Resistor—680,000 ohms—Carbon type—¼ watt—(R10)—Package of 5	1.00
11980	Resistor—680,000 ohms—Carbon type—1/10 watt—(R3, R13)—Package of 5	.75
11981	Resistor—1.5 megohms—Carbon type—1/10 watt—(R14)—Package of 5	.75
11626	Resistor—2.2 megohms—Carbon type—¼ watt—(R9)—Package of 5	1.00
11603	Shield—Antenna or oscillator coil shield	.26
11390	Shield—Intermediate frequency transformer shield	.25
3529	Socket—Dial lamp socket	.32
11198	Socket—7-contact 6J7, 25Z6 or 25A6 Radiotron socket	.15
11196	Socket—8-contact 6H6, 6K7 or 6A8 Radiotron socket	.15

Stock No.	DESCRIPTION	List Price
11614	Spring—Coil spring for large gears on variable tuning condenser—Package of 10	.70
11975	Switch—Range switch—(S1)	$0.95
11460	Switch—Tone control and power switch—(S2, S3)	.95
5238	Terminal—Antenna terminal board with clip insulating strip and rivets	.14
11976	Terminal—Ground terminal clip assembly	.15
11388	Transformer—First intermediate frequency transformer—(L12, L13, C20, C21)	1.90
11389	Transformer—Second intermediate frequency transformer—(L14, L15, C23, C24, C25, R7, R8)	3.02
11391	Trap—Wave trap—(L1, C1)	1.22
11237	Volume control—(R11)	1.20
	REPRODUCER ASSEMBLIES CONSOLE MODEL	
11232	Board—Terminal board assembly	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11827	Coil—Field coil—(L18)	1.92
11469	Coil—Neutralizing coil—(L17)	.20
11258	Cone—Reproducer cone complete—(L16)—Package of 5	3.85
5118	Connector—Three-contact male connector for reproducer	.25
5119	Connector—Three-contact female connector for reproducer cable	.25
11828	Transformer—Output transformer—(T1)	1.46
11886	Washer—Spring washer—used to hold speaker field coil securely—Package of 5	.20
	REPRODUCER ASSEMBLIES TABLE MODEL	
11827	Coil—Field coil—(L18)	$1.92
11235	Cone—Reproducer cone—(L16)—Package of 5	3.50
5118	Connector—Three-contact male connector for reproducer	.25
5119	Connector—Three-contact female connector for reproducer cable	.25
11826	Reproducer complete	6.50
11828	Transformer—Output transformer—(T1)	1.46
	MISCELLANEOUS ASSEMBLIES	
11823	Cord—Power cord and connector assembly	.65
11376	Escutcheon—Station selector escutcheon and crystal	.70
11609	Knob—Range switch knob—Package of 5	.52
11973	Knob—Station selector knob assembly—comprising one large and one small knob—Package of 5	.90
11455	Knob—Volume control or tone control knob—Package of 5	.48
11210	Screw—Chassis mounting screw assembly for Console Model—Package of 4	.28
11377	Screw—Chassis mounting screw assembly for Table Model—Package of 4	.12
11348	Screw—8-32 x 7/16" headless cupped-point set screw for small knob in Stock No. 11973—Package of 10	.32
11349	Spring—Retaining spring for knobs—Stock No. 11455 and No. 11609—Package of 5	.15
4982	Spring—Retaining spring for large knobs—Stock No. 11973—Package of 10	.26

The prices quoted above are subject to change without notice.

Socket, Trimmers

RCA MFG. CO., INC.

MODELS T6-11, C6-12
Schematic, Voltage

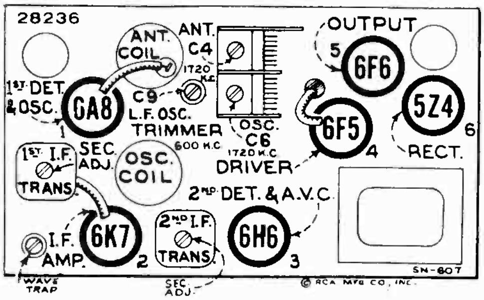
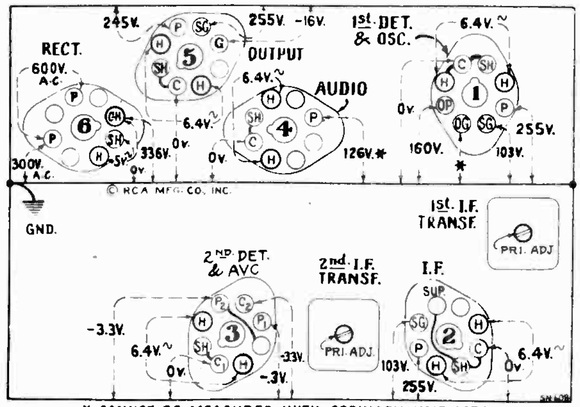


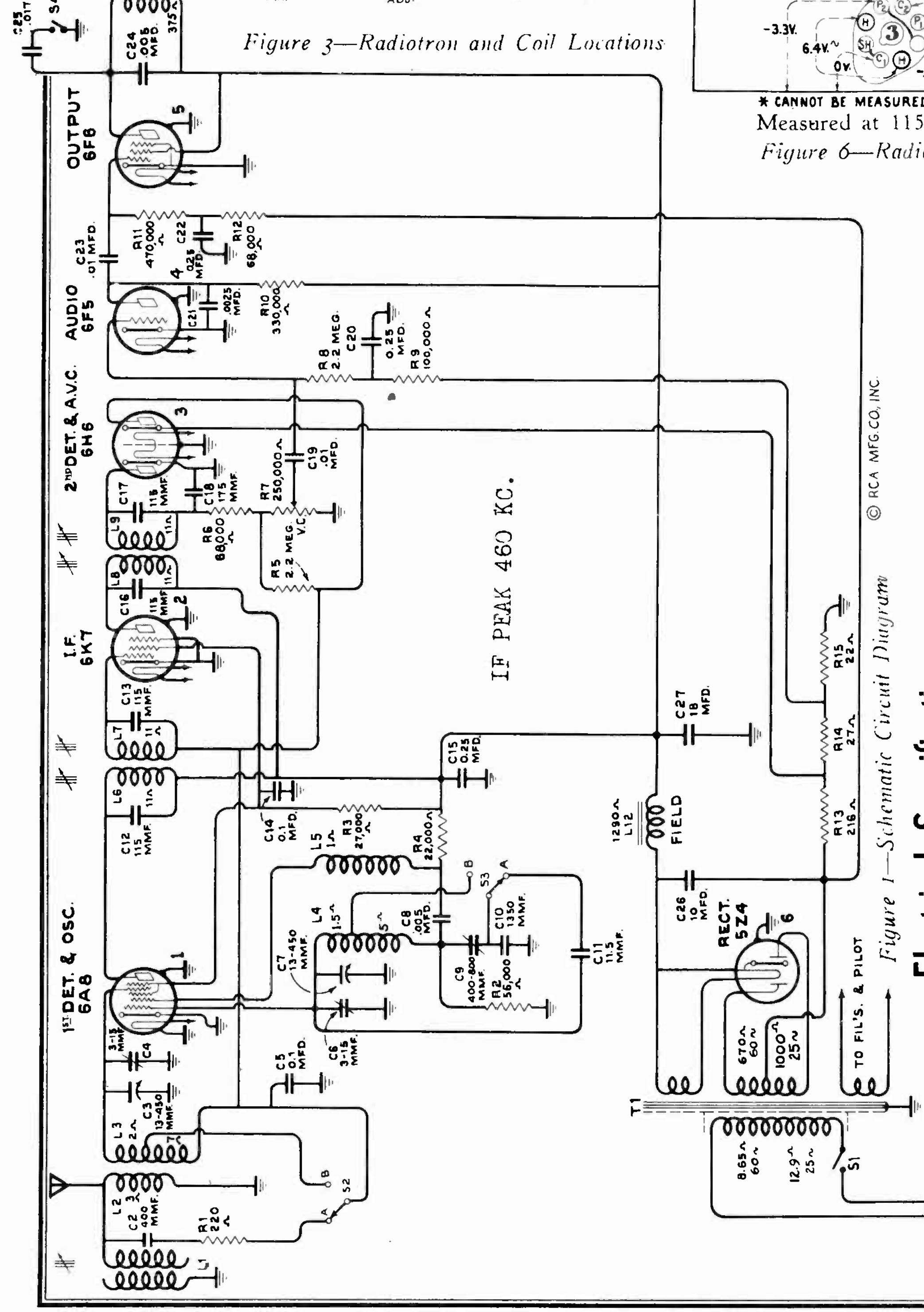
Figure 3—Radiotron and Coil Locations



* CANNOT BE MEASURED WITH ORDINARY VOLTMETER

Measured at 115 volts, 60 cycle supply

Figure 6—Radiotron Socket Voltages



© RCA MFG. CO., INC.

Figure 1—Schematic Circuit Diagram

Electrical Specifications

FREQUENCY RANGES

Broadcast Band (A) .... 540-1,850 kc.
Short-wave Band (B) .... 1,850-6,900 kc.

ALIGNMENT FREQUENCIES

Band (A) ...... 600 kc. (osc.), 1,720 kc. (osc., ant.)
Band (B) .... No Adjustments Required

POWER SUPPLY RATINGS

Rating A .... 105-125 Volts, 50-60 Cycles, 75 Watts
Rating B .... 105-125 Volts, 25-60 Cycles, 75 Watts
Rating C .... 100-130/140-160/195-250 Volts, 40-60 Cycles, 75 Watts

POWER OUTPUT RATINGS

Undistorted .... 2.0 Watts
Maximum .... 4.5 Watts

LOUDSPEAKER

Type .... Electrodynamic
Voice Coil Impedance .... 2.25 Ohms at 400 Cycles

MODELS T6-11, C6-12
Chassis Wiring

RCA MFG. CO., INC.

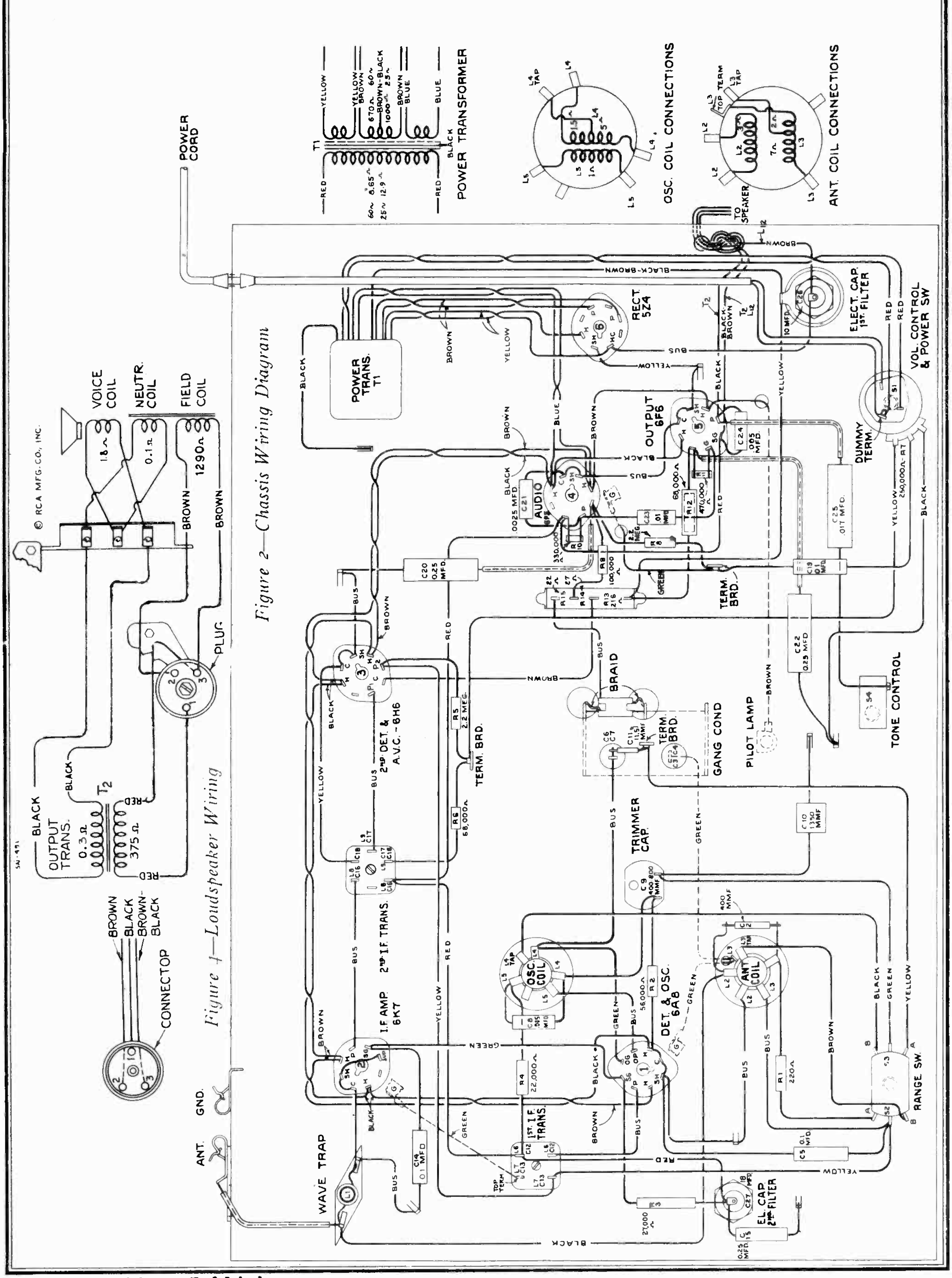


Figure 1—Loudspeaker Wiring

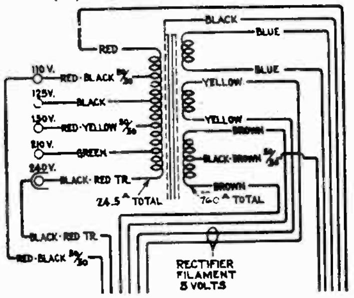
Figure 2—Chassis Wiring Diagram

RCA MFG. CO., INC.

MODELS T6-11, C6-12
Circuit Data, Alignment
Transformer Parts

General Features

These receivers each employ the same chassis and have many distinctive features. Model T6-11 employs an 8-inch dynamic loudspeaker and Model C6-12 employs a 12-inch dynamic loudspeaker.



An adjustable wave trap, in parallel with the antenna input, serves to suppress code interference which may be encountered in certain localities from intermediate frequency radio telegraph signals.

The first detector and oscillator functions are accomplished in a single tube, an RCA-6A8. The input of this tube is coupled to the antenna through a tuned transformer. A shunt (permeability tuned) wave trap is connected across the primary of this transformer to prevent signals of intermediate frequency (460 kc.) from being introduced into the first stage as interference. The two-section gang condenser, which tunes the antenna transformer secondary and the heterodyne oscillator coil, has adjustable trimmers for obtaining exact alignment. Each of these coils is tapped so that the range switch increases the range of tuning by decreasing the amount of inductance.

Circuit Arrangement

The intermediate frequency stage is coupled to the RCA-6A8 and to the RCA-6H6 by means of tuned transformers. These transformers resonate with fixed capacitors and are tuned by molded cores to 460 kc.

The modulated signal as obtained from the output of the i-f system is detected by an RCA-6H6 twin-diode tube. Audio frequency secured by this process is passed on to the a-f system for amplification and final reproduction. The d-c voltage, which results from detection of the signal, is used for automatic volume control. This voltage, which develops across the volume control resistor R-7, is applied as automatic control grid bias to the first detector and i-f tubes through a suitable resistance filter. The second diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This auxiliary diode, under such conditions, draws current which flows through resistors R-5 and R-7, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias diode ceases to draw current and the a.v.c. diode takes over the biasing function.

Manual volume control is effected by means of an acoustically tapered potentiometer connected as a variable coupling element between the output of the second detector and the first audio control grid. After amplification by the RCA-6F5, the audio signal is transmitted by resistance-capacitance coupling to the input of the RCA-6F6 power output stage, which, in turn, is transformer-coupled to the dynamic speaker. High-frequency tone control is provided by means of a shunt capacitor across the plate circuit of the output tube, which may be cut in or out of the circuit with a control switch (S-4).

The power supply system consists of an RCA-5Z4 rectifier tube which is supplied from an efficiently designed power transformer and which works into a suitable filter. The various potentials required for the plate, screen, control grid, and cathode circuits are obtained from the output of the filter. The electrodynamic loudspeaker field coil is used as a filter reactor.

SERVICE DATA

The various diagrams of this booklet contain such information as will be needed to isolate causes for defective operation when such develops. The ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Ratings of less than one ohm are generally omitted.

Alignment Procedure

There are three alignment trimmers provided in the antenna transformer and oscillator coil tuned circuits. The i-f transformer adjustments are made by means of screws attached to molded cores. All of these circuits have been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions or altered during servicing. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment.

The correct performance of this receiver can only be obtained when the aligning has been done with adequate and reliable apparatus. The manufacturer of this receiver has available, for sale through its distributors and dealers, a complete assortment of such service equipment as may be needed for the alignment operation.

An oscillator is required as a source of the specified alignment frequencies. Visual indication of receiver output during the adjustment is necessary and should be accomplished by the use of an indicator.

The following method of procedure should be followed in adjusting the various trimmer capacitors and molded cores:

I-F Core Adjustments

The four adjustment screws (attached to molded cores) of the two i-f transformers (one on top and one on bottom of each i-f transformer) are located as shown by Figures 3 and 6. Each circuit must be aligned to a basic frequency of 460 kc. To do this, attach the output indicator across the loudspeaker voice coil or across the output transformer primary. Connect the output of the test oscillator between the control grid of the RCA-6A8 and chassis ground. Tune the oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point, within its range, where no interference is encountered either from local broadcast stations or from the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is present on the output indicator. Then, adjust the two screws of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two screws of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i-f screws to assure that the interaction between them has not disturbed the original adjustment.

R-F Trimmer Adjustments

Calibrate the tuning dial by setting pointer to horizontal line at low-frequency end of broadcast band scale while variable condenser is at maximum capacity.

The output indicator should be left connected to the output system. Attach the output of the test oscillator between the antenna and ground terminals of the receiver input. Adjust the oscillator to 1,720 kc. and set the receiver tuning control to a dial reading of 1,720 kc. Leave the volume control of the receiver at its maximum position. Make sure that the range selector is at its broadcast position. Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the two trimmers, C-6 and C-4, of the oscillator and antenna transformer coils (mounted on the variable condenser) so that each produces maximum (peak) receiver output. After this maximum has been accurately obtained, shift the test oscillator to 600 kc. Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then, adjust the receiver oscillator series trimmer, C-9, simultaneously rocking the tuning control backward and forward through the signal until maximum receiver output results from these combined operations. The adjustment at 1,720 kc. should then be repeated to correct for any change which may have been caused by the oscillator series trimmer adjustment.

Radiotron Socket Voltages

Voltage values indicated at the Radiotron socket contacts on Figure 6 form a reference basis for test of the receiver. It is to be noted that all voltages are given with respect to chassis ground, excepting those appearing across the heaters (H-H). The values shown are obtainable when the receiver is in normal operating condition, with all tubes intact. They do not take into account inaccuracy caused by the resistance of the voltmeter used for the tests, the lower the voltmeter resistance the lower the degree of accuracy. Allowance must, therefore, be made, dependent upon the type of test instrument used, for the loading effect of the voltmeter on the circuit.

Wave-Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap screw (core) to the point which causes maximum suppression of the interference.

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	$0.43
11350	Cap—Grid contact cap—Package of 5	.20
11465	Capacitor—Adjustable capacitor—(C9)	.48
11450	Capacitor—11.5 Mmfd.—(C11)	.14
11998	Capacitor—115 Mmfd.—(C12, C13, C16, C17)	.28
11500	Capacitor—175 Mmfd.—(C18)	.18
4297	Capacitor—400 Mmfd.—(C2)	.30
11449	Capacitor—1,350 Mmfd.—(C10)	.26
5107	Capacitor—.0025 Mfd.—(C21)	16
4868	Capacitor—.005 Mfd.—(C8, C24)	.20
4858	Capacitor—.01 Mfd.—(C19, C23)	.25
11451	Capacitor—.017 Mfd.—(C25)	.18
4840	Capacitor—.25 Mfd.—(C20, C22)	.30
5170	Capacitor—.25 Mfd.—(C15)	.25
4841	Capacitor—.1 Mfd.—(C5)	.22
4835	Capacitor—.1 Mfd.—(C14)	.28
11240	Capacitor—10 Mfd.—(C26)	1.08
5212	Capacitor—18 Mfd.—(C27)	1.16
11462	Coil—Antenna coil—(L2, L3)	1.85
11463	Coil—Oscillator coil—(L4, L5)	1.65
11457	Condenser—2-gang variable tuning condenser—(C3, C4, C6, C7)	3.46
12006	Core—Adjustable core for wave trap stock No. 12005 and i-f transformer stock Nos. 12002 and 12003	.22
11583	Dial—Station selector dial scale	.40
12042	Drive—Vernier drive for tuning condenser stock No. 11457	.35
11467	Indicator—Station selector indicator pointer	.10
5226	Lamp—Dial lamp—Package of 5	.70
12004	Resistor—Voltage divider resistor—comprising one 216-ohm, one 27-ohm, and one 22-ohm sections—(R13, R14, R15)	.45
11174	Resistor—220 ohms—carbon type—¼ watt—(R1)—Package of 5	1.00
8070	Resistor—22,000 ohms—carbon type—½ watt—(R4)—Package of 5	1.00
12011	Resistor—27,000 ohms—carbon type—1 watt—(R3)—Package of 5	1.10
5029	Resistor—56,000 ohms—carbon type—¼ watt—(R2)—Package of 5	1.00
12009	Resistor—68,000 ohms—carbon type—¼ watt—(R12)—Package of 5	1.00
12010	Resistor—68,000 ohms—carbon type—1/10 watt—(R6)—Package of 5	.75
3118	Resistor—100,000 ohms—carbon type—¼ watt—(R9)—Package of 5	1.00
11297	Resistor—330,000 ohms—carbon type—1/10 watt—(R10)—Package of 5	.75
11452	Resistor—470,000 ohms—carbon type—1/10 watt—(R11)—Package of 5	.75
11626	Resistor—2.2 megohms—carbon type—¼ watt—(R5, R8)—Package of 5	1.00
11464	Shield—Antenna or oscillator coil shield	.25
12008	Shield—Intermediate frequency transformer shield for stock No. 12002 and 12003	[illegible]
8098	Socket—Dial lamp socket	.10
11195	Socket—5-contact 5Z4 Radiotron socket	$0.15
11198	Socket—7-contact 6K7, 6H6 or 6F5 Radiotron socket	.15
11196	Socket—8-contact 6A8 or 6F6 Radiotron socket	.15
12007	Spring—Retaining spring for adjustable core in stock Nos. 12002, 12003, 12005—Package of 10	.36
11461	Switch—Range switch—(S2, S3)	.56
12001	Switch—Tone control switch—(S4)	.30
5238	Terminal—Antenna terminal clip assembly	.14
12002	Transformer—First intermediate frequency transformer complete with shield—(L6, L7, C12, C13)	1.85
11999	Transformer—Power transformer, 105-125 volts, 50-60 cycles—(T1)	3.80
12132	Transformer—Power transformer, 105-125 volts, 25 to 50 cycles	5.48
12133	Transformer—Power transformer, 110-220 volts, 60 cycles	6.25
12003	Transformer—Second intermediate frequency transformer complete with shield—(L8, L9, C16, C17, C18)	2.05
12005	Trap—Wave trap—(L1)	1.20
12000	Volume control—Volume control and power switch—(R7, S1)	1.12
	MISCELLANEOUS ASSEMBLIES	
11455	Knob—Station selector, volume control, tone control or power switch knob—Package of 5	.48
11456	Screw—Chassis mounting screw assembly—for Model T6-11—Package of 2	.12
11586	Screw—Chassis mounting screw assembly—for Model C6-12—Package of 10	.22
11349	Spring—Retaining spring for knob stock No. 11455—Package of 5	.15
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board assembly with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
12012	Coil—Field coil—(L12)	1.85
11469	Coil—Neutralizing coil—(L10)	.20
11235	Cone—Reproducer cone—(L11)—Package of 5—(Table Model)	3.50
11258	Cone—Reproducer cone—(L11)—Package of 5—(Console Model)	3.85
5118	Connector—3-contact male connector for reproducer	.25
5119	Connector—3-contact female connector for reproducer cable	.25
9638	Reproducer complete—(Table Model)	6.50
9639	Reproducer complete—(Console Model)	6.95
11253	Transformer—Output transformer—(T2)	1.56
11886	Washer—Spring washer used to hold field coil securely—Package of 5	.20

The prices quoted above are subject to change without notice.

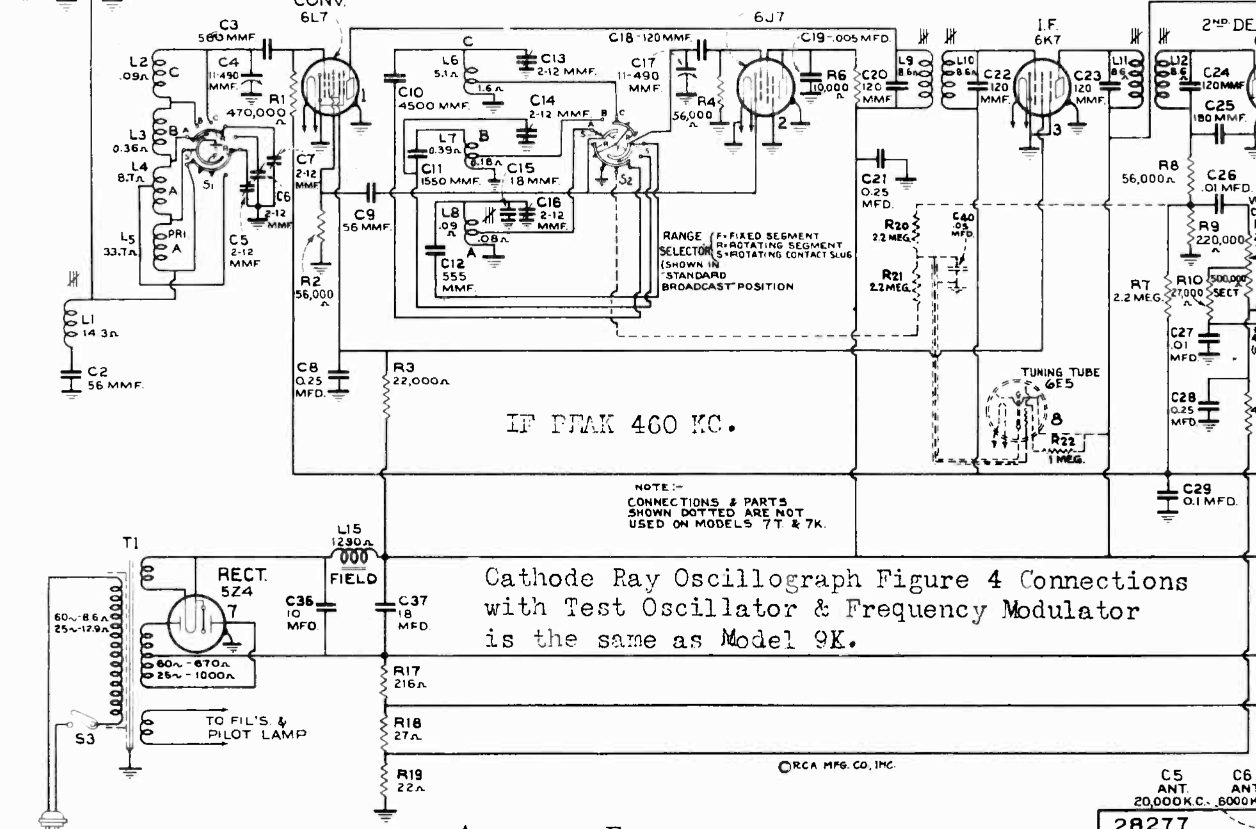
MODELS 7T, 7K, 8T, 8K
Schematic, Socket

RCA MFG. CO., INC.

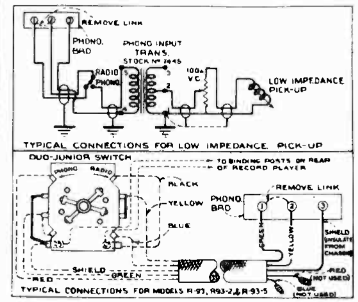
Trimmers, Phono.

Figure 1—Schematic Circuit Diagram

(* 470,000-ohm resistor not required when replacing volume control with Stk. No. 13144)



Cathode Ray Oscillograph Figure 4 Connections with Test Oscillator & Frequency Modulator is the same as Model 9K.



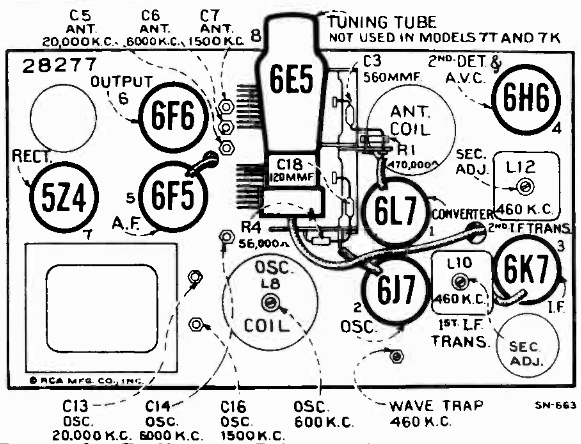


Figure 3—Radiotron, Coil, and Trimmer Locations

Alignment Frequencies

"Standard Broadcast"	600 kc (osc.), 1,500 kc (osc., ant.)
"Medium Wave"	6,000 kc (osc., ant.)
"Short Wave"	20,000 kc (osc., ant.)
Intermediate Frequency	460 kc

Power-Supply Ratings

Rating A	105-125 volts, 50-60 cycles, 80 watts
Rating B	105-125 volts, 25-60 cycles, 80 watts
Rating C	100-130/140-160/195-250 volts, 40-60 cycles, 80 watts

Pilot Lamps (3).....
.Mazda No. 46, 6.3 volts,
0.25 amperes

Power Output

Undistorted	2 watts
Maximum	4.5 watts

Loudspeaker

Type	Electrodynamic
Impedance (V.C.)	2.2 ohms at 400 cycles

RCA MFG. CO., INC.

MODELS 7T, 7K, 8T, 8K
Chassis Wiring

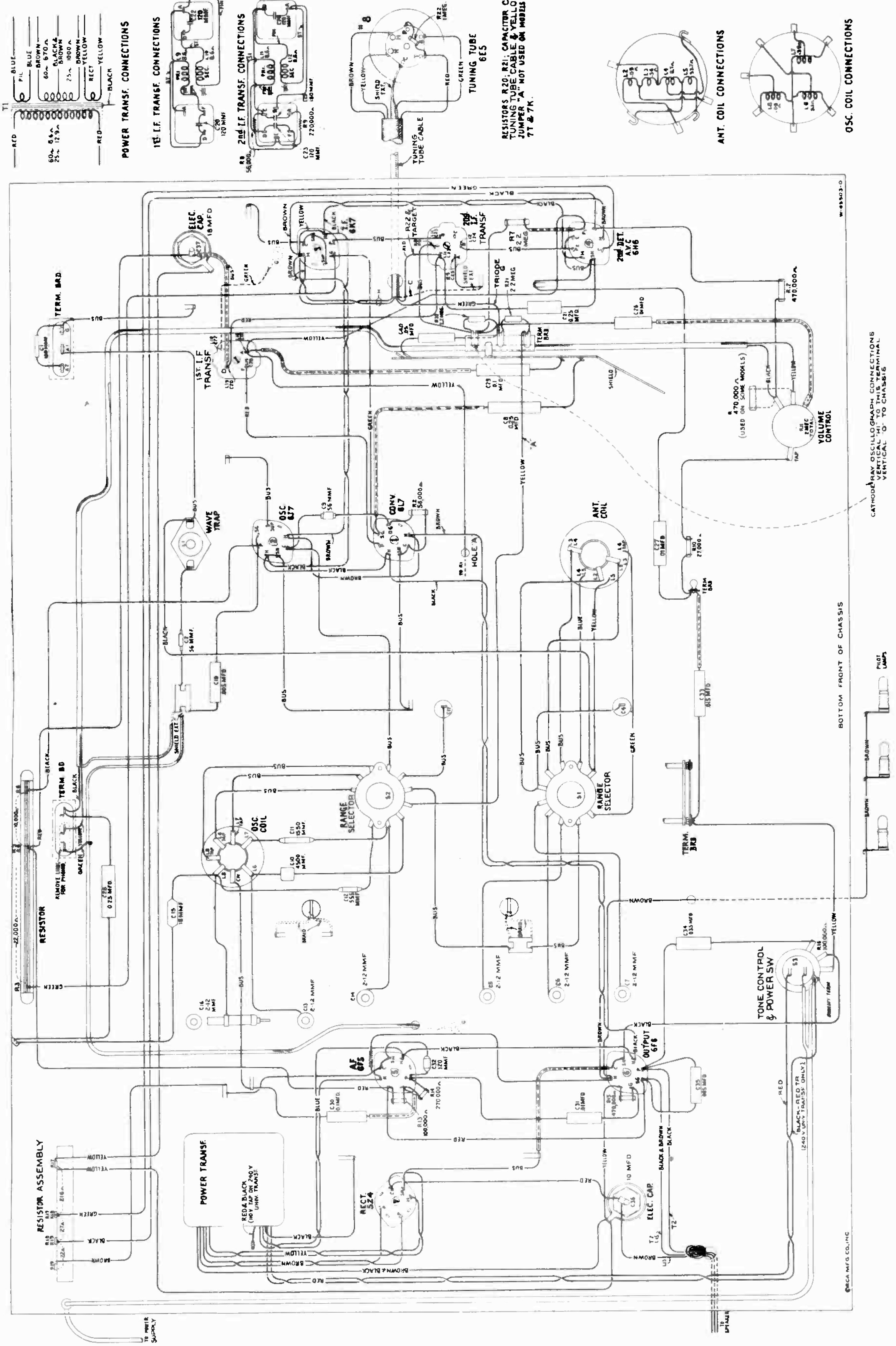


Figure 2—Chassis Wiring Diagram

RCA MFG. CO., INC.

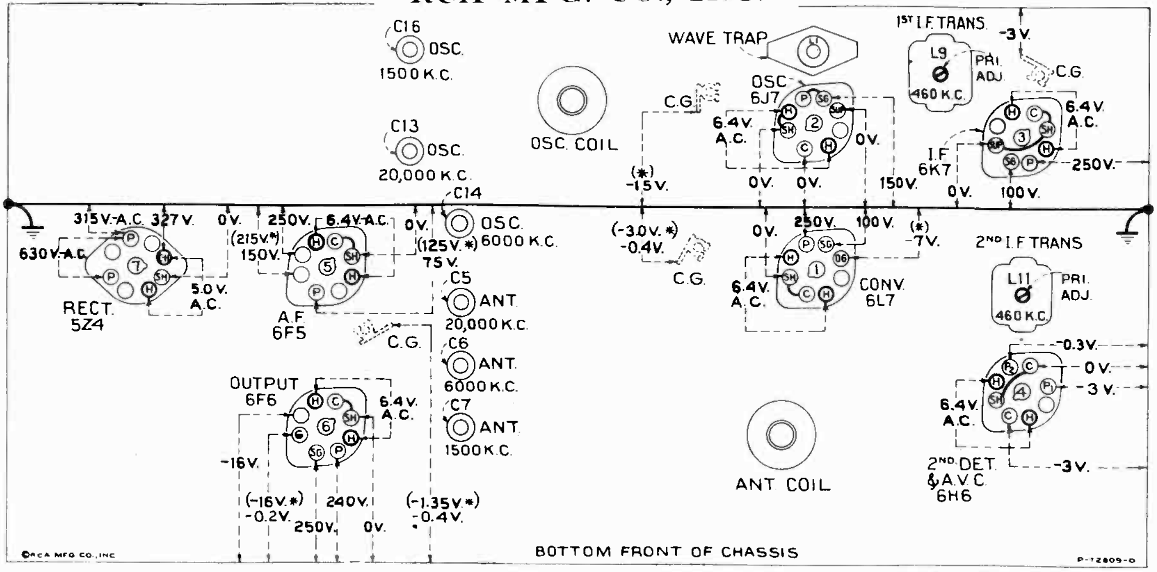
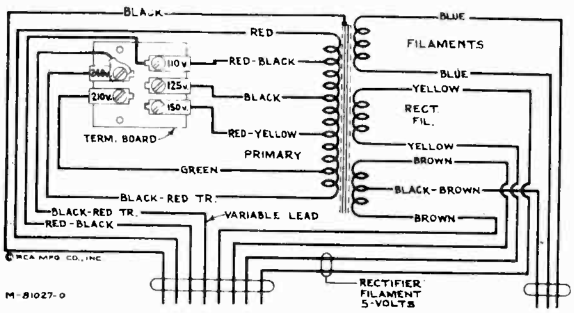


Figure 7—Radiotron Socket Voltages, Coil, and Trimmer Locations

Measured at 115 volts, 60-cycle supply—Tuned to approximately 1,000 kc—No signal being received—Volume control minimum

Radiotron Socket Voltages

Note: *Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.*



Primary resistance—24.5 ohms total
Secondary resistance—668 ohms total

Figure 8—Universal Transformer

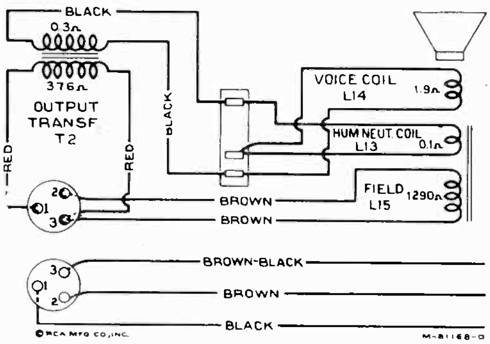
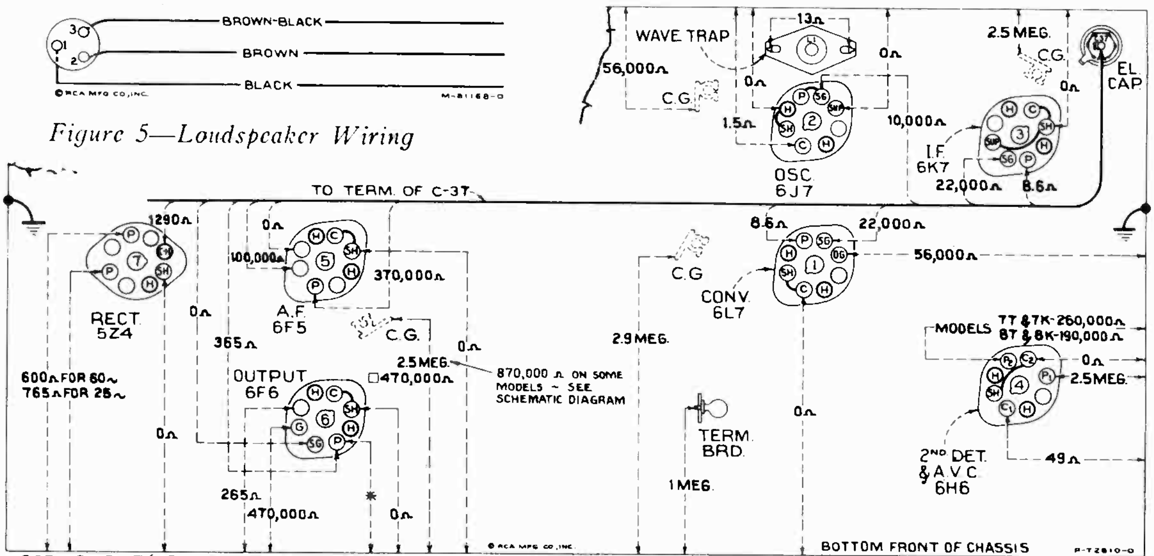


Figure 5—Loudspeaker Wiring



*OPEN CIRCUIT (LEAKAGE OF ELECTROLYTIC CAPACITORS ONLY) □ VOLUME CONTROL IN "MINIMUM" POSITION

Figure 6—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full-mesh—Range selector in "Standard broadcast" position—Volume control maximum

MODELS 7T, 7K, 8T, 8K
Circuit Data
Alignment. Part 1

RCA MFG. CO., INC.

General Description

These receivers represent the result of thorough development, design, and substantial manufacture. Noteworthy technical improvements have been applied in achieving marked advantages of operation and efficiency of performance.

Model 7T is a seven-tube, table-type, superheterodyne receiver with an eight-inch electrodynamic loudspeaker. Model 7K differs from the Model 7T in that it is of the console type and has a twelve-inch electrodynamic loudspeaker.

Models 8T and 8K are similar to Models 7T and 7K respectively, except for the addition of a tuning tube "Magic Eye" and different cabinet designs.

Design features incorporated in these receivers include: built-in doublet antenna coupler; improved plunger-type air-dielectric adjustable trimming capacitors in the antenna and oscillator coil circuits; high-efficiency first detector (converter) with separate oscillator; magnetite core adjusted i-f transformers, low-frequency oscillator tracking, and wave-trap; aural compensated volume control; continuously variable tone control with music-voice switch; automatic volume control; phonograph terminal board; band selective indication of dial scales; and a dust-proof electrodynamic loudspeaker.

The tuning range is continuous through the "Standard broadcast," "Medium wave," and "Short wave" bands. This extensive range includes the important short-wave broadcast bands at 49, 31, 19, 16, and 13 meters in addition to channels assigned for police, amateur, and aviation communication. Trimming adjustments are located at accessible points. Their number is reduced to the least that is consistent with efficient operation. A double tuning knob arrangement permits the choice of either a ten-to-one or a fifty-to-one dial ratio, the latter permits ease of tuning, especially in the "Medium wave" and "Short wave" bands.

Circuit Arrangement

The conventional type of superheterodyne circuit is used. It consists of a first-detector (converter) stage, separate oscillator stage, a single i-f stage, a diode-detector — automatic-volume-control stage, an audio voltage-amplifier stage, a pentode power-output stage, and a full-wave rectifier stage. Models 8T and 8K also have a tuning indicator "Magic Eye."

A single-wire antenna, or a doublet antenna, when connected to the proper input terminals of the receiver, is coupled to control grid No. 1 of the RCA-6L7 through a tuned r-f transformer. This transformer is tapped so that the range selector increases the range of tuning by decreasing the amount of inductance. A unique method of switching causes L5 to become the primary with L4, L3, and L2 as secondary, L4 to become the primary with L3 and L2 as secondary, and L3 to become the primary with L2 as secondary, for range selector positions "Standard broadcast," "Medium wave," and "Short wave" respectively. Separate windings are employed in the oscillator stage for each position of the range selector. All unused portions of the antenna and oscillator coils are shorted out to prevent undesirable interaction. Air-dielectric trimming capacitors are used for obtaining exact alignment. Proper low-frequency tracking of the oscillator for "Standard broadcast" is accomplished by adjusting the inductance of the respective coil with a molded magnetite core.

The intermediate-frequency amplifier consists of an RCA-6K7 in a transformer-coupled circuit. The windings of these transformers are resonated with fixed capacitors, and are adjusted by molded magnetite cores (both primary and secondary) to tune to 460 kc.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f stage is detected by an RCA-6H6 twin-diode tube. The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R9, is applied as automatic control-grid bias to the first-detector and i-f tubes. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R7 and R9, thereby maintaining the desired operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current and the a.v.c.-diode takes over the biasing function.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector diode and the input grid of the audio voltage-amplifier tube. This control has a tone-compensating filter connected to it so that the correct aural balance will be obtained at different volume settings. Phonograph terminals are inserted at this point for feeding the output of an external phonograph pickup to the control grid of the audio amplifier. Resistance-capacity coupling is used between the first-audio stage and the power-output stage. The power-output stage is transformer-coupled to the electrodynamic loudspeaker. Continuously-variable tone control is effected by means of capacitor C34 and variable resistor R16 shunting the plate circuit of the output tube. Extreme clockwise rotation of this tone control disconnects the resistor R16 from the circuit and places an additional capacitor C33 in shunt with capacitor C27, thereby reducing the low-frequency response of the amplifier. This point is known as the "Speech" position and provides optimum intelligibility of speech.

Tuning Indicator (Models 8T and 8K only)

An RCA-6E5 cathode-ray tuning tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal. This tube consists of an amplifier section and a cathode-ray section built in the same glass envelope. Maximum sensitivity of the tuning indicator is acquired in the "Short wave" position of the range selector S2 by removing the ground connection from resistor R21. In this position, resistors R20 and R21 no longer act as a voltage divider and maximum voltage is applied to the grid of the tuning tube.

SERVICE DATA

Alignment Procedure

There are eight adjustments required for the alignment of the antenna, oscillator, and wave-trap tuned circuits. Six of these adjustments are made with plunger-type air trimming capacitors, and require the use of an **RCA Stock No. 12636 adjusting tool.** The other two adjustments are screws attached to molded magnetite cores and are used to adjust the wave-trap and to align the oscillator at **600 kc.** Before adjusting the plunger-type air trimmers, they must be unlocked by loosening their hexagon lock nuts. The lock nuts should be tightened upon completion of adjustments.

The i-f transformer adjustments are made by means of four screws attached to molded magnetite cores.

All of the adjustable circuits of this receiver have been properly aligned at the factory to give correct performance, and their settings should remain intact indefinitely when the receiver is used under ordinary conditions. However, necessity for re-adjustment may occasionally occur from continued extremes of temperature, climate, tampering, or purported alteration for services, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the impairment of sensitivity, selectivity, and tone quality. Such conditions will generally exist simultaneously.

In re-adjusting the tuned circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as an **RCA Stock No. 9595,** will be required as the source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. Two indication methods are applicable—one requires use of the cathode-ray oscillograph, and the other requires a voltmeter or glow-type indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave image which represents the resonance characteristics of the circuits being tuned. This type of alignment is possible through use of apparatus such as the **RCA Stock No. 9558 Frequency Modulator** and the **RCA Stock No. 9545 Cathode-Ray Oscillograph.** The output indicator method should be performed with an instrument such as the **RCA Stock No. 4317 Neon Glow Indicator.** The two procedures are outlined as follows:

Cathode-Ray Alignment

Make alignment apparatus connections shown on figure 4. Remove the plug of the frequency modulator cable from the test oscillator jack. Connect the receiver chassis to a good external ground. Connect oscillograph "Vertical" input terminals as indicated on figure 2. Set oscillograph power switch to "On" and adjust "Intensity" and "Focus" controls to give a clearly defined spot, or line, on the screen. Set oscillograph "Ampl. A" switch to "On," "Vertical gain" control full-clockwise, "Ampl. B" switch to "Timing," "Range" switch to No. 2 position, and "Timing" switch to "Int." Place the "Sync." control, "Freq." control, and "Horizontal gain" control to about their mid-positions. For each of the following adjustments, the test oscillator output must be regulated so that the image obtained on the oscillograph screen will be of the minimum size for accurate observation. The receiver volume control setting is optional.

I-F Adjustments

(a) Connect the "Ant." output of the test oscillator to the grid cap of RCA-6K7 (with grid lead in place) through a **.001-mfd.** capacitor, with "Gnd." to receiver chassis. Tune the test oscillator to **460 kc,** place its modulation switch to "On" and its output switch to "Hi."

(b) Turn on the receiver and test oscillator. Increase the output of the test oscillator until a deflection is noticeable on the oscillograph screen. The figures obtained represent several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave image formed (400-cycle waves) to be spread completely across the screen by adjusting the "Horizontal gain" control. The image should be synchronized and made to remain motionless by adjusting the "Sync." and "Freq." controls.

(c) Adjust the two magnetite core screws (see figures 3 and 7) of the second i-f transformer (one on top and one on bottom) to produce maximum vertical deflection of the oscillographic image. This adjustment places the transformer in exact resonance with the **460-kc** signal.

(d) The sweeping operation should follow using the frequency modulator. Shift the oscillograph "Timing" switch to "Ext." Insert plug of frequency modulator cable in test oscillator jack. Turn the test oscillator modulation switch to "Off." Turn on the frequency modulator and place its sweep-range switch to "Hi."

(e) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. If only one wave appears, increase the "Freq." control on the oscillograph to obtain two waves. These waves will be identical in shape, totally disconnected, and appear in reversed positions. They will have a common base line, which is discontinuous. Adjust the "Freq." and "Sync." controls of the oscillograph to make them remain motionless on the screen. Continue increasing the test oscillator frequency until these forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will be obtained at a test oscillator setting of **approximately 575 kc.**

(f) With the images established as in (e), re-adjust the two magnetite core screws on the second i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(g) Without altering the adjustments of the apparatus, shift the "Ant." output of the test oscillator to the input of the i-f system, i.e., to the RCA-6L7 first-detector grid cap through a **.001-mfd.** capacitor (with grid lead in place). Regulate the test oscillator output so that the amplitude of the oscillographic image is approximately the same as used above for adjustment (f).

(h) The two first i-f transformer magnetite core screws (one on top and one on bottom) should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

Calibrate the pointer of the tuning dial by adjusting it to the extreme low-frequency end of dial scale (beyond 55 on dial) with the plates of the gang tuning condenser in full mesh. Alignment must be made in the sequence of "Short wave" band, "Medium wave" band, "Wave-trap," and "Standard broadcast" band.

"Short Wave" Band

(i) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" through a **300-ohm** resistor. Remove the plug of the frequency modulator cable from the test oscillator. Turn test oscillator modulation switch to "On." Shift the oscillograph "Timing" switch to "Int."

(j) Set receiver range selector to its "Short wave" position and dial pointer to **20,000 kc.** Adjust the test oscillator to **20,000 kc.** Set oscillator air trimmer **C13** to minimum capacity (plunger full out), and antenna air trimmer **C5** to maximum capacity (plunger full in). Slowly push in oscillator trimmer **C13** until maximum (peak) amplitude of output is reached. Two peaks may be found. Adjust C13 to the peak with minimum capacity (plunger near out) for maximum indication. Tighten lock nut. Slowly pull out plunger of antenna air trimmer **C5** until maximum (peak) amplitude of output is reached while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacity (plunger near in) should be used. Tighten lock nut.

"Medium Wave" Band

(k) Place receiver range selector to its "Medium wave" position with the receiver dial pointer set to **6,000 kc.** Tune the test oscillator to **6,000 kc.** Carefully adjust the oscillator and antenna air trimmers **C14** and **C6** respectively, so that each brings about maximum (peak) amplitude of output as shown by the wave on the oscillograph. When adjusting the oscillator trimmer **C14,** two peaks may be found. The one of minimum capacitance (plunger near out) should be used. Tighten lock nuts.

"Wave-Trap" Adjustment

(l) Connect the output of the test oscillator to the antenna terminal "A1" through a **200 mmfd. (important)** capacitor. Place receiver range selector in "Standard broadcast" position. Set the receiver dial to a position of no extraneous signals **near 600 kc.** Tune the test oscillator to **460 kc.** Adjust the wave-trap magnetite core screw to the point which causes minimum amplitude of output (maximum suppression of signal) as shown by the wave on the oscillograph. An increase of the test-oscillator output may be necessary before this point of minimum amplitude, obtained by correct adjustment of wave-trap screw, becomes apparent on oscillograph screen.

"Standard Broadcast" Band

(m) Reduce output of test oscillator to minimum. Set receiver dial pointer to **600 kc.** Tune the test oscillator to **600 kc** and increase its output until a deflection is noticeable on the oscillograph screen.

(n) Adjust oscillator magnetite core screw (top of oscillator coil) so that maximum (peak) amplitude of output is shown on the oscillograph screen.

(o) Set receiver dial pointer to **1,500 kc.** Set the test oscillator to **1,500 kc** (1,500-3,100-kc range) and increase its output to produce a registration on the oscillograph. Carefully adjust the oscillator and antenna air trimmers C16 and C7 respectively so that each brings about maximum (peak) amplitude of output as shown by the waves on the oscillograph. Shift the oscillograph "Timing" switch to "Ext." Place the frequency modulator sweep-range switch to "Lo" position and insert plug of the frequency modulator cable in test oscillator jack. Turn test oscillator modulation switch to "Off." Retune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test oscillator setting of **approximately 1,680 kc.** Adjust the trimmers C16 and C7 again, setting each to the point which produces the best coincidence and maximum amplitude of the images.

(p) Remove the plug of the frequency modulator cable from test oscillator jack. Turn test oscillator modulation switch to "On." Set oscillograph "Timing" switch to "Int." Tune test oscillator to **200 kc.** (200-400-kc range). Tune receiver for maximum response to this signal at a dial reading of **approximately 600 kc.** Third harmonic of **200 kc** is used for this adjustment. Shift oscillograph "Timing" switch to "Ext." Insert the plug of the frequency modulator cable in test oscillator jack. Turn test oscillator modulation switch to "Off." Retune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen. This will occur at a test oscillator setting of **approximately 230 kc.** Disregarding the fact that the two images may come together, adjust the oscillator magnetite core screw (top of oscillator coil) to produce maximum amplitude of images. Shift oscillograph "Timing" switch to "Int." Remove the plug of the frequency modulator cable from the test oscillator. Turn test oscillator modulation switch to "On." Repeat adjustment (o), and then lock C16 and C7.

Output Indicator Alignment

Attach the output indicator across the loudspeaker voice-coil circuit. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test oscillator output so that the signal level is as low as possible and still be observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the "Ant." output of the test oscillator to the grid cap of the RCA-6L7 (with grid lead in place) through a **.001-mfd.** capacitor, with "Gnd." to receiver chassis. Tune the test oscillator to **460 kc,** place its modulation switch to "On" and its output switch to "Hi."

(b) Adjust the two magnetite core screws of the second i-f transformer (one on top and one on bottom), to produce maximum (peak) output.

(c) The two first i-f transformer magnetite core screws (one on top and one on bottom) should be adjusted to produce maximum (peak) output

MODELS 7T,7K,8T,8K
Alignment,Part 2
Parts List

RCA MFG. CO., INC.

It is advisable to repeat the adjustment of all i-f magnetite core screws to assure that the interaction between them has not disturbed the original adjustments.

R-F Adjustments

Calibrate the pointer of the tuning dial by adjusting it to the extreme low-frequency end of dial scale (beyond 55 on dial) with the plates of the gang tuning condenser in full mesh. Alignment must be made in sequence of "Short wave" band, "Medium wave" band, "Wave-trap", and "Standard broadcast" band.

"Short Wave" Band

(d) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" through a **300-ohm** resistor, leaving the "Gnd." of the oscillator connected to the receiver chassis.

(e) Place range selector to its "Short wave" position. Set receiver dial pointer to **20,000 kc.** Adjust test oscillator to **20,000 kc.** Set oscillator air trimmer C13 to minimum capacity (plunger full out), and antenna air trimmer C5 to maximum capacity (plunger full in). Slowly push in oscillator trimmer C13 until maximum (peak) output is reached. Two peaks may be found. Adjust C13 to the peak with minimum capacity (plunger near out) for maximum indication. Tighten lock nut. Slowly pull out plunger of antenna air trimmer C5 until maximum (peak) output is reached while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacity (plunger near in) should be used. Tighten lock nut.

"Medium Wave" Band

(f) Place the receiver range selector to its "Medium wave" position, with the receiver dial pointer set to **6,000 kc.** Tune test oscillator to **6,000 kc.** Carefully adjust the oscillator and antenna air trimmers C14 and C6 respectively, so that each brings about maximum (peak) output. When adjusting the oscillator trimmer C14, two peaks may be found. The one of minimum capacitance (plunger near out) should be used.

"Wave-Trap" Adjustment

(g) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" through a **200 mmfd. (important)** capacitor. Place the range selector to its "Standard broadcast" position and set the receiver dial pointer to a position of no extraneous signals near **600 kc.** Tune the test oscillator to **460 kc.** Adjust the wave-trap magnetite core screw to the point which causes minimum output (maximum suppression of signal). An increase of the test-oscillator output may be necessary before the point of minimum output, obtained by adjustment of wave-trap screw, becomes apparent on the output indicator.

"Standard Broadcast" Band

(h) Reduce output of test oscillator to a minimum. Tune the test oscillator to **600 kc** and set receiver dial pointer to **600 kc.** Adjust output of test oscillator until a slight indication of output is visible.

(i) Adjust the oscillator magnetite core screw (top of oscillator coil) so that maximum (peak) output results.

(j) Set receiver dial pointer to **1,500 kc.** Tune the test oscillator to **1,500 kc.** Carefully adjust the oscillator and antenna air trimmers C16 and C7 respectively so that each brings about maximum (peak) output.

(k) Tune the test oscillator to **600 kc.** Tune the receiver to pick up this signal disregarding the dial reading at which it is best received. Adjust oscillator magnetite core screw (top of oscillator coil) for maximum (peak) output while rocking gang tuning condenser. After completing this adjustment, the trimmers C16 and C7 should be re-adjusted as in (j) to correct for any change in the oscillator high-frequency tuning which has been caused by the preceding adjustment.

Antenna and Ground Terminals

These receivers are equipped wih an antenna-ground terminal board having three terminals. These terminals are marked "A2," "A1," and "G," the latter being the ground terminal and should always be connected to a good external ground. The transmission line leads of the RCA RK-40A antenna system should be connected to terminals "A2" and "A1." The receiver coupling units of the RCA RK-40 and the RCA Spider-Web antenna systems should be connected to terminals "A1" and "G." Connect a single-wire antenna to terminal "A1."

Phonograph Terminal Board

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. Typical methods of connecting a low-impedance pickup, or the RCA Victor Models R-93, R-93-2, and R-93-[illegible] Record Players are shown on the Schematic Diagram (figure 1).

RADIOTRON COMPLEMENT

(1) RCA-6L7 .... First Detector
(2) RCA-6J7 .... Oscillator
(3) RCA-6K7 .... Intermediate Amplifier
(4) RCA-6H6 .... Second Detector and A.V.C.
(5) RCA-6F5 .... Audio Voltage Amplifier
(6) RCA-6F6 .... Power Output
(7) RCA-5Z4 .... Full-Wave Rectifier
(8) RCA-6E5 (Models 8T and 8K only) Tuning Tube

FREQUENCY RANGES

"Standard Broadcast" .... 530- 1,800 kc
"Medium Wave" .... 1,800- 6,300 kc
"Short Wave" .... 6,300-22,000 kc

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
12706	Arm—Hub and arm complete for operating shutter (located on range switch shaft)	.22
12716	Board—Antenna and ground terminal board	.20
12717	Board—Phonograph terminal board	.22
5237	Bushing—Variable capacitor mounting bushing assembly—Package of 3	.43
12730	Cable—Shielded cable approximately 14½-in. long—volume control to phono terminal board	.40
11625	Cable—Tuning tube cable and socket complete (Models 8T and 8K)	1.26
12511	Cap—Grid contact cap—Package of 5	.15
11315	Capacitor—.015 Mfd. (C33)	.20
12670	Capacitor—.035 Mfd. (C34)	.20
4836	Capacitor—.05 Mfd. (C40) (Models 8T and 8K)	.30
4841	Capacitor—0.1 Mfd. (C29)	.22
11414	Capacitor—0.1 Mfd. (C30)	.20
4840	Capacitor—0.25 Mfd. (C28)	.30
5170	Capacitor—0.25 Mfd. (C8, C21)	.20
11240	Capacitor—10 Mfd. (C36)	1.08
5212	Capacitor—18 Mfd. (C37)	1.16
12708	Coil—Antenna coil and shield (L2, L3, L4, L5)	2.04
12709	Coil—Oscillator coil and shield (L6, L7, L8)	2.02
12701	Condenser—2-gang variable tuning condenser (C4, C17)	4.00
5119	Connector—3-contact female connector for speaker cable	.25
12711	Core—Adjustable core and stud for Stock No. 12709	.16
12006	Core—Adjustable core and stud for Stock No. 12652 and 12653	.22
12664	Core—Adjustable core and stud for Stock No. 12654	.22
12703	Dial—Station selector dial scale	.80
12702	Drive—Vernier drive for tuning capacitor	.68
12712	Indicator—Station selector indicator pointer	.22
5226	Lamp—Indicator dial lamp 6.3 volt—Package of 5	.70
12718	Mask—Dial light diffuser complete with red, orange and green colored screen	.40
12738	Resistor—27,000 ohms, insulated, ¼ watt—Package of 5 (R10)	1.00
11282	Resistor—56,000 ohm, carbon type 1/10 watt—Package of 5 (R8)	.75
12286	Resistor—56,000 ohm, carbon type, ¼ watt—Package of 5 (R2)	1.00
11282	Resistor—56,000 ohm, carbon type, 1/10 watt—Package of 5 (R4)	.75
11281	Resistor—100,000 ohm, carbon type, 1/10 watt—Package of 5 (R13)	.75
11398	Resistor—220,000 ohm, carbon type, 1/10 watt—Package of 5 (R9)	.75
11453	Resistor—270,000 ohm, carbon type, 1/10 watt—Package of 5 (R14)	.75
11452	Resistor—470,000 ohm, carbon type, 1/10 watt—Package of 5 (R1, R15)	.75
12285	Resistor—470,000 ohm, insulated, ¼ watt—Package of 5 (R12)	1.00
12013	Resistor—1 meg., carbon type, 1/10 watt—Package of 5 (R22) (Models 8T and 8K)	.75
11626	Resistor—2.2 meg., carbon type, ¼ watt—Package of 5 (R7, R20, R21)	1.00
12004	Resistor—Voltage divider comprising one 216 ohm, one 27 ohm and one 22 ohm sections (R17, R18, R19)	.45
12715	Resistor—Wire wound comprising one 22,000 ohm and one 10,000 ohm sections (R3, R6)	.56
4669	Screw—No. 8-32 set screw for arm Stock No. 12706—Package of 10	[illegible]
12651	Shield—Coil shield for Stock No. 12708	[illegible]
12710	Shield—Coil shield for Stock No. 12709	.28
12735	Shield—Dial lamp shield—Package of 5	[illegible]
12008	Shield—I.F. transformer shield for Stock No. 12652 and 12653	[illegible]
12581	Shield—Shield top for I.F. transformer Stock No. 12653	.56
12607	Shield—Shield top for I.F. transformer Stock No. 12652	.30
12704	Shutter—Dial scale holder and shutter assembly for band indicator	.58
12714	Capacitor—Adjustable capacitor (C5, C6, C7, C13, C14, C16)	.38
12722	Capacitor—18 Mmfd. (C15)	.20
12723	Capacitor—56 Mmfd. (C9)	.20
12726	Capacitor—56 Mmfd. (C2)	.20
12724	Capacitor—120 Mmfd. (C18, C32)	.28
12404	Capacitor—120 Mmfd. (C20, C22, C23, C24)	.26
12725	Capacitor—150 Mmfd. (C1)	.28
12406	Capacitor—180 Mmfd. (C25)	.26
12727	Capacitor—555 Mmfd. (C12)	.20
12537	Capacitor—560 Mmfd. (C3)	.20
12729	Capacitor—1,550 Mmfd. (C11)	26
12728	Capacitor—4,500 Mmfd. (C10)	.36
4868	Capacitor—.005 Mfd. (C19, C35)	.20
4858	Capacitor—.01 Mfd. (C26, C27, C31)	.25
11195	Socket—5-contact 5Z4 radiotron socket	.15
11198	Socket—7-contact 6J7, 6K7 or 6L7 radiotron socket	.15
11196	Socket—8-contact 6F5, 6F6, 6H6, radiotron socket	.15
11222	Socket—Dial lamp socket	.18
11381	Socket—Tuning tube socket and cover (Models 8T and 8K)	.45
12007	Spring—Retaining spring for core Stock No. 12006, 12664 and 12711—Package of 10	.36
12849	Spring—Tension spring for band indicator shutter link—Package of 5	.18
12707	Switch—Range switch (S1, S2)	1.64
12668	Tone Control—Control and operating switch (R16, S3)	1.22
12652	Transformer—First I.F. transformer complete (L9, L10, C20, C22)	1.60
11999	Transformer—Power transformer 105-125 volts, 60 cycle (T1)	3.80
12132	Transformer—Power transformer 105-125 volts, 25 cycle (T1)	5.48
12133	Transformer—Power transformer 100-250 volts, 60 cycle (T1)	6.25
12653	Transformer—Second I. F. transformer complete (L11, L12, C23, C24, C25, R8, R9)	2.06
12654	Trap—Wave trap complete (L1)	.75
13144	Volume Control—Control and operating switch (R11)	1.00
	REPRODUCER ASSEMBLIES	
12641	Board—Reproducer terminal board	.15
12640	Bracket—Output transformer mounting bracket	.18
12012	Coil—Field coil (L15)	1.85
11469	Coil—Neutralizing coil (L13)	.20
12642	Cone—Reproducer cone and dust cap (L14) (Models 7T an 8T)	.94
12667	Cone—Reproducer cone and dust cap (L14) (Models 7K and 8K)	1.00
5118	Connector—3-contact male connector for speaker cable	.25
12666	Cover—Speaker cover (Models 7K and 8K)	65
9696	Reproducer Complete—(Models 7K and 8K)	6.90
9699	Reproducer Complete—(Models 7T and 8T)	6.38
11253	Transformer—Output transformer (T2)	1.56
11886	Washer—Spring washer to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
11996	Bracket—Tuning tube mounting bracket (Models 8T and 8K)	.22
12698	Crystal—Station selector crystal and escutcheon	1.02
12742	Escutcheon—Tuning tube escutcheon (Models 8T and 8K)	.22
12699	Knob—Large tuning knob—Package of 5	.68
11582	Knob—Tone control knob—Package of 5	.50
12700	Knob—Vernier tuning knob (small)—Package of 5	.58
11347	Knob—Volume control or range switch knob—Package of 5	.75
11377	Screw—Chassis mounting screw assembly for Table Model—Package of 4	.12
11210	Screw—Chassis mounting screw assembly for Console Model—Package of 4	.28
4982	Spring—Retaining spring for knob Stock No. 12699—Package of 10	.26
11349	Spring—Retaining spring for knob Stock No. 11347, 11582 and 12700—Package of 5	15

Prices quoted above are subject to change without notice.

Chassis Wiring

RCA MFG. CO., INC.

MODEL 7U
Schematic

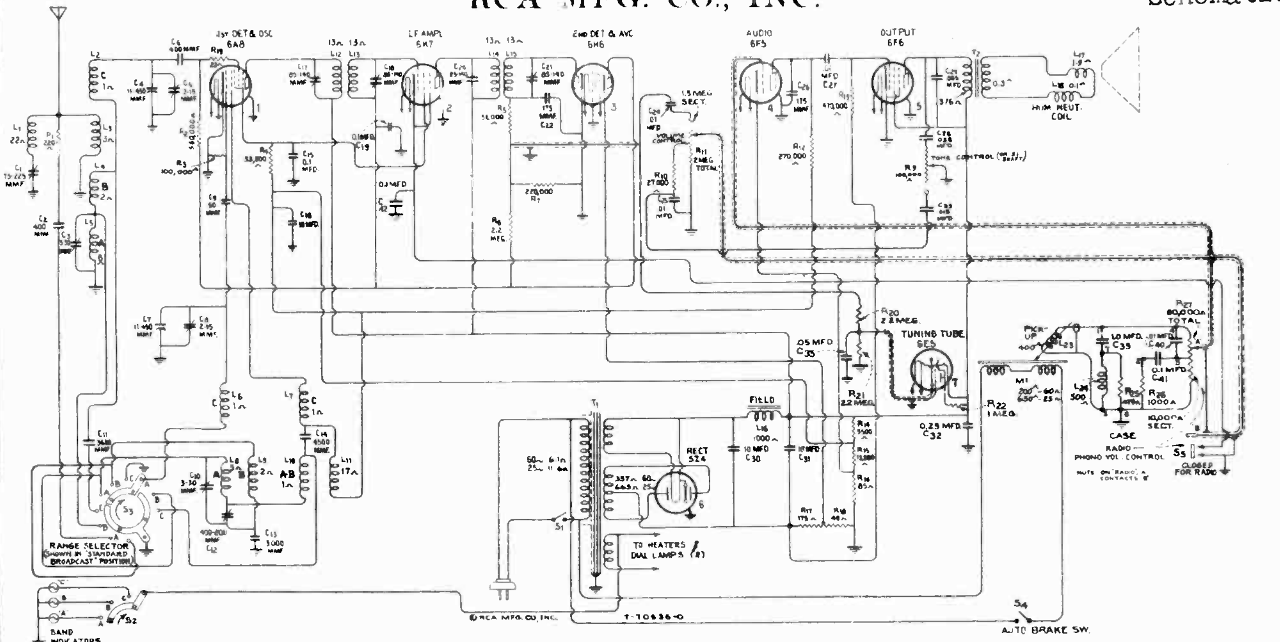


Figure 1—Schematic Circuit Diagram

Electrical Specifications

FREQUENCY RANGES

"Standard broadcast" (A) .... 540- 1,625 kc.

"Medium wave" (B) ....1,625- 5,700 kc.

"Short wave" (C) ....5,700-18,000 kc.

ALIGNMENT FREQUENCIES

"Standard broadcast" (A) . . .600 kc. (osc.), 1,400 kc. (osc. and ant.)

"Medium wave" (B) ....None required

"Short wave" (C) ....15,000 kc. (osc. and ant.)

Intermediate Frequency ....460 kc.

POWER OUTPUT

Undistorted ....2.0 watts

Maximum ....4.5 watts

LOUDSPEAKER

Type ....Electrodynamic

Impedance (v.c.) ....2.2 ohms at 400 cycles

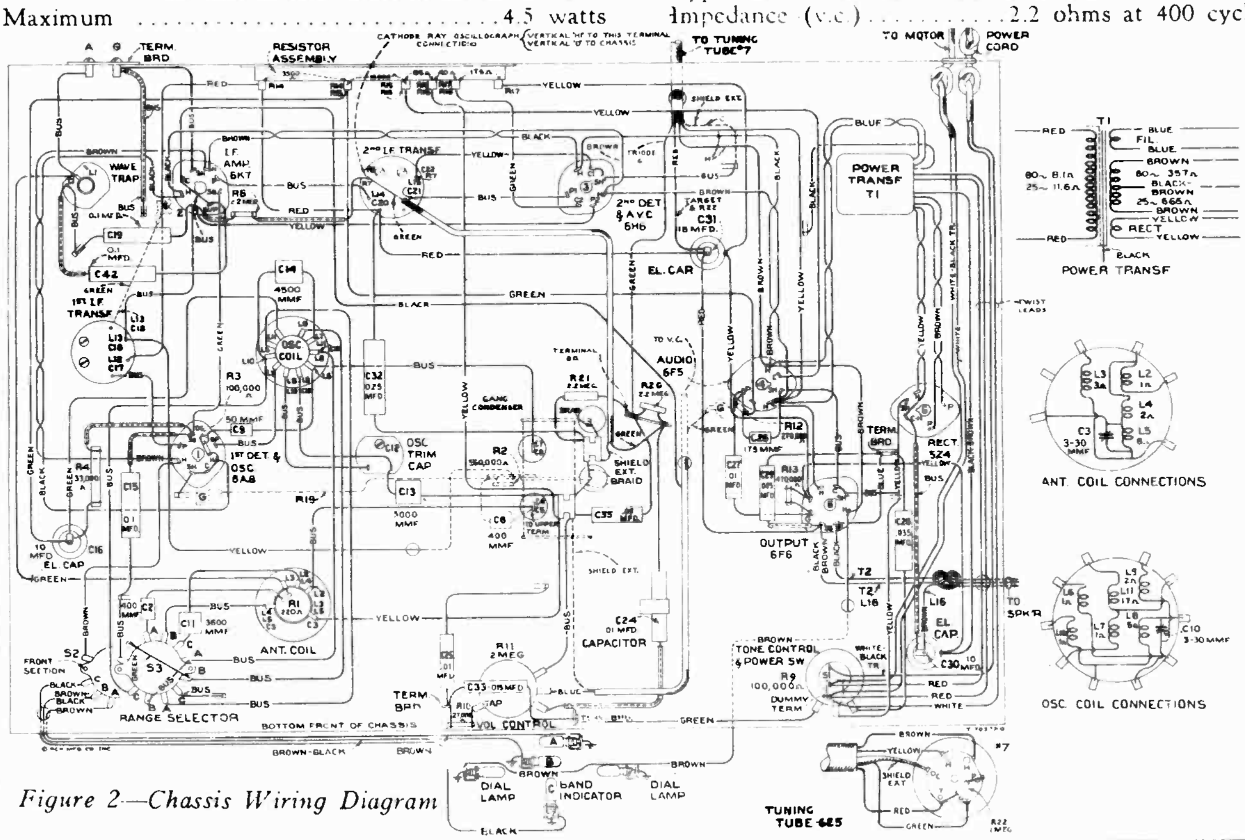


Figure 2—Chassis Wiring Diagram

RCA MFG. CO., INC.

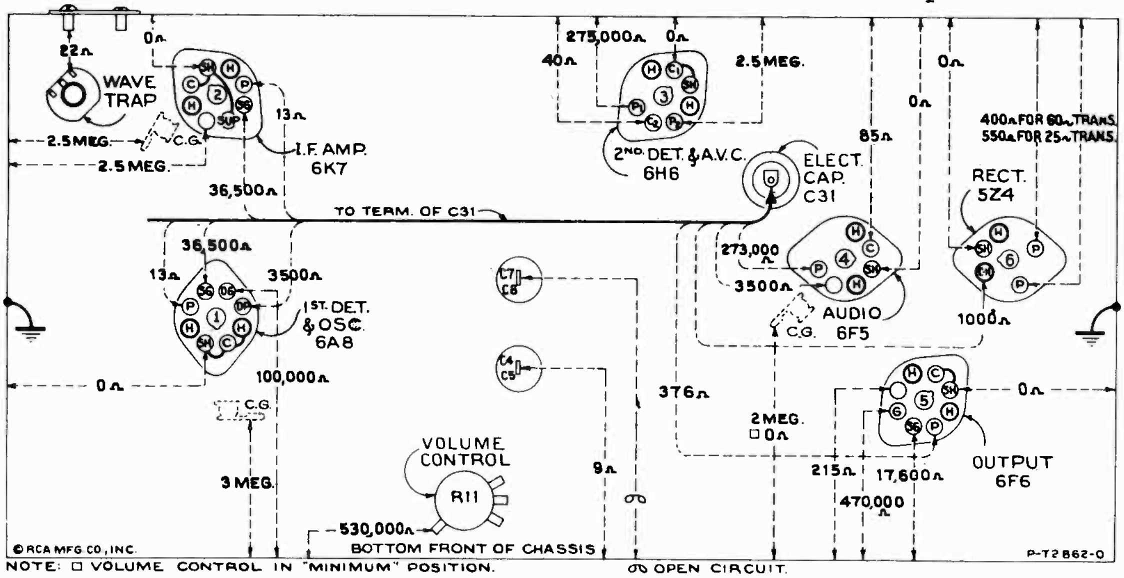


Figure 4—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full mesh
Range selector "Standard broadcast"—Radio-Phono-volume "Radio"—Radio volume control maximum

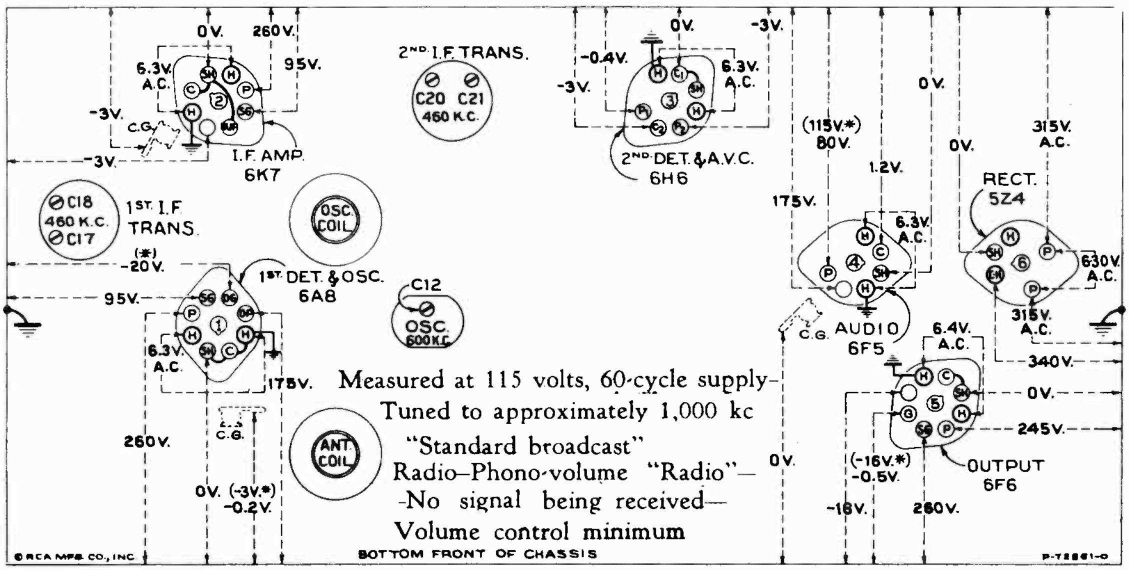
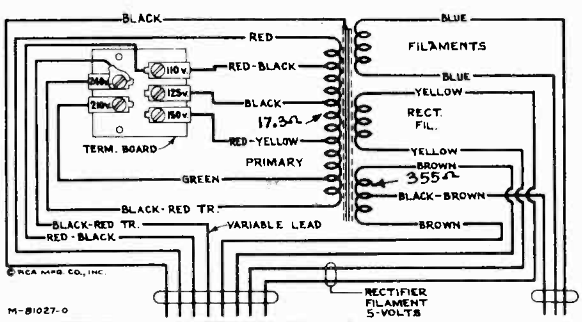


Figure 7—Radiotron Socket Voltages, Coil, and Trimmer Locations

Note: *Two voltage values are shown for some readings. The higher value shown in parentheses with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.*



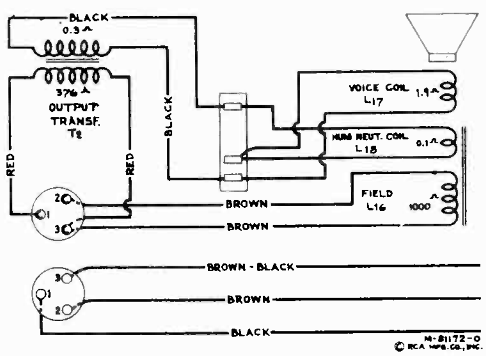


Figure 6—Loudspeaker Wiring

RCA MFG. CO., INC.

MODEL 7U
Motor Board
Adjustments

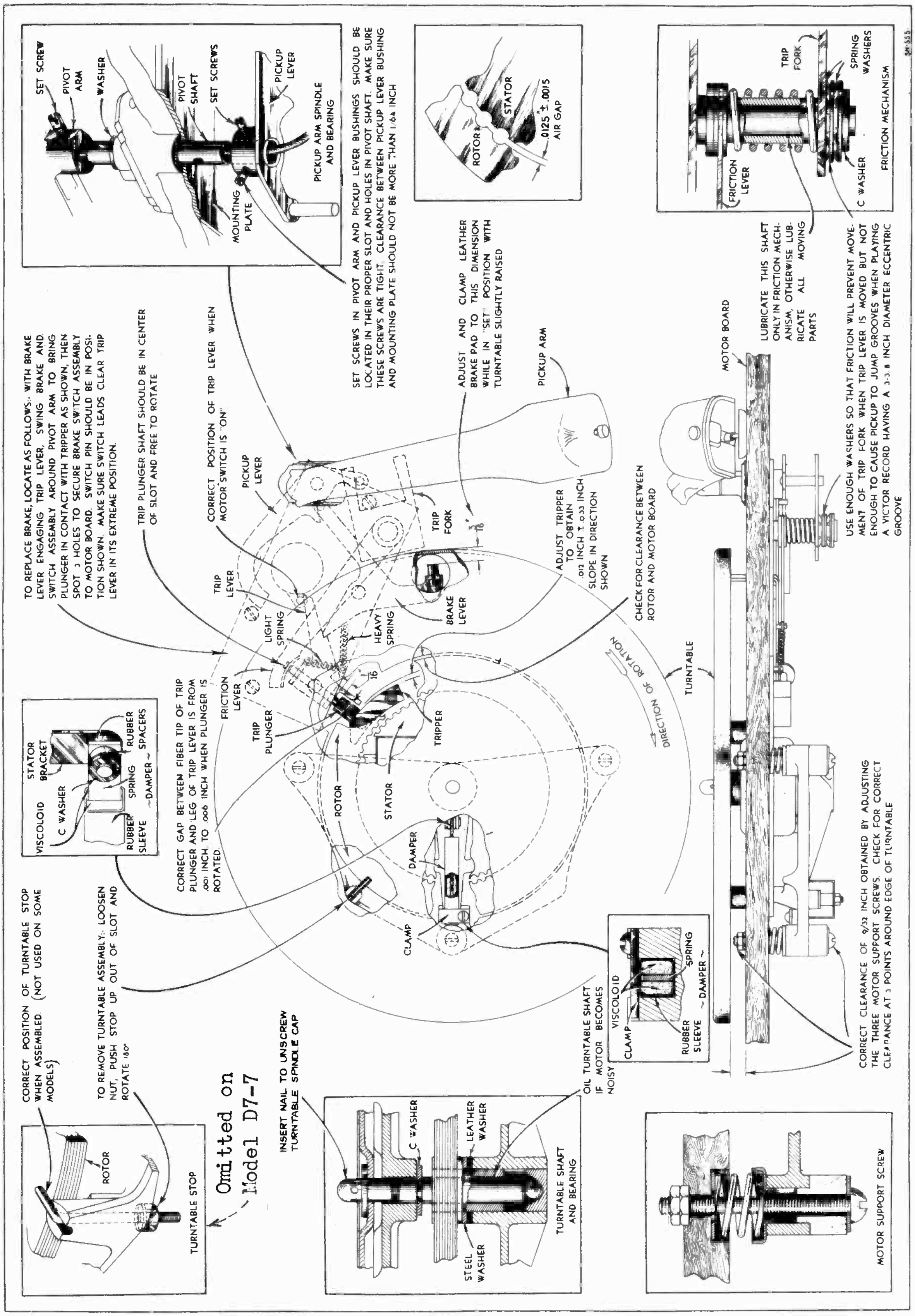


Figure 8—Motor Board Adjustments

MODEL 7U
Assembly Wiring
Pickup Details

RCA MFG. CO., INC.

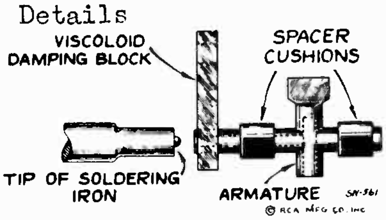


Figure 11—Special Soldering-Iron Tip

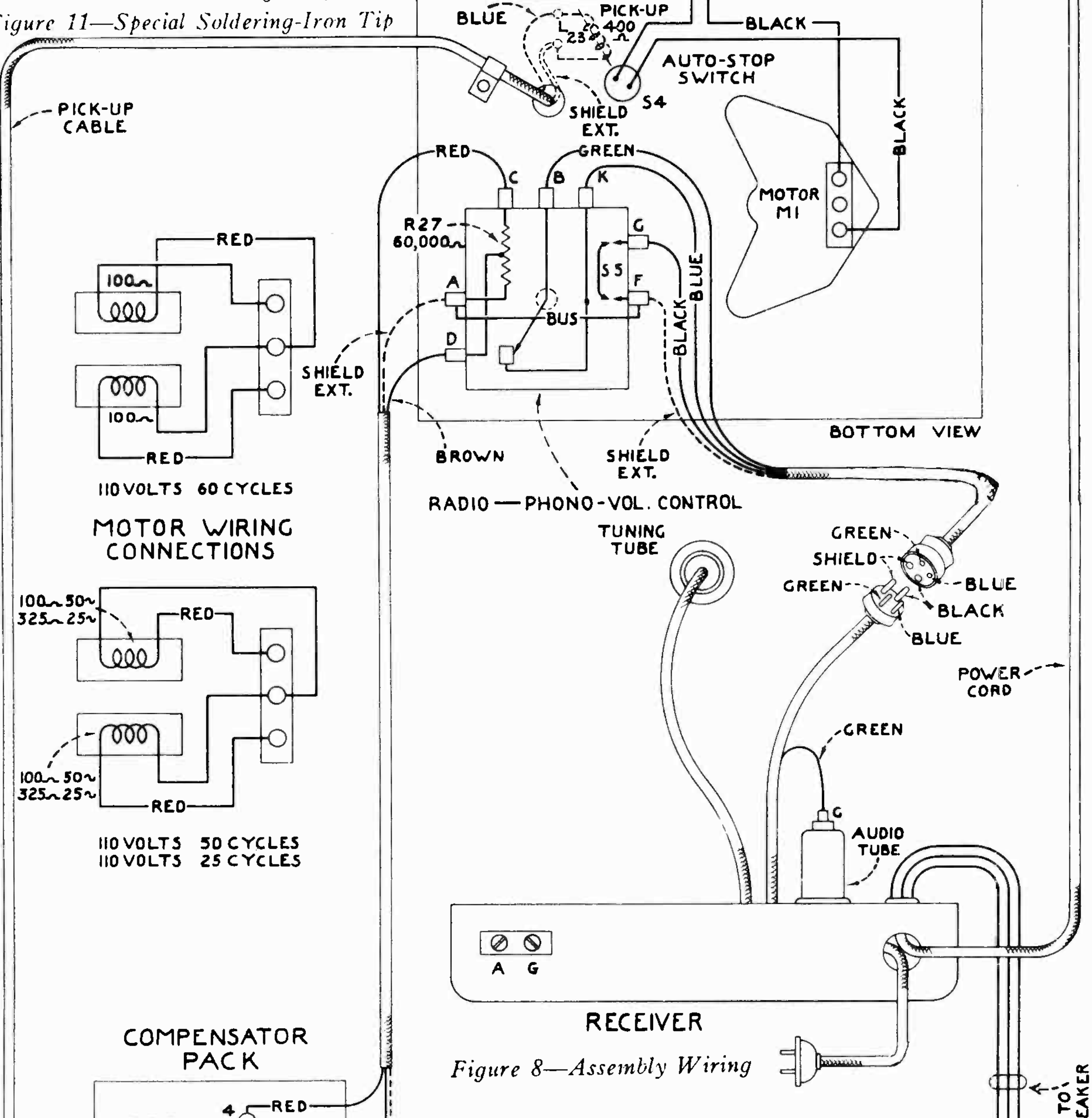


Figure 8—Assembly Wiring

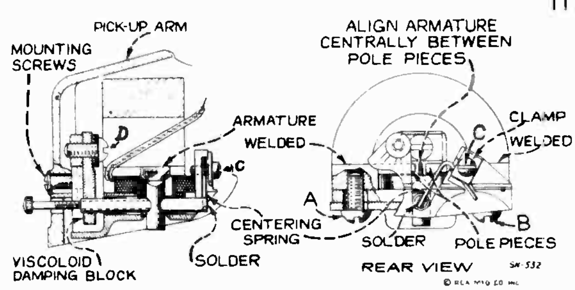


Figure 10—Details of Pickup

RCA MFG. CO., INC.

General Features

The Model 7U combination instrument consists of a seven-tube radio receiver and a manually-operated phonograph combined in one cabinet. The superheterodyne circuit is used with such features of design as: Antenna wave-trap, aural compensated volume control, continuously variable tone control with music-voice switch, automatic volume control, resistance-coupled audio system, tuning tube "Magic Eye," and band selective indication of dial scales. The tuning range is continuous through the "Standard broadcast" band, "Medium wave" band, and the "Short wave" band. It includes domestic broadcast, police, aircraft, and amateur services, and also the important foreign short-wave broadcast bands at 49, 31, 25, 19, and 16 meters.

Circuit Arrangement

The first detector and oscillator functions are accomplished in a single tube, an RCA-6A8. The input of this tube is coupled to the antenna through a tuned transformer. This transformer consists of a single primary and three series-connected secondary windings to provide the three ranges of tuning. The oscillator coil system is similarly wound on a single form. A range-selector switch S3 is used for connecting the various sections of these two coil systems into the circuit to provide operation on the band desired. The coils are tuned by a variable two-section gang condenser having trimming capacitors in shunt with each section. There are additional trimming capacitors across the section of each coil used for the "Standard broadcast" band. A series trimming capacitor is also associated with the "Standard broadcast" oscillator coil.

The intermediate-frequency stage is coupled to the RCA-6A8 and to the RCA-6H6 by means of tuned transformers. The windings of these transformers (both primary and secondary) are resonated with adjustable trimming capacitors to tune to 460 kc.

The modulated signal as obtained from the output of the i-f system is detected by an RCA-6H6 twin-diode tube. Audio frequency secured by this process is passed on to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage which develops across resistor R7 is applied as automatic control-grid bias to the first detector and i-f tubes. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R6 and R7, thereby maintaining the desired operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current, and the a.v.c. diode takes over the biasing function.

Manual volume control is effected by means of an acoustically tapered potentiometer connected as a variable coupling element between the output of the second detector and the first-audio control grid. After amplification by the RCA-6F5, the audio signal is transmitted by resistance-capacitance coupling to the input of the RCA-6F6 power-output stage, which, in turn, is transformer-coupled to the dynamic loudspeaker.

Continuously-variable tone control is effected by means of the combination of a capacitor C28 and variable resistor R9 shunting the plate circuit of the output tube. Extreme clockwise rotation of the tone control disconnects the resistor R9 from the circuit and places an additional capacitor, C33, in shunt with capacitor C25, thereby reducing the low-frequency response of the amplifier. This point is known as the "Speech" position and provides optimum intelligibility of speech.

An RCA-6E5 cathode-ray tuning tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal. This tube consists of an amplifier section and a cathode-ray section, built in the same glass envelope. A component of the signal voltage developed across resistor R7 is used to actuate the control grid of the amplifier section.

The power-supply system consists of an RCA-5Z4 rectifier tube, which is supplied from an efficiently designed power transformer, and which works into a suitable filter. The various potentials required for the plate, screen, control grid, and cathode circuits, are obtained from the output of the filter. The electrodynamic loudspeaker field coil is used as a filter reactor.

The phonograph mechanism is of the manually operated type, having a synchronous motor which rotates the turntable at a speed of 78 r.p.m. The 10-inch turntable will accommodate either the 10-inch or 12-inch phonograph records. The pickup mechanism and tone arm are combined as one unit. The instrument may be purchased with any one of five ratings as specified under Electrical Specifications. *It is important that a machine of any particular rating be operated at the frequency and voltage for which it is rated.* Attempts to operate at ratings other than specified for the particular instrument will result in improper reproduction from the phonograph and may result in damage to both the phonograph motor and radio receiver. An automatic switch is provided to turn "off" the phonograph motor at the completion of the record.

SERVICE DATA

Alignment Procedure

There are six adjustments required for the alignment of the antenna, oscillator, and wave-trap tuned circuits. The i-f transformer adjustments are made by four trimming capacitor screws. Improper alignment usually causes the impairment of sensitivity, selectivity, and tone quality. Such conditions will usually exist simultaneously.

A standard test oscillator, such as the **RCA Stock No. 9595**, will be required as a source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to show when the correct point of adjustment is reached. The **RCA Stock No. 4317 Neon Glow Indicator** is designed for this purpose.

Attach the output indicator across the loudspeaker voice coil. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test-oscillator output control so that the signal level is as low as possible and still be observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the test oscillator to the grid cap of the RCA-6A8 through a **.001 mfd.** capacitor, and connect the test oscillator ground to the receiver chassis. Set test oscillator to **460 kc.**

(b) Adjust the two trimming capacitors (**C20** and **C21**) of the second i-f transformer to produce maximum (peak) output.

(c) Adjust the two trimming capacitors (**C17** and **C18**) of the first i-f transformer, to produce maximum (peak) output.

It is advisable to repeat the adjustment of all i-f trimming capacitors a second time to assure that the interaction between them has not disturbed the original adjustment.

R-F Adjustments

Calibrate the tuning dial by adjusting the scale pointer to the extreme end calibration mark (beyond 55 on dial) while the two-gang tuning condenser plates are in full mesh. Alignment (see figure 3 for location of trimming adjustments) of "Wave-trap," "Short wave" band, and "Standard broadcast" band should be made in the following order and sequence.

"Wave-Trap"

(a) Connect the output of the test oscillator to the antenna terminal through a **200-mmfd.** (important) capacitor, leaving the test oscillator ground connected to the receiver chassis. With the range selector in its "Standard broadcast" position, set the receiver dial to a position of no extraneous signals, near **600 kc** (60 on dial). Set the test oscillator to **460 kc.** Adjust the wave-trap trimming capacitor **C1** to a point which causes minimum amplitude of output. An increase of the test oscillator output may be necessary before the point of minimum amplitude, obtained by adjustment of wave-trap screw, becomes apparent on the output indicator.

"Short Wave" Band

(a) Connect the output of the test oscillator to the antenna terminal through a **300-ohm** resistor, leaving the test oscillator ground connected as before.

(b) Set the range selector to its "Short wave" position. Set receiver dial pointer to **15,000 kc** (15 on dial). Adjust the test oscillator to **15,000 kc.** Adjust the oscillator trimming capacitor **C8** to the point which produces maximum (peak) output. Two points may be found, each of which **produces a maximum.** The one of maximum trimmer capacitance (most clockwise) is correct and should be used.

"Standard Broadcast" Band

(a) Connect the output of the test oscillator to the antenna terminal through a **200-mmfd.** capacitor, leaving test oscillator ground connected as before.

(b) Set the range selector to its "Standard broadcast" position. Set the receiver dial pointer to **1,400 kc** (**140** on dial). Adjust the test oscillator to **1,400 kc.** Adjust the oscillator and antenna trimming capacitors, **C10** and **C3** respectively, to the points where each produces maximum (peak) output.

(c) Shift the test oscillator frequency to **600 kc** and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(d) Adjust the low-frequency oscillator trimming capacitor, **C12**, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum (peak) output results from these combined operations. Repeat adjustments in (b) to compensate for any changes caused by the adjustment of the low-frequency oscillator coil trimming capacitor.

(c) Adjust the antenna trimming capacitor **C5** of the variable condenser, simultaneously rocking the receiver tuning control backward and forward through the **15,000 kc** input signal, until maximum (peak) output results from these combined operations.

Phonograph Mechanism

The phonograph motor is of the synchronous type and designed to be simple and foolproof. Under normal operating conditions, service difficulties should be negligible. Occasionally, however, certain adjustments may be required. These adjustments are illustrated and explained in figure 9.

Magnetic Pickup

The pickup used in the phonograph unit is of an improved design. The horseshoe magnet is rigidly welded to the pole pieces and is irremovable. There is a centering spring attached to the armature to maintain proper adjustment and to provide a limiting effect on the movement of the armature. The frequency response is substantially uniform over a wide range. Service operations which may be necessary on the pickup are as follows:

Centering Armature

Refer to figure 10 showing the pickup inner structure. The armature is shown in its proper relation to the magnet pole pieces, i. e., exactly centered. Whenever this centering adjustment has been disturbed it will be necessary to remove the pickup mechanism from the tone arm by removing the needle holding screw and the two mounting screws from the front of the tone arm, holding the pickup assembly to keep it from dropping. Unsolder the two leads from the lugs on the terminal board at the rear of the pickup. Insert a small rod or nail into the armature needle hole and replace the needle holding screw, tightening it to hold the rod securely. If the armature clamping screws A and B have not been disturbed, screw C should be loosened which will permit the armature to be moved from side to side, the rod acting as a lever to perform this operation. The proper adjustment is obtained when the armature is moved to the extreme position on each side (the movement being limited by the armature striking the pole pieces) and then brought to the mid position between these two extremes. Screw C should then be tightened. The armature position should then be central between the pole pieces and at right angles to them. With a little practice, the correct adjustment of the armature will be obtained. The air gap between the pole pieces and the armature should be kept free from dust, filings, and other foreign material which would obstruct the movement of the pickup armature.

Damping Block

The viscoloid damping block which is attached to the front end of the armature shank serves as a mechanical filter to eliminate undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block,

MODEL 7U
Pickup Data,Part 2
Socket.Parts List

RCA MFG. CO., INC.

the pickup mechanism should be removed from the tone arm as explained above. Unsolder the pickup coil leads from the two lugs on the pickup terminal board and remove the terminal board mounting screw and the terminal board. Then remove screw D and the damping block from the pickup assembly. Make sure that the shaft of the armature which contacts the viscoloid is clean. Then insert the new damping block so that it occupies the same position as that of the original block, and is in correct vertical alignment with the armature. The hole in the block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the damping block properly aligned on the armature, screw D with its washer should then be replaced. Heat should be applied to the armature (viscoloid side) so that the damping block will fuse at the point of contact and become rigidly attached to the armature. A special-tip soldering iron, constructed as shown in figure 11, will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block, causing a small bulge on both sides.

Replacing Coil

Whenever there is defective operation due to an open or shorted pickup coil, this coil should be replaced. Remove the pickup mechanism and terminal board as described above. Remove screws A and B and the magnet assembly. Remove the bakelite coil support (with coil attached) and insert the new coil support assembly in its place, after which replace the magnet assembly and center the armature as described above, then re-assemble the remainder of the unit. Only rosin core solder should be used for soldering the coil leads and pickup leads to the pickup terminal board. This same type of solder should be used when necessary for soldering the centering spring to the armature.

Magnetizing

Loss of magnetization will not usually occur when the pickup has received normal care because the magnet and pole pieces are one unit and the magnetic circuit remains practically closed at all times. When the pickup has been mishandled, subjected to a strong a-c field, jolted, or dropped, there may be an appreciable loss of magnetic strength, in which case it will be necessary to remagnetize the entire structure. To do this, it will be necessary to first remove the pickup mechanism from the tone arm, and then remove the magnet assembly. Place the magnet assembly on the poles of a standard pickup magnetizer such as the **RCA Stock No. 9549 Pickup Magnetizer** and charging the magnet in accordance with the instructions accompanying the magnetizer. It is preferable to check the polarity of the pickup magnet and to remagnetize it so that the same polarity is maintained.

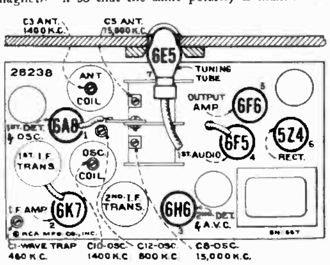


Figure 3—Radiotron, Coil, and Trimmer Locations

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
12930	Board—Antenna and ground terminal board	$0.20
5237	Bushing—Variable condenser mounting bushing assembly—Package of 3	.43
11888	Cable—Tuning lamp cable and socket	1.06
12032	Cable—3-conductor, shielded, volume control cable, approx. 8 inches long, complete with 4-contact male connector and grid contact cap	.90
11350	Cap—Grid contact cap—Package of 5	.20
12511	Cap—Grid contact cap—Package of 5	.15
11289	Capacitor—50 Mmfd.—(C9)	.26
11623	Capacitor—175 Mmfd.—(C22, C26)	.18
11290	Capacitor—400 Mmfd. (C2, C6)	.25
11622	Capacitor—3000 Mmfd.—(C13)	.36
11621	Capacitor—3600 Mmfd.—(C11)	.38
11287	Capacitor—4500 Mmfd.—(C14)	.30
4868	Capacitor—.005 Mfd.—(C29)	.20
11315	Capacitor—.015 Mfd.—(C33)	.20
12670	Capacitor—.035 Mfd.—(C28)	.20
11395	Capacitor—.01 Mfd.—(C24)	.18
4858	Capacitor—.01 Mfd.—(C25, C27)	.25
4836	Capacitor—.05 Mfd.—(C35)	.30
11414	Capacitor—0.1 Mfd.—(C15, C42)	.20
4841	Capacitor—0.1 Mfd.—(C19)	.22
5170	Capacitor—.25 Mfd.—(C32)	.25
11240	Capacitor—10 Mfd.—(C30)	1.08
11387	Capacitor—10 Mfd.—(C16)	.86
5212	Capacitor—18 Mfd.—(C31)	1.16
11465	Capacitor—Adjustable trimmer—(C12)	.48

Stock No.	DESCRIPTION	List Price
11256	Capacitor—Adjustable trimmer for wave-trap; Stock No. 11391—(C1)	.48
11617	Coil—Antenna coil less shield—(L2, L3, L4, L5, C3, R1)	1.68
11618	Coil—Oscillator coil less shield—(L6, L7, L8, L9, L10, L11, C10)	2.22
12767	Condenser—2-gang variable tuning condenser—(C4, C5, C7, C8)	4.10
4573	Connector—2-contact female connector for motor cable—receiver section	.30
5119	Connector—3-contact female connector for chassis reproducer cable	.25
6123	Connector—4-contact male connector for cable, Stock No. 12032	.30
12768	Drive—Variable tuning condenser vernier drive	1.30
11619	Foot—Chassis mounting foot and bracket assembly—Package of 2	.65
12770	Holder—Dial scale holder and lamp bracket assembly	.55
12712	Indicator—Station selector indicator pointer	.22
4340	Lamp—Dial lamp—Package of 5	.60
12718	Mask—Dial light diffuser complete with red, orange and green-colored screen	.40
11466	Resistor—Voltage divider—comprising one 3.500-ohm, one 13.000-ohm, one 85-	
	MOTOR BOARD ASSEMBLIES	
11751	Bushing—Motor mounting bushing and spring assembly, comprising one bushing, one large washer, one cup washer, one spring, one small washer and two nuts	$0.25
13065	Lever—Brake mechanism actuating lever, fastens to pivot shaft under base	.20
3261	Rest—Pickup rubber rest—Package of 5	.40
11750	Screw—No. 4-40 x 9/32, cone pointed, headless set screw for lever, Stock No. 13065—Package of 10	.22
13099	Brake—Automatic brake and switch complete	4.90
4577	Connector—2-contact male connector for brake switch power supply leads	.30
12932	Lever—Friction lever assembly complete	.35
11753	Plunger—Automatic brake trip plunger	.18
12043	Screw—Automatic brake screw and friction leather assembly	.20
11756	Spring—Automatic brake trip lever spring—Package of 10	.22
11757	Spring—Automatic brake lever spring—Package of 10	.20
11755	Switch—Automatic brake switch—(S4)	.75
	PICKUP AND ARM ASSEMBLIES	
11731	Armature—Pickup armature	.64
11732	Coil—Pickup coil—(L23)	.60
4543	Damper—Pickup damper block complete with damper plate	.10
12931	Pickup and arm complete	7.50
11951	Screw—Needle holding screw—Package of 10	.46
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board assembly	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11470	Coil—Field coil—(L16)	2.16
11469	Neutralizing coil—(L18)	.20
11258	Cone—Reproducer cone—(L17)—Package of 5	3.85
5118	Connector—3-contact male connector for reproducer	.25
5119	Connector—3-contact female connector for reproducer cable	.25
9622	Reproducer complete	7.16
11253	Transformer—Output transformer—(T2)	1.56
11886	Washer—Spring washer used to hold field coil securely—Package of 5	.20
	MOTOR ASSEMBLIES	
10194	Ball—Steel ball bearing—Package of 20	.25
11740	Base—Motor base and bearing assembly	1.45
11745	Cap—Turntable spindle cap—Package of 5	.30
11733	Coil—Stator assembly—comprising coil and laminations—105-125 volts, 60-cycle operation	2.96
11734	Coil—Stator assembly—comprising coil and laminations—105-125 volts, 50-cycle operation	3.08
11735	Coil—Stator assembly—comprising coil	
	ohm, one 40-ohm and one 175-ohm sections—(R14, R15, R16, R17, R18)	$0.95
11624	Resistor—22 ohms—Flexible type complete with grid contact cap—(R19)	.22
11620	Resistor—220 ohms—Carbon type—1/10 watt—(R1)—Package of 5	.75
11400	Resistor—27,000 ohms—Carbon type—¼ watt—(R10)—Package of 5	1.00
8072	Resistor—33,000 ohms—Carbon type—½ watt—(R4)—Package of 5	1.00
11282	Resistor—56,000 ohms—Carbon Type—1/10 watt—(R5)—Package of 5	.75
12263	Resistor—100,000 ohms—insulated—¼ watt—Package of 5—(R3)	1.00
11398	Resistor—220,000 ohms—Carbon type—1/10 watt—(R7)—Package of 5	.75
11453	Resistor—270,000 ohms—Carbon type—1/10 watt—(R12)—Package of 5	.75

Stock No.	DESCRIPTION	List Price
11452	Resistor—470,000 ohms—Carbon type—1/10 watt—(R13)—Package of 5	.75
11397	Resistor—560,000 ohms—Carbon type—1/10 watt—(R2)—Package of 5	.75
12013	Resistor—1 megohm—Carbon type—1/10 watt—(R22)—Package of 5	.75
11626	Resistor—2.2 megohms—Carbon type—¼ watt—(R6, R20, R21)—Package of 5	1.00
11603	Shield—Coil shield for Stock Nos. 11617 and 11618	.26
12735	Shield—Dial lamp shield—Package of 5	.25
11390	Shield—I. F. transformer shield for Stock Nos. 11388 and 11389	.25
11199	Socket—Dial lamp socket	.14
12771	Socket—Dial lamp socket—Located at top of dial scale	.25
11381	Socket—Tuning lamp socket and cover	.45
11195	Socket—5-contact 5Z4 Radiotron socket	.15
11198	Socket—7-contact 6F5 or 6H6 Radiotron socket	.15
11196	Socket—8-contact 6A8, 6F6 or 6K7 Radiotron socket	.15
12769	Switch—Range switch—(S2, S3)	1.25
12668	Tone Control and Power Switch—(R9, S1)	1.22
11391	Trap—Wave trap—(L1, C1)	1.22
11388	Transformer—First I. F. transformer less shield—(L12, L13, C17, C18)	1.90
11389	Transformer—Second I. F. transformer less shield—(L14, L15, C20, C21, C22, R5, R7)	3.02
11848	Transformer—Power transformer—100-125-volts, 50-60 cycles—(T1)	4.40
11849	Transformer—Power transformer—100-125-volts, 25-40 cycles—(T1)	5.70
11850	Transformer—Power transformer—105-250-volts, 40-60 cycles—(T1)	8.00
13144	Volume control—(R11)	1.00
	and laminations—105-125 volts, 25-cycle operation	$3.08
11748	Damper—Motor damper assembly—comprising one damper, one damper plate, one screw, two rubber washers and one "C" washer	.20
11741	Motor—105-125 volts, 60-cycle motor complete—(M1)	11.10
11742	Motor—105-125 volts, 50-cycle motor complete	11.10
11743	Motor—105-125 volts, 25-cycle motor complete	11.60
11746	Tripper—Automatic brake tripper—located on rotor laminations	.16
11737	Turntable—Turntable assembly—complete with rotor laminations—60-cycle operation	4.80
11738	Turntable—Turntable assembly—complete with rotor laminations—50-cycle operation	4.80
11739	Turntable—Turntable assembly—complete with rotor laminations—25-cycle operation	5.05
4083	Washer—Leather washer—Package of 10	.20
4084	Washer—Metal washer—Package of 10	.26
	MISCELLANEOUS ASSEMBLIES	
11762	Box—Used needle box	.25
11996	Bracket—Tuning lamp mounting bracket and clamp	.22
12030	Cable—2-conductor shielded cable, approx. 18 inches long, connects phonograph volume control to compensator pack	.52
12031	Cable—3-conductor shielded cable, approx. 19 inches long, complete with 4-contact female connector, connects phonograph volume to receiver	1.04
11272	Clamp—Cable clamp for phonograph volume control cable, Stock Nos. 12030 and 12031—Package of 5	.10
11760	Compensator—Phonograph compensator pack, comprising one 470-ohm and one 1.000-ohm resistors, one .01 Mfd., one .1 Mfd. and one 1 Mfd. capacitors and one .25 Henry reactor—(L24, C39, C40, C41, R25, R26)	3.85
4153	Connector—4-contact female connector for cable, Stock No. 12031	.48
12666	Cover—Reproducer cover	.65
12698	Escutcheon—Station selector escutcheon and crystal	1.02
12742	Escutcheon—Tuning tube escutcheon	.22
11347	Knob—Phonograph volume control, receiver volume control, or range switch knob—Package of 5	.75
11610	Knob—Station selector knob—includes one large and one small knob—Package of 5	1.00
11582	Knob—Tone and power switch knob—Package of 5	.50
11763	Receptacle—Needle receptacle	.38
11210	Screw—Chassis mounting screw assembly—comprising one screw, one washer, and one lockwasher—Package of 4	.28
4982	Spring—Retaining spring for large knob in Stock No. 11610—Package of 10	.50
11349	Spring—Retaining spring for small knob in Stock Nos. 11610, 11347 and 11582—Package of 5	.25
11695	Volume Control—Phonograph volume control and switch—(R27, S5)	1.60

The prices quoted above are subject to change without notice.

RADIOTRON COMPLEMENT

(1) RCA-6A8 .... First-detector-oscillator
(2) RCA-6K7 .... Intermediate amplifier
(3) RCA-6H6 .... Second-detector-a.v.c.
(4) RCA-6F5 .... Audio voltage amplifier
(5) RCA-6F6 .... Audio power amplifier
(6) RCA-5Z4 .... Full-wave rectifier
(7) RCA-6E5 .... Tuning tube

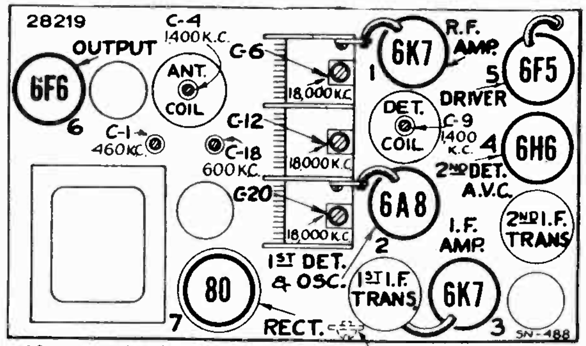
Pilot Lamps (5) .... Mazda No. 46, 6.3 volts, 0.25 amperes

POWER SUPPLY RATINGS

Rating A-6 .... 105-125 volts, 60 cycles, 95 watts
Rating A-5 .... 105-125 volts, 50 cycles, 95 watts
Rating B-2 .... 105-125 volts, 25 cycles, 95 watts
Rating C-6 .... 105-130/140-160/200-250 volts, 60 cycles, 95 watts
Rating C-5 .... 105-130/140-160/200-250 volts, 50 cycles, 95 watts

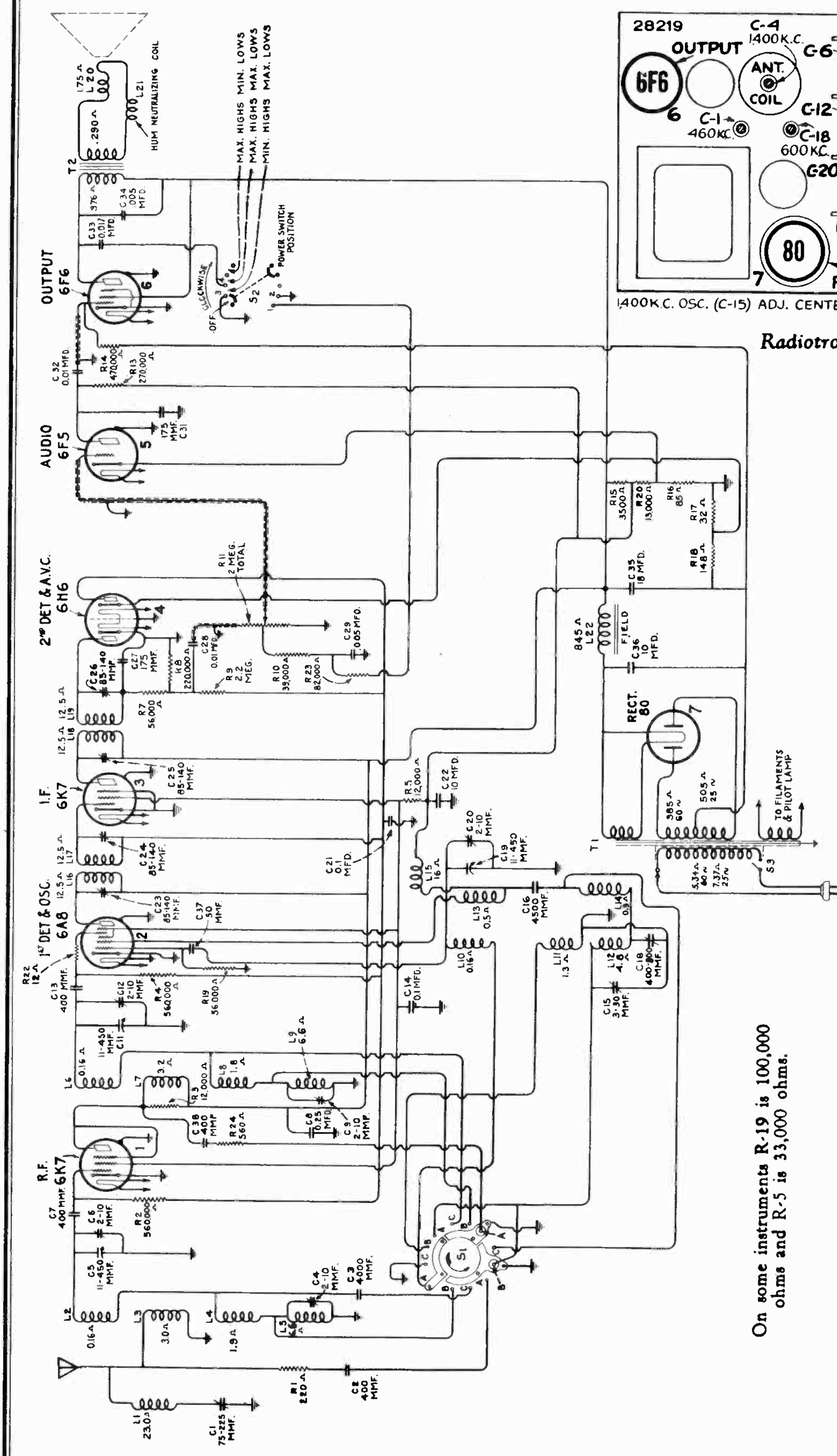
RCA MFG. CO., INC.

MODELS T7-5, C7-6
Schematic, Socket
Trimmers



1400 K.C. OSC. (C-15) ADJ. CENTER REAR OF CHASSIS

Radiotron and Coil Locations



On some instruments R-19 is 100,000 ohms and R-5 is 33,000 ohms.

FREQUENCY RANGES

Band A	540- 1,625 kc.
Band B	1,625- 5,700 kc.
Band C	5,700-18,000 kc.

Intermediate Frequency .... **460 kc.**

ALIGNMENT FREQUENCIES

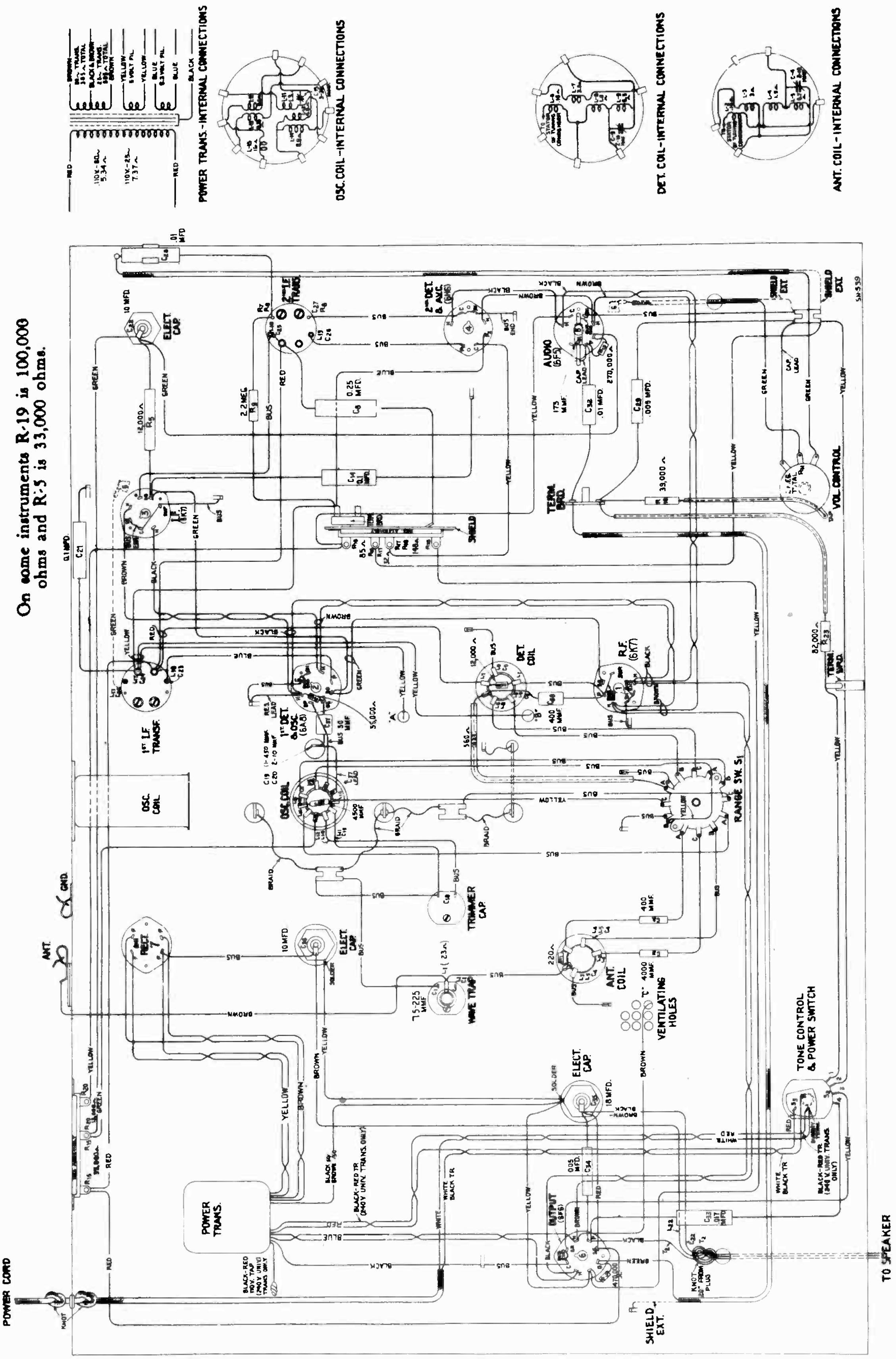
Band A	600 kc. (osc.), 1,400 kc. (osc., det., ant.)
Band B	None required
Band C	18,000 kc. (osc., det., ant.)

POWER SUPPLY RATINGS

Rating A	105-125 Volts, 50-60 Cycles, 100 Watts
Rating B	105-125 Volts, 25-60 Cycles, 105 Watts
Rating C	100-130/140-160/195-250 Volts, 40-60 Cycles, 105 Watts

MODELS T7-5,C7-6
Chassis Wiring

RCA MFG. CO., INC.

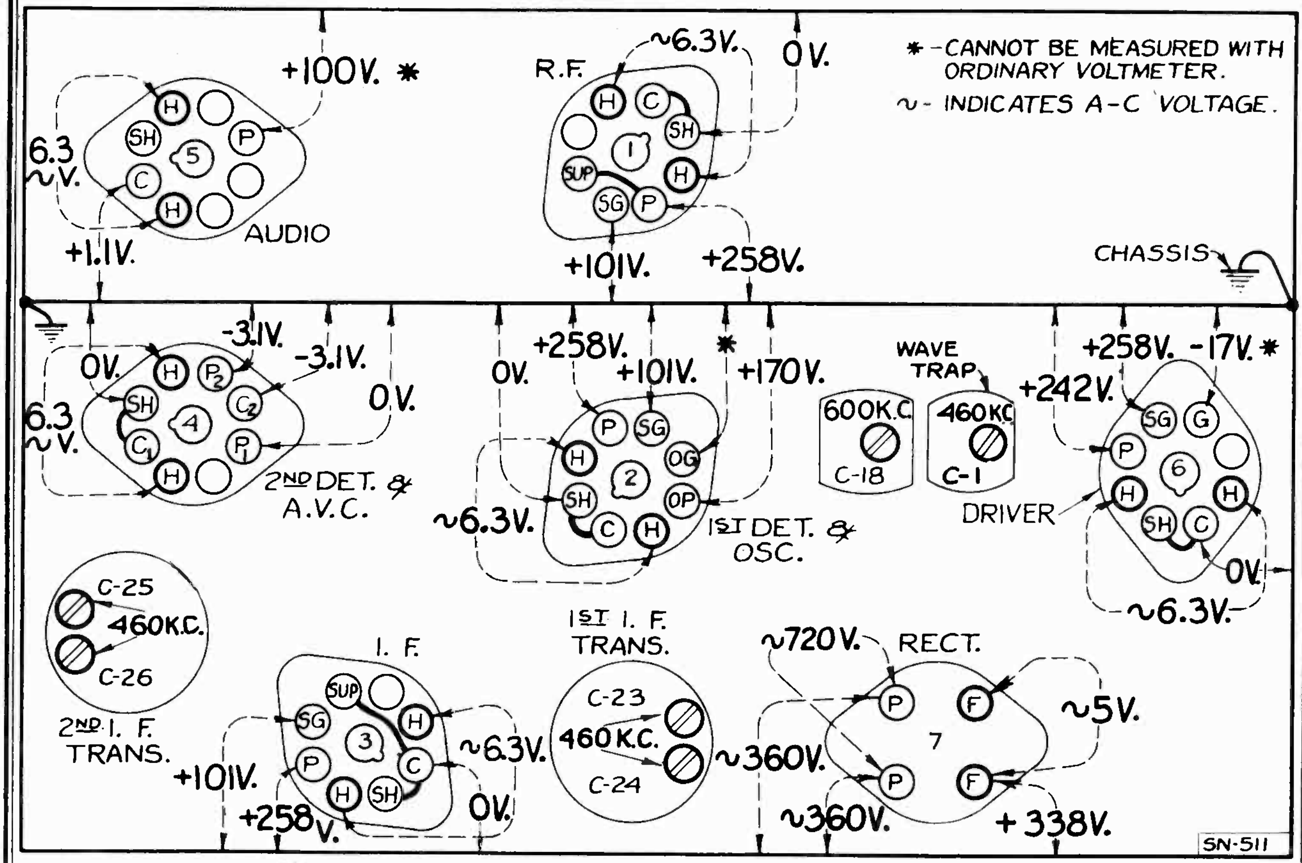


On some instruments R-19 is 100,000 ohms and R-5 is 33,000 ohms.

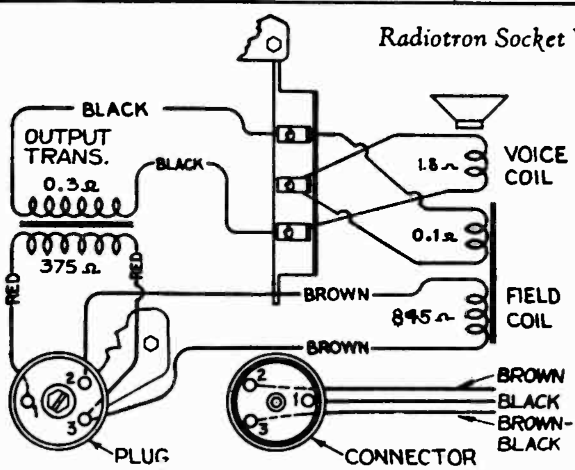
Trimmers, Transformer
Loudspeaker

RCA MFG. CO., INC.

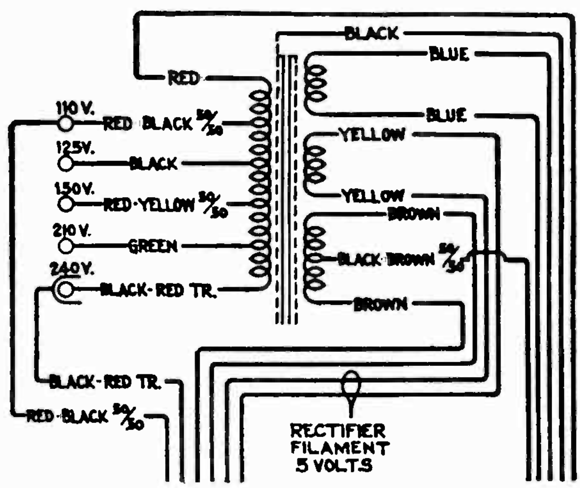
MODELS T7-5, C7-6
Voltage, Socket



Radiotron Socket Voltages Measured at 115 volts, 60 cycles—No signal input

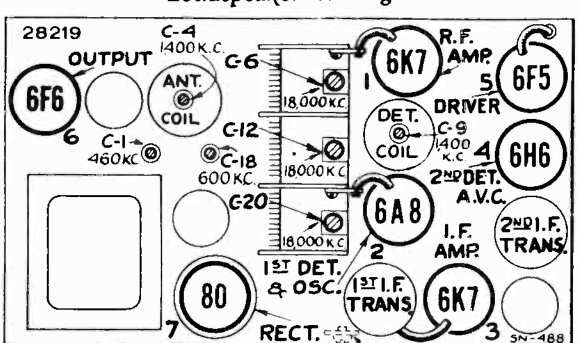


Loudspeaker Wiring



Primary Resistance—10.5 ohms, Total
Secondary Resistance—330 ohms, Total

Universal Transformer



1400K.C. OSC. (C-15) ADJ. CENTER REAR OF CHASSIS

Figure 3—Radiotron and Coil Locations

MODELS T7-5,C7-6
Circuit Data,Parts
Alignment,Data

RCA MFG. CO., INC.

General Features

[T]hese two models each employ the same seven-tube chassis. They have the new metal tubes. The tuning range is from 540 to 18,000 kc. The coverage includes domestic broadcast, police, aircraft and amateur services and also the important foreign short-wave broadcast bands at 49, 31, 25, 19, and 16 meters. Chassis features include automatic volume control, 3-point tone control, antenna wave trap, and audio tone compensation. A high level of output is available from the receiver for reproduction by the electrodynamic loudspeaker. The table model (T 7-5) uses an 8-inch dynamic speaker and the console model (C 7-6) uses an improved 12-inch dynamic speaker. The tuning dial is an illuminated semi-airplane type. Each band is distinctively marked with a separate color for each band. Positions of the range selector knob are plainly marked on the control panel with letters indicating each band position placed over color strips corresponding to the band colors on the dial. The tuning control is of the dual-ratio type, which permits fast tuning through a 10-to-1 drive ratio and vernier tuning through a 50-to-1 drive ratio. The latter is especially advantageous for accurate tuning of the short-wave stations.

Circuit Arrangement

The conventional Superheterodyne type of circuit, consisting of an r-f stage, a combined first-detector–oscillator stage, a single i-f stage, a diode-detector–automatic-volume-control stage, an audio voltage amplifier stage, an audio power output stage and a high-voltage rectifier power-supply stage, is used.

Tuned Circuits

The antenna coil system and the detector coil system each consist of a single primary and three series-connected secondary windings to provide the three ranges of tuning. The oscillator coil system is similarly wound on a single form. A range selector switch (S-1) is used for connecting the various sections of these three coil systems into the circuit to provide operation on the band desired. The coils are tuned by a variable three-section gang condenser having trimmer capacitors in shunt with each section. There are additional trimmer capacitors across the section of each coil used for Band "A". A series trimmer is also associated with the Band "A" oscillator coil.

The intermediate frequency amplifier system consists of an RCA-6K7 in a transformer-coupled circuit. This stage operates at a basic frequency of 460 kc. Each winding of both i-f transformers (input and output) is tuned by an adjustable trimmer.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f stage is detected by an RCA-6H6 twin-diode tube. The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R-8, is applied as automatic control-grid bias to the r-f, first-detector, and i-f tubes through a suitable resistance filter circuit. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R-8 and R-9, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current and the a.v.c. diode takes over the biasing function.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector diode and the input grid of the audio-voltage-amplifier tube. This control has a tone compensating filter connected to it so that the correct aural balance will be obtained at different volume settings.

Resistance capacitance coupling is used between the first audio stage and the power output stage. The output of the power amplifier is transformer coupled into the dynamic loudspeaker. High-frequency tone control is effected by a capacitor across the plate circuit of the output tube. Speech-music control is effected by a resistor connected to the compensated volume control circuit. Control of tone is obtained by means of the switch (S-2).

Rectifier

The power required for operation of this receiver is supplied through transformer T-1. This transformer has an efficient electrostatic shield between its primary and secondary windings. This shield prevents interference which is on the power-supply circuit from entering the receiver and conversely reduces the tendency of the receiver to re-radiate into the power circuit. An RCA-80 furnishes the d-c voltages necessary for plate, screen, cathode, and grid potentials. The field winding of the loudspeaker is used as a reactor in the filter circuit from which it simultaneously receives its magnetizing current. The heaters of all Radiotrons are supplied from a low voltage (6.3 volt) winding on the power transformer. One side of this winding is at ground potential.

SERVICE DATA

The various diagrams of this bulletin contain such information as will be needed to isolate causes for defective operation when such a condition develops. Values of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the diagrams and the replacement parts list. Locating of the parts in the schematic circuit is facilitated by the fact that the numerical titles increase from left to right on the diagram. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Resistances of less than one ohm are generally omitted.

Alignment Procedure

Precise alignment is vital to the proper functioning of this receiver. There are four trimming adjustments provided in the i-f system, three in the oscillator coil system, two in the detector coil system, and two in the antenna coil system. Each of these trimmers has been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions of climate or have been altered for service purposes. Incorrect alignment is usually evidenced by loss of sensitivity, improper tone quality, and poor selectivity. These indications will generally be present together.

The correct performance of the receiver can only be obtained when the alignment is performed with adequate and reliable test apparatus. The manufacturer of this instrument has a complete assortment of such service equipment available. This equipment, illustrated and described on a separate page of this booklet, may be purchased from authorized distributors and dealers.

An oscillator (signal generator) is required as a source of the specified alignment frequencies. Visual indication of the receiver output during the adjustments is necessary to enable the serviceman to obtain an accuracy of alignment which is not possible by listening to the signal. **The RCA Victor Stock No. 9595 Full-Range Oscillator and the RCA Victor Stock No. 4317 Neon Output Indicator are especially suitable and fulfill the above requirements.**

The following procedure should be followed in adjusting the various trimmer capacitors:

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 4. Each must be aligned to a basic frequency of 460 kc. To do this, attach the Output Indicator across the voice coil circuit or across the output transformer primary. Connect the output of the test oscillator between the control-grid of the RCA-6A8 first detector tube and chassis-ground. Tune the oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator. Then adjust the two trimmers, C-25 and C-26, of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two trimmers, C-23 and C-24, of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i-f trimmers a second time to assure that the inter-action between them has not disturbed the original adjustment.

R-F Trimmer Adjustments

The seven trimmers associated with the r-f, first detector, and oscillator tuned circuits have their locations shown by Figure 3. The three trimmers which are at all times directly in shunt with the variable tuning condenser necessitate that the high-frequency range (Band C) be aligned first. The range selector switch should, therefore, be turned to its Band C position for the first adjustment. The Output Indicator should be left connected to the output system. Attach the output terminals of the test oscillator to the antenna and ground terminals of the receiver.

Calibrate the dial by rotating the tuning control until the variable condenser plates are in their full mesh (maximum capacity) position and adjusting the dial pointer so that its end points to the *horizontal* graduation (530 kc.) at the low frequency end of the Band A scale.

Proceed further as follows:

(a) Adjust the test oscillator to 18,000 kc. and set the receiver tuning control to a dial reading of 18,000 kc.

(b) Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the trimmer, C-20, on the oscillator section of the variable condenser to the point at which it produces maximum indicated receiver output. Two points may be found, each of which produces such a maximum. The one of ***maximum trimmer capacitance*** is correct and should be used. (The oscillator will be 460 kc. below the signal frequency at this adjustment point.)

(c) Adjust the trimmer, C-12, of the detector section of the variable condenser, simultaneously rocking the receiver tuning control backward and forward through the 18,000 kc. input signal, until maximum receiver output results from these combined operations. Rocking of the variable condenser will prevent inaccurate adjustment which would otherwise be caused by the inter-action between the heterodyne oscillator circuit and the detector tuned circuit.

(d) With the receiver tuning control set to 18,000 kc. adjust the trimmer, C-6, on the antenna section of the variable condenser to the point which produces maximum (peak) indicated receiver output.

(e) Change the receiver range selector to its Band A position and set the receiver tuning control to a dial reading of 1,400 kc. Tune the test oscillator to 1,400 kc. and regulate its output to produce a slight indication on the receiver output indicating device.

(f) Adjust the high frequency trimmers of the Band A oscillator, detector, and antenna coils, C-15, C-9, and C-4 respectively, to the points at which each produces maximum indicated receiver output.

(g) Shift the test oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(h) Tune the low frequency trimmer, C-18, of the oscillator Band A coil, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum indicated receiver output results from these combined operations. The adjustment of C-20, C-12, and C-6 should be corrected at 18,000 kc. as in (b), (c), and (d); also C-15, C-9, and C-4 should be corrected at 1,400 kc. as in (f) to compensate for any changes caused by the adjustment of the low frequency oscillator coil trimmer.

Wave-Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference. This trimmer is adjusted to 460 kc during manufacture, however, local conditions may require a readjustment, depending upon the interfering frequency.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to chassis on Figure 4 will assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1000 ohms per volt will be satisfactory when the range used for each reading is chosen as high as possible consistent with good readability.

Universal Transformer

The special transformer used on some receivers of this type is adaptable to several ranges of voltage as given under Rating C of Electrical Specifications. Its schematic and wiring are shown by Figure 6. Terminals are provided at the top of the transformer case for changing the primary connections to suit the voltage available. Note that a 110-volt tap is brought out separately for supplying a phonograph motor.

Electrical Specifications

FREQUENCY RANGES

Band A .... 540- 1,625 kc
Band B .... 1,625- 5,700 kc.
Band C .... 5,700-18,000 kc.

Intermediate Frequency .... 460 kc

ALIGNMENT FREQUENCIES

Band A .... 600 kc (osc.), 1,400 kc. (osc., det., ant.)
Band B .... None required
Band C .... 18,000 kc. (osc., det., ant.)

RADIOTRON COMPLEMENT

(1) RCA 6K7 .... Radio-Frequency Amplifier
(2) RCA-6A8 .... First Detector-Oscillator
(3) RCA-6K7 .... Intermediate Amplifier
(4) RCA-6H6 .... Second Detector-A.V.C.
(5) RCA-6F5 .... Audio Voltage Amplifier
(6) RCA 6F6 .... Audio Power Amplifier
(7) RCA 80 .... Full-Wave Rectifier

LOUDSPEAKER

Type .... Electrodynamic
Voice Coil Impedance .... 7.25 ohms at 400 cycles

POWER OUTPUT

Undistorted .... 2.25 Watts
Maximum .... 5.0 Watts

POWER SUPPLY RATINGS

Rating A ..... 105-125 Volts, 50-60 Cycles, 100 Watts
Rating B ..... 105-125 Volts, 25-60 Cycles, 105 Watts
Rating C .... 100-130/140-160/195-250 Volts, 40-60 Cycles, 105 Watts

Mechanical Specifications

Tuning Drive Ratios .... 10-to-1 and 50-to-1
Chassis Base Dimensions .... 13⅞ x 7⅝ x 2½ inches

	MODEL T 7-5	MODEL C 7-6
Height	19⅜ inches	38 inches
Width	15⅜ inches	24 inches
Depth	9⅜ inches	11 inches
Weight (Net)	30½ pounds	49½ pounds
Weight (Shipping)	36 pounds	64 pounds

Operating Controls ..... (1) Volume, (2) Tuning, (3) Range Selector, (4) Power Switch-Tone

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
5737	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	$0 43
11350	Cap—Contact cap—Package of 5	.20
11465	Capacitor—Adjustable capacitor—(C18)	48
11289	Capacitor—50 MMfd.—(C37)	.26
5116	Capacitor—175 MMfd.—(C31)	.18
11290	Capacitor—400 MMfd.—(C2, C7, C13, C38)	.25
11401	Capacitor—4000 MMfd.—(C3)	.38
4868	Capacitor—.005 Mfd.—(C29, C34)	.20
4906	Capacitor—.017 Mfd.—(C33)	.25
11395	Capacitor—.01 Mfd.—(C28)	.18
4858	Capacitor—.01 Mfd.—(C32)	.25
4839	Capacitor—0.1 Mfd.—(C14)	.28
4841	Capacitor—0.1 Mfd.—(C21)	.22
5170	Capacitor—0.25 Mfd.—(C8)	.25
11240	Capacitor—10 Mfd.—(C36)	1.08
11387	Capacitor—10 Mfd.—(C22)	.86
5212	Capacitor—18 Mfd.—(C35)	1.16
5238	Clip—Antenna terminal board with clip, insulating strip and rivets	.14
11600	Coil—Antenna coil—(L2, L3, L4, L5, C4, R1)	1.78
11601	Coil—Detector coil—(L6, L7, L8, L9, C9, R3)	1.78
11602	Coil—Oscillator coil—(L10, L11, L12, L13, L14, L15, C15, C16)	2.15
11385	Condenser—Three gang variable tuning condenser—(C5, C6, C11, C12, C19, C20)	5.02
11673	Dial—Station selector dial	.78
11394	Foot—Chassis foot assembly—Package of 2	.70
11396	Indicator—Station selector indicator pointer	.25
5226	Lamp—Dial lamp—Package of 5	.70
11393	Resistor—Voltage divider resistor—comprising one 3,500 ohm and one 13,000 ohm sections—(R15, R20)	.74
11329	Resistor—Voltage divider resistor—comprising one 148 ohm, one 32 ohm and one 85 ohm sections—(R16, R17, R18)	.52

Stock No.	Description	List Price
11369	Resistor—12 ohms—flexible type complete with contact cap—(R22)	.22
11324	Resistor—560 ohms—Carbon type—¼ watt—(R24)—Package of 5	1.00
3066	Resistor—12,000 ohms—Carbon type—1 watt—(R5*)—Package of 5	1.10
11322	Resistor—39,000 ohms—Carbon type—¼ watt—(R10)—Package of 5	1.00
11282	Resistor—56,000 ohms—Carbon type—1/10 watt—(R19*)—Package of 5	.75
11365	Resistor—82,000 ohms—Carbon type—¼ watt—(R23)—Package of 5	1.00
11323	Resistor—270,000 ohms—Carbon type—¼ watt—(R13)—Package of 5	1.00
11172	Resistor—470,000 ohms—Carbon type—¼ watt—(R14)—Package of 5	1.00
11397	Resistor—560,000 ohms—Carbon type—1/10 watt—(R2, R4)—Package of 5	.75
11626	Resistor—2.2 megohms—Carbon type—¼ watt—(R9)—Package of 5	1.00
11603	Shield—Antenna or detector coil shield	.26
11604	Shield—Oscillator coil shield	.24
11383	Shield—Rectifier Radiotron shield	.20
11390	Shield—Intermediate frequency transformer shield	.25
11199	Socket—Dial lamp socket	.14
4794	Socket—4-contact rectifier Radiotron socket	.15
11198	Socket—7-contact 6K7—6F5—or 6H6 Radiotron socket	.15
11196	Socket—8-contact 6A8 or 6F6 Radiotron socket	.15
11386	Switch—Range switch—(S1)	1.16
11392	Switch—Tone control and power switch assembly—(S2, S3)	1.14
11388	Transformer—First intermediate frequency transformer—(L16, L17, C23, C24)	1.90
11389	Transformer—Second intermediate frequency transformer—(L18, L19, C25, C26, C27, R7, R8)	3.02
11384	Transformer—Power transformer—105-125 volts—50-60 cycles—(T1)	4.65
11725	Transformer—Power transformer—105-125 volts—25-50 cycles	6.60

REPLACEMENT PARTS (Continued)

Stock No.	Description	List Price
11727	Transformer—Power transformer—105-130, 140-160, 195-250 volts—40-60 cycles	6.60
11391	Trap—Wave trap—(L1, C1)	1.22
11237	Volume Control—(R11)	1.20
	MISCELLANEOUS ASSEMBLIES	
11376	Escutcheon—Station selector escutcheon and crystal	.70
11582	Knob—Range switch knob—Package of 5	.50
11610	Knob—Station selector knob assembly—comprising one small and one large knob—Package of 5	1.00
11347	Knob—Volume control or tone control knob—Package of 5	.75
11210	Screw—Chassis mounting screw assembly—Console Model—Package of 4	.28
11377	Screw—Chassis mounting screw assembly—Table Model—Package of 4	.12
11349	Spring—Retaining spring for knobs, Stock No. 11347, No. 11582 and small knob in Stock No. 11610—Package of 5	.15
4982	Spring—Retaining spring for large knob in Stock No. 11610—Package of 10	.26
	REPRODUCER ASSEMBLIES (Table Model)	
11232	Board—Terminal board with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil—(L22)	2.00

Stock No.	Description	List Price
11233	Coil—Neutralizing coil—(L21)	.30
11235	Cone—Reproducer cone—(L20)—Package of 5	3.50
5119	Connector—3-contact female connector for reproducer cable	.25
5118	Connector—3-contact male connector for reproducer	.25
9618	Reproducer—Complete	6.40
11253	Transformer—Output transformer—(T2)	1.56
11230	Washer—"Binders board" "C" washer—used to hold field coil securely—Package of 5	.18
	REPRODUCER ASSEMBLIES (Console Model)	
11232	Board—Terminal board assembly with two lead wire clips	.18
11231	Bolt—Reproducer yoke and core assembly bolt and nut	16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil—(L22)	2.00
11233	Coil—Neutralizing coil—(L21)	.30
11238	Cone—Reproducer cone—(L20)—Package of 5	3.85
5118	Connector—3-contact male connector for reproducer	.25
5119	Connector—3-contact female connector for reproducer cable	.25
9619	Reproducer—Complete	6.05
11253	Transformer—Output transformer—(T2)	1.56
11230	Washer—"Binders board" "C" washer—used to hold field coil securely—Package of 5	.18

***THE FOLLOWING ARE USED IN SOME MODELS:**

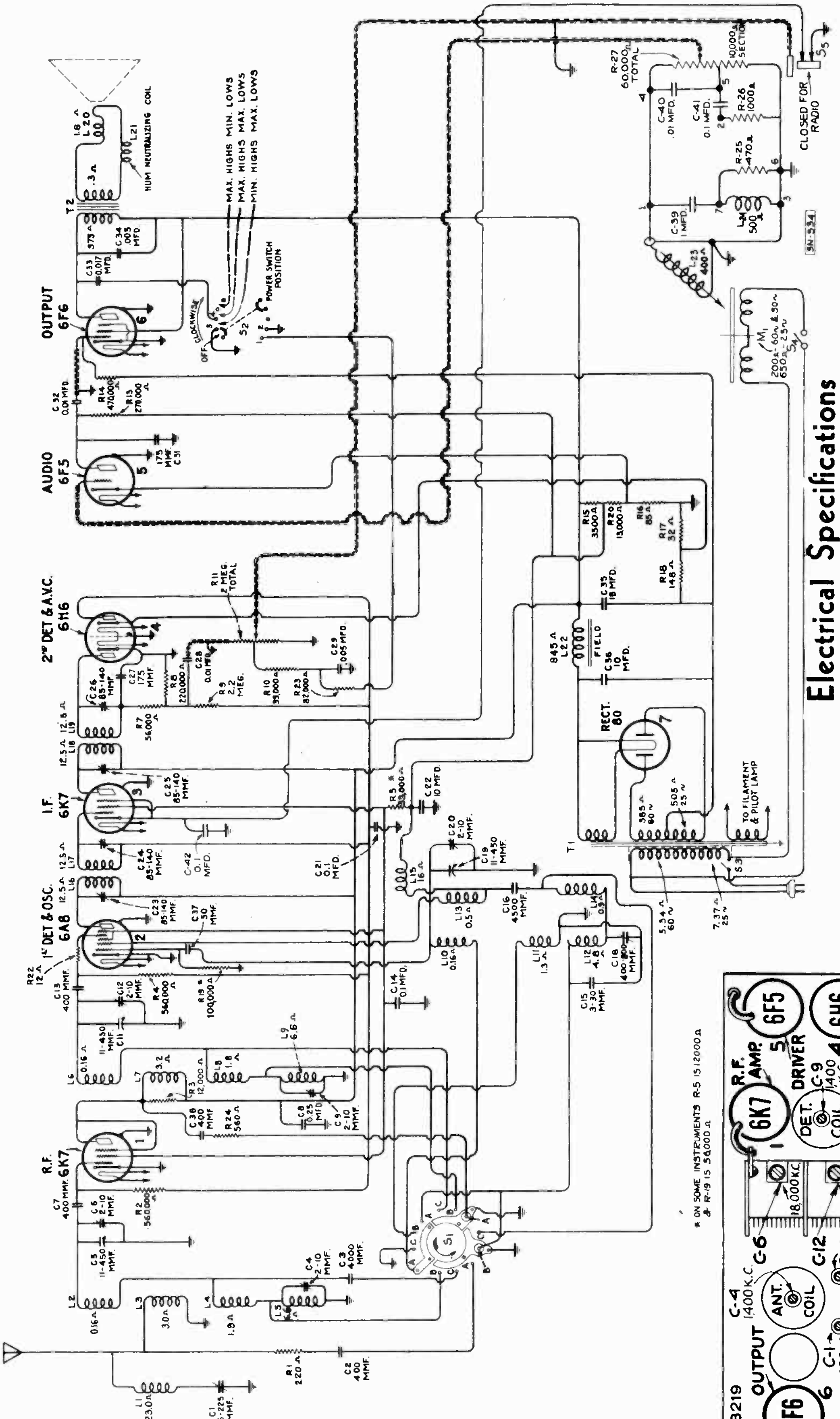
Stock No.	Description	List Price
3118	Resistor—100,000 ohms—Carbon type—¼ watt—(R19*)—Package of 5	1.00
8072	Resistor—33,000 ohms—Carbon type—½ watt—(R5*)—Package of 5	1.00

— NOTES —

(1) Beat notes or heterodyning (whistles) may be encountered in some instances on these receivers due to excessive antenna capacitance. This condition may be corrected by reducing the size of the antenna or by inserting a 150 mmfd. capacitor in series with the antenna lead. This may be accomplished in the receiver by removing the bus lead which connects from the antenna terminal to the wave trap inductance L-1 and inserting the condenser between these points.

RCA MFG. CO., INC.

MODEL D7-7
Schematic, Socket
Trimmers



Electrical Specifications

FREQUENCY RANGES

Band A.................540- 1,625 kc.
Band B.................1,625- 5,700 kc.
Band C.................5,700-18,000 kc.

ALIGNMENT FREQUENCIES

Band A.... 600 kc. (osc.), 1,400 kc. (osc., det., ant.)
Band B..None required
Band C.......................................18,000 kc. (osc., det., ant.)

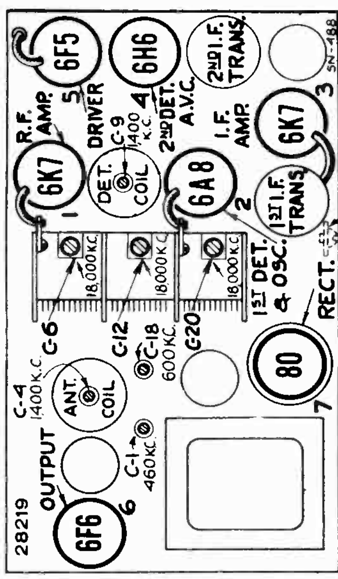
Intermediate Frequency .... **460 kc**

LOUDSPEAKER

Type ....12-inch Electrodynamic
Voice Coil Impedance.......2¼ Ohms at 400 Cycles

POWER OUTPUT RATINGS

Undistorted ....2¼ Watts
Maximum ....5 Watts

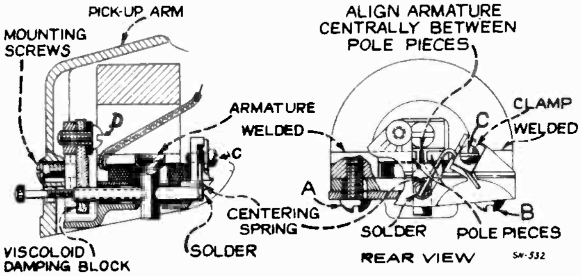


1400 K.C. OSC. (C-15) ADJ. CENTER REAR OF CHASSIS

Figure 1—Radiotron and Coil Locations

MODEL D7-7
Chassis Wiring
Pickup

RCA MFG. CO., INC.



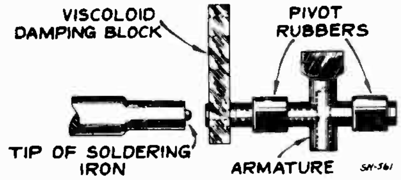
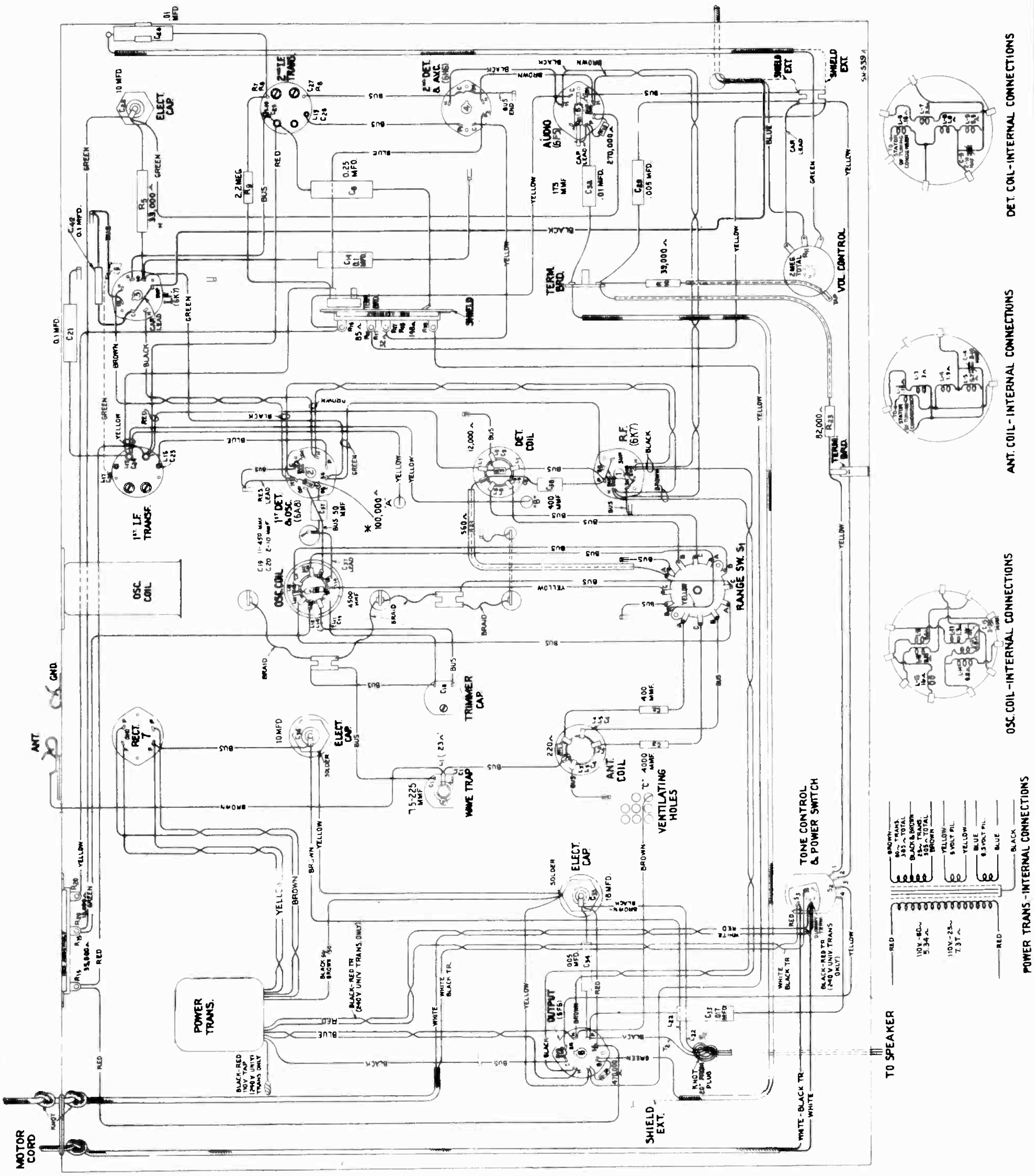


Figure 10—Special Soldering-Iron Tip



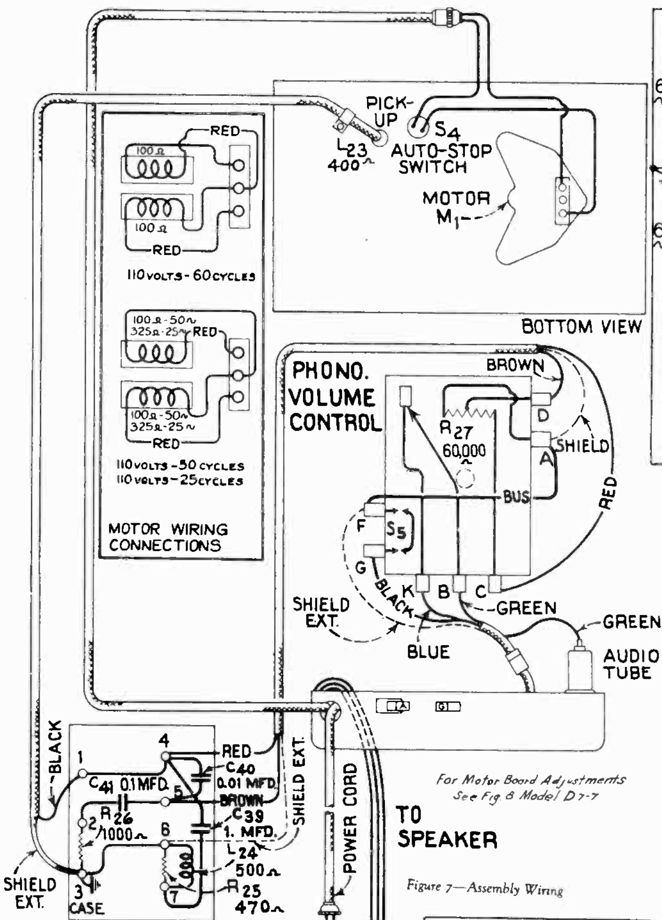


Figure 7—Assembly Wiring

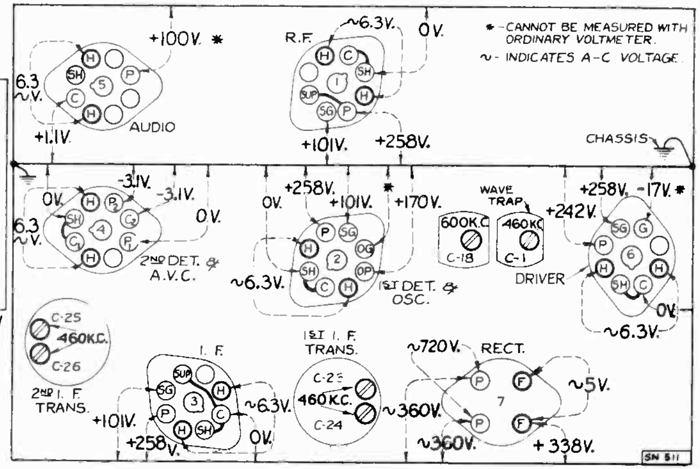


Figure 6—Radiotron Socket Voltages

Measured at 115 volts, 60 cycles—No signal input

Phonograph Mechanism

The phonograph mechanism is of the manually operated type, having a synchronous motor which rotates the turntable at a speed of 78 R.P.M. The 10-inch turntable will accommodate either the 10-inch or 12-inch phonograph records. The pickup mechanism and tone arm are combined as one unit. The instrument may be purchased with any one of five ratings as specified under Electrical Specifications. *It is important that a machine of any particular rating be operated at the frequency and voltage for which it is rated.* Attempts to operate at ratings other than specified for the particular instrument will result in improper reproduction from the phonograph and may result in damage to both the phonograph motor and radio receiver. An automatic switch is provided to turn "off" the phonograph motor at the completion of record play.

Tuning Dial

The tuning dial is an illuminated semi-airplane type. Each band is distinctively marked with a separate color for each band. Positions of the range selector knob are plainly marked on the control panel with letters indicating each band position placed over color strips corresponding to the band colors on the dial. The tuning control is of the dual-ratio type which permits fast tuning through a 10-to-1 drive ratio and vernier tuning through a 50-to-1 drive ratio. The latter is especially advantageous for accurate tuning of the short-wave stations. The new shock-proof condenser mounting reduces microphonic tendencies to a minimum.

Circuit Arrangement

The conventional Superheterodyne type of circuit, consisting of an r-f stage, a combined first-detector–oscillator stage, a single i-f stage, a diode-detector–automatic-volume-control stage, an audio voltage amplifier stage, an audio power output stage and a high-voltage rectifier power-supply stage, is used.

Tuned Circuits

The antenna coil system and the detector coil system each consist of a single primary and three series-connected secondary windings to provide the three ranges of tuning. The oscillator coil system is similarly wound on a single form. A range selector switch (S-1) is used for connecting the various sections of these three coil systems into the circuit to provide operation on the band desired. The coils are tuned by a variable three-section gang condenser having trimmer capacitors in shunt with each section. There are additional trimmer capacitors across the section of each coil used for Band "A." A series trimmer is also associated with the Band "A" oscillator coil.

The intermediate frequency amplifier system consists of an RCA-6K7 in a transformer-coupled circuit. This stage operates at a basic frequency of 460 kc. Each winding of both I-f transformers (input and output) is tuned by an adjustable trimmer.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f stage is detected by an RCA-6H6 twin-diode tube. The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R-8, is applied as automatic control-grid bias to the r-f, first-detector, and i-f tubes through a suitable resistance filter circuit. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R-8 and R-9, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current and the a.v.c. diode takes over the biasing function.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector diode and the input grid of the audio-voltage-amplifier tube. This control has a tone compensating filter connected to it so that the correct aural balance will be obtained at different volume settings.

Resistance-capacitance coupling is used between the first audio stage and the power output stage. The output of the power amplifier is transformer-coupled into the dynamic loudspeaker. High-frequency tone control is effected by a capacitor across the plate circuit of the output tube. Speech-music control is effected by a resistor connected to the compensated volume control circuit. Control of tone is obtained by means of the switch (S-2).

Rectifier

The power required for operation of this receiver is supplied through transformer T-1. This transformer has an efficient electrostatic shield between its primary and secondary windings. This shield prevents interference which is on the power-supply circuit from entering the receiver and conversely reduces the tendency of the receiver to re-radiate into the power circuit. An RCA-80 furnishes the d-c voltages necessary for plate, screen, cathode, and grid potentials.

The field winding of the loudspeaker is used as a reactor in the filter circuit from which it simultaneously receives its magnetizing current. The heaters of all Radiotrons are supplied from a low voltage (6.3 volt) winding on the power transformer. One side of this winding is at ground potential.

SERVICE DATA

The various diagrams of this bulletin contain such information as will be needed to isolate causes for defective operation when such a condition develops. Values of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the diagrams and the replacement parts list. Locating of the parts in the schematic circuit is facilitated by the fact that the numerical titles increase from left to right on the diagram. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Resistances of less than one ohm are generally omitted.

Alignment Procedure

Precise alignment is vital to the proper functioning of this receiver. There are four trimming adjustments provided in the i-f system, three in the oscillator coil system, two in the detector coil system, and two in the antenna coil system. Each of these trimmers has been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions of climate or have been altered for service purposes. Incorrect alignment is usually evidenced by loss of sensitivity, improper tone quality, and poor selectivity. These indications will generally be present together.

The correct performance of the receiver can only be obtained when the alignment is performed with adequate and reliable test apparatus. The manufacturer of this instrument has a complete assortment of such service equipment available. This equipment, illustrated and described on a separate page of this booklet, may be purchased from authorized distributors and dealers.

An oscillator (signal generator) is required as a source of the specified alignment frequencies. Visual indication of the receiver output during the adjustments is necessary to enable the serviceman to obtain an accuracy of alignment which is not possible by listening to the signal. **The RCA Victor Stock No. 9595 Full-Range Oscillator and the RCA Victor Stock No. 4317 Neon Output Indicator are especially suitable and fulfill the above requirements.**

The following procedure should be followed in adjusting the various trimmer capacitors:

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 6. Each must be aligned to a basic frequency of **460 kc.** To do this, attach the Output Indicator across the voice coil circuit or across the output transformer primary. Connect the output of the test oscillator between the control-grid of the RCA-6A8 first detector tube and chassis-ground. Tune the oscillator to **460 kc.** Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or the heterodyne oscil

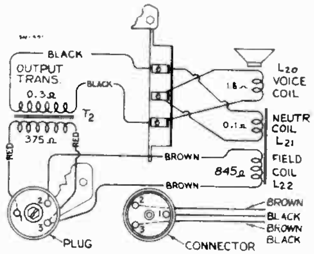


Figure 4—Loudspeaker Wiring

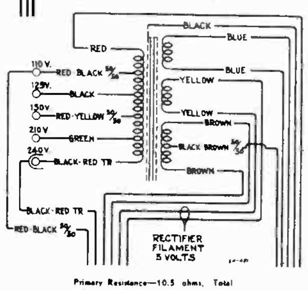


Figure 5—Universal Transformer

MODEL D7-7
Alignment, Part 2
Parts List

RCA MFG. CO., INC.

lator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator. Then adjust the two trimmers, C-25 and C-26, of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two trimmers, C-23 and C-24, of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i-f trimmers a second time to assure that the inter-action between them has not disturbed the original adjustment.

R-F Trimmer Adjustments

The seven trimmers associated with the r-f, first detector, and oscillator tuned circuits have their locations shown by Figure 1. The three trimmers which are at all times directly in shunt with the variable tuning condenser necessitate that the high-frequency range (Band C) be aligned first. The range selector switch should, therefore, be turned to its Band C position for the first adjustment. The Output Indicator should be left connected to the output system. Attach the output terminals of the test oscillator to the antenna and ground terminals of the receiver.

Calibrate the dial by rotating the tuning control until the variable condenser plates are in their full mesh (maximum capacity) position and adjusting the dial pointer so that its end points to the ***horizontal*** graduation (530 kc.) at the low frequency end of the Band A scale.

Proceed further as follows:

(a) Adjust the test oscillator to **18,000 kc.** and set the receiver tuning control to a dial reading of **18,000 kc.**

(b) Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the trimmer, **C-20**, on the oscillator section of the variable condenser to the point at which it produces maximum indicated receiver output. Two points may be found, each of which produces such a maximum. The one of ***maximum trimmer capacitance*** is correct and should be used. (The oscillator will be 460 kc. below the signal frequency at this adjustment point.)

(c) Adjust the trimmer, **C-12**, of the detector section of the variable condenser, simultaneously rocking the receiver tuning control backward and forward through the **18,000 kc.** input signal, until maximum receiver output results from these combined operations. Rocking of the variable condenser will prevent inaccurate adjustment which would otherwise be caused by the inter-action between the heterodyne oscillator circuit and the detector tuned circuit.

(d) With the receiver tuning control set to **18,000 kc.** adjust the trimmer, **C-6**, on the antenna section of the variable condenser to the point which produces maximum (peak) indicated receiver output.

(e) Change the receiver range selector to its Band A position and set the receiver tuning control to a dial reading of **1,400 kc.** Tune the test oscillator to **1,400 kc.** and regulate its output to produce a slight indication on the receiver output indicating device.

(f) Adjust the high frequency trimmers of the **Band A** oscillator, detector, and antenna coils, **C-15, C-9,** and **C-4** respectively, to the points at which each produces maximum indicated receiver output.

(g) Shift the test oscillator frequency to **600 kc.** and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(h) Tune the low frequency trimmer, **C-18,** of the oscillator Band A coil, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum indicated receiver output results from these combined operations. The adjustment of **C-20, C-12,** and **C-6** should be corrected at **18,000** kc. as in (b), (c), and (d); also **C-15, C-9,** and **C-4** should be corrected at **1,400** kc. as in (f) to compensate for any changes caused by the adjustment of the low frequency oscillator coil trimmer.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to chassis on Figure 6 will assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1000 ohms per volt will be satisfactory when the range used for each reading is chosen as high as possible consistent with good readability.

Universal Transformer

The special transformer used on some receivers of this type is adaptable to several ranges of voltage as given under Rating C of Electrical Specifications. Its schematic and wiring are shown by Figure 5. Terminals are provided at the top of the transformer case for changing the primary connections to suit the voltage available. Note that a 110-volt tap is brought out separately for supplying a phonograph motor.

Wave-Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference. This trimmer is adjusted to 460 kc. during manufacture, however, local conditions may require a readjustment, depending upon the interfering frequency.

Phonograph Mechanism

The phonograph motor is of the synchronous type and designed to be simple and foolproof. Under normal operating conditions, service difficulties should be negligible. Occasionally, however, certain adjustments may be required. These adjustments are illustrated and explained in Figure 8.

Magnetic Pickup

The pickup used in the phonograph unit is of an improved design. The horseshoe magnet is rigidly welded to the pole pieces and is irremovable. There is a centering spring attached to the armature to maintain proper adjustment and to provide a limiting effect on the movement of the armature. The frequency response is substantially uniform over a wide range. Service operations which may be necessary on the pickup are as follows:

Centering Armature

Refer to Figure 9 showing the pickup inner structure. The armature is shown in its proper relation to the magnet pole pieces, i. e., exactly centered. Whenever this centering adjustment has been disturbed it will be necessary to remove the pickup mechanism from the tone arm by removing the needle holding screw and the two mounting screws from the front of the tone arm, holding the pickup assembly to keep it from dropping. Unsolder the two leads from the lugs on the terminal board at the rear of the pickup. Insert a small rod or nail into the armature needle hole and replace the needle holding screw, tightening it to hold the rod securely. If the armature clamping screws **A** and **B** have not been disturbed, screw **C** should be loosened which will permit the armature to be moved from side to side, the rod acting as a lever to perform this operation. The proper adjustment is obtained when the armature is moved to the extreme position on each side (the movement being limited by the armature striking the pole pieces) and then brought to the mid position between these two extremes. Screw C should then be tightened. The armature position should then be central between the pole pieces and at right angles to them. With a little practice, the correct adjustment of the armature will be obtained. The air gap between the pole pieces and the armature should be kept free from dust, filings, and other foreign material which would obstruct the movement of the pickup armature.

Damping Block

The viscoloid damping block which is attached to the front end of the armature shank serves as a mechanical filter to eliminate undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block, the pickup mechanism should be removed from the tone arm as explained above. Then unsolder the pickup coil leads from the two lugs on the pickup terminal board and remove the terminal board mounting screw and the terminal board. Then remove screw D and the damping block from the pickup assembly. Make sure that the shaft of the armature which contacts the viscoloid is clean. Then insert the new damping block so that it occupies the same position as that of the original block, and is in correct vertical alignment with the armature. The hole in the block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the damping block properly aligned on the armature, screw D with its washer should then be replaced. Heat should be applied to the armature (viscoloid side) so that the damping block will fuse at the point of contact and become rigidly attached to the armature. A special-tip soldering iron, constructed as shown in Figure 10, will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block, causing a small bulge on both sides.

Replacing Coil

Whenever there is defective operation due to an open or shorted pickup coil, this coil should be replaced. Remove the pickup mechanism and terminal board as described above. Remove screws A and B and the magnet assembly. Remove the bakelite coil support (with coil attached) and insert the new coil support assembly in its place, after which replace the magnet assembly and center the armature as described above, then reassemble the remainder of the unit. Only rosin core solder should be used for soldering the coil leads and pickup leads to the pickup terminal board. This same type of solder should be used when necessary for soldering the centering spring to the armature.

Magnetizing

Loss of magnetization will not usually occur when the pickup has received normal care due to the fact that the magnet and pole pieces are one unit and the magnetic circuit remains closed at all times. When the pickup has been mishandled, subjected to a strong a-c field, jolted, or dropped, there may be an appreciable loss of magnetic strength, in which case it will be necessary to remagnetize the entire structure. To do this, it will be necessary to first remove the pickup mechanism from the tone arm, and then remove the magnet assembly. Place the magnet assembly on the poles of a standard pickup magnetizer such as the ***RCA Stock No. 9549 Pickup Magnetizer*** and charging the magnet in accordance with the instructions accompanying the magnetizer. It is preferable to check the polarity of the pickup magnet and to remagnetize it so that the same polarity is maintained.

Mechanical Specifications

Height	39¼ inches
Width	23 3/16 inches
Depth	14⅛ inches
Weight (Net)	65 pounds
Weight (Shipping)	85 pounds
Chassis Base Dimensions	13⅞ inches x 7⅝ inches x 2½ inches

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	$0.43
11759	Cable—Two-conductor shielded cable—complete with four-contact female connector	.92
11758	Cable—Three-conductor shielded cable—complete with four-contact male connector and grid contact cap—connects phonograph volume control to chassis cable	1.04
11350	Cap—Contact cap—Package of 5	.20
11465	Capacitor—Adjustable capacitor—(C18)	.48
11289	Capacitor—50 MMfd.—(C37)	.26
5116	Capacitor—175 MMfd.—(C31)	.18
11290	Capacitor—400 MMfd.—(C2, C7, C13, C38)	.25
11401	Capacitor—4000 MMfd.—(C3)	.38
4868	Capacitor—.005 Mfd.—(C29, C34)	.20
4906	Capacitor—.017 Mfd.—(C33)	.25
11395	Capacitor—.01 Mfd.—(C28)	.18
4858	Capacitor—.01 Mfd.—(C32)	.25
11414	Capacitor—0.1 Mfd.—(C42)	.20
4839	Capacitor—0.1 Mfd.—(C14)	.28
4841	Capacitor—0.1 Mfd.—(C21)	.22
5170	Capacitor—0.25 Mfd.—(C8)	.25
11240	Capacitor—10 Mfd.—(C36)	1.08
11387	Capacitor—10 Mfd.—(C22)	.86
5212	Capacitor—18 Mfd.—(C35)	1.16
5238	Clip—Antenna terminal board with clip, insulating strip and rivets	.14
11600	Coil—Antenna coil—(L2, L3, L4, L5, C4, R1)	1.78
11601	Coil—Detector coil—(L6, L7, L8, L9, C9, R3)	1.78
11602	Coil—Oscillator coil—(L10, L11, L12, L13, L14, L15, C15, C16)	2.15
6123	Connector—Four-contact male connector for cable, Stock No. 11758	.30
4153	Connector—Four-contact female connector for cable, Stock No. 11759	.48
11385	Condenser—Three gang variable tuning condenser—(C5, C6, C11, C12, C19, C20)	5.02
11673	Dial—Station selector dial	.78
11394	Foot—Chassis foot assembly—Package of 2	.70
11396	Indicator—Station selector indicator pointer	.25
5226	Lamp—Dial lamp—Package of 5	.70
11393	Resistor—Voltage divider resistor—comprising one 3,500 ohm and one 13,000 ohm sections—(R15, R20)	.74
11329	Resistor—Voltage divider resistor—comprising one 85 ohm, one 148 ohm, one 32 ohm sections—(R16, R17, R18)	.52
11369	Resistor—12 ohms—flexible type complete with contact cap—(R22)	.22
11324	Resistor—560 ohms—Carbon type—¼ watt—(R24)—Package of 5	1.00
3066	Resistor—12,000 ohms—Carbon type—1 watt—(R5*)—Package of 5	1.10
8072	Resistor—33,000 ohms—Carbon type—½ watt—(R5*)—Package of 5	1.00
11322	Resistor—39,000 ohms—Carbon type—¼ watt—(R10)—Package of 5	1.00
11282	Resistor—56,000 ohms—Carbon type—1/10 watt—(R19*)—Package of 5	.75
11365	Resistor—82,000 ohms—Carbon type—¼ watt—(R23)—Package of 5	1.00
3118	Resistor—100,000 ohms—Carbon type—¼ watt—(R19*)—Package of 5	1.00
11323	Resistor—270,000 ohms—Carbon type—¼ watt—(R13)—Package of 5	1.00
11172	Resistor—470,000 ohms—Carbon type—¼ watt—(R14)—Package of 5	1.00
11397	Resistor—560,000 ohms—Carbon type—1/10 watt—(R2, R4)—Package of 5	.75
11626	Resistor—2.2 megohms—Carbon type—¼ watt—(R9)—Package of 5	1.00
11603	Shield—Antenna or detector coil shield	.26
11604	Shield—Oscillator coil shield	.24
11383	Shield—Rectifier Radiotron shield	.20
11390	Shield—Intermediate frequency transformer shield	.25
11199	Socket—Dial lamp socket	.14
4794	Socket—4-contact rectifier Radiotron socket	.15
11198	Socket—7-contact 6K7—6F5—or 6H6 Radiotron socket	.15
11196	Socket—8-contact 6A8 or 6F6 Radiotron socket	.15
11386	Switch—Range switch—(S1)	1.16
11392	Switch—Tone control and power switch assembly—(S2, S3)	1.14
11388	Transformer—First intermediate frequency transformer—(L16, L17, C23, C24)	1.90
11389	Transformer—Second intermediate frequency transformer—(L18, L19, C25, C26, C27, R7, R8)	3.02
11384	Transformer—Power transformer—105-125 volts—50-60 cycles—(T1)	4.65
11725	Transformer—Power transformer—105-125 volts—25-50 cycles	6.60
11727	Transformer—Power transformer—105-130, 140-160, 195-250 volts—40-60 cycles	6.60
11391	Trap—Wave trap—(L1, C1)	1.22
11237	Volume Control—(R11)	1.20
	PICKUP AND ARM ASSEMBLY	
11731	Armature—Pickup armature	.64
11730	Cable—Pickup cable	.14
11732	Coil—Pickup coil (L23)	.60
4543	Damper—Pickup damper block complete with damper plate	.10
11728	Pickup and Arm Assembly—Complete	8.15
3811	Screw—Needle holding screw—Package of 10	.46
	MOTOR ASSEMBLY	
10194	Ball—Steel ball bearing—Package of 20	.25
11740	Base—Motor base and bearing assembly	1.45
11745	Cap—Turntable spindle cap—Package of 5	.30
11733	Coil—Stator assembly—comprising coil and laminations—105-125 volt, 60 cycle operation	2.96
11734	Coil—Stator assembly—comprising coil and laminations—105-125 volt, 50 cycle operation	3.08
11735	Coil—Stator assembly—comprising coil and laminations—105-125 volt, 25 cycle operation	3.08
11748	Damper—Motor damper assembly—comprising one damper, one damper plate, one screw, two rubber washers and one "C" washer	.20
11741	Motor—105-125 volts—60 cycle motor complete (M1)	11.10
11742	Motor—105-125 volts—50 cycle motor complete	11.10
11743	Motor—105-125 volts—25 cycle motor complete	11.60
11746	Tripper—Automatic brake tripper—located on rotor laminations	.16
11737	Turntable—Turntable assembly—complete with rotor laminations—60 cycle operation	4.80
11738	Turntable—Turntable assembly—complete with rotor laminations—50 cycle operation	4.80
11739	Turntable—Turntable assembly—complete with rotor laminations—25 cycle operation	5.05
4083	Washer—Leather washer—Package of 10	.20
4084	Washer—Metal washer—Package of 10	.26
	MOTOR BOARD ASSEMBLY	
11752	Brake—Automatic brake and switch—complete	2.50
11751	Bushing—Motor mounting bushing and spring assembly—comprising one bushing, one large washer, one cup washer, one spring, one small washer and two nuts	.74
4577	Connector—Two-contact male connector for power supply cable	.30
2947	Leather—Automatic brake friction leather—Package of 20	.50
11749	Lever—Brake mechanism actuating lever—fastens to pivot shaft under base of pickup arm	.28
11754	Lever—Friction lever assembly—complete	.38
11753	Plunger—Automatic brake trip plunger	.18
3261	Rest—Pickup rubber rest—Package of 5	.40
11750	Screw—No. 4-40x9/32-in. cone pointed headless set screw for brake mechanism actuating lever, Stock No. 11749—Package of 10	.22
11756	Spring—Automatic stop mechanism trip lever spring—Package of 10	.22
11757	Spring—Automatic stop mechanism brake lever spring—Package of 10	.20
11755	Switch—Automatic brake switch (S4)	.75
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board assembly with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil—(L22)	2.00
11233	Coil—Hum neutralizing coil—(L21)	.30
11258	Cone—Reproducer cone—(L20)—Package of 5	3.85
5118	Connector—3-contact male connector for reproducer	.25
5119	Connector—3-contact female connector plug for reproducer cable	.25
9619	Reproducer—Complete	6.05
11253	Transformer—Output transformer—(T2)	1.56
11886	Washer—spring washer used to hold speaker field coil securely—Package of 6	.20
	MISCELLANEOUS ASSEMBLIES	
11762	Box—Used needle box	.25
11764	Cable—Two-conductor shielded cable approximately 28-in. long, connects phonograph volume control to compensator pack	.56
11760	Compensator—Phonograph compensator pack—Comprising one 470 ohm and one 1,000 ohm resistors, one .01 Mfd., one 0.1 Mfd. and one 1.0 Mfd. capacitors, and one 0.25H reactor—(R25, R26, C39, C40, C41, L24)	3.85
11376	Escutcheon—Station selector escutcheon and crystal	.70
11582	Knob—Range switch knob—Package of 5	.50
11347	Knob—Volume control, power switch or phonograph volume control knob—Package of 5	.75
11610	Knob—Station selector knob assembly—comprising one large and one small knob—Package of 5	1.00
11763	Receptacle—Needle receptacle	.38
11210	Screw—Chassis mounting screw assembly—Package of 4	.28
11761	Screw—Motor board screw and finishing washer assembly—Package of 10	.28
11349	Spring—Retaining spring for knobs, Stock No. 11347, No. 11582 and small knob in Stock No. 11610—Package of 5	.15
4982	Spring—Retaining spring for large knob in Stock No. 11610—Package of 10	.26
11695	Volume Control—Phonograph volume control (R27, S5)	1.60

The prices quoted above are subject to change without notice.

—NOTES—

(1) Beat notes or heterodyning (whistles) may be encountered in some instances on these receivers due to excessive antenna capacitance. This condition may be corrected by reducing the size of the antenna or by inserting a 150 mmfd. capacitor in series with the antenna lead. This may be accomplished in the receiver by removing the brown lead which connects from the antenna terminal to the wave trap inductance L-1 and inserting the condenser between these points. Interference in the form of "beats" from a local station may frequently be remedied by tuning the antenna wave trap to that station. The wave trap will tune up to 700 kc.

RCA MFG. CO., INC.

MODELS T7-12, C7-14
Schematic
Chassis Wiring

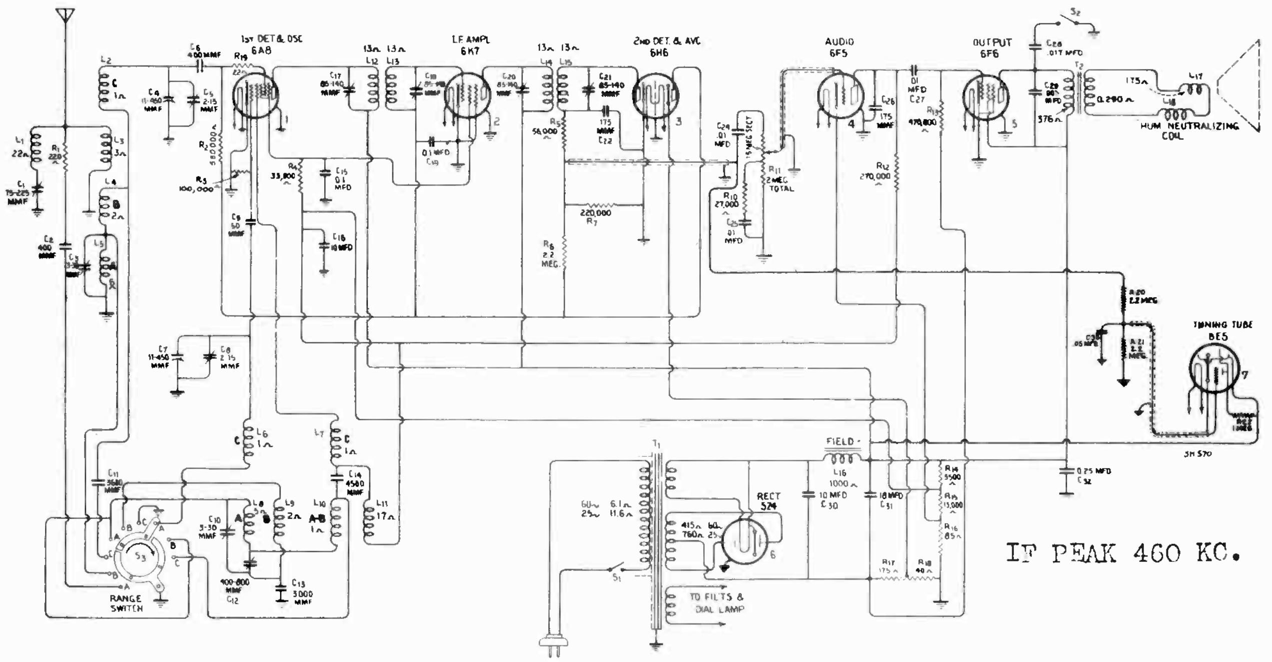


Figure 1—Schematic Circuit Diagram

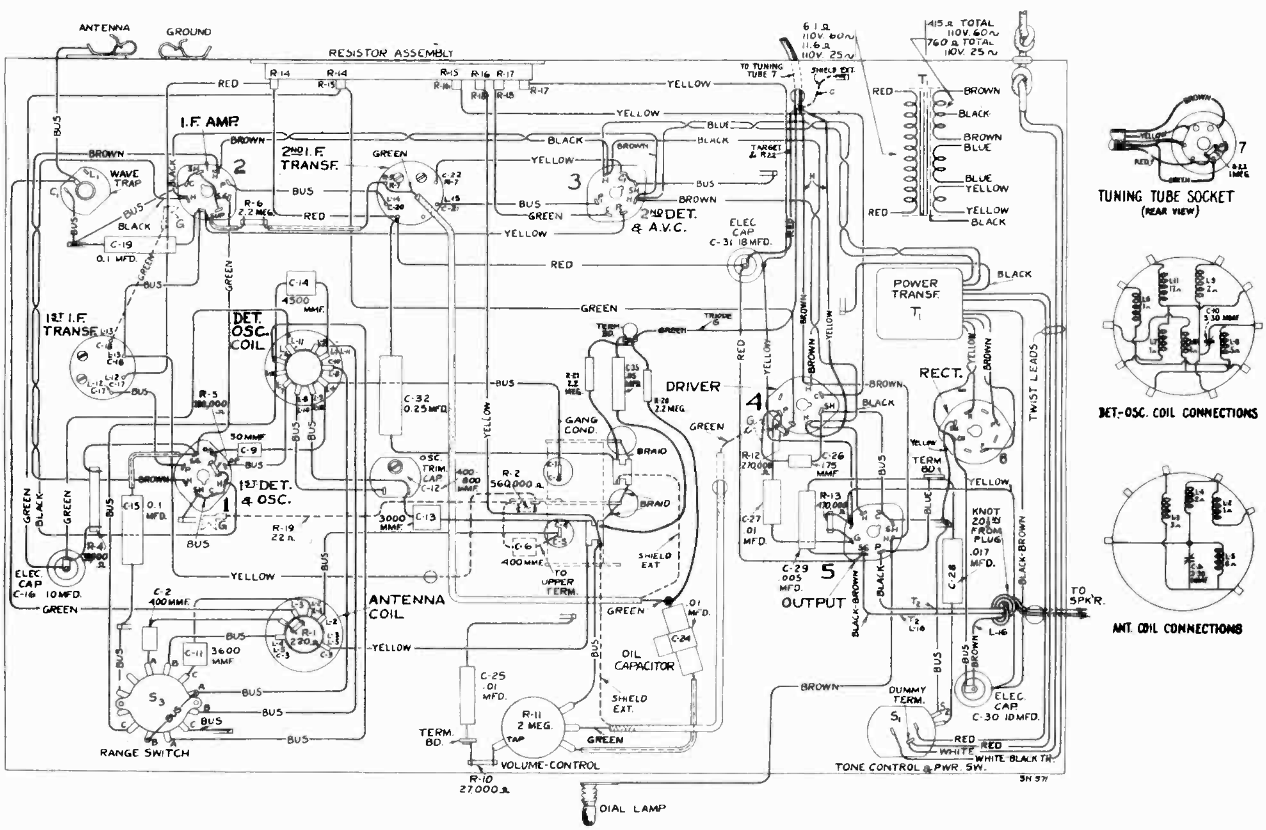


Figure 2—Chassis Wiring Diagram

MODELS T7-12,C7-14
Data,Parts List

RCA MFG. CO., INC.

Seven-Tube, Three-Band, A-C, Superheterodyne Receivers

TECHNICAL INFORMATION

Electrical Specifications

RADIOTRON COMPLEMENT

(1) RCA-6A8..................First Detector—Oscillator
(2) RCA-6K7....................Intermediate Amplifier
(3) RCA-6H6................Second Detector—A.V.C.
(4) RCA-6F5..................Audio Voltage Amplifier
(5) RCA-6F6....................Audio Power Amplifier
(6) RCA-5Z4.......................Full Wave Rectifier
(7) RCA-6E5.........................Tuning Indicator

FREQUENCY RANGES

Band A........................... 540— 1,625 kc.
Band B...........................1,625— 5,700 kc.
Band C...........................5,700—18,000 kc.

ALIGNMENT FREQUENCIES

Band A.............600 kc. (osc.), 1,400 kc. (osc., ant.)
Band B.................................None required
Band C........................18,000 kc. (osc., ant.)

Intermediate Frequency..**460 kc.**

POWER SUPPLY RATINGS

Rating A..105—125 volts, 50—60 cycles, 90 watts
Rating B..105—125 volts, 25—60 cycles, 90 watts
Rating C.............................100—130/140—160/195—250 volts, 40—60 cycles, 90 watts

POWER OUTPUT

Undistorted..................................2.0 watts
Maximum....................................4.5 watts

LOUDSPEAKER

Type.................................Electrodynamic
Voice Coil Impedance............2.25 ohms at 400 cycles

Mechanical Specifications

Chassis Base Dimensions.......................................12 inches x 7 inches x 2½ inches
Tuning Drive Ratio..10 to 1 and 50 to 1

MODEL T7-12

Height...................................24⅞ inches
Width....................................14⅞ inches
Depth....................................11 inches
Weight (Net)............................24 pounds
Weight (Shipping)......................28 pounds

MODEL C7-14

Height...................................40⅞ inches
Width....................................26½ inches
Depth....................................13⅜ inches
Weight (Net)............................43 pounds
Weight (Shipping).......................55½ pounds

General Description

These two models are similar to RCA Victor Models T6-1 and C6-2 respectively. The changes consist of (1) the addition of an RCA-6E5 Tuning Indicator, (2) an RCA-5Z4 all-metal rectifier used in place of the RCA-80, and (3) new cabinet design. All service data for Models T6-1 and C6-2 are directly applicable to these instruments except as follows:

Secondary resistance of Universal Transformer, 355 ohms total.

Tuning Tube Cable voltages: Yellow, 0 v.; Brown, 6.4 v. a-c; Red, 263 v.; and Green, 0 v.

The following parts listed for Models T6-1 and C6-2 are not required: Stock Nos. 4841 (C23), 11615, 11376, 11396, 11283, 5158, 11383, 11458, 11585, 11584, and 11230.

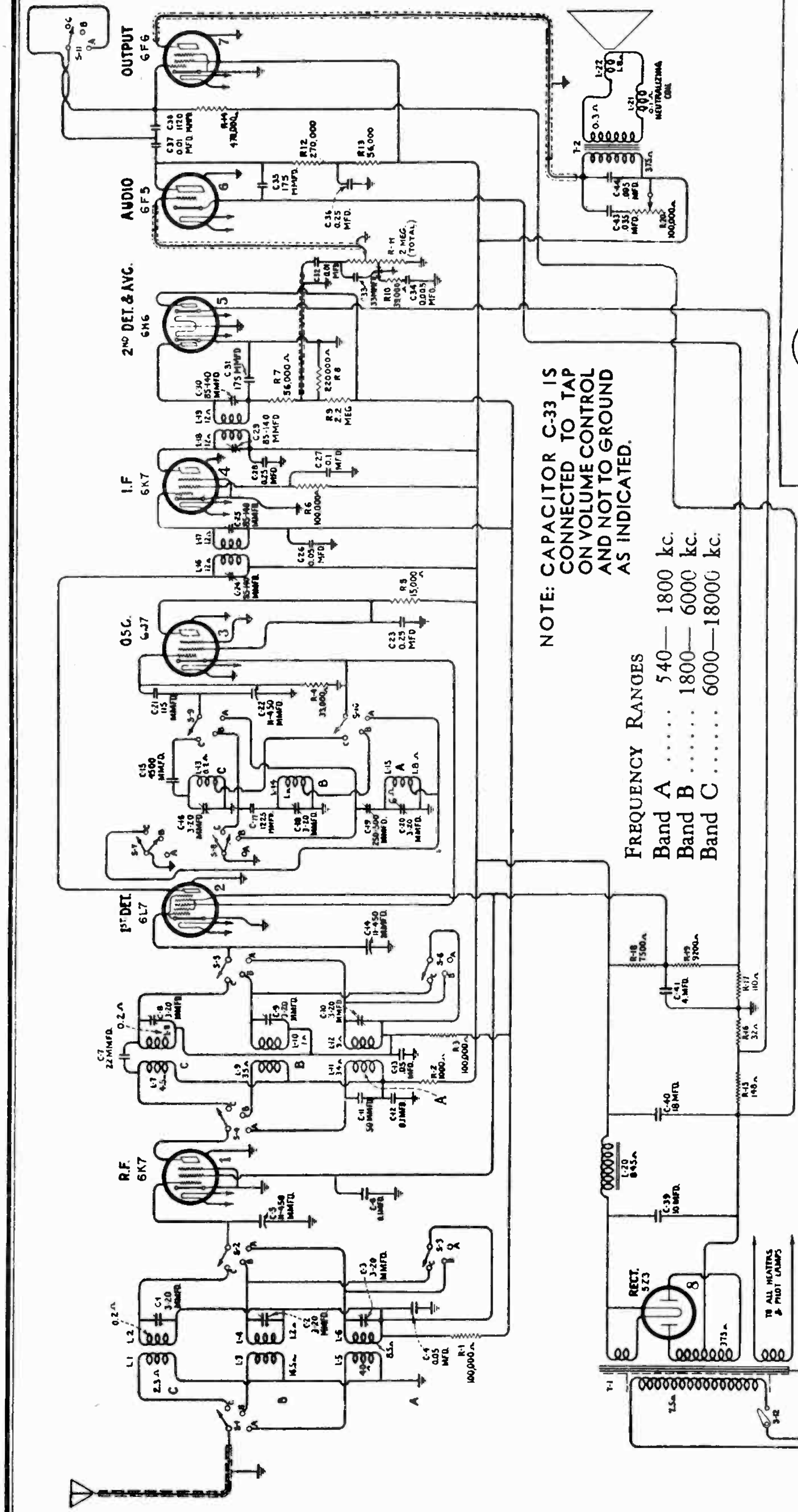
The parts listed below are required in addition to the remaining parts for Models T6-1 and C6-2 :

STOCK No.	DESCRIPTION	LIST PRICE
11996	Bracket—Tuning tube mounting bracket and clamp assembly	.22
11888	Cable—Tuning tube cable, complete with socket	1.06
4836	Capacitor—.05 Mfd. (C35)	.30
11894	Dial—Station selector dial scale	.65
11276	Escutcheon—Tuning tube escutcheon	.40
11893	Indicator—Station selector indicator pointer	.28
11455	Knob—Volume control or power switch knob—Package of 5	.48
11609	Knob—Range switch knob—Package of 5	.52
11610	Knob—Station selector knob assembly, comprising one large and one small knob—Package of 5	1.00
11382	Resistor—1 megohm—carbon type—1/10-watt (R22)—Package of 5	.75
11626	Resistc —2.2 megohms — carbon type — ¼-watt (R20, R21)—Package of 5	1.00
11210	Screw—Chassis mounting screw assembly —Console model—Package of 4	.28
11377	Screw—Chassis mounting screw assembly —Table model—Package of 4	.12
11199	Socket—Dial lamp socket	.14
11381	Socket—Tuning tube socket and cover	.45
11195	Socket—5-contact rectifier Radiotron socket	.15
11198	Socket—7-contact Radiotron socket	.15
11196	Socket—8-contact Radiotron socket	.15
11349	Spring—Retaining Spring for knob, Stock Nos. 11455 and 11609, and small knob in Stock No. 11610—Package of 5	.15
4982	Spring—Retaining spring for large knob in Stock No. 11610—Package of 10	.26
11848	Transformer—Power transformer—105-125 volts—50-60 cycles (T1)	4.40
11849	Transformer—Power transformer—105-125 volts—25-50 cycles	5.70
11850	Transformer—Power transformer—100-130 —140-160—195-250 volts—40-60 cycles	8.00
11886	Washer—Spring washer used to hold field coil securely—Package of 5	.20

The prices quoted above are subject to change without notice.

RCA MFG. CO., INC.

MODELS T8-14, C8-15
Schematic, Socket
Trimmers, Speaker



NOTE: CAPACITOR C-33 IS CONNECTED TO TAP ON VOLUME CONTROL AND NOT TO GROUND AS INDICATED.

FREQUENCY RANGES

Band A .... 540— 1800 kc.
Band B .... 1800— 6000 kc.
Band C .... 6000—18000 kc.

INTERMEDIATE FREQUENCY 460 KC

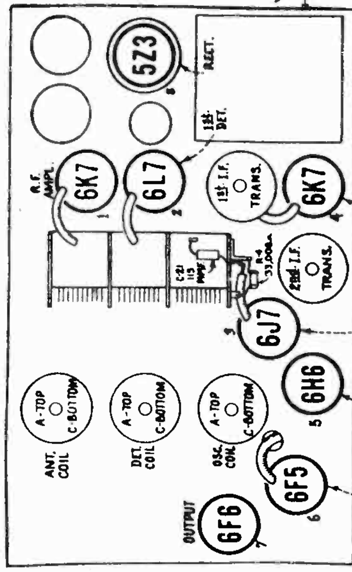


Figure 4—Coil and Radiotron Locations

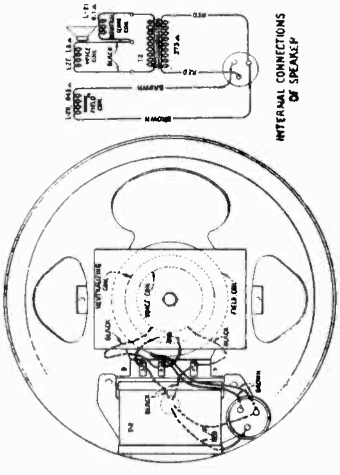


Figure 3—Loudspeaker Wiring

MODELS T8-14,C8-15
Chassis Wiring

RCA MFG. CO., INC.

MECHANICAL SPECIFICATIONS

	MODEL T 8-14	MODEL C 8-15
Height	19⅞ inches	39 inches
Width	16 inches	25¼ inches
Depth	11¾ inches	12¼ inches
Weight (Net)	35 pounds	52 pounds
Weight (Shipping)	41 pounds	68 pounds

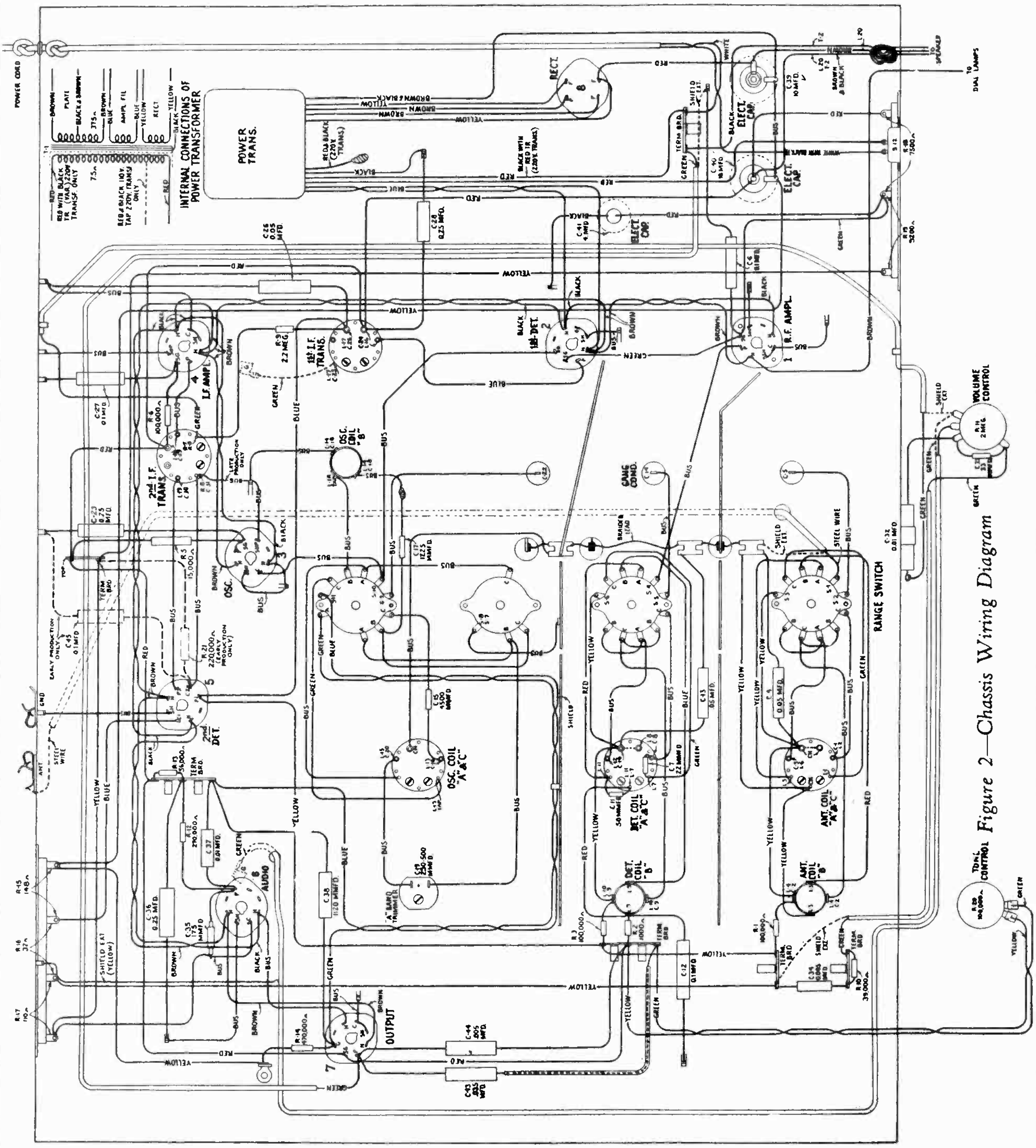


Figure 2—Chassis Wiring Diagram

RCA MFG. CO., INC.

MODELS T8-14,C8-15
Voltage,Transformer
Visual Alignment,Data

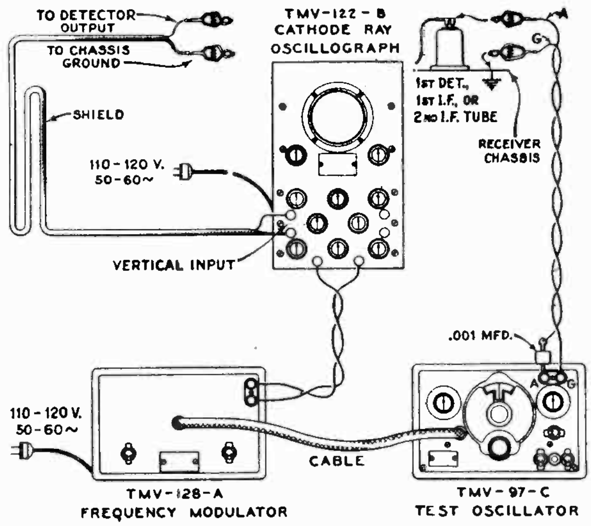


Figure 5—Alignment Apparatus Connections

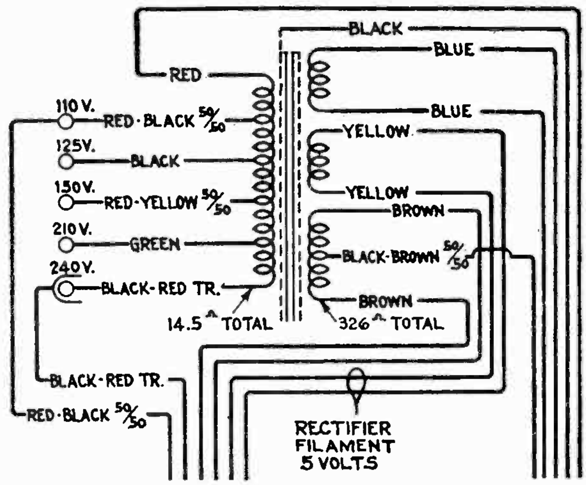


Figure 7—Universal Power Transformer Connections

Voltage and Frequency

Rating A....105—125 volts, 50—60 cycles
Rating B....105—125 volts, 25—60 cycles
Rating C....100—130/140—160/195—250 volts, 40—60 cycles

Power Consumption....105 watts

Undistorted Output....2 watts

Maximum Output....4½ watts

Loudspeaker....{C 8-15—12 inch, Electrodynamic
T 8-14— 8 inch, Electrodynamic

Voice Coil Impedance....2¼ ohms at 400 cycles

Intermediate Frequency....460 kc.

Alignment Frequencies

Band A....600 kc. (osc), 1720 kc. (osc, ant, det)
Band B....6132 kc. (osc, ant, det)
Band C....18000 kc. (osc, ant, det)

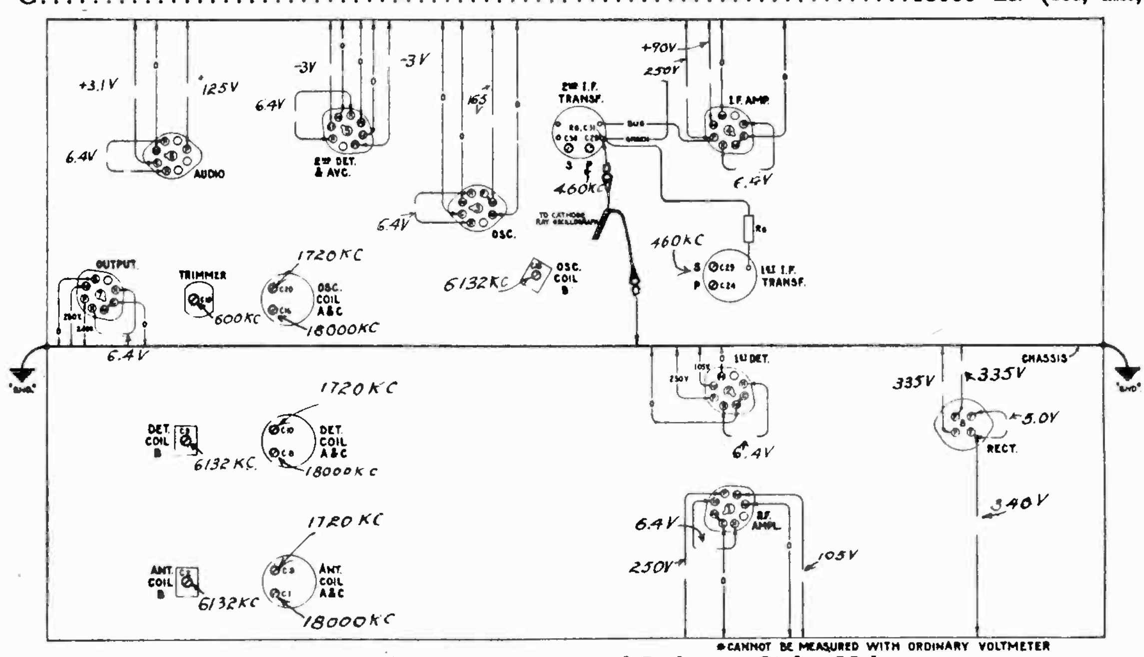


Figure 6—Trimmer Locations and Radiotron Socket Voltages
Measured at 115 volts A.C.—No Signal—Volume Control Maximum

MODELS T8-14, C8-15
Circuit Data
Alignment

RCA MFG. CO., INC.

GENERAL FEATURES

These two instruments are alike in chassis construction and design. The table model employs an 8 inch loudspeaker while the console model uses a 12 inch unit. The following features are of outstanding interest:—

Metal Tubes

This receiver uses the new metal tubes which are much smaller in size than the corresponding glass types. The high frequency efficiency of these metal tubes is greater, because of; the shorter lengths of leads, lesser interelectrode capacitance and the more complete shielding of the metallic envelopes. Their rugged construction prevents breakage and reduces microphonic tendencies. The bases and sockets of all types have a standardized arrangement of connecting prongs.

Dial Drive

An open face airplane type of dial is used. Each scale has a band of color adjacent to its graduations and three short strips of corresponding colors at the lower part of the dial for index purposes. An index pointer, which moves as the band switch is rotated, points to one of these colors to identify the band in use. The drive mechanism is variable, there being either a 50 to 1 or 10 to 1 ratio available between the tuning knob and condenser drive shaft.

Tuning Condenser

The variable tuning condenser is supported by a new design of shock-proof mount which has been developed by our engineers to prevent chassis vibration from producing audio frequency "howl"

Plug-In Loudspeaker

A readily detachable plug type of connection is used in the chassis to loudspeaker cable. This permits ready removal for service.

First Detector

This stage has unusually good high frequency mixing efficiency. The tube used, an RCA-6L7, is a new hexode type. The signal is supplied to the first control grid and the oscillator voltage is fed in on a second control grid, a screen grid separating the two. The arrangement of the grids prevents degenerative diffi-

CIRCUIT FEATURES

The circuit is based upon the Superheterodyne principle. The three ranges of tuning are covered by three sets of coils. A single r-f stage provides the desired selectivity and gain ahead of the hexode first detector tube. The oscillator stage operates separately from the first detector. A single stage i-f system is employed. Its basic frequency is 460 kc. Diode detection is performed by a double diode RCA-6H6 Radiotron. Automatic volume control is provided by this same tube. The audio system consists of two stages, one an RCA-6F5, and the output, an RCA-6F6. High voltages for plate and bias supplies are obtained from an RCA-5Z3 full wave rectifier through an efficient filter. The field of the loudspeaker acts as a reactor in the filter circuit. Further details of the circuit are as follows:—

Oscillator

The oscillator circuit has extreme stability of frequency and good uniformity of output over the tuning ranges. These qualities assure that the tuning of the receiver will not drift as the line voltage varies or the receiver heats. The action of the circuit is such that when the cathode emission tends to change with line voltage or because of other reasons, the variation of voltage drop in the plate and screen resistor restores the operating characteristics of the tube to normal and thus maintains constancy of the generated signal

culties, particularly at the higher frequencies. The second grid is direct-connected to the cathode of the oscillator and has no d-c bias.

Compensated Volume Control

The variation in response of the human ear with different degrees of volume is compensated for by a resistor and condenser network in the manual volume control circuit. The volume control itself is an acoustically tapered potentiometer which provides equal changes of sound intensity for the listener per degree of rotation.

Range Switch

The band change switch has several functions. It exchanges the antenna, detector and oscillator coils in order to select the range desired. At the same time, it shorts out the unused coils so as to eliminate their absorptive effects. It also varies the fidelity by shorting a coupling condenser in the audio system to provide the desired reproduction for short as well as long wave reception.

Tone Control

Provision is included for variable reduction of high frequencies. This consists of a resistor and condenser combination across the primary winding of the output transformer, the resistor being the variable element. As it is decreased, the high frequency response limit is lowered.

Power System

The power transformer has its primary winding capacitively shielded from its secondary windings to eliminate transfer of line disturbances into the receiver and to stop any tendency for the circuit to radiate into the line. Rectification is performed in the usual manner by a full wave tube.

Detection and A.V.C.

The modulated signal as obtained from the output of the i-f system is detected by an RCA-6H6 double diode tube. The audio frequency secured by this process is passed on to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R-8, is applied as automatic control grid bias to the r-f, first detector and i-f tubes through suitable resistance-capacitance filter circuits. The second diode of the RCA-6H6 is used to supply residual bias for these controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current, which flows through R-9 and R-8, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain low level, however, the auxiliary bias diode ceases to draw current and the a.v.c. diode takes over the biasing function.

SERVICE DATA

The various diagrams of this booklet contain such information as will be needed for servicing the receiver. The ratings of all resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. The coils, reactors and transformer windings are rated in terms of their d-c resistances only and where the value is less than one ohm, no rating is given. Identification titles such as R-3, L-2, C-1, etc., are provided for reference between the illustrations and replacement parts list.

Alignment Procedure

There are a total of fourteen adjustments necessary for obtaining proper alignment when such a process becomes necessary. Four of these are involved with the i-f system and the remainder are associated with the antenna, first detector and oscillator coils.

Correct performance of the receiver can only be obtained when the trimmer adjustments have been made by a skilled service man with the use of adequate and reliable test equipment. Such apparatus as may be required for this particular instrument is illustrated and described on a separate page of this booklet.

Two methods of alignment are applicable. One utilizes a Cathode-Ray Oscillograph as a means of output indication and the other follows former procedure where a glow type indicator or meter is used. The oscillographic method is much to be preferred, since greater accuracy is possible and the time required is lessened. There are no approximations necessary as with the meter or aural method, but each adjustment can be made with excellent precision. Both methods are hereinafter outlined so that alignment operations may be made according to the equipment available.

It is wise to determine the necessity for alignment as well as the direction of misalignment before making adjustments. The RCA Tuning Wand is an instrument designed particularly for such a purpose.

The Tuning Wand consists of a bakelite rod having a small brass cylinder at one end and a core of finely divided iron at the other. It may be inserted into a tuned coil while a signal of the normal resonant frequency is being supplied to such coil to obtain an indication of the tuning. Holes are provided at the top of each shield can for entrance of the Wand. The presence of either end of the Wand will cause a change in tuning which will be indicated at the receiver output as an increase or decrease in signal level. If there is a decrease of output when either end is inserted, the tuning is correct and will require no adjustment. However, should there be an increase of output due to the iron core and decrease with the brass cylinder, an increase in inductance or capacitance is indicated as necessary to bring the circuit into line. The trimmer involved should therefore be increased accordingly. If the brass cylinder end causes an increase in output while the iron end causes a decrease, reduction of inductance will be necessary to place the circuit in alignment. This is equivalent to decreasing the trimmer concerned. The following tabulation gives the various changes and the adjustments required:—

WAND	SIGNAL	TRIMMER
Brass	Decrease	None
Iron	Decrease	
Brass	Increase	Decrease
Iron	Decrease	
Brass	Decrease	Increase
Iron	Increase	

(1) CATHODE-RAY ALIGNMENT

Equipment

A standard source of the specified alignment frequencies is required. Such a source should consist of an RCA Full Range Oscillator, Stock No. 9595. Output indication should be by means of an RCA Stock No. 9545 Cathode Ray Oscillograph. An RCA Stock No. 9558 Frequency Modulator will be needed to sweep the generated signal and synchronize it with the Oscillograph in order to make possible the visual representation of the resonant characteristic of the circuit being tuned on the cathode ray fluorescent screen.

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 6. Each must be aligned to a basic frequency of 460 kc. The last transformer must be aligned firstly and the first transformer aligned secondly. For such a process, it is necessary to feed the output of the Full Range Oscillator to the stages in their order of alignment, adjusting the trimmers of each transformer and observing the effect at the second detector output on the Cathode-Ray Oscillograph. The proper point of connection of the Oscillograph is with its vertical "high" input terminal attached to the juncture of R-7, R-8 and R-9 as illustrated in Figure 6, and with the "0" or ground terminal to the chassis. The "Ext. Sync." terminals of the Oscillograph should be connected to the Frequency Modulator as shown by Figure 5. A .001 mfd. capacitor installed in series with the Oscillator "Ant." lead will prevent the voltages of the stage under alignment from becoming upset. The vertical "A" amplifier should be "On" for the ensuing adjustments and the gain control kept at its maximum position. For each adjustment, the Oscillator output need be regulated so that the image obtained on the Oscillograph screen will be of sufficient size as to be accurately observable. Proceed further as follows:—

(a) Place the receiver, Oscillograph and test Oscillator in operation. Set the receiver range switch to Band "A" and tune the station selector to a point where no interference will be picked up, shorting the antenna and ground terminals if necessary. Set the Oscillograph horizontal "B" amplifier to "Timing" and control its gain so that the luminescent spot sweeps a straight line trace completely across the screen. Place the timing control to "Int." Adjust the intensity and focusing controls of the Oscillograph to produce the correct size and strength of the spot.

(b) Attach the output of the test Oscillator between the control grid cap of the RCA-6K7 i-f tube and chassis ground as shown typically by Figure 5. Tune the Oscillator to 460 kc. and set its modulation switch to "On". Regulate its output until the signal produces a wave pattern on the Oscillograph screen, adjusting the Oscillograph controls to give the desired number of cycles. Cause the image to stand still on the screen by manipulation of the frequency and synchronizing controls. Then carefully tune the two trimmers C-29 and C-30 of the second i-f transformer to produce maximum amplitude (vertical deflection) of the oscillographic image. Under this condition the transformer will be sharply resonated to 460 kc.

(c) The Frequency Modulator should then be placed in operation and interconnected with the Full Range Oscillator by means of the special shielded patch cord. Figure 5 shows the proper arrangement. Set the Frequency Modulator sweep range switch to its "Lo" position and turn the Oscillator modulation switch to "Off". Change the timing control of the Oscillograph to "Ext." and place the range switch to its No. 2 position. Then carefully shift the tuning of the Oscillator so as to increase its frequency, until two distinct and similar waves appear on the Oscillograph screen and become exactly coincident at their highest points. These curves will be found to occur at an Oscillator setting of *approximately 540 kc.* They will be identical in shape but appearing in reversed positions. Adjust the frequency control of the Oscillograph in order to cause the waves to conform with the above requirements and to make them remain motionless on the screen. This will require a setting of approximately ½ clockwise rotation of the frequency control. The trimmers C-29 and C-30 should then be re-adjusted so that the two curves move together and become exactly coincident throughout their lengths, maintaining the maximum amplitude at which this condition can be brought about.

(d) Leaving the equipment connected and adjusted as in (c), change the Oscillator output to the control grid cap of the RCA-6L7 first detector tube. Then adjust the first i-f transformer trimmers C-24 and C-25 so that the forward and reverse waves appearing on the Oscillograph coincide throughout their lengths and have maximum amplitude. The shape of the composite wave obtained from this operation is a true representation of the overall tuning characteristic of the i-f system. Each trimmer of the entire group should then be checked to assure that it is in correct alignment as indicated by the degree of coincidence and relative amplitude of the image on the Oscillograph screen.

R-F Trimmer Adjustments

Locations of the various antenna, detector and oscillator coil trimmers are shown by Figure 6. The test Oscillator should be removed from connection with the i-f system and its output connected to the antenna-ground terminals of the receiver. No changes are to be made in the connections of the Oscillograph at the second detector. During the following adjustments, the Oscillator output should be regulated as often as is necessary to keep the oscillographic image as low as is practically observable. Adherence to such a procedure will obviate the broadness of tuning that would result from a.v.c. action on a stronger signal. Proceed with the adjustments as follows:—

Calibration

Set the receiver range switch to Band A and rotate the station selector until the tuning condenser plates are in full mesh (maximum capacitance). Then move the main dial pointer until it points exactly to the horizontal line at the low frequency end of the Band A scale.

Band A

(a) With the receiver range switch in its Band A position, tune the station selector until the dial pointer is at a reading of 1720 kc. Adjust the test Oscillator to 1720 kc. (modulation "On" and Frequency Modulator disconnected) and increase its output to produce a registration on the Oscillograph. Carefully align the oscillator, detector and antenna trimmers C-20, C-10 and C-3 respectively, so that each brings about maximum amplitude of output as shown by the wave on the Oscillograph. It will be necessary to have the timing control of the Oscillograph on "Int." for this operation. After each trimmer has been peaked, the Oscillograph timing control should be set to "Ext." and the Frequency Modulator placed into operation with its connections to the Oscillator and Oscillograph made in accordance with Figure 5. Turn the modulation switch of the Oscillator to "Off" and retune the Oscillator (increase frequency) until the forward and reverse waves show on the Oscillograph and become coincident at their highest points. Adjust the trimmers C-20, C-10 and C-3 again, setting each to the point which produces the best coincidence and maximum amplitude of the wave images.

(b) Remove the Frequency Modulator cable from the Oscillator and shift the signal frequency to 600 kc. Place the modulation switch to "On". Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then insert the Frequency Modulator plug and retune the Oscillator (modulation "Off") until the two similar forward and reverse waves appear on the screen. For this adjustment, it is advisable to shift the Oscillator to its 200—400 kc. range and use the third harmonic of the generated signal in order to obtain the desired range of sweep. The oscillator series trimmer C-19 should then be adjusted to produce maximum amplitude of the images. No rocking will be necessary on the station selector inasmuch as the signal frequency is being "wobbled" by the Frequency Modulator to produce the same effect.
After completing this adjustment the trimmer C-20 should be re-aligned as in (a) to correct for any change brought about by the adjustment of C-19.

Band B

(a) Advance the receiver range switch to its Band B position and tune the station selector to a dial reading of 6132 kc. Set the test Oscillator to this same frequency (modulation "On" and Frequency Modulator disconnected) and increase its output until a suitable indication is apparent on the Oscillograph. The Oscillograph should be adjusted for "Int." timing. Then adjust the oscillator trimmer C-18 to the point at which maximum amplitude of the image is obtained. Two positions will be found for this trimmer which gives such a maximum. The one of least capacitance is correct and should be used. This can be checked by tuning the "image" signal, which will be received at 5212 kc. on the dial if the adjustment of C-18 has been properly made. An increase in test Oscillator output may be necessary for this test, however, *its frequency should not be changed from 6132 kc. nor any trimmer adjustments made on the receiver.*

(b) Return the station selector to the 6132 kc. reading and align the detector and antenna coil trimmers, C-9 and C-2 respectively, for maximum (peak) output as shown by the Oscillograph. No further adjustments are to be made on this band.

Band C

(a) Turn the range switch of the receiver to its Band C position and tune the station selector until the dial pointer reads 18,000 kc. Set the test Oscillator to the same frequency (modulation "On" and Frequency Modulator disconnected) and regulate its output to the level required for convenient observation. Adjust the trimmer C-16 to the point producing maximum output as indicated on the Oscillograph. Check for the presence of the proper "image" signal by tuning the receiver to 17,080 kc. The 18,000 kc. signal of the Oscillator will be received at this point if the adjustment of C-16 has been properly made using the position of least capacitance which gives maximum receiver output. It may be necessary to increase the output of the Oscillator in order to get an indication of the "image". *No adjustments should be made during this check.*

(b) Return the receiver tuning to 18,000 kc., re-align C-16 if necessary, and then adjust the detector and antenna trimmers, C-8 and C-1, for maximum signal output as evidenced by the oscillographic image. No further adjustments are to be made on this band.

(2) ALIGNMENT WITH OUTPUT METER

To align the receiver by means of an output indicator other than a Cathode-Ray Oscillograph will require the use of a standard test Oscillator such as that recommended above for the source of signals and means of indication for the output. The RCA Neon Output Indicator, Stock No. 4317 will be found very satisfactory for such use. It should be connected across the voice coil circuit of the loudspeaker or across the output transformer primary.

I-F Alignment

Connect the test Oscillator to the control grid cap of the i-f tube. Advance the volume control of the receiver to its full-on position. Tune the test Oscillator accurately to 460 kc. and align the trimmers C-29 and C-30 to give maximum receiver output. Regulate the Oscillator output during this adjustment so that the output indication is as small as can be conveniently observed. After completing the adjustments of these trimmers re-connect the Oscillator so that it will feed into the control grid circuit of the RCA-6L7 first detector. Then tune the first i-f transformer trimmers C-24 and C-25 for maximum receiver output.

R-F Alignment

After completing the i-f adjustments, it is advisable to correct the line-up of the circuits ahead of the first detector. The test Oscillator should be connected to the antenna-ground terminals of the receiver and the manual volume control kept at its maximum position. For each adjustment the Oscillator output should be maintained as low as possible in order to avoid broadness of tuning which would result from a.v.c. action on a stronger signal. Band A should be aligned by supplying a 1720 kc. signal to the receiver, tuning the station selector to a dial reading of 1720 and adjusting the trimmers C-20, C-10 and C-3 to produce maximum receiver output. The Oscillator should then be shifted to 600 kc. and the receiver tuned to resonate this signal, disregarding the reading at which it is best received. Trimmer C-19 must then be adjusted, simultaneously while rocking the station selector backward and forward through the signal until the maximum output results from the combined operations. C-20 should be rechecked to assure that its adjustment has not changed because of the trimming of C-19. Band B must be aligned at 6132 kc. by tuning the test Oscillator to such a frequency and turning the station selector to the same dial reading. Tune the trimmer C-18 to produce maximum receiver output, using the setting of least capacitance which causes same. The presence of the proper "image" may be checked by tuning the receiver to 5212 kc. at which point the 6132 kc. signal will be heard if the trimmer C-18 has been properly set to the position of least capacitance for maximum (peak) output. It may be necessary to increase the Oscillator output for this check. *No adjustments are to be made.* Return the station selector to the 6132 kc. dial marking and trim capacitors C-9 and C-2 for maximum receiver output. No other adjustments are necessary on Band B. Change the receiver so that it is operative and the dial reads 18,000 kc. on the "C" Band. Tune the test Oscillator to this same frequency. Then adjust the oscillator trimmer C-16 to produce maximum (peak) output. Two positions of this trimmer will be found which conform with this requirement. The one of least capacitance is correct. Check for the presence of "image" response at 17,080 kc. by shifting the receiver tuning. If it is received at such a point, the trimmer C-16 has been correctly adjusted to the right peak. *No adjustments are to be made during this check.* Tune the receiver back to the 18,000 kc. dial marking, re-adjust C-16 if necessary, and then tune the detector and antenna capacitors C-1 and C-8 for maximum receiver output. No further adjustments are necessary.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to chassis on Figure 6 will serve to assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1000 ohms per volt will be satisfactory when the range used for each reading is chosen as high as possible consistent with good readability.

Universal Transformer

The transformer used on some models of these receivers is adaptable to several ranges of voltage as given under rating C of Electrical Specifications. Its schematic and wiring are shown by Figure 7. Terminals are provided at the top of the transformer case for changing the primary connections to suit the voltage being used.

RCA MFG. CO., INC.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

REPLACEMENT PARTS

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
4427	Bracket—Volume control or high frequency tone control mounting bracket	$0.18
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	.43
11350	Cap—Contact cap—Package of 5	.20
11223	Capacitor—Adjustable capacitor (C19)	.46
11292	Capacitor—22 MMfd. (C7)	.24
11321	Capacitor—33 MMfd. (C33)	.26
11289	Capacitor—50 MMfd. (C11)	.26
11291	Capacitor—115 MMfd. (C21)	.24
5116	Capacitor—175 MMfd. (C35)	.18
4409	Capacitor—1120 MMfd. (C38)	.35
11288	Capacitor—1225 MMfd. (C17)	.30
11287	Capacitor—4500 MMfd. (C15)	.30
4868	Capacitor—0.005 Mfd. (C34, C44)	.20
4624	Capacitor—0.01 Mfd. (C32)	.54
4858	Capacitor—0.01 Mfd. (C37)	.25
5196	Capacitor—0.035 Mfd. (C43)	.18
4836	Capacitor—0.05 Mfd. (C4, C13, C26)	.30
4885	Capacitor—0.1 Mfd. (C6, C12, C27)	.28
4841	Capacitor—0.1 Mfd. (C45)	.22
5170	Capacitor—0.25 Mfd. (C23, C28, C36)	$0.25
11248	Capacitor—4 Mfd. (C41)	1.06
11240	Capacitor—10 Mfd. (C39)	1.08
5212	Capacitor—18 Mfd. (C40)	1.16
11272	Clamp—Antenna cable clamp—Located near antenna terminal	.10
4748	Clamp—Capacitor mounting clamp assembly—for stock #11248	.15
5215	Coil—Antenna coil (A and C Bands)—(L1, L2, L5, L6, C1, C3)	2.32
5245	Coil—Antenna coil (B Band)—(L3, L4, C2)	1.58
5216	Coil—Detector coil (A and C Bands)—(L7, L8, L11, L12, C8, C10)	2.34
5246	Coil—Detector coil (B Band)—L9, L10, C9)	1.62
5217	Coil—Oscillator coil (A and C Bands)—(L13, L15, C16, C20)	2.20
5247	Coil—Oscillator coil (B Band)—(L14, C18)	1.44
11214	Condenser—3-Gang variable tuning condenser (C5, C14, C22)	4.20
11238	Tone Control—High frequency tone control (R20)	.96
11237	Volume Control—(R11)	$1.20
4340	Lamp—Dial lamp—Package of 5	.60
8041	Plate—R.F. or I.F. coil shield locking plate—Package of 2	.12
11244	Resistor—Voltage divider resistor, comprising one 7500 ohm and one 9200 ohm section—(R18, R19)	1.08
11245	Resistor—Voltage divider resistor, comprising one 148 ohm, one 32 ohm and one 110 ohm section—(R15, R16, R17)	.62
5112	Resistor—1000 Ohm—Carbon Type—¼ Watt—(R2)—Package of 5	1.00
5114	Resistor—15,000 Ohm—Carbon Type—1 Watt—(R5)	.22

Stock No.	Description	List Price
11300	Resistor—33,000 Ohm—Carbon Type—1/10 Watt—(R4)—Package of 5	.75
11322	Resistor—39,000 Ohm—Carbon Type—¼ Watt—(R10)—Package of 5	1.00
5029	Resistor—56,000 Ohm—Carbon Type—¼ Watt—(R13)—Package of 5	1.00
3118	Resistor—100,000 Ohm—Carbon Type—¼ Watt—(R1, R3, R6)—Package of 5	1.00
5158	Resistor—220,000 Ohm—Carbon Type—¼ Watt—(R21)—Package of 5	1.00
11323	Resistor—270,000 Ohm—Carbon Type—¼ Watt—(R12)—Package of 5	1.00
11172	Resistor—470,000 Ohm—Carbon Type—¼ Watt—(R14)—Package of 5	1.00
11151	Resistor—2.2 Megohms—Carbon Type—¼ Watt—(R9)—Package of 5	1.00
11273	Shield—Rectifier Radiotron shield	.25
11222	Socket—Dial lamp socket	.18
4794	Socket—4-contact rectifier Radiotron socket	.15
11313	Socket—5-contact Radiotron socket	.18
11198	Socket—7-contact Radiotron socket	.15
11236	Switch—Band switch (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11)	2.44
11133	Switch—Power switch—(S12)	.62
5238	Terminal—Antenna terminal clip assembly	.14
11216	Transformer—First intermediate frequency transformer (L16, L17, C24, C25)	2.15
11239	Transformer—Second intermediate frequency transformer—(L18, L19, C29, C30, C31, R7, R8)	2.72
11241	Transformer—Power transformer—105-125 volts—50-60 cycles (T1)	4.56
11242	Transformer—Power transformer—105-125 volts—25-60 cycles	6.52
11243	Transformer—Power transformer—100-130, 140-160, 195-250 volts—40-60 cycles	4.64
	DRIVE ASSEMBLIES	
4362	Arm—Band indicator operating arm	.28
10194	Ball—Steel ball—Used with winding shaft—Package of 20	.25
4422	Clutch—Tuning condenser drive clutch assembly—comprising drive shaft, balls, ring, spring and washers—assembled	1.00
11328	Dial—Dial scale	.68
11252	Drive—Variable tuning condenser drive assembly	1.88
11225	Indicator—Band indicator pointer	.18
4520	Indicator—Station selector indicator pointer	.18
11226	Link—Band indicator operating link and arm assembly—less pointer	.20
3993	Screw—No. 6-32-5/32" square set screw for band indicator operating arm—Package of 10	.25
4669	Screw—No. 8-32-5/32" set screw for variable condenser drive assembly—Package of 10	.25
4377	Spring—Band indicator operating arm spring—Package of 5	$0.25
4378	Stud—Band indicator operating arm stud and nut assembly—Package of 5	.25

Stock No.	Miscellaneous Assemblies	List Price
11337	Escutcheon—Station selector escutcheon	.70
6614	Glass—Station selector dial glass	.30
11346	Knob—Station selector knob—Package of 5	.75
11347	Knob—Volume control, tone control, range switch or power switch knob—Package of 5	.75
11246	Foot—Chassis mounting foot and bracket assembly—Package of 2	.76
4678	Ring—Spring retaining ring for dial glass—Package of 5	.34
11210	Screw—Chassis mounting screw assembly—Package of 4	.28
11348	Screw—No. 8-32-7/16" headless cupped point set screw for knob, stock #11346—Package of 10	.32
11349	Spring—Retaining spring for knob, stock #11347—Package of 5	.15
	REPRODUCER ASSEMBLIES Table Model	
11232	Board—Terminal board with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil—(L20)	2.00
11233	Coil—Neutralizing coil (L21)	.30
11235	Cone—Reproducer cone—(L22)—Package of 5	3.50
5119	Connector—3-contact female connector for reproducer cable	.25
5118	Connector—3-contact male connector for reproducer	.25
9618	Reproducer—Complete	6.40
11253	Transformer—Output transformer—(T2)	1.56
11230	Washer—"Binders board" "C" washer—used to hold field coil securely—Package of 5	.18
	REPRODUCER ASSEMBLIES Console Model	
11232	Board—Terminal board assembly with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil—L20	2.00
11233	Coil—Hum neutralizing coil—L21	.30
11258	Cone—Reproducer cone—L22—Package of 5	3.85
5118	Connector—3-contact male connector for reproducer	.25
5119	Connector—3-contact female connector plug for reproducer cable	.25
9619	Reproducer—Complete	6.05
11253	Transformer—Output transformer—T2	1.56
11230	Washer—"Binders board" "C" washer used to hold field coil assembly	.18

MODELS T7-5,T8-14,T8-16
T10-1,T10-3
Speaker Data

RCA MFG. CO., INC.

SUPPLEMENT TO

RCA VICTOR MODELS

T 7-5, T 8-14, T 8-16, T 10-1, and T 10-3

SERVICE NOTES

On receiver Models T 7-5 and T 8-14, three different type speakers are used. They can be readily identified by the following numbers stamped on them: (1) RL 63-4, (2) 76365-1, and (3) 76365-3.

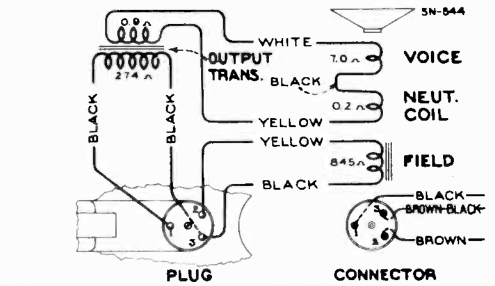
On receiver Models T 10-1 and T 10-3, two different type speakers are used: (1) RL 63-5 and (2) 76365-2.

On receiver Model T 8-16, two different type speakers are used: (1) RL 63-4 and (2) 76365-3.

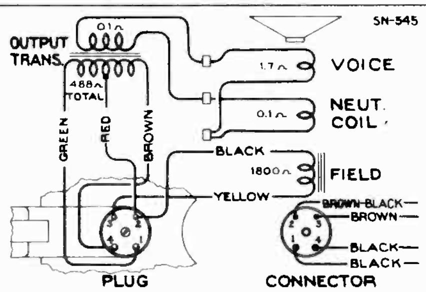
The internal connections and replacement parts for speakers RL 63-4 and RL 63-5 are given in the Service Notes, while the schematic diagrams given below indicate the color code and wiring to the plug and connector for speakers: (1) 76365-1, (2) 76365-2, and (3) 76365-3. The replacement parts appear opposite the respective speakers.

REPLACEMENT PARTS

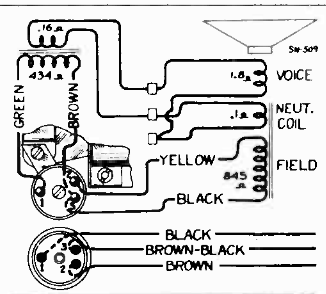
76365-1



76365-2



76365-3



Stock No.	Description	List Price
	76365-1	
11836	CONE—Reproducer cone	$1.75
5118	CONNECTOR—3-contact male connector for reproducer	.25
9634	REPRODUCER—Complete	6.40
11837	TRANSFORMER—Output transformer (Field and hum coils not removable.)	1.56
	76365-2	
11841	COIL—Field coil	2.15
11842	COIL—Hum neutralizing coil	.30
11838	CONE—Reproducer cone	2.00
5039	CONNECTOR—4-contact male connector for reproducer	.25
9636	REPRODUCER—Complete	6.60
11839	SPRING—Reproducer center support casting clamping spring—Package of 2	.30
11840	TRANSFORMER—Output transformer	1.66
	76365-3	
11844	COIL—Field coil	2.00
11842	COIL—Hum neutralizing coil	.30
11838	CONE—Reproducer cone	2.00
5118	CONNECTOR—3-contact male connector for reproducer	.25
9635	REPRODUCER—Complete	6.40
11839	SPRING—Reproducer center support casting clamping spring—Package of 2	.30
11843	TRANSFORMER—Output transformer	1.56

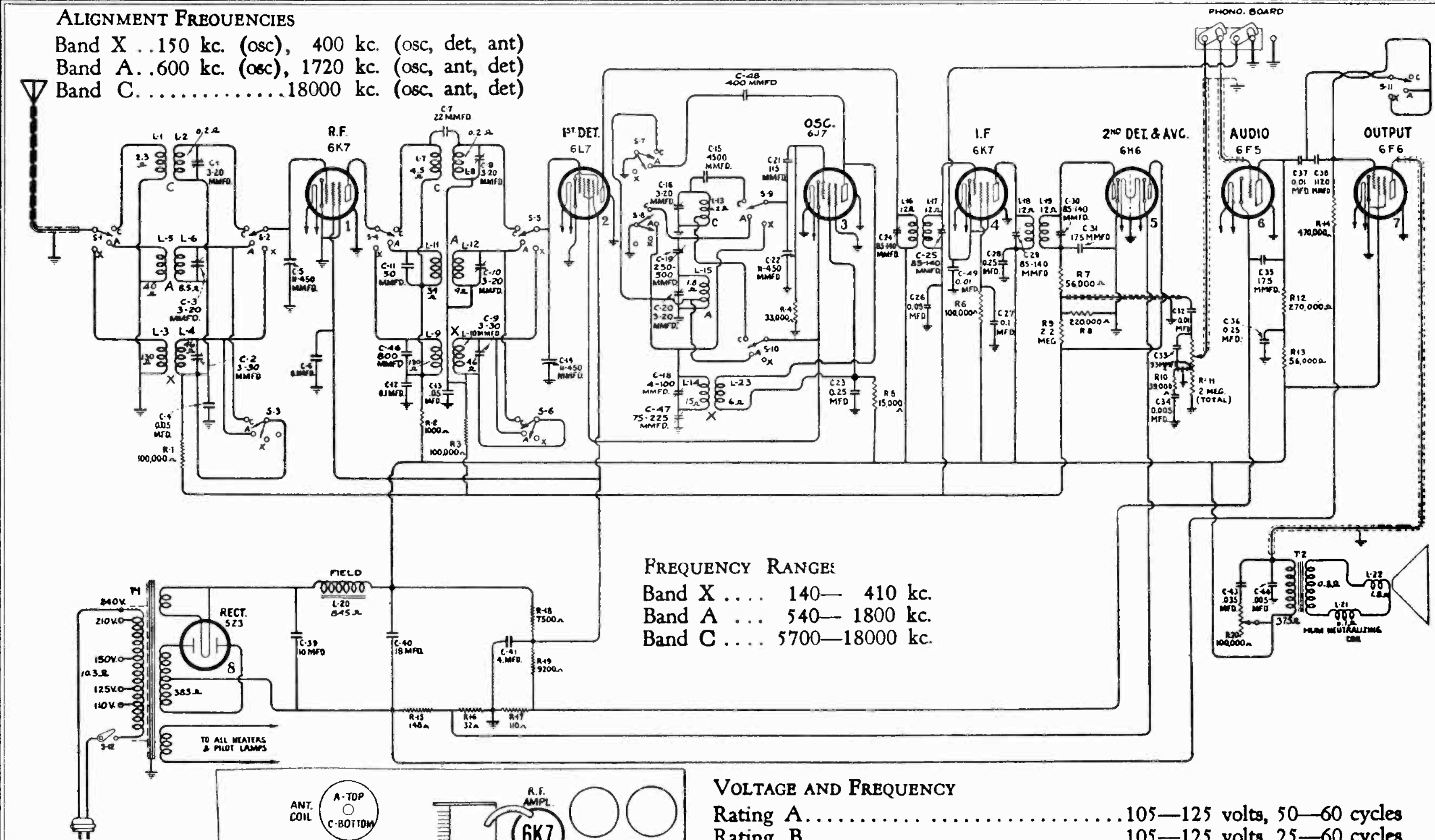
The prices quoted above are subject to change without notice.

MODELS T8-16,C8-17
Schematic,Socket
Trimmers

RCA MFG. CO., INC.

Alignment Frequencies

Band X . . 150 kc. (osc), 400 kc. (osc, det, ant)
Band A . . 600 kc. (osc), 1720 kc. (osc, ant, det)
Band C . . . . 18000 kc. (osc, ant, det)



Frequency Ranges

Band X . . . . 140— 410 kc.
Band A . . . 540— 1800 kc.
Band C . . . . 5700—18000 kc.

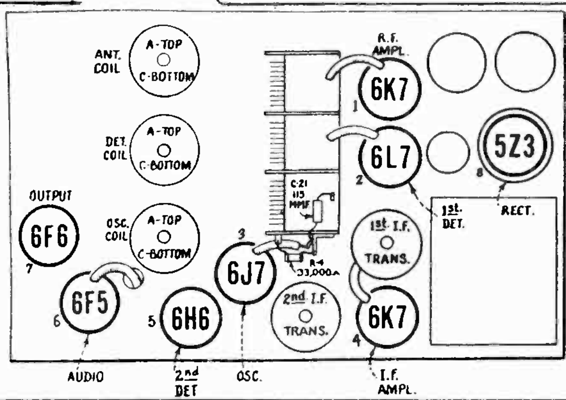


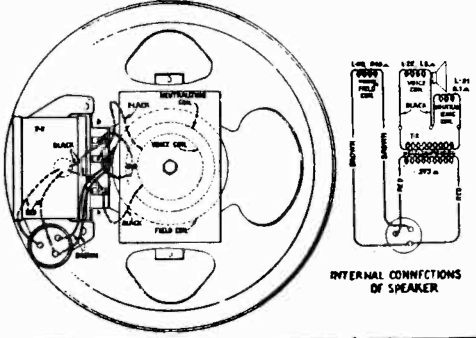
Figure 4—Coil and Radiotron Locations

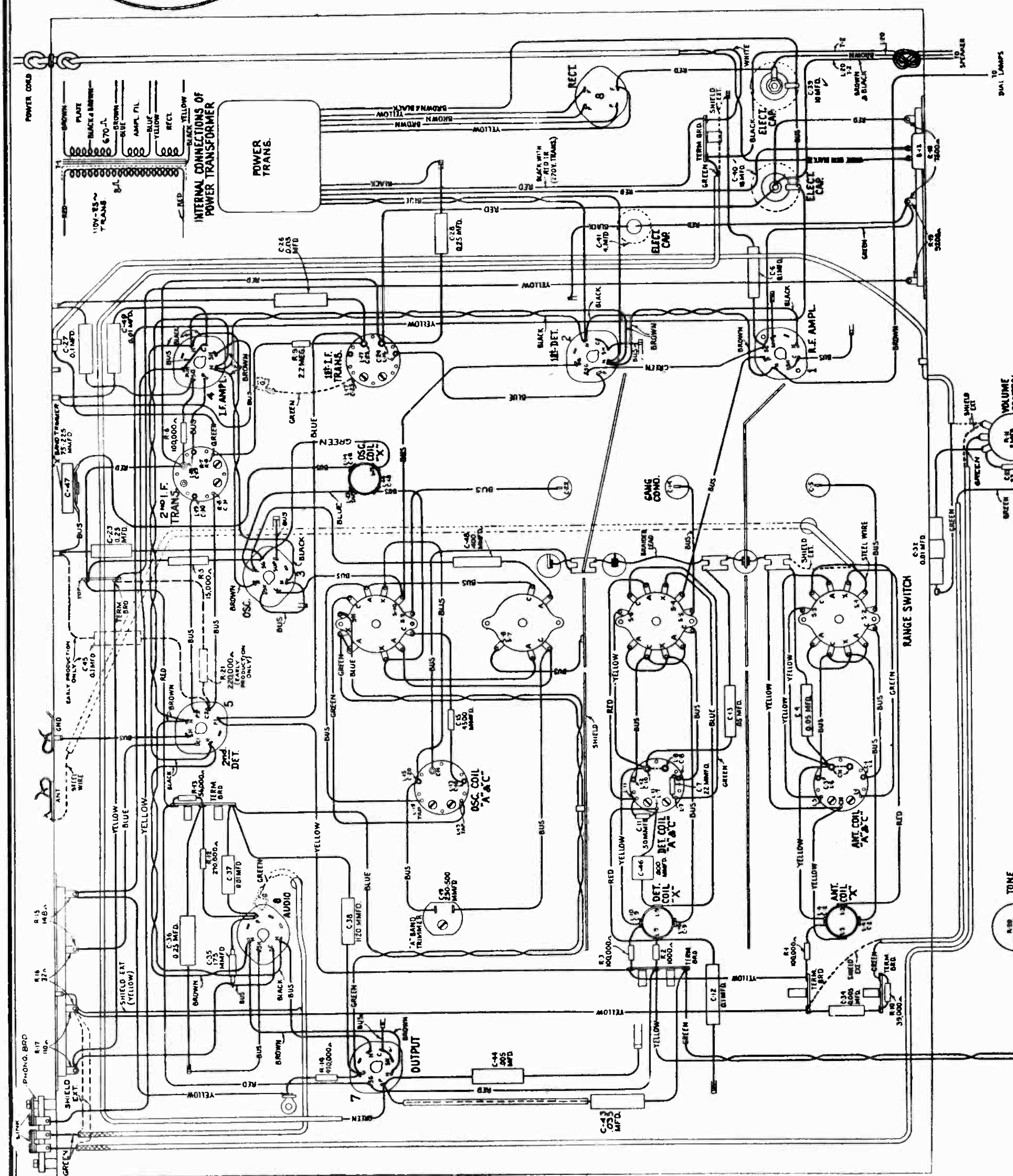
Voltage and Frequency

Rating A . . . . 105—125 volts, 50—60 cycles
Rating B . . . . 105—125 volts, 25—60 cycles
Rating C . . . . 100—130/140—160/195—250 volts, 40—60 cycles
Power Consumption . . . . 105 watts
Undistorted Output . . . . 2 watts
Maximum Output . . . . 4½ watts
Loudspeaker . . . . { C 8-17—12 inch, Electrodynamic / T 8-16— 8 inch, Electrodynamic }
Voice Coil Impedance . . . . 2¼ ohms at 400 cycles
Intermediate Frequency . . . . 460 kc.

MODELS T8-16,C8-17
Chassis Wiring

RCA MFG. CO., INC.





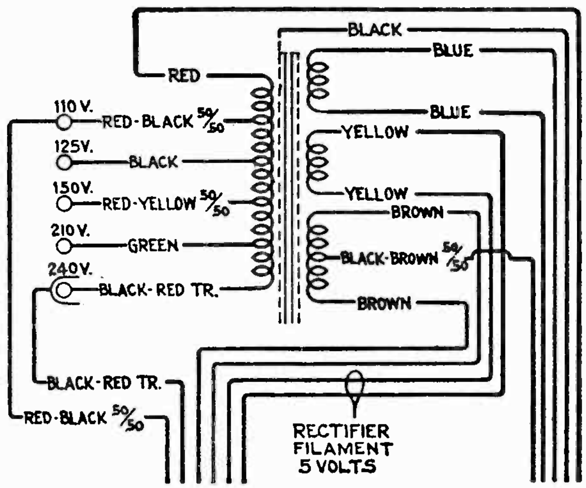


Figure 7—Universal Power Transformer Connections

Pri. Res.—10.3 Ohms, Total
Sec. Res.—383 Ohms, Total

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to chassis on Figure 6 will serve to assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings.

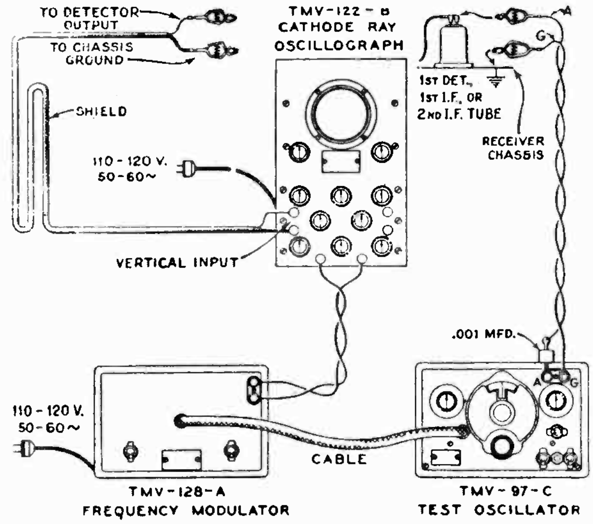
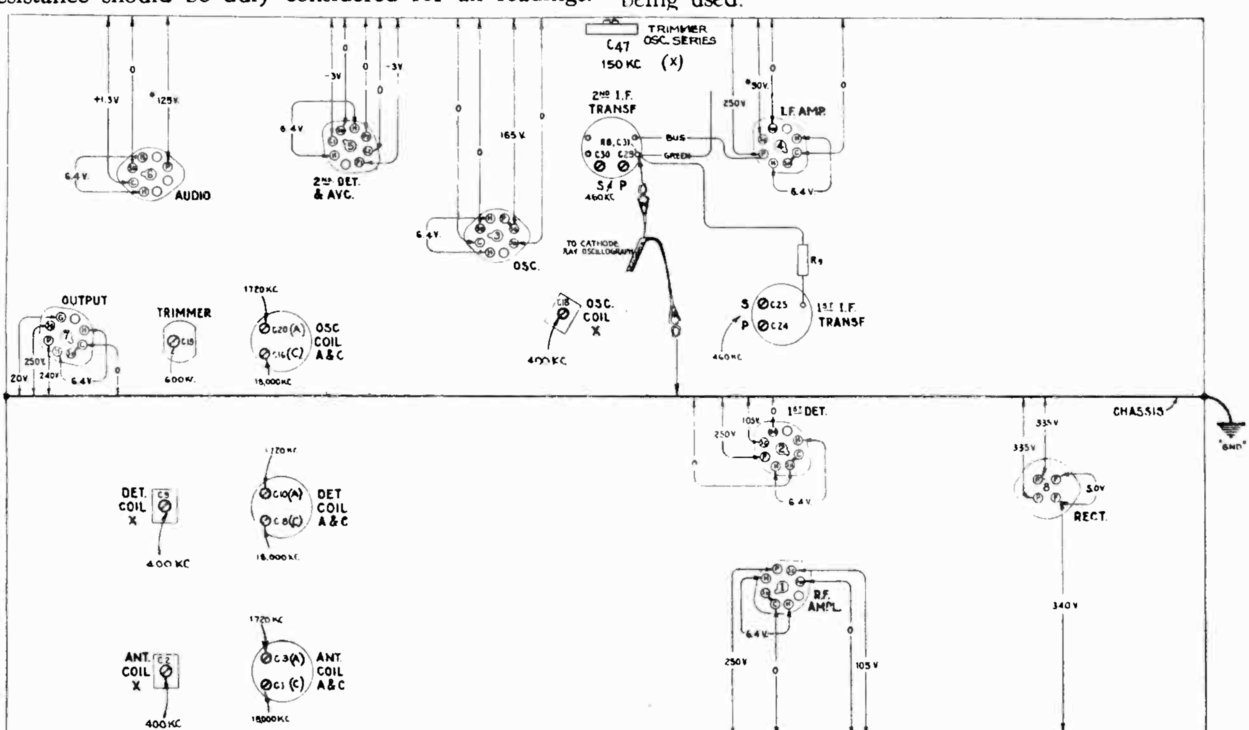


Figure 5—Alignment Apparatus Connections

The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance.

Universal Transformer

The transformer used on some models of these receivers is adaptable to several ranges of voltage as given under rating C of Electrical Specifications. Its schematic and wiring are shown by Figure 7. Terminals are provided at the top of the transformer case for changing the primary connections to suit the voltage being used.



*CANNOT BE MEASURED WITH ORDINARY VOLTMETER

Figure 6—Trimmer Locations and Radiotron Socket Voltages
Measured at 115 volts A.C.—No Signal—Volume Control Maximum

MODELS T8-16,C8-17
Alignment,Parts

RCA MFG. CO., INC.

(I) CATHODE-RAY ALIGNMENT

Equipment

A standard source of the specified alignment frequencies is required. Such a source should consist of an RCA Full Range Oscillator, Stock No. 9595. Output indication should be by means of an RCA Stock No. 9545 Cathode-Ray Oscillograph. An RCA Stock No. 9558 Frequency Modulator will be needed to sweep the generated signal and synchronize it with the Oscillograph in order to make possible the visual representation of the resonant characteristic of the circuit being tuned on the cathode-ray fluorescent screen.

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 6. Each must be aligned to a basic frequency of 460 kc. The last transformer must be aligned firstly and the first transformer aligned secondly. For such a process, it is necessary to feed the output of the Full Range Oscillator to the stage in their order of alignment, adjusting the trimmers of each transformer and observing the effect at the second detector output on the Cathode-Ray Oscillograph. The proper point of connection of the Oscillograph is with its vertical "high" input terminal attached to the juncture of R-7, R-8 and R-9 as illustrated in Figure 6, and with the "0" or ground terminal to the chassis. The "Ext. Sync." terminals of the Oscillograph should be connected to the Frequency Modulator as shown by Figure 5. A .001 mfd. capacitor installed in series with the Oscillator "Ant." lead will prevent the voltages of the stage under alignment from becoming upset. The vertical "A" amplifier should be "On" for the ensuing adjustments and the gain control kept at its maximum position. For each adjustment, the Oscillator output need be regulated so that the image obtained on the Oscillograph screen will be of sufficient size as to be accurately observable. Proceed further as follows:—

(a) Place the receiver, Oscillograph and test Oscillator in operation. Set the receiver range switch to Band "A" and tune the station selector to a point where no interference will be picked up, shorting the antenna and ground terminals if necessary. Set the Oscillograph horizontal "B" amplifier to "Timing" and control its gain so that the luminescent spot sweeps a straight line trace completely across the screen. Place the timing control to "Int." Adjust the intensity and focusing controls of the Oscillograph to produce the correct size and strength of the spot.

(b) Attach the output of the test Oscillator between the control grid cap of the RCA-6K7 i-f tube and chassis ground as shown typically by Figure 5. Tune the Oscillator to 460 kc. and set its modulation switch to "On". Regulate its output until the signal produces a wave pattern on the Oscillograph screen, adjusting the Oscillograph controls to give the desired number of cycles. Cause the image to stand still on the screen by manipulation of the frequency and synchronizing controls. Then carefully tune the two trimmers C-29 and C-30 of the second i-f transformer to produce maximum amplitude (vertical deflection) of the oscillographic image. Under this condition the transformer will be sharply resonated to 460 kc.

(c) The Frequency Modulator should then be placed in operation and interconnected with the Full Range Oscillator by means of the special shielded patch cord. Figure 5 shows the proper arrangement. Set the Frequency Modulator sweep range switch to its "Lo" position and turn the Oscillator modulation switch to "Off". Change the timing control of the Oscillograph to "Ext." and place the range switch to its No. 2 position. Then carefully shift the tuning of the Oscillator so as to increase its frequency, until two distinct and similar waves appear on the Oscillograph screen and become exactly coincident at their highest points. These curves will be found to occur at an Oscillator setting of *approximately 540 kc*. They will be identical in shape but appearing in reversed positions. Adjust the frequency control of the Oscillograph in order to cause the waves to conform with the above requirements and to make them remain motionless on the screen. This will require a setting of approximately ½ clockwise rotation of the frequency control. The trimmers C-29 and C-30 should then be re-adjusted so that the two curves move together and become exactly coincident throughout their lengths, maintaining the maximum amplitude at which this condition can be brought about.

(d) Leaving the equipment connected and adjusted as in (c), change the Oscillator output to the control grid cap of the RCA-6L7 first detector tube. Then adjust the first i-f transformer trimmers C-24 and C-25 so that the forward and reverse waves appearing on the Oscillograph coincide throughout their lengths and have maximum amplitude. The shape of the composite wave obtained from this operation is a true representation of the overall tuning characteristic of the i-f system. Each trimmer of the entire group should then be checked to assure that it is in correct alignment as indicated by the degree of coincidence and relative amplitude of the image on the Oscillograph screen.

R-F Trimmer Adjustments

Locations of the various antenna, detector and oscillator coil trimmers are shown by Figure 6. The test Oscillator should be removed from connection with the i-f system and its output connected to the antenna-ground terminals of the receiver. No changes are to be made in the connections of the Oscillograph at the second detector. During the following adjustments, the Oscillator output should be regulated as often as is necessary to keep the oscillographic image as low as is practically observable. Adherence to such a procedure will obviate the broadness of tuning that would result from a.v.c. action on a stronger signal. Proceed with the adjustments as follows:—

Calibration

Set the receiver range switch to Band A and rotate the station selector until the tuning condenser plates are in full mesh (maximum capacitance). Then move the main dial pointer until it points exactly to the horizontal line at the low frequency end of the Band A scale.

Band A

(a) With the receiver range switch in its Band A position, tune the station selector until the dial pointer is at a reading of 1720 kc. Adjust the test Oscillator to 1720 kc. (modulation "On" and Frequency Modulator disconnected) and increase its output to produce a registration on the Oscillograph. Carefully align the oscillator, detector and antenna trimmers C-20, C-10 and C-3 respectively, so that each brings about maximum amplitude of output as shown by the wave on the Oscillograph. It will be necessary to have the timing control of the Oscillograph on "Int." for this operation. After each trimmer has been peaked, the Oscillograph timing control should be set to "Ext." and the Frequency Modulator placed into operation with its connections to the Oscillator and Oscillograph made in accordance with Figure 5. Turn the modulation switch of the Oscillator to "Off" and retune the Oscillator (increase frequency) until the forward and reverse waves show on the Oscillograph and become coincident at their highest points. Adjust the trimmers C-20, C-10 and C-3 again, setting each to the point which produces the best coincidence and maximum amplitude of the wave images.

(b) Remove the Frequency Modulator cable from the Oscillator and shift the signal frequency to 600 kc. Place the modulation switch to "On". Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then insert the Frequency Modulator plug and retune the Oscillator (modulation "Off") until the two similar forward and reverse waves appear on the screen. For this adjustment, it is advisable to shift the Oscillator to its 200—400 kc. range and use the third harmonic of the generated signal in order to obtain the desired range of sweep. The oscillator series trimmer C-19 should then be adjusted to produce maximum amplitude of the images. No rocking will be necessary on the station selector inasmuch as the signal frequency is being "wobbled" by the Frequency Modulator to produce the same effect.
After completing this adjustment the trimmer C-20 should be re-aligned as in (a) to correct for any change brought about by the adjustment of C-19.

Band X

(a) Disconnect the Frequency Modulator and tune the test Oscillator to a frequency of 400 kc. (Modulation "On"). Place the receiver range switch to its Band X position and tune the station selector until the dial pointer reads exactly 400 kc. Adjust the Oscillograph timing control to "Int." Then align each of the trimmers C-18, C-9 and C-2 to the point producing maximum output at the Oscillograph. Place the Frequency Modulator in operation and attach it to the test Oscillator by means of the shielded cable. Change the Oscillograph timing to "Ext." Increase the frequency of the Oscillator (Modulation "Off" until the two forward and reverse waves appear and become coincident at their highest point, *approximately at 462 kc.* These waves may be made to remain stationary on the screen by manipulation of the Oscillograph range switch (No. 2 position) and frequency control (mid-position). Re-adjust the three trimmers C-18, C-9 and C-2 to give maximum amplitude and complete coincidence of the waves.

(b) Change the test Oscillator so that it delivers a signal of 150 kc. with the Frequency Modulator disconnected. Tune this signal on the receiver, which should be set to the Band X setting, disregarding the dial reading at which the signal is best received. Then interconnect the Frequency Modulator with the Oscillator and retune the latter to the point at which the two similar waves appear on the screen. Adjust the trimmer C-47 for maximum amplitude of the wave images. Rocking of the tuning condenser will not be necessary for this operation as such is duplicated by the Frequency Modulator. Repeat the alignment of C-18 as in (a) to correct for any error brought about by the adjustment of C-47.

Band C

(a) Turn the range switch of the receiver to its Band C position and tune the station selector until the dial pointer reads 18,000 kc. Set the test Oscillator to the same frequency (modulation "On" and Frequency Modulator disconnected) and regulate its output to the level required for convenient observation. Adjust the trimmer C-16 to the point producing maximum output as indicated on the Oscillograph. Check for the presence of the proper "image" signal by tuning the receiver to 17,080 kc. The 18,000 kc. signal of the Oscillator will be received at this point if the adjustment of C-16 has been properly made using the position of least capacitance which gives maximum receiver output. It may be necessary to increase the output of the Oscillator in order to get an indication of the "image". *No adjustments should be made during this check.*

(b) Return the receiver tuning to 18,000 kc., re-align C-16 if necessary, and then adjust the detector and antenna trimmers, C-8 and C-1, for maximum signal output as evidenced by the oscillographic image. No further adjustments are to be made on this band.

OUTPUT INDICATOR ALIGNMENT

I-F Alignment

Connect the test Oscillator to the control grid cap of the i-f tube. Advance the volume control of the receiver to its full-on position. Tune the test Oscillator accurately to 460 kc, and align the trimmers C-29 and C-30 to give maximum receiver output. Regulate the Oscillator output during this adjustment so that the output indication is as small as can be conveniently observed. After completing the adjustments of these trimmers, re-connect the Oscillator so that it will feed into the control grid circuit of the RCA-6L7 first detector. Then tune the first i-f transformer trimmers C-24 and C-25 for maximum receiver output.

R-F Alignment

After completing the i-f adjustments, it is advisable to correct the line-up of the circuits ahead of the first detector. The test Oscillator should be connected to the antenna-ground terminals of the receiver and the manual volume control kept at its maximum position. For each adjustment the Oscillator output should be maintained as low as possible in order to avoid broadness of tuning which would result from a.v.c. action on a stronger signal. Band A should be aligned by supplying a 1720 kc. signal to the receiver, tuning the station selector to a dial reading of 1720 and adjusting the trimmers C-20, C-10 and C-3 to produce maximum receiver output. The Oscillator should then be shifted to 600 kc. and the receiver tuned to resonate this signal, disregarding the reading at which it is best received. Trimmer C-19 must then be adjusted, simultaneously while rocking the station selector backward and forward through the signal until the maximum output results from the combined operations. C-20 should be rechecked to assure that its adjustment has not changed because of the trimming of C-19. Band X must be aligned at 400 kc. and 150 kc. Tune the test Oscillator to 400 kc. and turn the receiver dial to the same reading. Adjust trimmers C-18, C-9 and C-2 for maximum (peak) receiver output. Then shift the Oscillator to 150 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Adjust trimmer C-47, simultaneously rocking the tuning condenser backward and forward through the signal, until maximum receiver output results from the combined operations. Repeat the alignment of C-18 as above to correct for any change which may have been caused by the adjustment of C-47. Change the receiver so that it is operative and the dial reads 18,000 kc. on the "C" Band. Tune the test Oscillator to this same frequency. Then adjust the oscillator trimmer C-16 to produce maximum (peak) output. Two positions of this trimmer will be found which conform with this requirement. The one of least capacitance is correct. Check for the presence of "image" response at 17,080 kc. by shifting the receiver tuning. If it is received at such a point, the trimmer C-16 has been correctly adjusted to the right peak. *No adjustments are to be made during this check.* Tune the receiver back to the 18,000 kc. dial marking, re-adjust C-16 if necessary, and then tune the detector and antenna capacitors C-1 and C-8 for maximum receiver output. No further adjustments are necessary.

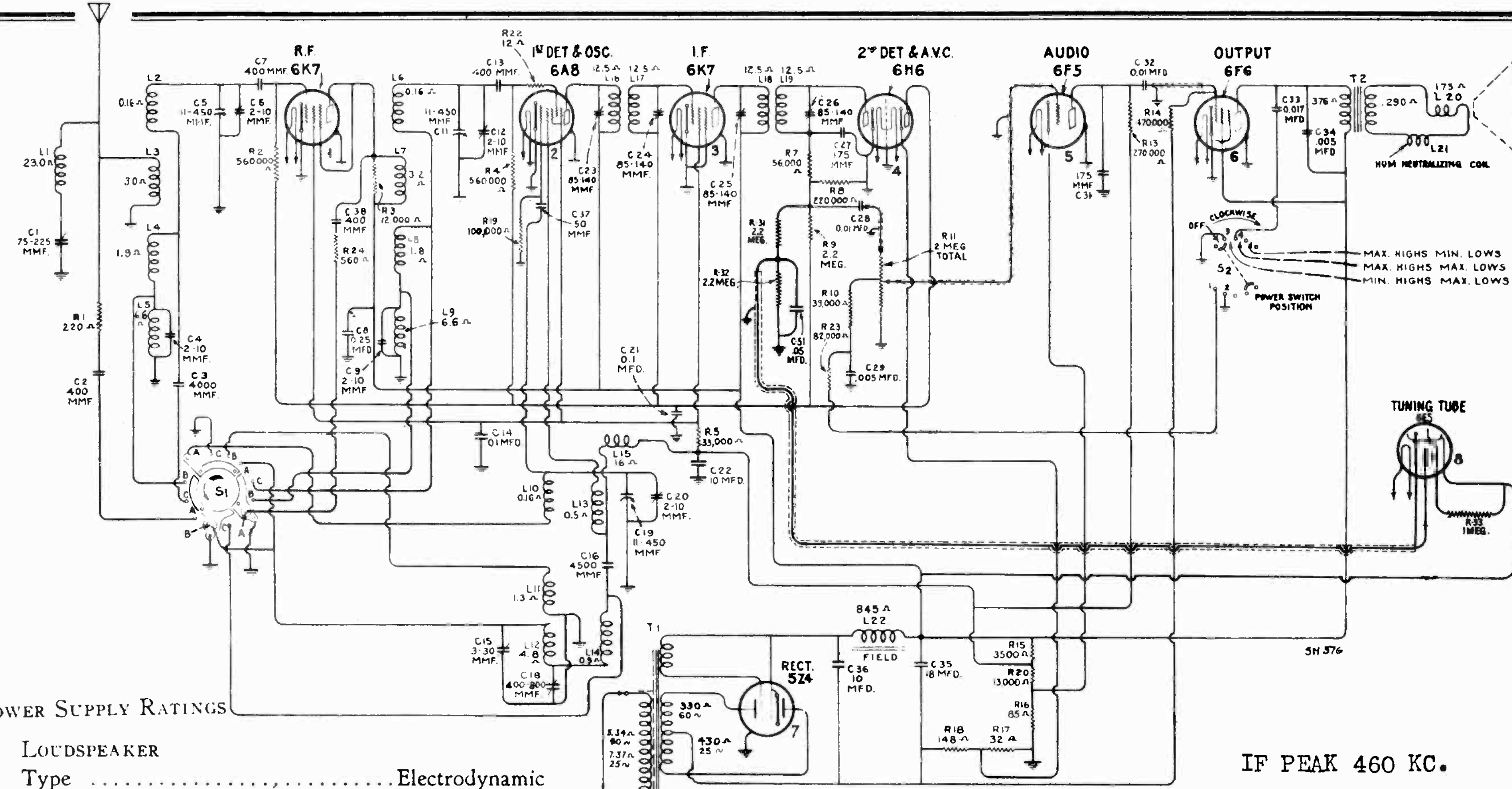
Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
4427	Bracket—Volume control or high frequency tone control mounting bracket	$0.18
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	.43
11350	Cap—Contact cap—Package of 5	.20
11223	Capacitor—Adjustable capacitor (C19)	.46
11256	Capacitor—Adjustable capacitor (C47)	.48
11292	Capacitor—22 MMfd. (C7)	.24
11321	Capacitor—33 MMfd. (C33)	.26
11289	Capacitor—50 MMfd. (C11)	.26
11291	Capacitor—115 MMfd. (C21)	.24
5116	Capacitor—175 MMfd. (C35)	.18
11290	Capacitor—400 MMfd. (C48)	.25
11269	Capacitor—800 MMfd. (C46)	.30
4409	Capacitor—1120 MMfd. (C38)	.35
11287	Capacitor—4500 MMfd. (C15)	.30
4868	Capacitor—0.005 Mfd. (C34)	.20
4838	Capacitor—0.005 Mfd. (C-44)	.20
4624	Capacitor—0.01 Mfd. (C32)	.54
4858	Capacitor—0.01 Mfd. (C37)	.25
5196	Capacitor—0.035 Mfd. (C43)	.18
4836	Capacitor—0.05 Mfd. (C4, C13, C26)	$0.30
4885	Capacitor—0.1 Mfd. (C6, C12, C27)	.28
5170	Capacitor—0.25 Mfd. (C23, C28, C36)	.25
11248	Capacitor—4 Mfd. (C41)	1.06
11240	Capacitor—10 Mfd. (C39)	1.08
5212	Capacitor—18 Mfd. (C40)	1.16
11272	Clamp—Antenna cable clamp—Located near antenna terminal	.10
4748	Clamp—Capacitor mounting clamp assembly—for stock #11248	.15
5215	Coil—Antenna coil (A and C Bands)—(L1, L2, L5, L6, C1, C3)	2.32
11325	Coil—Antenna coil (X Band)—(L3, L4, C2)	1.56
5216	Coil—Detector coil (A and C Bands)—(L7, L8, L11, L12, C8, C10)	2.34
11326	Coil—Detector coil (X Band)—(L9, L10, C9)	1.60
5217	Coil—Oscillator coil (A and C Bands)—(L13, L15, C16, C20)	2.20
11327	Coil—Oscillator coil (X Band)—(L14, C18)	1.44
11214	Condenser—3-Gang variable tuning condenser (C5, C14, C22)	4.20

Stock No.	Description	List Price
11238	Tone Control—High frequency tone control (R20)	$0.96
11237	Volume Control—(R11)	1.20
4340	Lamp—Dial lamp—Package of 5	.60
8041	Plate—R.F. or I.F. coil shield locking plate—Package of 2	.12
11244	Resistor—Voltage divider resistor, comprising one 7500 ohm and one 9200 ohm section—(R18, R19)	1.08
11245	Resistor—Voltage divider resistor, comprising one 148 ohm, one 32 ohm and one 110 ohm section—(R15, R16, R17)	.62
5112	Resistor—1000 Ohm—Carbon Type—¼ Watt—(R2)—Package of 5	1.00
5114	Resistor—15,000 Ohm—Carbon Type—1 Watt—(R5)	.22
11300	Resistor—33,000 Ohm—Carbon Type—1/10 Watt—(R4)—Package of 5	.75
11322	Resistor—39,000 Ohm—Carbon Type—¼ Watt—(R10)—Package of 5	1.00
5029	Resistor—56,000 Ohm—Carbon Type—¼ Watt—(R13)—Package of 5	1.00
3118	Resistor—100,000 Ohm—Carbon Type—¼ Watt—(R1, R3, R6)—Package of 5	1.00
11323	Resistor—270,000 Ohm—Carbon Type—¼ Watt—(R12)—Package of 5	1.00
11172	Resistor—470,000 Ohm—Carbon Type—¼ Watt—(R14)—Package of 5	1.00
11151	Resistor—2.2 Megohms—Carbon Type—¼ Watt—(R9)—Package of 5	1.00
11273	Shield—Rectifier Radiotron shield	.25
11222	Socket—Dial lamp socket	.18
4794	Socket—4-contact rectifier Radiotron socket	.15
11313	Socket—5-contact Radiotron socket	.18
11198	Socket—7-contact Radiotron socket	.15
11236	Switch—Band switch (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11)	2.44
11133	Switch—Power switch—(S12)	.62
5238	Terminal—Antenna terminal clip assembly	.14
11216	Transformer—First intermediate frequency transformer (L16, L17, C24, C25)	2.15
11239	Transformer—Second intermediate frequency transformer—(L18, L19, C29, C30, C31, R7, R8)	2.72
11241	Transformer—Power transformer—105-125 volts—50-60 cycles (T1)	4.56
11242	Transformer—Power transformer—105-125 volts—25-60 cycles	6.52
11243	Transformer—Power transformer—100-130, 140-160, 195-250 volts—40-60 cycles	4.64
	DRIVE ASSEMBLIES	
4362	Arm—Band indicator operating arm	.28
10194	Ball—Steel ball—Used with winding shaft—Package of 20	.25
4422	Clutch—Tuning condenser drive clutch assembly—comprising drive shaft, balls, ring, spring and washers—assembled	1.00
11262	Dial—Dial scale	.60
11252	Drive—Variable tuning condenser drive assembly	1.88
4520	Indicator—Station selector indicator pointer	.18
11226	Indicator—Band indicator pointer assembly comprising indicator pointer, arm, link and stud	.20
3993	Screw—No. 6-32-5/32" square set screw for band indicator operating arm—Package of 10	.25
4669	Screw—No. 8-32-5/32" set screw for variable condenser drive assembly—Package of 10	.25

Stock No.	Description	List Price
4377	Spring—Band indicator operating arm spring—Package of 5	$0.25
4378	Stud—Band indicator operating arm stud and nut assembly—Package of 5	.25
	MISCELLANEOUS ASSEMBLIES	
11337	Escutcheon—Station selector escutcheon	.70
6614	Glass—Station selector dial glass	.30
11346	Knob—Station selector knob—Package of 5	.75
11347	Knob—Volume control, tone control, range switch or power switch knob—Package of 5	.75
11246	Foot—Chassis mounting foot and bracket assembly—Package of 2	.76
4678	Ring—Spring retaining ring for dial glass—Package of 5	.34
11210	Screw—Chassis mounting screw assembly—Package of 4	.28
11348	Screw—No. 8-32-7/16" headless cupped point set screw for knob, stock #11346—Package of 10	.32
11349	Spring—Retaining spring for knob, stock #11347—Package of 5	.15
	REPRODUCER ASSEMBLIES Table Model	
11232	Board—Terminal board with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil—(L20)	2.00
11233	Coil—Neutralizing coil (L21)	.30
11235	Cone—Reproducer cone—(L22)—Package of 5	3.50
5119	Connector—3-contact female connector for reproducer cable	.25
5118	Connector—3-contact male connector for reproducer	.25
9618	Reproducer—Complete	6.40
11253	Transformer—Output transformer—(T2)	1.56
11230	Washer—"Binders board" "C" washer—used to hold field coil securely—Package of 5	.18
	REPRODUCER ASSEMBLIES Console Model	
11232	Board—Terminal board assembly with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil—L20	2.00
11233	Coil—Hum neutralizing coil—L21	.30
11258	Cone—Reproducer cone—L22—Package of 5	3.85
5118	Connector—3-contact male connector for reproducer	.25
5119	Connector—3-contact female connector plug for reproducer cable	.25
9619	Reproducer—Complete	6.05
11253	Transformer—Output transformer—T2	1.56
11230	Washer—"Binders board" "C" washer used to hold field coil assembly	.18

MODELS T8-18, C8-19, C8-20
Schematic, Changes

RCA MFG. CO., INC.



IF PEAK 460 KC.

POWER SUPPLY RATINGS

LOUDSPEAKER

Type ....Electrodynamic
Voice Coil Impedance......2.25 ohms at 400 cycles

POWER OUTPUT

Undistorted ....2.25 Watts
Maximum ....5.0 Watts

FREQUENCY RANGES

Band A .... 540-1,625 kc.
Band B .... 1,625-5,700 kc.
Band C .... 5,700-18,000 kc.

These three models are similar to RCA Victor Models T7-5 and C7-6, except for the addition of an RCA-6E5 Tuning Indicator; and an RCA-5Z4 All-Metal Rectifier used in place of the RCA-80. An 8-inch dynamic speaker is used in the Table Model (T8-18), while the two Console Models (C8-19 and C8-20) each use a 12-inch dynamic speaker. The two Console Models differ only in cabinet design.

Service Data

All information contained in the Service Notes for RCA Victor Models T7-5 and C7-6 is directly applicable to these instruments except the Schematic Diagram, Wiring Diagram, and Replacement Parts. Other differences are as follows:

Secondary resistance of universal transformer, 265 ohms total.

Tuning tube cable voltages:

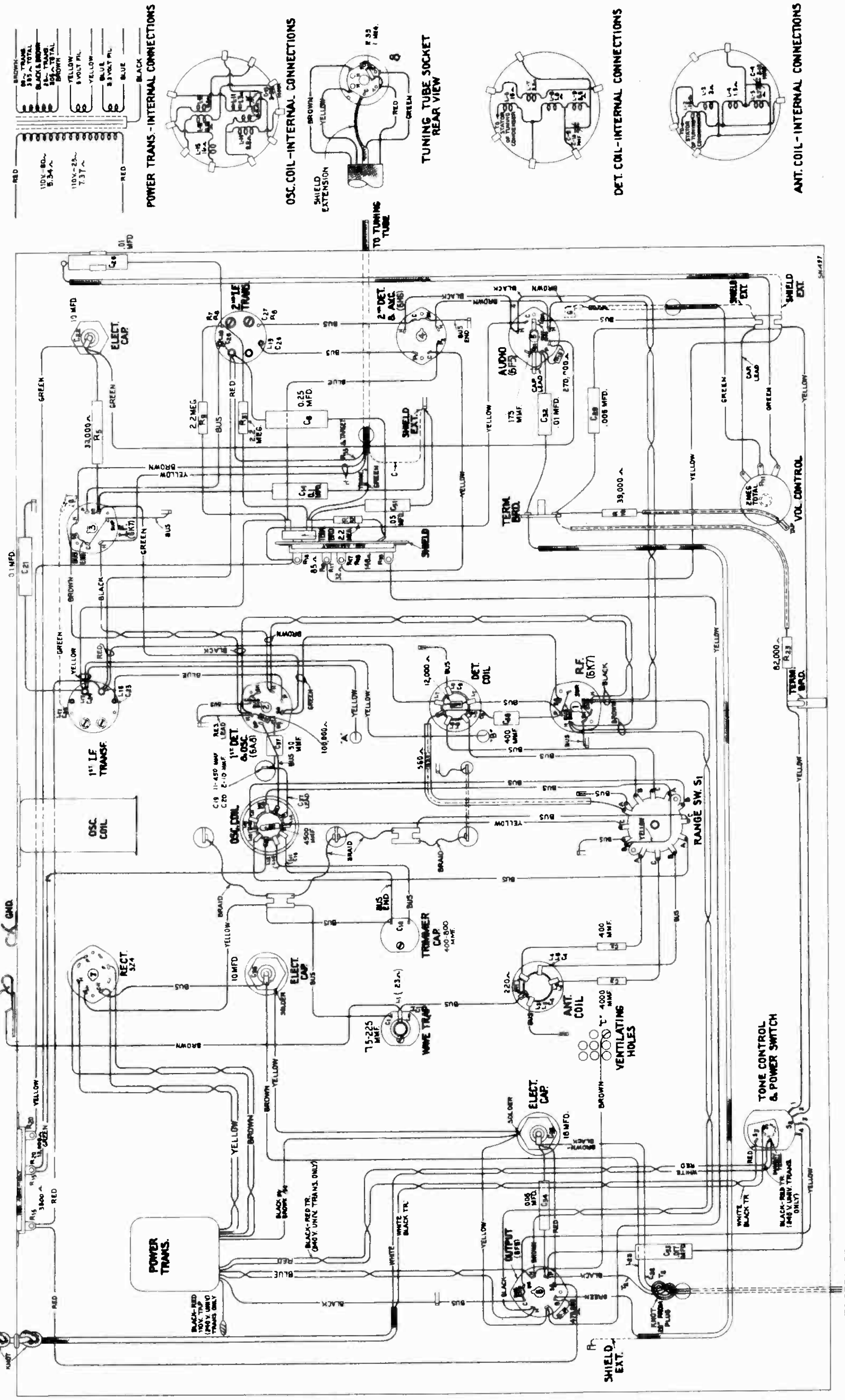
Yellow	Brown	Red	Green
0 v.	6.3 v. a-c	258 v.	0 v.

ALIGNMENT FREQUENCIES

Band A...600 kc. (osc.), 1,400 kc. (osc., det., ant.)
Band B..........................None required
Band C................18,000 kc. (osc., det., ant.)

MODELS T8-18, C8-19, C8-20
Chassis Wiring

RCA MFG. CO., INC.



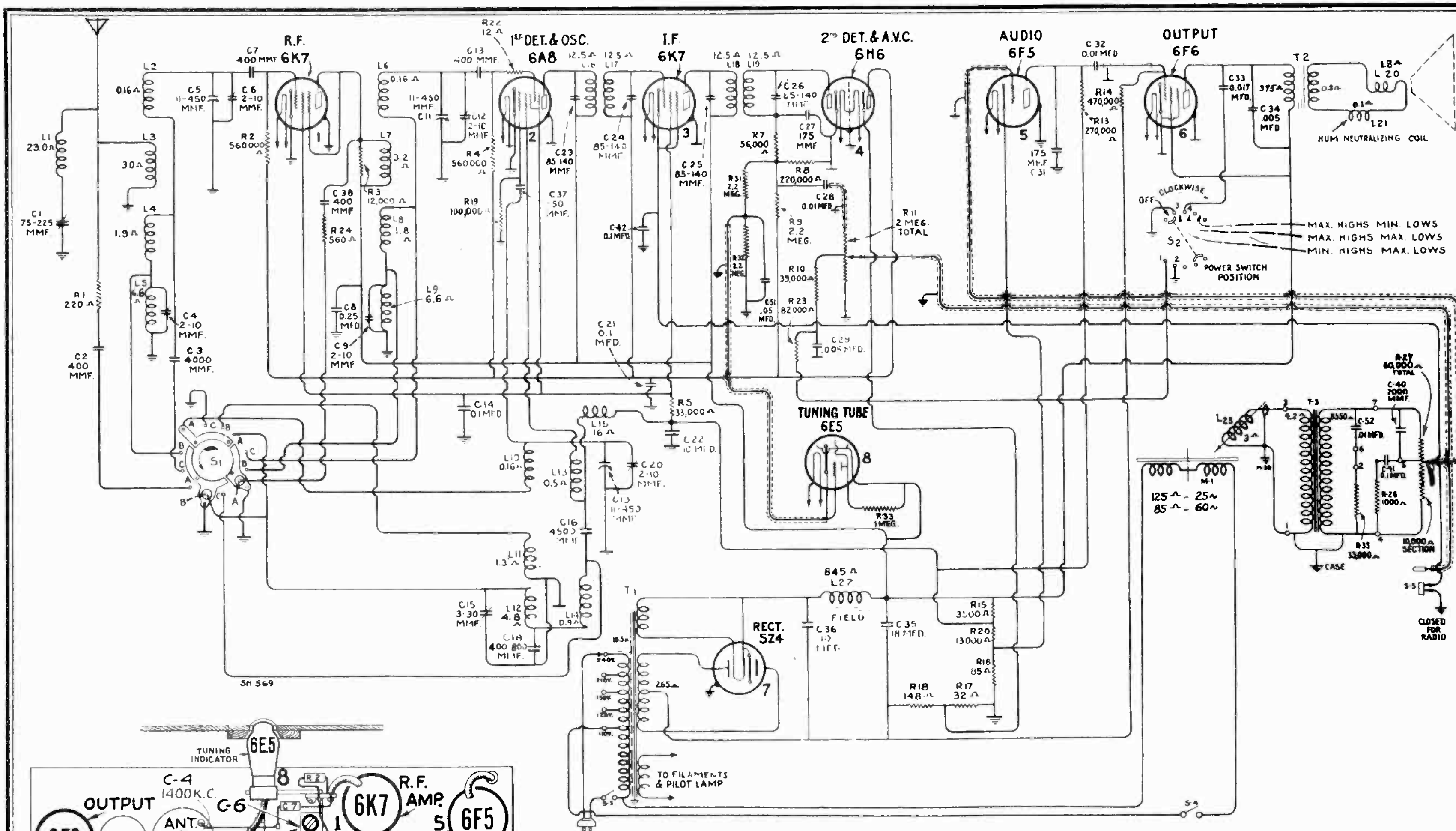
POWER TRANSFORMER

Rating A STOCK #11803 .... 105-125 Volts, 50-60 Cycles, 100 Watts
Rating B STOCK #11804 .... 105-125 Volts, 25-60 Cycles, 105 Watts
Rating C STOCK #11805 .... 100-130/140-160/195-250 Volts, 40-60 Cycles, 100 Watts

For Alignment, Parts List, etc.,
see Models T7-5, C7-6.

RCA MFG. CO., INC.

MODEL D8-28
Schematic, Socket
Trimmers



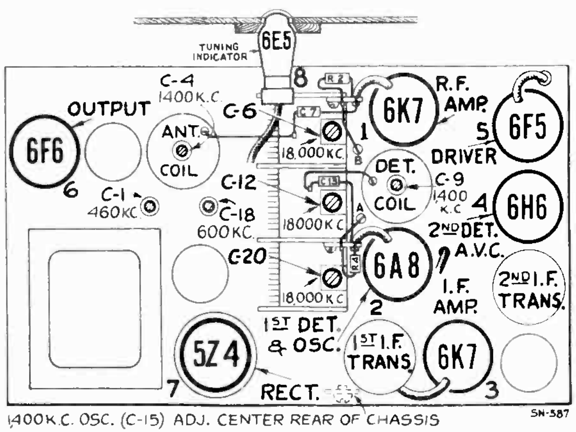


Figure 1—Radiotron and Coil Locations

Frequency Ranges

Band A	540- 1,625 kc.
Band B	1,625- 5,700 kc.
Band C	5,700-18,000 kc.

Alignment Frequencies

Band A	600 kc. (osc.), 1,400 kc. (osc., det., ant.)
Band B	None required
Band C	18,000 kc. (osc., det., ant.)

Intermediate Frequency .... **460 kc**

Power Supply Ratings

Rating A	105-125 Volts, 50-60 Cycles, 135 Watts
Rating B	105-125 Volts, 25 Cycles, 135 Watts
Rating C	105-130/140-160/200-250 Volts, 50-60 Cycles, 135 Watts

MODEL D8-28
Chassis Wiring
Pickup

RCA MFG. CO., INC.

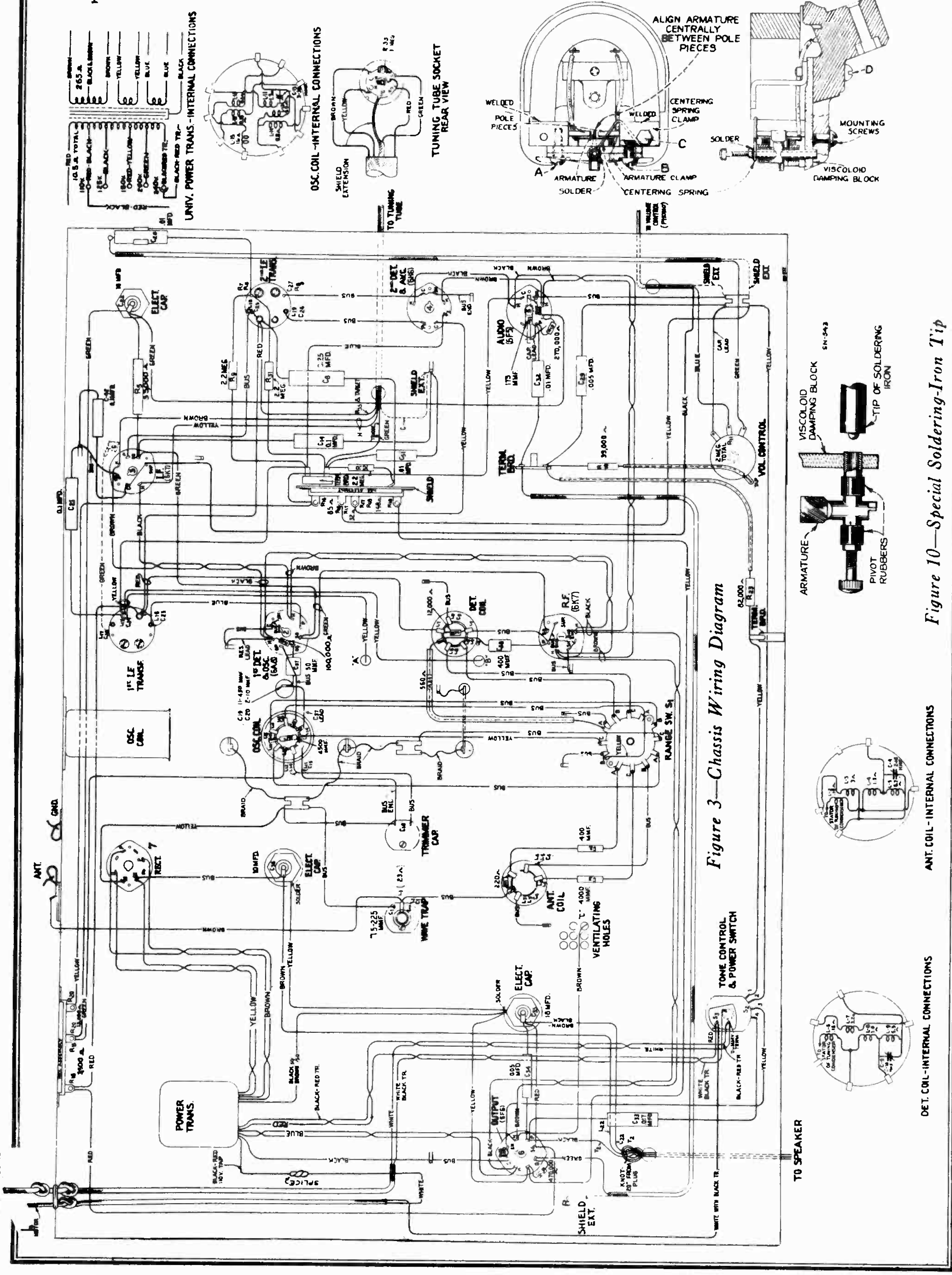


Figure 3—Chassis Wiring Diagram

Figure 10—Special Soldering-Iron Tip

MODEL D8-28
Voltage, Assembly Wiring
Phono. Adjustments, Data

RCA MFG. CO., INC.

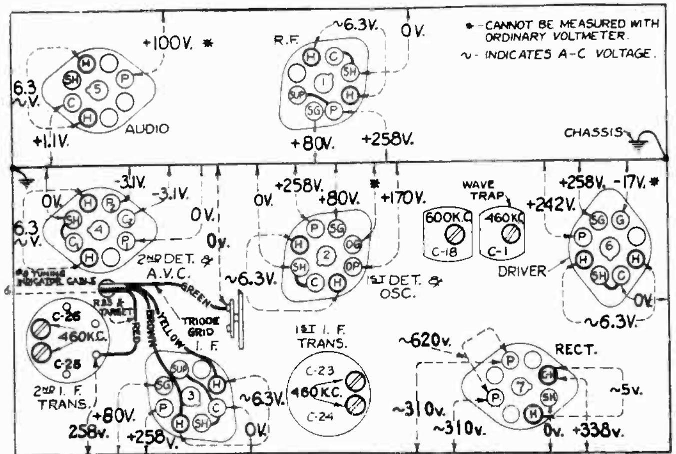


Figure 6—Radiotron Socket Voltages

Measured at 115 volts, 60 cycles—No signal input

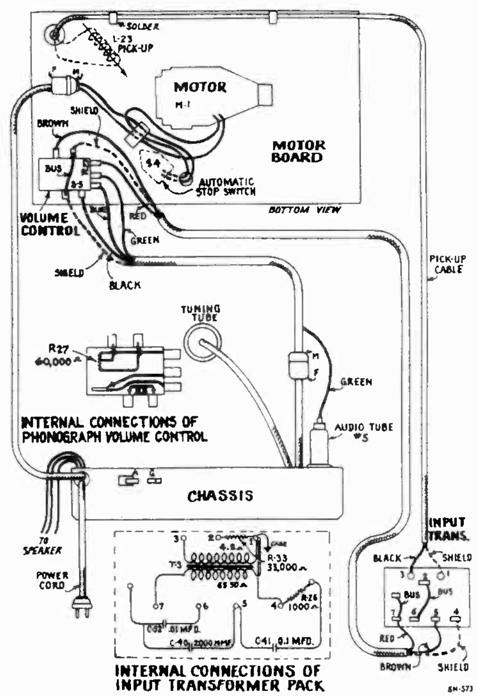


Figure 7—Assembly Wiring

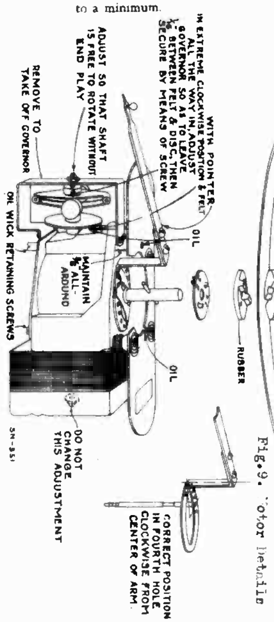


Fig.9. Motor Details

General Description

Magic Brain

The radio receiver incorporates the Junior "Magic Brain" which is a scientifically correct co-ordination of all the parts of the r-f, oscillator, and first detector functions of a Superheterodyne Receiver. This arrangement provides greater efficiency, especially in the short-wave ranges, as all lead lengths are kept as short as possible and all sockets and other parts are located for best possible operation.

Phonograph Mechanism

An improved manually operated phonograph mechanism is used in this model. The 12-inch turntable will accommodate either the 10-inch or the 12-inch phonograph records. The turntable rotates at a speed of 78 r.p.m. A speed regulator is provided for accurate adjustment of this speed. The instrument may be purchased with any one of three ratings as specified under Electrical Specifications. *It is important that a machine of any particular rating be operated at the frequency and voltage for which it is rated.* Attempts to operate at ratings other than specified for the particular instrument may result in damage to both the phonograph motor and the radio receiver. An automatic switch is provided to turn "off" the phonograph motor at the completion of record play when the eccentric-type inside groove record is used.

Tuning Dial

The tuning dial is an illuminated semi-airplane type. Each band is distinctively marked with a separate color for each band. Positions of the range selector knob are plainly marked on the control panel with letters indicating each band position placed over color strips corresponding to the band colors on the dial. The tuning control is of the dual-ratio type which permits fast tuning through a 10-to-1 drive ratio and vernier tuning through a 50-to-1 drive ratio. The latter is especially advantageous for accurate tuning of the short-wave stations. The new shock-proof condenser mounting reduces microphonic tendencies to a minimum.

Circuit Arrangement

The conventional Superheterodyne type of circuit, consisting of an r-f stage, a combined first-detector-oscillator stage, a single i-f stage, a diode-detector-automatic-volume-control stage, an audio voltage amplifier stage, an audio power output stage and a high-voltage rectifier power-supply stage, is used.

Tuned Circuits

The antenna coil system and the detector coil system each consist of a single-primary and three series-connected secondary windings to provide the three ranges of tuning. The oscillator coil system is similarly wound on a single form. A range selector switch (S-1) is used for connecting the various sections of these three coil systems into the circuit to provide operation on the band desired. The coils are tuned by a variable three-section gang condenser having trimmer capacitors in shunt with each section. There are additional trimmer capacitors across the section of each coil used for Band "A." A series trimmer is also associated with the Band "A" oscillator coil.

The intermediate frequency amplifier system consists of an RCA-6K7 in a transformer-coupled circuit. This stage operates at a basic frequency of 460 kc. Each winding of both i-f transformers (input and output) is tuned by an adjustable trimmer.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f stage is detected by an RCA-6H6 twin-diode tube. The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R-8, is applied as automatic control-grid bias to the r-f, first-detector, and i-f tubes through a suitable resistance filter circuit. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R-8 and R-9, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current and the a.v.c. diode takes over the biasing function.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector diode and the input grid of the audio-voltage-amplifier tube. This control has a tone compensating filter connected to it so that the correct aural balance will be obtained at different volume settings.

Resistance-capacitance coupling is used between the first audio stage and the power output stage. The output of the power amplifier is transformer-coupled into the dynamic loudspeaker. High-frequency tone control is effected by a capacitor across the plate circuit of the output tube. Speech-music control is effected by a resistor connected to the compensated volume control circuit. Control of tone is obtained by means of the switch (S-2).

Rectifier

The power required for operation of this receiver is supplied through transformer T-1. This transformer has an efficient electrostatic shield between its primary and secondary windings. This shield prevents interference which is on the power-supply circuit from entering the receiver and conversely reduces the tendency of the receiver to re-radiate into the power circuit. An RCA-5Z4 furnishes the d-c voltages necessary for plate, screen, cathode, and grid potentials. The field winding of the loudspeaker is used as a reactor in the filter circuit from which it simultaneously receives its magnetizing current. The heaters of all Radiotrons are supplied from a low voltage (6.3 volt) winding on the power transformer. One side of this winding is at ground potential.

Wave-Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference. This trimmer is adjusted to 460 kc. during manufacture, however, local conditions may require a readjustment, depending upon the interfering frequency.

Phonograph Mechanism

The phonograph motor is of the governor induction type and designed to be simple and foolproof. Under normal operating conditions, service difficulties should be negligible. Occasionally, however, certain adjustments may be required. These adjustments are illustrated and explained in Figure 9. Application of oil to the felt pad which rubs against the governor disc will insure smooth operation.

Magnetic Pickup

The pickup used in the phonograph unit is of an improved design, having several variations from the usual type of pickup. The magnetic assembly is one rigid piece. The horseshoe magnet is solidly welded to the pole pieces and is irremovable. There is a centering spring attached to the armature to maintain proper adjustment and provides a damping effect on the movement of the armature. The frequency response is uniform over a wide range.

Service operations which may be necessary on the pickup are as follows:

Centering Armature

Refer to Figure 8 showing the pickup inner structure. The armature is shown in its proper relation to the magnet pole pieces, i. e., exactly centered. Whenever this centering adjustment has been disturbed, the screws A, B, and C should be loosened and the armature clamp adjusted to the point where the vertical axis of the armature is at right angles to the horizontal axis of the pole pieces, and centered between them. This centering operation may be facilitated by inserting a small rod or nail into the armature needle hole, using it as a lever to test the angular movement of the armature. The limitations of the movement in each direction will be caused by the armature striking the pole pieces. The proper adjustment is obtained when there is equal angular displacement of the armature and adjustment rod or nail to each side of the vertical axis of the magnet and coil assembly. The screws A and B should then be secured, observing care not to disturb the adjustment of the armature clamp. Then place the pickup in a vise and secure the centering spring-clamp by means of the screw C, allowing the centering spring to remain in the position at which the armature is exactly centered between the pole pieces. With a little practice, the correct adjustment of the armature may be readily obtained. The air gap between the pole pieces and the armature should be kept free from dust, filings, and other such foreign materials which would obstruct the movement of the pickup armature.

Damping Block

The viscoloid block which is attached to the back end of the armature shank serves as a mechanical filter to eliminate undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block, it may be done by removing screw D and the cover support bracket from the mechanism and taking off the old viscoloid block. The surface of the armature which is in contact with the viscoloid should be thoroughly cleaned with fine emery cloth. Then insert the new block so that it occupies the same position as it did originally. Make certain that the block is in correct vertical alignment with the armature. The hole in the new viscoloid block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the viscoloid aligned on the armature, screw D and the cover support bracket should then be replaced. Heat should be applied to the armature (viscoloid side) so that the viscoloid block will fuse at the point of contact and become rigidly attached to the armature. A special-tip soldering iron constructed as shown in Figure 10 will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block and cause

MODEL D8-28
Alignment, Parts
Loudspeaker, Transformer

RCA MFG. CO., INC.

a small bulge on both sides.

Replacing Coil

Whenever there is defective operation due to an open or shorted pickup coil, this coil should be replaced. The method of replacement will be obvious upon inspection of the pickup assembly and by study of the cut-a-way illustrations. Make sure that the new coil is properly centered with the hole in the support strip and glued securely in that position. It is important to readjust the armature as previously explained after re-assembly of the mechanism. Only rosin core solder should be used for soldering the coil leads in the pickup. This same type of solder should be used when necessary for soldering the centering spring to the armature.

Magnetizing

Loss of magnetization will not usually occur when the pickup has received normal care, due to the fact that the magnet and pole pieces are one unit and the magnetic circuit remains closed at all times. When the pickup has been mishandled, subjected to a strong a-c field, jolted, or dropped, there may be an appreciable loss of magnetic strength, in which case it will be necessary to re-magnetize the entire structure. This should be done by first removing the pickup cover and then placing the pickup assembly on the poles of a standard pickup magnetizer such as the RCA Pickup Magnetizer, Stock No. 9549, and charging the pickup in accordance with the instructions accompanying the magnetizer. It is recommended that the pickup be magnetized with the armature in place. This will require that one pole piece on the pickup magnetizer be rotated 180 degrees. This gives the desired clearance for the armature clamp assembly. It is preferable to check the polarity of the pickup magnet and to re-magnetize it so that the same polarity is maintained.

SERVICE DATA

The various diagrams of this bulletin contain such information as will be needed to isolate causes for defective operation when such a condition develops. Values of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the diagrams and the replacement parts list. Locating of the parts in the schematic circuit is facilitated by the fact that the numerical titles increase from left to right on the diagram. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Resistances of less than one ohm are generally omitted.

Alignment Procedure

Precise alignment is vital to the proper functioning of this receiver. There are four trimming adjustments provided in the i-f system, three in the oscillator coil system, two in the detector coil system, and two in the antenna coil system. Each of these trimmers has been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions of climate or have been altered for service purposes. Incorrect alignment is usually evidenced by loss of sensitivity, improper tone quality, and poor selectivity. These indications will generally be present together.

The correct performance of the receiver can only be obtained when the alignment is performed with adequate and reliable test apparatus. The manufacturer of this instrument has a complete assortment of such service equipment available. This equipment, illustrated and described on a separate page of this booklet, may be purchased from authorized distributors and dealers.

An oscillator (signal generator) is required as a source of the specified alignment frequencies. Visual indication of the receiver output during the adjustments is necessary to enable the serviceman to obtain an accuracy of alignment which is not possible by listening to the signal. **The RCA Victor Stock No. 9595 Full-Range Oscillator and the RCA Victor Stock No. 4317 Neon Output Indicator are especially suitable and fulfill the above requirements.**

The following procedure should be followed in adjusting the various trimmer capacitors:

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 6. Each must be aligned to a basic frequency of 460 kc. To do this, attach the Output Indicator across the voice coil circuit or across the output transformer primary. Connect the output of the test oscillator between the control-grid of the RCA-6A8 first detector tube and chassis-ground. Tune the oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator. Then adjust the two trimmers, C-25 and C-26, of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two trimmers, C-23 and C-24, of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i-f trimmers a second time to assure that the inter-action between them has not disturbed the original adjustment.

R-F Trimmer Adjustments

The seven trimmers associated with the r-f, first detector, and oscillator tuned circuits have their locations shown by Figure 1. The three trimmers which are at all times directly in shunt with the variable tuning condenser necessitate that the high-frequency range (Band C) be aligned first. The range selector switch should, therefore, be turned to its Band C position for the first adjustment. The Output Indicator should be left connected to the output system. Attach the output terminals of the test oscillator to the antenna and ground terminals of the receiver.

Calibrate the dial by rotating the tuning control until the variable condenser plates are in their full mesh (maximum capacity) position and adjusting the dial pointer so that its end points to the ***horizontal*** graduation (530 kc.) at the low frequency end of the Band A scale.

Proceed further as follows:

(a) Adjust the test oscillator to 18,000 kc. and set the receiver tuning control to a dial reading of 18,000 kc.

(b) Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the trimmer, C-20, on the oscillator section of the variable condenser to the point at which it produces maximum indicated receiver output. Two points may be found, each of which produces such a maximum. The one of ***maximum trimmer capacitance*** is correct and should be used. (The oscillator will be 460 kc. below the signal frequency at this adjustment point.)

(c) Adjust the trimmer, C-12, of the detector section of the variable condenser, simultaneously rocking the receiver tuning control backward and forward through the 18,000 kc. input signal, until maximum receiver output results from these combined operations. Rocking of the variable condenser will prevent inaccurate adjustment which would otherwise be caused by the inter-action between the heterodyne oscillator circuit and the detector tuned circuit.

(d) With the receiver tuning control set to 18,000 kc. adjust the trimmer, C-6, on the antenna section of the variable condenser to the point which produces maximum (peak) indicated receiver output.

(e) Change the receiver range selector to its Band A position and set the receiver tuning control to a dial reading of 1,400 kc. Tune the test oscillator to 1,400 kc. and regulate its output to produce a slight indication on the receiver output indicating device.

(f) Adjust the high frequency trimmers of the Band A oscillator, detector, and antenna coils, C-15, C-9, and C-4 respectively, to the points at which each produces maximum indicated receiver output.

(g) Shift the test oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(h) Tune the low frequency trimmer, C-18, of the oscillator Band A coil, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum indicated receiver output results from these combined operations. The adjustment of C-20, C-12, and C-6 should be corrected at 18,000 kc. as in (b), (c), and (d); also C-15, C-9, and C-4 should be corrected at 1,400 kc. as in (f) to compensate for any changes caused by the adjustment of the low frequency oscillator coil trimmer.

Radiotron Socket Voltages

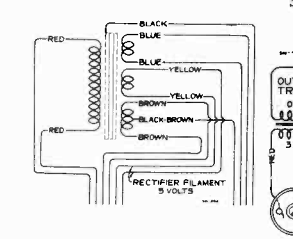
The voltage values indicated from the Radiotron socket contacts to chassis on Figure 6 will assist in the location of causes for faulty operation. Each value as specified should hold within $\pm 20\%$ when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1000 ohms per volt will be satisfactory when the range used for each reading is chosen as high as possible consistent with good readability.

Standard Transformer

The transformer used on some models of this instrument is adaptable for voltages and frequencies as given under Ratings A and B of Electrical Specifications. Its schematic and wiring are shown by Figure 5.

Radiotron Complement

(1) RCA-6K7 .... Radio Frequency Amplifier
(2) RCA-6A8 .... First Detector-Oscillator
(3) RCA-6K7 .... Intermediate Amplifier
(4) RCA-6H6 .... Second Detector A.V.C.
(5) RCA-6F5 .... Audio Voltage Amplifier
(6) RCA-6F6 .... Audio Power Amplifier
(7) RCA-5Z4 .... Full-Wave Rectifier
(8) RCA-6E5 .... Tuning Indicator



110 VOLT—60 CYCLE
Pri. Res. 5.34 ohms, total
Sec. Res. 330 ohms, total

110 VOLT—25 CYCLE
Pri. Res. 7.37 ohms, total
Sec. Res. 430 ohms, total

Figure 5—Standard Power Transformer Connections

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	$0.43
11625	Cable—Radiotron tuning tube cable complete with socket	1.26
11759	Cable—Phonograph input cable complete with 4-contact female connector stock 4153—connects chassis to cable stock 11948	.92
11350	Cap—Contact cap—Package of 5	.20
11465	Capacitor—Adjustable capacitor—(C18)	.48
11289	Capacitor—50 MMfd.—(C37)	.26
5116	Capacitor—175 MMfd.—(C31)	.18
11290	Capacitor—400 MMfd.—(C2, C7, C13, C38)	.25
11401	Capacitor—4000 MMfd.—(C3)	.38
4868	Capacitor—.005 Mfd.—(C29, C34)	.20
4906	Capacitor—.017 Mfd.—(C33)	.25
11395	Capacitor—.01 Mfd.—(C28)	.18
4858	Capacitor—.01 Mfd.—(C32)	.25
4886	Capacitor—.05 Mfd.—(C51)	.20
4839	Capacitor—0.1 Mfd.—(C14)	.28
4841	Capacitor—0.1 Mfd.—(C21)	.22
11414	Capacitor—0.1 Mfd.—(C42)	.20
5170	Capacitor—0.25 Mfd.—(C8)	.25
11240	Capacitor—10 Mfd.—(C36)	1.08
11387	Capacitor—10 Mfd.—(C22)	.86
5212	Capacitor—18 Mfd.—(C35)	1.16
5238	Clip—Antenna terminal board with clip, insulating strip and rivets	.14
11600	Coil—Antenna coil—(L2, L3, L4, L5, C4, R1)	1.78
11601	Coil—Detector coil—(L6, L7, L8, L9, C9, R3)	1.78
11602	Coil—Oscillator coil—(L10, L11, L12, L13, L14, L15, C15, C16)	2.15
11385	Condenser—Three-gang variable tuning condenser—(C5, C6, C11, C12, C19, C20)	5.02
4153	Connector—4-contact female connector for cable stock 11759	.48
11892	Dial—Station selector dial scale	.78
11394	Foot—Chassis foot assembly—Package of 2	.70
11893	Indicator—Station selector indicator pointer	.28
5226	Lamp—Dial lamp—Package of 5	.70
11393	Resistor—Voltage divider resistor—comprising one 3,500 ohm and one 13,000 ohm sections—(R15, R20)	.74
11329	Resistor—Voltage divider resistor—comprising one 148 ohm, one 32 ohm and one 85 ohm sections—(R16, R17, R18)	.52
11369	Resistor—12 ohms—Flexible type complete with contact cap—(R22)	.22
11324	Resistor—560 ohms—Carbon type—¼ watt—(R24)—Package of 5	1.00
8073	Resistor—33,000 ohms—Carbon type—½ watt—(R5)—Package of 5	1.00
11322	Resistor—39,000 ohms—Carbon type—¼ watt—(R10)—Package of 5	1.00
11365	Resistor—82,000 ohms—Carbon type—¼ watt—(R23)—Package of 5	1.00
3118	Resistor—100,000 ohms—Carbon type—¼ watt—(R19)—Package of 5	1.00
11323	Resistor—270,000 ohms—Carbon type—¼ watt—(R13)—Package of 5	1.00
11172	Resistor—4[illegible]0,000 ohms—Carbon type—¼ watt—(R14)—Package of 5	1.00
11397	Resistor—50,000 ohms—Carbon type—1/10 watt—(R2, R4)—Package of 5	.75
11626	Resistor—2.2 megohms—Carbon type—¼ watt—(R9, R31, R32)—Package of 5	1.00
11603	Shield—Antenna or detector coil shield	.26
11604	Shield—Oscillator coil shield	.24
11390	Shield—Intermediate frequency transformer shield	.25
11199	Socket—Dial lamp socket	.14
11195	Socket—5-contact rectifier Radiotron socket	.15
11198	Socket—7-contact 6K7—6F5—or 6H6 Radiotron socket	.15
11196	Socket—8-contact 6A8 or 6F6 Radiotron socket	.15
11386	Switch—Range switch—(S1)	1.16
11392	Switch—Tone control and power switch assembly—(S2, S3)	1.14
11388	Transformer—First intermediate frequency transformer—(L16, L17, C23, C24)	1.90
11389	Transformer—Second intermediate frequency transformer—(L18, L19, C25, C26, C27, R7, R8)	3.02
11803	Transformer—Power transformer—105-125 volts—50-60 cycles	4.38
11804	Transformer—Power transformer—105-125 volts—25-50 cycles	6.02
11805	Transformer—Power transformer—105-130, 140-160, 195-250, volts—40-60 cycles—(T1)	7.95
11391	Trap—Wave trap—(L1, C1)	1.22
11237	Volume control—(R11)	1.20
	MOTOR ASSEMBLIES	
11703	Governor—Governor complete for phonograph motor—Stock No. 11701 or No. 11702	3.05
11701	Motor—Phonograph turntable motor—110 volts—50 to 60 cycles—(M1)	21.20
11702	Motor—Phonograph turntable motor—110 volts—25 cycles	33.35
	MOTOR BOARD ASSEMBLIES	
4594	Box—Used needle box (cup)	.30
7084	Cover—Turntable cover	.40

Stock No.	Description	List Price
11704	Damper—Turntable rubber damper and damper plate	.24
4596	Escutcheon—Speed regulator escutcheon plate	.36
4597	Screw—Motor mounting screw assembly—comprising four screws, four lockwashers, four spacers, and four nuts	.22
11696	Turntable—Complete	2.48
11695	Volume Control—Phonograph volume control—(R27, S5)	1.60
	ECCENTRIC AUTOMATIC BRAKE SWITCH ASSEMBLIES	
3994	Cover—Eccentric automatic switch cover and screw	.26
10174	Springs—Automatic brake springs—comprising one each of four springs—Package of 2	.50
6896	Switch—Eccentric automatic brake and switch assembly—less switch cover	2.50
3322	Switch—Eccentric automatic switch only—less cover—(S4)	.75
	PICKUP AND ARM ASSEMBLIES	
11944	Arm—Pickup arm complete—less escutcheon and pickup unit	4.50
11724	Armature—Pickup armature	.38
6346	Back—Pickup housing back	.45
11946	Coil—Pickup coil—(L23)	.65
3521	Cover—Pickup back cover	.18
11708	Cover—Pickup front cover	.15
3737	Damper—Pickup damper—Package of 5	.65
3390	Escutcheon—Pickup arm escutcheon	.46
11945	Pickup Unit—Complete	4.80
3389	Rod—Eccentric automatic brake trip rod—Package of 5	.40
3387	Screw Assembly—Pickup mounting screw assembly—comprising one screw, one lockwasher and one nut—Package of 10	.40
11549	Screw—Pickup front cover screw—Package of 10	.42
11547	Screw—Pickup needle holding screw—Package of 10	.42
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board assembly with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil—(L20)	2.00
11233	Coil—Hum neutralizing coil—(L21)	.30
11258	Cone—Reproducer cone—(L22)—Package of 5	3.85
5118	Connector—3-contact male connector for reproducer	.25
5119	Connector—3-contact female connector plug for reproducer cable	.25
9619	Reproducer—Complete	6.05
11253	Transformer—Output transformer—(T2)	1.56
11886	Washer—Spring washer used to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
12038	Band—Rubber band used with tuning tube—Package of 10	.25
11996	Bracket—Tuning tube mounting bracket and clamp assembly	.22
11947	Cable—Two-conductor shielded cable approx. 35-in. long—connects volume control to input transformer	.85
11948	Cable—Three-conductor shielded cable approx. 24-in. long—complete with male connector stock 6123 and grid cap—connects volume control to chassis cable stock 11759	1.50
6123	Connector—4-contact male connector for cable stock 11948	.30
11276	Escutcheon—Tuning tube escutcheon	.40
11376	Escutcheon—Station selector escutcheon and crystal	.70
11582	Knob—Range switch knob—Package of 5	.50
11610	Knob—Station selector knob assembly—comprising one small and one large knob—Package of 5	1.00
11347	Knob—Volume control or tone control knob—Package of 5	.75
11382	Resistor—1 megohm—Carbon type—1/10 watt—(R33)—Package of 5	.75
11210	Screw—Chassis mounting screw assembly—Package of 4	.28
11381	Socket—Tuning tube socket and cover	.45
11349	Spring—Retaining spring for knobs, Stock No. 11347, No. 11582 and small knob in Stock No. 11610—Package of 5	.15
4982	Spring—Retaining spring for large knob in Stock No. 11610—Package of 10	.26
3391	Spring—Motor board mounting spring assembly—comprising one bolt, one "C" washer, two cup washers, one bottom spring, one lockwasher, and one cap nut	.50
11949	Transformer—Phonograph input transformer—(T3, R26, R33, C40, C41, C52)	7.05

The prices quoted above are subject to change without notice.

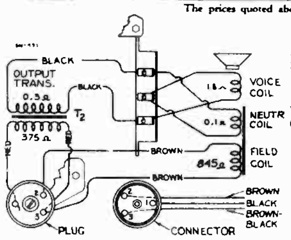


Figure 4—Loudspeaker Wiring

Mechanical Specifications

Height .... 42⅛ inches
Width .... 22⅞ inches
Depth .... 14⅞ inches
Weight (Net) .... 82 pounds
Weight (Shipping) .... 144 pounds
Chassis Base Dimension 13⅞ inches x 7⅝ inches x 2½ inches

Loudspeaker

Type .... 12-inch Electrodynamic
Voice Coil Impedance .... 2¼ Ohms at 400 Cycles

Phonograph

Type .... Manual
Turntable Speed .... 78 R.P.M.

Power Output Ratings

Undistorted .... 2¼ Watts
Maximum .... 5 Watts
Type of Pickup .. Improved Low-Impedance Magnetic
Pickup Impedance .... 7 Ohms at 1,000 Cycles

MODEL 9K Schematic Pickup

RCA MFG. CO., INC.

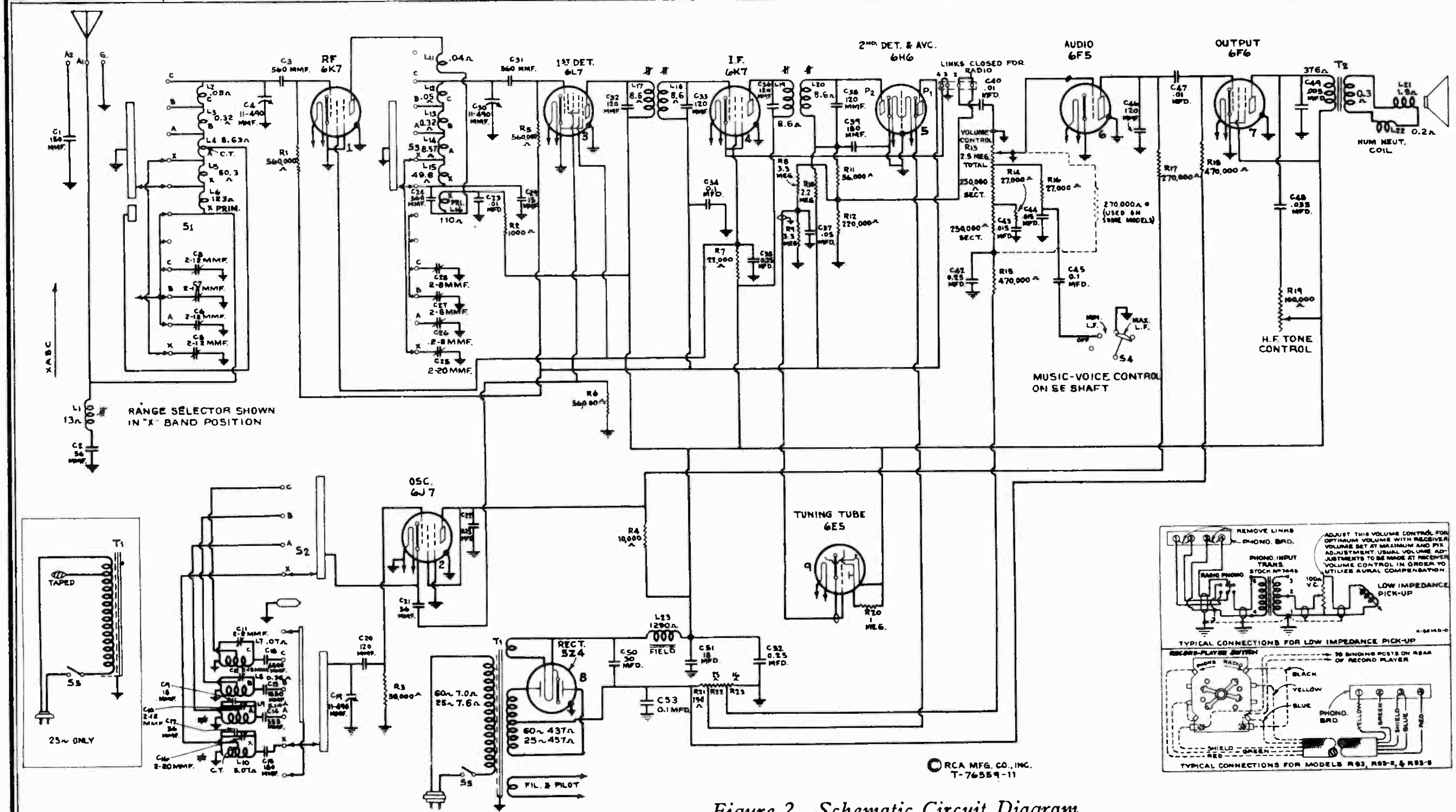


Figure 2—Schematic Circuit Diagram

(* 270,000-ohm resistor not required when replacing volume control with Stk. No. 12861)

IF PEAK 460 KC.

FREQUENCY RANGES

"Long Wave" (X) .... 150-410 kc

"Standard Broadcast" (A) .... 530-1,800 kc

"Medium Wave" (B) .... 1,800-6,400 kc

"Short Wave" (C) .... 6,400-23,000 kc

Intermediate Frequency .... 460 kc

ALIGNMENT FREQUENCIES

"Long Wave" (X) .... 175 kc (osc.), 350 kc (osc., det., ant.)

"Standard Broadcast" (A) .... 600 kc (osc.), 1,500 kc (osc., det., ant.)

"Medium Wave" (B) ... 6,000 kc (osc., det., ant.)

"Short Wave" (C) .... 20,000 kc (osc., det., ant.)

LOUDSPEAKER

Type .... Electrodynamic

Impedance (v.c.) .... 2.2 ohms at 400 cycles

POWER OUTPUT

Undistorted .... 2 watts

Maximum .... 4.5 watts

MODEL 9K
Chassis Wiring

RCA MFG. CO., INC.

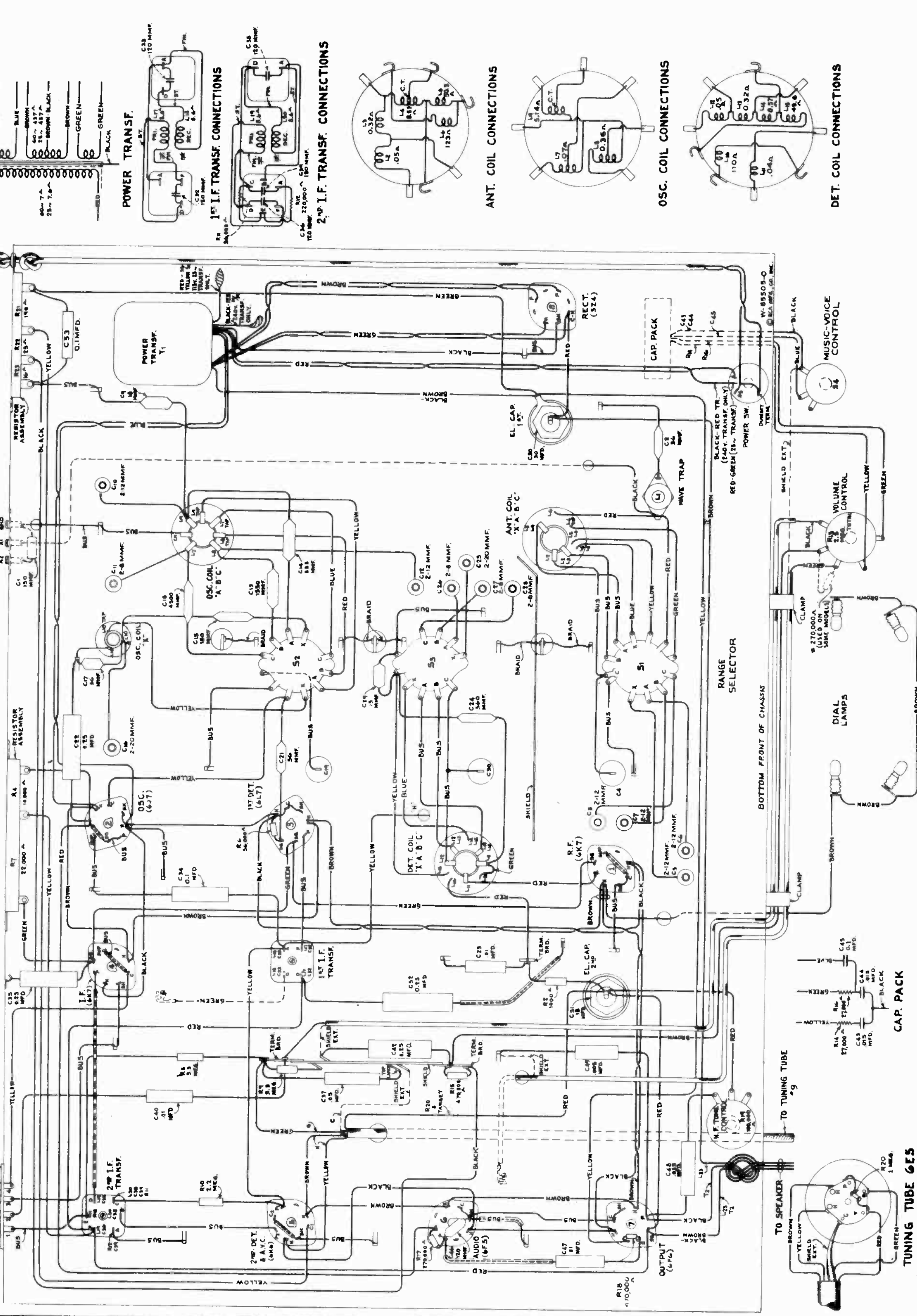


Figure 3—Chassis Wiring Diagram

RCA MFG. CO., INC.

MODEL 9K
Socket, Trimmers
Dial Mechanism
Transformer, Speaker
Visual Alignment

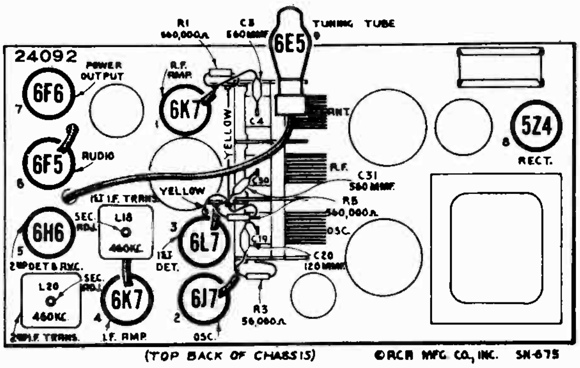


Figure 1—Radiotron and I-F Trimmer Locations

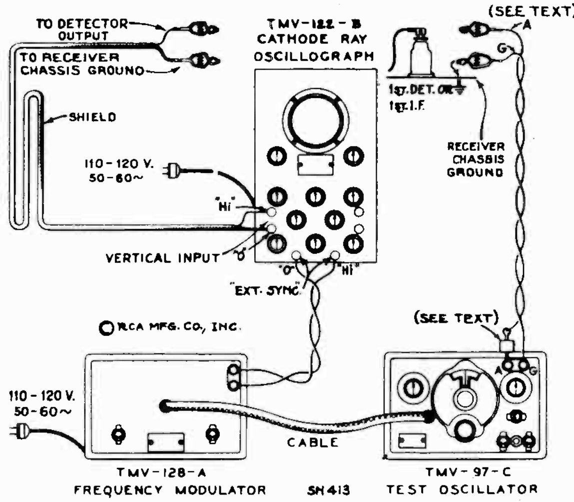
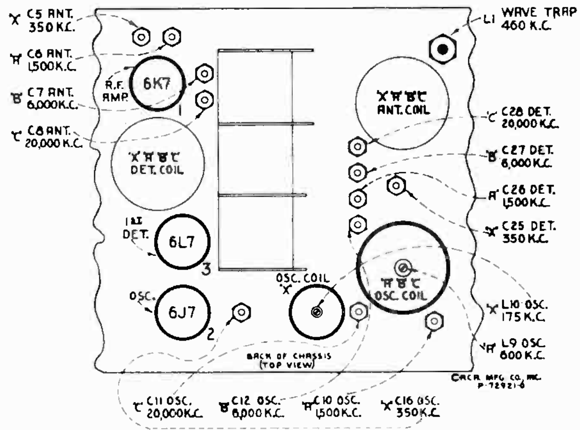


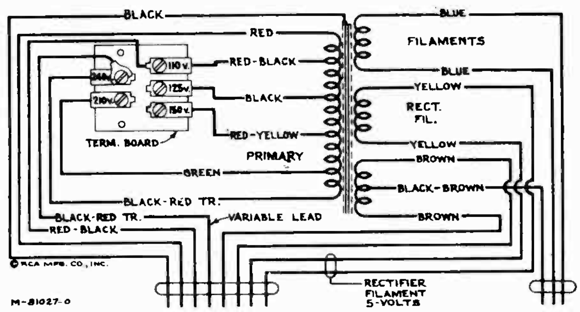
Figure 4—Alignment Apparatus Connections



APPROX. DISTANCE IN INCHES-CHASSIS BASE TO TOP OF TRIMMER PLUNGER

BAND	OSC.	DET.	ANT.
ꞇ	1 1/8	1 5/16	1 5/16
ठ	1 1/4	1 5/16	1 9/16
ㅠ	1 3/16	1 7/16	1 3/8
ᵡ	2 1/16	1 13/16	1 1/4

Figure 5—R-F Trimmer Locations



Primary resistance—13.5 ohms total
Secondary resistance—370 ohms total

Figure 8—Universal Transformer

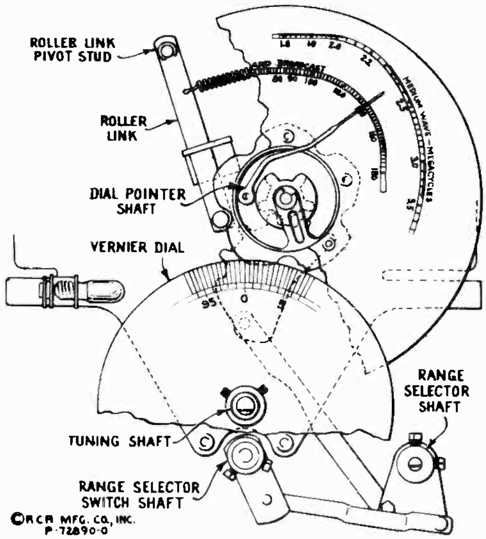


Figure 9—Selector Dial Change Mechanism

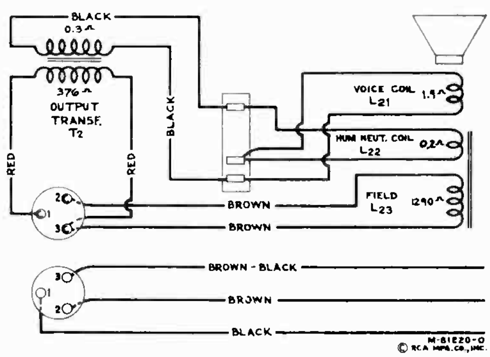


Figure 10—Loudspeaker Wiring

MODEL 9K Resistance, Voltage

RCA MFG. CO., INC.

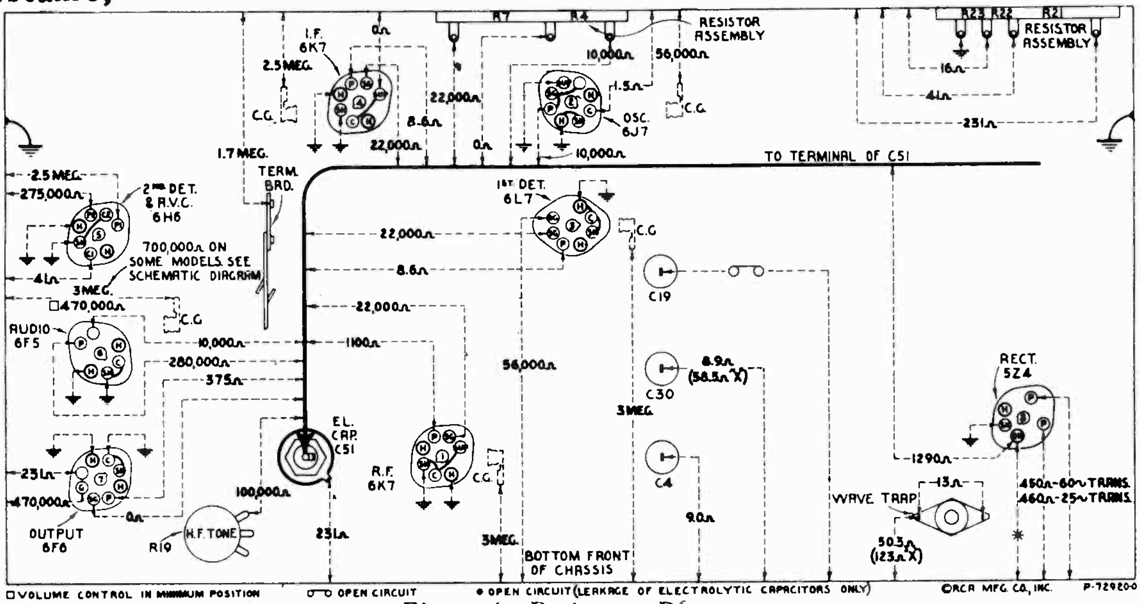


Figure 6—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full-mesh—Range selector in "Standard broadcast" position—Volume control maximum—Tone control clockwise

The resistance values shown between Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground or other pertinent point on figure 6, permit a rapid continuity check of the circuits. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 2, and Wiring Diagram, figure 3, will permit the location of certain troubles which might otherwise be difficult to ascertain. Each value as specified should hold within ± 20%. Variations in excess of this limit will usually be indicative of trouble in circuit under test. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative terminal of the resistance meter to chassis-ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

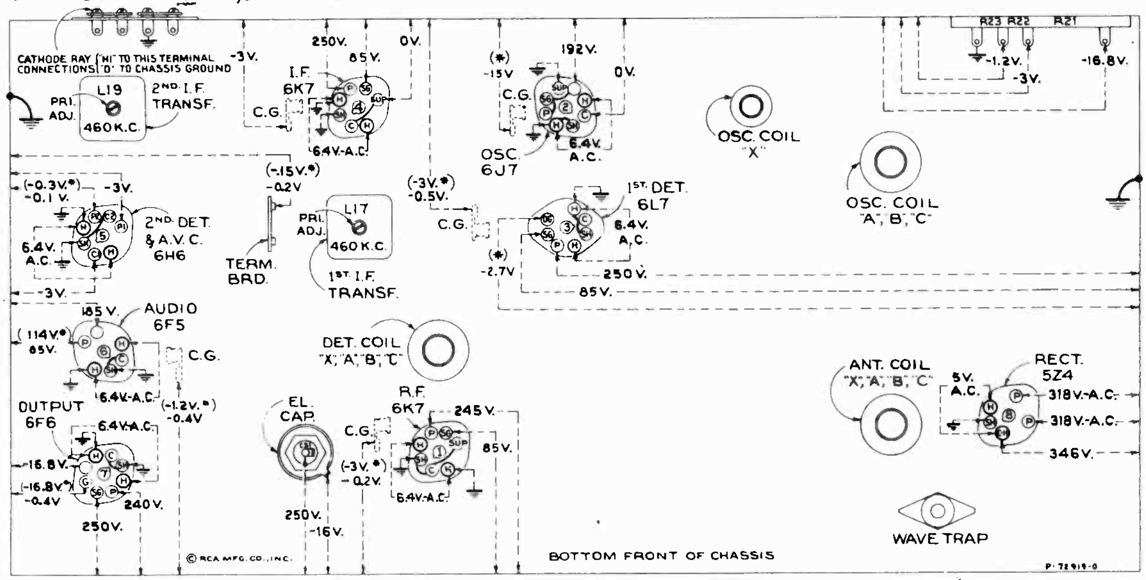


Figure 7—Radiotron Socket Voltages, Coil, and I-F Trimmer Locations

Measured at 115 volts, 60-cycle supply—Tuned to approximately 1,000 kc—No signal being received—Volume control minimum

Note: Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground on figure 7 will assist in locating cause for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm-per-volt d-c meter, having ranges of 10, 50, 250, 500, and 1,000 volts. Use the nearest range above the specified measured voltage. A-c voltages were measured with a corresponding a-c meter.

RCA MFG. CO., INC.

MODEL 9K
Circuit Data
Alignment, Part 1

General Description

This receiver represents the result of thorough development, design, and substantial manufacture. Noteworthy technical improvements have been applied in achieving marked advantages of operation, and efficiency of performance.

Model 9K is a nine-tube, console-type, superheterodyne receiver with a twelve-inch electrodynamic loudspeaker. Design features incorporated in this receiver include a built-in doublet antenna coupler; improved plunger-type air-dielectric adjustable trimming capacitors in the antenna, detector, and oscillator coil circuits; tuned r-f amplifier; high-efficiency first detector (converter) with separate oscillator; magnetite core adjusted i-f transformers, low-frequency oscillator tracking, and wave-trap; two-point aural compensated volume control; music speech switch; automatic volume control; phonograph terminal board; new selector dial; and a dust-proof electrodynamic loudspeaker.

Service convenience has been a controlling factor in the layout of the chassis parts and wiring. The assembly of these various elements is such that the number of conductors is minimized, with all important connections being readily accessible. Trimming adjustments are located at accessible points. A double tuning-knob arrangement permits the choice of either a twenty-to-one or a hundred-to-one dial drive ratio. The latter permits ease of tuning, especially in the "Medium wave" and "Short wave" bands.

Circuit Arrangement

The conventional type of superheterodyne circuit is used. It consists of an r-f amplifier stage, a first-detector (converter) stage, a separate oscillator stage, an i-f amplifier stage, a diode-detector—automatic-volume-control stage, an audio voltage-amplifier stage, a power-amplifier stage, a tuning indicator "Magic Eye," and a full-wave rectifier.

A single-wire antenna, or a doublet antenna, when connected to the proper input terminals of the receiver, is coupled to the control grid of the RCA-6K7 r-f amplifier tube through the tuned r-f transformer consisting of L6, L5, L4, L3, and L2. A unique method of switching is used. In the "Long wave" (X) band, L6 becomes the primary with L5, L4, L3, and L2 as secondary. In the "Standard broadcast" (A) band, L5 becomes the primary with L4, L3, and L2 as secondary (L6 shorted out). In the "Medium wave" (B) band, L4 becomes the primary with L3 and L2 as secondary (L6 and L5 shorted out). In the "Short wave" (C) band, L3 becomes the primary with L2 as secondary (L6, L5, L4, and tap on L4 shorted out). The tap on L4 is provided to prevent interaction with L3 and L2 when operating receiver in "Short wave" band. This method of switching reduces the total number of coils and leads, and results in having a low-loss primary and secondary winding for each band with high efficiency of operation.

The band switching of the detector circuits is similar to that of the antenna circuits. Coils L11 and L16 are always connected in series with the plate circuit of the RCA-6K7 r-f amplifier tube. In the "Long wave" (X) band, L15, L14, L13, and L12 are connected in series as the secondary circuit. The ground of the coil system is at the low end of L15. L16 acts as the primary which transfers energy to the secondary L15. Capacitor C24 resonates primary L16 at the proper frequency. In the "Standard broadcast" (A) band L14, L13, and L12 are connected in series as the secondary circuit. The ground of the coil system is now between L15 and L14. L15 is used as the primary and is resonated at the proper frequency by capacitors C28 and C29 which are in shunt with this coil. Capacitor C24 is connected to transfer energy to the primary coil L15. In the "Medium wave" (B) band, L13 and L12 are connected in series as the secondary. The ground of the coil system is now between L14 and L13. L14 is used as the primary and is resonated at the proper frequency by capacitor C29 which is in shunt with this coil. L15 is shorted by the range selector. Capacitor C24 transfers the r-f energy from the plate circuit to the primary L14. In the "Short wave" (C) band, L12 is the secondary. The ground of the coil system is now between L13 and L12. L13 is used as the primary and is resonated to the proper frequency by capacitor C29. In addition, L11 acts as a high-frequency primary which resonates at about 20 mc and improves the gain at the high-frequency end of the "Short wave" band. Coils L15 and L14 are shorted by the range selector.

Separate windings are employed in the oscillator stage for each position of the range selector. The inherent stability of this circuit provides minimum frequency drift which is especially advantageous for high-frequency reception. The locally generated signal is capacitance coupled to control grid No. 2 of the RCA-6L7 first detector.

I-F Amplifier

The intermediate-frequency amplifier consists of an RCA-6K7 in a transformer-coupled circuit. The windings of these transformers are resonated with fixed capacitors, and are adjusted by molded magnetite cores (both primary and secondary) to tune to 460 kc.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f stage is detected by an RCA-6H6 twin-diode tube. The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistors R11 and R12, is applied as automatic control-grid bias to the r-f, first-detector, and i-f tubes. The other (auxiliary) diode of the RCA-6H6 is used to supply residual bias to the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R10, R11, and R12, thereby maintaining the desired operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current and the a.v.c. diode takes over the biasing function.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector-diode and the input grid of the RCA 6F5 audio voltage-amplifier tube. This control has a two-point tone-compensating filter connected to it so that the correct aural balance will be obtained at different volume settings. Phonograph terminals are provided to feed the output of an external phonograph pickup to the control grid of the audio amplifier through this aurally compensated volume control.

The output of the voltage amplifier is resistance-capacitance coupled to the control grid of the RCA-6F6 power-output tube. The output of this stage is transformer coupled to the voice coil of the electrodynamic speaker.

The "Music-speech" control consists of a switch S4 which, in the "Speech" position, places an additional capacitor C45 in shunt with the capacitor C44 in one of the tone compensating filters. This reduces the low-frequency response of the amplifier and provides maximum intelligibility of the voice frequencies.

Continuously variable tone control is effected by means of capacitor C48 and variable resistor R19 shunting the plate circuit of the output tube.

"Magic Eye"

An RCA-6E5 cathode-ray tuning tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal. This tube consists of an amplifier section and a cathode-ray section built in the same glass envelope. A portion of the signal voltage developed across resistor R12 is used to actuate the grid of the amplifier section. Maximum voltage is applied to this grid when the receiver is tuned to resonance with an incoming carrier. This condition is evidenced by the minimum width of the dark sector on the fluorescent screen.

SERVICE DATA

The various diagrams in this booklet contain such information as will be needed to locate causes for defective operation if such develops. The values of the various resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagram. Identification titles, such as C1, L2, R1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistance only. Resistance values of less than one ohm are generally omitted.

Alignment Procedure

There are fourteen adjustments required for the alignment of the oscillator, first-detector, and antenna-tuned circuits; one adjustment for the wave-trap, and four adjustments for the i-f system. Twelve of these adjustments are made with plunger-type air trimming capacitors and require the use of an **RCA Stock No. 12636 Adjusting Tool**. Each of these capacitors has a lock nut for securing the plunger in place after adjustment. The remaining seven adjustments are made by means of screws attached to molded magnetite cores. These cores change the inductance of the particular coils in which they are inserted to provide exact alignment. All of these adjustments are accurately made during manufacture and should remain in proper alignment unless affected by abnormal conditions of climate or purported alterations for servicing, or unless altered by other means. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment. Such conditions will usually exist simultaneously. Correct performance of this receiver can only be obtained when these adjustments have been made by a skilled service engineer with the use of adequate and reliable test equipment. The manufacturer of this receiver has such test equipment available for sale through its distributors and dealers.

This receiver requires a more or less involved method of alignment. However, if the following directions are carefully applied in the sequence given, normal performance of the instrument will be obtained.

The plunger-type air trimming capacitors have their approximate plunger settings tabulated on figure 5. If the plungers have been disturbed from their original adjustments, they may be roughly set to the specified dimensions prior to alignment.

In performing services on the oscillator, detector, and r-f circuits, the leads should be restored to their original positions, since the lead-dress is important for proper operation and dial calibration.

Precautionary Dressing of Leads Prior to Alignment
(Refer to Figure 3)

Band "X"

1. Keep blue lead X of S1 to antenna coil L4-5 dressed away from chassis, and from yellow lead of S1 to antenna coil L5-6.
2. Keep blue lead X of S3 to detector coil L14-15 clear of chassis, coil shield, coil, and other leads.
3. Keep bus lead C5 to X of S1 apart from bus lead C6 to A of S1, and from chassis.

Band "A"

1. Keep green lead, terminal of S1 to antenna coil tap L-4, away from chassis, coil shield, and coil.
2. Keep bus lead C6 to A of S1 apart from bus lead C5 to X of S1, and from chassis.

Band "C"

Lead from C18 to oscillator coil L7 should be maintained as short and straight as possible.

For alignment, the test-oscillator frequency should be quite accurate. A convenient and reliable means of accurately checking the frequency of test oscillators, receivers, etc., is the **RCA Stock No. 9572 Crystal Calibrator.**

If the test-oscillator signal cannot be heard as the receiver (heterodyne) oscillator air-trimmer plunger is changed from its minimum-capacity to maximum-capacity position (receiver dial and test oscillator set to the specified frequencies, and the correct oscillator air-trimmer used) it may be an indication that the test-oscillator frequency is outside the range covered by the air-trimmer. Under such conditions, when a more accurate setting of the test oscillator cannot be determined, set the oscillator air-trimmer plungers to the approximate settings given on figure 5. Tune the test oscillator until the signal is heard in the speaker. Each of two test-oscillator settings (the fundamentals or the harmonics of which are 920 kc apart) produce a signal. The lower-frequency test-oscillator setting should be used as this places the test-oscillator (signal) frequency 460 kc below the frequency of the receiver heterodyne oscillator.

Holes are provided in the top of the r-f and antenna coil cans on some models to enable a tuning check with the **RCA Stock No. 6679 Tuning Wand.** The hole in the top of the detector coil can has a cinch button which must be removed before insertion of the tuning wand. When the brass end of the wand is inserted in the coil, the inductance of the coil is decreased. If this results in an increase of output, the respective air-trimmer capacitance should be decreased (plunger pulled out). If inserting the iron end of the tuning wand causes an increase in output, resulting from an increase of inductance of the coil, the respective air-trimmer capacitance should be increased (plunger pushed in). If the range of the air trimmer is not sufficient to give the desired results, the lead-dress may be changed in the particular circuit being aligned so as to cause the circuit to resonate within the range of the trimmer. An increase in the capacity-to-ground of the circuit will be required if the iron end of the tuning wand causes an increase of signal output when the air-trimmer plunger is full-in, while a decrease in the capacity-to-ground will be required if the brass end of the tuning wand causes an increase in signal output when the air-trimmer plunger is full-out.

Two methods of alignment are applicable—one requires use of the cathode-ray oscillograph, and the other requires a voltmeter or glow-type indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave-image which represents the resonance characteristics of the circuit being tuned. This type of alignment is possible through use of apparatus such as the **RCA Stock No. 9558 Frequency Modulator** and the **RCA Stock No. 9545 Cathode-Ray Oscillograph.** The output-indicator method should be performed with an instrument such as the **RCA Stock No. 4317 Neon Glow Indicator.** Either of these methods require the use of a reliable test oscillator such as the **RCA Stock No. 9595.** Both of these procedures are outlined below.

Cathode-Ray Alignment

Make alignment apparatus connections shown on figure 4. Remove the plug of the frequency-modulator cable from the test-oscillator jack. Connect the receiver chassis to a good external ground. Connect oscillograph "Vertical" input terminals as indicated on figure 3. Set oscillograph power switch to "On" and adjust "Intensity" and "Focus" controls to give a clearly defined spot, or line, on the screen. Set oscillograph "Ampl. A" switch to "On," "Vertical gain" control full-clockwise, "Ampl. B" switch to "Timing," "Range" switch to No. 2 position, and "Timing" switch to "Int." Place the "Sync." control, "Freq." control, and "Horizontal gain" control to about their mid-positions. For each of the following adjustments, the test-oscillator output must be regulated so that the image obtained on the oscillograph screen will be of the minimum size for accurate observation. The receiver volume-control setting is optional.

I-F Adjustments

(a) Connect the "Ant." output of the test oscillator to the grid cap of RCA-6K7 i-f tube (with grid lead in place) through a **.001-mfd.** capacitor, with "Gnd." to receiver chassis. Tune the test oscillator to **460 kc** and place its modulation switch to "On" and its output switch to "Hi."

(b) Turn on the receiver and test oscillator. Increase the output of the test oscillator until a deflection is noticeable on the oscillograph screen. The figures obtained represent several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave-image formed (400-cycle waves) to be spread completely across the screen by adjusting the "Horizontal gain" control. The image should be synchronized and made to remain motionless by adjusting the "Sync." and "Freq." controls.

(c) Adjust the two magnetite core screws **L20** and **L19** (see figures 1 and 7) of the second i-f transformer (one on top and one on bottom) to produce maximum vertical deflection of the oscillographic image. This adjustment places the transformer in exact resonance with the **460-kc** signal.

(d) The sweeping operation should follow using the frequency modulator. Shift the oscillograph "Timing" switch to "Ext." Insert plug of frequency-modulator cable in test-oscillator jack. Turn the test-oscillator modulation switch to "Off." Turn on the frequency modulator and place its sweep-range switch to "Hi."

(e) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. If only one wave appears, increase the "Freq." control on the oscillograph to obtain two waves. These waves will be identical in shape, totally disconnected, and appear in reversed positions. They will have a common base line, which is discontinuous. Adjust the "Freq." and "Sync." controls of the oscillograph to make them remain motionless on the screen. Continue increasing the test-oscillator frequency until these forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will be obtained at a test-oscillator setting of **approximately 575 kc.**

(f) With the images established as in (e), re-adjust the two magnetite core screws **L20** and **L19** on the second i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(g) Without altering the adjustments of the apparatus, shift the "Ant." output of the test oscillator to the input of the i-f system, i.e., to the RCA-6L7 first-detector grid cap, through a **.001-mfd.** capacitor (with grid lead in place). Regulate the test-oscillator output so that the amplitude of the oscillographic image is approximately the same as used for adjustment (f) above.

(h) The two first i-f transformer magnetite core screws **L18** and **L17** (one on top and one on bottom) should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

Make receiver dial adjustments as outlined by "Selector dial," figure 9. Alignment must be made in sequence of "Wave-trap," "Short wave" band, "Medium wave" band, "Standard broadcast" band, and "Long wave" band.

"Wave-Trap" Adjustment

(a) Connect the output of the test oscillator to the antenna terminal "A1" through a **200-mmfd. (important)** capacitor. Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn test-oscillator modulation switch to "On." Shift the oscillograph "Timing" switch to "Int." Place receiver range selector in "Standard broadcast" position. Set the receiver dial to a position of no extraneous signals **near 600 kc**. Tune the test oscillator to **460 kc.** Adjust the wave-trap magnetite core screw **L1** to the point which causes minimum amplitude of output (maximum suppression of signal) as shown by the waves on the oscillograph. An increase of the test-oscillator output may be necessary before this point of minimum amplitude, obtained by correct adjustment of wave-trap screw, becomes apparent on oscillograph screen.

"Short Wave" Band

(b) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" of the receiver through a **300-ohm** resistor. Set the receiver range selector to its "Short wave" position and its dial pointer to **20,000 kc.** Adjust the test oscillator to **20,000 kc.** Adjust oscillator air-trimmer **C11** until maximum (peak) output is reached. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust detector air-trimmer **C28** until maximum (peak) output is reached, while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer **C8** until maximum (peak) output is reached while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to **19,080 kc.** The image signal should be received at this position indicating that the adjustment of **C11** has been correctly made. No adjustments should be made while checking for the image signal.

"Medium Wave" Band

(c) Place receiver range selector to its "Medium wave" position with its dial pointer set to **6,000 kc.** Tune the test oscillator to **6,000 kc.** Adjust oscillator air-trimmer **C12** to produce maximum (peak) output as shown by the waves on the oscillograph. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust the detector air-trimmer **C27** for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer **C7** to produce maximum (peak) output. Tighten lock nut.

"Standard Broadcast" Band

(d) Remove the **300-ohm** resistor from between the test-oscillator "Ant." post and receiver antenna terminal "A1" and insert a **200-mmfd.** capacitor in its place. Place receiver range selector to "Standard broadcast" position with receiver dial pointer set to **600 kc.** Tune the test oscillator to **600 kc.** Adjust oscillator magnetite core screw **L9** (top of large oscillator coil can) for maximum (peak) output as shown by the waves on the oscillograph screen.

(e) Set receiver dial pointer to **1,500 kc.** Tune test oscillator to **1,500 kc (1,500–3,100-kc range)** and increase its output to produce a registration on the oscillograph screen. Carefully adjust the oscillator, detector, and antenna air-trimmers **C10, C26,** and **C6**, respectively, to produce maximum (peak) output as shown by the waves on the oscillograph screen. Shift the oscillograph "Timing" switch to "Ext." Place the frequency modulator sweep-range switch to its "Lo" position and insert plug of the frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test-oscillator setting of **approximately 1,680 kc.** Adjust trimmers **C10, C26,** and **C6** again, setting each to the point which produces the best coincidence and maximum amplitude of the images.

(f) Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn test-oscillator modulation switch to "On." Set oscillograph "Timing" switch to "Int." Tune test oscillator to **200 kc (200–400-kc range).** Tune receiver for maximum response to this signal at a dial reading of **approximately 600 kc.** The third harmonic of the **200-kc** signal is used for this adjustment. Shift oscillograph "Timing" switch to "Ext." Insert the plug of the frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen. This will occur at a test-oscillator setting of **approximately 230 kc.** Disregarding the fact that the two images may or may not come together, adjust the oscillator magnetite core screw L9 (top of large oscillator coil can) to produce

Radiotron Cathode Current Readings
Measured with Milliammeter Connected at Tube Socket Cathode Terminals under Conditions Similar to Those of Voltage Measurements

(1)	RCA-6K7—R-F	7.5 ma
(2)	RCA-6J7—Osc	5.4 ma
(3)	RCA-6L7—1st Det	6.4 ma
(4)	RCA-6K7—I-F	7.5 ma.
(5)	RCA 6H6—2nd Det–A.V.C.	—
(6)	RCA 6F5—A.F.	0.3 ma
(7)	RCA 6F6—Power	41 ma
(8)	RCA-5Z4—Rect	72 ma.*
(9)	RCA-6E5—Eye	3.0 ma.

(*Cannot be measured at socket)

MODEL 9K
Alignment,Part 2
Data, Parts List

RCA MFG. CO., INC.

maximum (peak) amplitude of the images. Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Repeat adjustments in (e) above to compensate for any changes caused by the adjustment of **L9** core, tightening lock nuts on **C10**, **C26**, and **C6**, respectively, after each is adjusted.

"Long Wave" Band

(g) Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Place receiver range selector to its "Long wave" position. Set the receiver dial pointer to **175 kc.** Tune the test oscillator to **175 kc** and increase its output until a deflection is noticeable on the oscillograph screen. Adjust oscillator magnetite core screw **L10** (located on top of small oscillator coil can) so that maximum (peak) amplitude of output is shown on the oscillograph screen.

(h) Set receiver dial pointer to **350 kc.** Tune test oscillator to **350 kc.** Adjust the oscillator, detector, and antenna air-trimmers **C16**, **C25**, and **C5** to produce maximum (peak) output as shown by the waves on the oscillograph screen. Without disturbing the connections, shift the oscillograph "Timing" switch to "Ext." Place the frequency-modulator sweep-range switch to its "Hi" position and insert plug of frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (decrease frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test-oscillator setting of **approximately 198 kc.** This setting places the test-oscillator frequency to **175 kc.** The second harmonic is now used for the **350 kc** adjustment. Adjust air-trimmers **C16**, **C25**, and **C5**, again, to produce maximum amplitude of the images and best coincidence throughout their lengths.

(i) Re-tune the receiver to **approximately 175 kc** so that the forward and reverse waves appear on the oscillograph screen. Adjust the oscillator magnetite core screw **L10** to produce maximum (peak) amplitude of the waves, disregarding the fact that the two images may or may not come together.

(j) Shift the receiver dial setting to **350 kc** without altering any other adjustments (frequency modulator still in operation). Adjust air-trimmers **C16**, **C25**, and **C5**, respectively, to produce maximum amplitude and best coincidence of the waves. These adjustments compensate for any changes caused by the adjustment of the magnetite core screw **L10**. Tighten lock nuts on **C16**, **C25**, and **C5**, respectively, after each is adjusted.

Output Indicator Alignment

Attach the output indicator across the loudspeaker voice-coil circuit. Advance the receiver "Volume" control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test-oscillator output so that the signal level is as low as possible and still be observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the "Ant." output of the test oscillator to the grid cap of the RCA-6L7 first detector tube (with grid lead in place) through a **.001-mfd.** capacitor, with "Gnd." to receiver chassis. Tune the test oscillator to **460 kc.** Place its modulation switch to "On" and its output switch to "Hi."

(b) Adjust the two magnetic core screws **L20** and **L19** (see figures 1 and 7) of the second i-f transformer to produce maximum (peak) output.

(c) Adjust the two first i-f transformer magnetite core screws **L18** and **L17** to produce maximum (peak) output. It is advisable to repeat the adjustment of all i-f magnetite core screws to assure that the interaction between them has not disturbed the original adjustments.

R-F Adjustments

Make receiver dial adjustments as outlined by "Selector dial," figure 9. Alignment must be made in sequence of "Wave-trap," "Short wave" band, "Medium wave" band, "Standard broadcast" band, and "Long wave" band.

"Wave-Trap" Adjustment

(a) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" on the receiver through a **200-mmfd.** (important) capacitor. Place the receiver range selector to its "Standard broadcast" position and set the dial pointer to a position of no extraneous signals **near 600 kc.** Tune the test oscillator to **460 kc.** Adjust the wave-trap magnetite core screw **L1** to the point which causes minimum output (maximum suppression of signal). An increase of the test-oscillator output may be necessary before the point of minimum output, obtained by adjustment of wave trap screw, becomes apparent on the output indicator.

"Short Wave" Band

(b) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" through a **300-ohm** resistor. Set the receiver range selector to its "Short wave" position and its dial pointer to **20,000 kc.** Adjust the test oscillator to **20,000 kc.** Adjust oscillator air-trimmer **C11** until maximum (peak) output is reached. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust detector air-trimmer **C28** until maximum (peak) output is reached, while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer **C8** until maximum (peak) output is reached, while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to **19,080 kc.** The signal should be received at this position indicating that the adjustment of **C11** has been correctly made. No adjustments should be made while checking for the image signal.

"Medium Wave" Band

(c) Place receiver range selector to its "Medium wave" position with the receiver dial pointer set to **6,000 kc.** Tune the test oscillator to **6,000 kc.** Adjust oscillator air-trimmer **C12** to produce maximum (peak) output. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust the detector air-trimmer **C27** for maximum (peak) output while slightly rocking the receiver gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer **C7** to produce maximum (peak) output. Tighten lock nut.

"Standard Broadcast" Band

(d) Remove the **300-ohm** resistor from between the test-oscillator "Ant." post and receiver antenna terminal "A1" and insert a **200-mmfd.** capacitor in its place. Place receiver range selector to its "Standard broadcast" position with the receiver dial pointer set to **600 kc.** Tune the test oscillator to **600 kc.** Adjust the oscillator magnetite core screw **L9** (top of large oscillator coil can) for maximum (peak) output.

(e) Set receiver dial pointer to **1,500 kc.** Tune test oscillator to **1,500 kc** and regulate its output until a slight indication of output is visible. Carefully adjust the oscillator, detector, and antenna air-trimmers **C10**, **C26**, and **C6**, respectively, to produce maximum (peak) output.

(f) Tune test oscillator to **600 kc.** Tune the receiver to pick up this signal **near 600 kc,** disregarding the dial reading at which it is best received. Adjust oscillator magnetite core screw **L9** (top of large oscillator coil can) for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Repeat adjustments in (e) above to compensate for any change caused by adjustment of **L9** magnetite core screw, tightening lock nuts on **C10**, **C26**, and **C6**, respectively, after each is adjusted.

"Long Wave" Band

(g) Place receiver range selector to its "Long wave" position, with dial pointer set to **175 kc.** Tune the test oscillator to **175 kc** and increase its output until a slight indication of output is visible. Adjust oscillator magnetite core screw **L10** (top of small oscillator coil can) for maximum (peak) output.

(h) Set receiver dial pointer to **350 kc.** Tune test oscillator to **350 kc.** Adjust the oscillator, detector, and antenna air-trimmers **C16**, **C25**, and **C5**, respectively, to produce maximum (peak) output.

(i) Tune test oscillator to **175 kc.** Tune receiver to pick up this signal near **175 kc,** disregarding the dial reading at which it is best received. Adjust oscillator magnetite core screw **L10** (top of small oscillator coil can) for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Repeat adjustments in (h) above to compensate for any changes caused by the adjustment of the magnetite core screw **L10.** Tighten lock nuts on **C16**, **C25**, and **C5**, respectively, after each is adjusted.

Selector Dial

Figure 9 illustrates the relation of the various parts of the dial mechanism when in its "Standard broadcast" position with the range switch likewise turned to its "Standard broadcast" position. In re-assembling the dial after repairs, see that the gears are meshed in accordance with the diagram, at the same time noting that the range switch is in its "Standard broadcast" position and the lever attached to the range-switch shaft placed in the position shown.

To adjust the dial mechanism, set the range switch to its "Standard broadcast" position. Place a straight-edge across the center of the dial so that its edge is even with the lower (end) marking at both the low-frequency and high-frequency ends of the dial. Under such conditions the straight-edge should be parallel with the top of the chassis base. If the straight-edge is not parallel with the top of the chassis base, loosen the nut on the rear of the roller link pivot stud and move the stud up or down until the link roller moves the dial to the desired position so that the end calibration marks obtain the position mentioned above. Tighten the nut on the roller link pivot stud.

Set the gang tuning condenser to its maximum capacity position. Adjust the dial pointer to the low-frequency (end) mark on "Standard broadcast" scale. This is a friction adjustment.

With the gang tuning condenser plates still in full mesh, loosen the two set screws on the vernier-dial hub. Rotate the vernier dial until the "0" marking is in a vertical plane above the center of the shaft. Tighten set screws.

Phonograph Terminal Board

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. Typical methods of connecting a low-impedance pickup, or the RCA Victor Models R-93, R-93-2, and R-93-S Record Players are shown on the Schematic Diagram (figure 2).

Antenna and Ground Terminals

These receivers are equipped with an antenna-ground terminal board having three terminals. These terminals are marked "A2," "A1," and "G," the latter being the ground terminal and should always be connected to a good external ground. The transmission-line leads of the RCA RK-40A antenna system should be connected to terminals "A2" and "A1." The receiver coupling units of the RCA RK-40 and the RCA Spider-Web antenna systems should be connected to terminals "A1" and "G." Connect a single-wire antenna to terminal "A1."

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover should be cemented back in place with ambroid upon completion of adjustment.

RADIOTRON COMPLEMENT

(1) RCA-6K7 .... R-F Amplifier
(2) RCA-6J7 .... Oscillator
(3) RCA-6L7 .... First Detector
(4) RCA-6K7 .... I-F Amplifier
(5) RCA-6H6 .... Second Detector and A.V.C.
(6) RCA-6F5 .... Audio Voltage Amplifier
(7) RCA-6F6 .... Power Output
(8) RCA-5Z4 .... Full-Wave Rectifier
(9) RCA-6E5 .... Tuning Tube

Pilot Lamps (4) .... Mazda No. 46, 6.3 volts, 0.25 ampere

POWER SUPPLY RATINGS

Rating A .... 105-125 volts, 50-60 cycles, 95 watts
Rating B .... 105-125 volts, 25-60 cycles, 95 watts
Rating C .... 100-130/140-160/195-250 volts, 40-60 cycles, 95 watts

Mechanical Specifications

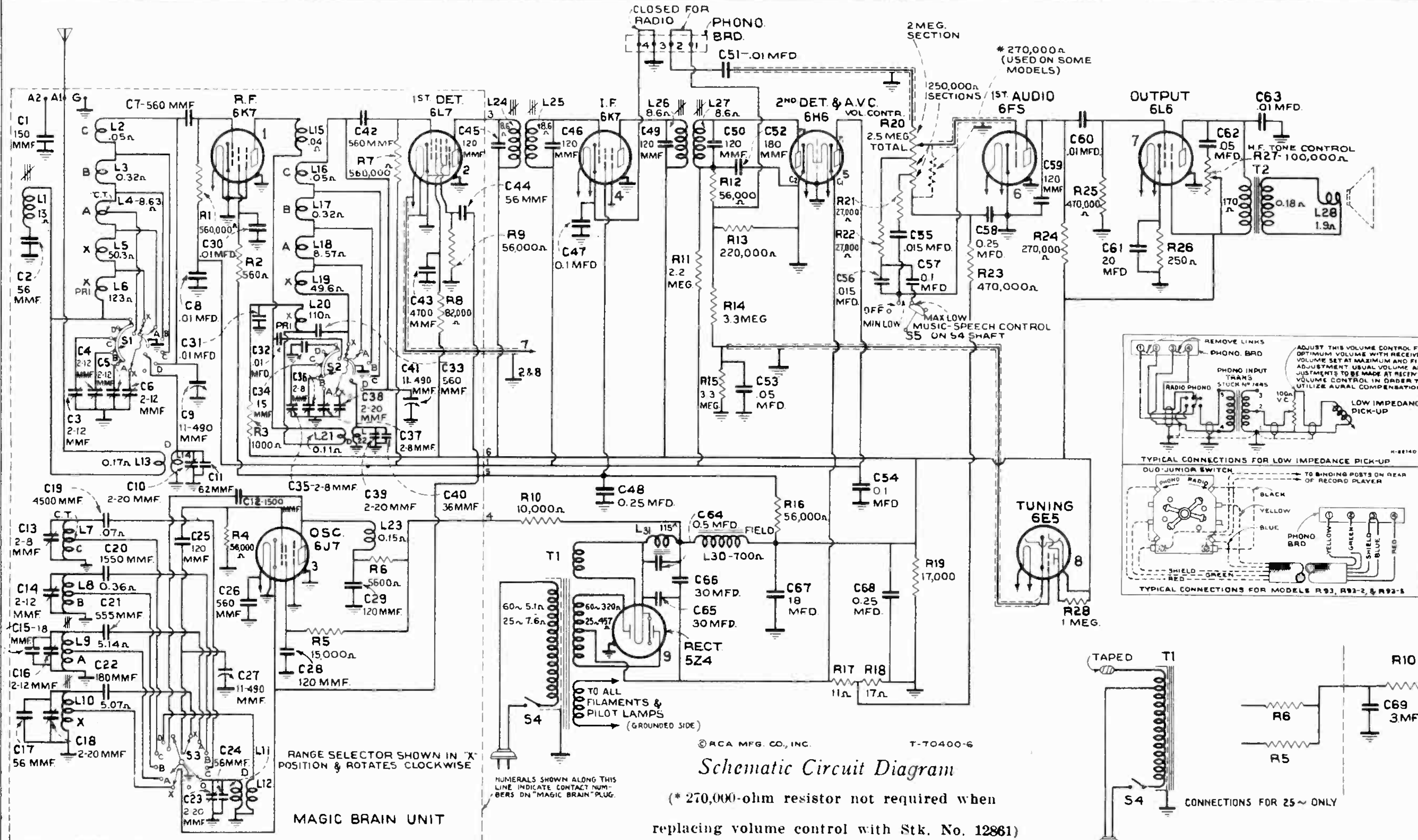
Height .... 40½ inches
Width .... 27 inches
Depth .... 14 inches
Weight (net) .... 56 pounds
Weight (shipping) .... 86 pounds
Chassis Base Dimensions .... 14½ inches x 7¾ inches x 3¼ inches
Over-all Height of Chassis .... 9 inches
Operating Controls. (1) Music-Speech—Power Switch, (2) Volume, (3) Tuning, (4) Range Selector, (5) Tone
Tuning Drive Ratios .... 20 to 1 and 100 to 1

REPLACEMENT PARTS

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
12806	Board—3-contact antenna and ground terminal board	$0.25
12863	Board—4-contact and 2-link phonograph terminal board	.25
12929	Bracket—Mounting bracket for L.F. tone control or volume control	.15
5237	Bushing—Variable condenser mounting bushing assembly—Package of 3	.43
11625	Cable—Tuning lamp cable and socket	1.26
12511	Cap—Grid contact cap—Package of 5	.15
12884	Capacitor—Adjustable trimmer (C16, C25)	.40
12807	Capacitor—Adjustable trimmer (C11, C27, C28)	.35
12714	Capacitor—Adjustable trimmer (C5, C6, C7, C8, C10, C12, C26)	.38
12896	Capacitor—15 Mmfd. (C29)	.20
12722	Capacitor—18 Mmfd. (C9)	.20
12895	Capacitor—56 Mmfd. (C17)	.20
12723	Capacitor—56 Mmfd. (C2, C21)	.20
12724	Capacitor—120 Mmfd. (C20, C46)	.28
12404	Capacitor—120 Mmfd. (C32, C33, C36, C38)	.26
12725	Capacitor—150 Mmfd. (C1)	.28
12894	Capacitor—180 Mmfd. (C15)	.20
12406	Capacitor—180 Mmfd. (C39)	.26
12727	Capacitor—555 Mmfd. (C14)	.20
12537	Capacitor—560 Mmfd. (C3, C24, C31)	.20
12729	Capacitor—1,550 Mmfd. (C13)	.26
12728	Capacitor—4,500 Mmfd. (C18)	.36
4838	Capacitor—.005 Mfd. (C49)	.20
4858	Capacitor—.01 Mfd. (C23, C40, C47)	.25
5196	Capacitor—.035 Mfd. (C48)	.18
4836	Capacitor—.05 Mfd. (C37)	.30
11282	Resistor—56,000 ohm, carbon type, 1/10 watt—Package of 5 (R6, R11, R3)	.75
11398	Resistor—220,000 ohm, carbon type, 1/10 watt—Package of 5 (R12)	.75
11453	Resistor—270,000 ohm, carbon type, 1/10 watt—Package of 5 (R17)	.75
11172	Resistor—470,000 ohm, carbon type, ¼ watt—Package of 5 (R15)	1.00
11452	Resistor—470,000 ohm, carbon type, 1/10 watt—Package of 5 (R18)	.75
11397	Resistor—560,000 ohm, carbon type, 1/10 watt—Package of 5 (R1, R5)	.75
12013	Resistor—1 Meg., carbon type, 1/10 watt—Package of 5 (R20)	.75
12679	Resistor—2.2 Meg., insulated, ¼ watt—Package of 5 (R10)	1.00
12928	Resistor—3.3 Meg., insulated, ¼ watt—Package of 5 (R8, R9)	1.00
12927	Resistor—Voltage divider resistor, comprising one 16 ohm, one 25 ohm and one 190 ohm sections (R21, R22, R23)	.35
12715	Resistor—Wire wound resistor, comprising one 10,000 ohm and one 22,000 ohm sections (R4, R7)	.86
4669	Screw—No. 8-32-5/32 set screw for link, Stock No. 12868—Package of 10	.25
3903	Screw—No. 8-32-3/16 headless, cup point set screw for Stock No. 12870—Package of 20	.36
12925	Shaft—Range switch and band indicator operating shaft and hub assembly	.25
12651	Shield—Coil shield for Stock Nos. 12923 and 12924	.22
12710	Shield—Coil shield for Stock No. 12709	.28
12883	Shield—Coil shield for Stock No. 12881	.20
12926	Shield—Chassis end shield and rubber mounting foot assembly—Package of 2	.85
12008	Shield—I. F. transformer shield for Stock Nos. 12652 and 12653	.28
12607	Shield—I. F. transformer shield top for Stock No. 12652	.30
12581	Shield—I. F. transformer shield top for Stock No. 12653	.36
5119	Socket—3-contact female connector for speaker leads	.25
11195	Socket—5-contact 5Z4 Radiotron socket	.15
11198	Socket—7-contact 6F5, 6H6, 6K7 or 6L7 Radiotron socket	.15
11196	Socket—8-contact 6F6 or 6J7 Radiotron socket	.15
11222	Socket—Upper right or lower left hand dial lamp socket	.18
13095	Socket—Upper left or lower right hand dial lamp socket	.25
11381	Socket—Tuning lamp socket and cover	.45
12007	Spring—Retaining spring for core, Stock Nos. 12006, 12664, 12800 and 12882—Package of 10	.36
12920	Switch—Range switch (S1, S2, S3)	2.60
12921	Tone Control—High frequency tone control (R19)	.95
12860	Tone Control—Low frequency tone control and power switch (S4, S5)	1.30
12652	Transformer—First I. F. transformer, complete (L17, L18, C32, C33)	1.60
12918	Transformer—Power transformer, 105-125 volt, 50-60 cycle (T1)	4.20
12857	Transformer—Power transformer, 105-125 volt, 25 cycle (T1)	7.10
12919	Transformer—Power transformer, 100-250 volt, 40-60 cycle (T1)	6.20
12653	Transformer—Second I. F. transformer, complete (L19, L20, C36, C38, C39, R11, R12)	2.06
12654	Trap—Wave trap, complete (L1)	.75
12861	Volume Control (R13)	1.00
4841	Capacitor—0.1 Mfd. (C34, C53)	.22
5170	Capacitor—0.25 Mfd. (C22, C52)	.25
4840	Capacitor—0.25 Mfd. (C42, C35)	.30
5212	Capacitor—18 Mfd. (C51)	1.16
12467	Capacitor—30 Mfd. (C50)	1.40
12923	Coil—Antenna coil and shield XABC bands (L2, L3, L4, L5, L6)	1.75
12924	Coil—Detector coil and shield XABC bands (L11, L12, L13, L14, L15, L16)	1.90
12709	Coil—Oscillator coil and shield ABC bands only (L7, L8, L9)	2.02
12881	Coil—Oscillator coil and shield X band only (L10)	.80
12859	Compensator Pack—Comprising two sections .015 Mfd. each, one section .1 Mfd. and two resistors 27,000 ohms each (C43, C44, C45, R14, R16)	1.50
12922	Condenser—3-gang variable tuning condenser (C4, C19, C30)	4.15
12664	Core—Adjustable core and stud for Stock No. 12654	.22
12800	Core—Adjustable core and stud for Stock No. 12709	.20
12882	Core—Adjustable core and stud for Stock No. 12881	.20
12006	Core—Adjustable core and stud for Stock Nos. 12652 and 12653	.22
12870	Dial—Vernier dial and disc assembly	.65
5226	Lamp—Dial lamp—6.3 volt—Package of 5	.70
12868	Link—Range switch and band indicator operating link, complete with set screws	.45
5112	Resistor—1,000 ohm, carbon type, ¼ watt—Package of 5 (R2)	1.00
	REPRODUCER ASSEMBLIES	
12641	Board—3-contact reproducer terminal board	.15
12640	Bracket—Output transformer mounting bracket and clamp	.18
12012	Coil—Field coil (L23)	1.85
11469	Coil—Neutralizing coil (L22)	.20
12667	Cone—Reproducer cone and dust cap (L21)	1.00
5118	Connector—3-contact male speaker cable connector	.25
9696	Reproducer, complete	6.90
11253	Transformer—Output transformer (T2)	1.56
11886	Washer—Spring washer to hold field coil securely—Package of 5	.20
	DRIVE ASSEMBLIES	
10705	Ball—5/32-inch dia. steel ball for planetary drive—Package of 20	.25
10941	Ball—⅛-inch dia. steel ball for planetary drive bearing—Package of 20	.25
12904	Bushing—Plate and bushing assembly for planetary drive mounting	.20
12905	Coupling—Flexible coupling and shaft assembly, complete	.50
12909	Dial—Band indicating dial and cam assembly	1.05
12899	Drive—Variable tuning condenser drive, complete—including mounting bracket, drive, dial scale and indicator, less vernier dial, Stock No. 12870 and link, Stock No. 12868	4.40
12906	Gear—Anti-lash drive gear, complete	.75
12910	Gear—Sector gear and link assembly for band selector	.20
12908	Indicator—Station selector indicator pointer	.20
8051	Link—Link and roller assembly, complete with spring	.30
12911	Screen—Dial lamp screen and light diffuser	.20
4669	Screw—Set screw for flexible coupling or gear, Stock Nos. 12905 and 12906—Package of 10	.25
12901	Shaft—Direct drive shaft and pinion gear for planetary drive	.75
12900	Shaft—Vernier drive shaft for planetary drive	.25
12903	Spring—Tension spring for planetary drive bearing—Package of 10	.20
12907	Spring—Tension spring for gear, Stock No. 12906—Package of 10	.20
8052	Spring—Tension spring for link, Stock No. 8051—Package of 5	.32
	MISCELLANEOUS ASSEMBLIES	
11996	Bracket—Tuning lamp mounting bracket and clamp	.22
12666	Cover—Reproducer cover assembly	.65
12915	Crystal—Station selector escutcheon and crystal	1.30
12742	Escutcheon—Tuning lamp escutcheon	.22
12699	Knob—Large station selector knob—Package of 5	.68
11347	Knob—Low frequency tone control and power switch, volume control, range switch or high frequency tone control knob—Package of 5	.75
12700	Knob—Small (vernier) station selector knob—Package of 5	.58
11210	Screw—Chassis mounting screw assembly—Package of 4	.28
11349	Spring—Retaining spring for knob, Stock Nos. 11347 and 12700—Package of 5	.25
4982	Spring—Retaining spring for knob, Stock No. 12699—Package of 10	.50

MODELS 9T, 9K2
Schematic
Pickup

RCA MFG. CO., INC.



Schematic Circuit Diagram

(* 270,000-ohm resistor not required when replacing volume control with Stk. No. 12861)

Frequency Ranges

"Long Wave" (X)	150-410 kc
"Standard Broadcast" (A)	530-1,800 kc
"Medium Wave" (B)	1,800-6,400 kc
"Short Wave" (C)	6,400-23,000 kc
"Ultra Short Wave" (D)	23,000-60,000 kc

Intermediate Frequency .... 460 kc

Alignment Frequencies

"Long Wave" (X) .... 175 kc (osc.), 350 kc (osc., det., ant.)
"Standard Broadcast" (A) .... 600 kc (osc.), 1,500 kc (osc., det., ant.)
"Medium Wave" (B) .... 6,000 kc (osc., det., ant.)
"Short Wave" (C) ..... 20,000 kc (osc., det., ant.)
"Ultra Short Wave" (D) .. 57,000 kc (osc., det., ant.)

Power Output

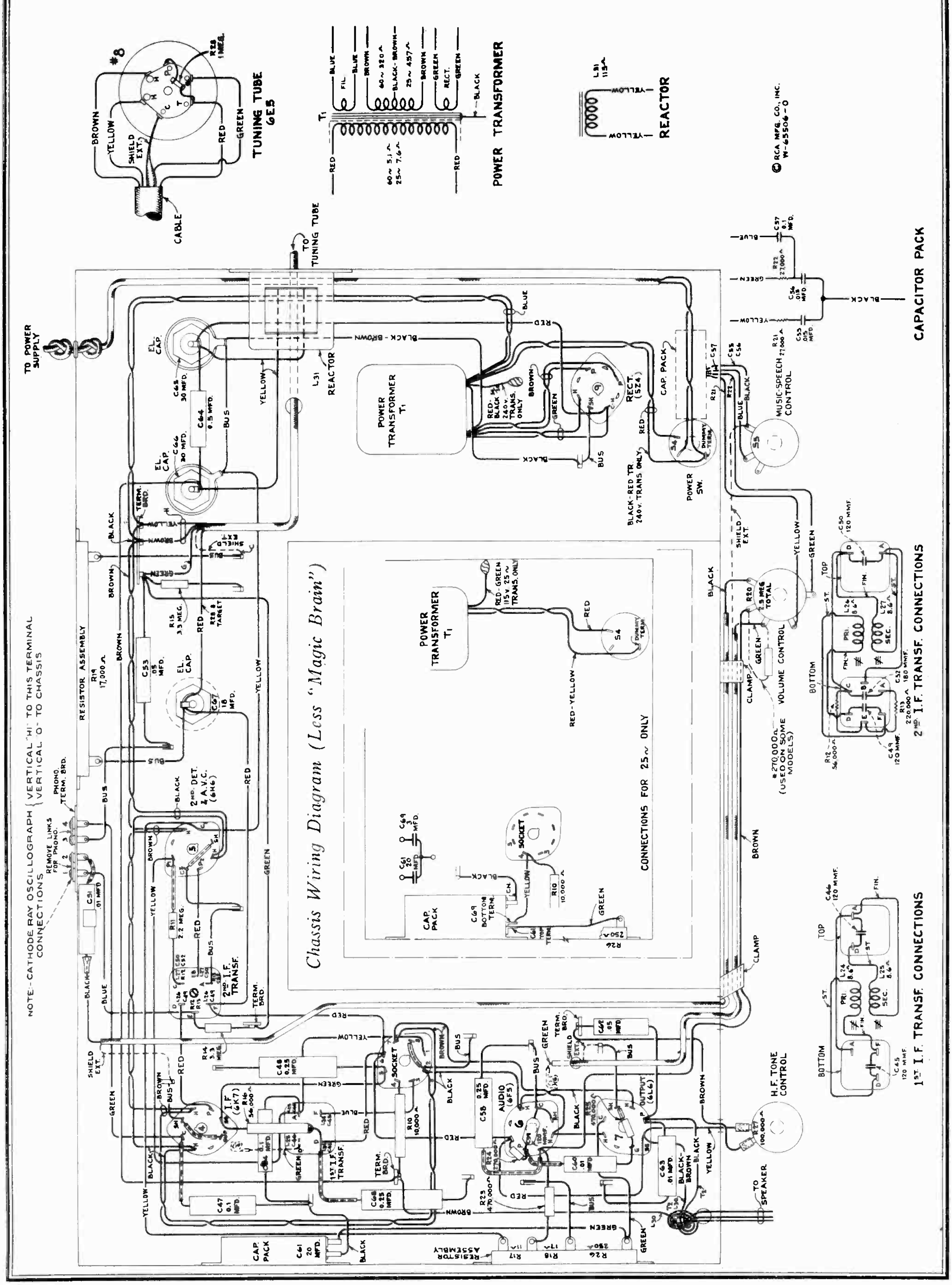
Undistorted .... 5 watts
Maximum .... 9 watts

Loudspeaker

Type .... Electrodynamic
Impedance (V.C.) .. 2.2 ohms at 400 cycles

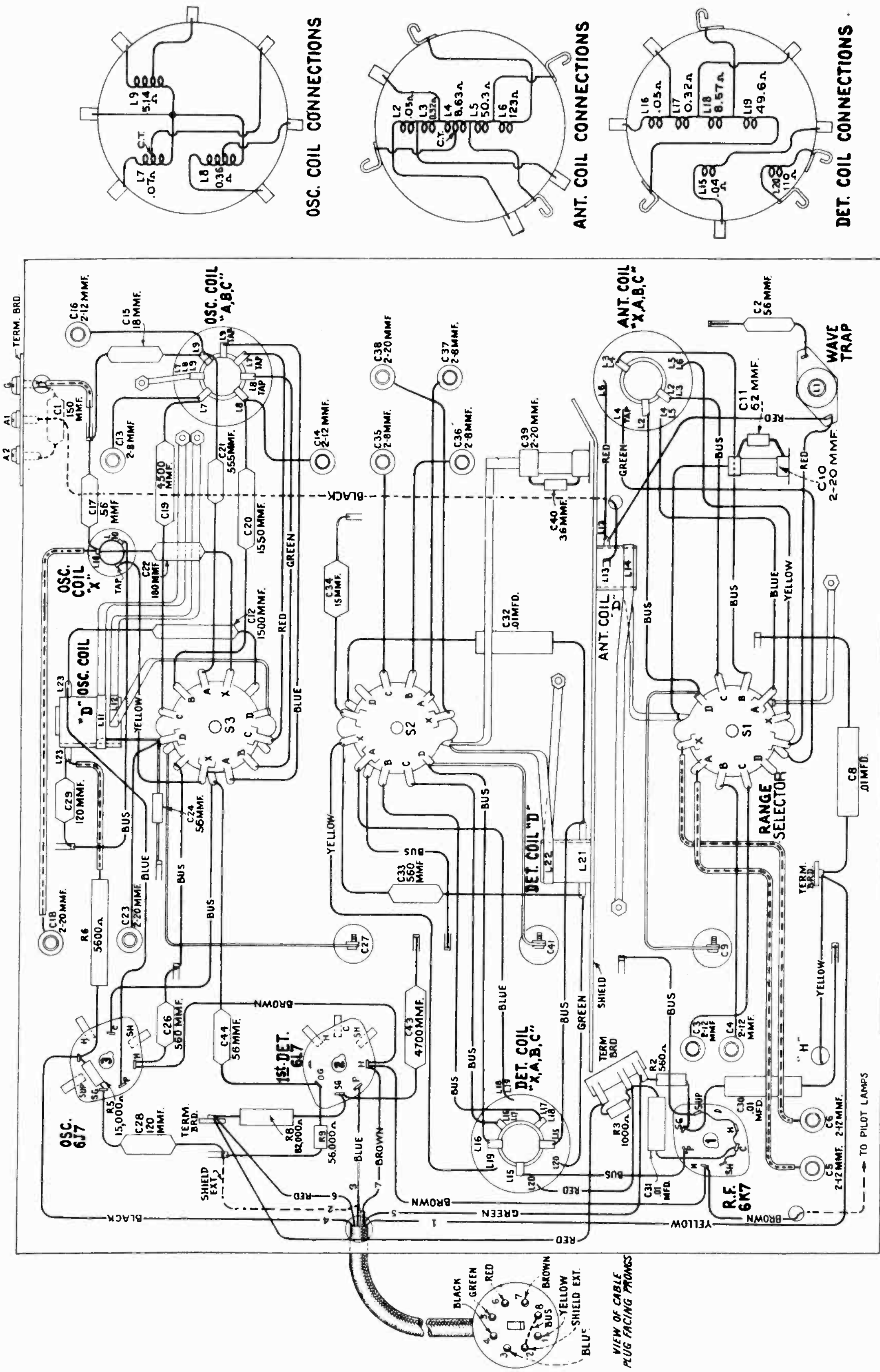
MODELS 9T, 9K2
Chassis Wiring

RCA MFG. CO., INC.



MODELS 9T,9K2
"Magic Brain"
Chassis Wiring

RCA MFG. CO., INC.



"Magic Brain" Wiring Diagram

Power Supply Ratings

Rating A........................ 105-125 volts, 50-60 cycles, 120 watts
Rating B........................ 105-125 volts, 25-60 cycles, 120 watts
Rating C........ 100-130/140-160/195-250 volts, 40-60 cycles, 120 watts

MODELS 9T,9K2
Socket,Trimmers
Visual Alignment
Dial Mechanism
Transformer,Speaker

RCA MFG. CO., INC.

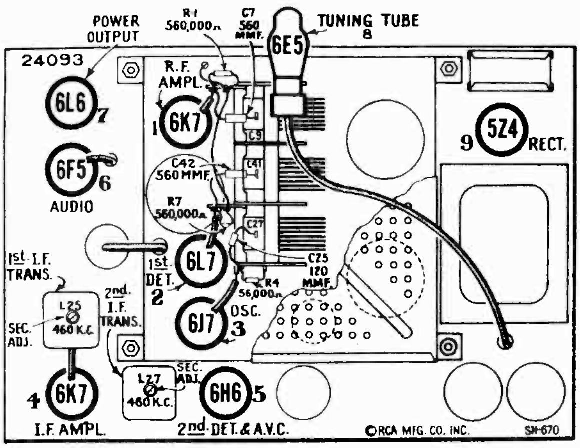


Figure 1—Radiotron and I-F Trimmer Locations

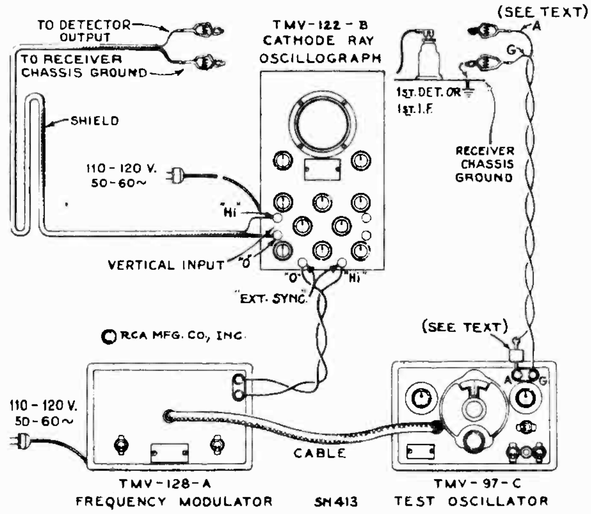
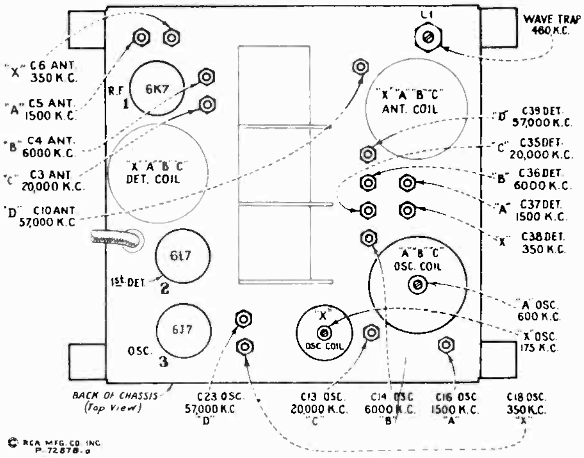


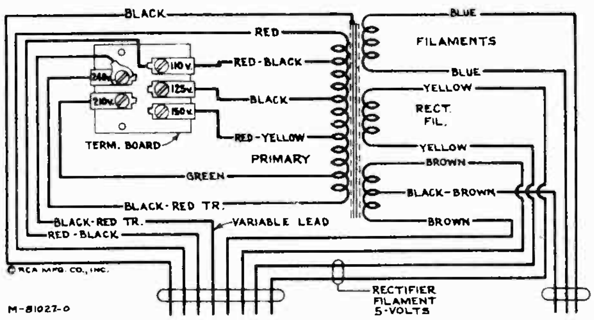
Figure 5—Alignment Apparatus Connections



APPROX. DISTANCE IN INCHES—CHASSIS BASE TO TOP OF TRIMMER PLUNGER

BAND	OSC.	DET.	ANT.
D	1 1/2	1 3/8	1 5/8
C	1 7/16	1 1/8	1 1/16
B	1 3/8	1 1/8	1 3/8
A	1 1/2	1	1 1/4
X	1 1/2	1 15/16	1 9/16

Figure 6—"Magic Brain" Trimmer Locations



Primary resistance—10.1 ohms total
Secondary resistance—226 ohms total

Figure 9—Universal Transformer

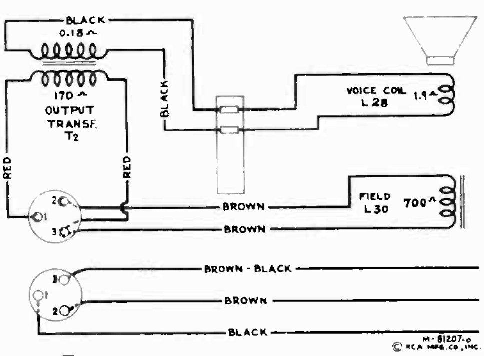


Figure 10—Loudspeaker Wiring

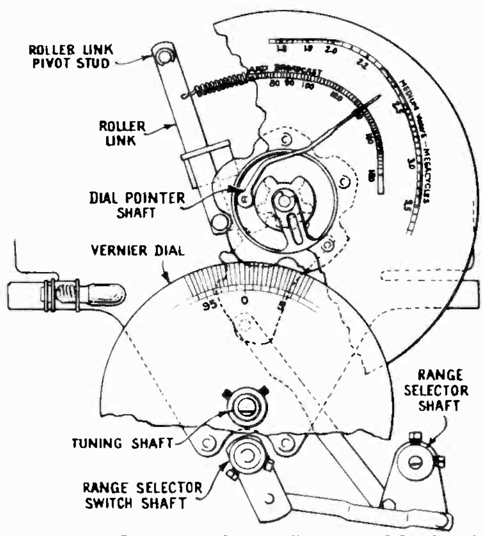


Figure 11—Selector Dial Change Mechanism

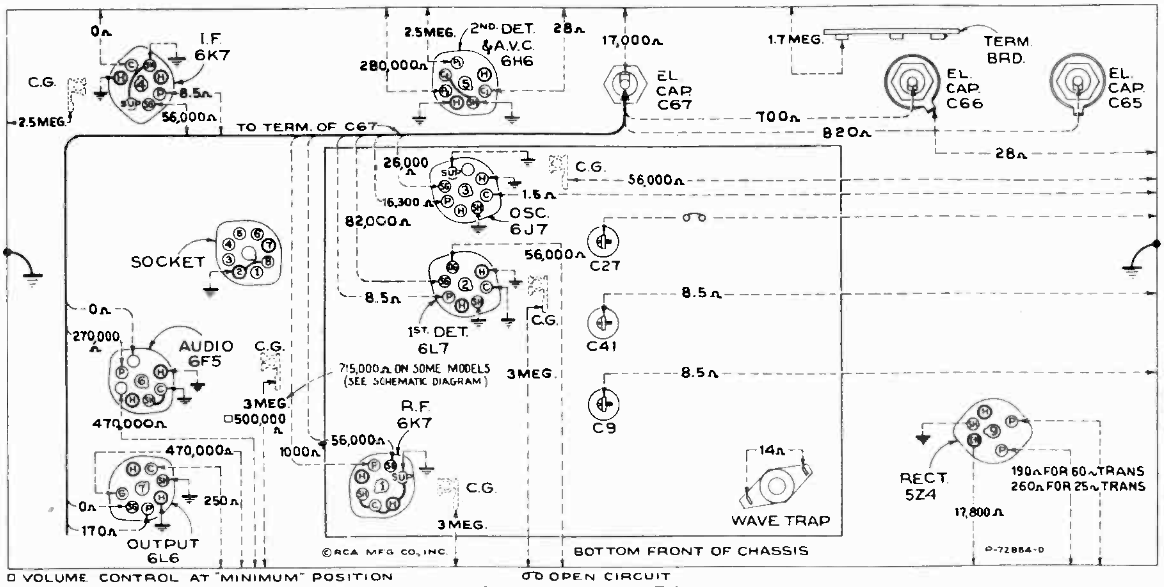


Figure 7—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full-mesh—Range selector in "Standard broadcast" position—Volume control maximum

The resistance values shown between Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground or other pertinent point on figure 7, permit a rapid continuity check of the circuits. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 2, and Wiring Diagrams, figures 3 and 4, will permit the location of certain troubles which might otherwise be difficult to ascertain. Each value as specified should hold within ± 20%. Variations in excess of this limit will usually be indicative of trouble in circuit under test. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative terminal of the resistance meter to chassis-ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

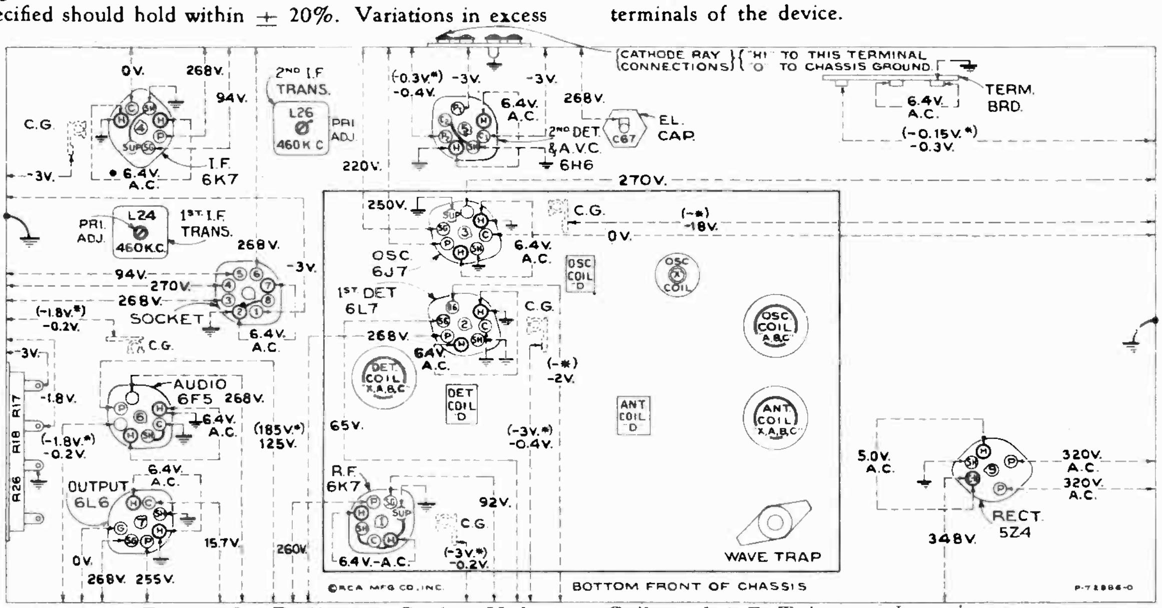


Figure 8—Radiotron Socket Voltages, Coil, and I-F Trimmer Locations

Measured at 115 volts, 60-cycle supply—Tuned to approximately 1,000 kc—No signal being received—Volume control minimum

Note: Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground on figure 8 will assist in locating cause for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm-per-volt d-c meter, having ranges of 10, 50, 250, 500, and 1,000 volts. Use the nearest range above the voltage to be measured. A-c voltages were measured with a corresponding a-c meter.

MODELS 9T,9K2
Circuit Data
Alignment,Part 1

RCA MFG. CO., INC.

Circuit Arrangement

The conventional type of superheterodyne circuit is used. It consists of an r-f amplifier stage, first-detector (converter) stage, separate oscillator stage, an i-f amplifier stage, a diode-detector—automatic-volume-control stage, an audio voltage-amplifier stage, a beam-type power-amplifier stage, a tuning indicator "Magic Eye", and a full-wave rectifier.

"Magic Brain"

The new "Magic Brain" is constructed as a separate, self-contained, completely shielded, five-band, oscillator-detector-antenna-tuning unit which plugs into the main chassis.

A single-wire antenna, or a doublet antenna, when connected to the proper input terminals of the receiver, is coupled to the control grid of the RCA-6K7 r-f amplifier tube through the tuned r-f transformer consisting of L6, L5, L4, L3, and L2 (except when range selector is in "Ultra short wave" position). The primary coil L13 of the "Ultra short wave" (D) band tuned r-f transformer remains in the antenna circuit at all times. A unique method of switching is used. In the "Long wave" (X) band, L6 becomes the primary with L5, L4, L3, and L2 as secondary. In the "Standard broadcast" (A) band, L5 becomes the primary with L4, L3, and L2 as secondary (L6 shorted out). In the "Medium wave" (B) band, L4 becomes the primary with L3 and L2 as secondary (L6 and L5 shorted out). In the "Short wave" (C) band, L3 becomes the primary with L2 as secondary (L6, L5, L4, and tap on L4 shorted out). The tap on L4 is provided to prevent interaction with L3 and L2 when operating receiver in "Short wave" band. In the "Ultra short wave" (D) band, L6, L5, L4, and L3 are shorted out and grounded, and secondary L14 is placed in shunt with L2. The latter connection prevents undesirable interaction of L2 with L14. This method of switching reduces the total number of coils and leads, and results in having a low-loss primary and secondary winding for each band with high efficiency of operation.

The band switching of the detector circuits is similar to that of the antenna circuits. Coils L15, L21, and L20 are always connected in series with the plate circuit of the RCA-6K7 r-f amplifier tube. In the "Long wave" (X) band, L19, L18, L17, and L16 are connected in series as the secondary circuit. The ground of the coil system is at the low end of L19. L20 acts as the primary which transfers energy to the secondary L19. Capacitor C33 resonates primary L20 at the proper frequency. In the "Standard broadcast" (A) band, L18, L17, and L16 are connected in series as the secondary circuit. The ground of the coil system is now between L18 and L19. L19 is used as the primary and is resonated at the proper frequency by capacitors C34 and C35 which are in shunt with this coil. Capacitor C33 is connected to transfer energy to the primary coil L19. In the "Medium wave" (B) hand, L17 and L16 are connected in series as the secondary. The ground of the coil system is now between L17 and L18. L18 is used as the primary and is resonated at the proper frequency by capacitor C34 which is in shunt with this coil. L19 is shorted by the range selector. Capacitor C33 transfers the r-f energy from the plate circuit to the primary L18. In the "Short wave" (C) band, L16 is the secondary. The ground of the coil system is now between L16 and L17. L17 is used as the primary and is resonated to the proper frequency by capacitor C34. In addition, L15 acts as a high-frequency primary which resonates above 20 mc and improves the gain at the high-frequency end of the "Short wave" band. Coils L19 and L18 are shorted by the range selector. L21 is effectively r-f bypassed in this position by capacitor C32. In the "Ultra short wave" (D) band, L22 is the secondary, or grid coil, and consists of approximately a single turn of silver plated strap around a 7/8-inch coil form. The primary coils, L21 and L15 are in series on this band, with L21 acting as a low-frequency primary and L15 as a high-frequency primary. L16 is shunted by L22 instead of being shorted directly by the range selector. Any inductive effect of L16 is thus eliminated. L19, L18, and L17 are shorted directly by the range selector.

Separate windings are employed in the oscillator stage for each position of the range selector. The inherent stability of this circuit provides minimum frequency drift which is especially advantageous for high-frequency reception. The locally generated signal is capacitance coupled to control grid No. 2 of the RCA-6L7 first detector.

The output of the "Magic Brain" is fed to the i-f amplifier through the plug-in cable. This cable also supplies all power required by the "Magic Brain" unit.

I-F Amplifier

The intermediate-frequency amplifier consists of an RCA 6K7 in a transformer-coupled circuit. The windings of these transformers are resonated with fixed capacitors, and are adjusted by molded magnetite cores (both primary and secondary) to tune to 460 kc.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f stage is detected by an RCA-6H6 twin-diode tube. The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistors R12 and R13, is applied as automatic control-grid bias to the first-detector and i-f tubes. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias to the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R11, R12, and R13, thereby maintaining the desired operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current and the a.v.c. diode takes over the biasing function.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector-diode and the input grid of the RCA 6F5 audio voltage-amplifier tube. This control has a two-point tone-compensating filter connected to it so that the correct aural balance will be obtained at different volume settings. Phonograph terminals are provided to feed the output of an external phonograph pickup to the control grid of the audio amplifier through this aurally compensated volume control.

The output of the voltage amplifier is resistance-capacitance coupled to the control grid of the RCA-6L6 power output tube. The output of this stage is transformer coupled to the voice coil of the electro-dynamic speaker.

The "Music-speech" control consists of a switch S5 which, in the "Speech" position, places an additional capacitor C57 in shunt with the capacitor C56 in one of the tone compensating filters. This reduces the low-frequency response of the amplifier and provides maximum intelligibility of the voice frequencies.

Continuously variable tone control is effected by means of capacitor C62 and variable resistor R27 shunting the plate circuit of the output tube.

"Magic Eye"

An RCA-6E5 cathode-ray tuning tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal. This tube consists of an amplifier section and a cathode-ray section built in the same glass envelope. A portion of the signal voltage developed across resistor R13 is used to actuate the grid of the amplifier section. Maximum voltage is applied to this grid when the receiver is tuned to resonance with an incoming carrier. This condition is evidenced by the minimum width of the dark sector on the fluorescent screen.

"Magic Voice" (Model 9K2)

Model 9K2 is designed with a cabinet incorporating the "Magic Voice." This is accomplished by having the rear of the speaker compartment completely enclosed by a tight-fitting back.

Five metal open-end pipes of equal diameter but of three different lengths are inserted in holes in the cabinet base and extend upward in the speaker compartment. The effect is to cause the lower-frequency waves, reaching the front of the cabinet through the pipes, to arrive approximately in-phase giving extended low-frequency response without boominess, or cabinet resonance.

SERVICE DATA

The various diagrams in this booklet contain such information as will be needed to locate causes for defective operation if such develops. The values of the various resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagram. Identification titles, such as C1, L2, R1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistance only. Resistance values of less than one ohm are generally omitted.

Alignment Procedure

There are seventeen adjustments required for the alignment of the oscillator, first-detector, and antenna-tuned circuits; one adjustment for the wave-trap; and four adjustments for the i-f system. Fifteen of these adjustments are made with plunger-type air trimmi capacitors and require the use of an RCA Stock No. 12636 Adjusting Tool. Each of these capacitors has a lock nut for securing the plunger in place after adjustment. The remaining seven adjustments are made by means of screws attached to molded magnetite cores. These cores change the inductance of the particular coils in which they are inserted to provide exact alignment. All of these adjustments are accurately made during manufacture and should remain in proper alignment unless affected by abnormal conditions of climate or purported alterations for servicing, or unless altered by other means. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment. Such conditions will usually exist simultaneously. Correct performance of this receiver can only be obtained when these adjustments have been made by a skilled service engineer with the use of adequate and reliable test equipment. The manufacturer of this receiver has such test equipment available for sale through its distributors and dealers.

The extensive frequency range of these receivers necessitates a more or less involved method of alignment. However, if the following directions are carefully applied in the sequence given, normal performance of the instruments will be obtained.

The plunger-type air trimming capacitors have their approximate plunger settings tabulated on figure 6. If the plungers have been disturbed from their original adjustments, they may be roughly set to the specified dimensions prior to alignment.

In performing services on the "Magic Brain", the leads should be restored to their original positions, since the lead-dress is important for proper operation and dial calibration.

Precautionary Dressing of Leads for "Magic Brain" Alignment
(Refer to Figure 4)

Band "X"

1. Keep blue lead A of S1 to antenna coil L4-5 dressed away from chassis, and from yellow lead X of S1 to antenna coil L5-6.
2. Bus lead from C-10 to S1 should be as short as possible.
3. Keep blue lead A of S2 to detector coil L18-19 clear of chassis, coil shield, coil, and other leads.
4. Keep spaghetti lead C6 to X of S1 apart from spaghetti lead C5 to A of S1, and from chassis.

Band "A"

1. Keep green lead terminal S1 to antenna coil tap L4 away from chassis, coil shield, and coil.
2. Keep spaghetti lead C5 to A of S1 apart from spaghetti lead C6 to X of S1 and from chassis.

Band "C"

Lead from C19 to oscillator coil L7 should be maintained as short and straight as possible.

For alignment, the test-oscillator frequency should be quite accurate. A convenient and reliable means of accurately checking the frequency of test oscillators, receivers, etc., is the RCA Stock No. 9572 Crystal Calibrator.

If the test-oscillator signal cannot be heard as the receiver (heterodyne) oscillato air-trimmer plunger is changed from its minimum-capacity to maximum-capacity position (receiver dial and test oscillator set to the specified frequencies, and the correct oscillator air-trimmer used) it may be an indication that the test-oscillator frequency is outside the range covered by the air-trimmer. Under such conditions, when a more accurate setting of the test oscillator cannot be determined, set the oscillator air-trimmer plungers to the approximate settings given on figure 6. Tune the test-oscillator until the signal is heard in the speaker. Each of two test-oscillator settings (the fundamentals or the harmonics of which are 920 kc apart) produce a signal. The lower-frequency test-oscillator setting should be used as this places the test-oscillator (signal) frequency 460 kc below the frequency of the receiver heterodyne oscillator.

Holes are provided in the top of the r-f and antenna coil cans on some models to enable a tuning check with the RCA Stock No. 6679 Tuning Wand. The hole in the top of the detector coil can has a cinch button which must be removed before insertion of the tuning wand. When the brass end of the wand is inserted in the coil, the inductance of the coil is decreased. If this results in an increase of output, the respective air-trimmer capacitance should be decreased (plunger pulled out). If inserting the iron end of the tuning wand causes an increase in output, resulting from an increase of inductance of the coil, the respective air-trimmer capacitance should be increased (plunger pushed in). If the range of the air trimmer is not sufficient to give the desired results, the lead-dress may be changed in the particular circuit being aligned, so as to cause the circuit to resonate within the range of the trimmer. An increase in the capacity-to-ground of the circuit will be required if the iron end of the tuning wand causes an increase of signal output when the air-trimmer plunger is full-in, while a decrease in the capacity-to-ground will be required if the brass end of the tuning wand causes an increase in signal output when the air-trimmer plunger is full-out.

Two methods of alignment are applicable—one requires use of the cathode-ray oscillograph, and the other requires a voltmeter or glow-type indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave-image which represents the resonance characteristics of the circuit being tuned. This type of alignment is possible through use of apparatus such as the RCA Stock No. 9558 Frequency Modulator and the RCA Stock No. 9545 Cathode-Ray Oscillograph. The output-indicator method should be performed with an instrument such as the RCA Stock No. 4317 Neon Glow Indicator. Both of these procedures are outlined below.

Cathode-Ray Alignment

Make alignment apparatus connections shown on figure 5. Remove the plug of the frequency-modulator cable from the test-oscillator jack. Connect the receiver chassis to a good external ground. Connect oscillograph "Vertical" input terminals as indicated on figure 3. Set oscillograph power switch to "On" and adjust "Intensity" and "Focus" controls to give a clearly defined spot, or line, on the screen. Set oscillograph "Ampl. A" switch to "On," "Vertical gain" control full-clockwise, "Ampl. B" switch to "Timing," "Range" switch to No. 2 position, and "Timing" switch to "Int." Place the "Sync." control, "Freq." control, and "Horizontal gain" control to about their mid-positions. For each of the following adjustments, the test-oscillator output must be regulated so that the image obtained on the oscillograph screen will be of the minimum size for accurate observation. The receiver volume-control setting is optional.

I-F Adjustments

(a) Connect the "Ant." output of the test oscillator to the grid cap of RCA-6K7 i-f tube (with grid lead in place) through a .001-mfd. capacitor, with "Gnd." to receiver chassis. Tune the test oscillator to 460 kc and place its modulation switch to "On" and its output switch to "Hi."

(b) Turn on the receiver and test oscillator. Increase the output of the test oscillator until a deflection is noticeable on the oscillograph screen. The figures obtained represent several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave-image formed (400-cycle waves) to be spread completely across the screen by adjusting the "Horizontal gain" control. The image should be synchronized and made to remain motionless by adjusting the "Sync." and "Freq." controls.

(c) Adjust the two magnetite core screws L27 and L26 (see figures 1 and 8) of the second i-f transformer (one on top and one on bottom) to produce maximum vertical deflection of the oscillographic image. This adjustment places the transformer in exact resonance with the 460-kc signal.

(d) The sweeping operation should follow using the frequency modulator. Shift the oscillograph "Timing" switch to "Ext." Insert plug of frequency-modulator cable in test-oscillator jack. Turn the test-oscillator modulation switch to "Off." Turn on the frequency modulator and place its sweep-range switch to "Hi."

(e) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. If only one wave appears, increase the "Freq." control on the oscillograph to obtain two waves. These waves will be identical in shape, totally disconnected, and appear in reversed positions. They will have a common base line, which is discontinuous. Adjust the "Freq." and "Sync." controls of the oscillograph to make them remain motionless on the screen. Continue increasing the test-oscillator frequency until these forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will be obtained at a test-oscillator setting of approximately 575 kc.

(f) With the images established as in (e), re-adjust the two magnetite core screws L27 and L26 on the second i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(g) Without altering the adjustments of the apparatus, shift the "Ant." output of the test oscillator to the input of the i-f system, i.e., to the RCA-6L7 first-detector grid cap, through a .001-mfd. capacitor (with grid lead in place). Regulate the test-oscillator output so that the amplitude of the oscillographic image is approximately the same as used for adjustment (f) above.

(h) The two first i-f transformer magnetite core screws L25 and L24 (one on top and one on bottom) should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

Make receiver dial adjustments as outlined by "Selector dial," figure 11. Alignment must be made in sequence of "Wave-trap," "Ultra short wave" band, "Short wave" band, "Medium wave" band, "Standard broadcast" band, and "Long wave" band.

"Wave-Trap" Adjustment

(a) Connect the output of the test oscillator to the antenna terminal "A1" through a 200-mmfd. (important) capacitor. Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn test-oscillator modulation switch to "On." Shift the oscillograph "Timing" switch to "Int." Place receiver range selector in "Standard broadcast" position. Set the receiver dial to a position of no extraneous signals near 600 kc. Tune the test oscillator to 460 kc. Adjust the wave-trap magnetite core screw to the point which causes minimum amplitude of output (maximum suppression of signal) as shown by the waves on the oscillograph. An increase of the test-oscillator output may be necessary before this point of minimum amplitude, obtained by correct adjustment of wave-trap screw, becomes apparent on oscillograph screen.

"Ultra Short Wave" Band

(b) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" of the receiver through a 300-ohm resistor. Set the receiver range selector to its "Ultra short wave" position and its dial pointer to 57,000 kc. Adjust the test oscillator to 19,000 kc. The third harmonic of 19,000 kc is used for this adjustment. If the indication on the oscillograph screen is not sufficient for the following adjustments at 57,000 kc, the vertical-input terminals of the cathode-ray oscillograph may be connected thus: "Hi" to the plate contact of the RCA-6L6 power-output tube socket with the "0" terminal to chassis-ground. The receiver should be turned off while making this connection since the plate potential is impressed across the oscillograph input and a severe shock will result if contact is made between these two points. If this connection is made, advance the receiver volume control to its maximum position. Adjust oscillator air-trimmer C23 for maximum (peak) output. Two positions, each producing maximum output, may be found. The position of minimum capacitance (plunger near out) should be used. This places the receiver heterodyne oscillator 460 kc higher in frequency than the incoming signal. Tighten lock nut. Adjust the detector air-trimmer C39, while slightly rocking the gang tuning condenser back and forth through the signal, for maximum (peak) output. Two peaks may be found on this trimmer. The peak of maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust the antenna air-trimmer C10 for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found on this trimmer which produce maximum output. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to 56,080 kc. If the image signal is received at this position, the adjustment of the oscillator air-trimmer C23 has been correctly made. No adjustments should be made while checking for the image signal.

(c) Re-tune receiver for maximum response to 57,000 kc (not image response) without disturbing test-oscillator adjustments. Change test oscillator to 6,800—14,000 kc range. Tune test oscillator until signal is heard in speaker (should occur at approximately 14,250 kc, fourth harmonic of test oscillator used). Two test-oscillator settings (230 kc apart) will produce a signal at this point. The lower frequency test-oscillator setting should be used, as this places the test oscillator harmonic 460 kc below the frequency of the receiver heterodyne oscillator. Tune receiver for maximum response at a dial setting of approximately 28,500 kc (image should tune in at a dial setting approximately 27,580 kc) without altering test-oscillator adjustment. Test-oscillator second harmonic of 14,250 kc is used for the following check. Check calibration of receiver dial. A receiver-dial reading of less than 28,500 kc indicates that the inductance of the oscillator secondary coil L11 is too low and should be increased. If the receiver dial reading is greater than 28,500 kc, the inductance of L11 is too high and should be decreased. If it is necessary to change the inductance of L11, first remove bottom cover of "Magic Brain" and then set receiver dial pointer to 28,500 kc. To decrease inductance, move the grounded ends (straps) of L11 and L12 (see figure 4) nearer chassis. Do not allow straps to touch chassis except where connected. To increase inductance, move the straps farther away from chassis. Adjust position of straps till maximum (peak) output results. The alignment of the detector tuned circuit should next be checked at 28,500 kc without changing either the receiver or test oscillator adjustments. An increase of output when the brass end of a tuning wand is brought near L22 indicates that L22 is too high in inductance, while an increase when the iron end is brought near the coil indicates that the inductance is too low. The inductance of L22 may be varied by changing the spacing between the grounded end (strap) of L22 and the strap connected from C41 to contact on S2 (figure 4). An increase of spacing will increase the inductance, while a decrease of spacing will decrease the inductance. Adjust the spacing until maximum (peak) output results. Replace "Magic Brain" bottom cover and repeat adjustments in (b) prior to those of "Short wave" band.

"Short Wave" Band

(d) Set the receiver range selector to its "Short wave" position and its dial pointer to 20,000 kc. Adjust the test oscillator to 20,000 kc. If the vertical input cathode-ray connections were changed for adjustment (b) above, they should

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be restored to their original position as shown on figure 3. Adjust oscillator air-trimmer C13 until maximum (peak) output is reached. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust detector air-trimmer C35 until maximum (peak) output is reached, while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer C3 until maximum (peak) output is reached while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacity (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to 19,080 kc. The image signal should be received at this position indicating that the adjustment of C13 has been correctly made. No adjustments should be made while checking for the image signal.

"Medium Wave" Band

(e) Place receiver range selector to its "Medium wave" position with its dial pointer set to 6,000 kc. Tune the test oscillator to 6,000 kc. Adjust oscillator air-trimmer C14 to produce maximum (peak) output as shown by the waves on the oscillograph. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust the detector air-trimmer C36 for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer C4 to produce maximum (peak) output. Tighten lock nut.

"Standard Broadcast" Band

(f) Remove the 300-ohm resistor from between the test oscillator "Ant." post and receiver antenna terminal "A1" and insert a 200-mmfd. capacitor in its place. Place receiver range selector to "Standard broadcast" position with receiver dial pointer set to 600 kc. Tune the test oscillator to 600 kc. Adjust oscillator magnetite core screw L9 (top of large oscillator coil can) for maximum (peak) output as shown by the waves on the oscillograph screen.

(g) Set receiver dial pointer to 1,500 kc. Tune test oscillator to 1,500 kc (1,500–3,100-kc range) and increase its output to produce a registration on the oscillograph screen. Carefully adjust the oscillator, detector, and antenna air-trimmers C16, C37 and C5, respectively, to produce maximum (peak) output as shown by the waves on the oscillograph screen. Shift the oscillograph "Timing" switch to "Ext." Place the frequency modulator sweep-range switch to its "Lo" position and insert plug of the frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test-oscillator setting of approximately 1,680 kc. Adjust trimmers C16, C37, and C5 again, setting each to the point which produces the best coincidence and maximum amplitude of the images.

(h) Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn test-oscillator modulation switch to "On." Set oscillograph "Timing" switch to "Int." Tune test oscillator to 200 kc (200–400-kc range). Tune receiver for maximum response to this signal at a dial reading of approximately 600 kc. The third harmonic of the 200-kc signal is used for this adjustment. Shift oscillograph "Timing" switch to "Ext." Insert the plug of the frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increased frequency) until the forward and reverse waves show on the oscillograph screen. This will occur at a test-oscillator setting of approximately 230 kc. Disregarding the fact that the two images may or may not come together, adjust the oscillator magnetite core screw L9 (top of large oscillator coil can) to produce maximum (peak) amplitude of the images. Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Repeat adjustments in (g) above to compensate for any changes caused by the adjustment of L9 core, tightening lock nuts on C16, C37, and C5, respectively, after each is adjusted.

Radiotron Cathode Current Readings
Measured with Milliammeter Connected at Tube Socket Cathode Terminal under Conditions Similar to Those of Voltage Measurements

(1)	RCA-6K7—R-F	8.0 ma.
(2)	RCA-6L7—1st Det.	4.4 ma.
(3)	RCA-6J7—Osc.	6.7 ma.
(4)	RCA-6K7—I-F	8.0 ma.
(5)	RCA-6H6—2nd Det.-A.V.C.	—
(6)	RCA-6F5—A.F.	0.3 ma.
(7)	RCA-6L6—Power	63 ma.
(8)	RCA-6E5—Eye	3.0 ma.
(9)	RCA-5Z4—Rect.	110 ma.

"Long Wave" Band

(i) Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Place receiver range selector to its "Long wave" position. Set the receiver dial pointer to 175 kc. Tune the test oscillator to 175 kc and increase its output until a deflection is noticeable on the oscillograph screen. Adjust oscillator magnetite core screw L10 (located on top of small oscillator coil can) so that maximum (peak) amplitude of output is shown on the oscillograph screen.

(j) Set receiver dial pointer to 350 kc. Tune test oscillator to 350 kc. Adjust the oscillator, detector, and antenna air-trimmers C18, C38, and C6 to produce maximum (peak) output as shown by the waves on the oscillograph screen. Without disturbing the connections, shift the oscillograph "Timing" switch to "Ext." Place the frequency-modulator sweep-range switch to its "Hi" position and insert plug of frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (decrease frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test-oscillator setting of approximately 198 kc. This setting places the test-oscillator frequency to 175 kc. The second harmonic is now used for the 350 kc adjustment. Adjust air-trimmers C18, C38, and C6, again, to produce maximum amplitude of the images and best coincidence throughout their lengths.

(k) Re-tune the receiver to approximately 175 kc so that the forward and reverse waves appear on the oscillograph screen. Adjust the oscillator magnetite core screw L10 to produce maximum (peak) amplitude of the waves, disregarding the fact that the two images may or may not come together.

(l) Shift the receiver dial setting to 350 kc without altering any other adjustments (frequency modulator still in operation). Adjust air-trimmers C18, C38, and C6, respectively, to produce maximum amplitude and best coincidence of the waves. These adjustments compensate for any changes caused by the adjustment of the magnetite core screw L10. Tighten lock nuts on C18, C38, and C6, respectively, after each is adjusted.

Output Indicator Alignment

Attach the output indicator across the loudspeaker voice-coil circuit. Advance the receiver "Volume" control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test-oscillator output so that the signal level is as low as possible and still be observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the "Ant." output of the test oscillator to the grid cap of the RCA-6L7 first detector tube (with grid lead in place) through a .001-mfd. capacitor, with "Gnd." to receiver chassis. Tune the test oscillator to 460 kc. Place its modulation switch to "On" and its output switch to "Hi."

(b) Adjust the two magnetite core screws of the second i-f transformer (one on top and one on bottom) to produce maximum (peak) output.

(c) The two first i-f transformer magnetite core screws (one on top and one on bottom) should be adjusted to produce maximum (peak) output. It is advisable to repeat the adjustment of all i-f magnetite core screws to assure that the interaction between them has not disturbed the original adjustments.

R-F Adjustments

Make receiver dial adjustments as outlined by "Selector dial," figure 11. Alignment must be made in sequence of "Wave-trap," "Ultra short wave" band, "Short wave" band, "Medium wave" band, "Standard broadcast" band, and "Long wave" band.

"Wave-Trap" Adjustment

(a) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" on the receiver through a 200-mmfd. (important) capacitor. Place the range selector to its "Standard broadcast" position and set the receiver dial pointer to a position of no extraneous signals near 600 kc. Tune the test oscillator to 460 kc. Adjust the wave-trap magnetite core screw to the point which causes minimum output (maximum suppression of signal). An increase of the test-oscillator output may be necessary before the point of minimum output, obtained by adjustment of wave-trap screw, becomes apparent on the output indicator.

"Ultra Short Wave" Band

(b) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" through a 300-ohm resistor. Set receiver range selector to its "Ultra short wave" position and its dial pointer to 57,000 kc. Adjust the test oscillator to 19,000 kc. The third harmonic of 19,000 kc is used for this adjustment. Adjust the oscillator air-trimmer C23 for maximum (peak) output. Two positions for maximum output may be found. The position of minimum capacitance (plunger near out) should be used. This places the receiver heterodyne oscillator 460 kc higher in frequency than the incoming signal. Tighten lock nut. Adjust the detector air-trimmer C39 while slightly rocking the gang tuning condenser back and forth through the signal for maximum (peak) output. Two peaks may be found on this trimmer. The peak of maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust the antenna air-trimmer C10 for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found on this trimmer which produce maximum output. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to 56,080 kc. If the image signal is received at this position, the adjustment of the oscillator air-trimmer C23 has been correctly made. No adjustments should be made while checking for the image signal.

(c) Re-tune receiver for maximum response to 57,000 kc (not image response) without disturbing test-oscillator adjustments. Change test oscillator to 6,800–14,000-kc range. Tune test oscillator until signal is heard in speaker (should occur at approximately 14,250 kc, fourth harmonic of test oscillator used). Two test-oscillator settings (230 kc apart) will produce a signal at this point. The lower frequency test-oscillator setting should be used, as this places the test oscillator harmonic 460 kc below the frequency of the receiver heterodyne oscillator. Tune receiver for maximum response at a dial setting of approximately 28,500 kc (image should tune in at a dial setting of approximately 27,580 kc) without altering test-oscillator adjustment. Test-oscillator second harmonic of 14,250 kc is used for the following check. Check calibration of receiver dial. A receiver-dial reading of less than 28,500 kc indicates that the inductance of the oscillator secondary coil L11 is too low and should be increased. If the receiver-dial reading is greater than 28,500 kc, the inductance of L11 is too high and should be decreased. If it is necessary to change the inductance of L11, first remove bottom cover of "Magic Brain" and then set receiver dial pointer to 28,500 kc. To decrease inductance, move the grounded ends (straps) of L11 and L12 (see figure 4) nearer chassis. Do not allow straps to touch chassis except where connected. To increase inductance, move the straps farther away from chassis. Adjust position of straps till maximum (peak) output results. The alignment of the detector-tuned circuit should next be checked at 28,500 kc without changing either the receiver or test oscillator adjustments. An increase of output when the brass end of a tuning wand is brought near L22 indicates that L22 is too high in inductance, while an increase when the iron end is brought near the coil indicates that the inductance is too low. The inductance of L22 may be varied by changing the spacing between the grounded end strap of L22 and the strap connected from C41 to contact on S2. An increase of spacing will increase the inductance, while a decrease of spacing will decrease the inductance. Adjust the spacing until maximum (peak) output results. Replace "Magic Brain" bottom cover and repeat adjustments in (b) prior to those of "Short wave" band.

"Short Wave" Band

(d) Set the receiver range selector to its "Short wave" position and its dial pointer to 20,000 kc. Adjust the test oscillator to 20,000 kc. Adjust oscillator air-trimmer C13 until maximum (peak) output is reached. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust detector air-trimmer C35 until maximum (peak) output is reached, while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer C3 until maximum (peak) output is reached, while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacity (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to 19,080 kc. The signal should be received at this position indicating that the adjustment of C13 has been correctly made. No adjustments should be made while checking for the image signal.

"Medium Wave" Band

(e) Place receiver range selector to its "Medium wave" position with the receiver dial pointer set to 6,000 kc. Tune the test oscillator to 6,000 kc. Adjust oscillator air-trimmer C14 to produce maximum (peak) output. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust the detector air-trimmer C36 for maximum (peak) output while slightly rocking the receiver gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer C4 to produce maximum (peak) output. Tighten lock nut.

"Standard Broadcast" Band

(f) Remove the 300-ohm resistor from between the test oscillator "Ant." post and receiver antenna terminal "A1" and insert a 200-mmfd. capacitor in its place. Place receiver range selector to its "Standard broadcast" position with the receiver dial pointer set to 600 kc. Tune the test oscillator to 600 kc. Adjust the oscillator magnetite core screw L9 (top of large oscillator coil can) for maximum (peak) output.

(g) Set receiver dial pointer to 1,500 kc. Tune test oscillator to 1,500 kc and regulate its output until a slight indication of output is visible. Carefully adjust the oscillator, detector, and antenna air-trimmers C16, C37, and C5, respectively, to produce maximum (peak) output.

(h) Tune test oscillator to 600 kc. Tune the receiver to pick up this signal near 600 kc, disregarding the dial reading at which it is best received. Adjust oscillator magnetite core screw L9 (top of large oscillator coil can) for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Repeat adjustments in (g) above to compensate for any change caused by adjustment of L9 magnetite core screw, tightening lock nuts on C16, C37, and C5, respectively, after each is adjusted.

"Long Wave" Band

(i) Place receiver range selector to its "Long wave" position, with dial pointer set to 175 kc. Tune the test oscillator to 175 kc and increase its output until a slight indication of output is visible. Adjust oscillator magnetite core screw L10 (top of small oscillator coil can) for that maximum (peak) output.

(j) Set receiver dial position to 350 kc. Tune test oscillator to 350 kc. Adjust the oscillator, detector, and antenna air-trimmers C18, C38, and C6, respectively, to produce maximum (peak) output.

(k) Tune test oscillator to 175 kc. Tune receiver to pick up this signal near 175 kc, disregarding the dial reading at which it is best received. Adjust oscillator magnetite core screw L10 (top of small oscillator coil can) for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Repeat adjustments in (j) above to compensate for any changes caused by the adjustment of the magnetite core screw L10. Tighten lock nuts on C18, C38, and C6, respectively, after each is adjusted.

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed either permanently by cutting it away with a sharp knife, or by softening its cement with a very slight application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

Phonograph Terminal Board

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. Typical methods of connecting a low-impedance pickup, or the RCA Victor Models R–93, R–93–2, and R–93–S Record Players are shown on the Schematic Diagram (figure 2).

Selector Dial

Figure 11 illustrates the relation of the various parts of the dial mechanism when in its "Standard broadcast" position with the range switch likewise turned to its "Standard broadcast" position. In re-assembling the dial after repairs, see that the gears are meshed in accordance with the diagram, at the same time noting that the range switch is in its "Standard broadcast" position and the lever attached to the range-switch shaft placed in the position shown.

To adjust the dial mechanism, set the range switch to its "Standard broadcast" position. Place a straight-edge across the center of the dial so that its edge is even with the lower (end) marking at both the low-frequency and high-frequency ends of the dial. Under such conditions the straight-edge should be parallel with the top of the chassis base. If the straight-edge is not parallel with the top of the chassis base, loosen the nut on the rear of the roller link pivot stud and move the stud up or down until the link roller moves the dial to the desired position so that the end calibration marks obtain the position mentioned above. Tighten the nut on the roller link pivot stud.

Set the gang tuning condenser to its maximum capacity position. Adjust the dial pointer to the low-frequency (end) mark on "Standard broadcast" scale. This is a friction adjustment.

With the gang tuning condenser plates still in full mesh, loosen the two set screws on the vernier-dial hub. Rotate the vernier dial until the "0" marking is in a vertical plane above the center of the shaft. Tighten set screws.

Antenna and Ground Terminals

These receivers are equipped with an antenna-ground terminal board having three terminals. These terminals are marked "A2," "A1," and "G," the latter being the ground terminal and should always be connected to a good external ground. The transmission-line leads of the RCA RK–40A antenna system should be connected to terminals "A2" and "A1." The receiver coupling units of the RCA RK–40 and the RCA Spider-Web antenna systems should be connected to terminals "A1" and "G." Connect a single-wire antenna to terminal "A1."

General Description

These receivers represent the result of thorough development, design, and substantial manufacture. Noteworthy technical improvements have been applied in achieving marked advantages of operation, and efficiency of performance.

Model 9T is a nine-tube, table-type, "Magic Brain" superheterodyne receiver with an eight-inch electrodynamic loudspeaker. Model 9K2 employs an identical radio chassis, is of the console-type, has a twelve-inch electrodynamic loudspeaker, and incorporates the newly developed "Magic Voice." Design features incorporated in these receivers include built-in doublet antenna coupler, "Magic Brain"; improved plunger-type air-dielectric adjustable trimming capacitors in the antenna, detector, and oscillator coil circuits; tuned r-f amplifier; high-efficiency first detector (converter) with separate oscillator; beam-type power amplifier, magnetite core adjusted i-f transformers, low-frequency oscillator tracking, and wave-trap; two-point aural compensated volume control, music-speech switch; automatic volume control; phonograph terminal board; new selector dial; and a dust-proof electrodynamic loudspeaker.

Service convenience has been a controlling factor in the layout of the chassis parts and wiring. The assembly of these various elements is such that the number of conductors is minimized, with all important connections being readily accessible. Trimming adjustments are located at accessible points. A double tuning-knob arrangement permits the choice of either a twenty-to-one or a hundred-to-one dial drive ratio. The latter permits ease of tuning, especially in the "Medium wave", "Short wave", and "Ultra short wave" bands.

Mechanical Specifications

Cabinet Dimensions	Model 9T	Model 9K2
Height	22 3/4 inches	41 inches
Width	17 1/2 inches	27 3/16 inches
Depth	12 9/16 inches	14 1/2 inches
Weights		
Net	44 pounds	86 pounds
Shipping	53 pounds	129 pounds

Chassis Base Dimensions .... 15 x 9 3/4 x 3 inches
Over-all Height of Chassis .... 9 1/4 inches
Tuning Drive Ratios .... 20 to 1 and 100 to 1

Radiotron Complement

(1)	RCA-6K7	R-F Amplifier
(2)	RCA-6L7	First Detector
(3)	RCA-6J7	Oscillator
(4)	RCA-6K7	I-F Amplifier

Pilot Lamps (4) .... Mazda No. 46, 6.3 volts, 0.25 ampere

(5)	RCA-6H6	Second Detector and A.V.C.
(6)	RCA-6F5	Audio Voltage Amplifier
(7)	RCA-6L6	Power Output
(8)	RCA-6E5	Tuning Tube
(9)	RCA-5Z4	Full-Wave Rectifier

MODELS 9T, 9K2
Parts List

RCA MFG. CO., INC.

Stock No	Description	List Price
12807	Capacitor—Adjustable trimmer capacitor (C13, C35, C36, C37)	.35
12884	Capacitor—Adjustable trimmer capacitor (C10, C18, C23, C38, C39)	.40
12896	Capacitor—15 Mmfd. (C34)	.20
12722	Capacitor—18 Mmfd. (C15)	.20
12891	Capacitor—36 Mmfd. (C40)	.20
12629	Capacitor—56 Mmfd. (C24)	.20
12895	Capacitor—56 Mmfd. (C17)	.20
12723	Capacitor—56 Mmfd. (C2, C44)	.20
13307	Capacitor—62 Mmfd. (C11)	.20
12724	Capacitor—120 Mmfd. (C25, C28, C29)	.28
12725	Capacitor—150 Mmfd. (C1)	.28
12894	Capacitor—180 Mmfd. (C22)	.20
12727	Capacitor—555 Mmfd. (C21)	.20
12537	Capacitor—560 Mmfd. (C7, C26, C33, C42)	.20
12898	Capacitor—1,500 Mmfd. (C12)	.20
12729	Capacitor—1,550 Mmfd. (C20)	.26
12728	Capacitor—4,500 Mmfd. (C19)	.36
12897	Capacitor—4,700 Mmfd. (C43)	.40
4858	Capacitor—.01 Mfd. (C8, C30, C31, C32)	.25
12879	Coil—Antenna coil and shield XABC bands (L2, L3, L4, L5, L6)	1.90
12888	Coil—Antenna coil "D" band (L13, L14)	.60
12880	Coil—Detector coil and shield XABC bands (L15, L16, L17, L18, L19, L20)	2.05
12709	Coil—Oscillator coil and shield ABC bands (L7, L8, L9)	2.02
12881	Coil—Oscillator coil and shield X band only (L10)	.80
12890	Coil—Oscillator coil "D" band (L11, L12, L23)	.70
12889	Coil—R.F. coil "D" band (L21, L22)	.65
12877	Condenser—3-gang variable tuning condenser (C9, C27, C41)	5.10
12887	Connector—8-contact male connector and cover for power cable Stock No. 12886	.40
12664	Core—Adjustable core and stud for Stock No. 12654	.22
12800	Core—Adjustable core and stud for Stock No. 12709	.20
12882	Core—Adjustable core and stud for Stock No. 12881	.20
11324	Resistor—560 ohms—carbon type—¼ watt (R2)—Package of 5	1.00
5112	Resistor—1,000 ohms—carbon type—¼ watt (R3)—Package of 5	1.00
11298	Resistor—5,600 ohms—carbon type—1 watt (R6)—Package of 5	.22
3998	Resistor—15,000 ohms—carbon type—¼ watt (R5)—Package of 5	1.00
11282	Resistor—56,000 ohms—carbon type—1/10 watt (R4, R9)—Package of 5	.75
8064	Resistor—82,000 ohms—carbon type—½ watt (R8)—Package of 5	1.00
11397	Resistor—560,000 ohms—carbon type—1/10 watt (R1, R7)—Package of 5	.75
12651	Shield—Coil shield for Stock Nos. 12879, 12880	.22
12710	Shield—Coil shield for Stock No. 12709	.28
12883	Shield—Coil shield for Stock No. 12881	.20
11198	Socket—7-contact 6K7 radiotron socket	.15
11279	Socket—7-contact 6L7 radiotron socket	.20
12885	Socket—8-contact 6J7 radiotron socket	.20
12007	Spring—Retaining spring for core Stock Nos. 12664, 12800, 12882—Package of 10	.36
12878	Switch—Range switch and mounting nut (S1, S2, S3)	3.60
12654	Trap—Wave trap complete (L1)	.75
	DRIVE ASSEMBLIES	
10705	Ball—5/32-in. dia. steel ball for planetary drive—Package of 20	.25
10941	Ball—1/8-in. dia. steel ball for planetary drive bearing—Package of 20	.25
12904	Bushing—Plate and bushing assembly for planetary drive mounting	.20
12905	Coupling—Flexible coupling and shaft assembly complete	.50
12909	Dial—Band indicating dial and cam assembly	1.05
12899	Drive—Variable tuning condenser drive complete including mounting bracket, drive, dial scale, and indicator less vernier dial Stock No. 12870 and link Stock No. 12868	4.40
12906	Gear—Anti-lash drive gear complete	.75
12910	Gear—Sector gear and link assembly for band selector	.20
12908	Indicator—Station selector indicator pointer	.20
8051	Link—Link and roller assembly complete with spring	.30
12911	Screen—Dial lamp screen and light diffuser	.20
4669	Screw—Set screw for flexible coupling or gear Stock No. 12905 and 12906—Package of 10	.25
12901	Shaft—Direct drive shaft and pinion gear for planetary drive	.75
12900	Shaft—Vernier drive shaft for planetary drive	.25
12903	Spring—Tension spring for planetary drive bearing—Package of 10	.20
12907	Spring—Tension spring for gear Stock No. 12906—Package of 10	.20
8052	Spring—Tension spring for link Stock No. 8051—Package of 5	.32
	REPRODUCER ASSEMBLIES	
12914	Board—3-contact reproducer terminal board	.25
12640	Bracket—Output transformer mounting bracket and clamp assembly	.18
12912	Coil—Field coil (L30)	1.70
12642	Cone—Reproducer cone and dust cap (L28) (Model 9T)	.94
12667	Cone—Reproducer cone and dust cap (L28) (Model 9K2)	1.00
5118	Plug—3-contact male reproducer plug	.25
9714	Reproducer Complete—(Model 9T)	6.85
9716	Reproducer Complete—(Model 9K2)	7.80
12913	Transformer—Output transformer (T2)	1.45
11886	Washer—Spring washer to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
11996	Bracket—Tuning lamp mounting bracket and clamp	.22
12915	Crystal—Station selector escutcheon and crystal	1.30
12742	Escutcheon—Tuning lamp escutcheon	.22
12699	Knob—Large station selector knob—Package of 5	.68
11347	Knob—Low frequency tone control and power switch volume control range switch or high frequency tone control knob—Package of 5	.75
12700	Knob—Small (vernier) station selector knob—Package of 5	.58
11377	Screw—Chassis mounting screw assembly for table model only—Package of 4	.12
11210	Screw—Chassis mounting screw assembly for console model only—Package of 4	.28
12916	Shield—Complete R.F. unit shield	.90
11349	Spring—Retaining spring for knob Stock No. 11347 and 12700—Package of 5	.25
4982	Spring—Retaining spring for knob Stock No. 12699—Package of 10	.50
	RECEIVER ASSEMBLIES	
12863	Board—4-contact and 2-link phonograph terminal board	$0.25
4427	Bracket—Mounting bracket for H.F. tone control, L.F. tone control or volume control	.18
12867	Cable—Tuning lamp cable and socket	1.70
12511	Cap—Grid contact cap—Package of 5	.15
12859	Capacitor Pack—Comprising two sections .015 Mfd., one section .1 Mfd., and two resistors 27,000 ohms each (C55, C56, C57, R21, R22)	1.50
12873	Capacitor Pack—Comprising one 3 Mfd. and one 20 Mfd. section used in 25 cycle Model only (C61, C69)	1.20
12724	Capacitor—120 Mmfd. (C59)	.28
12404	Capacitor—120 Mmfd. (C45, C46, C49, C50)	.26
12406	Capacitor—180 Mmfd. (C52)	.26
4624	Capacitor—.01 Mfd. (C51)	.54
4858	Capacitor—.01 Mfd. (C60)	.25
4937	Capacitor—.01 Mfd. (C63)	.25
4836	Capacitor—.05 Mfd. (C53)	.30
4886	Capacitor—.05 Mfd. (C62)	.20
4841	Capacitor—.1 Mfd. (C54)	.22
11414	Capacitor—.1 Mfd. (C47)	.20
4840	Capacitor—.25 Mfd. (C58)	.30
5170	Capacitor—.25 Mfd. (C48, C68)	.25
12741	Capacitor—.5 Mfd. (C64)	.34
5212	Capacitor—18 Mfd. (C67)	1.16
12872	Capacitor—20 Mfd. (C61)	.90
12467	Capacitor—30 Mfd. (C65, C66)	1.40
5119	Connector—3-contact female connector for speaker leads	.25
12006	Core—Adjustable core and stud for Stock No. 12652 and 12653	.22
12870	Dial—Vernier dial and disc assembly	.65
12866	Foot—Chassis mounting bracket and foot assembly—Package of 2	.75
5226	Lamp—Dial lamp—6.3 volt—Package of 5	.70
12868	Link—Range switch and band indicator operating link complete with set screw	.45
12871	Reactor—Filter reactor (L31)	1.50
12865	Resistor—Voltage divider resistor—Comprising one section 250 ohm, one section 17 ohm and one section 11 ohm (R17, R18, R26)	.45
12876	Resistor—10,000 ohms—wire wound, 10 watt (R10)	.55
12864	Resistor—17,000 ohms—wire wound (R19)	.70
11282	Resistor—56,000 ohms—carbon type—1/10 watt (R12)—Package of 5	.75
12875	Resistor—56,000 ohms—carbon type—1 watt (R16)—Package of 5	1.10
11398	Resistor—220,000 ohms—carbon type—1/10 watt (R13)—Package of 5	.75
11453	Resistor—270,000 ohms—carbon type—1/10 watt (R24)—Package of 5	.75
11172	Resistor—470,000 ohms—carbon type—¼ watt (R23)—Package of 5	1.00
11452	Resistor—470,000 ohms—carbon type—1/10 watt (R25)—Package of 5	.75
12013	Resistor—1 Megohm—carbon type—1/10 watt (R28)—Package of 5	.75
11626	Resistor—2.2 Megohm—carbon type—¼ watt (R11)—Package of 5	1.00
12874	Resistor—3.3 Megohm—carbon type—¼ watt (R14, R15)—Package of 5	1.00
4669	Screw—No. 8-32-5/32 set screw for link Stock No. 12868—Package of 10	.25

3903	Screw—No. 8-32-3/16 headless cup point set screw for Stock No. 12870—Package of 20	.36
12869	Shaft—Range switch and band indicator operating shaft and hub assembly	.25
12008	Shield—I.F. transformer shield for Stock No. 12652, 12653	.28
12607	Shield—I.F. transformer shield for Stock No. 12652	.30
12581	Shield—I.F. transformer shield top for Stock No. 12653	.36
13095	Socket—Dial lamp socket	.25
11222	Socket—Dial lamp socket	.18
11381	Socket—Tuning lamp socket and cover	.45
11195	Socket—5-contact 5Z4 radiotron socket	.15
11198	Socket—7-contact 6H6, 6K7, 6L6 or 6F5 radiotron sockets	.15
11196	Socket—8-contact socket for R.F. unit power cable plug	.15
12007	Spring—Retaining spring for Stock No. 12006	.36
12860	Tone Control—Low frequency tone control and power switch (S4, S5)	1.50
12862	Tone Control—High frequency tone control (R27)	1.00

12652	Transformer—First I.F. transformer complete (L24, L25, C45, C46)	1.60
12856	Transformer—Power transformer 105-125 volt, 50-60 cycle (T1)	5.35
12857	Transformer—Power transformer 105-125 volt, 25 cycle (T1)	7.10
12858	Transformer—Power transformer 100-250 volt, 40-60 cycle (T1)	8.75
12653	Transformer—Second I.F. transformer complete (L26, L27, C49, C50, C52, R12, R13)	2.06
12861	Volume Control—(R20)	1.00
	MAGIC BRAIN UNIT ASSEMBLIES	
12806	Board—3-contact antenna and ground terminal board	.25
5237	Bushing—Variable condenser mounting bushing assembly—Package of 3	.43
12886	Cable—Shielded power cable approx. 4-in. long complete with 8-contact male plug	1.50
12511	Cap—Grid contact cap—Package of 5	.15
12714	Capacitor—Adjustable trimmer capacitor (C3, C4, C5, C6, C14, C16)	.38

MODELS C9-4(Late), T9-10
Schematic

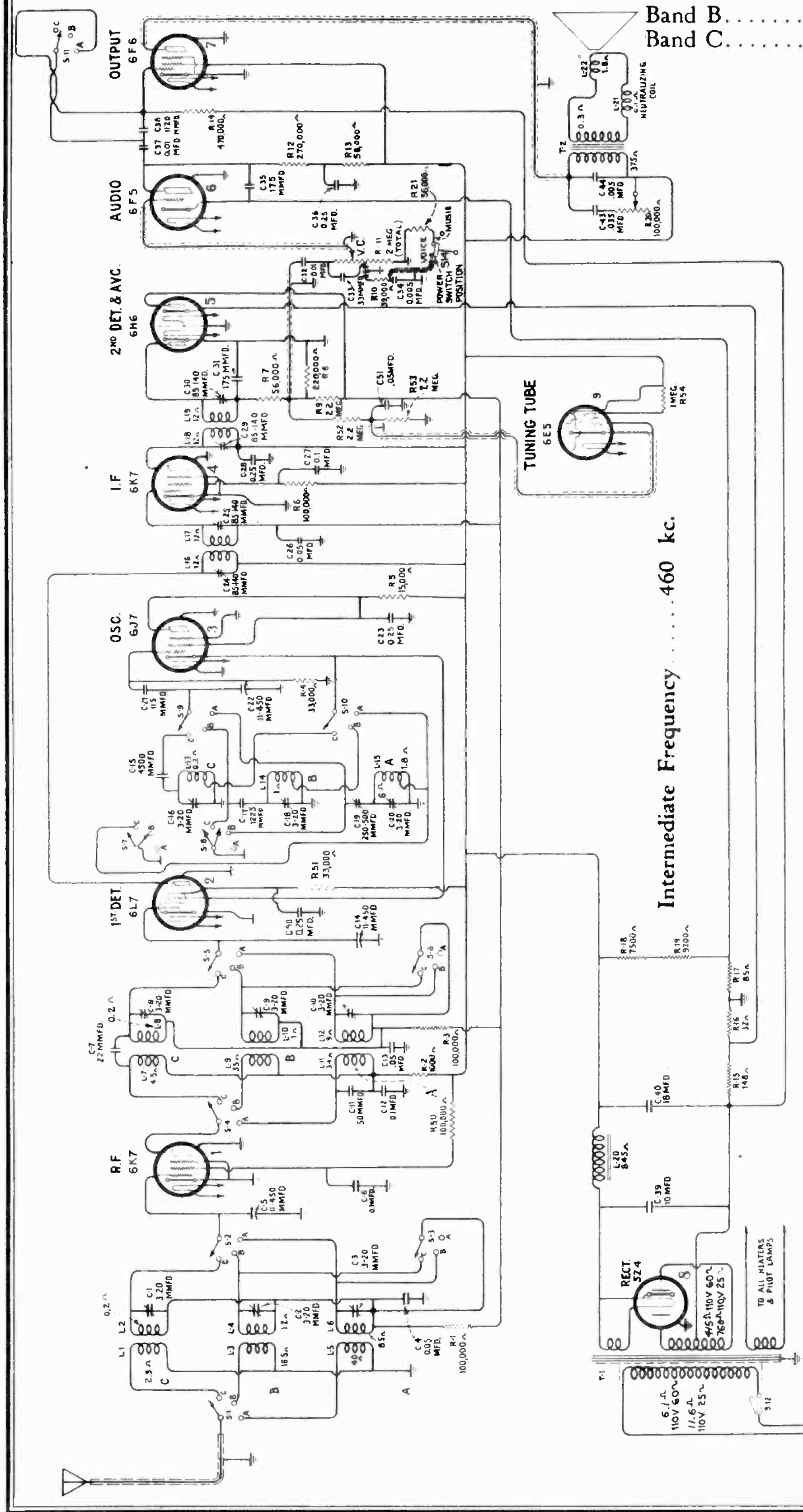
RCA MFG. CO., INC.

FREQUENCY RANGES

Band A............................540-1,800 kc.
Band B..........................1,800-6,000 kc.
Band C.........................6,000-18,000 kc.

ALIGNMENT FREQUENCIES

Band A...600 kc. (osc.), 1,720 kc. (osc., det., ant.
Band B.................6,132 kc. (osc., det., ant.
Band C...............18,000 kc. (osc., det., ant.



Intermediate Frequency .....460 kc.

Figure 1—Schematic Circuit Diagram

For Voltage, Alignment, etc., see Model C9-4

General Description

These two models each employ the same type of chassis and are similar to the original RCA Victor Model C9-4. The main changes consist of the following: (1) An RCA-5Z4 metal rectifier is used in place of the RCA-5Z3 glass rectifier, and (2) a Speech-Music Control is added to the compensated volume control circuit and is actuated by the same knob as the power switch. The Console Model (C9-4) employs a 12-inch dynamic loudspeaker and the Table Model (T9-10) employs an 8-inch dynamic loudspeaker.

Service Data

All Service Data contained in the Service Notes for RCA Victor Model C9-4 are directly applicable to these instruments except the Schematic Diagram, Wiring Diagram, and Replacement Parts. Other differences not illustrated are as follows:

Universal Transformer d-c resistance (Figure 7 of C9-4 Service Note).

Primary Winding 17.3 ohms total.

Secondary Winding 400 ohms total.

MODELS C9-4(Late),T9-10
Chassis Wiring

RCA MFG. CO., INC.

POWER SUPPLY RATINGS

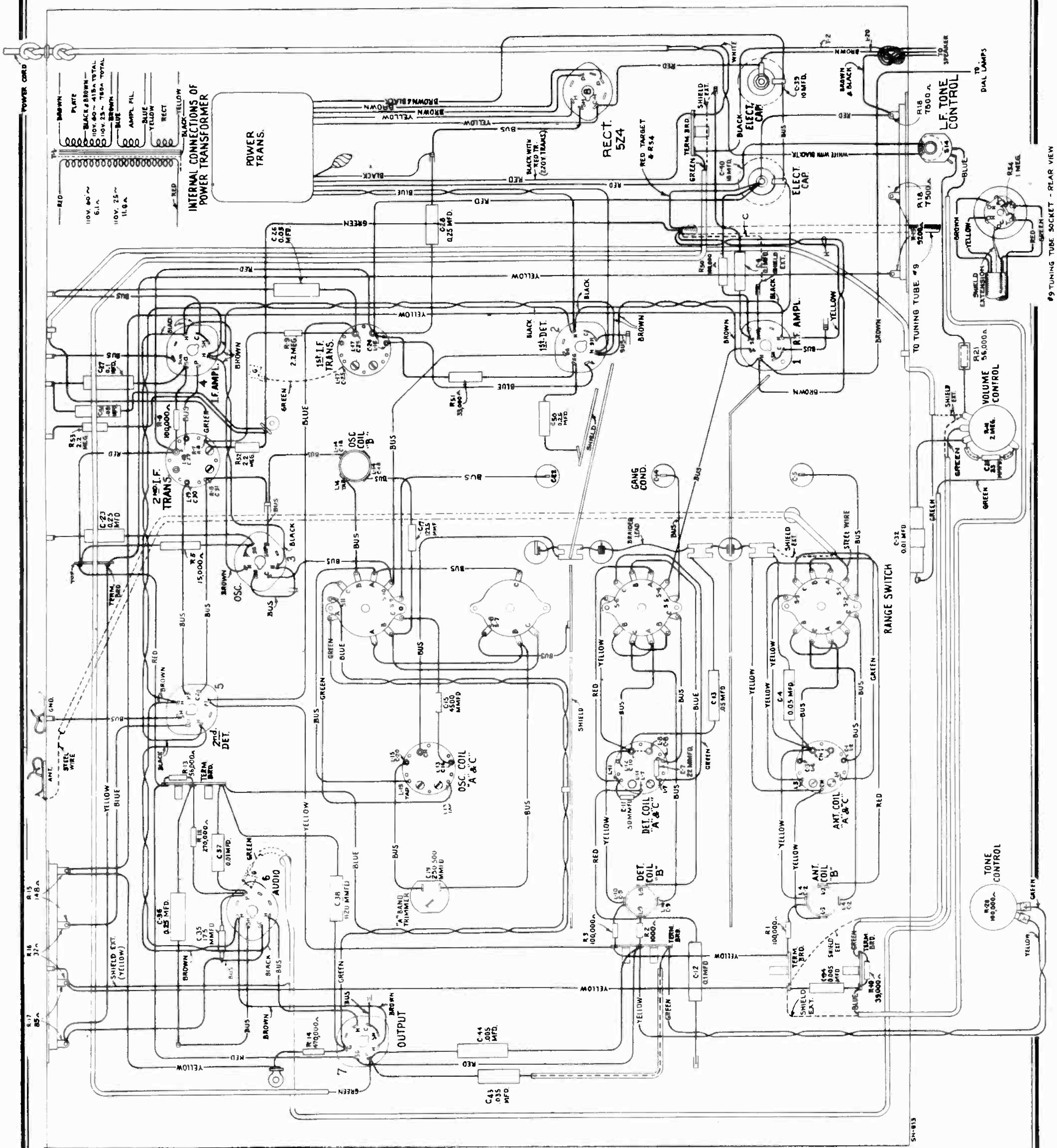
Rating A . . . . 105-125 volts, 50-60 cycles, 105 watts
Rating B . . . . 105-125 volts, 25-60 cycles, 105 watts
Rating C . . 100-130/140-160/195-250 volts, 40-60 cycles, 105 watts

LOUDSPEAKER

Type . . . . Electrodynamic
Voice Coil Impedance . . . . . 2¼ Ohms at 400 Cycles

POWER OUTPUT RATINGS

Undistorted . . . . 2 Watts
Maximum . . . . 4½ Watts



MODELS C9-4(Late),T9-10
Parts List

RCA MFG. CO., INC.

Mechanical Specifications

	Model C9-4	Model T9-10
Height	40 inches	22¼ inches
Width	26 inches	16½ inches
Depth	12½ inches	11¾ inches
Weight (Net)	57 pounds	34 pounds
Weight (Shipping)	72 pounds	39 pounds
Chassis Base Dimensions		14½ inches x 9 inches x 3½ inches

RADIOTRON COMPLEMENT

(1) RCA-6K7........Radio-Frequency Amplifier
(2) RCA-6L7........First Detector
(3) RCA-6J7........Heterodyne Oscillator
(4) RCA-6K7........Intermediate Amplifier
(5) RCA-6H6........Second Detector and A.V.C.
(6) RCA-6F5........Audio Amplifier
(7) RCA-6F6........Power Output Amplifier
(8) RCA-5Z4........Full Wave Rectifier
(9) RCA-6E5........Tuning Indicator

REPLACEMENT PARTS

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
4427	Bracket—Volume control or high frequency tone control mounting bracket	$0.18
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	.43
11350	Cap—Contact cap—Package of 5	.20
11223	Capacitor—Adjustable capacitor (C19)	.46
11292	Capacitor—22 MMfd. (C7)	.24
11321	Capacitor—33 MMfd. (C33)	.26
11289	Capacitor—50 MMfd. (C11)	.26
11291	Capacitor—115 MMfd. (C21)	.24
5116	Capacitor—175 MMfd. (C35)	.18
4409	Capacitor—1120 MMfd. (C38)	.35
11288	Capacitor—1225 MMfd. (C17)	.30
11287	Capacitor—4500 MMfd. (C15)	.30
4868	Capacitor—0.005 Mfd. (C34, C44)	.20
4624	Capacitor—0.01 Mfd. (C32)	.54
4858	Capacitor—0.01 Mfd. (C37)	.25
5196	Capacitor—0.035 Mfd. (C43)	.18
4836	Capacitor—0.05 Mfd. (C4, C13, C26)	.30
4886	Capacitor—0.05 Mfd. (C51)	.20
4885	Capacitor—0.1 Mfd. (C6, C12, C27)	.28
5170	Capacitor—0.25 Mfd. (C23, C28, C36, C50)	.25
11240	Capacitor—10 Mfd. (C39)	1.08
5212	Capacitor—18 Mfd. (C40)	1.16
11272	Clamp—Antenna cable clamp—Located near antenna terminal	.10
5215	Coil—Antenna coil (A and C Bands)—(L1, L2, L5, L6, C1, C3)	2.32
5245	Coil—Antenna coil (B Band)—(L3, L4, C2)	1.58
5216	Coil—Detector coil (A and C Bands)—(L7, L8, L11, L12, C8, C10)	2.34
5246	Coil—Detector coil (B Band)—(L9, L10, C9)	1.62
5217	Coil—Oscillator coil (A and C Bands)—(L13, L15, C16, C20)	2.20
5247	Coil—Oscillator coil (B Band)—(L14, C18)	1.44
11214	Condenser—3-gang variable tuning condenser (C5, C14, C22)	4.20
4340	Lamp—Dial lamp—Package of 5	.60
8041	Plate—R.F. or I.F. coil shield locking plate—Package of 2	.12
11244	Resistor—Voltage divider resistor, comprising one 7500 ohm and one 9200 ohm section—(R18, R19)	1.08
11329	Resistor—Voltage divider resistor, comprising one 148 ohm, one 32 ohm and one 85 ohm section—(R15, R16, R17)	.52
5112	Resistor—1000 ohm—Carbon Type—¼ watt—(R2)—Package of 5	1.00
5114	Resistor—15,000 ohm—Carbon Type—1 watt—(R5)	.22
11300	Resistor—33,000 ohm—Carbon Type—1/10 watt—(R4)—Package of 5	.75
5033	Resistor—33,000 ohm—Carbon Type—1 watt—(R51)—Package of 5	1.10
11322	Resistor—39,000 ohm—Carbon Type—¼ watt—(R10)—Package of 5	1.00
5029	Resistor—56,000 ohm—Carbon Type—¼ watt—(R13, R21)—Package of 5	1.00
3118	Resistor—100,000 ohm—Carbon Type—¼ watt—(R1, R3, R6, R50)—Package of 5	1.00
11323	Resistor—270,000 ohm—Carbon Type—¼ watt—(R12)—Package of 5	1.00
11172	Resistor—470,000 ohm—Carbon Type—¼ watt—(R14)—Package of 5	1.00

Stock No.	Description	List Price
11151	Resistor—2.2 megohms—Carbon Type—¼ watt—(R9, R52, R53)—Package of 5	1.00
5249	Shield—Antenna, detector or oscillator coil shield	.20
5250	Shield—Intermediate frequency transformer shield	.22
11222	Socket—Dial lamp socket	.18
11195	Socket—5-contact rectifier radiotron socket	.15
11313	Socket—5-contact radiotron socket	.18
11198	Socket—7-contact radiotron socket	.15
11236	Switch—Band switch (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11)	2.44
5224	Switch—Tone control and power switch (S12, S14)	1.00
5238	Terminal—Antenna terminal clip assembly	.14
11238	Tone Control—High frequency tone control (R20)	.96
11216	Transformer—First intermediate frequency transformer (L16, L17, C24, C25)	2.15
11239	Transformer—Second Intermediate frequency transformer (L18, L19, C29, C30, C31, R7, R8)	2.72
11803	Transformer—Power transformer—105-125 volts—50-60 cycles (T1)	4.38
11804	Transformer—Power transformer—105-125 volts—25-60 cycles	6.02
11805	Transformer—Power transformer—100-130, 140-160, 195-250 volts—40-60 cycles	7.95
11237	Volume Control—(R11)	1.20
	DRIVE ASSEMBLIES	
4362	Arm—Band indicator operating arm	.28
10194	Ball—Steel ball—Package of 20	.25
4422	Clutch—Tuning condenser drive clutch assembly—comprising drive shaft, balls, ring, spring and washers—assembled	1.00
11328	Dial—Dial scale	.68
11252	Drive—Variable tuning condenser drive assembly	1.88
4520	Indicator—Station selector indicator pointer	.18
11226	Indicator—Band indicator pointer assembly—comprising indicator pointer, arm, link and stud	.20
3993	Screw—No. 6-32-5/32-in. square head set screw for band indicator operating arm—Package of 10	.25
4669	Screw—No. 8-32-5/32-in. set screw for variable condenser drive assembly—Package of 10	.25
4377	Spring—Band indicator operating arm spring—Package of 5	.25
4378	Stud—Band indicator operating arm stud and nut assembly—Package of 5	.25
	REPRODUCER ASSEMBLIES Table Model	
11232	Board—Terminal board with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil (L20)	2.00
11233	Coil—Neutralizing coil (L21)	.30

Stock No.	Description	List Price
11235	Cone—Reproducer cone—(L22)—Package of 5	3.50
5119	Connector—3-contact female connector for reproducer cable	.25
5118	Connector—3-contact male connector for reproducer	.25
9618	Reproducer—Complete	6.40
11253	Transformer—Output transformer (T2)	1.56
11886	Washer—Spring washer used to hold field coil securely—Package of 5	.20
	REPRODUCER ASSEMBLIES Console Models	
11232	Board—Terminal board assembly with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil (L20)	2.00
11233	Coil—Hum neutralizing coil (L21)	.30
11258	Cone—Reproducer cone—(L22)—Package of 5	3.85
5118	Connector—3-contact male connector for reproducer	.25
5119	Connector—3-contact female connector plug for reproducer cable	.25
9619	Reproducer—Complete	6.05
11253	Transformer—Output transformer (T2)	1.56
11886	Washer—Spring washer used to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
11996	Bracket—Tuning tube mounting bracket and clamp assembly	.22
11331	Cable—Tuning lamp cable—complete with socket	1.28
11276	Escutcheon—Tuning lamp escutcheon	.40
11337	Escutcheon—Station selector escutcheon	.70
6614	Glass—Station selector dial glass	.30
11346	Knob—Station selector knob—Package of 5	.75
11347	Knob—Volume control, tone control, range switch or power switch knob—Package of 5	.75
11246	Foot—Chassis mounting foot and bracket assembly—Package of 2	.76
11382	Resistor—1 megohm—Carbon Type—1/10 watt (R34)—Package of 5	.75
4678	Ring—Spring retaining ring for dial glass—Package of 5	.34
5210	Screw—Chassis mounting screw assembly—for console model—Package of 4	.16
11210	Screw—Chassis mounting screw assembly—for table model—Package of 4	.28
11348	Screw—No. 8-32-7/16-in. headless cupped point set screw for knob, Stock No. 11346—Package of 10	.32
11381	Socket—Tuning lamp socket and cover	.45
11349	Spring—Retaining spring for knob, Stock No. 11347—Package of 5	.15

The prices quoted above are subject to change without notice.

MODELS C9-6,T9-9
Schematic

RCA MFG. CO., INC.

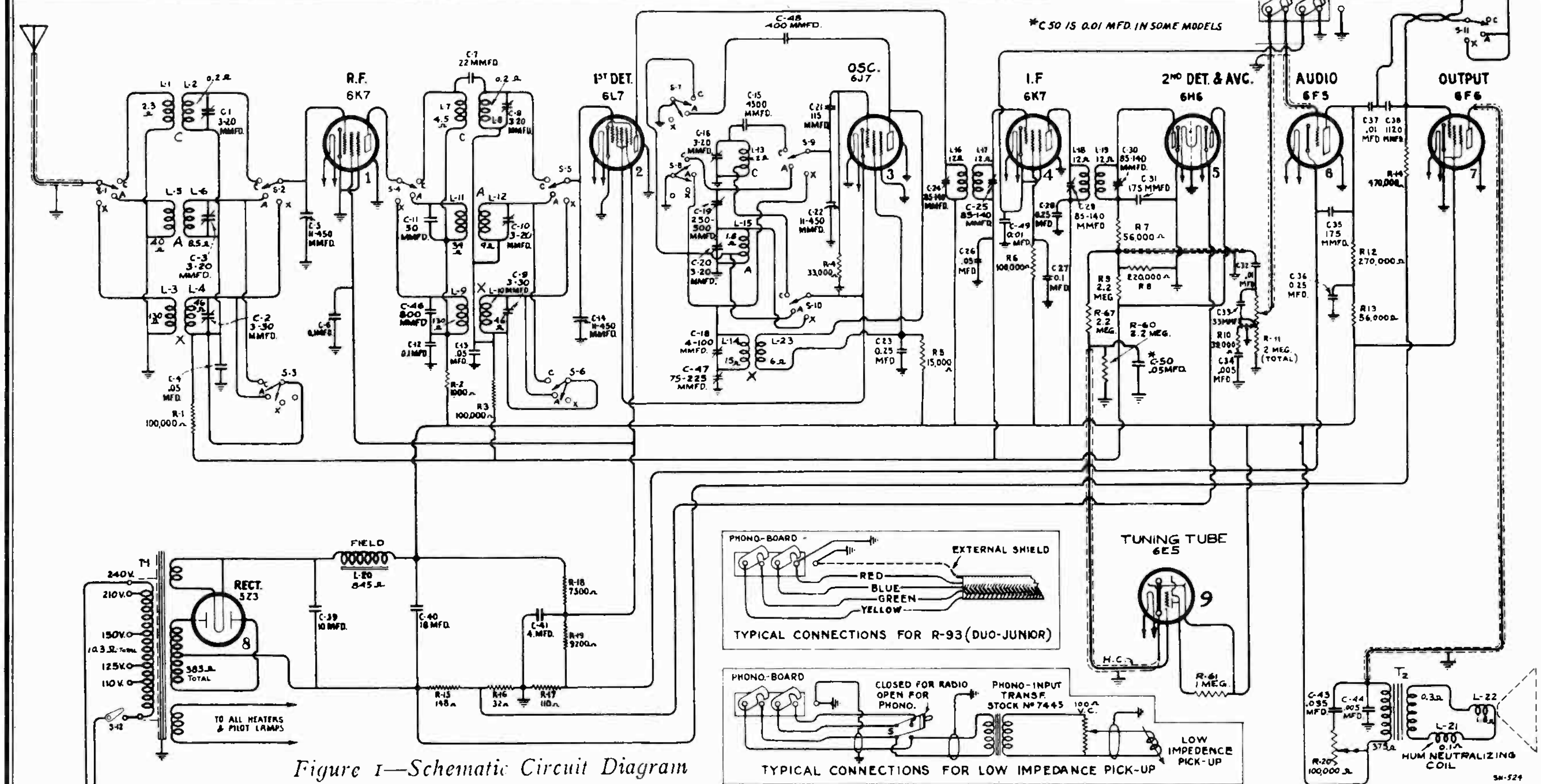


Figure 1—Schematic Circuit Diagram

Electrical Specifications

Frequency Ranges

Band X .... 140 kc.— 410 kc.
Band A .... 540 kc.— 1,800 kc.
Band C .... 5,700 kc.—18,000 kc.

Alignment Frequencies

Band X ......150 kc. (osc.), 400 kc. (osc., ant., det.)
Band A ....600 kc. (osc.), 1,720 kc. (osc., ant., det.)
Band C ....18,000 kc. (osc., ant., det.)

Intermediate Frequency .... **460 kc.**

Power Supply Ratings

Rating A ....105—125 volts, 50—60 cycles, 105 watts
Rating B ....105—125 volts, 25—60 cycles, 105 watts
Rating C ....100—130/140—160/195—250 volts, 40—60 cycles, 105 watts

Loudspeaker

Type ....Electrodynamic
Voice Coil Impedance......2¼ Ohms at 400 Cycles

Power Output Ratings

Undistorted .... 2 Watts
Maximum .... 4½ Watts

RCA MFG. CO., INC.

Mechanical Specifications

	Model C 9-6	Model T 9-9
Height	40 inches	22 13/18 inches
Width	26 inches	16½ inches
Depth	12½ inches	11⅞ inches
Weight (Net)	55 pounds	39 pounds
Weight (Shipping)	72 pounds	50 pounds
Chassis Base Dimensions	14½ inches x 9 inches x 3½ inches	

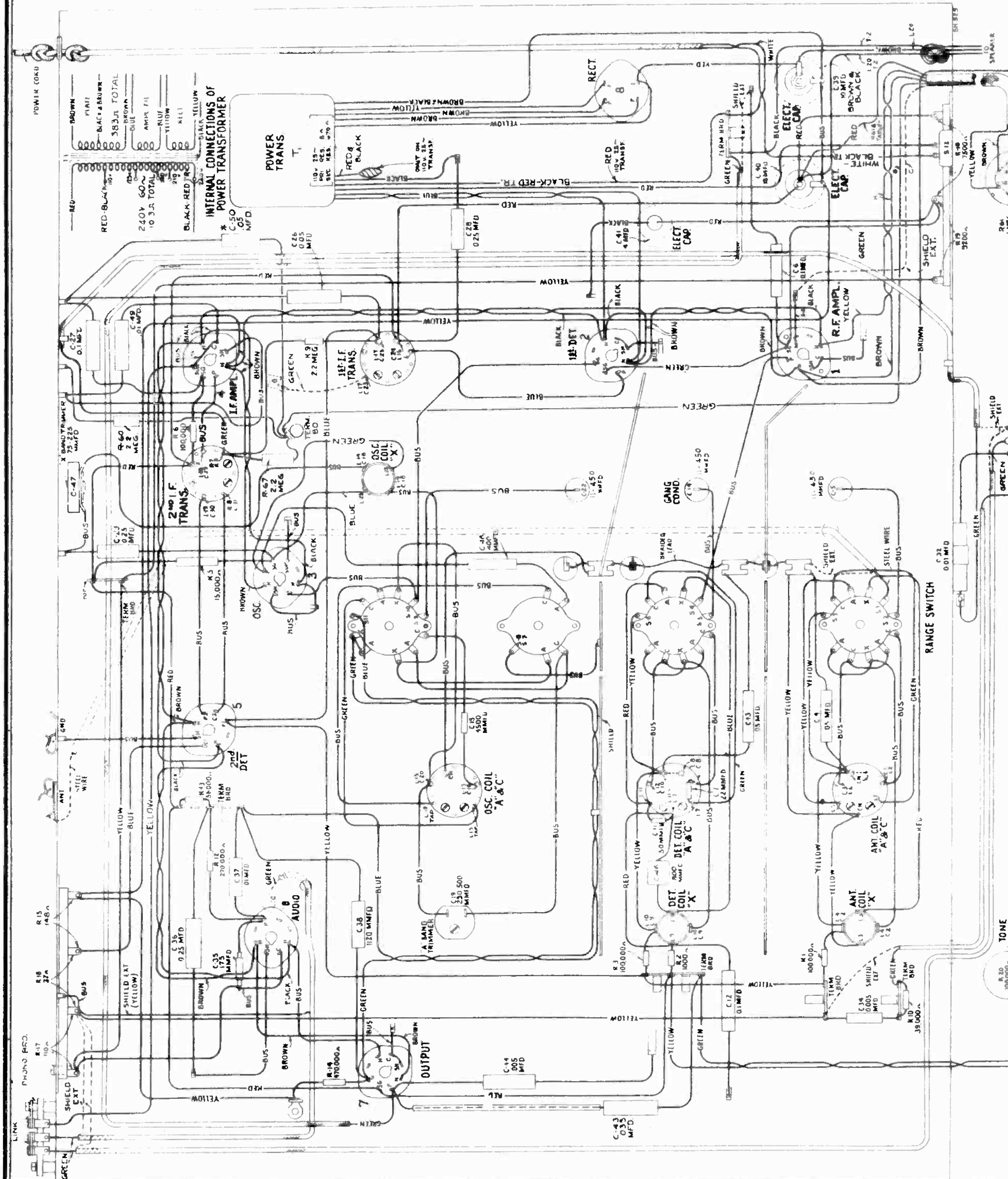


Figure 2—Chassis Wiring Diagram

MODELS C9-6,T9-9
Socket,Voltage
Trimmers,Speaker
Transformer

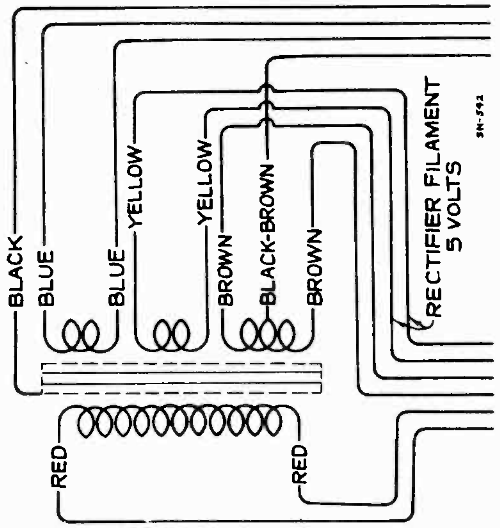
RCA MFG. CO., INC.

Standard Transformer

The transformer used on some models of this instrument is adaptable for voltages and frequencies as given under Ratings A and B of Electrical Specifications. Its schematic and wiring are shown by Figure 7.

Phonograph Attachment

A terminal board is provided for connecting a phonograph attachment into the audio amplifying circuit Two typical methods of connection are shown on the schematic diagram, Figure 1. The radio volume control must be set to minimum when using phonograph.



Pri. Res.—8.0 ohms, total
Sec. Res.—670 ohms, total

Figure 7—Standard Power Transformer Connections

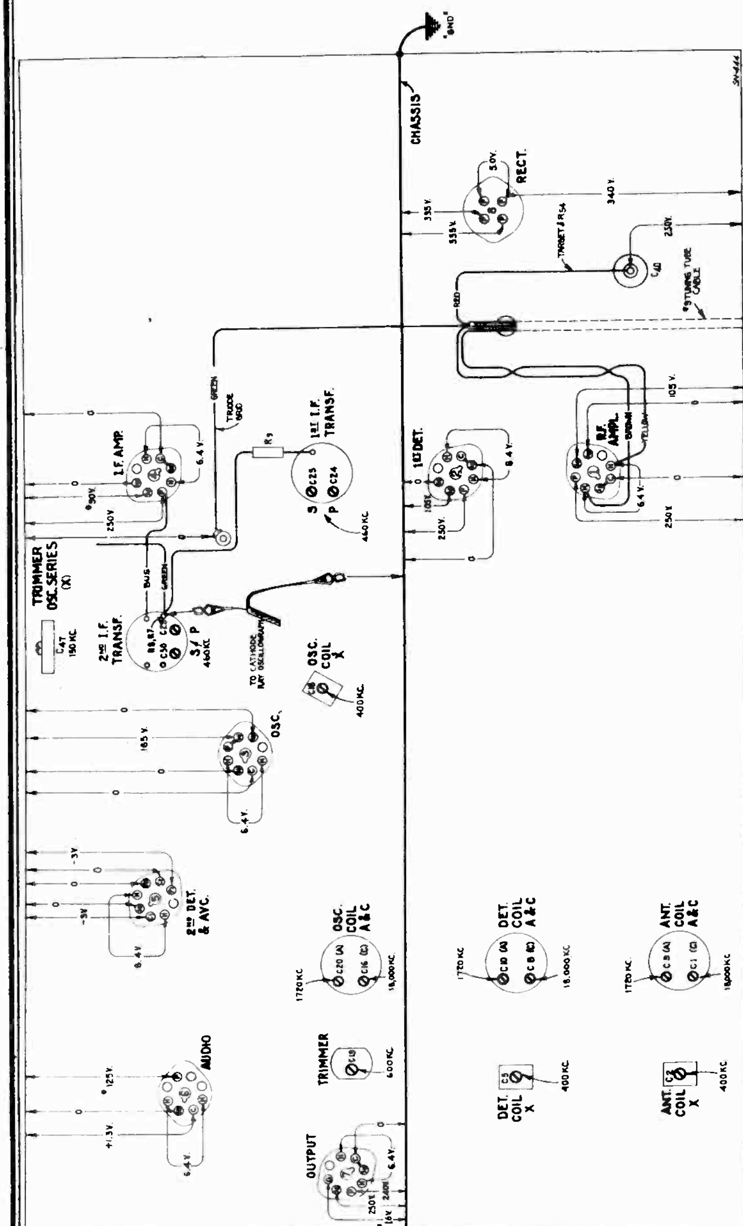


Figure 6—Radiotron Socket Voltages and Trimmer Locations

Measured at 115 volts, 60 cycle supply—No signal being received

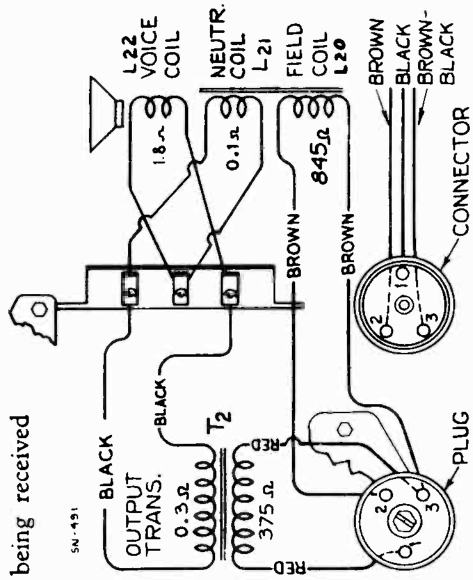


Figure 5—Loudspeaker Wiring

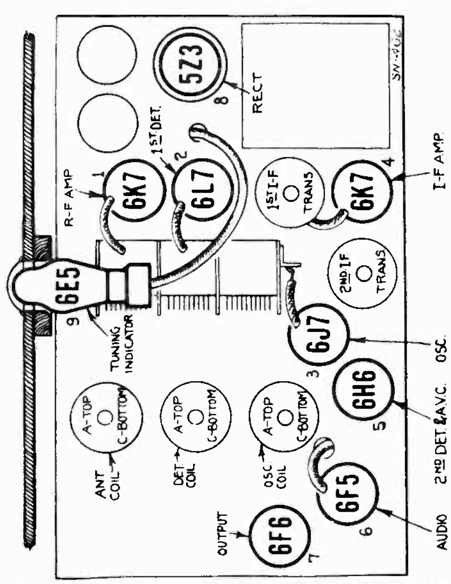


Figure 3—Radiotron and Coil Locations

RCA MFG. CO., INC.

MODELS C9-6, T9-9
Circuit Data
Alignment

General Features

These two models each employ the same nine-tube chassis. The table model (T 9-9) uses an 8-inch dynamic speaker and the console model (C 9-6) uses an improved 12-inch dynamic speaker.

Metal Tubes

The new metal tubes are used in the radio receiver for amplifying and detecting purposes. These tubes make possible a greater range of stable amplification not previously attainable with corresponding glass types. Their metal envelopes form a perfect electrostatic and electromagnetic shield, precluding the former necessity for elaborate shielding by means of cans. The metal tubes are especially adaptable to the modern, extended-range receivers because of their efficient shielding and their favorable internal characteristics.

Dial Drive

An open face airplane-type of dial is used. Each scale has a band of color adjacent to its graduations and three short strips of corresponding colors at the lower part of the dial for index purposes. An index pointer, which moves as the band switch is rotated, points to one of these colors to identify the band in use. The drive mechanism is variable, there being either a 50-to-1 or 10-to-1 ratio available between the tuning knob and condenser drive shaft.

Tuning Indicator

A cathode-ray tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal. This tube is of new design and comprises an amplifier section and a cathode-ray section built in the same glass envelope. The cathode-ray section consists of a conically shaped luminescent screen, upon which a pattern is formed by an effect of the detected signal after said effect has been amplified by the amplifier section which is fed from the detector diode circuit. The size of the patterns is determined by the strength of the signal voltage, so that any change of tuning may be readily observed in order to facilitate tuning to exact resonance.

CIRCUIT FEATURES

The circuit is based upon the Superheterodyne principle. The three ranges of tuning are covered by three sets of coils. A single r-f stage provides the desired selectivity and gain ahead of the hexode first-detector tube. The oscillator stage operates separately from the first detector. A single stage i-f system is employed. Its basic frequency is 460 kc. Diode detection is performed by a double diode RCA-6H6 Radiotron. Automatic volume control is provided by this same tube. The audio system consists of two stages, the driver, an RCA-6F5, and the output, an RCA-6F6. High voltages for plate, screen, and bias supplies are obtained from an RCA-5Z3 full-wave rectifier through an efficient filter. The field of the loudspeaker acts as a reactor in the filter circuit. Further details of the circuit are as follows:

Oscillator

The oscillator circuit has extreme stability of frequency and good uniformity of output over the tuning ranges. These qualities assure that the tuning of the receiver will not drift as the line voltage varies. The action of the circuit is such that when the cathode emission tends to change with line voltage or because of other reasons, the variation of voltage drop in the plate and screen resistor restores the operating characteristics of the tube to normal and thus maintains constancy of the generated signal.

First Detector

This stage has unusually good high frequency mixing efficiency. The tube used, an RCA-6L7, is a new hexode type. The signal is supplied to the first control-grid and the oscillator voltage is fed in on a second control-grid, a screen grid separating the two. The arrangement of the grids prevents degenerative difficulties, particularly at the higher frequencies. The second grid is direct-connected to the cathode of the oscillator and has no d-c bias.

Compensated Volume Control

The variation in response of the human ear with different degrees of volume is compensated for by a resistor and condenser network in the manual volume control circuit. The volume control itself is an acoustically tapered potentiometer which provides equal changes of sound intensity for the listener per degree of rotation.

Range Switch

The band-change switch has several functions. It exchanges the antenna, detector, and oscillator coils in order to select the range desired. At the same time, it shorts out the unused coils so as to eliminate their absorptive effects. It also varies the fidelity by shorting a coupling condenser in the audio system to provide the desired reproduction for short-wave as well as long wave reception.

Tone Control

Provision is included for variable reduction of high frequencies. This consists of a resistor and condenser combination across the primary winding of the output transformer, the resistor being the variable element. As it is decreased, the high-frequency response limit is lowered.

Power System

The power transformer has its primary winding capacitively shielded from its secondary windings to eliminate transfer of line disturbances into the receiver and to stop any tendency for the circuit to radiate into the line. Rectification is performed in the usual manner by a full wave tube.

Detection and A.V.C.

The modulated signal as obtained from the output of the i-f system is detected by an RCA-6H6 twin diode tube. The audio frequency secured by this process is passed on to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R-8, is applied as automatic control-grid bias to the r-f, first-detector, and i-f tubes through suitable resistance-capacitance filter circuits. The second diode of the RCA-6H6 is used to supply residual bias for these controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current, which flows through R-9 and R-8, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias diode ceases to draw current and the a.v.c. diode takes over the biasing function.

SERVICE DATA

The various diagrams of this booklet contain such information as will be needed for servicing the receiver. The ratings of all resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Ratings of less than one ohm are generally omitted. Identification titles such as R-3, L-2, C-1, etc., are provided for reference between the illustrations and replacement parts.

Alignment Procedure

The extensive frequency range of this receiver necessitates a more or less involved method of alignment. However, if the following directions are carefully applied, the normal performance of the instrument will be obtained.

Correct performance of the receiver can only be obtained when the trimmer adjustments have been made by a skilled service man with the use of adequate and reliable test equipment. Such apparatus as may be required for this particular instrument is illustrated and described on a separate page of this booklet.

Two methods of alignment are applicable. One utilizes a Cathode-Ray Oscillograph as a means of output indication and the other follows former procedure where a glow type indicator or meter is used. The oscillographic method is much to be preferred, since greater accuracy is possible from the type of indication afforded. There are no approximations necessary as with the meter or aural method, but each adjustment can be made with excellent precision. Both methods are hereinafter outlined so that alignment operations may be made according to the equipment available.

It is wise to determine the necessity for alignment as well as the direction of misalignment before making adjustments. The RCA Tuning Wand is an instrument designed particularly for such a purpose.

The Tuning Wand consists of a bakelite rod having a small brass cylinder at one end and a core of finely divided iron at the other. It may be inserted into a tuned coil while a signal of the normal resonant frequency is being supplied to such coil to obtain an indication of the tuning. Holes are provided at the top of the r-f shield cans for entrance of the Wand. The presence of either end of the Wand will cause a change in tuning which will be indicated at the receiver output as an increase or decrease in signal level. If there is a decrease of output when either end is inserted, the tuning is correct and will require no adjustment. However should there be an increase of output due to the iron core and decrease with the brass cylinder, an increase in inductance or capacitance is indicated as necessary to bring the circuit into line. The trimmer involved should therefore be increased accordingly. If the brass cylinder end causes an increase in output while the iron end causes a decrease, reduction of inductance will be necessary to place the circuit in alignment. This is equivalent to decreasing the trimmer concerned. The following tabulation gives the various changes and the adjustments required.

WAND	SIGNAL	TRIMMER
Brass	Decrease	None
Iron	Decrease	
Brass	Increase	Decrease
Iron	Decrease	
Brass	Decrease	Increase
Iron	Increase	

CATHODE-RAY ALIGNMENT

Equipment

A standard source of the specified alignment frequencies is required. Such a source should consist of an **RCA Full Range Oscillator, Stock No. 9595.** Output indication should be by means of an **RCA Stock No. 9545 Cathode-Ray Oscillograph.** An **RCA Stock No. 9558 Frequency Modulator** will be needed to sweep the generated signal and synchronize it with the Oscillograph in order to make possible the visual representation of the resonant characteristic of the circuit being tuned on the cathode-ray fluorescent screen.

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 6. Each must be aligned to a basic frequency of 460 kc. The last transformer must be aligned firstly and the first transformer aligned secondly. For such a process, it is necessary to feed the output of the Full-Range Oscillator to the stages in their order of alignment, adjusting the trimmers of each transformer and observing the effect at the second detector output on the Cathode Ray Oscillograph. The proper point of connection of the Oscillograph is with its vertical "high" input terminal attached to the junction of R-7, R8 and R9 as illustrated in Figure 6, and with the "0" or ground terminal to the chassis. The "Ext. Sync." terminals of the Oscillograph should be connected to the Frequency Modulator as shown by Figure 4. A .001 mfd. capacitor installed in series with the Oscillator "Ant." lead will prevent the voltages of the stage under alignment from becoming upset. The vertical "A" amplifier should be "On" for the ensuing adjustments and the gain control kept at its maximum position. For each adjustment, the Oscillator output need be regulated so that the image obtained on the Oscillograph screen will be of sufficient size as to be accurately observable. Proceed further as follows:

(a) Place the receiver, Oscillograph and test Oscillator in operation. Set the receiver range switch to Band "A" and tune the station selector to a point where no interference will be picked up, shorting the antenna and ground terminals if necessary. Set the Oscillograph horizontal "B" amplifier to "Timing" and control its gain so that the luminescent spot sweeps a straight line trace completely across the screen. Place the timing control to "Int." Adjust the intensity and focusing controls of the Oscillograph to produce the correct size and strength of the spot.

(b) Attach the output of the test Oscillator between the control grid cap of the RCA-6K7 i-f tube and chassis ground as shown typically by Figure 4. Tune the Oscillator to 460 kc. and set its modulation switch to "On". Regulate its output until the signal produces a wave pattern on the Oscillograph screen, adjusting the Oscillograph controls to give the desired number of cycles. Cause the image to stand still on the screen by manipulation of the frequency and synchronizing controls. Then carefully tune the two trimmers C-29 and C-30 of the second i-f transformer to produce maximum amplitude (vertical deflection) of the oscillographic image. Under this condition the transformer will be sharply resonated to 460 kc.

(c) The Frequency Modulator should then be placed in operation and interconnected with the Full-Range Oscillator by means of the special shielded patch cord. Figure 4 shows the proper arrangement. Set the Frequency Modulator sweep range switch to its "Lo" position and turn the Oscillator modulation switch to "Off". Change the timing control of the Oscillograph to "Ext." and place the range switch to its No. 2 position. Then carefully shift the tuning of the Oscillator so as to increase its frequency, until two distinct and similar waves appear on the Oscillograph screen and become exactly coincident at their highest points. These curves will be found to occur at an Oscillator setting of ***approximately* 540 kc.** They will be identical in shape but appearing in reversed positions. Adjust the frequency control of the Oscillograph in order to cause the waves to conform with the above requirements and to make them remain motionless on the screen. This will require a setting of approximately ½ clockwise rotation of the frequency control. The trimmers C-29 and C-30 should then be re-adjusted so that the two curves move together and become exactly coincident throughout their lengths, maintaining the maximum amplitude at which this condition can be brought about.

(d) Leaving the equipment connected and adjusted as in (c), change the Oscillator output to the control-grid cap of the RCA-6L7 first detector tube. Then adjust the first i-f transformer trimmers C-24 and C-25 so that the forward and reverse waves appearing on the Oscillograph coincide throughout their lengths and have maximum amplitude. The shape of the composite wave obtained from this operation is a true representation of the overall tuning characteristic of the i-f system. Each trimmer of the entire group should then be checked to assure that it is in correct alignment as indicated by the degree of coincidence and relative amplitude of the image on the Oscillograph screen.

R-F Trimmer Adjustments

Locations of the various antenna, detector and oscillator coil trimmers are shown by Figure 6. The test Oscillator should be removed from connection with the i-f system and its output connected to the antenna-ground terminals of the receiver. No changes are to be made in the connections of the Oscillograph at the second detector. During the following adjustments, the Oscillator output should be regulated as often as is necessary to keep the oscillographic image as low as is practically observable. Adherence to such a procedure will obviate the broadness of tuning that would result from a.v.c. action on a stronger signal. Proceed with the adjustments as follows.

Calibration

Set the receiver range switch to Band A and rotate the station selector until the tuning condenser plates are in ***full mesh*** (maximum capacitance). Then move the main dial pointer until it points exactly to the ***horizontal*** line at the low frequency end of the Band A scale.

Band A

(a) With the receiver range switch in its Band A position, tune the station selector until the dial pointer is at a reading of 1,720 kc. Adjust the test Oscillator to 1,720 kc. (modulation "On" and Frequency Modulator disconnected) and increase its output to produce a registration on the Oscillograph. Carefully align the oscillator, detector, and antenna trimmers C-20, C-10 and C-3 respectively, so that each brings about maximum amplitude of output as shown by the wave on the Oscillograph. It will be necessary to have the timing control of the Oscillograph on "Int." for this operation. After each trimmer has been peaked, the Oscillograph timing control should be set to "Ext." and the Frequency Modulator placed into operation with its connections to the Oscillator and Oscillograph made in accordance with Figure 4. Turn the modulation switch of the Oscillator to "Off" and retune the Oscillator (increase frequency) until the forward and reverse waves show on the Oscillograph and become coincident at their highest points. Adjust the trimmers C-20, C-10 and C-3 again, setting each to the point which produces the best coincidence and maximum amplitude of the wave images.

(b) Remove the Frequency Modulator cable from the Oscillator and shift the signal frequency to 600 kc. Place the modulation switch to "On". Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then insert the Frequency Modulator plug and retune the Oscillator (modulation "Off") until the two similar forward and reverse waves appear on the screen. For this adjustment, it is advisable to shift the Oscillator to its 200—400 kc. range and use the third harmonic of the generated signal in order to obtain the desired range of sweep. The oscillator series trimmer C-19 should then be adjusted to produce maximum amplitude of the images. No rocking will be necessary on the station selector inasmuch as the signal frequency is being "wobbled" by the Frequency Modulator to produce the same effect.

After completing this adjustment, the trimmer C-20 should be realigned as in (a) to correct for any change brought about by the adjustment of C-19.

Band X

(a) Disconnect the Frequency Modulator and tune the test Oscillator to a frequency of 400 kc. (Modulation "On"). Place the receiver range switch to its Band X position and tune the station selector until the dial pointer reads exactly 400 kc. Adjust the Oscillograph timing control to "Int." Then align each of the trimmers C-18, C-9 and C-2 to the point producing maximum output at the Oscillograph. Place the Frequency Modulator in operation and attach it to the test Oscillator by means of the shielded cable. Change the Oscillograph timing to "Ext." Increase the frequency of the Oscillator (Modulation "Off") until the two forward and reverse waves appear and become coincident at their highest point, ***approximately at* 462 kc.** These waves may be made to remain stationary on the screen by manipulation of the Oscillograph range switch (No. 2 position) and frequency control (mid-position). Readjust the three trimmers C-18, C-9 and C-2 to give maximum amplitude and complete coincidence of the waves.

(b) Change the test Oscillator so that it delivers a signal of 150 kc. with the Frequency Modulator disconnected. Tune this signal on the receiver, which should be set to the Band X setting, disregarding the dial reading at which the signal is best received. Then interconnect the Frequency Modulator with the Oscillator and retune the latter to the point at which the two similar waves appear on the screen. Adjust the trimmer C-47 for maximum amplitude of the wave images. Rocking of the tuning condenser will not be necessary for this operation as such is duplicated by the Frequency Modulator. Repeat the alignment of C-18 as in (a) to correct for any error brought about by the adjustment of C-47.

Band C

(a) Turn the range switch of the receiver to its Band C position and tune the station selector until the dial pointer reads 18,000 kc. Set the test Oscillator to 18,000 kc. (modulation "On" and Frequency Modulator disconnected) and regulate its ouput to the level required for convenient observation. Adjust the trimmer C-16 to the point producing maximum output as indicated on the Oscillograph. Check for the presence of the proper "image" signal by tuning the receiver to 17,080 kc. The 18,000 kc. signal of the Oscillator will be received at this point if the adjustment of C-16 has been properly made using the position of least capacitance which gives maximum receiver output. It may be necessary to increase the output of the Oscillator in order to get an indication of the "image". ***No adjustments should be made during this check.***

(b) Return the receiver tuning to 18,000 kc., realign C-16 if necessary, and then adjust the detector and antenna trimmers, C-8 and C-1, for maximum signal output as evidenced by the oscillographic image. No further adjustments are to be made on this band.

OUTPUT INDICATOR ALIGNMENT

To align the receiver by means of an output indicator other than a Cathode Ray Oscillograph will require the use of a standard test Oscillator such as that recommended above for the source of signals and means of indication for the output. The **RCA Neon Output Indicator, Stock No. 4317** will be found very satisfactory for such use. It should be connected across the voice coil circuit of the loudspeaker or across the output transformer primary.

I-F Alignment

Connect the test Oscillator to the control grid cap of the i-f tube. Advance the volume control of the receiver to its full on position. Tune the test Oscillator to 460 kc. and align the trimmers C-29 and C-30 to give maximum receiver output. Regulate the Oscillator output during this adjustment so that the output indication is as small as can be conveniently observed. After completing the adjustments of these trimmers, reconnect the Oscillator so that it will feed into the control-grid circuit of the RCA-6L7 first detector. Then tune the first i-f transformer trimmers C-24 and C-25 for maximum receiver output.

R-F Alignment

After completing the i-f adjustments, it is advisable to correct the line-up of the circuits ahead of the first detector. The test Oscillator should be connected to the antenna-ground terminals of the receiver and the manual volume control kept at its maximum position. For each adjustment the Oscillator output should be maintained as low as possible in order to avoid broadness of tuning which would result from a.v.c. action on a stronger signal. Band A should be aligned by supplying a 1,720 kc. signal to the receiver, tuning the station selector to a dial reading of 1,720 and adjusting the trimmers C-20, C-10 and C-3 to produce maximum receiver output. The Oscillator should then be shifted to 600 kc. and the receiver tuned to resonate this signal, disregarding the reading at which it is best received. Trimmer C-19 must then be adjusted, simultaneously while rocking the station selector backward and forward through the signal until the maximum output results from the combined operations. C-20 should be rechecked to assure that its adjustment has not changed because of the trimming of C-19. Band X must be aligned at 400 kc. and 150 kc. Tune the test Oscillator to 400 kc. and turn the receiver dial to the same reading. Adjust trimmers C-18, C-9 and C-2 for maximum (peak) receiver output. Then shift the Oscillator to 150 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Adjust trimmer C-47, simultaneously rocking the tuning condenser backward and forward through the signal, until maximum receiver output results from the combined operations. Repeat the alignment of C-18 as above to correct for any change which may have been caused by the adjustment of C-47. Change the receiver so that it is operative and the dial reads 18,000 kc. on the "C" Band. Tune the test Oscillator to 18,000 kc. Then adjust the oscillator trimmer C-16 to produce maximum (peak) output. Two positions of this trimmer will be found which conform with this requirement. The one of least capacitance is correct. Check for the presence of "image" response at 17,080 kc. by shifting the receiver tuning. If it is received at such a point, the trimmer C-16 has been correctly adjusted to the right peak. ***No adjustments are to be made during this check.*** Tune the receiver back to the 18,000 kc. dial marking, readjust C-16 if necessary, and then tune the detector and antenna capacitors C-1 and C-8 for maximum receiver output. No further adjustments are necessary.

MODELS C9-6, T9-9
Visual Alignment
Parts List

RCA MFG. CO., INC.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to chassis on Figure 6 will serve to assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1,000 ohms per volt will be satisfactory when the range used for each reading is chosen as high as possible consistent with good readability.

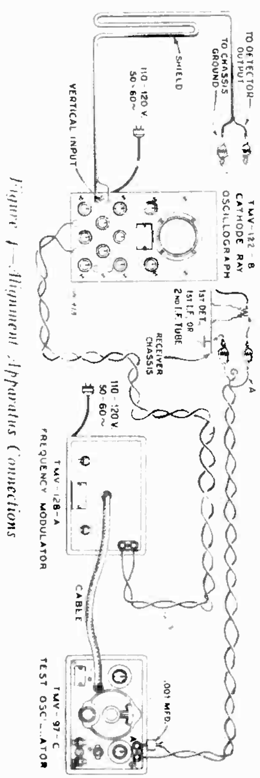


Figure 4—Alignment Apparatus Connections

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
11698	Board—Three-terminal phonograph terminal board	$0.22
4427	Bracket—Volume control or high-frequency tone control mounting bracket	.18
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	.43
11350	Cap—Contact cap—Package of 5	.20
11223	Capacitor—Adjustable capacitor (C19)	.46
11256	Capacitor—Adjustable capacitor (C-47)	.48
11292	Capacitor—22 MMfd. (C7)	.24
11321	Capacitor—33 MMfd. (C33)	.26
11289	Capacitor—50 MMfd. (C11)	.26
11291	Capacitor—115 MMfd. (C21)	.24
5116	Capacitor—175 MMfd. (C35)	.18
11290	Capacitor—400 MMfd. (C48)	.25
11269	Capacitor—800 MMfd. (C46)	.30
4409	Capacitor—1120 MMfd. (C38)	.35
11287	Capacitor—4500 MMfd. (C15)	.30
4868	Capacitor—.005 Mfd. (C34)	.20
4838	Capacitor—.005 Mfd. (C44)	.20
4624	Capacitor—.01 Mfd. (C32)	.54
4858	Capacitor—.01 Mfd. (C37, C49)	.25
5196	Capacitor—.035 Mfd. (C43)	.18
4886	Capacitor—.05 Mfd. (C50)	.20
4836	Capacitor—.05 Mfd. (C4, C13, C26)	.30
4885	Capacitor—0.1 Mfd. (C6, C12, C27)	.28
5170	Capacitor—0.25 Mfd. (C23, C28, C36)	.25
11248	Capacitor—4 Mfd. (C41)	1.06
11240	Capacitor—10 Mfd. (C39)	1.08
5212	Capacitor—18 Mfd. (C40)	1.16
11272	Clamp—Antenna cable clamp—Located near antenna terminal	.10
4748	Clamp—Capacitor mounting clamp assembly—for Stock No. 11248	$0.15
5215	Coil—Antenna coil (A and C Bands)—(L1, L2, L5, L6, C1, C3)	2.32
11325	Coil—Antenna coil (X Band)—(L3, L4, C2)	1.56
5216	Coil—Detector coil (A and C Bands)—(L7, L8, L11, L12, C8, C10)	2.34
11326	Coil—Detector coil (X Band)—(L9, L10, C9)	1.60
5217	Coil—Oscillator coil (A and C Bands)—(L13, L15, C16, C20)	2.20
11327	Coil—Oscillator coil (X Band)—(L14, L23, C18)	1.44
11214	Condenser—Three-gang variable tuning condenser (C5, C14, C22)	4.20
11697	Cover—Phonograph terminal board cover	.12
4340	Lamp—Dial lamp—Package of 5	.60
8041	Plate—R.F. or I.F. coil shield locking plate—Package of 2	.12
11244	Resistor—Voltage divider resistor, comprising one 7500-ohm and one 9200-ohm sections (R18, R19)	1.08
11245	Resistor—Voltage divider resistor, comprising one 148-ohm, one 32-ohm, and one 110-ohm section (R15, R16, R17)	.62
5112	Resistor—1000 Ohm—Carbon type—¼ Watt—(R2)—Package of 5	1.00
5114	Resistor—15,000 Ohm—Carbon type—1 Watt—(R5)	.22
11300	Resistor—33,000 Ohm—Carbon type—1/10 Watt—(R4)—Package of 5	.75

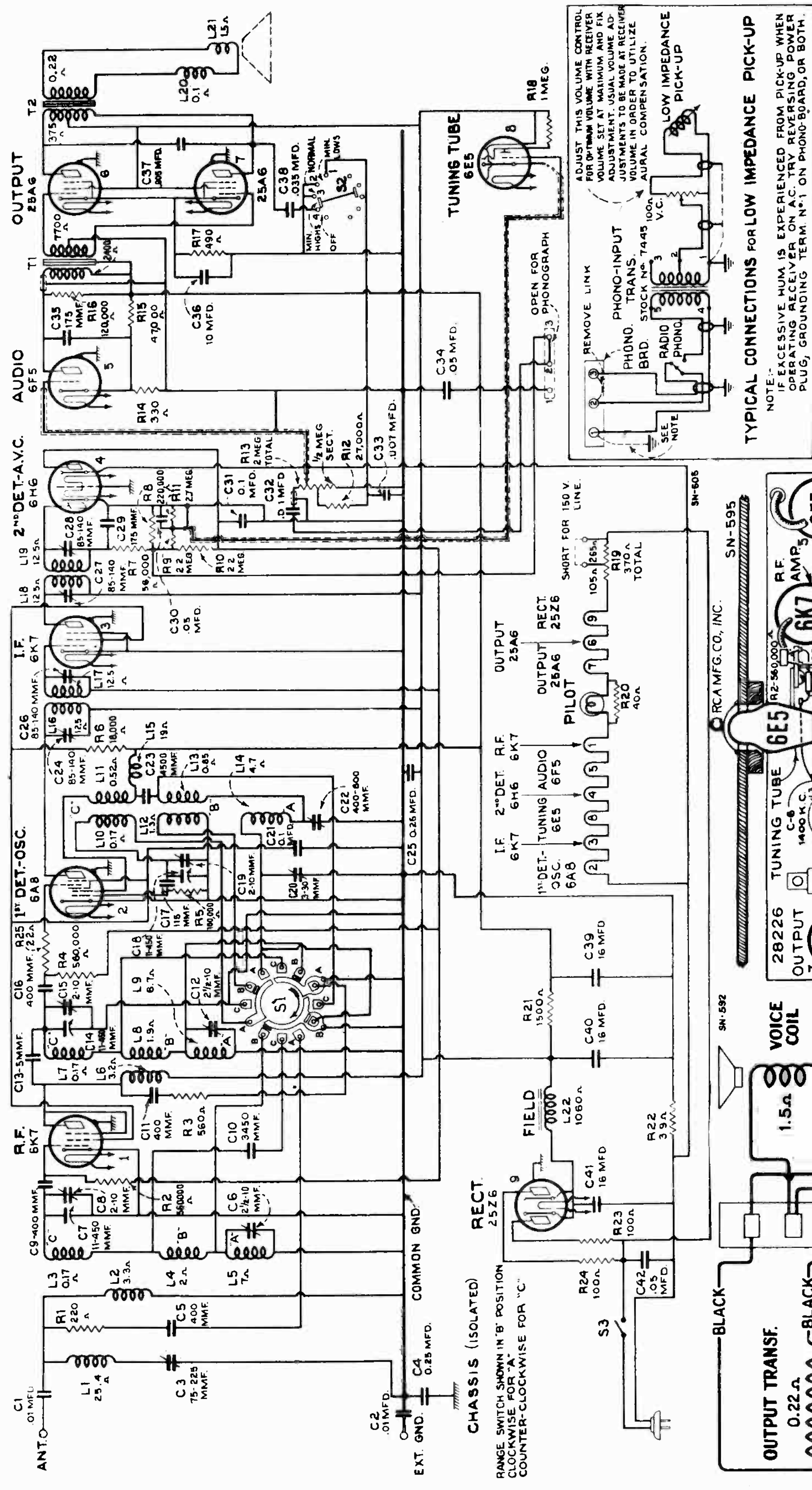
Stock No.	DESCRIPTION	List Price
11322	Resistor—39,000 Ohm—Carbon type—¼ Watt—(R10)—Package of 5	$1.00
5029	Resistor—56,000 Ohm—Carbon type—¼ Watt—(R13)—Package of 5	1.00
3118	Resistor—100,000 Ohm—Carbon type—¼ Watt—(R1, R3, R6)—Package of 5	1.00
11323	Resistor—270,000 Ohm—Carbon type—¼ Watt—(R12)—Package of 5	1.00
11172	Resistor—470,000 Ohm—Carbon type—¼ Watt—(R14)—Package of 5	1.00
11151	Resistor—2.2 Megohms—Carbon type—¼ Watt—(R9, R60, R67)—Package of 5	1.00
5249	Shield—Antenna, detector, or oscillator coil shield	.20
5250	Shield—I.F. transformer shield	.22
11273	Shield—Rectifier Radiotron shield	.25
11222	Socket—Dial lamp socket	.18
4794	Socket—Four-contact rectifier Radiotron socket	.15
11313	Socket—Five-contact Radiotron socket	.18
11198	Socket—Seven-contact Radiotron socket	.15
11236	Switch—Band switch (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11)	2.44
11133	Switch—Power switch (S12)	.62
5238	Terminal—Antenna terminal clip assembly	.14
11238	Tone Control—High-frequency tone control (R20)	.96
11216	Transformer—First intermediate frequency transformer (L16, L17, C24, C25)	2.15
11239	Transformer—Second intermediate frequency transformer (L18, L19, C29, C30, C31, R7, R8)	2.72
11242	Transformer—Power transformer—105-125 Volts—25-60 Cycles	6.52
11243	Transformer—Power transformer—100-130, 140-160, 195-250 Volts—40-60 Cycles—(T1)	4.64
11237	Volume control (R11)	1.20
	DRIVE ASSEMBLIES	
4362	Arm—Band indicator operating arm	.28
10194	Ball—Steel ball—Package of 20	.25
4422	Clutch—Tuning condenser drive clutch assembly—comprising drive shaft, balls, ring, spring and washers—assembled	1.00
11262	Dial—Dial scale	.60
11252	Drive—Variable tuning condenser drive assembly	1.88
4520	Indicator—Station selector indicator pointer	.18
11226	Indicator—Band indicator pointer assembly—comprising indicator pointer, arm, link and stud	.20
3993	Screw—No. 6-32-5/32" square head set-screw for band indicator operating arm—Package of 10	.25
4669	Screw—No. 8-32-5/32" set-screw for variable condenser drive assembly—Package of 10	.25
4377	Spring—Band indicator operating arm spring—Package of 5	.25
4378	Stud—Band indicator operating arm stud and nut assembly—Package of 5	.25

Stock No.	DESCRIPTION	List Price
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board assembly with two lead wire clips	$0.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil (L20)	2.00
11233	Coil—Neutralizing coil (L21)	.30
11235	Cone—Reproducer cone (L22)—Package of 5 (table model)	3.50
11258	Cone—Reproducer cone (L22)—Package of 5 (console model)	3.85
5119	Connector—Three-contact female connector plug for reproducer cable	.25
5118	Connector—Three-contact male connector for reproducer	.25
9618	Reproducer—Complete (table model)	6.40
9619	Reproducer—Complete (console model)	6.05
11253	Transformer—Output transformer (T2)	1.56
11220	Washer—"Binder's board" "C" washer—Used to hold field coil securely—Package of 5	.18
	MISCELLANEOUS ASSEMBLIES	
11729	Bolt—Reproducer mounting bolt assembly—Comprising one bolt, one washer, one lockwasher and one nut—Package of 2 (table model)	.20
11191	Bracket—Tuning tube mounting bracket—less clamp	.12
11319	Cable—Tuning tube cable complete with socket (table model)	1.38
11331	Cable—Tuning tube cable complete with socket (console model)	1.28
11192	Clamp—Tuning tube mounting clamp—less bracket	.12
11276	Escutcheon—Radiotron tuning tube escutcheon	.40
11337	Escutcheon—Station selector escutcheon	.70
11246	Foot—Chassis mounting foot and bracket assembly—Package of 2	.76
6614	Glass—Station selector dial glass	.30
11347	Knob—Volume control, tone control, range switch or power switch knob—Package of 5	.75
11346	Knob—Station selector knob—Package of 5	.75
11382	Resistor—1 Megohm—Carbon type—1/10 Watt—(R61)—Package of 5	.75
4678	Ring—Retaining ring for station selector dial glass—Package of 5	.34
5210	Screw—Chassis mounting screw assembly—Package of 4 (console model)	.16
11377	Screw—Chassis mounting screw assembly—Comprising one screw, one washer and one lockwasher—Package of 4 (table model)	.12
11348	Screw—No. 8-32-7/16" Headless cupped point set screw for knob. Stock No. 11346—Package of 10	.32
11381	Socket—Tuning tube socket and cover	.45
11349	Spring—Retaining spring for knob—Stock No. 11347—Package of 5	.15

The prices quoted above are subject to change without notice.

RCA MFG. CO., INC.

MODEL T9-7
Schematic
Socket, Trimmers
Loudspeaker, Pickup



Intermediate Frequency . . . .460 kc.

FREQUENCY RANGES

Band A . . . . 540- 1,600 kc.
Band B . . . . 1,600- 5,500 kc.
Band C . . . . 5,500-18,000 kc.

ALIGNMENT FREQUENCIES

Band A. . . .600 kc. (osc.),
1,400 kc. (osc., det., ant.)
Band B. . . . . .None required
Band C. . .18,000 kc. (osc., det., ant.)

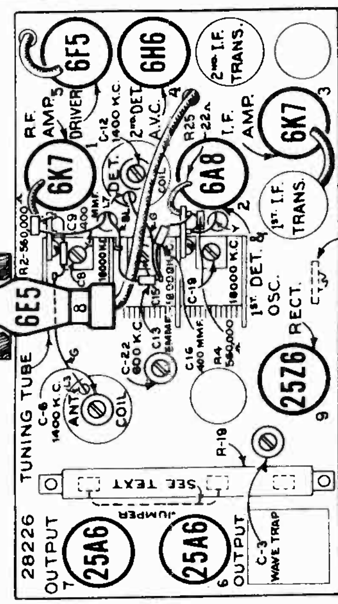


Figure 3—Radiotron, Coil and Trimmer Locations

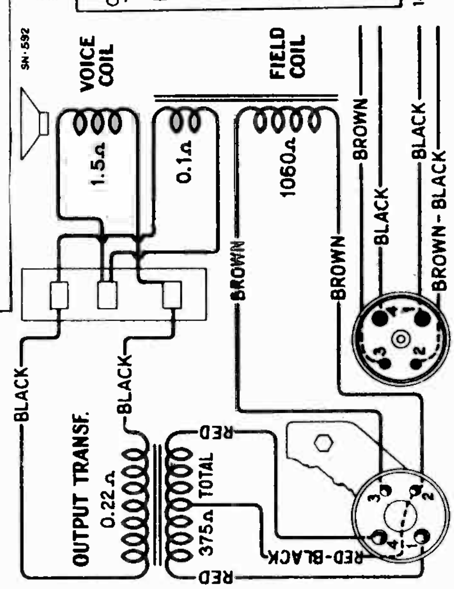


Figure 5—Loudspeaker Wiring

MODEL T9-7
Chassis Wiring

RCA MFG. CO., INC.

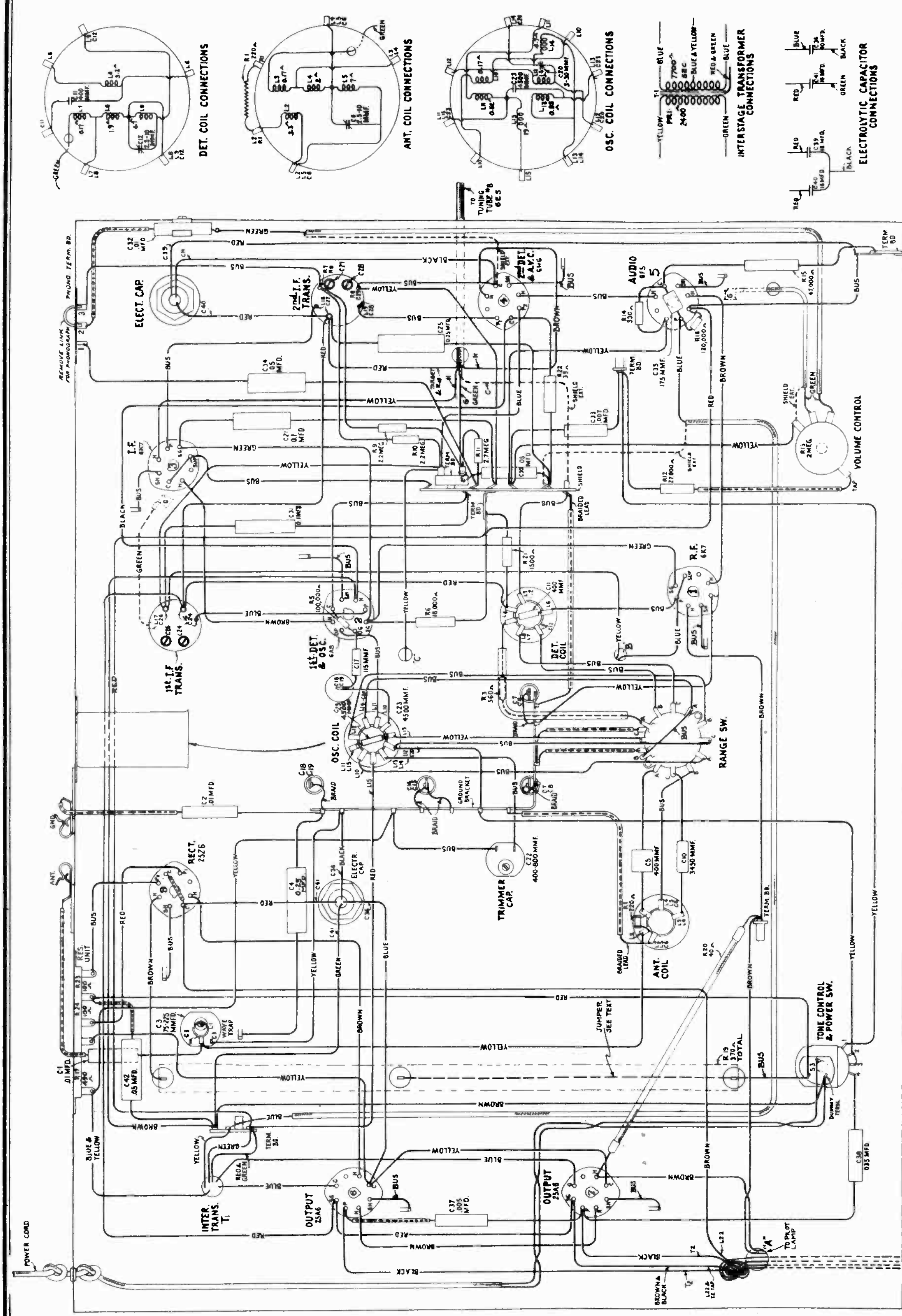


Figure 2—Chassis Wiring Diagram

POWER OUTPUT (250-Volt Line)
Undistorted ....2.25 Watts A-C, 1.75 Watts D-C
Maximum ......3.00 Watts A-C, 2.30 Watts D-C

POWER OUTPUT (160-Volt Line)
Undistorted ....0.90 Watts A-C, 0.75 Watts D-C
Maximum ......1.25 Watts A-C, 0.95 Watts D-C

RCA MFG. CO., INC.

MODEL T9-7
Voltage, Changes

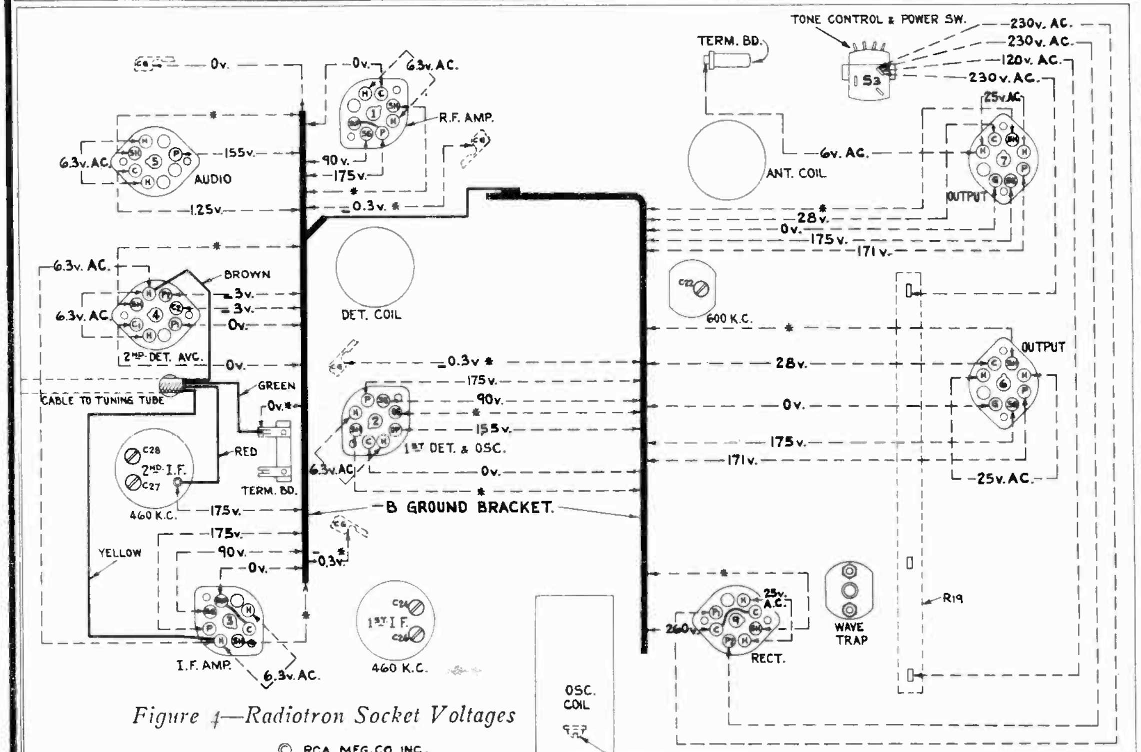


Figure 4—Radiotron Socket Voltages

* - CAN NOT BE MEASURED WITH ORDINARY VOLTMETER.

Measured at 230 volts, 60-cycle supply

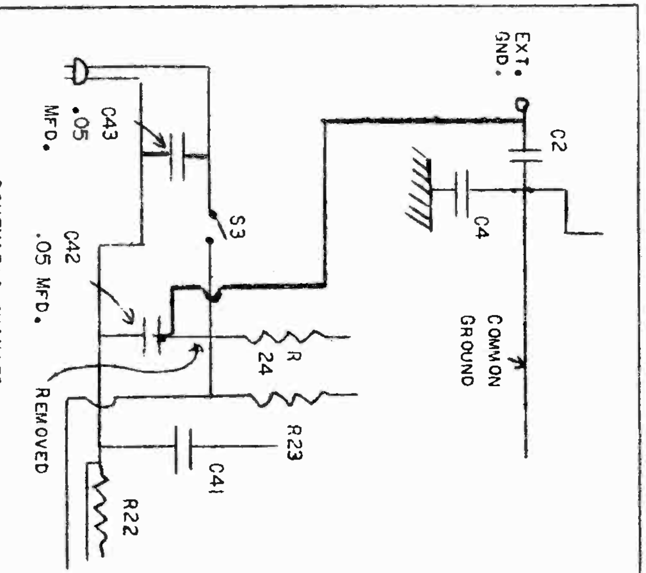
Tuned to approximately 900 kc. (Band A)—No signal being received—Volume control setting optional

For 160-volt, 60-cycle supply, 30% lower; for 230-volt d-c supply, 13% lower; for 160-volt d-c supply, 35% lower

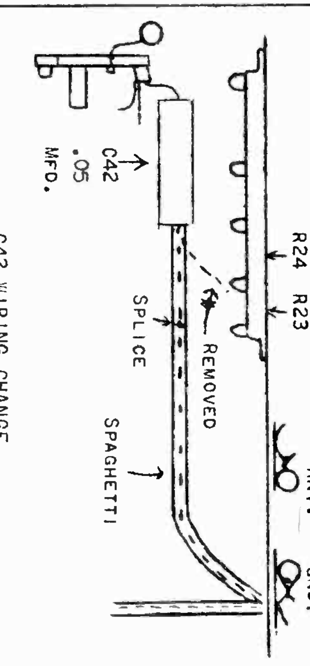
On some instruments the following changes affecting the Schematic Circuit and Chassis Wiring Diagrams have been made.

Capacitor C42 is disconnected from the side of the power line which connects to R24 and R23 and is reconnected to the external ground terminal. The other lead of this capacitor remains connected to the side of the power line which connects to C41 and R22.

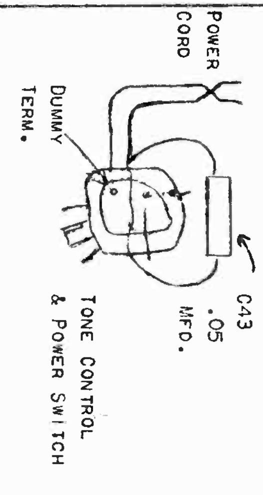
An additional capacitor (Stock No. 12480 - Capacitor - .05 Mfd. - C43 - List Price $0.30) is connected across the power line circuit. It is mounted on the power switch and connected between the dummy terminal and the lug to which the other lead of the power cord



SCHEMATIC CHANGES



C42 WIRING CHANGE



C43 CONNECTIONS

MODEL T9-7
Circuit Data
Alignment, Parts

RCA MFG. CO., INC.

General Features

This instrument comprises a nine-tube chassis, mounted in a table type of cabinet. It uses the new metal tubes. The tuning range is from 540 to 18,000 kc. This coverage includes the important short-wave broadcast bands at 49, 31, 25, 19, and 16 meters, as well as the American broadcast band (540-1600 kc.). Chassis features include automatic volume control, cathode ray tuning indicator ("Magic Eye"), 3-point tone control, antenna wave trap, and audio compensation. A high level of output is available from the receiver for reproduction by the 8-inch electro-dynamic speaker. The tuning dial is an illuminated semi-airplane type. Each dial scale is distinctly marked with a separate color. Positions of the range selector knob are correspondingly indexed on the control panel with sections of similar colors. The tuning control is a dual ratio type, which permits fast tuning through a 10-to-1 drive ratio and vernier tuning through a 50-to-1 drive ratio. The latter is especially advantageous for accurate tuning of the short-wave stations.

Circuit Arrangement

The conventional superheterodyne type of circuit is used. It consists of an r-f stage, a combined first detector oscillator stage, a single i-f stage, a diode detector automatic volume control stage, an audio voltage amplifier stage, a push-pull audio power output stage, a tuning indicator, and a half wave rectifier power supply stage.

Tuned Circuits

The antenna coil system and the detector coil system each consist of a single primary and three series-connected secondary windings to provide the three ranges of tuning. The oscillator coil system is similarly wound on a single form. A range selector switch (S-1) is used for connecting the various sections of these three coil systems into the circuit to provide operation on the band desired. The coils are tuned by a variable three-section gang condenser having trimmer capacitors in shunt with each section. There are additional trimmer capacitors across the section of each coil used for Band "A." A series trimmer is also associated with the Band "A" oscillator coil.

The intermediate frequency amplifier system consists of an RCA-6K7 in a transformer-coupled circuit. This stage operates at a basic frequency of 460 kc. Each winding of both i-f transformers (input and output) is tuned by an adjustable trimmer capacitor.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f stage is detected by an RCA-6H6 twin-diode tube. The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R-8, is applied as automatic control-grid bias to the r-f, first-detector, and i-f tubes through a suitable resistance filter circuit. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R-8 and R-10, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current and the a-v-c diode takes over the biasing function.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector diode and the input grid of the audio-voltage-amplifier tube. This control has a tone-compensating filter connected to it, so that the correct aural balance will be obtained at different volume settings. Transformer coupling is used between the first audio stage and the push-pull power output stage. The output of the power amplifier is transformer-coupled into the dynamic loudspeaker. High-frequency tone control is effected by a capacitor across the plate circuit of one of the output tubes. Speech-music control is effected by a resistor connected to the compensated volume control circuit. Control of tone is obtained by means of the switch (S-2).

Tuning Indicator

A cathode-ray tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal.

NOTE: On a-c and d-c circuits of 160 volts or less, the action of the "Magic Eye" will be limited.

This tube is of new design and comprises an amplifier section and a cathode-ray section built in the same glass envelope. The cathode-ray section consists of a conically shaped luminescent screen, upon which a pattern is formed by an effect of the detected signal after said effect has been amplified by the amplifier section, which is fed from the detector diode circuit. The size of the pattern is determined by the strength of the signal voltage, so that any change of tuning may be readily observed in order to facilitate tuning to exact resonance.

Rectifier

The plate, grid, and cathode voltages required for the operation of this receiver are supplied by the RCA-25Z6 rectifier operating as a half-wave rectifier. The field winding of the loudspeaker is used as a reactor in the filter circuit from which it simultaneously receives its magnetizing current.

The filaments of all nine tubes are connected in series and are fed direct from the supply line, the voltage being dropped to the required value by resistors R-19 and R-20. The correct operating voltage for the pilot lamp is developed across resistor R-20. This voltage across the pilot lamp will be slightly high when the receiver is first turned on, but will quickly drop to a normal value as soon as the tube filaments reach their operating temperature.

NOTE: (Power Supply Rating) As shipped from the factory, all instruments are connected for operation on a 200-250-volt supply line. They may be converted for operation at 140-160 volts by connecting a jumper between points shown by dotted line on resistor R-19, Figures 2 and 3.

SERVICE DATA

CAUTION: Grid caps, tuning condenser, and resistor on top of chassis may be "hot" with respect to external ground, and should be avoided when servicing, unless due precautions are taken.

The various diagrams of this bulletin contain such information as will be needed to isolate causes for defective operation when such a condition develops. Values of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the diagrams and the replacement parts list. Locating of the parts in the schematic circuit is facilitated by the fact that the numerical titles increase from left to right on the diagram. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Resistances of less than one ohm are generally omitted.

Alignment Procedure

Precise alignment is vital to the proper functioning of this receiver. There are four trimming adjustments provided in the i-f system, three in the oscillator coil system, two in the detector coil system, and two in the antenna coil system. Each of these trimmers has been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions of climate, or have been altered for service purposes. Incorrect alignment is usually evidenced by loss of sensitivity, improper tone quality, and poor selectivity. These indications will generally be present together.

The correct performance of the receiver can only be obtained when the alignment is performed with adequate and reliable test apparatus. The manufacturer of this instrument has a complete assortment of such service equipment available. This equipment, illustrated and described on a separate page of this booklet, may be purchased from authorized distributors and dealers.

An oscillator (signal generator) is required as a source of the specified alignment frequencies. Visual indication of the receiver output during the adjustments is necessary to enable the serviceman to obtain an accuracy of alignment which is not possible by listening to the signal. The RCA Stock No. 9595 Full Range Oscillator and the RCA Stock No. 4317 Neon Output Indicator are especially suitable and fulfill the above requirements.

The following procedure should be followed in adjusting the various trimmer capacitors:

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 4. Each must be aligned to a basic frequency of 460 kc. To do this, attach the output indicator across the voice coil circuit or across the output transformer primary. Connect the output of the test oscillator through a .05 mfd. condenser to the RCA-6A8 control grid, the ground of the test oscillator being connected to the receiver ground terminal. Tune the oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator. Then adjust the two trimmers, C-27 and C-28, of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two trimmers, C-24 and C-26, of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to a-v-c action will be avoided. It is advisable to repeat the adjustment of all i-f trimmers a second time to assure that the interaction between them has not disturbed the original adjustment.

R-F Trimmer Adjustments

The seven trimmers associated with the r-f, first detector, and oscillator tuned circuits have their locations shown by Figures 3 and 4. The three trimmers which are at all times directly in shunt with the variable tuning condenser necessitates that the high frequency range (Band C) be aligned first. The range selector switch should, therefore, be turned to its Band C position for the first adjustment. The output indicator should be left connected to the output system as for i-f alignment. Attach the output terminals of the test oscillator to the antenna and ground terminals of the receiver.

Calibrate the dial by rotating the tuning control until the variable condenser plates are in their full mesh (maximum capacity) position and adjusting the dial pointer so that its end points to the horizontal graduation (approximately 530 kc.) at the low-frequency end of the Band A scale.

Proceed further as follows:

(a) Adjust the test oscillator to 18,000 kc. and set the receiver tuning control to a dial reading of 18,000 kc.

(b) Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the trimmer, C-19, on the oscillator section of the variable condenser to the point at which it produces maximum indicated receiver output. Two points may be found, each of which produces such a maximum. The one of ***maximum trimmer capacitance*** is correct and should be used. (The oscillator will be 460 kc. below the signal frequency at this adjustment point.)

(c) Adjust the trimmer, C-15, of the detector section of the variable condenser, simultaneously rocking the receiver tuning control backward and forward through the 18,000 kc. input signal, until maximum receiver output results from these combined operations. Rocking of the variable condenser will prevent inaccurate adjustment, which would otherwise be caused by the interaction between the heterodyne oscillator circuit and the detector tuned circuit.

(d) With the receiver tuning control set to 18,000 kc. adjust the trimmer, C-8, on the antenna section of the variable condenser to the point which produces maximum (peak) indicated receiver output.

(e) Change the receiver range selector to its Band A position and set the receiver tuning control to a dial reading of 1,400 kc. Tune the test oscillator to 1,400 kc. and regulate its output to produce a slight indication on the receiver output indicating device.

(f) Adjust the high-frequency trimmers of the Band A oscillator, detector, and antenna coils, C-20, C-12, and C-6 respectively, to the points at which each produces maximum indicated receiver output.

(g) Shift the test oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(h) Tune the low frequency trimmer, C-22, of the oscillator Band A coil, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum indicated receiver output results from these combined operations. The adjustment of C-19, C-15, and C-8 should be corrected at 18,000 kc. as in (b), (c), and (d), also C-20, C-12 and C-6 should be corrected at 1,400 kc. as in (f) to compensate for any changes caused by the adjustment of the low-frequency oscillator coil trimmer.

Phonograph Attachment

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. A typical method of connection is shown on the schematic diagram (Figure 1). Correct procedure to be observed for adjustment of attachment to secure proper aural compensation is indicated.

Wave Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to -B ground bracket on Figure 4 will assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with set tuned to approximately 900 kc. (Band A); no signal being received, and volume control setting optional. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm per volt d-c meter, having ranges of 10, 50, and 250 volts. Voltages below 10 read on 10-volt scale, between 10 and 50 on 50-volt scale, and between 50 and 250 on 250-volt scale. A-C voltages were measured with a corresponding a-c meter.

POWER SUPPLY RATINGS

Rating (As shipped from Factory) .... 200-250 Volts, 40-100 Cycles, also D-C, 110 Watts
Rating (See note in text) .... 140-160 Volts, 40-100 Cycles also D-C, 50 Watts

LOUDSPEAKER

Type .... Electrodynamic   Voice Coil Impedance ... 2.25 Ohms at 400 Cycles

Mechanical Specifications

Height	21¼ inches
Width	15¾ inches
Depth	9½ inches
Weight (Net)	27½ pounds
Weight (Shipping)	33 pounds
Chassis Base Dimensions	13⅞ inches x 7⅝ inches x 2½ inches
Tuning Drive Ratios	10 to 1 and 50 to 1
Operating Controls	(1) Volume, (2) Tuning, (3) Range Selector, (4) Power Switch-Tone

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	$0.43
12066	Board—Terminal board assembly and link	.25
12068	Cable—Tuning tube cable and socket	.56
11465	Capacitor—Adjustable capacitor—(C22)	.48
12077	Capacitor—5 Mmfd.—(C13)	.42
11291	Capacitor—115 Mmfd.—(C17)	.24
11623	Capacitor—175 Mmfd.—(C35)	.18
11290	Capacitor—400 Mmfd.—(C5, C9, C16)	.25
12076	Capacitor—3,450 Mmfd.—(C10)	.42
4868	Capacitor—.005 Mfd.—(C37)	.20
5148	Capacitor—.07 Mfd.—(C33)	.20
4858	Capacitor—.01 Mfd.—(C1, C2)	25
11395	Capacitor—.01 Mfd.—(C32)	18
5196	Capacitor—.035 Mfd.—(C38)	.18
4836	Capacitor—.05 Mfd.—(C30)	.30
12078	Capacitor—.05 Mfd.—(C34, C42)	30
5170	Capacitor—0.25 Mfd.—(C4, C25)	.25
4835	Capacitor—0.1 Mfd.—(C21)	28
4841	Capacitor—0.1 Mfd.—(C31)	22
12058	Resistor—Comprising 2 sections of 100 ohms and one section of 490 ohms—(R17, R23, R24)	$0.90
11624	Resistor—22 ohms—flexible type—complete with contact cap—(R25)	.22
11956	Resistor—39 ohms—carbon type—½ watt—(R22)—Package of 5	1.00
12074	Resistor—40 ohms—flexible type—(R20)	.30
11296	Resistor—330 ohms—carbon type—¼ watt—(R14)—Package of 5	1.00
11324	Resistor—560 ohms—carbon type—¼ watt—(R3)—Package of 5	1.00
3047	Resistor—1,500 ohms—carbon type—½ watt—(R21)—Package of 5	1.00
3219	Resistor—18,000 ohms—carbon type—¼ watt—(R6)—Package of 5	1.00
11400	Resistor—27,000 ohms—carbon type—¼ watt—(R12)—Package of 5	1.00
12073	Resistor—47,000 ohms—carbon type—1 watt—(R15)—Package of 5	1.10
11281	Resistor—100,000 ohms—carbon type—1/10 watt—(R5)—Package of 5	.75
12355	Resistor—120,000 ohms—carbon type—1/10 watt—(R16)—Package of 5	.75
11397	Resistor—560,000 ohms—carbon type—1/10 watt—(R2, R4)—Package of 5	.75
11626	Resistor—2.2 megohms—carbon type—¼ watt—(R9, R10)—Package of 5	1.00
12072	Resistor—2.7 megohms—carbon type—¼ watt—(R11)—Package of 5	1.00
11603	Shield—Antenna or detector coil shield for Stock Nos. 11600 and 12059	.26
11390	Shield—Intermediate frequency transformer shield	.25
11604	Shield—Oscillator coil shield for Stock No. 11602	.24
3529	Socket—Dial lamp socket	.32
11198	Socket—7-contact Radiotron socket	.15
11196	Socket—8-contact 6A8 Radiotron socket	.15
12054	Switch—Range switch (S1)	1.16
11392	Switch—Tone control and power switch assembly (S2, S3)	1.14
5238	Terminal—Antenna terminal board with clip insulating strip and rivets	.14
11976	Terminal—Ground terminal clip assembly	.15
11388	Transformer—First intermediate frequency transformer—(L16, L17, C24, C26)	1.90
11389	Transformer—Second intermediate frequency transformer—(L18, L19, C27, C28, C29, R7, R8)	3.02

Stock No.	DESCRIPTION	List Price
12055	Capacitor Pack—Comprising 2 sections of 16 Mfd.—(C39, C40)	$3.75
12056	Capacitor Pack—Comprising 1 section of 16 Mfd. and one section of 10 Mfd.—(C36, C41)	2.95
11600	Coil—Antenna coil—(L2, L3, L4, L5, C6, R1)	1.78
12059	Coil—Detector coil—(L6, L7, L8, L9, C11, C12)	1.94
11602	Coil—Oscillator coil—(L10, L11, L12, L13, L14, L15, C20, C23)	2.15
11385	Condenser—3-gang variable tuning condenser—(C7, C8, C14, C15, C18, C19)	5.0.
12057	Dial—Station selector dial	.75
11394	Foot—Chassis foot and bracket assembly—Package of 2	.70
11893	Indicator—Station selector indicator pointer	28
4340	Lamp—Dial lamp—Package of 5	60
12053	Resistor—Line resistor—Comprising one 265-ohm and one 105-ohm sections—(R19)	.58
12081	Transformer—Interstage transformer—(T1)	$4.52
11391	Trap—Wave trap (L1, C3)	1.22
11237	Volume Control—(R13)	1.20
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.18
12079	Coil—Field coil—(L22)	1.88
11233	Coil—Neutralizing coil—(L20)	30
11235	Cone—Reproducer cone—(L21)—Package of 5	3.50
5040	Connector—4-contact female connector for reproducer cable	.25
5039	Connector—4-contact male connector for reproducer	.25
9643	Reproducer—Complete	6.50
12080	Transformer—Output transformer—(T2)	1.70
11886	Washer—Spring washer—used to hold field coil securely—Package of 5	20
	MISCELLANEOUS ASSEMBLIES	
11996	Clamp—Tuning tube mounting bracket and clamp assembly	22
11276	Escutcheon—Tuning tube escutcheon	.40
11376	Escutcheon—Station selector escutcheon and crystal	.70
11582	Knob—Range switch knob—Package of 5	50
11610	Knob—Station selector knob assembly—Comprising 1 large and 1 small knob—Package of 5	1.00
11347	Knob—Volume control or power switch knob—Package of 5	.75
11382	Resistor—1 megohm—carbon resistor—1/10 watt—(R18)—Package of 5	.75
11377	Screw—Chassis mounting screw assembly—Package of 4	.12
11381	Socket—Tuning tube socket and cover	.45
11349	Spring—Retaining spring for knob Stock Nos. 11347 and 11582 and small knob in No. 11610—Package of 5	.15
4982	Spring—Retaining spring for large knobs—for Stock No. 11610—Package of 10	26

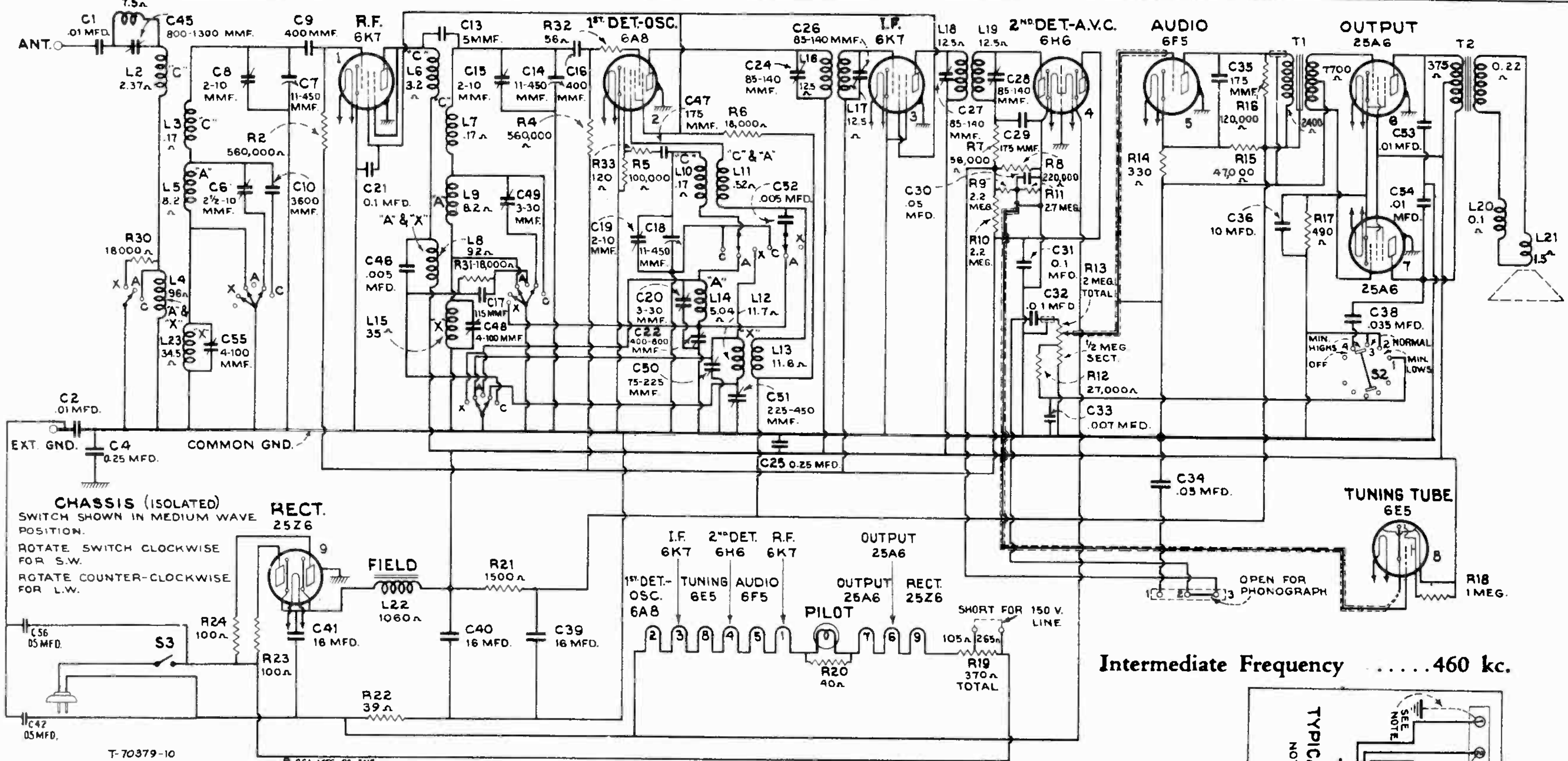
The prices quoted above are subject to change without notice.

NOTES

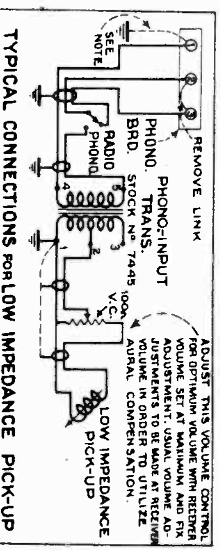
(1) Beat notes or heterodyning (whistles) may be encountered in some instances on these receivers due to excessive antenna capacitance. This condition may be corrected by reducing the size of the antenna or by inserting a 150 mmfd. capacitor in series with the antenna lead at the antenna terminal. Interference in the form of "beats" from a combination of local stations may frequently be remedied by tuning the wave trap to one of the interfering stations. The wave trap will tune from approximately 375 kc. to 700 kc.

MODEL T9-8
Schematic
Pickup

RCA MFG. CO., INC.



Intermediate Frequency .....460 kc.



TYPICAL CONNECTIONS FOR LOW IMPEDANCE PICK-UP

NOTE:- IF EXCESSIVE HUM IS EXPERIENCED FROM PICK-UP WHEN OPERATING RECEIVER ON A.C. TRY REVERSING POWER PLUG, GROUNDING TERM. Nº 1 ON PHONO-BOARD, OR BOTH.

Frequency Ranges

Band X	155- 320 kc.
Band A	530- 1,500 kc.
Band C	5,400-18,000 kc.

Alignment Frequencies

Band X	180 kc. (osc.), 300 kc. (osc., det., ant.)
Band A	600 kc. (osc.), 1,400 kc. (osc., det., ant.)
Band C	18,000 kc. (osc., det., ant.)

Power Supply Ratings

Rating (As shipped from Factory) ....200-250 Volts, 40-100 Cycles, also D-C, 110 Watts
Rating (See note in text) ....140-160 Volts, 40-100 Cycles, also D-C, 50 Watts

Power Output (250-Volt Line)

Undistorted ...2.25 Watts A-C, 1.75 Watts D-C
Maximum ......3.00 Watts A-C, 2.30 Watts D-C

Power Output (160-Volt Line)

Undistorted ....0.90 Watts A-C, 0.75 Watts D-C
Maximum ......1.25 Watts A-C, 0.95 Watts D-C

Loudspeaker

Type ....Electrodynamic

Voice Coil Impedance.....2.25 Ohms at 400 Cycles

MODEL T9-8
Chassis Wiring

RCA MFG. CO., INC.

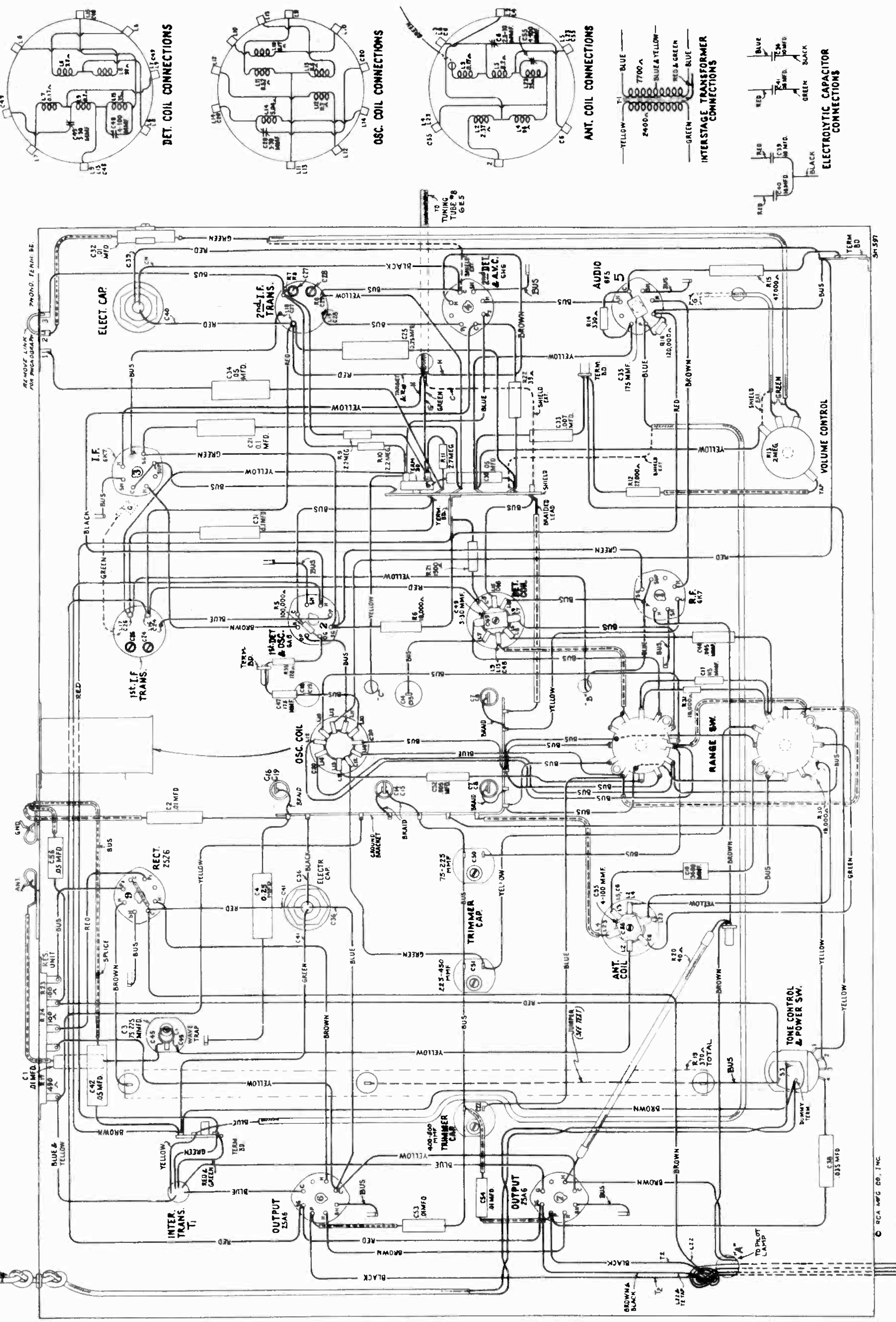


Figure 2—Chassis Wiring Diagram

RCA MFG. CO., INC.

MODEL T9-8
Socket, Trimmers
Loudspeaker
Voltage

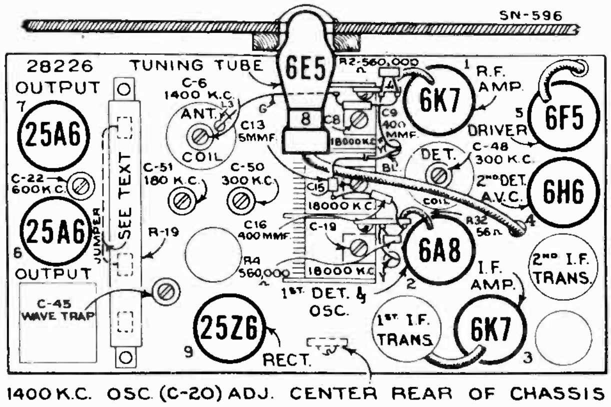


Figure 3—Radiotron, Coil and Trimmer Locations

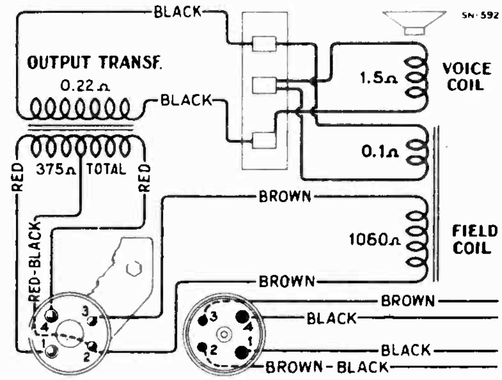


Figure 5—Loudspeaker Wiring

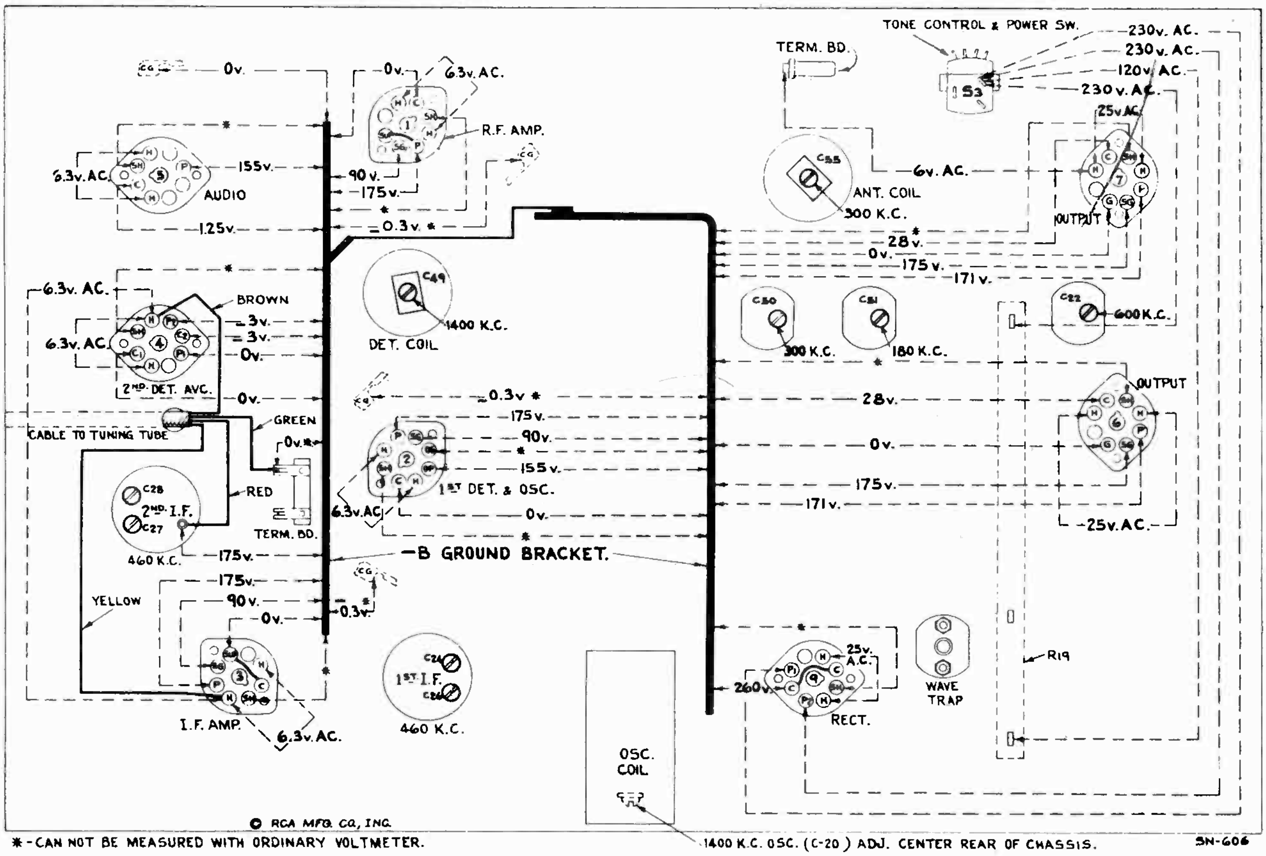


Figure 4—Radiotron Socket Voltages

Measured at 230 volts, 60-cycle supply

Tuned to approximately 900 kc. (Band A)—No signal being received—Volume control setting optional

For 160-volt, 60-cycle supply, 30% lower; 230-volt d-c supply, 13% lower; 160-volt d-c supply, 35% lower.

MODEL T9-8
Circuit Data
Alignment, Data
Parts List

RCA MFG. CO., INC.

General Features

This instrument comprises a nine-tube chassis, mounted in a table type of cabinet. It uses the new metal tubes. The tuning range is from 155 to 320 kc.; from 530 to 1,500 kc. and from 5,400 to 18,000 kc. This coverage includes the important short wave bands at 49, 31, 25, 19 and 16 meters, the European long-wave band (150-320 kc.) and the American broadcast band (530-1,500 kc.). Chassis features include automatic volume control, cathode-ray tuning indicator ("Magic Eye"), 3-point tone control, antenna wave trap, and audio compensation. A high level of output is available from the receiver for reproduction by the 8-inch electrodynamic speaker. The tuning dial is an illuminated semi-airplane type. Each dial scale is distinctly marked with a separate color. Positions of the range selector knob are correspondingly indexed on the control panel with sections of similar colors. The tuning control is a dual-ratio type, which permits fast tuning through a 10-to-1 drive ratio and vernier tuning through a 50-to-1 drive ratio. The latter is especially advantageous for accurate tuning of the short-wave stations.

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Tuned Circuits

The antenna coil system and the detector coil system each consist of two series-connected primary windings and three series-connected secondary windings to provide the three ranges of tuning. The oscillator coil system is similarly wound on a single form. A range selector switch (S-1) is used for connecting the various sections of these three coil systems into the circuit to provide operation on the band desired. The coils are tuned by a variable three-section gang condenser having trimming capacitors in shunt with each section. There are additional trimming capacitors across the section of each Band "A" coil and each Band "X" coil. Series trimming capacitors are also associated with the Band "A" and Band "X" oscillator coils.

The intermediate frequency amplifier system consists of an RCA-6K7 in a transformer-coupled circuit. This stage operates at a basic frequency of 460 kc. Each winding of both i-f transformers (input and output) is tuned by an adjustable trimmer capacitor.

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Tuning Indicator

A cathode-ray tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal.

NOTE: On a-c and d-c circuits of 160 volts or less, the action of the "Magic Eye" will be limited.

This tube is of new design and comprises an amplifier section and a cathode-ray section built in the same glass envelope. The cathode-ray section consists of a conically shaped luminescent screen, upon which a pattern is formed by an effect of the detected signal after said effect has been amplified by the amplifier section, which is fed from the detector diode circuit. The size of the pattern is determined by the strength of the signal voltage, so that any change of tuning may be readily observed in order to facilitate tuning to exact resonance.

Rectifier

The plate, grid, and cathode voltages required for the operation of this receiver are supplied by the RCA-25Z6 rectifier operating as a half-wave rectifier. The field winding of the loudspeaker is used as a reactor in the filter circuit from which it simultaneously receives its magnetizing current.

The filaments of all nine tubes are connected in series and are fed direct from the supply line, the voltage being dropped to the required value by resistors R-19 and R-20. The correct operating voltage for the pilot lamp is developed across resistor R-20. This voltage across the pilot lamp will be slightly high when the receiver is first turned on, but will quickly drop to a normal value as soon as the tube filaments reach their operating temperature.

NOTE: (Power Supply Rating) As shipped from the factory, all instruments are connected for operation on a 200-250-volt supply line. They may be converted for operation at 140-160 volts by connecting a jumper between points shown by dotted line on resistor R-19, Figures 2 and 3.

SERVICE DATA

CAUTION: Grid caps, tuning condenser, and resistor on top of chassis may be "hot" with respect to external ground, and should be avoided when servicing, unless due precautions are taken.

The various diagrams of this bulletin contain such information as will be needed to isolate causes for defective operation when such a condition develops. Values of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the diagrams and the replacement parts list. Locating of the parts in the schematic circuit is facilitated by the fact that the numerical titles increase from left to right on the diagram. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Resistances of less than one ohm are generally omitted.

Alignment Procedure

Precise alignment is vital to the proper functioning of this receiver. There are four trimming adjustments provided in the i-f system, five in the oscillator coil system, three in the detector coil system, and three in the antenna coil system. Each of these trimmers has been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions of climate, or have been altered for service purposes. Incorrect alignment is usually evidenced by loss of sensitivity, improper tone quality, and poor selectivity. These indications will generally be present together.

The correct performance of the receiver can only be obtained when the alignment is performed with adequate and reliable test apparatus. The manufacturer of this instrument has a complete assortment of such service equipment available. This equipment may be purchased from authorized distributors and dealers.

An oscillator (signal generator) is required as a source of the specified alignment frequencies. Visual indication of the receiver output during the adjustments is necessary to enable the serviceman to obtain an accuracy of alignment which is not possible by listening to the signal. The RCA Stock No. 9595 Full-Range Oscillator and the RCA Stock No. 4317 Neon Output Indicator are especially suitable and fulfill the above requirements.

The following procedure should be followed in adjusting the various trimmer capacitors:

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 4. Each must be aligned to a basic frequency of 460 kc. To do this, attach the output indicator across the voice coil circuit or across the output transformer primary. Connect the output of the test oscillator through a .05 mfd. condenser to the RCA-6A8 control grid, the ground of the test oscillator being connected to the receiver ground terminal. Tune the oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator. Then adjust the two trimmers, C-27 and C-28, of the second i-f transformer to produce maximum (peak) indicated receiver output. Then, adjust the two trimmers, C-24 and C-26, of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i-f trimmers a second time to assure that the interaction between them has not disturbed the original adjustment.

R-F Trimmer Adjustments

The eleven trimmers associated with the r-f, first detector, and oscillator tuned circuits have their locations shown by Figures 3 and 4. The three trimmers which are at all times directly in shunt with the variable tuning condenser necessitate that the high-frequency range (Band C) be aligned first. The range selector switch should, therefore, be turned to its Band C position for the first adjustment. The output indicator should be left connected to the output system as for i-f alignment. Attach the output terminals of the test oscillator to the antenna and ground terminals of the receiver.

Calibrate the dial by rotating the tuning control until the variable condenser plates are in their full mesh (maximum capacity) position and adjusting the dial pointer so that its end points to the horizontal graduation (approximately 530 kc.) at the low-frequency end of the Band A scale.

Proceed further as follows:

(a) Adjust the test oscillator to 18,000 kc. and set the receiver tuning control to a dial reading of 18,000 kc.

(b) Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the trimmer, C-19, on the oscillator section of the variable condenser to the point at which it produces maximum indicated receiver output. Two points may be found, each of which produces such a maximum. The one of ***maximum trimmer capacitance*** is correct and should be used. (The oscillator will be 460 kc. below the signal frequency at this adjustment point.)

(c) Adjust the trimmer, C-15, of the detector section of the variable condenser, simultaneously rocking the receiver tuning control backward and forward through the 18,000 kc. input signal, until maximum receiver output results from these combined operations. Rocking of the variable condenser will prevent inaccurate adjustment, which would otherwise be caused by the interaction between the heterodyne oscillator circuit and the detector tuned circuit.

(d) With the receiver tuning control set to 18,000 kc. adjust the trimmer, C-8, on the antenna section of the variable condenser to the point which produces maximum (peak) indicated receiver output.

(e) Change the receiver range selector to its Band A position and set the receiver tuning control to a dial reading of 1,400 kc. Tune the test oscillator to 1,400 kc. and regulate its output to produce a slight indication on the receiver output indicating device.

(f) Adjust the high-frequency trimmers of the Band A oscillator, detector, and antenna coils, C-20, C-49, and C-6 respectively, to the points at which each produces maximum indicated receiver output.

(g) Shift the test oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(h) Tune the low-frequency trimmer, C-22, of the oscillator Band A coil, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum indicated receiver output results from these combined operations.

(i) Change the receiver range selector to its Band "X" position and set the receiver tuning control to a dial reading of 300 kc., set the test oscillator to 300 kc. and regulate its output to produce a slight indication on the receiver output indicating device.

(j) Adjust the high-frequency trimmers of the Band "X" oscillator, detector and antenna coils, C-50, C-48, and C-55 respectively, to the points at which each produces maximum indicated receiver output.

(k) Shift the test oscillator to 180 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(l) Tune the low frequency trimmer C-51 of the oscillator Band "X" coil, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum indicated receiver output results from these combined operations.

(m) The adjustment of C-19, C-15, and C-8 should be corrected at 18,000 kc. as in (b), (c) and (d).

(n) The adjustment of C-20, C-49 and C-6 should be corrected at 1,400 kc. as in (f) to compensate for any change caused by adjustment of the low-frequency oscillator coil trimmer.

(o) The adjustment of C-50, C-48, and C-55 should be corrected at 300 kc. as in (j) to compensate for any changes caused by the low frequency oscillator coil trimmer.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to -B ground bracket on Figure 4 will assist in the location of causes for faulty operation. Each value as specified should hold within ±20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with set tuned to approximately 900 kc. (Band A); no signal being received, and volume control setting optional. To duplicate the conditions under which the voltages were measured requires a 1,000 ohm-per-volt d-c meter, having ranges of 10, 50, and 250 volts. Voltages below 10 read on 10-volt scale, between 10 and 50 on 50-volt scale, and between 50 and 250 on 250-volt scale. A-C voltages were measured with a corresponding a-c meter.

Phonograph Attachment

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. A typical method of connection is shown on the schematic diagram (Figure 1). Correct procedure to be observed for adjustment of attachment to secure proper aural compensation is indicated.

Wave-Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference.

Mechanical Specifications

Height	$21\frac{3}{16}$ inches
Width	$15\frac{3}{4}$ inches
Depth	$9\frac{1}{2}$ inches
Weight (Net)	$27\frac{1}{2}$ pounds
Weight (Shipping)	33 pounds
Chassis Base Dimensions	$13\frac{7}{8} \times 7\frac{5}{8} \times 2\frac{1}{2}$ inches
Tuning Drive Ratios	10-to-1 and 50-to-1

RADIOTRON COMPLEMENT

(1) RCA-6K7	Radio-Frequency Amplifier
(2) RCA-6A8	First Detector-Oscillator
(3) RCA-6K7	Intermediate Amplifier
(4) RCA-6H6	Second Detector-A.V.C.
(5) RCA-6F5	Audio Voltage Amplifier
(6) RCA-25A6	Audio Power Amplifier
(7) RCA-25A6	Audio Power Amplifier
(8) RCA-6E5	Tuning Indicator
(9) RCA-25Z6	Half-Wave Rectifier

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	$0.43
12066	Board—Terminal board assembly and link	.25
12068	Cable—Tuning tube cable and socket	.56
11256	Capacitor—Adjustable capacitor—(C50)	.48
11465	Capacitor—Adjustable capacitor—(C22)	.48
12065	Capacitor—Adjustable capacitor—(C51)	.65
12077	Capacitor—5 Mmfd.—(C13)	.42
11291	Capacitor—115 Mmfd.—(C17)	.24
11673	Capacitor—175 Mmfd.—(C35, C47)	.18
11290	Capacitor—400 Mmfd.—(C9, C16)	$0.25
11621	Capacitor—3,600 Mmfd.—(C10)	.38
4868	Capacitor—.005 Mfd.—(C46, C52)	.20
5148	Capacitor—.007 Mfd.—(C33)	.20
4858	Capacitor—.01 Mfd. (C1, C2, C53, C54)	.25
11395	Capacitor—.01 Mfd.—(C32)	.18
5196	Capacitor—.035 Mfd.—(C38)	.18
4836	Capacitor—.05 Mfd.—(C30)	.30
12078	Capacitor—.05 Mfd.—(C34, C42)	.30
12480	Capacitor—.05 Mfd.—(C56)	.30
5170	Capacitor—0.25 Mfd.—(C4, C25)	.25
4835	Capacitor—0.1 Mfd.—(C21)	.28
4841	Capacitor—0.1 Mfd.—(C31)	$0.22
12055	Capacitor Pack—Comprising 2 sections of 16 Mfd.—(C39, C40)	3.75
12056	Capacitor Pack—Comprising 1 section of 16 Mfd. and one section of 10 Mfd.—(C36, C41)	2.95
12061	Coil—Antenna coil—(L2, L3, L4, L5, L23, C6, C55)	1.90
12062	Coil—Detector coil—(L6, L7, L8, L9, L15, C48, C49)	1.94
12063	Coil—Oscillator coil (L10, L11, L12, L13, L14, C20)	2.62
12067	Condenser—3-gang variable tuning condenser—(C7, C8, C14, C15, C18, C19)	4.85
12131	Dial—Station selector dial scale	.75
11394	Foot—Chassis foot and bracket assembly—Package of 2	.70
11893	Indicator—Station selector indicator pointer	.28
4340	Lamp—Dial lamp—Package of 5	.60
12053	Resistor—Line resistor—Comprising one 265-ohm and one 105-ohm sections—(R19)	.58
12058	Resistor—Comprising 2 sections of 100 ohms and one section of 490 ohms—(R17, R23, R24)	.90
11956	Resistor—39 ohms—carbon type—½ watt—(R22)—Package of 5	1.00
12074	Resistor—40 ohms—flexible type—(R20)	.30
12075	Resistor—56 ohms—flexible type, complete with contact cap—(R32)	.28
12071	Resistor—120 ohms—carbon type—¼ watt—(R33)—Package of 5	1.00
11296	Resistor—330 ohms—carbon type—¼ watt—(R14)—Package of 5	1.00
3047	Resistor—1,500 ohms—carbon type—½ watt—(R21)—Package of 5	1.00
3219	Resistor—18,000 ohms—carbon type—½ watt—(R6)—Package of 5	1.00
12070	Resistor—18,000 ohms—carbon type—1/10 watt—(R30, R31)—Package of 5	.75
11400	Resistor—27,000 ohms—carbon type—¼ watt—(R12)—Package of 5	1.00
12073	Resistor—47,000 ohms—carbon type—[illegible] watt—(R15)—Package of 5	1.10
11281	Resistor—100,000 ohms—carbon type—1/10 watt—(R5)—Package of 5	.75
12355	Resistor—120,000 ohms—carbon type—1/10 watt—(R16)—Package of 5	.75
11397	Resistor—560,000 ohms—carbon type—1/10 watt—(R2, R4)—Package of 5	.75
11626	Resistor—2.2 megohms—carbon type—¼ watt—(R9, R18)—Package of 5	1.00
12072	Resistor—2.7 megohms—carbon type—¼ watt—(R11)—Package of 5	1.00
12064	Shield—Antenna or detector coil shield—for stock Nos. 12061 and 12062	.28
11390	Shield—Intermediate frequency transformer shield	.25
11604	Shield—Oscillator coil shield for Stock No. 12063	.24
3529	Socket—Dial lamp socket	.32
11198	Socket—7-contact Radiotron socket	.15
11196	Socket—8 contact 6A8 Radiotron socket	$0.15
12060	Switch—Range switch	1.00
11392	Switch—Tone control and power switch assembly (S2, S3)	1.14
5238	Terminal—Antenna terminal board with clip insulation strip and rivets	.14
11976	Terminal—Ground terminal clip assembly	.15
11388	Transformer—First intermediate frequency transformer—(L16, L17, C24, C26)	1.90
11389	Transformer—Second intermediate frequency transformer—(L18, L19, C27, C28, C29, R7, R8)	3.02
12081	Transformer—Interstage transformer—(T1)	4.52
11667	Trap—Wave trap—(L1, C45)	1.22
11237	Volume Control—(R13)	1.20
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.18
12079	Coil—Field coil—(L22)	1.88
11233	Coil—Neutralizing coil—(L20)	.30
11235	Cone—Reproducer cone—(L21)—Package of 5	3.50
5040	Connector—4-contact female connector for reproducer cable	.25
5039	Connector—4-contact male connector for reproducer	.25
9643	Reproducer—Complete	6.50
12080	Transformer—Output transformer—(T2)	1.70
11886	Washer—Spring washer—used to hold field coil assembly—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
11996	Clamp—Tuning tube mounting bracket and clamp assembly	.22
11276	Escutcheon—Tuning tube escutcheon	.40
11376	Escutcheon—Station selector escutcheon and crystal	.70
11582	Knob—Range switch knob—Package of 5	.50
11610	Knob—Station selector knob assembly—Comprising 1 large and 1 small knob—Package of 5	1.00
11347	Knob—Volume control or power switch knob—Package of 5	.75
11382	Resistor—1 megohm—carbon type—1/10 watt—(R18)—Package of 5	.75
11377	Screw—Chassis mounting screw assembly—Package of 4	.12
11381	Socket—Tuning tube socket and cover	.45
11349	Spring—Retaining spring for knob Stock Nos. 11347 and 11582 and small knob in No. 11610—Package of 5	.15
4982	Spring—Retaining spring for large knobs—for Stock No. 11610—Package of 10	.26

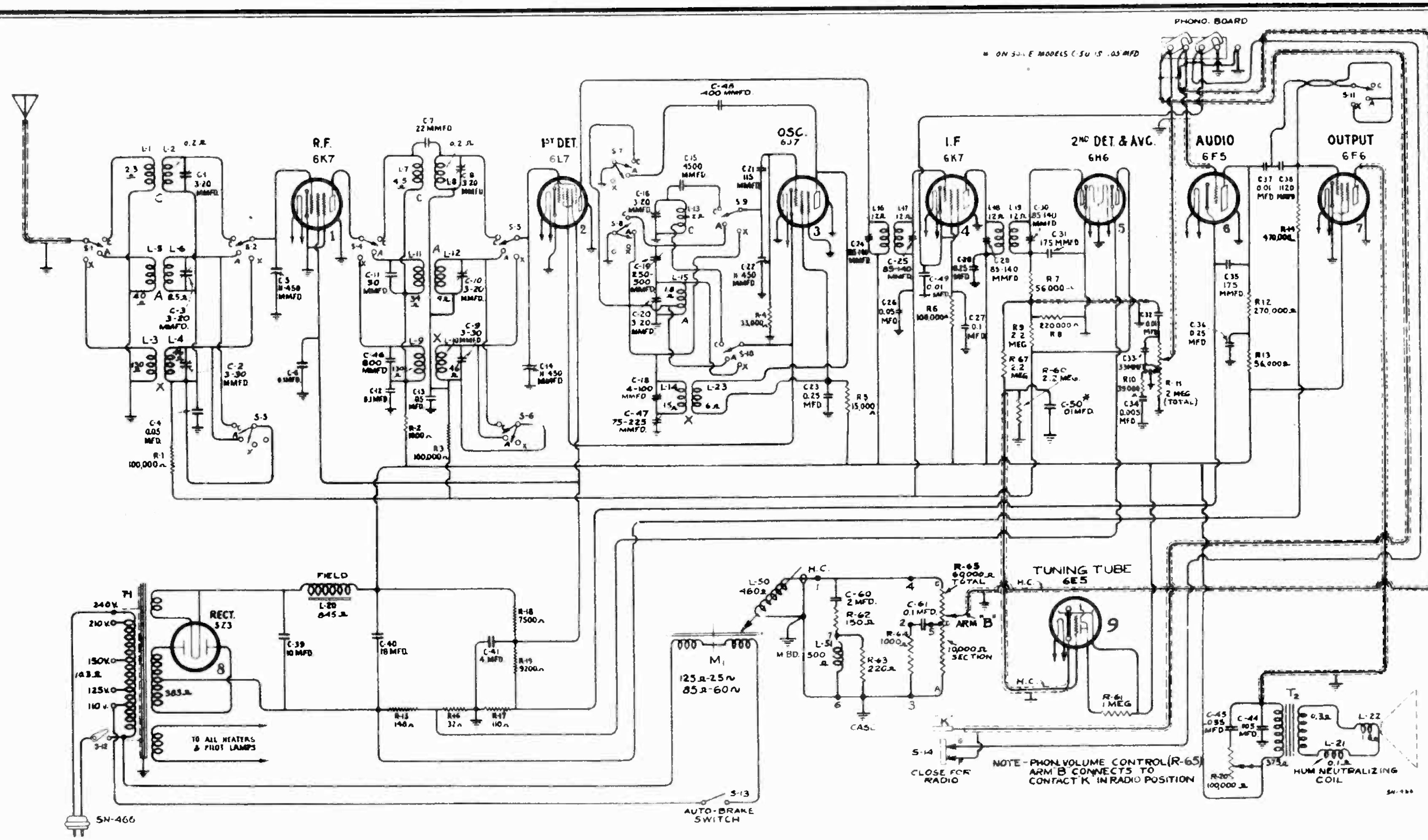
The prices quoted above are subject to change without notice

NOTES

(1) Beat notes or heterodyning (whistle) may be encountered in some instances on these receivers due to excessive antenna capacitance. This condition may be corrected by reducing the size of the antenna or by inserting a 150 mmfd. capacitor in series with the antenna lead at the antenna terminal. Interference in the form of "beats" from combination of local stations may frequently be remedied by tuning the wave trap to one of the interfering stations.

MODEL D9-19
Schematic

RCA MFG. CO., INC.



FREQUENCY RANGES

Band X	140 kc.— 410 kc.
Band A	540 kc.— 1,800 kc.
Band C	5,700 kc.—18,000 kc.

ALIGNMENT FREQUENCIES

Band X	150 kc. (osc.), 400 kc. (osc., ant., det.)
Band A	600 kc. (osc.), 1,720 kc. (osc., ant., det.)
Band C	18,000 kc. (osc., ant., det.)

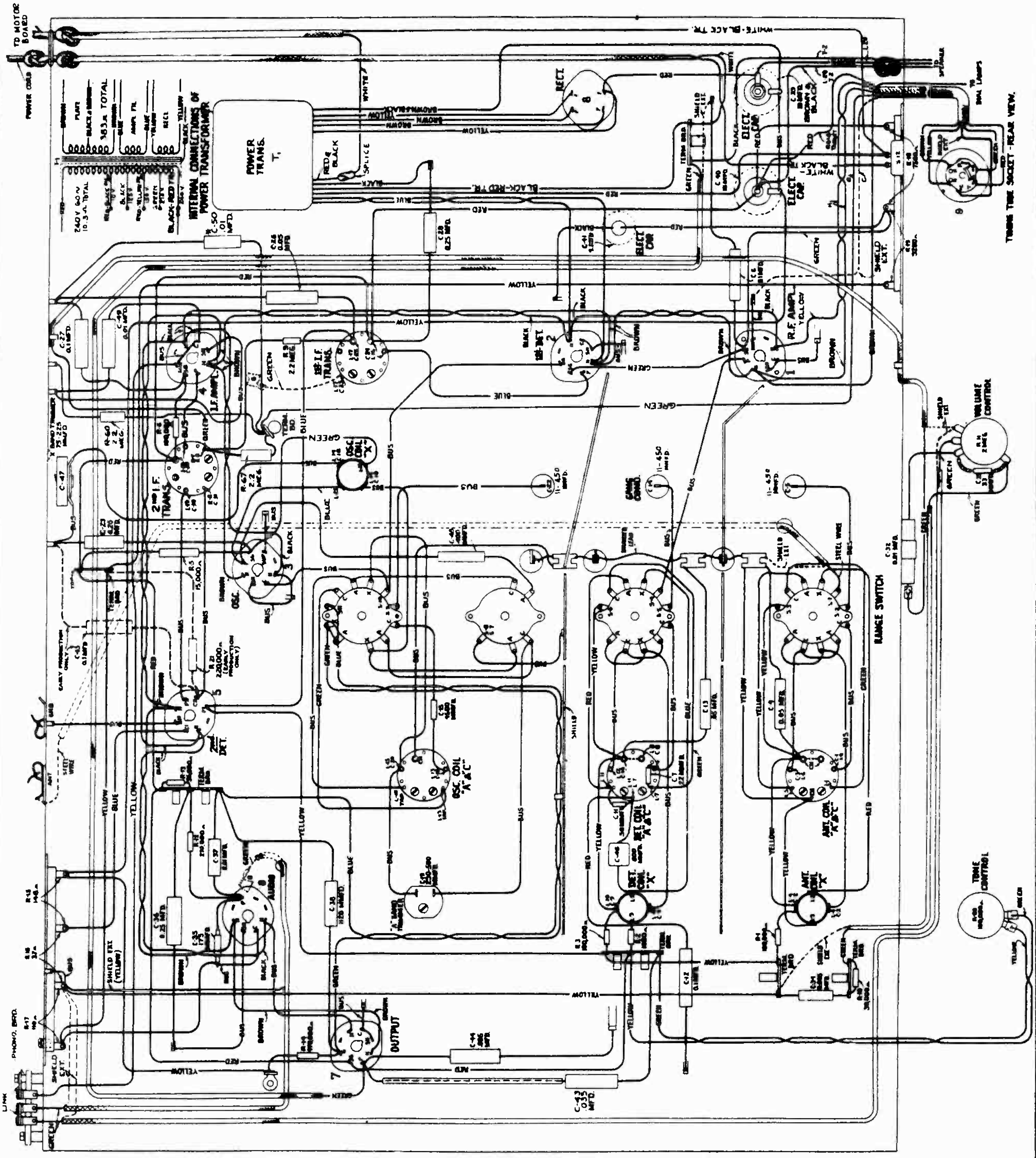
Intermediate Frequency .... 460 kc.

POWER SUPPLY RATINGS

Rating A	105—125 volts, 50—60 cycles, 140 watts
Rating B	105—125 volts, 25 cycles, 140 watts
Rating C	100—130/140—160/195—250 volts, 50—60 cycles, 140 watts

MODEL D9-19
Chassis Wiring

RCA MFG. CO., INC.



Loudspeaker

Type ....12-inch Electrodynamic
Voice Coil Impedance......$2\frac{1}{4}$ Ohms at 400 Cycles

Power Output Ratings

Undistorted .... 2 Watts
Maximum .... $4\frac{1}{2}$ Watts

Phonograph

Type ....Manual
Turntable Speed..........(Adjustable) 78 R.P.M.

Type of Pickup. Improved High-Impedance Magnetic
Pickup Impedance......2,800 Ohms at 1,000 Cycles

RCA MFG. CO., INC.

MODEL D9-19
Socket, Trimmers
Voltage, Pickup
Loudspeaker

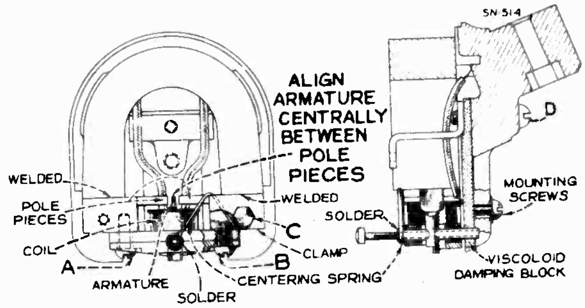


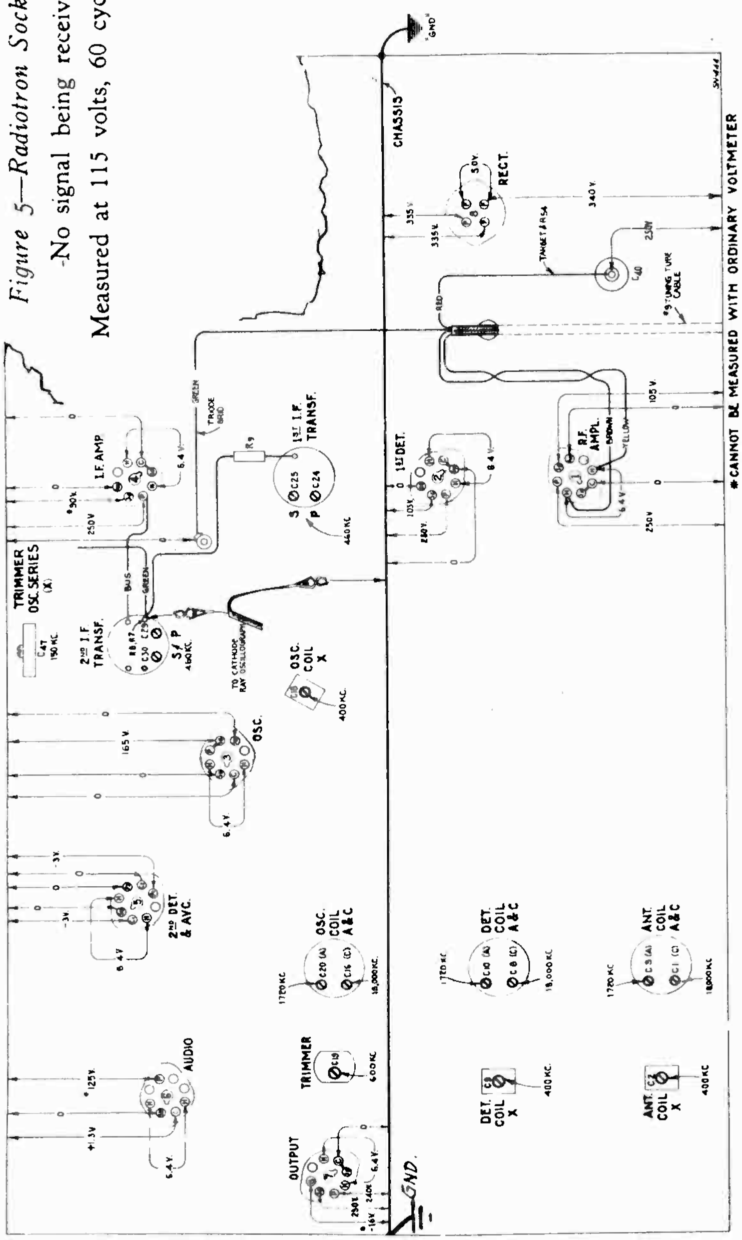
Figure 10—Details of Pickup

Radiotron Complement

(1) RCA-6K7..........Radio-Frequency Amplifier
(2) RCA-6L7.....................First Detector
(3) RCA-6J7...............Heterodyne Oscillator
(4) RCA-6K7..............Intermediate Amplifier
(5) RCA-6H6........Second Detector and A.V.C.
(6) RCA-6F5...................Audio Amplifier
(7) RCA-6F6............Power Output Amplifier
(8) RCA-5Z3................Full Wave Rectifier
(9) RCA-6E5..................Tuning Indicator

For Fig. 4 Alignment Apparatus Connections, see Model 9T & 9K2, Fig. 4

Figure 5—Radiotron Socket Voltages
-No signal being received
Measured at 115 volts, 60 cycle supply—



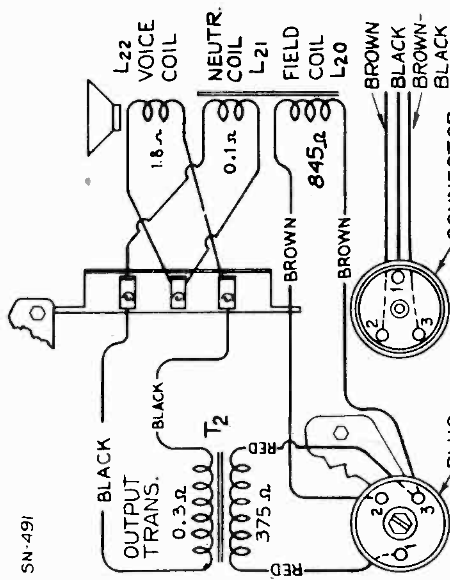


Figure 6—Loudspeaker Wiring

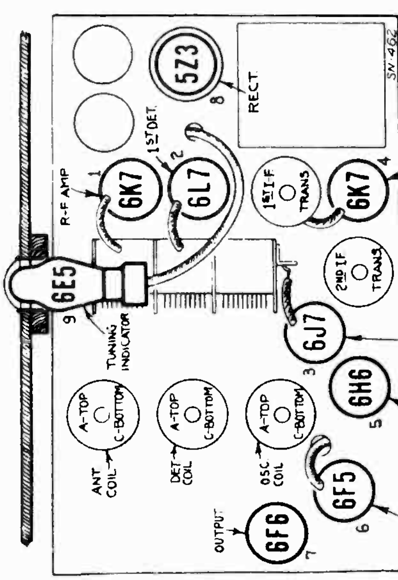


Figure 1—Radiotron and Coil Locations

MODEL D9-19
Assembly Wiring

RCA MFG. CO., INC.

Motor Details

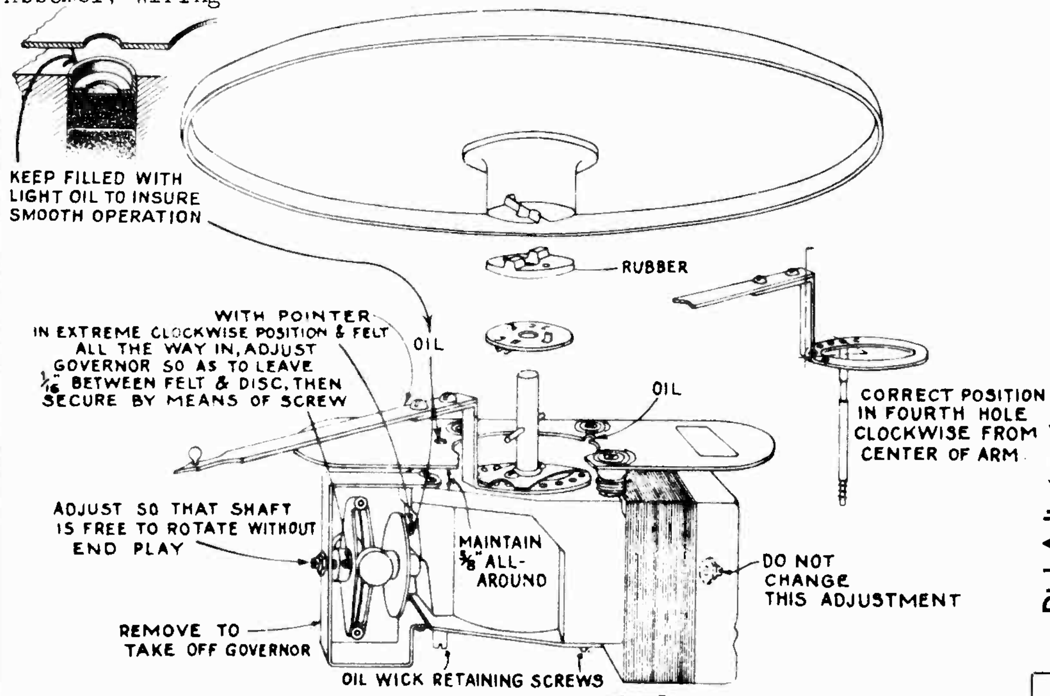


Figure 9—Motor Details

Dial Adjustment

Figure 10 illustrates the relations of the various parts of the dial mechanism when it is in its A—Broadcast position and the range switch is likewise turned to its Band A setting. In re-assembling the dial after repairs, see that the gears are meshed in accordance with the diagram, at the same time noting that the lever which is attached to the range-switch shaft is in the position as shown.

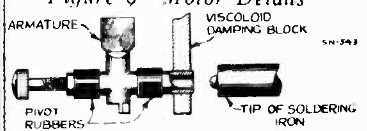


Figure 11—Special Soldering-Iron Tip

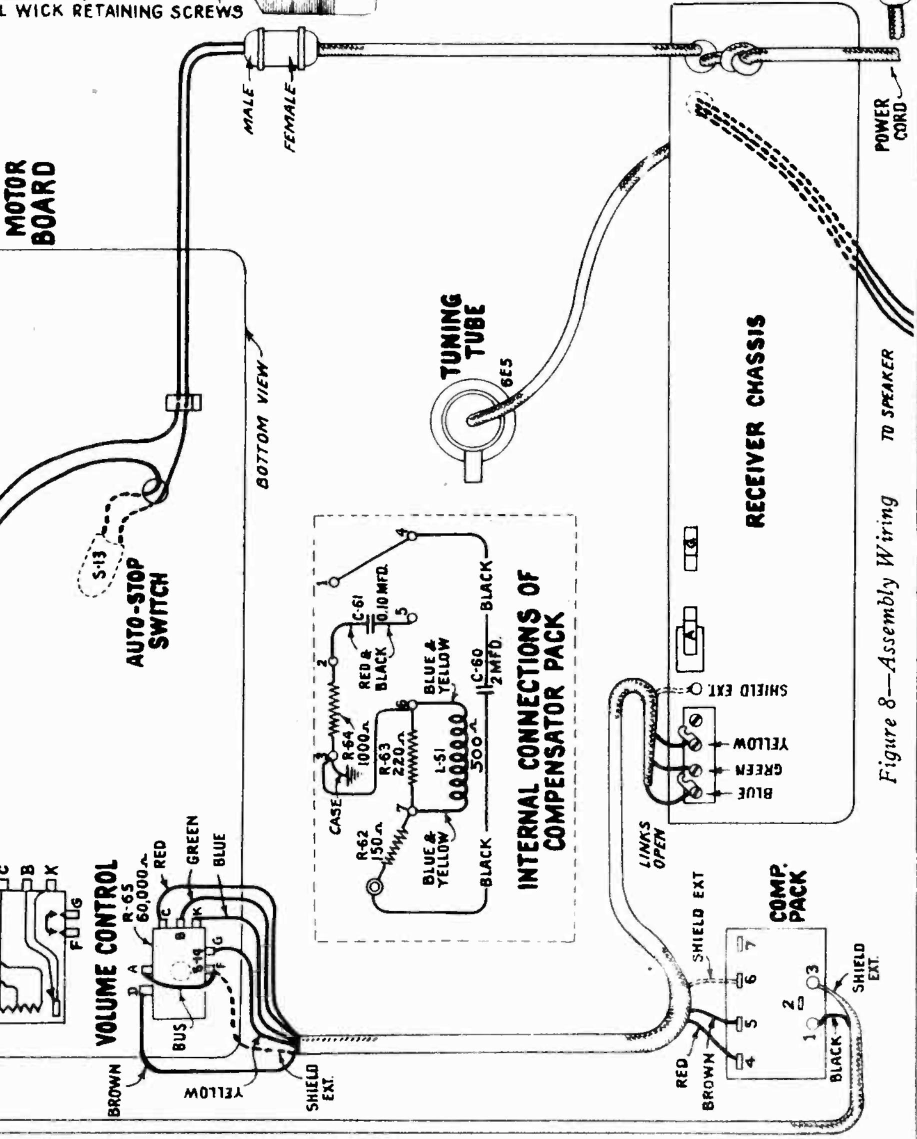


Figure 8—Assembly Wiring

RCA MFG. CO., INC.

General Description

The RCA Victor Model D 9-19 combination radio receiver and manual phonograph provides excellent entertainment from either broadcast reception or record reproduction. It consists of a nine-tube, three-band radio receiver, and a manual phonograph, combined in the one cabinet. The high level of sound energy obtainable from the output of this instrument is capably handled by a new sensitive, twelve-inch, electrodynamic loudspeaker. Outstanding features of this instrument are as follows:

Magic Brain

The radio receiver includes the "Magic Brain" unit for maximum all-around efficiency. This unit is a scientifically correct co-ordination of all the parts for the r-f, oscillator, and first detector functions of a Superheterodyne Receiver. Such design of the important head end, or "Magic Brain" unit, gives greater efficiency in the short-wave ranges as all lead lengths are kept as short as possible, and all sockets and other parts are located for best possible operation.

Magic Eye

A cathode-ray tube whose fluorescent screen has the appearance of a human eye is used for visually indicating when the receiver is accurately tuned to the incoming signal. This tube is of new design. It contains two groups of elements; one group operates as an amplifier and the other group operates as a cathode-ray tube.

The cathode-ray section consists of a conically shaped luminescent screen, a cathode, and a control electrode. The detected signal from the receiver is applied through the amplifier section of the tuning tube to the control electrode of the cathode-ray section. This control electrode, in turn, affects the electron stream emitted by the cathode in such a manner as to cause a triangular shadow on the luminescent screen. The size of the shadow caused by the control electrode is determined by the strength of the incoming signal, so that a change-of-tuning is readily exhibited on the cathode-ray screen, and therefore tuning to exact resonance can be definitely obtained.

RCA All-Metal Tubes

The new metal tubes are used in the radio receiver for amplifying and detecting purposes. These tubes make possible a greater range of stable amplification not previously attainable with corresponding glass types. Their metal envelopes form a perfect electrostatic and electromagnetic shield, precluding the former necessity for elaborate shielding by means of cans. The metal tubes are especially adaptable to the modern, extended-range receivers because of their efficient shielding and their favorable internal characteristics.

Phonograph Mechanism

An improved manually operated phonograph mechanism is used in this model. The 12-inch turntable will accommodate either the 10-inch or the 12-inch phonograph records. The turntable rotates at a speed of 78 r.p.m. A speed regulator is provided for accurate adjustment of this speed. The instrument may be purchased with any one of three ratings as specified under Electrical Specifications. *It is important that a machine of any particular rating be operated at the frequency and voltage for which it is rated.* Attempts to operate at ratings other than specified for the particular instrument may result in damage to both the phonograph motor and the radio receiver. An automatic switch is provided to turn "off" the phonograph motor at the completion of record play when the eccentric-type inside groove record is used.

Colorband Dial

An open face airplane-type of dial is used. Each scale has a band of color adjacent to its graduations and three short strips of corresponding colors at the lower part of the dial for index purposes. An index pointer, which moves as the band switch is rotated, points to one of these colors to identify the band in use. The drive mechanism is variable, there being either a 50-to-1 or 10-to-1 ratio available between the tuning knob and condenser drive shaft. The new shock-proof condenser mounting reduces microphonic tendencies to a minimum.

CIRCUIT FEATURES

The circuit is based upon the Superheterodyne principle. The three ranges of tuning are covered by three sets of coils. A single r-f stage provides the desired selectivity and gain ahead of the hexode first-detector tube. The oscillator stage operates separately from the first detector. A single stage i-f system is employed. Its basic frequency is 460 kc. Diode detection is performed by a double diode RCA-6H6 Radiotron. Automatic volume control is provided by this same tube. The audio system consists of two stages, the driver, an RCA-6F5, and the output, an RCA-6F6. High voltages for plate, screen, and bias supplies are obtained from an RCA-5Z3 full-wave rectifier through an efficient filter. The field of the loudspeaker acts as a reactor in the filter circuit. Further details of the circuit are as follows:

Oscillator

The oscillator circuit has extreme stability of frequency and good uniformity of output over the tuning ranges. These qualities assure that the tuning of the receiver will not drift as the line voltage varies. The action of the circuit is such that when the cathode emission tends to change with line voltage or because of other reasons, the variation of voltage drop in the plate and screen resistor restores the operating characteristics of the tube to normal and thus maintains constancy of the generated signal.

First Detector

This stage has unusually good high frequency mixing efficiency. The tube used, an RCA-6L7, is a new hexode type. The signal is supplied to the first control-grid and the oscillator voltage is fed in on a second control-grid, a screen-grid separating the two. The arrangement of the grids prevents degenerative difficulties, particularly at the higher frequencies. The second grid is direct-connected to the cathode of the oscillator and has no d-c bias.

Compensated Volume Control

The variation in response of the human ear with different degrees of volume is compensated for by a resistor and condenser network in the manual volume control circuit. The volume control itself is an acoustically tapered potentiometer which provides equal changes of sound intensity for the listener per degree of rotation.

Range Switch

The band-change switch has several functions. It exchanges the antenna, detector, and oscillator coils in order to select the range desired. At the same time, it shorts out the unused coils so as to eliminate their absorptive effects. It also varies the fidelity by shorting a coupling condenser in the audio system to provide the desired reproduction for short-wave as well as long-wave reception.

Tone Control

Provision is included for variable reduction of high frequencies. This consists of a resistor and condenser combination across the primary winding of the output transformer, the resistor being the variable element. As it is decreased, the high-frequency response limit is lowered.

Power System

The power transformer has its primary winding capacitively shielded from its secondary windings to eliminate transfer of line disturbances into the receiver and to stop any tendency for the circuit to radiate into the line. Rectification is performed in the usual manner by a full-wave tube.

Detection and A.V.C.

The modulated signal as obtained from the output of the i-f system is detected by an RCA-6H6 twin diode tube. The audio frequency secured by this process is passed on to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R-8, is applied as automatic control-grid bias to the r-f, first-detector, and i-f tubes through suitable resistance-capacitance filter circuits. The second diode of the RCA-6H6 is used to supply residual bias for these controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current, which flows through R-9 and R-8, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias diode ceases to draw current and the a.v.c. diode takes over the biasing function.

SERVICE DATA

The various diagrams of this booklet contain such information as will be needed for servicing the receiver. The ratings of all resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Ratings of less than one ohm are generally omitted. Identification titles such as R-3, L-2, C-1, etc., are provided for reference between the illustrations and replacement parts.

Alignment Procedure

The extensive frequency range of this receiver necessitates a more or less involved method of alignment. However, if the following directions are carefully applied, the normal performance of the instrument will be obtained.

Correct performance of the receiver can only be obtained when the trimmer adjustments have been made by a skilled service man with the use of adequate and reliable test equipment. Such apparatus as may be required for this particular instrument is illustrated and described on a separate page of this booklet.

Two methods of alignment are applicable. One utilizes a Cathode-Ray Oscillograph as a means of output indication and the other follows former procedure where a glow type indicator or meter is used. The oscillographic method is much to be preferred, since greater accuracy is possible from the type of indication afforded. There are no approximations necessary as with the meter or aural method, but each adjustment can be made with excellent precision. Both methods are hereinafter outlined so that alignment operations may be made according to the equipment available.

It is wise to determine the necessity for alignment as well as the direction of misalignment before making adjustments. The RCA Tuning Wand is an instrument designed particularly for such a purpose.

The Tuning Wand consists of a bakelite rod having a small brass cylinder at one end and a core of finely divided iron at the other. It may be inserted into a tuned coil while a signal of the normal resonant frequency is being supplied to such coil to obtain an indication of the tuning. Holes are provided at the top of the r-f shield cans for entrance of the Wand. The presence of either end of the Wand will cause a change in tuning which will be indicated at the receiver output as an increase or decrease in signal level. If there is a decrease of output when either end is inserted, the tuning is correct and will require no adjustment. However, should there be an increase of output due to the iron core and decrease with the brass cylinder, an increase in inductance or capacitance is indicated as necessary to bring the circuit into line. The trimmer involved should therefore be increased accordingly. If the brass cylinder end causes an increase in output while the iron end causes a decrease, reduction of inductance will be necessary to place the circuit in alignment. This is equivalent to decreasing the trimmer concerned. The following tabulation gives the various changes and the adjustments required:

WAND	SIGNAL	TRIMMER
Brass Iron	Decrease Decrease	None
Brass Iron	Increase Decrease	Decrease
Brass Iron	Decrease Increase	Increase

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to chassis on Figure 5 will serve to assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1,000-ohms-per-volt will be satisfactory when the range used for each reading is chosen as high as possible consistent with good readability.

MODEL D9-19
Alignment
Part 2

RCA MFG. CO., INC.

CATHODE-RAY ALIGNMENT

Equipment

A standard source of the specified alignment frequencies is required. Such a source should consist of an **RCA Full Range Oscillator, Stock No. 9595.** Output indication should be by means of an **RCA Stock No. 9545 Cathode-Ray Oscillograph. An RCA Stock No. 9558 Frequency Modulator** will be needed to sweep the generated signal and synchronize it with the Oscillograph in order to make possible the visual representation of the resonant characteristic of the circuit being tuned on the cathode-ray fluorescent screen.

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 5. Each must be aligned to a basic frequency of **460 kc.** The last transformer must be aligned firstly and the first transformer aligned secondly. For such a process, it is necessary to feed the output of the Full-Range Oscillator to the stages in their order of alignment, adjusting the trimmers of each transformer and observing the effect at the second detector output on the Cathode-Ray Oscillograph. The proper point of connection of the Oscillograph is with its vertical "high" input terminal attached to the junction of R-7, R8 and R9 as illustrated in Figure 5, and with the "0" or ground terminal to the chassis. The "Ext. Sync." terminals of the Oscillograph should be connected to the Frequency Modulator as shown by Figure 4. A .001 mfd. capacitor installed in series with the Oscillator "Ant." lead will prevent the voltages of the stage under alignment from becoming upset. The vertical "A" amplifier should be "On" for the ensuing adjustments and the gain control kept at its maximum position. For each adjustment, the Oscillator output need be regulated so that the image obtained on the Oscillograph screen will be of sufficient size as to be accurately observable. Proceed further as follows:

(a) Place the receiver, Oscillograph and test Oscillator in operation. Set the receiver range switch to Band "A" and tune the station selector to a point where no interference will be picked up, shorting the antenna and ground terminals if necessary. Set the Oscillograph horizontal "B" amplifier to "Timing" and control its gain so that the luminescent spot sweeps a straight line trace completely across the screen. Place the timing control to "Int." Adjust the intensity and focusing controls of the Oscillograph to produce the correct size and strength of the spot.

(b) Attach the output of the test Oscillator between the control grid cap of the RCA 6K7 i-f tube and chassis ground as shown typically by Figure 4. Tune the Oscillator to **460 kc.** and set its modulation switch to "On". Regulate its output until the signal produces a wave pattern on the Oscillograph screen, adjusting the Oscillograph controls to give the desired number of cycles. Cause the image to stand still on the screen by manipulation of the frequency and synchronizing controls. Then carefully tune the two trimmers **C-29** and **C-30** of the second i-f transformer to produce maximum amplitude (vertical deflection) of the oscillographic image. Under this condition the transformer will be sharply resonated to **460 kc.**

(c) The Frequency Modulator should then be placed in operation and interconnected with the Full-Range Oscillator by means of the special shielded patch cord. Figure 4 shows the proper arrangement. Set the Frequency Modulator sweep range switch to its "Lo" position and turn the Oscillator modulation switch to "Off". Change the timing control of the Oscillograph to "Ext." and place the range switch to its No. 2 position. Then carefully shift the tuning of the Oscillator so as to increase its frequency, until two distinct and similar waves appear on the Oscillograph screen and become exactly coincident at their highest points. These curves will be found to occur at an Oscillator setting of ***approximately*** **540 kc.** They will be identical in shape but appearing in reversed positions. Adjust the frequency control of the Oscillograph in order to cause the waves to conform with the above requirements and to make them remain motionless on the screen. This will require a setting of approximately ½ clockwise rotation of the frequency control. The trimmers **C-29** and **C-30** should then be re-adjusted so that the two curves move together and become exactly coincident throughout their lengths, maintaining the maximum amplitude at which this condition can be brought about.

(d) Leaving the equipment connected and adjusted as in (c), change the Oscillator output to the control-grid cap of the RCA-6L7 first-detector tube. Then adjust the first i-f transformer trimmers **C-24** and **C-25** so that the forward and reverse waves appearing on the Oscillograph coincide throughout their lengths and have maximum amplitude. The shape of the composite wave obtained from this operation is a true representation of the overall tuning characteristic of the i-f system. Each trimmer of the entire group should then be checked to assure that it is in correct alignment as indicated by the degree of coincidence and relative amplitude of the image on the Oscillograph screen.

R-F Trimmer Adjustments

Locations of the various antenna, detector and oscillator coil trimmers are shown by Figure 5. The test Oscillator should be removed from connection with the i-f system and its output connected to the antenna-ground terminals of the receiver. No changes are to be made in the connections of the Oscillograph at the second detector. During the following adjustments, the Oscillator output should be regulated as often as is necessary to keep the oscillographic image as low as is practically observable. Adherence to such a procedure will obviate the broadness of tuning that would result from a.v.c. action on a stronger signal. Proceed with the adjustments as follows:

Calibration

Set the receiver range switch to Band A and rotate the station selector until the tuning condenser plates are in ***full mesh*** (maximum capacitance). Then move the main dial pointer until it points exactly to the ***horizontal*** line at the low frequency end of the Band A scale.

Band A

(a) With the receiver range switch in its Band A position, tune the station selector until the dial pointer is at a reading of **1,720 kc.** Adjust the test Oscillator to **1,720 kc.** (modulation "On" and Frequency Modulator disconnected) and increase its output to produce a registration on the Oscillograph. Carefully align the oscillator, detector, and antenna trimmers **C-20, C-10** and **C-3** respectively, so that each brings about maximum amplitude of output as shown by the wave on the Oscillograph. It will be necessary to have the timing control of the Oscillograph on "Int." for this operation. After each trimmer has been peaked, the Oscillograph timing control should be set to "Ext." and the Frequency Modulator placed into operation with its connections to the Oscillator and Oscillograph made in accordance with Figure 4. Turn the modulation switch of the Oscillator to "Off" and retune the Oscillator (increase frequency) until the forward and reverse waves show on the Oscillograph and become coincident at their highest points. Adjust the trimmers **C-20, C-10** and **C-3** again, setting each to the point which produces the best coincidence and maximum amplitude of the wave images.

(b) Remove the Frequency Modulator cable from the Oscillator and shift the signal frequency to **600 kc.** Place the modulation switch to "On". Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then insert the Frequency Modulator plug and retune the Oscillator (modulation "Off") until the two similar forward and reverse waves appear on the screen. For this adjustment, it is advisable to shift the Oscillator to its 200—400 kc. range and use the third harmonic of the generated signal in order to obtain the desired range of sweep. The oscillator series trimmer **C-19** should then be adjusted to produce maximum amplitude of the images. No rocking will be necessary on the station selector inasmuch as the signal frequency is being "wobbled" by the Frequency Modulator to produce the same effect.

After completing this adjustment, the trimmer **C-20** should be realigned as in **(a)** to correct for any change brought about by the adjustment of **C-19.**

Band X

(a) Disconnect the Frequency Modulator and tune the test Oscillator to a frequency of **400 kc.** (Modulation "On"). Place the receiver range switch to its Band X position and tune the station selector until the dial pointer reads exactly **400 kc.** Adjust the Oscillograph timing control to "Int." Then align each of the trimmers **C-18, C-9** and **C-2** to the point producing maximum output at the Oscillograph. Place the Frequency Modulator in operation and attach it to the test Oscillator by means of the shielded cable. Change the Oscillograph timing to "Ext." Increase the frequency of the Oscillator (Modulation "Off") until the two forward and reverse waves appear and become coincident at their highest point, ***approximately at*** **462** ***kc.*** These waves may be made to remain stationary on the screen by manipulation of the Oscillograph range switch (No. 2 position) and frequency control (mid-position). Readjust the three trimmers **C-18, C-9** and **C-2** to give maximum amplitude and complete coincidence of the waves.

(b) Change the test Oscillator so that it delivers a signal of **150 kc.** with the Frequency Modulator disconnected. Tune this signal on the receiver, which should be set to the Band X setting, disregarding the dial reading at which the signal is best received. Then interconnect the Frequency Modulator with the Oscillator and retune the latter to the point at which the two similar waves appear on the screen. Adjust the trimmer **C-47** for maximum amplitude of the wave images. Rocking of the tuning condenser will not be necessary for this operation as such is duplicated by the Frequency Modulator. Repeat the alignment of **C-18** as in **(a)** to correct for any error brought about by the adjustment of **C-47.**

Band C

(a) Turn the range switch of the receiver to its Band C position and tune the station selector until the dial pointer reads **18,000 kc.** Set the test Oscillator to **18,000 kc.** (modulation "On" and Frequency Modulator disconnected) and regulate its ouput to the level required for convenient observation. Adjust the trimmer **C-16** to the point producing maximum output as indicated on the Oscillograph. Check for the presence of the proper "image" signal by tuning the receiver to **17,080 kc.** The **18,000 kc.** signal of the Oscillator will be received at this point if the adjustment of **C-16** has been properly made using the position of least capacitance which gives maximum receiver output. It may be necessary to increase the output of the Oscillator in order to get an indication of the "image". ***No adjustments should be made during this check.***

(b) Return the receiver tuning to **18,000 kc.,** re-align **C-16** if necessary, and then adjust the detector and antenna trimmers, **C-8** and **C-1,** for maximum signal output as evidenced by the oscillographic image. No further adjustments are to be made on this band.

OUTPUT INDICATOR ALIGNMENT

To align the receiver by means of an output indicator other than a Cathode-Ray Oscillograph will require the use of a standard test Oscillator such as that recommended above for the source of signals and means of indication for the output. The **RCA Neon Output Indicator, Stock No. 4317** will be found very satisfactory for such use. It should be connected across the voice coil circuit of the loudspeaker or across the output transformer primary.

I-F Alignment

Connect the test Oscillator to the control-grid cap of the i-f tube. Advance the volume control of the receiver to its full-on position. Tune the test Oscillator to **460 kc.** and align the trimmers **C-29** and **C-30** to give maximum receiver output. Regulate the Oscillator output during this adjustment so that the output indication is as small as can be conveniently observed. After completing the adjustments of these trimmers, reconnect the Oscillator so that it will feed into the control-grid circuit of the RCA-6L7 first detector. Then tune the first i-f transformer trimmers **C-24** and **C-25** for maximum receiver output.

R-F Alignment

After completing the i-f adjustments, it is advisable to correct the line-up of the circuits ahead of the first detector. The test Oscillator should be connected to the antenna-ground terminals of the receiver and the manual volume control kept at its maximum position. For each adjustment the Oscillator output should be maintained as low as possible in order to avoid broadness of tuning which would result from a.v.c. action on a stronger signal. **Band A** should be aligned by supplying a **1,720 kc.** signal to the receiver, tuning the station selector to a dial reading of **1,720** and adjusting the trimmers **C-20, C-10** and **C-3** to produce maximum receiver output. The Oscillator should then be shifted to **600 kc.** and the receiver tuned to resonate this signal, disregarding the reading at which it is best received. Trimmer **C-19** must then be adjusted, simultaneously while rocking the station selector backward and forward through the signal until the maximum output results from the combined operations. **C-20** should be rechecked to assure that its adjustment has not changed because of the trimming of **C-19. Band X** must be aligned at **400 kc.** and **150 kc.** Tune the test Oscillator to **400 kc.** and turn the receiver dial to the same reading. Adjust trimmers **C-18, C-9** and **C-2** for maximum (peak) receiver output. Then shift the Oscillator to **150 kc.** and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Adjust trimmer **C-47,** simultaneously rocking the tuning condenser backward and forward through the signal, until maximum receiver output results from the combined operations. Repeat the alignment of **C-18** as above to correct for any change which may have been caused by the adjustment of **C-47.** Change the receiver so that it is operative and the dial reads **18,000 kc.** on the **"C" Band.** Tune the test Oscillator to **18,000 kc.** Then adjust the Oscillator trimmer **C-16** to produce maximum (peak) output. Two positions of this trimmer will be found which conform with this requirement. The one of least capacitance is correct. Check for the presence of "image" response at **17,080 kc.** by shifting the receiver tuning. If it is received at such a point, the trimmer **C-16** has been correctly adjusted to the right peak. ***No adjustments are to be made during this check.*** Tune the receiver back to the **18,000** kc. dial marking, readjust **C-16** if necessary, and then tune the detector and antenna capacitors **C-1** and **C-8** for maximum receiver output. No further adjustments are necessary.

Centering Armature

Refer to Figure 10 showing the pickup inner structure. The armature is shown in its proper relation to the magnet pole pieces, i. e., exactly centered. Whenever this centering adjustment has been disturbed, the screws **A, B,** and **C** should be loosened and the armature clamp adjusted to the point where the vertical axis of the armature is at right angles to the horizontal axis of the pole pieces, and centered between them. This centering operation may be facilitated by inserting a small rod or nail into the armature needle hole, using it as a lever to test the angular movement of the armature. The limitation of the movement in each direction will be caused by the armature striking the pole pieces. The proper adjustment is obtained when there is equal angular displacement of the armature and adjustment rod or nail to each side of the vertical axis of the magnet and coil assembly. The screws **A** and **B** should then be secured, observing care not to disturb the adjustment of the armature clamp. Then place the pickup in a vise and secure the centering spring-clamp by means of the screw **C,** allowing the centering spring to remain in the position at which the armature is exactly centered between the pole pieces. With a little practice, the correct adjustment of the armature may be readily obtained. The air gap between the pole pieces and the armature should be kept free from dust, filings, and other such foreign materials which would obstruct the movement of the pickup armature.

Damping Block

The viscoloid block which is attached to the back end of the armature shank serves as a mechanical filter to eliminate undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block, it may be done by removing screw **D** and the cover support bracket from the mechanism and taking off the old viscoloid block. The surface of the armature which is in contact with the viscoloid should be thoroughly cleaned with fine emery cloth. Then insert the new block so that it occupies the same position as it did originally. Make certain that the block is in correct vertical alignment with the armature. The hole in the new viscoloid block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the viscoloid aligned on the armature, screw **D** and the cover support bracket should then be replaced. Heat should be applied to the armature (viscoloid side) so that the viscoloid block will fuse at the point of contact and become rigidly attached to the armature. A special-tip soldering iron constructed as shown in Figure 11 will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block and cause a small bulge on both sides.

Replacing Coil

Whenever there is defective operation due to an open or shorted pickup coil, this coil should be replaced. The method of replacement will be obvious upon inspection of the pickup assembly and by study of the cut-a-way illustrations. Make sure that the new coil is properly centered with the hole in the support strip and glued securely in that position. It is important to readjust the armature as previously explained after reassembly of the mechanism. Only rosin core solder should be used for soldering the coil leads in the pickup. This same type of solder should be used when necessary for soldering the centering spring to the armature.

Magnetizing

Loss of magnetization will not usually occur when the pickup has received normal care due to the fact that the magnet and pole pieces are one unit and the magnetic circuit remains closed at all times. When the pickup has been mishandled, subjected to a strong a-c field, jolted, or dropped, there may be an appreciable loss of magnetic strength, in which case it will be necessary to remagnetize the entire structure. This should be done by first removing the cover and then placing the pickup assembly on the poles of a standard pickup magnetizer such as the **RCA Stock No. 9549 Pickup Magnetizer** and charging the pickup in accordance with the instructions accompanying the magnetizer. It is recommended that the pickup be magnetized while the armature assembly is in place. This will necessitate that one of the poles of the magnetizer be rotated 180 degrees. This will provide proper clearance for the armature clamp assembly. It is preferable to check the polarity of the pickup magnet and to remagnetize it so that the same polarity is maintained.

MODEL D9-19
Parts List

RCA MFG. CO., INC.

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
11698	Board—Three-terminal phonograph terminal board	$0.22
4427	Bracket—Volume control or high-frequency tone control mounting bracket	.18
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	.43
11350	Cap—Contact cap—Package of 5	.20
11223	Capacitor—Adjustable capacitor (C19)	.46
11256	Capacitor—Adjustable capacitor (C-47)	.48
11292	Capacitor—22 MMfd. (C7)	.24
11321	Capacitor—33 MMfd. (C33)	.26
11289	Capacitor—50 MMfd. (C11)	.26
11291	Capacitor—115 MMfd. (C21)	.24
5116	Capacitor—175 MMfd. (C35)	.18
11290	Capacitor—400 MMfd. (C48)	.25
11269	Capacitor—800 MMfd. (C46)	.30
4409	Capacitor—1120 MMfd. (C38)	.35
11287	Capacitor—4500 MMfd. (C[illegible])	.30
4868	Capacitor—.005 Mfd. (C34)	.20
4838	Capacitor—.005 Mfd. (C44)	.20
4624	Capacitor—.01 Mfd. (C32)	.54
4858	Capacitor—.01 Mfd. (C37, C49, C50*)	.25
5196	Capacitor—.035 Mfd. (C43)	.18
4886	Capacitor—.05 Mfd. (C50*)	.20
4836	Capacitor—.05 Mfd. (C4, C13, C26)	.30
4885	Capacitor—0.1 Mfd. (C6, C12, C27)	.28
5170	Capacitor—0.25 Mfd. (C23, C28, C36)	.25
11248	Capacitor—4 Mfd. (C41)	1.06
11240	Capacitor—10 Mfd. (C39)	1.08
5212	Capacitor—18 Mfd. (C40)	1.16
11272	Clamp—Antenna cable clamp—Located near antenna terminal	.10
4748	Clamp—Capacitor mounting clamp assembly—for Stock No. 11248	.15
5215	Coil—Antenna coil (A and C Bands)—(L1, L2, L5, L6, C1, C3)	2.32
11325	Coil—Antenna coil (X Band)—(L3, L4, C2)	1.56
5216	Coil—Detector coil (A and C Bands)—(L7, L8, L11, L12, C8, C10)	2.34
11326	Coil—Detector coil (X Band)—(L9, L10, C9)	1.60
5217	Coil—Oscillator coil (A and C Bands)—(L13, L15, C16, C20)	2.20
11327	Coil—Oscillator coil (X Band)—(L14, L23, C18)	1.44
11214	Condenser—Three-gang variable tuning condenser (C5, C14, C22)	4.20
11697	Cover—Phonograph terminal board cover	.12
4340	Lamp—Dial lamp—Package of 5	.60
8041	Plate—R.F. or I.F. coil shield locking plate—Package of 2	.12
11244	Resistor—Voltage divider resistor, comprising one 7500-ohm and one 9200-ohm sections (R18, R19)	1.08
11245	Resistor—Voltage divider resistor, comprising one 148-ohm, one 32-ohm, and one 110-ohm section (R15, R16, R17)	.62
5112	Resistor—1000 Ohm—Carbon type—¼ Watt—(R2)—Package of 5	1.00
5114	Resistor—15,000 Ohm—Carbon type—1 Watt—(R5)	.22
11300	Resistor—33,000 Ohm—Carbon type—1/10 Watt—(R4)—Package of 5	.75
11322	Resistor—39,000 Ohm—Carbon type—¼ Watt—(R10)—Package of 5	1.00
5029	Resistor—56,000 Ohm—Carbon type—¼ Watt—(R13)—Package of 5	1.00
3118	Resistor—100,000 Ohm—Carbon type—¼ Watt—(R1, R3, R6)—Package of 5	1.00
11323	Resistor—270,000 Ohm—Carbon type—¼ Watt—(R12)—Package of 5	1.00

Stock No.	DESCRIPTION	List Price
11172	Resistor—470,000 Ohm—Carbon type—¼ Watt—(R14)—Package of 5	1.00
11151	Resistor—2.2 Megohms—Carbon type—¼ Watt—(R9, R60, R67)—Package of 5	1.00
5249	Shield—Antenna, detector, or oscillator coil shield	.20
5250	Shield—I.F. transformer shield	.22
11273	Shield—Rectifier Radiotron shield	.25
11222	Socket—Dial lamp socket	.18
4794	Socket—Four-contact rectifier Radiotron socket	.15
11313	Socket—Five-contact Radiotron socket	.18
11198	Socket—Seven contact Radiotron socket	.15
11236	Switch—Band switch (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11)	2.44
11133	Switch—Power switch (S12)	.62
5238	Terminal—Antenna terminal clip assembly	.14
11238	Tone Control—High-frequency tone control (R20)	.96
11216	Transformer—First intermediate frequency transformer (L16, L17, C24, C25)	2.15
11239	Transformer—Second intermediate frequency transformer (L18, L19, C29, C30, C31, R7, R8)	2.72
11242	Transformer—Power transformer—105-125 Volts—25-60 Cycles	6.52
11243	Transformer—Power transformer—100-130, 140-160, 195-250 Volts—40-60 Cycles—(T1)	4.64
11237	Volume control (R11)	1.20
	DRIVE ASSEMBLIES	
4362	Arm—Band indicator operating arm	.28
10194	Ball—Steel ball—Package of 20	.25
4422	Clutch—Tuning condenser drive clutch assembly—comprising drive shaft, balls, ring, spring and washers—assembled	1.00
11262	Dial—Dial scale	.60
11252	Drive—Variable tuning condenser drive assembly	1.88
4520	Indicator—Station selector indicator pointer	.18
11226	Indicator—Band indicator pointer assembly—comprising indicator pointer, arm, link and stud	20
3993	Screw—No. 6-32-5/32" square set-screw for band indicator operating arm—Package of 10	.25
4669	Screw—No. 8-32-5/32" set-screw for variable condenser drive assembly—Package of 10	.25
4377	Spring—Band indicator operating arm spring—Package of 5	.25
4378	Stud—Band indicator operating arm stud and nut assembly—Package of 5	.25
	MOTOR ASSEMBLIES	
11703	Governor—Governor complete for phonograph motor—Stock No. 11701 or No. 11702	3.05
11701	Motor—Phonograph turntable motor—110 Volts—50 to 60 Cycles—(M1)	21.20
11702	Motor—Phonograph turntable motor—110 Volts—25 Cycles	33.35
	MOTOR BOARD ASSEMBLIES	
4594	Box—Used needle box (cup)	.30
7084	Cover—Turntable cover	.40
11704	Damper—Turntable rubber damper and damper plate	

Stock No.	DESCRIPTION	List Price
4596	Escutcheon—Speed regulator escutcheon plate	.36
4597	Screw—Motor mounting screw assembly—comprising four screws, four lockwashers, four spacers, and four nuts	.22
11696	Turntable—Complete	2.48
11695	Volume Control—Phonograph volume control (R65, S14)	1.60
	ECCENTRIC AUTOMATIC BRAKE SWITCH ASSEMBLIES	
3994	Cover—Eccentric automatic switch cover and screw	.26
10174	Springs—Automatic brake springs—comprising one each of four springs—Package of 2	.50
6896	Switch—Eccentric automatic brake and switch assembly—less switch cover	2.50
3322	Switch—Eccentric automatic switch only—less cover (S13)	.75
	PICKUP AND ARM ASSEMBLIES	
11705	Arm—Pickup arm complete—less escutcheon and pickup unit	4.50
11707	Armature—Pickup armature	.28
6346	Back—Pickup housing back	.45
11709	Coil—Pickup coil (L50)	.58
3521	Cover—Pickup back cover	.18
11708	Cover—Pickup front cover	.15
3737	Damper—Pickup damper—Package of 5	.65
3390	Escutcheon—Pickup arm escutcheon	.46
11706	Pickup Unit—Complete (L50)	4.80
3389	Rod—Eccentric automatic brake trip rod—Package of 5	.40
3387	Screw Assembly—Pickup mounting screw assembly—comprising one screw, one lockwasher and one nut—Package of 10	.40
11549	Screw—Pickup front cover screw—Package of 10	.42
11547	Screw—Pickup needle holding screw—Package of 10	.42
	CABLE ASSEMBLIES	
11700	Cable—Five-conductor shielded cable—approximately 24" long—Connects phonograph volume control to compensator pack and chassis terminal strip	.88
11699	Cable—Radiotron tuning tube cable complete with socket and cover—approximately 25" long	1.32
4573	Plug—Female section of two-contact plug—Used on power cable to motor	.30
4577	Plug—Male section of two-contact plug—Used on motor leads	.30
11382	Resistor—1 Megohm—Carbon type—1/10 Watt—Located in tuning tube socket—(R61)—Package of 5	.75
11381	Socket—Radiotron tuning tube socket and cover	.45
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board assembly with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16

Stock No.	DESCRIPTION	List Price
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil (L20)	2.00
11233	Coil—Hum neutralizing coil (L21)	.30
11258	Cone—Reproducer cone (L22)—Package of 5	3.85
5118	Connector—Three-contact male connector for reproducer	.25
5119	Connector—Three-contact female connector plug for reproducer cable	.25
9619	Reproducer—Complete	6.05
11253	Transformr—Output transformer (T2)	1.56
11230	Washer—"Binder's board" "C" washers—Used to hold field coil assembly	.18
	MISCELLANEOUS ASSEMBLIES	
11191	Bracket—Tuning tube mounting bracket—less clamp	.12
11192	Clamp—Tuning tube mounting clamp—less bracket	.12
11694	Compensator—Phonograph input compensator pack—comprising one 150-ohm, one 220-ohm, and one 1000-ohm resistor, one 0.1 Mfd. and one 2 Mfd. capacitor, and one 0.25 H reactor—(R62, R63, R64, C60, C61, L51)	3.80
11337	Escutcheon—Station selector escutcheon	.70
11276	Escutcheon—Radiotron tuning tube escutcheon	.40
11246	Foot—Chassis mounting foot and bracket assembly—Package of 2	.76
6614	Glass—Station selector dial glass	.30
11346	Knob—Station selector knob—Package of 5	.75
11347	Knob—Phonograph volume control, radio volume control, tone control, power switch or range switch knob—Package of 5	.75
4678	Ring—Retaining ring for station selector dial glass—Package of 5	.34
11210	Screw—Chassis mounting screw assembly—Package of 4	.28
11348	Screw—No. 8-32-7/16" set-screw for knob—Stock No. 11346—Package of 10	.32
3391	Spring—Motor board mounting spring assembly—comprising one bolt, one "C" washer, two cup washers, one bottom spring, one lockwasher, and one cap nut	.50
11349	Spring—Retaining spring for knob—Stock No. 11347—Package of 5	.15

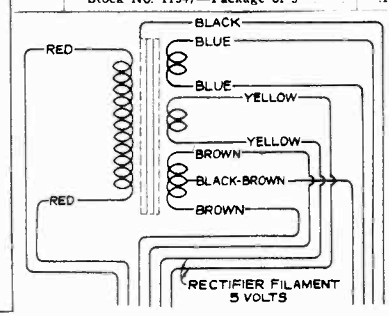


Figure 7—Standard Power Transformer Connections

Pri. Res. =5.42 ohms total
Sec. Res. = 470 ohms total

MODELS 10T, 10K
Schematic

RCA MFG. CO., INC.

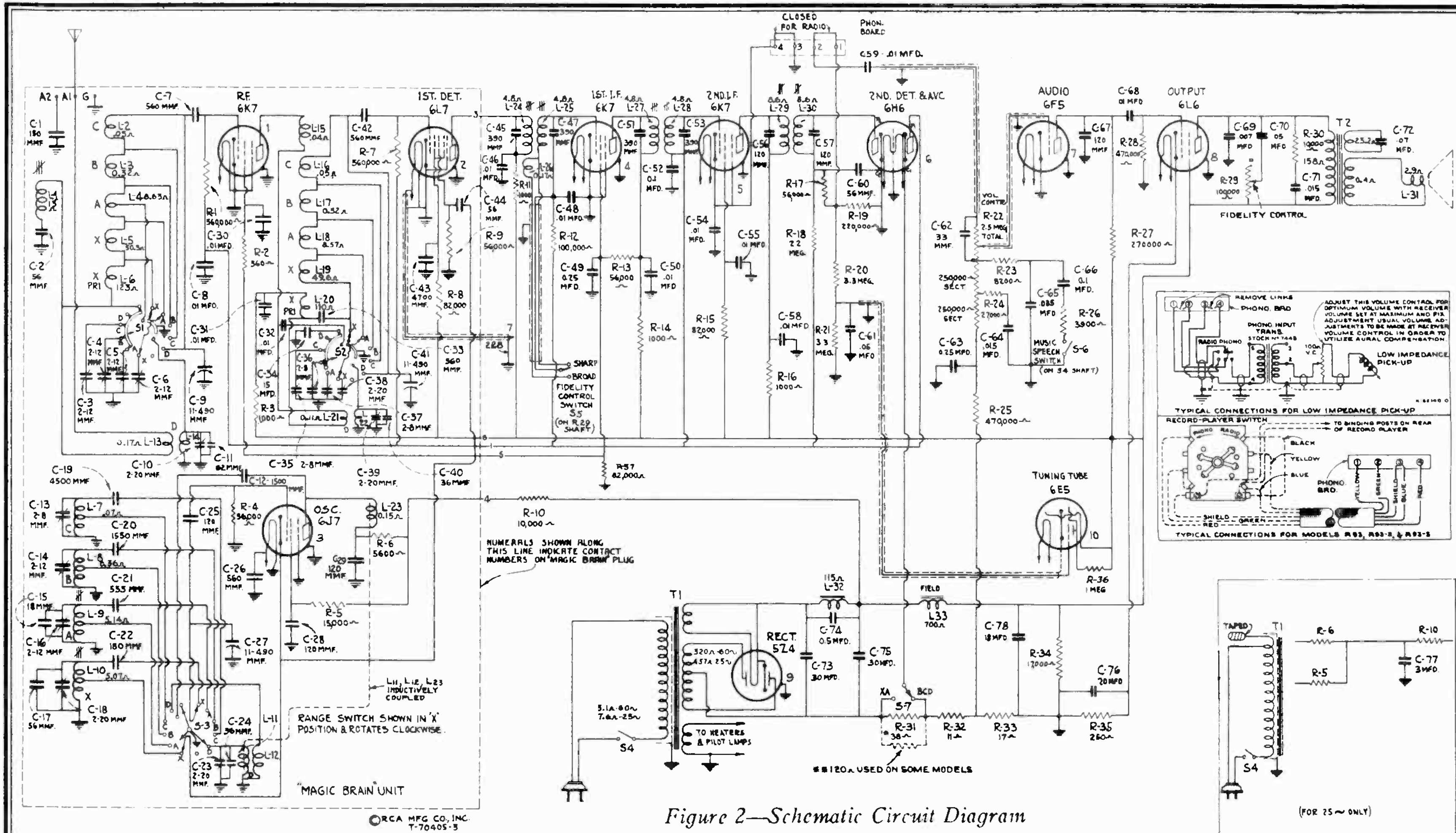


Figure 2—Schematic Circuit Diagram

(* Resistor R31 may be 56 ohms on some models. Replace with Stock No. 12980)
(** 120-ohm resistor not required when replacing resistor R31 with Stock No. 12980)

FREQUENCY RANGES

"Long Wave" (X)	150-410 kc
"Standard Broadcast" (A)	530-1,800 kc
"Medium Wave" (B)	1,800-6,400 kc
"Short Wave" (C)	6,400-23,000 kc
"Ultra Short Wave" (D)	23,000-60,000 kc

Intermediate Frequency .... 460 kc

ALIGNMENT FREQUENCIES

"Long Wave" (X)	175 kc (osc.), 350 kc (osc., det., ant.)
"Standard Broadcast" (A)	600 kc (osc.), 1,500 kc (osc., det., ant.)
"Medium Wave" (B)	6,000 kc (osc., det., ant.)
"Short Wave" (C)	20,000 kc (osc., det., ant.)
"Ultra Short Wave" (D)	57,000 kc (osc., det., ant.)

MODELS 10T, 10K
Chassis Wiring

RCA MFG. CO., INC.

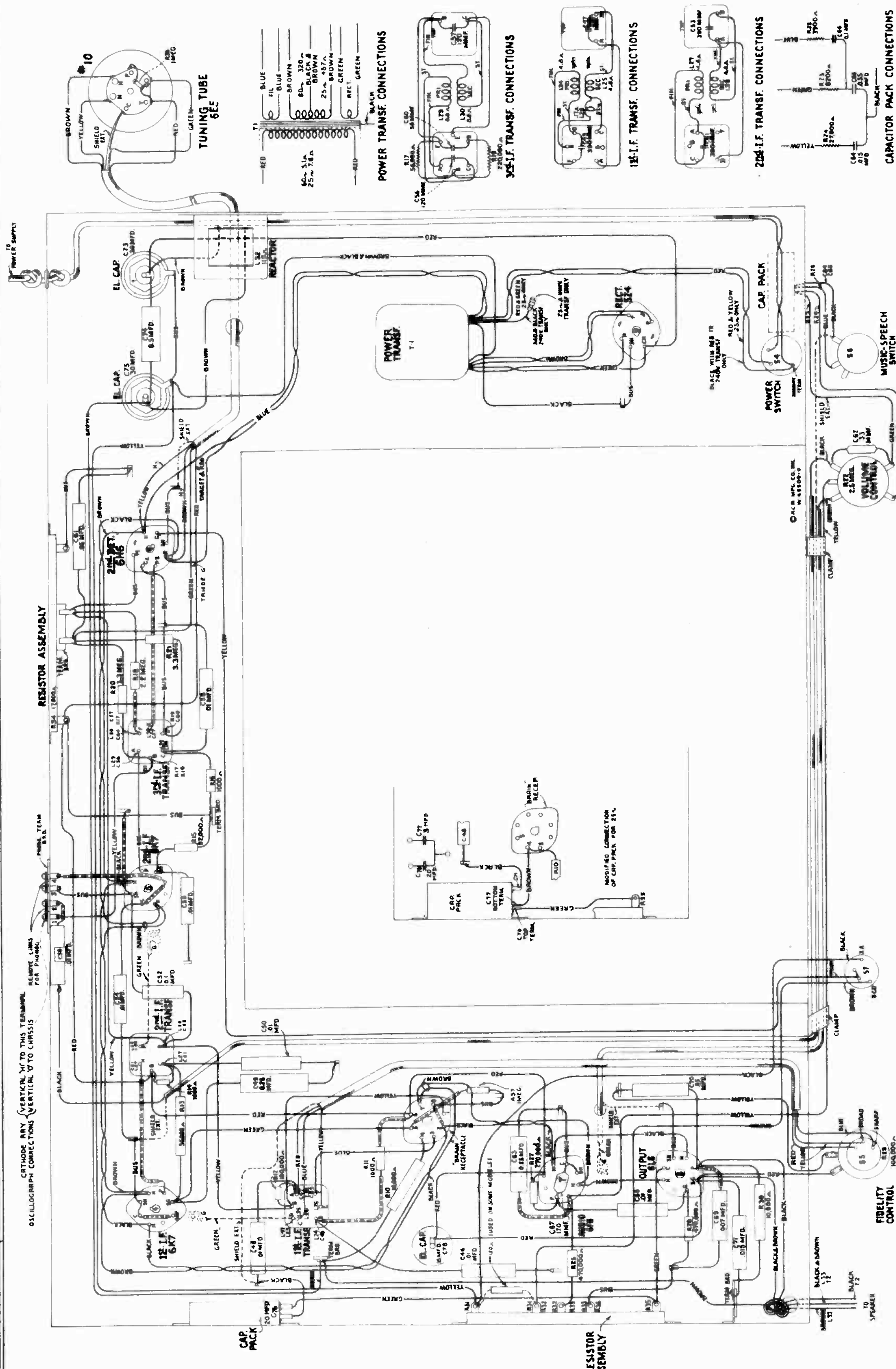


Figure 3—Chassis Wiring Diagram (Less "Magic Brain")

Pilot Lamps (4) .... Mazda No. 46, 6.3 volts, 0.25 ampere

POWER SUPPLY RATINGS

Rating A .... 105-125 volts, 50-60 cycles, 120 watts
Rating B .... 105-125 volts, 25-60 cycles, 120 watts
Rating C .... 100-130/140-160/195-250 volts, 40-60 cycles, 120 watts

MODELS 10T,10K
"Magic Brain"
Chassis Wiring

RCA MFG. CO., INC.

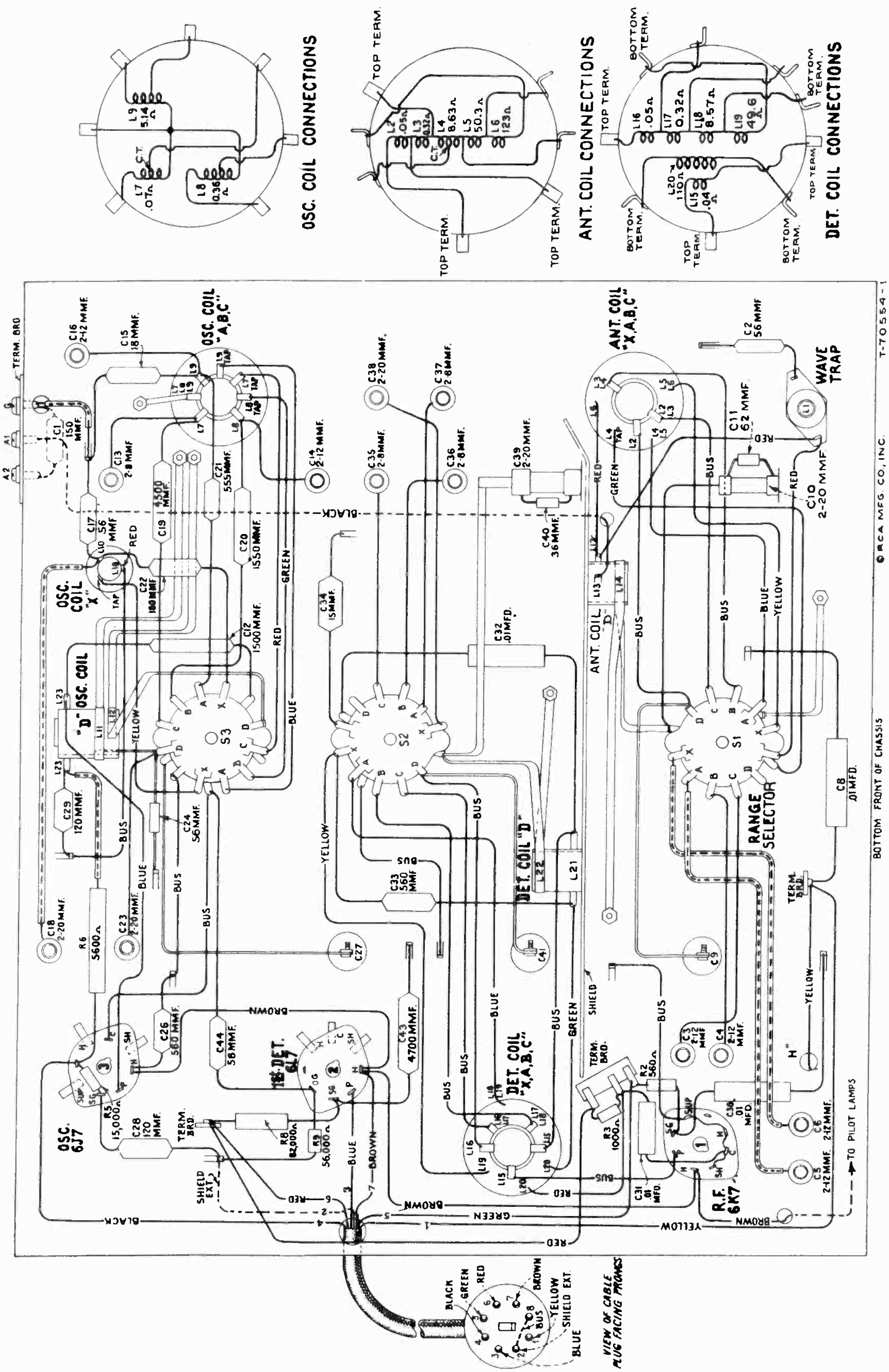


Figure 4—"Magic Brain" Wiring Diagram

POWER OUTPUT		
Undistorted	....	5 watts
Maximum	....	9 watts
LOUDSPEAKER		
Type	....	Electrodynamic
Impedance (v.c.)	....	3.4 ohms at 400 cycles

RCA MFG. CO., INC.

For Fig. 5- Alignment Apparatus Connections
see Fig. 5 Model 9T & 9K2

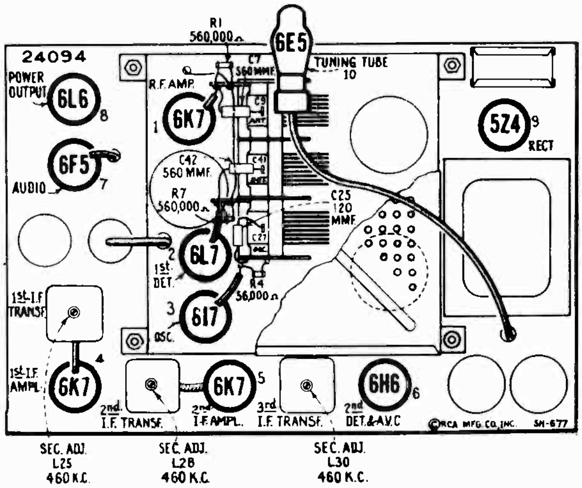


Figure 1—Radiotron and I-F Trimmer Locations

Selector Dial

Figure 11 illustrates the relation of the various parts of the dial mechanism when in its "Standard broadcast" position with the range switch likewise turned to its "Standard broadcast" position. In re-assembling the dial after repairs, see that the gears are meshed in accordance with the diagram, at the same time noting that the range switch is in its "Standard broadcast" position and the lever attached to the range-switch shaft placed in the position shown.

To adjust the dial mechanism, set the range switch to its "Standard broadcast" position. Place a straight-edge across the center of the dial so that its edge is even with the lower (end) marking at both the low-frequency and high-frequency ends of the dial. Under such conditions the straight-edge should be parallel with the top of the chassis base. If the straight-edge is not parallel with the top of the chassis base, loosen the nut on the rear of the roller link pivot stud and move the stud up or down until the link roller moves the dial to the desired position so that the end calibration marks obtain the position mentioned above. Tighten the nut on the roller link pivot stud.

Set the gang tuning condenser to its maximum capacity position. Adjust the dial pointer to the low-frequency (end) mark on "Standard broadcast" scale. This is a friction adjustment.

With the gang tuning condenser plates still in full mesh, loosen the two set screws on the vernier-dial hub. Rotate the vernier dial until the "0" marking is in a vertical plane above the center of the shaft. Tighten set screws.

Antenna and Ground Terminals

These receivers are equipped with an antenna-ground terminal board having three terminals. These terminals are marked "A2," "A1," and "G," the latter being the ground terminal and should always be connected to a good external ground. The transmission-line leads of the RCA RK-40A antenna system should be connected to terminals "A2" and "A1." The receiver coupling units of the RCA RK-40 and the RCA Spider-Web antenna systems should be connected to terminals "A1" and "G." Connect a single-wire antenna to terminal "A1."

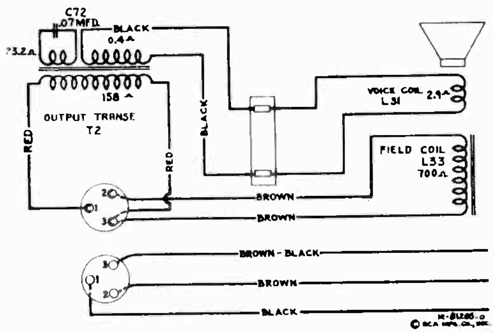


Figure 10—Loudspeaker Wiring

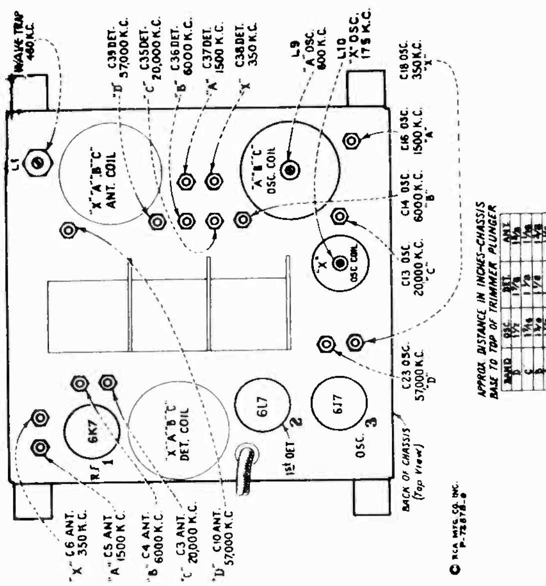


Figure 6—"Magic Brain" Trimmer Locations

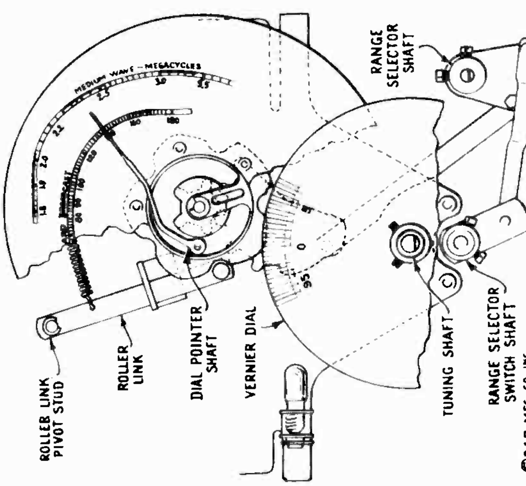


Figure 11—Selector Dial Change Mechanism

MODELS 10T, 10K
Resistance
Voltage, Transformer

RCA MFG. CO., INC.

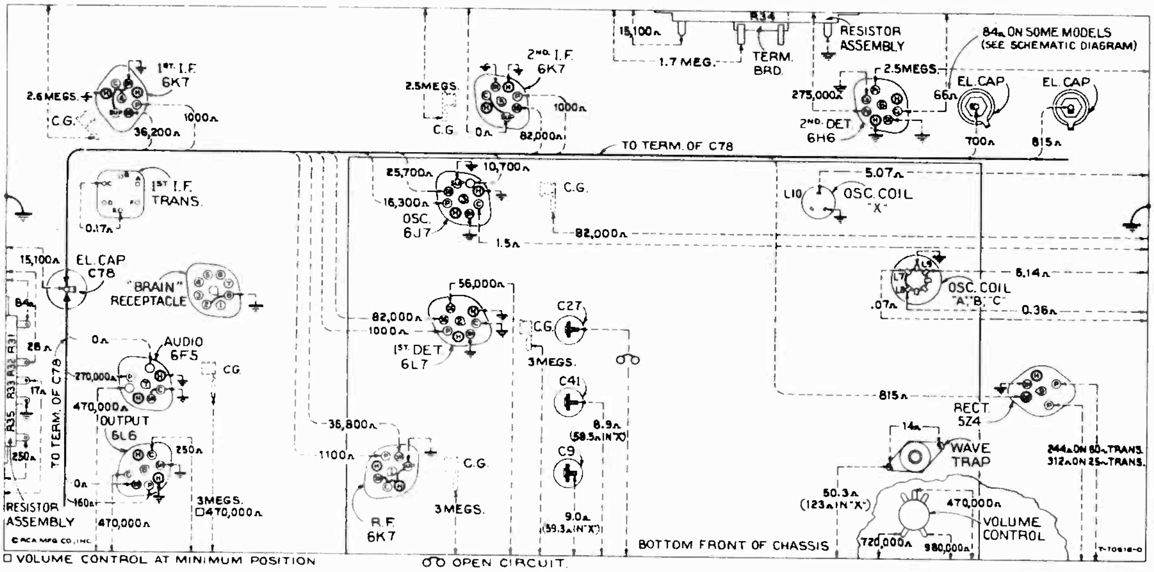


Figure 7—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full-mesh—Range selector in "Standard broadcast" position—Volume control maximum—Fidelity control counter-clockwise

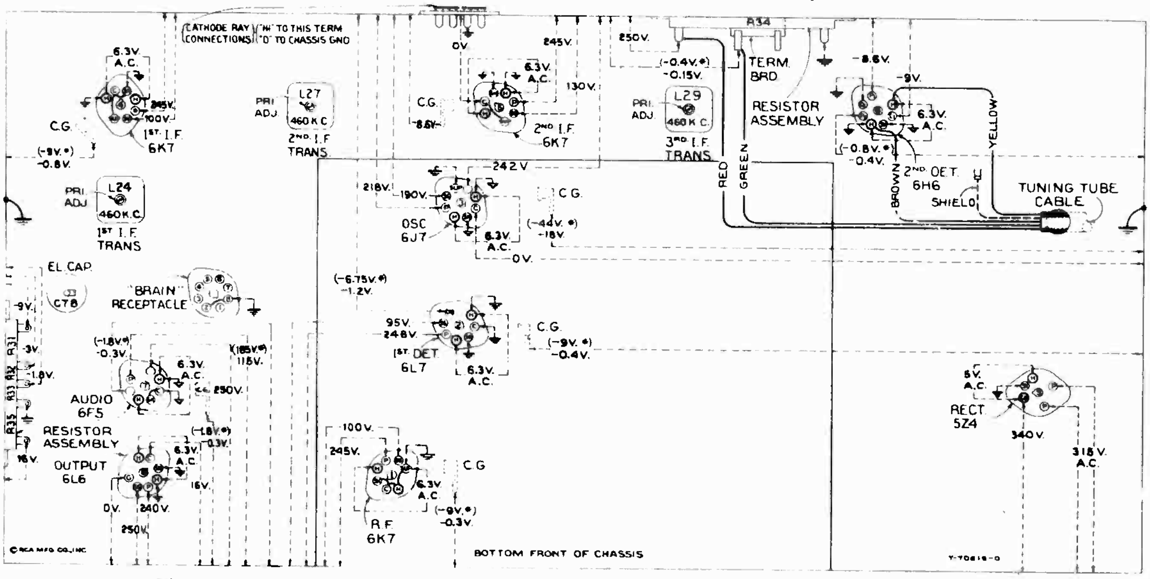


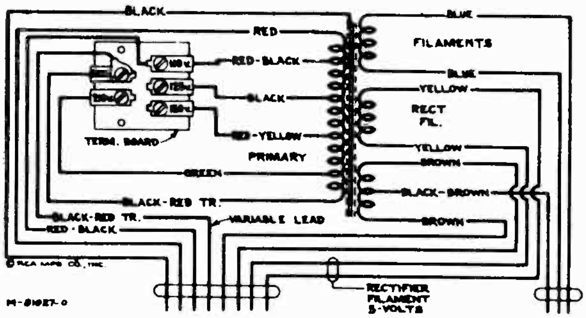
Figure 8—Radiotron Socket Voltages, Coil, and I-F Trimmer Locations

Measured at 115 volts, 60-cycle supply—Tuned to approximately 1,000 kc—No signal being received—Volume control minimum—Fidelity control counter-clockwise

Radiotron Cathode Current Readings
Measured with Milliammeter Connected at Tube Socket Cathode Terminals under Conditions Similar to Those of Voltage Measurements

(1)	RCA-6K7—R-F	4.6 ma.
(2)	RCA-6L7—1st Det.	3.0 ma.
(3)	RCA-6J7—Osc.	6.0 ma.
(4)	RCA-6K7—1st I.F.	5.0 ma.
(5)	RCA-6K7—2nd I.F.	7.0 ma.
(6)	RCA-6H6—2nd Det.-A.V.C.	—
(7)	RCA-6F5—A.F.	0.3 ma.
(8)	RCA-6L6—Power	65 ma.
(9)	RCA-5Z4—Rect.	110 ma.*
(10)	RCA-6E5—Eye	3.0 ma.

(* Cannot be measured at socket)



Primary resistance—10.1 ohms total
Secondary resistance—226 ohms total

—Universal Transformer

NOTE: Two voltage values are shown for some readings. The value shown in parenthesis (*) indicates operating conditions without voltmeter loading. The other value (generally lower) is the actual measured voltage

RCA MFG. CO., INC.

MODELS 10T,10K
Circuit Data
Alignment,Part 1

General Description

These receivers represent the result of thorough development, design, and substantial manufacture. Noteworthy technical improvements have been applied in achieving marked advantages of operation, and efficiency of performance.

Model 10T is a ten-tube, table-type, "Magic Brain" superheterodyne receiver with an eight-inch electrodynamic loudspeaker. Model 10K employs an identical radio chassis, is of the console-type, has a twelve-inch electrodynamic loudspeaker, and incorporates the newly developed "Magic Voice." Design features incorporated in these receivers include built-in doublet antenna coupler, "Magic Brain", improved plunger-type air-dielectric adjustable trimming capacitors in the antenna, detector, and oscillator coil circuits, tuned r-f amplifier, high efficiency first detector (converter) with separate oscillator, two-stage i-f amplifier, beam-type power amplifier, magnetite core adjusted i-f transformers, low frequency oscillator tracking, and wave trap; range-selector sensitivity control, fidelity control; two-point aural compensated volume control, music speech switch; automatic volume control, phonograph terminal board, new selector dial; and a dust proof electrodynamic loudspeaker.

Service convenience has been a controlling factor in the layout of the chassis parts and wiring. The assembly of these various elements is such that the number of conductors is minimized, with all important connections being readily accessible. Trimming adjustments are located at accessible points. A double tuning-knob arrangement permits the choice of either a twenty-to-one or a hundred-to-one dial drive ratio. The latter permits ease of tuning, especially in the "Medium wave", "Short wave", and "Ultra short wave" bands.

Circuit Arrangement

The conventional type of superheterodyne circuit is used. It consists of an r-f amplifier stage, first-detector (converter) stage, separate oscillator stage, two i-f amplifier stages, a diode detector—automatic volume-control stage, an audio voltage-amplifier stage, a beam-type power-amplifier stage, a tuning indicator "Magic Eye", and a full-wave rectifier.

"Magic Brain"

The new "Magic Brain" is constructed as a separate, self-contained, completely shielded, five-band, oscillator-detector-antenna tuning unit which plugs into the main chassis.

A single-wire antenna, or a doublet antenna, when connected to the proper input terminals of the receiver, is coupled to the control grid of the RCA 6K7 r-f amplifier tube through the tuned r-f transformer consisting of L6, L5, L4, L3, and L2 (except when range selector is in "Ultra short wave" position). The primary coil L13 of the "Ultra short wave" (D) band tuned r-f transformer remains in the antenna circuit at all times. A unique method of switching is used. In the "Long wave" (X) band, L6 becomes the primary with L5, L4, L3, and L2 as secondary. In the "Standard broadcast" (A) band, L5 becomes the primary with L4, L3, and L2 as secondary (L6 shorted out). In the "Medium wave" (B) band, L4 becomes the primary with L3 and L2 as secondary (L6 and L5 shorted out). In the "Short wave" (C) band, L3 becomes the primary with L2 as secondary (L6, L5, L4, and tap on L4 shorted out). The tap on L4 is provided to prevent interaction with L3 and L2 when operating receiver in "Short wave" band. In the "Ultra short wave" (D) band, L6, L5, L4, and L3 are shorted out and grounded, and secondary L14 is placed in shunt with L2. The latter connection prevents undesirable interaction of L2 with L14. This method of switching reduces the total number of coils and leads, and results in having a low loss primary and secondary winding for each band with high efficiency of operation.

The band switching of the detector circuits is similar to that of the antenna circuits. Coils L15, L21, and L20 are always connected in series with the plate circuit of the RCA-6K7 r-f amplifier tube. In the "Long wave" (X) band, L19, [illegible], L17, and L16 are connected in series as the secondary circuit. The ground of the coil system is at the low end of L19. L20 acts as the primary which transfers energy to the secondary L19. Capacitor C33 resonates primary L20 at the proper frequency. In the "Standard broadcast" (A) band, L18, L17, and L16 are connected in series as the secondary circuit. The ground of the coil system is now between L18 and L19. L19 is used as the primary and is resonated at the proper frequency by capacitors C34 and C35 which are in shunt with this coil. Capacitor C33 is connected to transfer energy to the primary coil L19. In the "Medium wave" (B) band, L17 and L16 are connected in series as the secondary. The ground of the coil system is now between L17 and L18. L18 is used as the primary and is resonated at the proper frequency by capacitor C34 which is in shunt with this coil. L19 is shorted by the range selector. Capacitor C33 transfers the r-f energy from the plate circuit to the primary L18. In the "Short wave" (C) band, L16 is the secondary. The ground of the coil system is now between L16 and L17. L17 is used as the primary and is resonated to the proper frequency by capacitor C34. In addition, L15 acts as a high frequency primary which resonates above 20 mc and improves the gain at the high-frequency end of the "Short wave" band. Coils L19 and L18 are shorted by the range selector. L21 is effectively r-f bypassed in this position by capacitor C32. In the "Ultra short wave" (D) band, L22 is the secondary, or grid coil, and consists of approximately a single turn of silver plated strap around a 7/8-inch coil form. The primary coils, L21 and L15 are in series on this band, with L21 acting as a low frequency primary and L15 as a high-frequency primary. L16 is shunted by L22 instead of being shorted directly by the range selector. Any inductive effect of L16 is thus eliminated. L19, L18, and L17 are shorted directly by the range selector.

Separate windings, with the exception of L23, are employed in the oscillator stage for each position of the range selector. L23 (inductively coupled to L11 and L12) is placed in the oscillator plate circuit to provide additional feed-back when operating receiver on the "Ultra short wave" (D) band. This coil is effectively r-f bypassed by capacitor C12, when range selector is in the "Short wave" (C) position, to prevent undesirable reactions. Its effect on the remaining bands is negligible. The inherent stability of the oscillator circuit provides minimum frequency drift which is especially advantageous for high-frequency reception. The locally-generated signal is capacitance coupled to grid No. 3 of the RCA-6L7 first detector.

The output of the "Magic Brain" is fed to the r-f amplifier through the plug-in cable. This cable also supplies all power required by the "Magic Brain" unit.

I-F Amplifier

The intermediate-frequency amplifier consists of two RCA-6K7 tubes in a two-stage, transformer-coupled circuit. The windings of all three i-f transformers are resonated by fixed capacitors, and are adjusted by molded magnetite cores (both primary and secondary) to tune to 460 kc. A third winding L26, in the first i-f transformer, is placed in series with the main secondary L25 when the fidelity control switch S5 is thrown to "broad" position (see figure 2), thereby increasing the coupling between the primary and secondary circuits with consequent broadening of the band width of the i-f amplifier. The increased band width of the i-f amplifier therefore causes less attenuation of the higher audio modulation side-band frequencies, permitting higher fidelity reception.

Detector and A.V.C.

The modulated signal, as obtained from the output of the last i-f stage, is detected by an RCA 6H6 twin-diode tube (No. 2 diode). The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistors R17 and R19, is applied as automatic control-grid bias to the r-f, first detector, and i-f tubes. The No. 1 diode of the RCA-6H6 is used to supply residual bias to the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R18, R17, and R19, thereby maintaining the desired operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias diode ceases to draw current and the a-v-c diode takes over the biasing function. The sensitivity of the receiver is increased in the "Ultra short wave" (D), "Short wave" (C), and "Medium wave" (B) bands by reducing the residual bias on the above mentioned controlled tubes with switch S7 which is operated by the range selector control.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector diode and the input grid of the RCA-6F5 audio voltage amplifier tube. This control has a two-point tone-compensating filter connected to it so that the correct aural balance will be obtained at different volume settings. Phonograph terminals are provided to feed the output of an external phonograph pickup to the control grid of the audio amplifier through this aurally compensated volume control.

The output of the voltage amplifier is resistance-capacitance coupled to the control grid of the RCA-6L6 power-output tube. The output of this stage is transformer coupled to the voice coil of the electrodynamic speaker.

The "Music-speech" control consists of a switch S6 which, in the "Speech" position, places an additional capacitor C66 and resistor R26 in shunt with the capacitor C65 in one of the tone compensating filters. This reduces the low-frequency response of the amplifier and provides maximum intelligibility of the voice frequencies.

Fidelity Control

The fidelity control consists essentially of the combination of a conventional high audio frequency tone control, including capacitor C70 and variable resistor R29 in shunt with the plate circuit of the output tube, and means for changing the band width of the i-f amplifier. It performs in the following manner:

When the fidelity control is in its extreme counter-clockwise position, the resistance of R29 is a minimum, and winding L26 is disconnected from the i-f circuit (S5 in sharp position, see figure 2). Capacitor C70 is most effective at this point causing maximum attenuation of the higher audio frequencies. As the control is turned clockwise, placing more resistance in series with capacitor C70, the capacitor becomes less and less effective, and the upper frequency range of the audio amplifier is extended. When the fidelity control nears its extreme clockwise position, resistor R29 is disconnected and switch S5, operated by fidelity control shaft, places winding L26 (first i-f transformer) in series with L25 (S5 in broad position).

"Magic Eye"

An RCA-6E5 cathode-ray tuning tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal. This tube consists of an amplifier section and a cathode-ray section built in the same glass envelope. A portion of the signal voltage developed across resistor R19 is used to actuate the grid of the amplifier section. Maximum voltage is applied to this grid when the receiver is tuned to resonance with an incoming carrier. This condition is evidenced by the minimum width of the dark sector on the fluorescent screen.

"Magic Voice" (Model 10K)

Model 10K is designed with a cabinet incorporating the "Magic Voice." This is accomplished by having the rear of the speaker compartment completely enclosed by a tight-fitting back.

Five metal open-end pipes of equal diameter but of three different lengths are inserted in holes in the cabinet base and extend upward in the speaker compartment. The effect is to cause the lower-frequency waves, reaching the front of the cabinet through the pipes, to arrive approximately in-phase giving extended low frequency response without boominess, or cabinet resonance.

SERVICE DATA

The various diagrams in this booklet contain such information as will be needed to locate causes for defective operation if such develops. The values of the various resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagram. Identification titles, such as C1, L2, R1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistance only. Resistance values of less than one ohm are generally omitted.

Alignment Procedure

There are seventeen adjustments required for the alignment of the oscillator, first-detector, and antenna-tuned circuits, one adjustment for the wave-trap, and six adjustments for the i-f system. Fifteen of these adjustments are made with plunger type air trimming capacitors and require the use of an **RCA Stock No. 12636 Adjusting Tool.** Each of these capacitors has a lock nut for securing the plunger in place after adjustment. The remaining nine adjustments are made by means of screws attached to molded magnetite cores. These cores change the inductance of the particular coils in which they are inserted to provide exact alignment. All of these adjustments are accurately made during manufacture and should remain in proper alignment unless affected by abnormal conditions of climate or purported alterations for servicing, or unless altered by other means. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment. Such conditions will usually exist simultaneously. Correct performance of this receiver can only be obtained when these adjustments have been made by a skilled service engineer with the use of adequate and reliable test equipment. The manufacturer of this receiver has such test equipment available for sale through its distributors and dealers.

The extensive frequency range of these receivers necessitates a more or less involved method of alignment. However, if the following directions are carefully applied in the sequence given, normal performance of the instruments will be obtained.

The plunger-type air trimming capacitors have their approximate plunger settings tabulated on figure 6. If the plungers have been disturbed from their original adjustments, they may be roughly set to the specified dimensions prior to alignment.

In performing services on the "Magic Brain", the leads should be restored to their original positions, since the lead dress is important for proper operation and dial calibration.

Precautionary Dressing of Leads for "Magic Brain" Alignment
(Refer to Figure 4)

Band "X"

1. Keep blue lead A of S1 to antenna coil L4-5 dressed away from chassis, and from yellow lead X of S1 to antenna coil L5-6.
2. Bus lead from C10 to S1 should be as short as possible.
3. Keep blue lead A of S2 to detector coil L18-19 clear of chassis, coil shield, coil, and other leads.
4. Keep spaghetti lead C6 to X of S1 apart from spaghetti lead C5 to A of S1, and from chassis.

Band "A"

1. Keep green lead terminal S1 to antenna coil tap L4 away from chassis, coil shield, and coil.
2. Keep spaghetti lead C5 to A of S1 apart from spaghetti lead C6 to X of S1 and from chassis.

Band "C"

Lead from C19 to oscillator coil L7 should be maintained as short and straight as possible.

For alignment, the test-oscillator frequency should be quite accurate. A convenient and reliable means of accurately checking the frequency of test oscillators, receivers, etc., is the **RCA Stock No. 9572 Crystal Calibrator.**

If the test-oscillator signal cannot be heard as the receiver (heterodyne) oscillator air-trimmer plunger is changed from its minimum capacity to maximum capacity position (receiver dial and test oscillator set to the specified frequencies, and the correct oscillator air-trimmer used) it may be an indication that the test-oscillator frequency is outside the range covered by the air-trimmer. Under such conditions, when a more accurate setting of the test oscillator cannot be determined, set the oscillator air-trimmer plungers to the approximate settings given on figure 6. Tune the test oscillator until the signal is heard in the speaker. Each of two test-oscillator settings (the fundamentals or the harmonics of which are **920 kc** apart) produce a signal. The lower-frequency test oscillator setting should be used as this places the test-oscillator (signal) frequency **460 kc** below the frequency of the receiver heterodyne oscillator.

Holes are provided in the top of the r-f and antenna coil cans on some models to enable a tuning check with the **RCA Stock No. 6679 Tuning Wand.** The hole in the top of the detector coil can has a cinch button which must be removed before insertion of the tuning wand. When the brass end of the wand is inserted in the coil, the inductance of the coil is decreased. If this results in an increase of output, the respective air-trimmer capacitance should be decreased (plunger pulled out). If inserting the iron end of the tuning wand causes an increase in output, resulting from an increase of inductance of the coil, the respective air-trimmer capacitance should be increased (plunger pushed in). If the range of the air trimmer is not sufficient to give the desired results, the lead dress may be changed in the particular circuit being aligned, so as to cause the circuit to resonate within the range of the trimmer. An increase in the capacity-to-ground of the circuit will be required if the iron end of the tuning wand causes an increase of signal output when the air-trimmer plunger is full in, while a decrease in the capacity-to-ground will be required if the brass end of the tuning wand causes an increase in signal output when the air-trimmer plunger is full out.

Two methods of alignment are applicable—one requires use of the cathode-ray oscillograph, and the other requires a voltmeter or glow-type indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave-image which represents the resonance characteristics of the circuit being tuned. This method is preferred because of the i-f characteristics of these receivers. This type of alignment is possible through use of apparatus such as the **RCA Stock No. 9558 Frequency Modulator** and the **RCA Stock No. 9545 Cathode-Ray Oscillograph.** If this equipment is not available, an approximate alignment may be performed by the output-indicator method with an instrument such as the **RCA Stock No. 4317 Neon Glow Indicator** attached across the loudspeaker voice coil. Alignment by this method is similar to the cathode-ray method outlined below except that the receiver volume control should be at maximum, the trimmers adjusted to peak response and the test-oscillator sweeping operations omitted. Either of these methods require the use of a reliable test oscillator such as the **RCA Stock No. 9595.**

Cathode-Ray Alignment

Make alignment apparatus connections shown on figure 5. Remove the plug of the frequency-modulator cable from the test-oscillator jack. Connect the receiver chassis to a good external ground. Connect oscillograph "Vertical" input terminals as indicated on figure 3. Set oscillograph power switch to "On" and adjust "Intensity" and "Focus" controls to give a clearly defined spot, or line, on the screen. Set oscillograph "Ampl A" switch to "On," "Vertical gain" control full clockwise, "Ampl B" switch to "Timing," "Range" switch to No. 2 position, and "Timing" switch to "Int." Place the "Sync" control, "Freq." control, and "Horizontal gain" control to about their mid-positions. For each of the following adjustments, the test-oscillator output must be regulated so that the image obtained on the oscillograph screen will be of the minimum size for accurate observation. The receiver volume-control setting is optional.

I-F Adjustments

(a) Set fidelity control to counter clockwise position. Connect the "Ant." output of the test oscillator to the grid cap of RCA 6K7 second i-f tube (with grid lead in place) through a .001-mfd. capacitor, with "Gnd." to receiver chassis. Tune the test oscillator to 460 kc and place its modulation switch to "On" and its output switch to "Hi."

(b) Turn on the receiver and test oscillator. Increase the output of the test oscillator until a deflection is noticeable on the oscillograph screen. The figures obtained represent several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave-image formed (400-cycle waves) to be spread completely across the screen by adjusting the "Horizontal gain" control. The image should be synchronized and made to remain motionless by adjusting the "Sync." and "Freq." controls.

(c) Adjust the two magnetite core screws L30 and L29 (see figures 1 and 8) of the third i-f transformer (one on top and one on bottom) to produce maximum vertical deflection of the oscillographic image. This adjustment places the transformer in exact resonance with the 460-kc signal.

(d) The sweeping operation should follow using the frequency modulator. Shift the oscillograph "Timing" switch to "Ext." Insert plug of frequency-modulator cable in test-oscillator jack. Turn the test-oscillator modulation switch to "Off." Turn on the frequency modulator and place its sweep-range switch to "Hi."

(e) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. If only one wave appears, increase the "Freq." control on the oscillograph to obtain two waves. These waves will be identical in shape, totally disconnected, and appear in reversed positions. They will have a common base line, which is discontinuous. Adjust the "Freq." and "Sync" controls of the oscillograph to make them remain motionless on the screen. Continue increasing the test-oscillator frequency until these forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will be obtained at a test-oscillator setting of **approximately 575 kc.**

(f) With the images established as in (e), re-adjust the two magnetite core screws L30 and L29 on the third i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(g) Without altering the adjustments of the apparatus, shift the "Ant." output of the test oscillator to the grid cap of the RCA-6K7 first i-f tube (with grid lead in place), through a .001-mfd. capacitor. Regulate the test oscillator output so that the amplitude of the oscillographic image is approximately the same as used for adjustment (f) above.

(h) The two second i-f transformer magnetite core screws L28 and L27 (one on top and one on bottom) should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude.

(i) Without altering the adjustments of the apparatus, shift the "Ant." output of the test oscillator to the input of the i-f system, i.e., to the grid cap of the RCA 6L7 first-detector, (with grid lead in place) through a .001-mfd. capacitor. Regulate the test oscillator output so the amplitude of the oscillographic image is approximately the same as used for adjustment (h) above.

(j) The two first i-f transformer magnetite core screws L25 and L24 (one on top and one on bottom) should then be adjusted so that they cause the forward and reverse waves to become coincident throughout their lengths and have maximum amplitude.

(k) Note width of oscillographic image at a point which is 50% of maximum amplitude. Turn receiver fidelity control to extreme clockwise position. Note width of oscillographic image at a point which is 50% of maximum amplitude. Under normal conditions the latter measurement should be approximately 60% greater in width than the former measurement. The image should also appear slightly double humped. These conditions indicate proper broadening of the band width of the i-f amplifier. Turn range selector to "Medium wave" (B) band and note increase of amplitude. The amplitude should increase several times. It may be necessary to decrease output of test oscillator to keep image on screen. Turn receiver fidelity control to extreme counter-clockwise position and proceed to "R-F Adjustments."

R-F Adjustments

Make receiver dial adjustments as outlined by "Selector dial," figure 11. Alignment must be made in sequence of "Wave-trap," "Ultra short wave" band, "Short wave" band, "Medium wave" band, "Standard broadcast" band, and "Long wave" band.

"Wave-Trap" Adjustment

(a) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" through a 200-mmfd. (important) capacitor. Remove the plug of the frequency-modulator cable from the test oscillator jack. Turn test-oscillator modulation switch to "On." Shift the oscillograph "Timing" switch to "Int." Place receiver range selector in "Standard broadcast" position. Set the receiver dial to a position of no extraneous signals near 600 kc. Tune the test oscillator to 460 kc. Adjust the wave-trap magnetite core screw L1 to the

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point which causes minimum amplitude of output (maximum suppression of signal) as shown by the waves on the oscillograph. An increase of the test-oscillator output may be necessary before this point of minimum amplitude, obtained by correct adjustment of wave-trap screw, becomes apparent on oscillograph screen.

"Ultra Short Wave" Band

(b) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" of the receiver through a 300-ohm resistor. Set the receiver range selector to its "Ultra short wave" position and its dial pointer to 57,000 kc. Adjust the test oscillator to 19,000 kc. The third harmonic of 19,000 kc is used for this adjustment. If the indication on the oscillograph screen is not sufficient for the following adjustments at 57,000 kc, the vertical-input terminals of the cathode-ray oscillograph may be connected thus: "Hi" to the plate contact of the RCA-6L6 power-output tube socket with the "0" terminal to chassis-ground. The receiver should be turned off while making this connection since the plate potential is impressed across the oscillograph input and a severe shock will result if contact is made between these two points. If this connection is made, advance the receiver volume control to its maximum position.

Adjust oscillator air-trimmer C23 for maximum (peak) output. Two positions, each producing maximum output, may be found. The position of minimum capacitance (plunger near out) should be used. This places the receiver heterodyne oscillator 460 kc higher in frequency than the incoming signal. Tighten lock nut. Adjust the detector air-trimmer C39, while slightly rocking the gang tuning condenser back and forth through the signal, for maximum (peak) output. Two peaks may be found on this trimmer. The peak of maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust the antenna air-trimmer C10 for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found on this trimmer which produce maximum output. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to 56,080 kc. If the image signal is received at this position, the adjustment of the oscillator air-trimmer C23 has been correctly made. No adjustments should be made while checking for the image signal.

(c) Re-tune receiver for maximum response to 57,000 kc (not image response) without disturbing test-oscillator adjustments. Change test oscillator to 6,800—14,000 kc range. Tune test oscillator until signal is heard in speaker (should occur at approximately 14,250 kc, fourth harmonic of test oscillator used). Two test-oscillator settings (230 kc apart) will produce a signal at this point. The lower frequency test-oscillator setting should be used, as this places the test oscillator harmonic 460 kc below the frequency of the receiver heterodyne oscillator. Tune receiver for maximum response at a dial setting of approximately 28,500 kc (image should tune in at a dial setting approximately 27,580 kc) without altering test-oscillator adjustment. Test-oscillator second harmonic of 14,250 kc is used for the following check. Check calibration of receiver dial. A receiver dial reading of less than 28,500 kc indicates that the inductance of the oscillator secondary coil L11 is too low and should be increased. If the receiver dial reading is greater than 28,500 kc, the inductance of L11 is too high and should be decreased. If it is necessary to change the inductance of L11, first remove bottom cover of "Magic Brain" and then set receiver dial pointer to 28,500 kc. To decrease inductance, move the grounded ends (straps) of L11 and L12 (see figure 4) nearer chassis. Do not allow straps to touch chassis except where connected. To increase inductance, move the straps farther away from chassis. Adjust position of straps until maximum (peak) output results. The alignment of the detector tuned circuit should next be checked at 28,500 kc without changing either the receiver or test oscillator adjustments. An increase of output when the brass end of a tuning wand is brought near L22 indicates that L22 is too high in inductance, while an increase when the iron end is brought near the coil indicates that the inductance is too low. The inductance of L22 may be varied by changing the spacing between the grounded end (strap) of L22 and the strap connected from C41 to contact on S2 (figure 4). An increase of spacing will increase the inductance, while a decrease of spacing will decrease the inductance. Adjust the spacing until maximum (peak) output results. Replace "Magic Brain" bottom cover and repeat adjustments in (b) prior to those of "Short wave" band.

"Short Wave" Band

(d) Set the receiver range selector to its "Short wave" position and its dial pointer to 20,000 kc. Adjust the test oscillator to 20,000 kc. If the vertical input cathode-ray connections were changed for adjustment (b) above, they should be restored to their original position as shown on figure 3. Adjust oscillator air-trimmer C13 until maximum (peak) output is reached. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust detector air-trimmer C35 until maximum (peak) output is reached, while slightly rocking the gang tuning condenser back and forth through the circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer C3 until maximum (peak) output is reached while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to 19,080 kc. The image signal should be received at this position indicating that the adjustment of C13 has been correctly made. No adjustments should be made while checking for the image signal.

"Medium Wave" Band

(e) Place receiver range selector to its "Medium wave" position with its dial pointer set to 6,000 kc. Tune the test oscillator to 6,000 kc. Adjust oscillator air-trimmer C14 to produce maximum (peak) output as shown by the waves on the oscillograph. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust the detector air-trimmer C36 for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer C4 to produce maximum (peak) output. Tighten lock nut.

"Standard Broadcast" Band

(f) Remove the 300-ohm resistor from between the test-oscillator "Ant." post and receiver antenna terminal "A1" and insert a 200-mmfd. capacitor in its place. Place receiver range selector to "Standard broadcast" position with receiver dial pointer set to 600 kc. Tune the test oscillator to 600 kc. Adjust oscillator magnetite core screw L9 (top of large oscillator coil can) for maximum (peak) output as shown by the waves on the oscillograph screen.

(g) Set receiver dial pointer to 1,500 kc. Tune test oscillator to 1,500 kc (1,500–3,100-kc range) and increase its output to produce a registration on the oscillograph screen. Carefully adjust the oscillator, detector, and antenna air-trimmers C16, C37 and C5, respectively, to produce maximum (peak) output as shown by the waves on the oscillograph screen. Shift the oscillograph "Timing" switch to "Ext." Place the frequency modulator sweep-range switch to its "Lo" position and insert plug of the frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test-oscillator setting of approximately 1,680 kc. Adjust trimmers C16, C37, and C5 again, setting each to the point which produces the best coincidence and maximum amplitude of the images.

(h) Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn test-oscillator modulation switch to "On." Set oscillograph "Timing" switch to "Int." Tune test oscillator to 200 kc (200–400-kc range). Tune receiver for maximum response to this signal at a dial reading of approximately 600 kc. The third harmonic of the 200-kc signal is used for this adjustment. Shift oscillograph "Timing" switch to "Ext." Insert the plug of the frequency modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increased frequency) until the forward and reverse waves show on the oscillograph screen. This will occur at a test-oscillator setting of approximately 230 kc. Disregarding the fact that the two images may or may not come together, adjust the oscillator magnetite core screw L9 (top of large oscillator coil can) to produce maximum (peak) amplitude of the images. Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Repeat adjustments in (g) above to compensate for any changes caused by the adjustment of L9 core, tightening lock nuts on C16, C37, and C5, respectively, after each is adjusted.

"Long Wave" Band

(i) Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Place receiver range selector to its "Long wave" position. Set the receiver dial pointer to 175 kc. Tune the test oscillator to 175 kc and increase its output until a deflection is noticeable on the oscillograph screen. Adjust oscillator magnetite core screw L10 (located on top of small oscillator coil can) so that maximum (peak) amplitude of output is shown on the oscillograph screen.

(j) Set receiver dial pointer to 350 kc. Tune test oscillator to 350 kc. Adjust the oscillator, detector, and antenna air-trimmers C18, C38, and C6 to produce maximum (peak) output as shown by the waves on the oscillograph screen. Without disturbing the connections, shift the oscillograph "Timing" switch to "Ext." Place the frequency-modulator sweep-range switch to its "Hi" position and insert plug of frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (decrease frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test oscillator setting of approximately 198 kc. This setting places the test-oscillator frequency to 175 kc. The second harmonic is now used for the 350 kc adjustment. Adjust air-trimmers C18, C38, and C6, again, to produce maximum amplitude of the images and best coincident throughout their lengths.

(k) Re-tune the receiver to approximately 175 kc so that the forward and reverse waves appear on the oscillograph screen. Adjust the oscillator magnetite core screw L10 to produce maximum (peak) amplitude of the waves, disregarding the fact that the two images may or may not come together.

(l) Shift the receiver dial setting to 350 kc without altering any other adjustments (frequency modulator still in operation). Adjust air-trimmers C18, C38, and C6, respectively, to produce maximum amplitude and best coincidence of the waves. These adjustments compensate for any changes caused by the adjustment of the magnetite core screw L10. Tighten lock nuts on C18, C38, and C6, respectively, after each is adjusted.

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

Phonograph Terminal Board

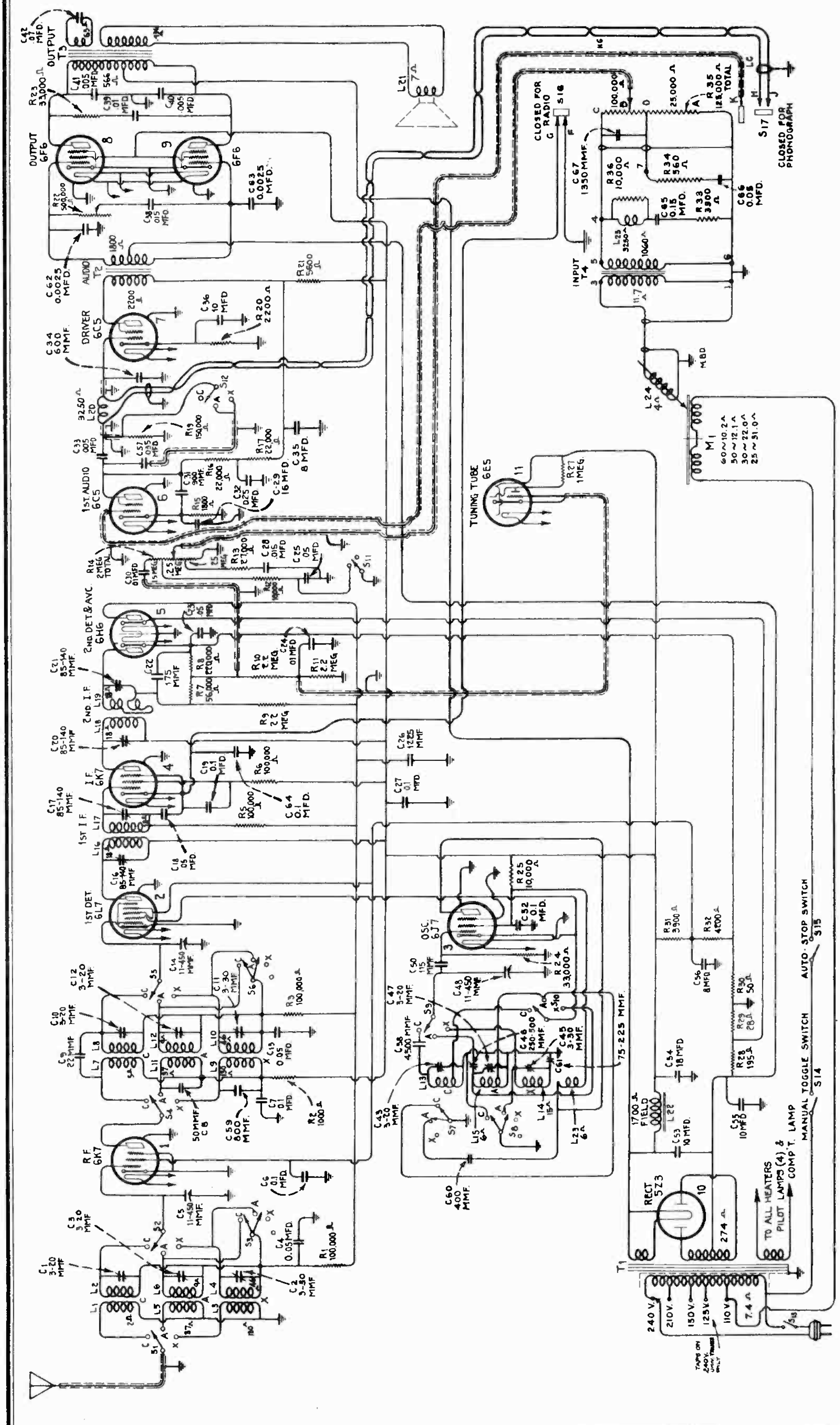
A terminal board is provided for connecting a phonograph into the audio amplifying circuit. Typical methods of connecting a low-impedance pickup, or the RCA Victor Models R-93, R-93-2, and R-93-S Record Players are shown on the Schematic Diagram (figure 2).

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
12863	Board—Phonograph input terminal board	$0.25
4427	Bracket—Volume control mounting bracket	.18
12987	Bracket—Band changeover switch bracket	.15
12985	Cable—Tuning lamp cable and socket	1.70
12991	Cable—3-conductor shielded fidelity control cable, approximately 7¼ inches long	.50
12511	Cap—Grid contact cap—Package of 5	.15
12948	Capacitor—33 Mmfd. (C62)	.20
12629	Capacitor—56 Mmfd. (C60)	.20
12404	Capacitor—120 Mmfd. (C56, C57)	.26
12724	Capacitor—120 Mmfd. (C67)	.28
13022	Capacitor—390 Mmfd. (C45, C47, C51, C53)	.25
5148	Capacitor—.007 Mfd. (C69)	.20
4858	Capacitor—.01 Mfd. (C46, C48, C50, C54, C55, C58, C68)	.25
4624	Capacitor—.01 Mfd. (C59)	.54
11315	Capacitor—.015 Mfd. (C71)	.20
4886	Capacitor—.05 Mfd. (C70)	.20
4836	Capacitor—.05 Mfd. (C61)	.30
4841	Capacitor—0.1 Mfd. (C52)	.22
5170	Capacitor—0.25 Mfd. (C49)	.25
4840	Capacitor—0.25 Mfd. (C63)	.30
12741	Capacitor—0.5 Mfd. (C74)	.30
5212	Capacitor—18 Mfd. (C78)	1.16
12872	Capacitor—20 Mfd.—Used in 60-cycle model only (C76)	.90
12467	Capacitor—30 Mfd. (C73, C75)	1.40
12873	Capacitor Pack—Comprising one 20-Mfd and one 3-Mfd capacitor, 25-cycle model only (C76, C77)	1.20
12978	Compensator Pack—Comprising one .015-Mfd., one .035-Mfd., and one 0.1-Mfd. capacitor and one 3,900-ohm, one 8,200-ohm and one 27,000-ohm resistor (C64, C65, C66, R23, R24, R26)	1.35
12006	Core—Core and stud assembly for intermediate frequency transformer	.22
12866	Foot—Chassis foot assembly—Package of 2	.75
5226	Lamp—Pilot lamp—Package of 5	.70
12868	Link—Link mechanism on band indicator operating arm	.45
12871	Reactor—Filter reactor (L32)	1.50
4669	Screw—Set screw for flexible coupling or gear, Stock Nos. 12905 and 12906—Package of 10	.25
12901	Shaft—Direct drive shaft and pinion gear for planetary drive	.75
12900	Shaft—Vernier drive shaft for planetary drive	.25
12903	Spring—Tension spring for planetary drive bearing—Package of 10	.20
12907	Spring—Tension spring for gear, Stock No. 12906—Package of 10	.20
8052	Spring—Tension spring for link, Stock No. 8051—Package of 5	.32
	REPRODUCER ASSEMBLIES	
12914	Board—Reproducer terminal board	.25
12640	Bracket—Output transformer mounting bracket and clamp	.18
12912	Coil—Reproducer field coil (L33)	1.70
13290	Cone—Reproducer cone and dust cap (L31) (Model 10T)	1.35
13291	Cone—Reproducer cone and dust cap (L31) (Model 10K)	2.55
5118	Connector—3-contact male connector for speaker leads	.25
9757	Reproducer, complete (Model 10T)	8.70
11222	Socket—Upper right or lower left hand dial lamp socket	.18
11381	Socket—Tuning tube socket and cover	.45
11196	Socket—Voltage supply or 6F5 Radiotron socket	.15
12607	Spring—Retaining spring for core in I.F. transformer—Package of 10	.36
12986	Stud—Band indicator operating arm stud—Package of 5	.65
12860	Switch—Low frequency tone and power switch (S4, S6)	1.50
12988	Switch—Band changeover switch (S1, S2, S3)	.65
12979	Tone Control—High frequency tone and fidelity control (R29, S5)	1.60
12981	Transformer—First intermediate frequency transformer (L24, L25, L26, C45, C47)	2.15
12990	Transformer—Second intermediate frequency transformer (L27, L28, C51, C53)	1.85
12982	Transformer—Third intermediate frequency transformer (L29, L30, C56, C57, C60, R17, R19)	2.25
12856	Transformer—Power transformer, 105-125 volts, 50/60 cycles (T1)	5.35
12857	Transformer—Power transformer, 105-125 volts, 25/60 cycles	7.10
12858	Transformer—Power transformer, 110-125-150-210-240 volts 40/60 cycles	8.75
12861	Volume Control (R22)	1.00
	MAGIC BRAIN UNIT ASSEMBLIES	
12806	Board—3-contact antenna and ground terminal board	.25
5237	Bushing—Variable condenser mounting bushing assembly—Package of 3	.43
12886	Cable—Shielded power cable, approximately 4 inches long, complete with 8-contact male plug	1.50
12511	Cap—Grid contact cap—Package of 5	.15
12714	Capacitor—Adjustable trimmer capacitor (C3, C4, C5, C6, C14, C16)	.38
12884	Capacitor—Adjustable trimmer capacitor (C10, C18, C23, C38, C39)	.40
12807	Capacitor—Adjustable trimmer capacitor (C13, C35, C36, C37)	.35
12896	Capacitor—15 Mmfd. (C34)	.20
12722	Capacitor—18 Mmfd. (C15)	.20
12891	Capacitor—36 Mmfd. (C40)	.20
12629	Capacitor—56 Mmfd. (C24)	.20
12895	Capacitor—56 Mmfd. (C17)	.20
12723	Capacitor—56 Mmfd. (C2, C44)	.20
13307	Capacitor—62 Mmfd. (C11)	.20
12724	Capacitor—120 Mmfd. (C25, C28, C29)	.28
12725	Capacitor—150 Mmfd. (C1)	.28
12894	Capacitor—180 Mmfd. (C22)	.20
12727	Capacitor—555 Mmfd. (C21)	.20
12537	Capacitor—560 Mmfd. (C7, C26, C33, C42)	.20
12898	Capacitor—1,500 Mmfd. (C12)	.20
12729	Capacitor—1,550 Mmfd. (C20)	.26
12728	Capacitor—4,500 Mmfd. (C19)	.36
12897	Capacitor—4,700 Mmfd. (C43)	.40
4858	Capacitor—.01 Mfd. (C8, C30, C31, C32)	.25
12879	Coil—Antenna coil and shield, XABC bands (L2, L3, L4, L5, L6)	1.90
12888	Coil—Antenna coil, "D" band (L13, L14)	.60
12880	Coil—Detector coil and shield, XABC bands (L15, L16, L17, L18, L19, L20)	2.05

Stock No.	Description	List Price
12980	Resistor—Voltage divider resistor—Comprising one 250-ohm, one 17-ohm, one 11-ohm and one 38-ohm sections (R31, R32, R33, R35)	.55
12311	Resistor—1,000 ohms—insulated, ¼ watt (R11, R16)—Package of 5	1.00
11935	Resistor—1,000 ohms—carbon type, 1/10 watt (R14)—Package of 5	.75
13097	Resistor—10,000 ohms—insulated, 1 watt (R30)	.22
12876	Resistor—10,000 ohms—wire wound (R10)	.55
12864	Resistor—17,000 ohms—wire wound resistor (R34)	.70
11282	Resistor—56,000 ohms—carbon type, 1/10 watt (R17)—Package of 5	.75
12875	Resistor—56,000 ohms—carbon type, 1 watt (R13)—Package of 5	1.10
11365	Resistor—82,000 ohms—carbon type, ¼ watt (R15)—Package of 5	1.00
8064	Resistor—82,000 ohms—carbon type, ½ watt (R37)—Package of 5	1.00
11281	Resistor—100,000 ohms—carbon type, 1/10 watt (R12)—Package of 5	.75
11398	Resistor—220,000 ohms—carbon type, 1/10 watt (R19)—Package of 5	.75
11323	Resistor—270,000 ohms—carbon type, ¼ watt (R27)—Package of 5	1.00
11172	Resistor—470,000 ohms—carbon type, ¼ watt (R25, R28)—Package of 5	1.00
12013	Resistor—1.0 megohm—carbon type, 1/10 watt—Located in tuning tube socket (R11)—Package of 5	.75
11626	Resistor—2.2 megohm—carbon type, ¼ watt (R18)—Package of 5	1.00
12874	Resistor—3.3 megohm—carbon type, ¼ watt (R20, R21)—Package of 5	1.00
12870	Scale—Vernier dial scale	.65
12008	Shield—Intermediate frequency transformer shield	.28
12607	Shield—1st or 2nd I.F. transformer shield top	.30
12581	Shield—3rd I.F. transformer shield top	.36
11195	Socket—5-contact 5Z4 Radiotron socket	.15
11198	Socket—7-contact 6K7, 6L6 or 6H6 Radiotron socket	.15
13095	Socket—Upper left or lower right hand dial lamp socket	.25
9758	Reproducer, complete (Model 10K)	9.40
13289	Transformer—Output transformer (T2)	2.90
11886	Washer—Spring washer to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
11996	Bracket—Tuning lamp bracket and clamp	.22
12915	Escutcheon—Station selector escutcheon and crystal	1.30
12742	Escutcheon—Tuning lamp escutcheon	.22
12699	Knob—Large station selector knob—Package of 5	.68
12700	Knob—Small (vernier) station selector knob—Package of 5	.58
11347	Knob—Music-speech and power switch—volume control—range selector or fidelity control knob—Package of 5	.75
11377	Screw—Chassis mounting screw assembly—Package of 4 (Model 10T)	.12
11210	Screw—Chassis mounting screw assembly—Package of 4 (Model 10K)	.28
12916	Shield—Complete r-f unit top shield	.90
4982	Spring—Holding spring for station selector or volume control knob, Stock No. 12699—Package of 10	.50
11349	Spring—Retaining spring for knob, Stock Nos. 12700 and 11347—Package of 5	.25
12709	Coil—Oscillator coil and shield, ABC bands (L7, L8, L9)	2.02
12881	Coil—Oscillator coil and shield, X band only (L10)	.80
12890	Coil—Oscillator coil, "D" band (L11, L12, L23)	.70
12889	Coil—R.F. coil, "D" band (L21, L22)	.65
12877	Condenser—3-gang variable tuning condenser (C9, C27, C41)	5.10
12887	Connector—8-contact male connector and cover for power cable, Stock No. 12886	.40
12664	Core—Adjustable core and stud for Stock No. 12654	.22
12800	Core—Adjustable core and stud for Stock No. 12709	.20
12882	Core—Adjustable core and stud for Stock No. 12881	.20
11324	Resistor—560 ohms—carbon type, ¼ watt (R2)—Package of 5	1.00
5112	Resistor—1,000 ohms—carbon type, ¼ watt (R3)—Package of 5	1.00
11298	Resistor—5,600 ohms—carbon type, 1 watt (R6)	.22
3998	Resistor—15,000 ohms—carbon type, ¼ watt (R5)—Package of 5	1.00
11282	Resistor—56,000 ohms—carbon type, 1/10 watt (R4, R9)—Package of 5	.75
8064	Resistor—82,000 ohms—carbon type, ½ watt (R8)—Package of 5	1.00
11397	Resistor—560,000 ohms—carbon type, 1/10 watt (R1, R7)—Package of 5	.75
12651	Shield—Coil shield for Stock Nos. 12879, 12880	.22
12710	Shield—Coil shield for Stock No. 12709	.28
12883	Shield—Coil shield for Stock No. 12881	.30
11198	Socket—7-contact 6K7 Radiotron socket	.15
11279	Socket—7-contact 6L7 Radiotron socket	.20
12885	Socket—8-contact 6J7 Radiotron socket	.20
12007	Spring—Retaining spring for core, Stock Nos. 12664, 12800, 12882—Package of 10	.36
12878	Switch—Range switch and mounting nut (S1, S2, S3)	3.60
12654	Trap—Wave-trap, complete (L1)	.75
	DRIVE ASSEMBLIES	
10705	Ball—5/32-inch diameter steel ball for planetary drive—Package of 20	.25
10941	Ball—⅛-inch diameter steel ball for planetary drive bearing—Package of 20	.25
12904	Bushing—Plate and bushing assembly for planetary drive mounting	.20
12905	Coupling—Flexible coupling and shaft assembly, complete	.50
12909	Dial—Band indicating dial and cam assembly	1.05
12899	Drive—Variable tuning condenser drive, complete, including mounting bracket drive, dial scale and indicator, less vernier dial, Stock No. 12870 and link, Stock No. 12868	4.40
12906	Gear—Anti-lash drive gear, complete	.75
12910	Gear—Sector gear and link assembly for band selector	.20
12908	Indicator—Station selector indicator pointer	.20
8051	Link—Link and roller assembly, complete with spring	.30
12911	Screen—Dial lamp screen and light diffuser	.20

MODEL D11-2
Schematic

RCA MFG. CO., INC.



On some models C 24 is .05 M.F.D.

Frequency Ranges

Band X . . . . 140 kc. – 410 kc.
Band A . . . . 540 kc. – 1,800 kc.
Band C . . . . 5,700 kc. – 18,000 kc.

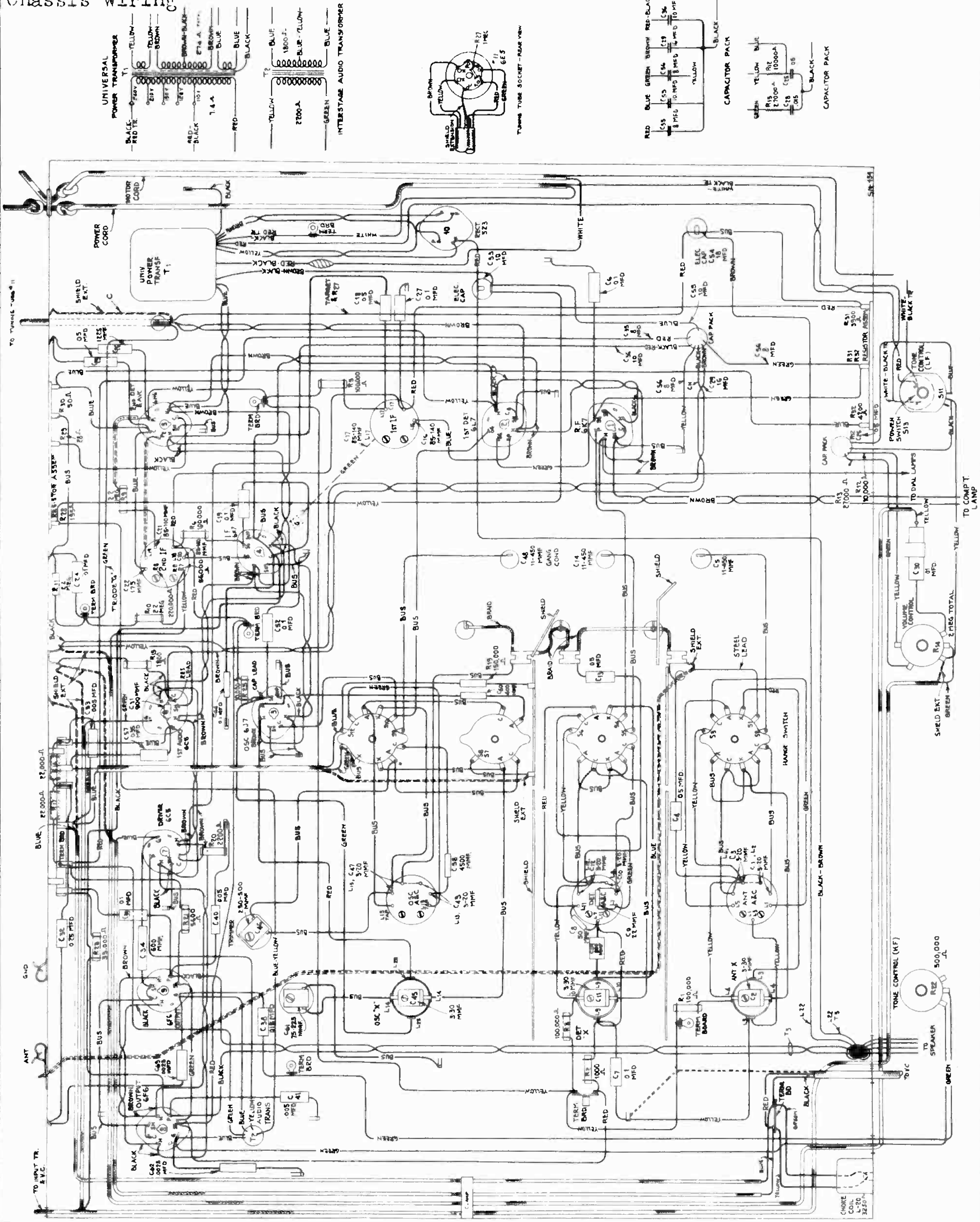
Alignment Frequencies

Band X . . . . . 150 kc. (osc.), 400 kc. (osc., ant., det.)
Band A . . . . . 600 kc. (osc.), 1,720 kc. (osc., ant., det.)
Band C . . . . . 18,000 kc. (osc., ant., det.)

Intermediate Frequency . . . . 460 kc.

MODEL D11-2
Chassis Wiring

RCA MFG. CO., INC.



Rating A-6. . . . . 105-125 Volts, 60 Cycles, 170 Watts
Rating A-5. . . . . 105-125 Volts, 50 Cycles, 165 Watts
Rating B-4. . . . . POWER SUPPLY RATINGS . . . . 105-125 Volts, 40 Cycles, 170 Watts
Rating B-3. . . . . 105-125 Volts, 30 Cycles, 160 Watts
Rating B-2. . . . . 105-125 Volts, 25 Cycles, 165 Watts
Rating C-6. . . . . 105-130/140-160/200-250 Volts, 60 Cycles, 175 Watts
Rating C-5. . . . . 105-130/140-160/200-250 Volts, 50 Cycles, 170 Watts

RCA MFG. CO., INC.

MODEL D11-2
Voltage, Socket
Trimmers, Pickup
Transformer, Speaker
Dial Mechanism

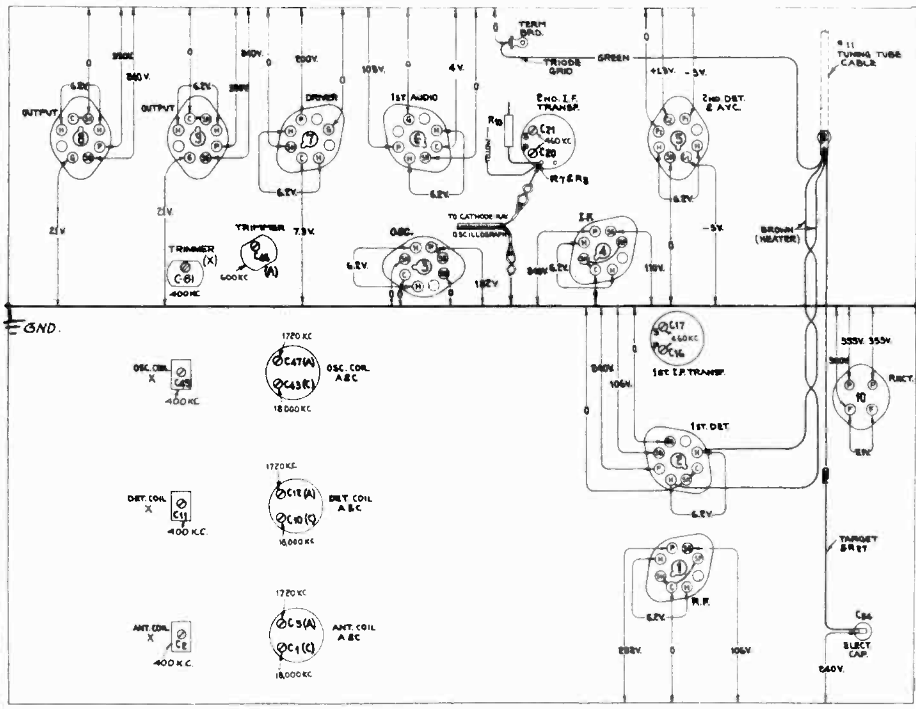
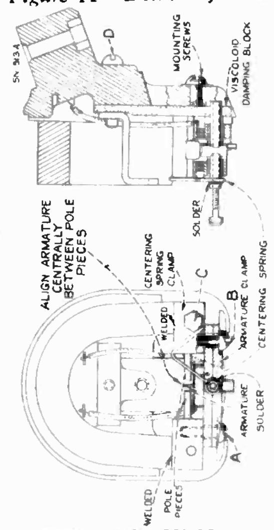


Figure 5—Radiotron Socket Voltages

Measured at 115 volts, 60 cycle supply—No signal being received

Figure 11—Details of Pickup



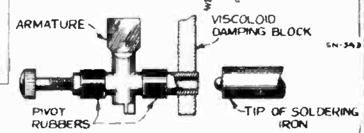


Figure 12—Special Soldering-Iron Tip

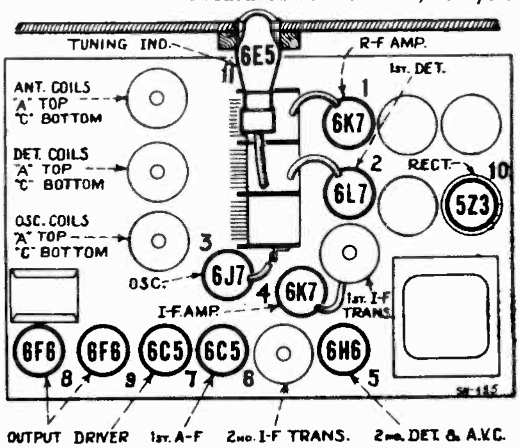


Figure 1—Radiotron and Coil Locations

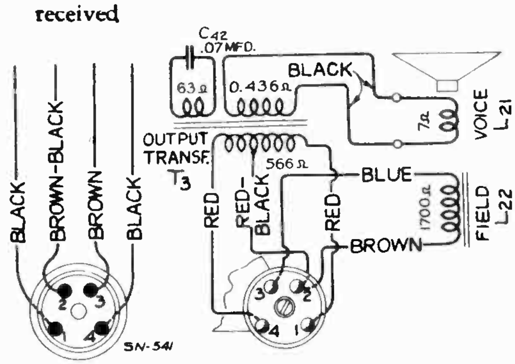
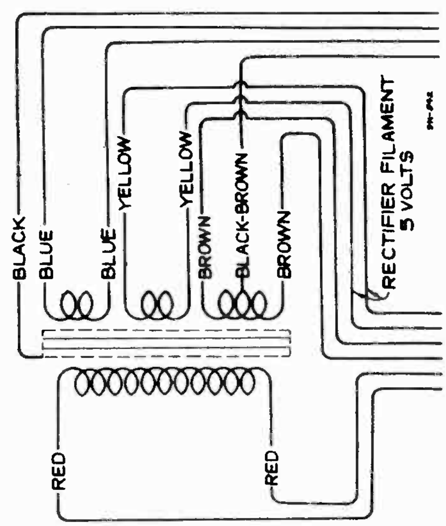


Figure 6—Loudspeaker Wiring



Pri. Res.—5.42 ohms, total
Sec. Res.—470 ohms, total

Figure 7—Standard Power Transformer Connections

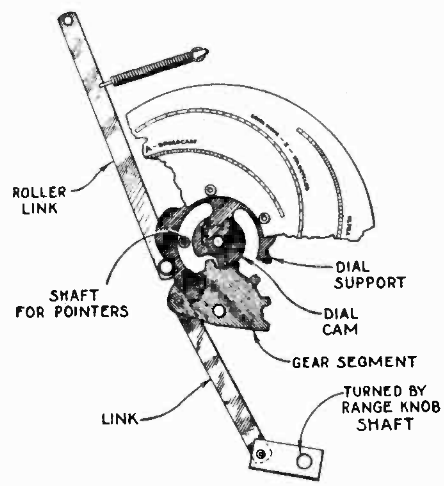


Figure 10—Selector Dial Change Mechanism

For Fig. 5 Alignment Apparatus Connections see 9T & 9T2 Fig. 4

MODEL D11-2
Assembly Wiring
Recorder Changer

RCA MFG. CO., INC.

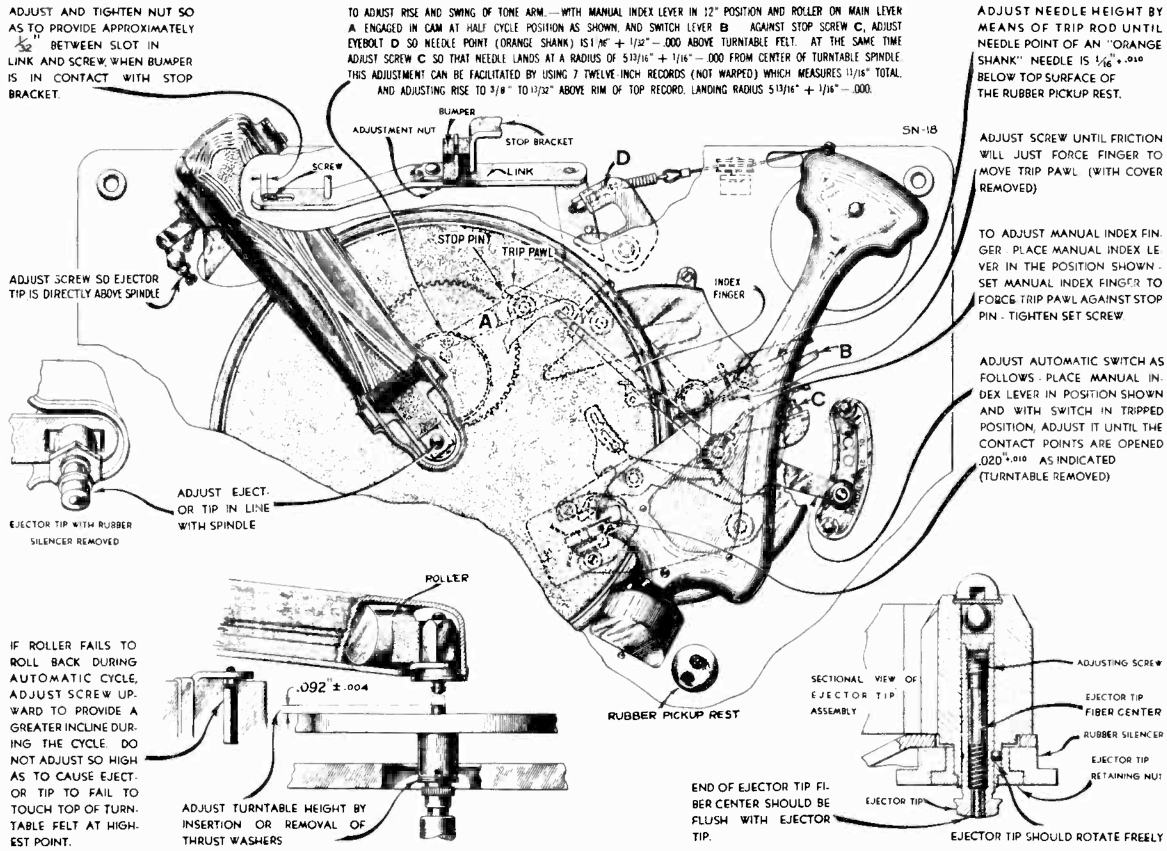


Figure 9—Automatic Record Changer Adjustments

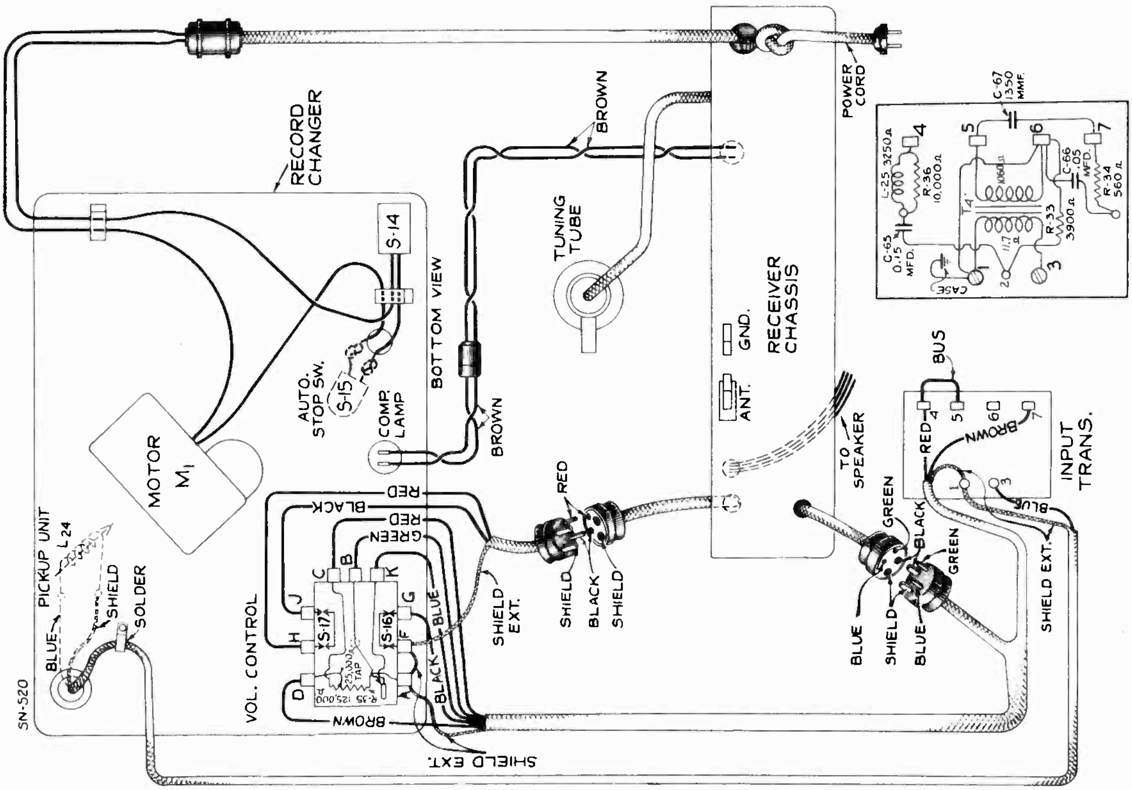


Figure 8—Assembly Wiring

RCA MFG. CO., INC.

MODEL D11-2
Circuit Data
Notes

Radiotron Complement

(1)	RCA-6K7	Radio-Frequency Amplifier
(2)	RCA-6L7	First Detector
(3)	RCA-6J7	Heterodyne Oscillator
(4)	RCA-6K7	Intermediate Amplifier
(5)	RCA-6H6	Second Detector and A.V.C.
(6)	RCA-6C5	First Audio Amplifier
(7)	RCA-6C5	Audio Driver Amplifier
(8)	RCA-6F6	Power Output Amplifier
(9)	RCA-6F6	Power Output Amplifier
(10)	RCA-5Z3	Full-Wave Rectifier
(11)	RCA-6E5	Tuning Indicator

Phonograph

Type	Automatic Record Ejector
Record Capacity	Seven 10-inch or Six 12-inch
Turntable Speed	78 R.P.M.
Type of Pickup	Improved Low-Impedance Magnetic
Pickup Impedance	12 Ohms at 1,000 Cycles

Power Output Ratings

Undistorted	8.5 Watts
Maximum	11.5 Watts

Loudspeaker

Type	12-inch Electrodynamic
Voice Coil Impedance	7.5 Ohms at 400 Cycles
Field Coil Rating	1,7 0 Ohms—72 M.A.

Mechanical Specifications

Height	43 inches
Width	30⅝ inches
Depth	18½ inches
Weight (Net)	155 pounds
Weight (Shipping)	229 pounds
Chassis Base Dimensions	15½ inches x 10½ inches x 3½ inches

General Description

The RCA Victor Model D 11-2 combination radio receiver and automatic phonograph provides excellent entertainment from either broadcast reception or record reproduction. It consists of an eleven-tube, three-band radio receiver, and an automatic phonograph, combined in the one cabinet. The high level of sound energy obtainable from the output of this instrument is capably handled by a new Super-Sensitive, twelve-inch, electrodynamic loudspeaker. Outstanding features of this instrument are as follows:

Magic Brain

The radio receiver includes the "Magic Brain" unit for maximum all around efficiency. This unit is a scientifically correct co-ordination of all the parts for the r-f, oscillator, and first detector functions of a Superheterodyne Receiver. Such design of the important head end, or "Magic Brain" unit, gives greater efficiency in the short-wave ranges as all lead lengths are kept as short as possible, and all sockets and other parts are located for best possible operation.

Magic Eye

A cathode-ray tube whose fluorescent screen has the appearance of a human eye, is used for visually indicating when the receiver is accurately tuned to the incoming signal. This tube is of new design. It contains two groups of elements, one group operates as an amplifier and the other group operates as a cathode-ray tube.

The cathode-ray section consists of a conically shaped luminescent screen, a cathode, and a control electrode. The detected signal from the receiver is applied through the amplifier section of the tuning tube to the control electrode of the cathode-ray section. This control electrode, in turn, affects the electron stream emitted by the cathode in such a manner as to cause a triangular shadow on the luminescent screen. The size of the shadow caused by the control electrode is determined by the strength of the incoming signal, so that a change-of-tuning is readily exhibited on the cathode-ray screen, and therefore, tuning to exact resonance can be definitely obtained.

RCA All-Metal Tubes

The new metal tubes are used in the radio receiver for amplifying and detecting purposes. These tubes make possible a greater range of stable amplification not previously attainable with corresponding glass types. Their metal envelopes form a perfect electrostatic and electromagnetic shield, precluding the former necessity for elaborate shielding by means of cans. The metal tubes are especially adaptable to the modern, extended-range receivers because of their efficient shielding and their favorable internal characteristics.

Automatic Record Changer

An improved automatic mechanism is used in this model. It is of the record ejector type, having a record capacity of seven for the ten-inch type, and a capacity of six for the twelve-inch type. The turntable speed is fixed at 78 r.p.m. by the design of the drive motor and the intermediate gear mechanism. *This speed is invariable and does not vary as long as the supply line frequency remains constant.* The instrument may be purchased with any one of seven ratings as specified under Electrical Specifications. *It is very important that a machine of any particular rating be operated at the frequency for which it is designed and rated.* Attempts to operate at other frequencies will result in improper reproduction from the phonograph system. The ejecting mechanism is arranged so that it will trip on various types of records. This is obtained by having a trip mechanism which is actuated by the rate of needle acceleration toward the center of the record.

Selector Dial

The dial drive and station indicator system are of unique design. There are three individual dial scales, each with full 180 degree band spread, one for use on each of the three tuning bands. These scales are eccentrically arranged on a rotary disc which operates in conjunction with the range selector switch, so that as the switch is shifted to a particular band, the corresponding dial scale rotates into position, leaving the remaining scales concealed. The driving mechanism for the dial pointer and the variable gang condenser has tuning ratios of 10-to-1 and 50-to-1. Control may be interchanged between these two ratios by a push-pull operation of a positive-action clutch which is actuated by the tuning control knob. A vernier dial with an auxiliary pointer (band-spreader) is provided for the accurate tuning required for short-wave reception. The vernier pointer is geared to the main dial-shaft through a mechanism which causes it to rotate ten times to a 180 degree rotation of the main dial-pointer. The dial-drive mechanism connects to the variable gang condenser by means of a flexible coupling. This coupling arrangement together with the new shock-proof condenser mounting makes possible the rigid attachment of the drive mechanism to the receiver-chassis base without causing serious microphonic coupling between the base and the tuning condenser.

CIRCUIT ARRANGEMENT

The Superheterodyne principle of operation forms the basis of the circuit design. A single, tuned r-f stage is used ahead of the first detector. The functions of oscillator and detector are performed by two separate tubes. One i-f stage is employed and designed to operate at 460 kc. The combined second detector and a.v.c. stage uses an RCA-6H6 double diode. The audio system consists of two single amplifier stages working in cascade with a push-pull power output stage. The loudspeaker is an electrodynamic type, receiving its field supply from the rectifier and filter system and simultaneously acting as a filter reactor. Full wave rectification is performed in the RCA-5Z3 tube. The outstanding features of electrical design are concerned with the following:

Tuned Circuits

A total of seven circuits are tuned to provide gain and selectivity to the incoming signal. The variable gang condenser resonates the antenna transformer secondary, the detector transformer secondary and the oscillator coil. Alignment trimmers are included for each of these same circuits. Additional trimmers are used on the i-f transformers, tuning both the secondaries and primaries to 460 kc. There are separate groups of antenna, detector and oscillator coils for each of the tuning ranges. They are placed into operation by means of a rugged rotary switch.

First Detector

This stage has unusually good high frequency mixing efficiency. The tube used, an RCA-6L7, is a new hexode type. The signal is supplied to the first control grid and the oscillator is fed in on a second control grid, a screen grid separating the two. The arrangement of the grids prevents degenerative difficulties, particularly at the higher frequencies. The second grid is direct-connected to the cathode of the oscillator tube and has no d-c bias.

Oscillator

The oscillator circuit is worthy of careful study inasmuch as it is different from the type ordinarily employed. It has self-stabilizing properties which are very advantageous for short wave operation. The generated frequency remains substantially constant, the circuit being unaffected by variation of line voltage and other similar influences. Output also remains uniform over the individual tuning ranges. The switching of the tuning coils is arranged so as to short those not in use in order to prevent absorption or any reactive effects in the particular band being tuned.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f system is detected by an RCA-6H6 double diode tube. The audio frequency secured by this process is passed on to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal, is used for automatic volume control. This voltage, which develops across resistors R-7 and R-8, is applied as automatic control grid bias to the r-f, first detector and i-f tubes through suitable resistance-capacitance filter circuits. The second diode of the RCA-6H6 is used to supply residual bias for these controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current, which flows through resistors R-7, R-8 and R-9, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias diode ceases to draw current and the a.v.c. diode takes over the biasing function. The cathode and anode of the signal-a.v.c. diode have positive potential in respect to chassis-ground and cathodes of the a.v.c. controlled tubes when no signal is being received.

Audio System

Manual volume control of the detected signal is effected by an acoustically tapered potentiometer in the grid circuit of the first a-f stage. This control has tone compensating filters connected to two points thereon. These filters effect the correct aural balance at different volume settings. A music-speech switch (low frequency tone control) is associated with one of the compensation filters. The purpose of this control is to make speech reproduction more intelligible and to reduce hum obtained from stray modulation on a carrier. The driver stage of the audio system uses an RCA-6C5 which is resistance coupled to the first a-f tube and transformer coupled into the push-pull power output stage.

SERVICE DATA

The various diagrams of this booklet contain such information as will be needed to isolate causes for defective operation when such develops. The ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles such as R-3, L-2, C-1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Ratings of less than one ohm are generally omitted.

Alignment Procedure

Eleven alignment trimmers are provided in the r-f, first detector and oscillator tuning system and four are used in the i-f system. All of these are accurately adjusted during manufacture and should remain in proper alignment unless affected by abnormal conditions of climate or have been altered by other means. Loss of sensitivity, improper tone quality and poor selectivity are the usual indications of improper alignment.

Correct performance of the receiver can only be obtained when the trimmer adjustments have been made by a skilled service man with the use of adequate and reliable test equipment. Such apparatus as may be required for alignment of this particular instrument is illustrated and described on a separate page of this booklet.

Two methods of alignment are applicable. One utilizes a Cathode-Ray Oscillograph as a means of output indication and the other follows former procedure where a glow type indicator or meter is used.

The oscillographic method is much to be preferred, since greater accuracy is possible from the type of indication afforded. There are no approximations necessary as with the meter or aural method, but each adjustment can be made with definite precision. Both methods are hereinafter outlined so that alignment operations may be made according to the equipment available.

It is wise to determine the necessity for alignment as well as the direction of misalignment before making adjustments. The RCA Tuning Wand is an instrument designed particularly for such a purpose.

The Tuning Wand consists of a bakelite rod having a small brass cylinder at one end and a core of finely divided iron at the other. It may be inserted into a tuned coil while a signal of the normal resonant frequency is being supplied to such coil to obtain an indication of the tuning. Holes are provided at the top of the r-f shield cans for entrance of the Wand. The presence of either end of the Wand will cause a change in tuning which will be indicated at the receiver output as an increase or decrease in signal level. If there is a decrease of output when either end is inserted, the tuning is correct and will require no adjustment. However should there be an increase of output due to the iron core and decrease with the brass cylinder, an increase in inductance or capacitance is indicated as necessary to bring the circuit into line. The trimmer involved should therefore be increased accordingly. If the brass cylinder end causes an increase in output while the iron end causes a decrease, reduction of inductance will be necessary to place the circuit in alignment. This is equivalent to decreasing the trimmer concerned. The following tabulation gives the various changes and the adjustments required:

Wand	Signal	Trimmer
Brass	Decrease	None
Iron	Decrease	
Brass	Increase	Decrease
Iron	Decrease	
Brass	Decrease	Increase
Iron	Increase	

Dial Adjustment

Figure 10 illustrates the relations of the various parts of the dial mechanism when it is in its A—Broadcast position and the range switch is likewise turned to its Band A setting. In re-assembling the dial after repairs, see that the gears are meshed in accordance with the diagram, at the same time noting that the lever which is attached to the range-switch shaft is in the position as shown.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to chassis on Figure 5 will serve to assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1000 ohms per volt will be satisfactory when the range used for each reading is chosen as high as possible consistent with good readability.

Automatic Record Ejector

The record changing mechanism is designed to be simple and fool-proof. Under normal operating conditions, service difficulties should be negligible. Occasionally, however, certain adjustments may be required. These adjustments are illustrated and explained in Figure 9.

It is important when servicing the automatic mechanism, to have it placed on a level support. It is also important to refrain from forcing the mechanism if there is a tendency to bind or jam, since bent levers and possibly broken parts may result.

The tip of the record ejector is adjustable in relation to the turntable spindle, the two being exactly coaxial when properly adjusted. To align the tip, remove the rubber silencer of the ejector assembly, loosen ejector tip retaining nut and slide the tip assembly to the position where it is in true-line with the axis of the turntable spindle. This adjustment may be simplified by placing several records on the turntable, depressing the spindle through the top record hole and lining up the ejector tip in the spindle hole of the record.

To insure that the ejector tip rotates freely, apply a slight amount of oil to the shank of the tip at the point where it is in contact with the ball bearing.

Magnetic Pickup

The pickup used in the phonograph unit is of an improved design, having several variations from the usual type of pickup. The magnetic assembly is one rigid piece. The horseshoe magnet is solidly welded to the pole pieces and is irremovable. There is a centering spring attached to the armature to maintain proper adjustment and provides a damping effect on the movement of the armature. The frequency response is uniform over a wide range.

Service operations which may be necessary on the pickup are as follows:

MODEL D11-2
Alignment

RCA MFG. CO., INC.

CATHODE-RAY ALIGNMENT

Equipment

A standard source of alignment frequencies is required. Such a source should consist of an RCA Full Range Oscillator, Stock No. 9595. Output indication should be by means of an RCA Stock No. 9545 Cathode-Ray Oscillograph. An RCA Stock No. 9558 Frequency Modulator will be needed to sweep the generated signal and synchronize it with the Oscillograph in order to obtain visual representation of the resonant characteristic of the circuit being tuned on the cathode-ray fluorescent screen.

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 5. Each must be aligned to a basic frequency of **460 kc.** The last transformer must be aligned firstly and the first transformer aligned secondly. For such a process, it is necessary to feed the output of the Full Range Oscillator to the stages in their order of alignment, adjusting the trimmers of each transformer and observing the effect at the second detector output on the Cathode-Ray Oscillograph. The proper point of connection of the Oscillograph is with its vertical "high" input terminal attached to the juncture of R-7 and R-8, as illustrated in Figure 5, and with the "0" or ground terminal to the chassis. The "Ext. Sync." terminals of the Oscillograph should be connected to the Frequency Modulator as shown by Figure 4. A .001 mfd. capacitor installed in series with the Oscillator "Ant." lead will prevent the voltages of the stage under alignment from becoming upset. The vertical "A" amplifier should be "On" for the ensuing adjustments and its gain control kept at maximum. For each adjustment, the Oscillator output must be regulated so that the image obtained on the Oscillograph screen will be of the minimum size convenient for accurate observation. Proceed further as follows:

(a) Place the receiver, Oscillograph and test Oscillator in operation. Set the receiver range switch to Band "A" and tune the station selector to a point where no interference will be encountered from signal pickup or from the RCA-6J7 oscillator, removing the tube if necessary. Set the Oscillograph horizontal "B" amplifier to "Timing" and control its gain so that the luminescent spot sweeps a straight line trace completely across the screen. Place the timing control to "Int." Adjust the intensity and focusing controls of the Oscillograph to produce the correct size and strength of spot.

(b) Attach the output of the test Oscillator between the control grid cap of the RCA-6K7 i-f tube and chassis ground as shown typically by Figure 4. Tune the Oscillator to **460 kc.** and set its modulation switch to "On." Regulate its output until the signal produces a wave pattern on the Oscillograph screen, adjusting the Oscillograph controls to give a shape which is convenient for peak indications. Cause the image to stand still on the screen by manipulation of the frequency and synchronizing controls. Then carefully tune the two trimmers C-20 and C-21 of the second i-f transformer to produce maximum amplitude (vertical deflection) of the oscillographic image. Under this condition the transformer will be sharply resonated to 460 kc.

(c) The Frequency Modulator should then be placed in operation and interconnected with the Full Range Oscillator by means of the special shielded patch cord. Figure 4 shows the proper arrangement. Set the Frequency Modulator sweep range switch to its "Lo" position and turn the Oscillator modulation switch to "Off." Change the timing control of the Oscillograph to "Ext." and place the range switch to its No. 2 position. Then carefully shift the tuning of the Oscillator so as to increase its frequency, until two distinct and similar waves appear on the Oscillograph screen and become exactly coincident at their highest points. This condition will be found to occur at an Oscillator setting of *approximately* **540 kc.** The curves will be identical in shape but appearing in reversed positions. Adjust the frequency control of the Oscillograph in order to cause the waves to conform with the above requirement and to make them remain motionless on the screen. This will require a setting of approximately ½ clockwise rotation of the frequency control. The trimmers C-20 and C-21 should then be re-adjusted so that the two curves move together and become exactly coincident throughout their lengths, maintaining the maximum amplitude at which this condition can be brought about.

(d) Leaving the equipment connected and adjusted as in (c), change the Oscillator output to the control grid cap of the RCA-6L7 first detector tube. Then adjust the first i-f transformer trimmers C-16 and C-17 so that the forward and reverse waves appearing on the Oscillograph coincide throughout their lengths and have maximum amplitude. The shape of the composite wave obtained from this operation is a true representation of the overall tuning characteristic of the i-f system.

R-F Trimmer Adjustments

For Bands A and X, adjustments must be made at the high and low frequency ends of the range. On Band C, alignment is required only at the high frequency end.

Locations of the various antenna, detector and oscillator coil trimmers are shown by Figure 5. The test Oscillator should be removed from connection with the i-f system and its output connected to the antenna-ground terminals of the receiver. No changes are to be made in the connections of the Oscillograph at the second detector. During the following adjustments, the Oscillator output should be regulated as often as is necessary to keep the oscillographic image as low as is practically observable. Adherence to this procedure will obviate the broadness of tuning that would result from a.v.c. action on a stronger signal. Proceed with the adjustments as follows:

Calibration

Set the receiver range switch to Band A and rotate the station selector until the tuning condenser plates are in full mesh (maximum capacitance). Then move the main dial pointer until it points exactly to the horizontal line at the low frequency end of the Band A scale. Correct the setting of the vernier second hand pointer to read zero.

Band A

(a) With the receiver range switch in its Band A position, tune the station selector until the dial pointer is at a reading of **1720 kc.** Adjust the test Oscillator to **1720 kc.** (modulation "On" and Frequency Modulator disconnected) and increase its output to produce a registration on the Oscillograph. Carefully align the oscillator, detector and antenna trimmers, C-47, C-12 and C-3 respectively, so that each brings about maximum amplitude of output as shown by the wave on the Oscillograph. It will be necessary to have the timing control of the Oscillograph on "Int." for this operation. After each trimmer has been peaked, the Oscillograph timing control should be set to "Ext." and the Frequency Modulator placed into operation with its connections to the Oscillator and Oscillograph made in accordance with Figure 4. Turn the modulation switch of the Oscillator to "Off" and retune the Oscillator (increase frequency) until the forward and reverse waves show on the Oscillograph and become coincident at their highest points. Adjust the trimmers C-47, C-12 and C-3 again, setting each to the point which produces the best coincidence and maximum amplitude of the wave images.

(b) Remove the Frequency Modulator cable from the Oscillator and shift the signal frequency to **600 kc.** Place the modulation switch to "On". Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then insert the Frequency Modulator plug and retune the Oscillator (modulation "Off") until the two similar forward and reverse waves appear on the screen. For this adjustment, it is advisable to shift the Oscillator to its 200-400 kc. range using the third harmonic of the generated signal in order to obtain the desired range of sweep. The oscillator series trimmer, C-46, should then be adjusted to produce maximum amplitude of the images. No rocking will be necessary on the station selector inasmuch as the signal frequency is being "wobbled" by the Frequency Modulator to produce the same effect. After completing this adjustment, the trimmer C-47 should be re-aligned as in (a) to correct for any change brought about by the adjustment of C-46.

Band X

(a) Disconnect the Frequency Modulator and tune the test Oscillator to a frequency of **400 kc.** (Modulation "On") Place the receiver range switch in its Band **X** position and turn the station selector until the dial pointer reads **400 kc.** Adjust the Oscillograph timing control to "Int." Then align each of the trimmers C-45, C-11 and C-2 to the point producing maximum output at the Oscillograph. Place the Frequency Modulator in operation and attach it to the Oscillator in the normal manner. Change the Oscillograph timing to "Ext." Increase the frequency of the Oscillator (modulation "Off") until the two waves appear and become coincident at their highest points, *approximately at* **462 kc.** They may be made to remain stationary on the screen by manipulation of the Oscillograph range switch and frequency control. Readjust the three trimmers C-45, C-11 and C-2 to give maximum amplitude and complete coincidence of the waves.

(b) Change the test Oscillator so that it delivers a signal of **150 kc.** with the Frequency Modulator disconnected. Tune this signal on the receiver which has previously been set to Band X, disregarding the dial reading at which the signal is best received. Then interconnect the Frequency Modulator with the Oscillator and retune the latter to the point at which the two similar waves appear on the screen. Adjust trimmer C-61, for maximum amplitude of the wave images. Rocking of the tuning condenser will not be necessary as the Frequency Modulator duplicates such an operation. Repeat the alignment of C-45 as outlined in (a) to correct for any reflective error brought about by the adjustment of C-61.

Band C

(a) Turn the range switch of the receiver to its Band C position and tune the station selector until the dial pointer reads **18,000 kc.** Set the test Oscillator to the same frequency (modulation "On" and Frequency Modulator disconnected) and regulate its output to the level required for convenient observation. Adjust the trimmer C-43 to the point producing maximum output as indicated on the Oscillograph. Check for the presence of the proper "image" signal by tuning the receiver to **17,080 kc.** The **18,000 kc.** signal of the Oscillator will be received at this point if the adjustment of C-43 has been properly made by using the position of least capacitance which gives maximum receiver output. It may be necessary to increase the output of the Oscillator in order to get an indication of the "image". *No adjustments should be made during this check.*

(b) Return the receiver tuning to **18,000 kc.**, realign C-43 if necessary, and then adjust the detector and antenna trimmers, C-10 and C-1, for maximum signal output as evidenced by the oscillographic image. No further adjustments are to be made on this band.

OUTPUT INDICATOR ALIGNMENT

To align the receiver by means of an output indicator other than a Cathode-Ray Oscillograph will require the use of a standard test Oscillator, such as that recommended above, for the source of signals and means of indication for the output. The RCA Neon Output Indicator, Stock No. 4317, will be found very satisfactory for such use. It should be connected across the voice coil circuit of the loudspeaker or across the output transformer primary.

I-F Alignment

Connect the test Oscillator to the control grid cap of the i-f tube. Advance the volume control of the receiver to its full-on position. Tune the test Oscillator accurately to **460 kc.** and align the trimmers C-20 and C-21 to give maximum receiver output. Regulate the Oscillator output during this adjustment so that the output indication is as small as can be conveniently observed. After completing the adjustments of these trimmers, re-connect the Oscillator so that it will feed into the control-grid circuit of the RCA-6L7 first detector. Then tune the first i-f transformer trimmers C-16 and C-17 for maximum receiver output.

R-F Alignment

After completing the i-f adjustments, it is advisable to correct the line-up of the circuits ahead of the first detector. The test Oscillator should be connected to the antenna-ground terminals of the receiver and the manual volume control turned to its maximum position. For each adjustment, the Oscillator output should be maintained as low as possible in order to avoid broadness of tuning which would result from a.v.c. action on a stronger signal.

Band A—This band should be aligned by supplying a **1720 kc.** signal to the receiver, tuning the station selector to a dial reading of **1720** and adjusting the trimmers C-47, C-12 and C-3 to produce maximum receiver output. The Oscillator should then be shifted to **600 kc.** and the receiver tuned to resonate this signal, disregarding the reading at which it is best received. Trimmer C-46 must then be adjusted, simultaneously while rocking the station selector backward and forward through the signal until the maximum output results from the combined operations. C-47 should be rechecked to assure that its adjustment has not changed because of the trimming of C-46.

Band X—Change the range switch to its Band "X" position. Tune the receiver to read **400 kc.** and set the Oscillator to **400 kc.** Adjust trimmers C-45, C-11 and C-2 to produce maximum receiver output. Then shift the Oscillator frequency to **150 kc.** and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then tune the oscillator series trimmer, C-61, simultaneously rocking the tuning control (receiver) backward and forward through the signal, until maximum output results from the combined operations. Repeat the alignment of C-45 as in (a) to correct for any change caused by the adjustment of C-61.

Band C—Change the receiver so that it is operative and the dial reads **18,000 kc.** on the "C" Band. Tune the test Oscillator to this same frequency. Then adjust the oscillator trimmer C-43 to produce maximum (peak) output. Two positions of this trimmer will be found which conform with this requirement. The one of least capacitance is correct. Check for the presence of "image" response at **17,080 kc.** by shifting the receiver tuning. If it is received at such a point, the trimmer C-43 has been correctly adjusted to the right peak. *No adjustments are to be made during this check.* Tune the receiver back to the **18,000 kc.** dial marking, readjust C-43 if necessary, and then tune the detector and antenna capacitors C-10 and C-1 for maximum receiver output. No further adjustments are necessary.

Standard Transformer

The transformer used on some models of this instrument is adaptable for voltages and frequencies as given under Ratings A and B of Electrical Specifications. Its schematic and wiring are shown by Figure 7.

Centering Armature

Refer to Figure 11 showing the pickup inner structure. The armature is shown in its proper relation to the magnet pole pieces, i. e., exactly centered. Whenever this centering adjustment has been disturbed, the screws A, B, and C should be loosened and the armature clamp adjusted to the point where the vertical axis of the armature is at right angles to the horizontal axis of the pole pieces, and centered between them. This centering operation may be facilitated by inserting a small rod or nail into the armature needle hole, using it as a lever to test the angular movement of the armature. The limitations of the movement in each direction will be caused by the armature striking the pole pieces. The proper adjustment is obtained when there is equal angular displacement of the armature and adjustment rod or nail to each side of the vertical axis of the magnet and coil assembly. The screws A and B should then be secured, observing care not to disturb the adjustment of the armature clamp. Then place the pickup in a vise and secure the centering spring-clamp by means of the screw C, allowing the centering spring to remain in the position at which the armature is exactly centered between the pole pieces. With a little practice, the correct adjustment of the armature may be readily obtained. The air gap between the pole pieces and the armature should be kept free from dust, filings, and other such foreign materials which would obstruct the movement of the pickup armature.

Damping Block

The viscoloid block which is attached to the back end of the armature shank serves as a mechanical filter to eliminate undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block, it may be done by removing screw D and the cover support bracket from the mechanism and taking off the old viscoloid block. The surface of the armature which is in contact with the viscoloid should be thoroughly cleaned with fine emery cloth. Then insert the new block so that it occupies the same position as it did originally. Make certain that the block is in correct vertical alignment with the armature. The hole in the new viscoloid block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the viscoloid aligned on the armature, screw D and the cover support bracket should then be replaced. Heat should be applied to the armature (viscoloid side) so that the viscoloid block will fuse at the point of contact and become rigidly attached to the armature. A special-tip soldering iron constructed as shown in Figure 12 will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block and cause a small bulge on both sides.

Replacing Coil

Whenever there is defective operation due to an open or shorted pickup coil, this coil should be replaced. The method of replacement will be obvious upon inspection of the pickup assembly and by study of the cut-a-way illustrations. Make sure that the new coil is properly centered with the hole in the support strip and glued securely in that position. It is important to readjust the armature as previously explained after re-assembly of the mechanism. Only rosin core solder should be used for soldering the coil leads in the pickup. This same type of solder should be used when necessary for soldering the centering spring to the armature.

Magnetizing

Loss of magnetization will not usually occur when the pickup has received normal care, due to the fact that the magnet and pole pieces are one unit and the magnetic circuit remains closed at all times. When the pickup has been mishandled, subjected to a strong a-c field, jolted, or dropped, there may be an appreciable loss of magnetic strength, in which case it will be necessary to re-magnetize the entire structure. This should be done by first removing the pickup cover and then placing the pickup assembly on the poles of a standard pickup magnetizer such as the RCA Pickup Magnetizer, Stock No. 9549, and charging the pickup in accordance with the instructions accompanying the magnetizer. It is recommended that the pickup be magnetized with the armature in place. This will require that one pole piece on the pickup magnetizer be rotated 180 degrees. This gives the desired clearance for the armature clamp assembly. It is preferable to check the polarity of the pickup magnet and to remagnetize it so that the same polarity is maintained.

RCA MFG. CO., INC.

MODEL D11-2
Parts List

REPLACEMENT PARTS

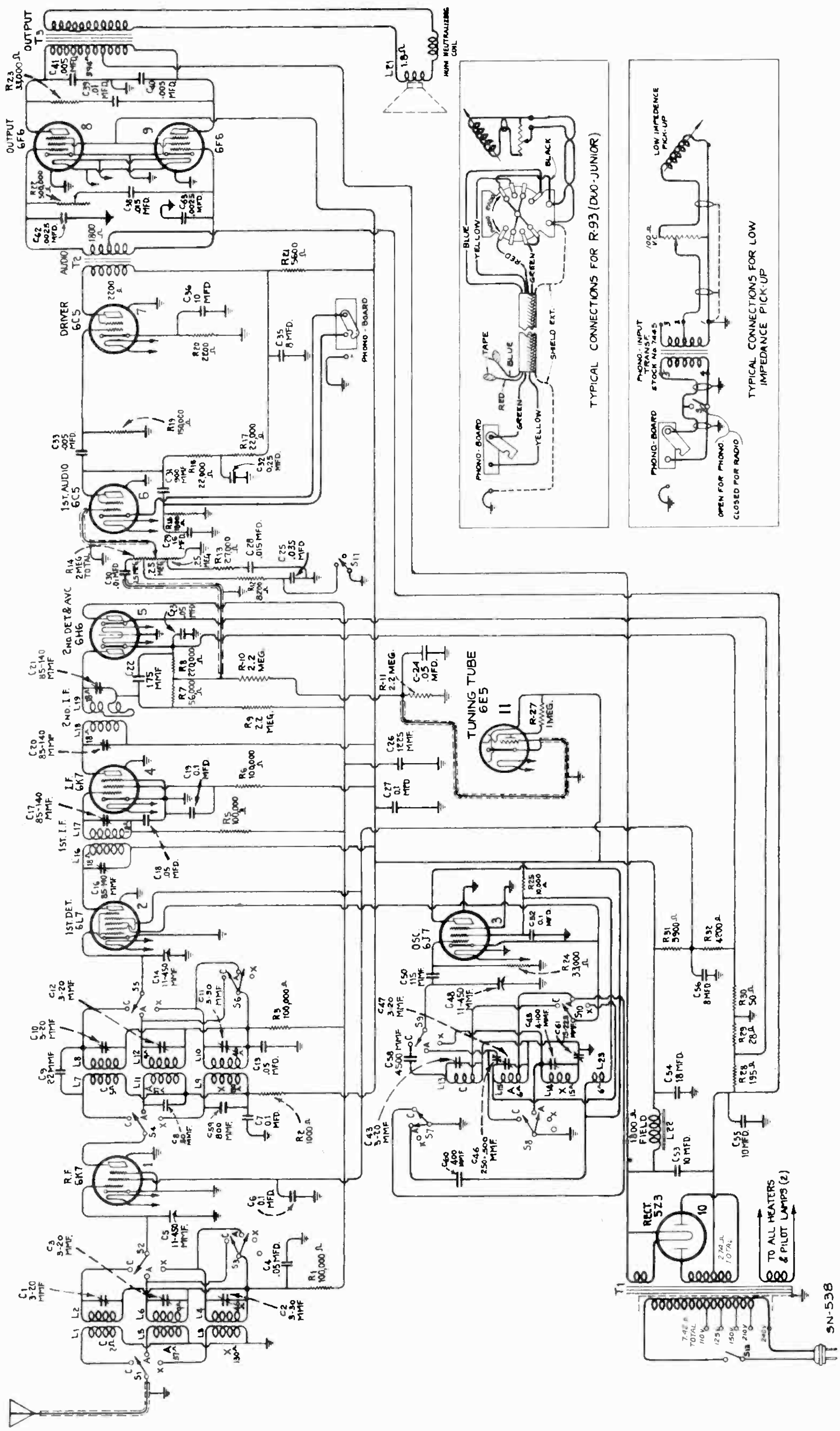
Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
4427	Bracket—High or low frequency tone control or volume control mounting bracket	$0 18
5237	Bushing—Variable condenser mounting bushing assembly—Package of 3	.43
11524	Cable—Two conductor cable with two prong male sections of connector plug	.36
11712	Cable—Shielded three conductor cable from volume control (R14) to "C" of No 4 socket, "G" of No. 6 socket and input transformer	1 24
11713	Cable—Shielded two conductor volume control cable	.80
11223	Capacitor—Adjustable capacitor (C46)	.46
5241	Capacitor—Adjustable capacitor (C61)	.40
11292	Capacitor—22 MMfd (C9)	.24
11289	Capacitor—50 MMfd (C8)	.26
11291	Capacitor—115 MMfd. (C50)	.24
11290	Capacitor—400 MMfd (C60)	.25
11317	Capacitor—600 MMfd (C34)	.30
11269	Capacitor—800 MMfd (C59)	.30
3784	Capacitor—900 MMfd (C31)	.30
11316	Capacitor—1225 MMfd (C26)	.40
11287	Capacitor—4500 MMfd. (C58)	.30
5107	Capacitor—.0025 Mfd (C62, C63)	.16
4838	Capacitor—0.005 Mfd. (C40, C41)	.20
4868	Capacitor—0.005 Mfd. (C33)	.20
4624	Capacitor—0.01 Mfd (C30)	.54
4937	Capacitor—0.01 Mfd. (C39)	.25
4858	Capacitor—.01 Mfd. (C24*)	.25
11315	Capacitor—0.015 Mfd (C38)	.20
5196	Capacitor—.035 Mfd. (C57)	.18
4886	Capacitor—0.05 Mfd. (C24*)	.20
4836	Capacitor—0.05 Mfd. (C4, C13, C18, C23)	.30
4835	Capacitor—0.1 Mfd. (C64)	.28
4885	Capacitor—0.1 Mfd. (C7, C19, C27, C52)	.28
4841	Capacitor—0.1 Mfd (C6)	.22
5170	Capacitor—0.25 Mfd. (C32)	.25
11203	Capacitor—10 Mfd. (C53)	1.18
5212	Capacitor—18 Mfd. (C54)	1.16
11215	Capacitor pack—Comprising one 16 Mfd., two 10 Mfd., and two 8 Mfd. capacitors (C29, C35, C36, C55, C56)	3.85
11201	Clamp—Cable clamp—located near variable tuning condenser—Package of 5	.20
11272	Clamp—Cable clamp—located above antenna terminal	.10
4693	Clamp—Electrolytic capacitor clamp—for stock No. 11215	.15
5215	Coil—Antenna coil—A and C bands (L1, L2, L5, L6, C1, C3)	2.32
11325	Coil—Antenna coil—X band (L3, L4, C2)	1.56
5216	Coil—Detector coil—A and C bands (L7, L8, L11, L12, C10, C12)	2 34
11326	Coil—Detector coil—X band (L9, L10, C11)	1.60
5217	Coil—Oscillator coil—A and C bands (L13, L15, C43, C47)	2 20
11327	Coil—Oscillator coil—X band (L14, L23, C45)	1.44
11320	Coil—Choke coil (L20)	1.00
11318	Capacitor Pack—Comprising one 0.015 Mfd., one .05 Mfd. capacitor, one 27,000 ohm and one 10,000 ohm resistor—(C25, C28, R12, R13)	1.30
5214	Condenser—Three gang variable tuning condenser (C5, C14, C48)	4.42
11205	Volume Control (R14)	1.30
11219	Tone Control—High frequency tone control (R22)	.90
4153	Connector—Four contact female connector for cables, stock Nos. 11712 and 11713	.48
11710	Lead—Shielded antenna lead	.40
8041	Plate—I. F. or R. F. coil shield locking plate with screw—Package of 2	.12
11220	Resistor—Voltage divider resistor—Comprising one 3900 ohm and one 4200 ohm section (R31, R32)	.84
11221	Resistor—Voltage divider resistor—Comprising one 50 ohm, one 28 ohm and one 195 ohm section (R28, R29, R30)	.48
5112	Resistor—1000 ohm—Carbon type—1/4 watt (R2)—Package of 5	1.00
3706	Resistor—1800 ohm—Carbon type—1/4 watt (R15)—Package of 5	1.00
5159	Resistor—2200 ohm—Carbon type—1/4 watt (R20)—Package of 5	1.00
5175	Resistor—5600 ohm—Carbon type—1/2 watt (R21)—Package of 5	1.00
2731	Resistor—10,000 ohm—Carbon type—1 watt (R25)—Package of 5	1.10
11305	Resistor—22,000 ohm—Carbon type—1/4 watt (R16, R17)—Package of 5	1.00
11300	Resistor—33,000 ohm—Carbon type—1/10 watt (R24)—Package of 5	.75
5033	Resistor—33,000 ohm—Carbon type—1 watt (R23)—Package of 5	1.10
3118	Resistor—100,000 ohm—Carbon type—1/4 watt (R1, R3, R5, R6)—Package of 5.	1.00
5027	Resistor—150,000 ohm—Carbon type—1/4 watt (R19)—Package of 5	1.00
11151	Resistor—2 2 megohms—Carbon type—1/4 watt (R9, R10, R11)—Package of 5	1.00
5249	Shield—R. F. coil shield	.20
11273	Shield—Radiotron shield	.25
5250	Shield—I. F. transformer shield	.22
11199	Socket—Dial lamp socket	.14
4794	Socket—4-contact Radiotron socket	.15
11197	Socket—6-contact Radiotron socket	.14
11198	Socket—7-contact Radiotron socket	.15
5224	Switch—Low frequency tone control switch and power switch (S11, S13)	1.00
11236	Switch—Range switch (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S12)	2.44
5238	Terminal—Antenna terminal assembly	.14
11218	Transformer—Audio driver transformer (T2)	2.58
11216	Transformer—First intermediate frequency transformer (L16, L17, C16, C17)	2.15
11217	Transformer—Second intermediate frequency transformer (L18, L19, C20, C21, C22, R7, R8)	3.10
11213	Transformer—Power transformer—105-125-150-210-250 volts—40-60 cycles (T1)	5.10
11212	Transformer—Power transformer—105-125 volts—25-60 cycles	7.18
	DRIVE ASSEMBLIES	
5243	Arm—Band indicator operating arm	.42
10194	Ball—Steel ball for drive assembly—Package of 20	.25
8054	Cam—Five position cam for station selector drive assembly	.28
4422	Clutch—Tuning condenser drive clutch assembly—Comprising shaft, balls, ring, spring and washers, assembled	1.00
8048	Coupling—Flexible coupling for variable capacitor (includes indicator shaft)	.70
11693	Dial—Station selector dial and cam assembly	1.00
8045	Disc—Drive disc and gear assembly	.46
11692	Drive—Tuning condenser drive assembly, complete	6.45
8044	Escutcheon—Dial escutcheon with vernier scale	1 08
8046	Gear—Indicator shaft drive gear and vernier idler with one spring	.72
8050	Gear—Gear sector and band indicator operating link (link connects to arm on band switch)	.15
8053	Indicator—Station selector indicator pointer	.12
8051	Link—Complete with roller and spring	.30
8049	Pinion—Vernier pointer drive pinion and shaft	.55
4669	Screw—Square head No. 8-32x5/32 set screw—Package of 10	.25
1047	Spring—Coil spring for indicator shaft drive gear and vernier idler (stock No. 8046)	.12
8052	Spring—Coil spring for link—Package of 5	.32
8042	Stud—Band indicator operating arm stud—Package of 5	.25
	EJECT ARM ASSEMBLIES	
11541	Arm—Eject arm, complete	.82
11533	Ball—3/16-inch diameter steel ball—Package of 10	.20
10129	Ball—3/16-inch diameter steel ball—Package of 20	.25
11529	Bearing—Ejector tip bearing and nut	.32
11538	Bracket—Eject arm bracket	1.72
11537	Collar—Eject arm shaft collar and set screw	.24
11540	Cover—Eject arm cover	1.52
11536	Cushion—Counter balance roller cushion—Located inside of eject arm	.14
4055	Post—Vertical adjustment post—Located on eject arm bracket	.30
3729	Roller—Eject arm counter balance roller—Located inside of eject arm	.45
4580	Screw—No. 6—32—3/16-inch square head set screw for eject arm collar—Package of 10	.25
11534	Screw—No. 8—36—7/32-inch special screw for eject arm tip center adjustment—Package of 10	.14
11535	Shaft and Collar—Eject arm vertical action shaft and collar assembly	.15
11528	Silencer—Ejector tip silencer	.14
4067	Spring—Eject arm bracket spring—Package of 10	.30
11531	Spring—Ejector tip spring—Package of 10	.42
11530	Tip—Ejector tip with tip center, adjusting screw and cap	.32
11539	Yoke—Eject arm yoke assembly	.94
	PICKUP AND ARM ASSEMBLIES	
11720	Arm—Pickup arm, complete—less escutcheon and pickup unit	4.65
11724	Armature—Pickup armature	.38
11548	Back—Pickup back	.52
11722	Coil—Pickup coil (L24)	.52
11545	Cover—Pickup front cover	.22
11546	Cover—Pickup back cover with mounting screws	.14
3737	Damper—Pickup damper—Package of 5.	.65
3516	Damper—Damper assembly for pickup arm base—Comprising one upper and one lower damper—one upper bushing and one lower bearing	.14
11723	Escutcheon—Pickup arm escutcheon	.62
11721	Pickup—Pickup unit, complete	4.75
11549	Screw—Pickup front cover screw—Package of 10	.42
3387	Screw, nut and washer for mounting pickup to arm—Package of 10	.40
11547	Screw—Pickup needle screw—Package of 10	.42
	OPERATING MECHANISM	
5502	Cam—Cam and gear assembly	1.18
6808	Clutch—Trip lever friction clutch	.30
11558	Cover—Metal cover for trip lever and friction finger assembly	.36
6809	Finger—Manual index lever finger assembly	.25
3670	Finger—Friction finger assembly	.32
11554	Lever—Manual index lever—less pin	.62
11556	Lever—Main lever and link assembly	2.10
11557	Lever—Main spring lever	.42
3677	Lever—Pickup arm cable lever assembly—Comprising lever with cable screw, spring and nut	.40
11555	Lever—Trip lever and friction clutch assembly	.94
6503	Pawl—Trip pawl assembly	.40
4124	Plate—Eject arm actuating plate assembly.	.50
4563	Screw—Cable lever screw and nut—Package of 10	.60
4564	Screw—Manual index lever finger set screw—Package of 10	.20
4059	Screw—Trip lever clutch tension adjustment screw—Package of 10	.22
4566	Screw—Special screw used to fasten main lever and link assembly bushing—Package of 10	.30
11559	Spacer—Pickup arm mounting spacer	.28
4127	Spring—Actuating spring—Package of 10	.24
3666	Spring—Cable lever tension spring—Package of 10	.44
4565	Spring—Manual index lever finger tension spring—Package of 10	.30
4061	Spring—Main spring lever tension spring—Package of 10	.38
2893	Spring—Trip lever latch plate tension spring—Package of 10	.30
2917	Washer—Spring washer, "U" type—Package of 10	.25
	MOTOR ASSEMBLIES	
9012	Motor—105-125 volts—25 cycles (M1)	24 16
9014	Motor—105-125 volts—50 cycles (M1)	19.72
9011	Motor—105-125 volts—60 cycles (M1)	19.72
4562	Suspension Spring—Motor mounting spring, washer, and stud assembly—Comprising six springs, six cup washers, three spring washers and three studs	.58
	AUTOMATIC SWITCH ASSEMBLIES	
3994	Cover—Motor switch cover	.26
10184	Plate—Automatic brake latch plate—Package of 5	.40
10174	Springs—Automatic brake springs—Package of 2	.50
6805	Switch Assembly—Automatic switch, complete	1.90
3322	Switch—Motor switch (S15)	.75
	MOTOR BOARD ASSEMBLIES	
11553	Escutcheon—Index escutcheon engraved Manual—12-10	.44
3764	Nut—Cap nut for motor board suspension assembly—Package of 4	.40
3672	Pin—Manual index pin	.42
11551	Rest—Pickup rest	.14
3654	Roller—Pickup arm cable guide roller—Comprising bracket roller and guide pin	.34
3763	Suspension Spring—Suspension spring, washer and bolt assembly for motor board—Comprising one bolt, two cup washers, two springs, two "C" washers and one cap nut	.42
4671	Switch—Operating switch—toggle type (S14)	.72
11542	Cover—Turntable cover	.88
11599	Turntable, complete	2.90
11348	Screw—No. 8-32—7/16-in. headless cupped point set screw for knob (Stock No. 11346)—Package of 10	.32
11381	Socket—Tuning lamp socket and cover	.45
11349	Spring—Retaining spring for knob (Stock No. 11347)—Package of 5	.15
11714	Transformer—Phonograph input transformer—Comprising 1 transformer, 1 choke coil, 3 resistors and 3 capacitors (T4, L25, C65, C66, C67, R33, R34, R36)	3.96
11715	Volume Control—Phonograph volume control (S16, S17, R35)	1.55
	REPRODUCER ASSEMBLIES	
8059	Board—Reproducer terminal board (2 terminals)	.14
8060	Bracket—Output transformer mounting bracket	.14
11304	Cable—Reproducer cable—Complete with female connector	.80
8058	Clamp—Cone rim clamp—Package of 4	.44
11189	Coil—Field coil, magnet and cone housing (L22)	10.60
8056	Cone—Reproducer cone (L21)	1.58
5039	Connector—4 prong male connector plug for reproducer	.25
5040	Connector—4 contact female connector socket for reproducer cable	.25
9620	Reproducer, complete	16.32
8057	Transformer—Output transformer (T3, C42)	3.22
	MISCELLANEOUS ASSEMBLIES	
11881	Base—Phonograph compartment lamp base	.55
4391	Box—Needle box	.70
11191	Bracket—Radiotron tuning lamp mounting bracket—less clamp (Stock No. 11192)	.12
11319	Cable—Radiotron tuning lamp cable and plug—approximately 25-in. long	1.38
11716	Cable—Two conductor shielded cable—Volume control "H-J and F" to chassis cable (Stock No. 11712)	.64
11717	Cable—Five conductor shielded cable from volume control "A-B-C-D-G-K" to input transformer terminals No. 4 and No. 7.	1.14
11192	Clamp—Radiotron tuning lamp mounting clamp—less bracket (Stock No. 11191)	.12
6123	Connector—Four contact male connector plug for cable (Stock No. 11717)	.30
11570	Connector—Four contact male connector for cable (Stock No 11716)	.32
11276	Escutcheon—Radiotron tuning lamp escutcheon	.40
11379	Escutcheon—Station selector escutcheon and crystal	1.08
11346	Knob—Station selector knob—Package of 5	.75
11347	Knob—Volume control, tone control, power switch or range switch knob—Package of 5	.75
11382	Resistor—1 megohm—Carbon type—1/10 watt (R27)—Package of 5	.75
11711	Shade—Phonograph compartment lamp shade	.16

PRICES ARE SUBJECT

TO CHANGE WITHOUT NOTICE

MODEL T11-8
Schematic
Phono.,Pickup

RCA MFG. CO., INC.



Intermediate Frequency . . 460 kc.

FREQUENCY RANGES

Band X .... 140 kc.— 410 kc.
Band A .... 540 kc.— 1,800 kc.
Band C .... 5,700 kc.—18,000 kc.

Band X .....150 kc. (osc.), 400 kc. (osc., ant., det.)
Band A ....600 kc. (osc.), 1,720 kc. (osc., ant., det.)
Band C ....18,000 kc. (osc., ant., det.)

POWER SUPPLY RATINGS

Rating A ....105-125 volts, 50-60 cycles, 130 watts
Rating B ....105-125 volts, 25-60 cycles, 135 watts
Rating C ....100-130/140-160/195-250 volts, 40-60 cycles, 135 watts

POWER OUTPUT RATINGS

Undistorted Output ...... 8.5 watts
Maximum Output .... 11.5 watts

LOUDSPEAKER

Type ....8-inch Electrodynamic
Voice Coil Impedance ....2¼ ohms at 400 cycles

MODEL T11-8
Chassis Wiring

RCA MFG. CO., INC.

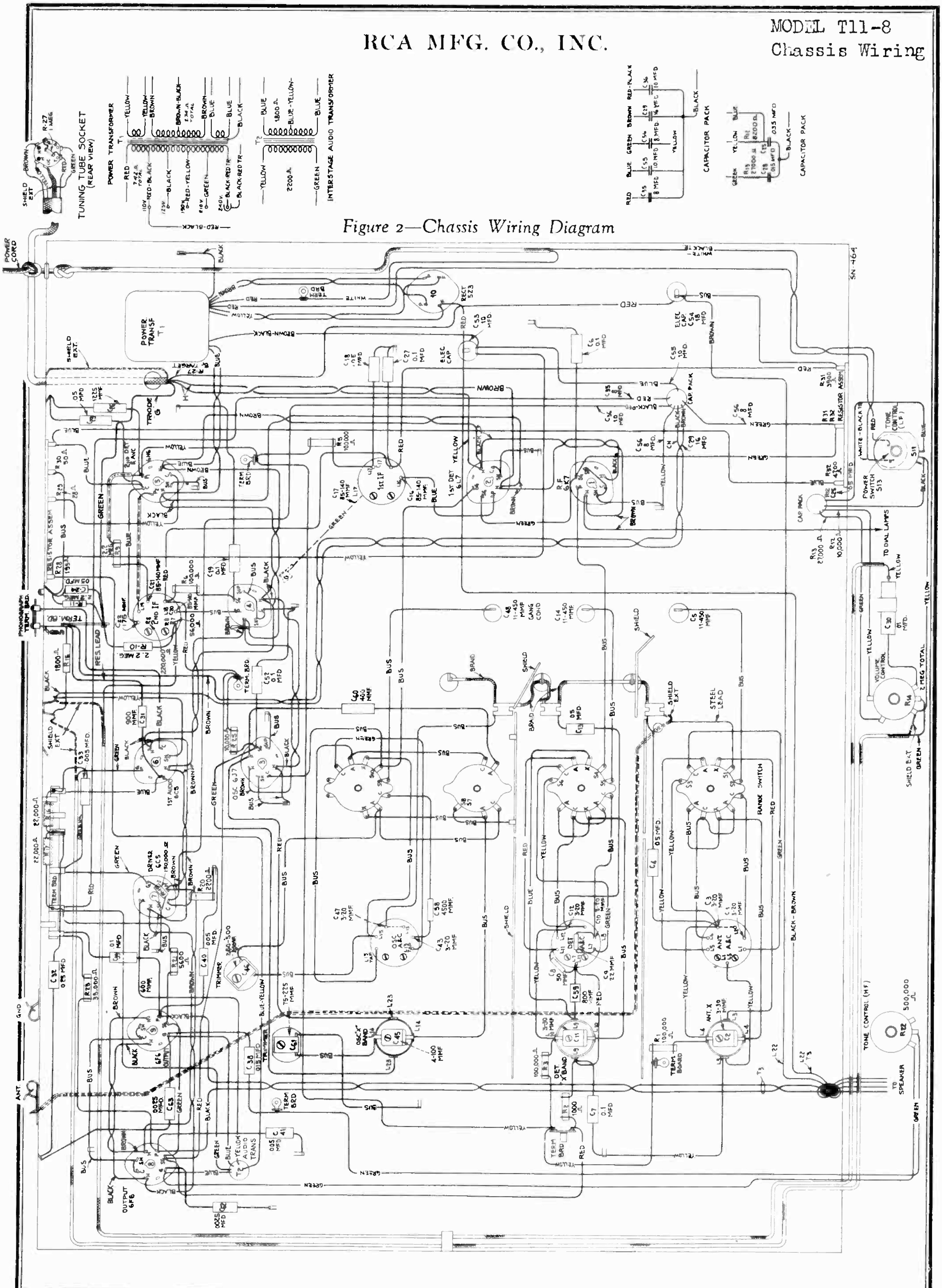


Figure 2—Chassis Wiring Diagram

MODEL T11-8
Socket, Trimmers
Voltage, Speaker
Transformer

RCA MFG. CO., INC.

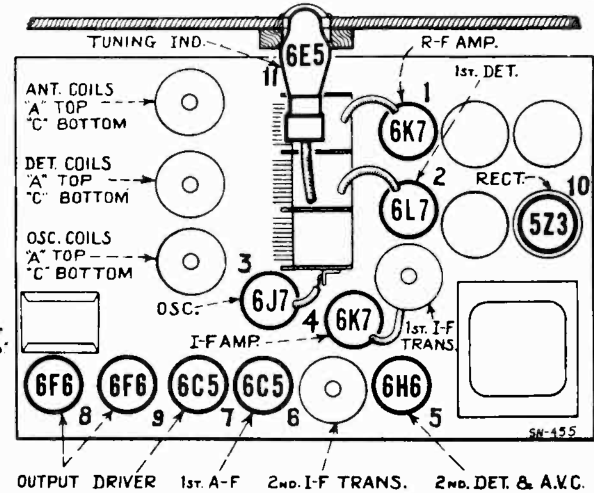


Figure 4—Radiotron and Coil Locations

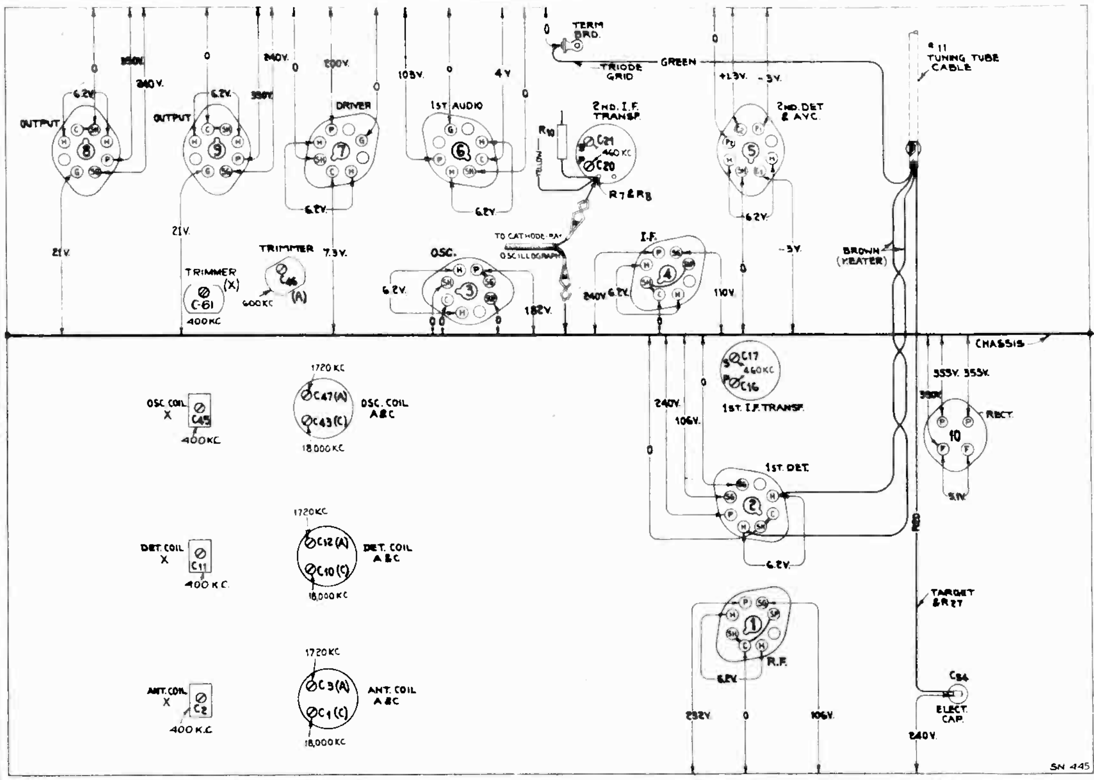
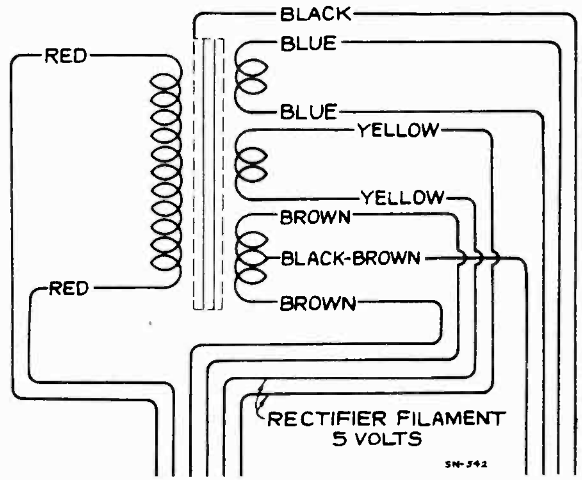


Figure 6—Trimmer Locations and Radiotron Socket Voltages
Measured at 115 volts, 60 cycles—No signal input



Pri. Res.—5.42 ohms, total
Sec. Res.—470 ohms, total

Figure 7—Standard Power Transformer Connections

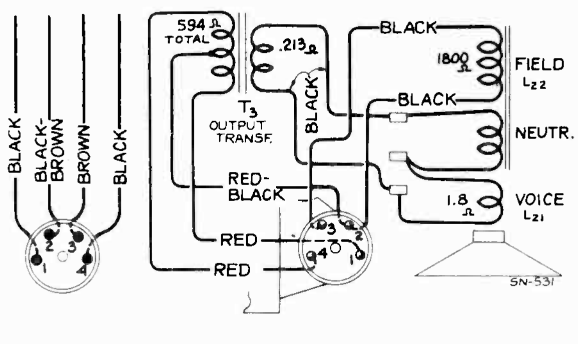


Figure 3—Loudspeaker Wiring

For Figure 5 Alignment Apparatus Connections, see Model 9K, Fig. 4

Mechanical Specifications

Height	$23\frac{3}{16}$ inches
Width	17 inches
Depth	13½ inches
Weight (Net)	48 pounds
Weight (Shipping)	60½ pounds
Chassis Base Dimensions	15½ inches x 10½ inches x 3½ inches

RCA MFG. CO., INC.

MODEL T11-8
Circuit Data
Alignment, Part 1

GENERAL FEATURES

This instrument comprises an eleven-tube chassis mounted in a table type of cabinet. Its tuning ranges cover the long wave, standard broadcast, short wave broadcast, amateur and aviation bands. The following points of design are of particular importance:

Metal Radiotrons

The new metal tubes are used in the radio receiver for amplifying and detecting purposes. These tubes make possible a greater range of stable amplification not previously attainable with corresponding glass types. Their metal envelopes form a perfect electrostatic and electromagnetic shield, precluding the former necessity for elaborate shielding by means of cans. The metal tubes are especially adaptable to the modern, extended-range receivers because of their efficient shielding and their favorable internal characteristics.

Tuning Condenser

The variable tuning condenser is supported by a new design of shock-proof mount which has been developed by our engineers to prevent chassis vibration from producing audio frequency howl.

Chassis

Servicing convenience has been a governing factor in the layout of the chassis parts and the associated wiring. Each part has been situated so that a minimum of wiring is necessary. Adjustments provided by means of substantial trimmers are mounted where they may be easily reached. Holes are included in the shield cans of the r-f coil system for testing the tuning with a Tuning Wand.

Loudspeaker

An eight-inch, electrodynamic reproducer unit is used to handle the high level output of the receiver. The speaker is designed to operate in such manner with the acoustics of the cabinet that the best quality of reproduction is obtained. Connections from the chassis to speaker are made through a plug and connector, which permits either unit to be removed quickly for service.

Color Band Dial

The station indicating dial is neatly designed with each scale identified by a different color. As the range switch is changed from one band to another, an index pointer moves so as to point to a short strip of color at the lower part of the dial to indicate the band being used. A push-in clutch arrangement gives a 10-to-1 or 50-to-1 drive ratio. The vernier pointer has a ratio of 20-to-1 with respect to the main pointer.

CIRCUIT ARRANGEMENT

The Superheterodyne principle of operation forms the basis of the circuit design. A single, tuned r-f stage is used ahead of the first detector. The functions of oscillator and detector are performed by two separate tubes. One i-f stage is employed and designed to operate at 460 kc. The combined second detector and a.v.c. stage uses an RCA-6H6 double diode. The audio system consists of two single amplifier stages working in cascade with a push-pull power output stage. The loudspeaker is an electrodynamic type, receiving its field supply from the rectifier and filter system and simultaneously acting as a filter reactor. Full wave rectification is performed in the RCA-5Z3 tube. The outstanding features of electrical design are concerned with the following:

Tuned Circuits

A total of seven circuits are tuned to provide gain and selectivity to the incoming signal. The variable gang condenser resonates the antenna transformer secondary, the detector transformer secondary and the oscillator coil. Alignment trimmers are included for each of these same circuits. Additional trimmers are used on the i-f transformers, tuning both the secondaries and primaries to 460 kc. There are separate groups of antenna, detector and oscillator coils for each of the tuning ranges. They are placed into operation by means of a rugged rotary switch.

First Detector

This stage has unusually good high frequency mixing efficiency. The tube used, an RCA-6L7, is a new hexode type. The signal is supplied to the first control grid and the oscillator is fed in on a second control grid, a screen grid separating the two. The arrangement of the grids prevents degenerative difficulties, particularly at the higher frequencies. The second grid is direct-connected to the cathode of the oscillator tube and has no d-c bias.

Oscillator

The oscillator circuit is worthy of careful study inasmuch as it is different from the type ordinarily employed. It has self-stabilizing properties which are very advantageous for short wave operation. The generated frequency remains substantially constant, the circuit being unaffected by variation of line voltage and other similar influences. Output also remains uniform over the individual tuning ranges. The switching of the tuning coils is arranged so as to short those not in use in order to prevent absorption or any reactive effects in the particular band being tuned.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f system is detected by an RCA-6H6 double diode tube. The audio frequency secured by this process is passed on to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal, is used for automatic volume control. This voltage, which develops across resistors R-7 and R-8, is applied as automatic control grid bias to the r-f, first detector and i-f tubes through suitable resistance-capacitance filter circuits. The second diode of the RCA-6H6 is used to supply residual bias for these controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current, which flows through resistors R-7, R-8 and R-9, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias diode ceases to draw current and the a.v.c. diode takes over the biasing function. The cathode and anode of the signal-a.v.c. diode have positive potential in respect to chassis-ground and cathodes of the a.v.c. controlled tubes when no signal is being received.

Audio System

Manual volume control of the detected signal is effected by an acoustically tapered potentiometer in the grid circuit of the first a-f stage. This control has tone compensating filters connected to two points thereon. These filters effect the correct aural balance at different volume settings. A music-speech switch (low frequency tone control) is associated with one of the compensation filters. The purpose of this control is to make speech reproduction more intelligible and to reduce hum obtained from stray modulation on a carrier. The driver stage of the audio system uses an RCA-6C5 which is resistance coupled to the first a-f tube and transformer coupled into the push-pull power output stage.

Tuning Indicator

A cathode-ray tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal. This tube is of new design and comprises an amplifier section and a cathode-ray section built in the same glass envelope. The cathode-ray section consists of a conically shaped luminescent screen, upon which a pattern is formed by an effect of the detected signal after said effect has been amplified by the amplifier section which is fed from the detector diode circuit. The size of the pattern is determined by the strength of the signal voltage, so that any change of tuning may be readily observed in order to facilitate tuning to exact resonance.

SERVICE DATA

The various diagrams of this booklet contain such information as will be needed to isolate causes for defective operation when such develops. The ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles such as R-3, L-2, C-1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Ratings of less than one ohm are generally omitted.

Alignment Procedure

Eleven alignment trimmers are provided in the r-f, first detector and oscillator tuning system and four are used in the i-f system. All of these are accurately adjusted during manufacture and should remain in proper alignment unless affected by abnormal conditions of climate or have been altered by other means. Loss of sensitivity, improper tone quality and poor selectivity are the usual indications of improper alignment.

Correct performance of the receiver can only be obtained when the trimmer adjustments have been made by a skilled service man with the use of adequate and reliable test equipment. Such apparatus as may be required for alignment of this particular instrument is illustrated and described on a separate page of this booklet.

Two methods of alignment are applicable. One utilizes a Cathode-Ray Oscillograph as a means of output indication and the other follows former procedure where a glow type indicator or meter is used. The oscillographic method is much to be preferred, since greater accuracy is possible from the type of indication afforded. There are no approximations necessary as with the meter or aural method, but each adjustment can be made with definite precision. Both methods are hereinafter outlined so that alignment operations may be made according to the equipment available.

It is wise to determine the necessity for alignment as well as the direction of misalignment before making adjustments. The RCA Tuning Wand is an instrument designed particularly for such a purpose.

The Tuning Wand consists of a bakelite rod having a small brass cylinder at one end and a core of finely divided iron at the other. It may be inserted into a tuned coil while a signal of the normal resonant frequency is being supplied to such coil to obtain an indication of the tuning. Holes are provided at the top of the r-f shield cans for entrance of the Wand. The presence of either end of the Wand will cause a change in tuning which will be indicated at the receiver output as an increase or decrease in signal level. If there is a decrease of output when either end is inserted, the tuning is correct and will require no adjustment. However should there be an increase of output due to the iron core and decrease with the brass cylinder, an increase in inductance or capacitance is indicated as necessary to bring the circuit into line. The trimmer involved should therefore be increased accordingly. If the brass cylinder end causes an increase in output while the iron end causes a decrease, reduction of inductance will be necessary to place the circuit in alignment. This is equivalent to decreasing the trimmer concerned. The following tabulation gives the various changes and the adjustments required.

WAND	SIGNAL	TRIMMER
Brass	Decrease	None
Iron	Decrease	
Brass	Increase	Decrease
Iron	Decrease	
Brass	Decrease	Increase
Iron	Increase	

CATHODE-RAY ALIGNMENT

Equipment

A standard source of alignment frequencies is required. Such a source should consist of an RCA Full Range Oscillator, Stock No. 9595. Output indication should be by means of an RCA Stock No. 9545 Cathode-Ray Oscillograph. An RCA Stock No. 9558 Frequency Modulator will be needed to sweep the generated signal and synchronize it with the Oscillograph in order to obtain visual representation of the resonant characteristic of the circuit being tuned on the cathode-ray fluorescent screen.

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 6. Each must be aligned to a basic frequency of 460 kc. The last transformer must be aligned firstly and the first transformer aligned secondly. For such a process, it is necessary to feed the output of the Full Range Oscillator to the stages in their order of alignment, adjusting the trimmers of each transformer and observing the effect at the second detector output on the Cathode-Ray Oscillograph. The proper point of connection of the Oscillograph is with its vertical "high" input terminal attached to the juncture of R-7 and R-8, as illustrated in Figure 6, and with the "0" or ground terminal to the chassis. The "Ext. Sync." terminals of the Oscillograph should be connected to the Frequency Modulator as shown by Figure 5. A .001 mfd capacitor installed in series with the Oscillator "Ant." lead will prevent the voltages of the stage under alignment from becoming upset. The vertical "A" amplifier should be "On" for the ensuing adjustments and its gain control kept at maximum. For each adjustment, the Oscillator output must be regulated so that the image obtained on the Oscillograph screen will be of the minimum size convenient for accurate observation. Proceed further as follows.

(a) Place the receiver, Oscillograph and test Oscillator in operation. Set the receiver range switch to Band "A" and tune the station selector to a point where no interference will be encountered from signal pickup or from the RCA-6J7 oscillator, removing the tube if necessary. Set the Oscillograph horizontal "B" amplifier to "Timing" and control its gain so that the luminescent spot sweeps a straight line trace completely across the screen. Place the timing control to "Int." Adjust the intensity and focusing controls of the Oscillograph to produce the correct size and strength of spot.

(b) Attach the output of the test Oscillator between the control grid cap of the RCA-6K7 i-f tube and chassis ground as shown typically by Figure 5. Tune the Oscillator to 460 kc. and set its modulation switch to "On." Regulate its output until the signal produces a wave pattern on the Oscillograph screen, adjusting the Oscillograph controls to give a shape which is convenient for peak indications. Cause the image to stand still on the screen by manipulation of the frequency and synchronizing controls. Then carefully tune the two trimmers C-20 and C-21 of the second i-f transformer to produce maximum amplitude (vertical deflection) of the oscillographic image. Under this condition the transformer will be sharply resonated to 460 kc.

(c) The Frequency Modulator should then be placed in operation and interconnected with the Full Range Oscillator by means of the special shielded patch cord. Figure 5 shows the proper arrangement. Set the Frequency Modulator sweep range switch to its "Lo" position and turn the Oscillator modulation switch to "Off." Change the timing control of the Oscillograph to "Ext." and place the range switch to its No. 2 position. Then carefully shift the tuning of the Oscillator so as to increase its frequency, until two distinct and similar waves appear on the Oscillograph screen and become exactly co-incident at their highest points. This condition will be found to occur at an Oscillator setting of *approximately* 540 kc. The curves will be identical in shape but appearing in reversed positions. Adjust the frequency control of the Oscillograph in order to cause the waves to conform with the above requirement and to make them remain motionless on the screen. This will require a setting of approximately ½ clockwise rotation of the frequency control. The trimmers C-20 and C-21 should then be re-adjusted so that the two curves move together and become exactly coincident throughout their lengths, maintaining the maximum amplitude at which this condition can be brought about.

(d) Leaving the equipment connected and adjusted as in (c), change the Oscillator output to the control grid cap of the RCA-6L7 first detector tube. Then adjust the first i-f transformer trimmers C-16 and C-17 so that the forward and reverse waves appearing on the Oscillograph coincide throughout their lengths and have maximum amplitude. The shape of the composite wave obtained from this operation is a true representation of the overall tuning characteristic of the i-f system.

R-F Trimmer Adjustments

For Bands A and X, adjustments must be made at the high and low frequency ends of the range. On Band C, alignment is required only at the high frequency end.

Locations of the various antenna, detector and oscillator coil trimmers are shown by Figure 6. The test Oscillator should be removed from connection with the i-f system and its output connected to the antenna-ground terminals of the receiver. No changes are to be made in the connections of the Oscillograph at the second detector. During the following adjustments, the Oscillator output should be regulated as often as is necessary to keep the oscillographic image as low as is practically observable. Adherence to this procedure will obviate the broadness of tuning that would result from a.v.c. action on a stronger signal. Proceed with the adjustments as follows:

CALIBRATION

Set the receiver range switch to Band A and rotate the station selector until the tuning condenser plates are in full mesh (maximum capacitance). Then move the main dial pointer until it points exactly to the horizontal line at the low frequency end of the Band A scale. Correct the setting of the vernier second hand pointer to read zero.

BAND A

(a) With the receiver range switch in its Band A position, tune the station selector until the dial pointer is at a reading of 1720 kc. Adjust the test Oscillator to 1720 kc. (modulation "On" and Frequency Modulator disconnected) and increase its output to produce a registration on the Oscillograph. Carefully align the oscillator, detector and antenna trimmers, C-47, C-12 and C-3 respectively, so that each brings about maximum amplitude of output as shown by the wave on the Oscillograph. It will be necessary to have the timing control of the Oscillograph on "Int." for this operation. After each trimmer has been peaked, the Oscillograph timing control should be set to "Ext." and the Frequency Modulator placed into operation with its connections to the Oscillator and Oscillograph made in accordance with Figure 5. Turn the modulation switch of the Oscillator to "Off" and retune the Oscillator (increase frequency) until the forward and reverse waves show on the Oscillograph and become coincident at their highest points. Adjust the trimmers C-47, C-12 and C-3 again, setting each to the point which produces the best coincidence and maximum amplitude of the wave images.

(b) Remove the Frequency Modulator cable from the Oscillator and shift the signal frequency to 600 kc. Place the modulation switch to "On." Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then insert the Frequency Modulator plug and retune the Oscillator (modulation "Off") until the two similar forward and reverse waves appear on the screen. For this adjustment, it is advisable to shift the Oscillator to its 200-400 kc. range using the third harmonic of the generated signal in order to obtain the desired range of sweep. The oscillator series trimmer, C-46, should then be adjusted to produce maximum amplitude of the images. No rocking will be necessary on the station selector inasmuch as the signal frequency is being "wobbled" by the Frequency Modulator to produce the same effect. After completing this adjustment, the trimmer C-47 should be re-aligned as in (a) to correct for any change brought about by the adjustment of C-46.

BAND X

(a) Disconnect the Frequency Modulator and tune the test Oscillator to a frequency of 400 kc. (Modulation "On"). Place the receiver range switch in its Band X position and turn the station selector until the dial pointer reads 400 kc. Adjust the Oscillograph timing control to "Int." Then align each of the trimmers C-45, C-11 and C-2 to the point producing maximum output at the Oscillograph. Place the Frequency Modulator in operation and attach it to the Oscillator in the normal manner. Change the Oscillograph timing to "Ext." Increase the frequency of the Oscillator (modulation "Off") until the two waves appear and become coincident at their highest points, *approximately* at 462 kc. They may be made to remain stationary on the screen by manipulation of the Oscillograph range switch and frequency control. Readjust the three trimmers C-45, C-11 and C-2 to give maximum amplitude and complete coincidence of the waves.

(b) Change the test Oscillator so that it delivers a signal of 150 kc. with the Frequency Modulator disconnected. Tune this signal on the receiver which has previously been set to Band X, disregarding the dial reading at which the signal is best received. Then interconnect the Frequency Modulator with the Oscillator and retune the latter to the point at which the two similar waves appear on the screen. Adjust trimmer C-61, for maximum amplitude of the wave images. Rocking of the tuning condenser will not be necessary as the Frequency Modulator duplicates such an operation. Repeat the alignment of C-45 as outlined in (a) to correct for any reflective error brought about by the adjustment of C-61.

BAND C

(a) Turn the range switch of the receiver to its Band C position and tune the station selector until the dial pointer reads 18,000 kc. Set the test Oscillator to the same frequency (modulation "On" and Frequency Modulator disconnected) and regulate its output to the level required for convenient observation. Adjust the trimmer C-43 to the point producing maximum output as indicated on the Oscillograph. Check for the presence of the proper "image" signal by tuning the receiver to 17,080 kc. The 18,000 kc. signal of the Oscillator will be received at this point if the adjustment of C-43 has been properly made by using the position of least capacitance which gives maximum receiver output. It may be necessary to increase the output of the Oscillator in order to get an indication of the "image." *No adjustments should be made during this check.*

(b) Return the receiver tuning to 18,000 kc., re-align C-43 if necessary, and then adjust the detector and antenna trimmers, C-10 and C-1, for maximum signal output as evidenced by the oscillographic image. No further adjustments are to be made on this band.

OUTPUT INDICATOR ALIGNMENT

To align the receiver by means of an output indicator other than a Cathode-Ray Oscillograph will require the use of a standard test Oscillator, such as that recommended above, for the source of signals and means of indication for the output. The RCA Neon Output Indicator, Stock No. 4317, will be found very satisfactory for such use. It should be connected across the voice coil circuit of the loudspeaker or across the output transformer primary.

I-F Alignment

Connect the test Oscillator to the control grid cap of the i-f tube. Advance the volume control of the receiver to its full-on position. Tune the test Oscillator accurately to 460 kc. and align the trimmers C-20 and C-21 to give maximum receiver output. Regulate the Oscillator output during this adjustment so that the output indication is as small as can be conveniently observed. After completing the adjustments of these trimmers, re-connect the Oscillator so that it will feed into the control-grid circuit of the RCA-6L7 first detector. Then tune the first i-f transformer trimmers C-16 and C-17 for maximum receiver output.

R-F Alignment

After completing the i-f adjustments, it is advisable to correct the line-up of the circuits ahead of the first detector. The test Oscillator should be connected to the antenna-ground terminals of the receiver and the manual volume control turned to its maximum position. For each adjustment, the Oscillator output should be maintained as low as possible in order to avoid broadness of tuning which would result from a.v.c. action on a stronger signal.

MODEL T11-8
Alignment, Part 2
Parts List

RCA MFG. CO., INC.

Band A—This band should be aligned by supplying a 1720 kc. signal to the receiver, tuning the station selector to a dial reading of 1720 and adjusting the trimmers C-47, C-12 and C-3 to produce maximum receiver output. The Oscillator should then be shifted to 600 kc. and the receiver tuned to resonate this signal, disregarding the reading at which it is best received. Trimmer C-46 must then be adjusted, simultaneously while rocking the station selector backward and forward through the signal until the maximum output results from the combined operations. C-47 should be rechecked to assure that its adjustment has not changed because of the trimming of C-46.

Band X—Change the range switch to its Band "X" position. Tune the receiver to read 400 kc. and set the Oscillator to 400 kc. Adjust trimmers C-45, C-11 and C-2 to produce maximum receiver output. Then shift the Oscillator frequency to 150 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then tune the oscillator series trimmer, C-61, simultaneously rocking the tuning control (receiver) backward and forward through the signal, until maximum output results from the combined operations. Repeat the alignment of C-45 as in (a) to correct for any change caused by the adjustment of C-61.

Band C—Change the receiver so that it is operative and the dial reads 18,000 kc. on the "C" Band. Tune the test Oscillator to this same frequency. Then adjust the oscillator trimmer C-43 to produce maximum (peak) output. Two positions of this trimmer will be found which conform with this requirement. The one of least capacitance is correct. Check for the presence of "image" response at 17,080 kc. by shifting the receiver tuning. If it is received at such a point, the trimmer C-43 has been correctly adjusted to the right peak. *No adjustments are to be made during this check.* Tune the receiver back to the 18,000 kc. dial marking, readjust C-43 if necessary, and then tune the detector and antenna capacitors C-10 and C-1 for maximum receiver output. No further adjustments are necessary.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to chassis on Figure 6 will serve to assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance.

Standard Transformer

The transformer used on some models of this instrument is adaptable for voltages and frequencies as given under Ratings A and B of Electrical Specifications. Its schematic and wiring are shown by Figure 7.

Phonograph Attachment

A terminal board is provided for connecting a phonograph attachment into the audio amplifying circuit. Two typical methods of connection are shown on the schematic diagram Figure 1. The radio volume control must be set to minimum when using phonograph.

RADIOTRON COMPLEMENT

(1) RCA-6K7..........Radio-Frequency Amplifier
(2) RCA-6L7..........First Detector
(3) RCA-6J7..........Heterodyne Oscillator
(4) RCA-6K7..........Intermediate Amplifier
(5) RCA-6H6..........Second Detector and A.V.C.

(6) RCA-6C5..........First Audio Amplifier
(7) RCA-6C5..........Audio Driver Amplifier
(8) RCA-6F6..........Power Output Amplifier
(9) RCA-6F6..........Power Output Amplifier
(10) RCA-5Z3..........Full-Wave Rectifier
(11) RCA-6E5..........Tuning Indicator

REPLACEMENT PARTS

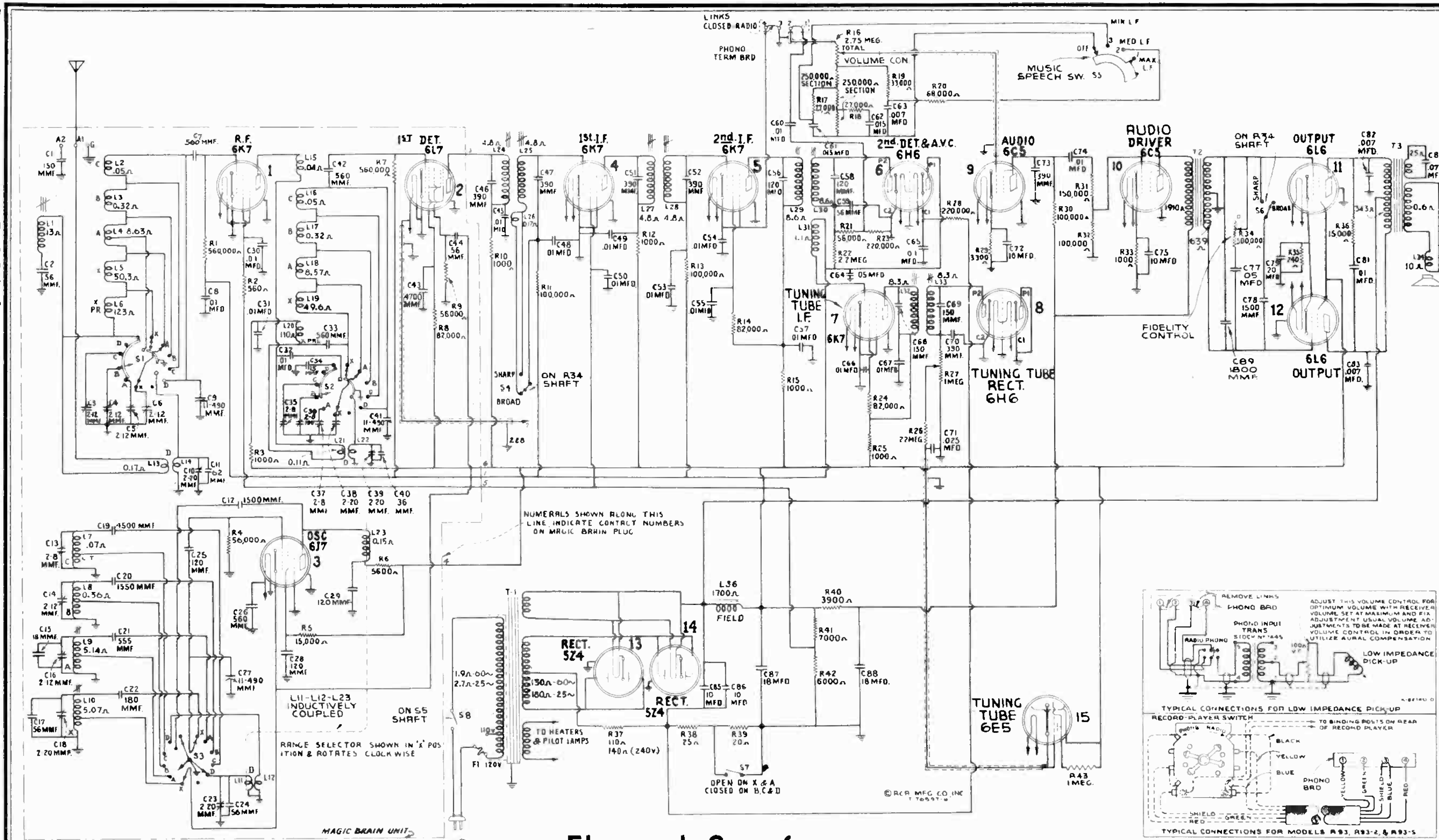
Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
4632	Board—Terminal board assembly—two terminals	$0.25
4427	Bracket—Volume control mounting bracket	.18
5237	Bushing—Variable tuning condenser mounting bushing assembly—comprising one bushing, one washer, one lockwasher and one nut—Package of 3	.43
11223	Capacitor—Adjustable capacitor (C46)	.46
5241	Capacitor—Adjustable capacitor (C61)	.40
11292	Capacitor—22 MMfd. (C9)	.24
11289	Capacitor—50 MMfd. (C8)	.26
11291	Capacitor—115 MMfd. (C50)	.24
11290	Capacitor—400 MMfd. (C60)	.25
11269	Capacitor—800 MMfd. (C59)	.30
3784	Capacitor—900 MMfd. (C31)	.30
11316	Capacitor—1225 MMfd. (C26)	.40
11287	Capacitor—4500 MMfd. (C58)	.30
5107	Capacitor—.0025 Mfd. (C62, C63)	.16
4838	Capacitor—.005 Mfd. (C40, C41)	.20
4868	Capacitor—.005 Mfd. (C33)	.20
4624	Capacitor—.01 Mfd. (C30)	.54
4937	Capacitor—.01 Mfd. (C39)	.25
11315	Capacitor—.015 Mfd. (C38)	.20
4836	Capacitor—.05 Mfd. (C4, C13, C18, C23)	.30
4886	Capacitor—.05 Mfd. (C24)	.20
4839	Capacitor—0.1 Mfd. (C7, C19, C27, C52)	.28
4841	Capacitor—0.1 Mfd. (C6)	.22
5170	Capacitor—0.25 Mfd. (C32)	.25
8041	Plate—I. F. or R. F. coil shield locking plate—Package of 2	.12
11220	Resistor—Voltage divider resistor—Comprising one 3900 ohm and one 4200 ohm sections (R31, R32)	.84
11221	Resistor—Voltage divider resistor—Comprising one 50 ohm, one 28 ohm and one 195 ohm sections (R28, R29, R30)	.48
5112	Resistor—1000 ohm—Carbon type—¼ watt (R2)—Package of 5	1.00
3706	Resistor—1800 ohm—Carbon type—¼ watt (R15)—Package of 5	1.00
5159	Resistor—2200 ohm—Carbon type—¼ watt (R20)—Package of 5	1.00
5175	Resistor—3600 ohm—Carbon type—½ watt (R21)—Package of 5	1.00
2731	Resistor—10,000 ohm—Carbon type—1 watt (R25)—Package of 5	1.10
11305	Resistor—22,000 ohm—Carbon type—¼ watt (R16, R17)—Package of 5	1.00
5033	Resistor—33,000 ohm—Carbon type—1 watt (R23)—Package of 5	1.10
11300	Resistor—33,000 ohm—Carbon type—1/10 watt (R24)—Package of 5	.75
3118	Resistor—100,000 ohm—Carbon type—¼ watt (R1, R3, R5, R6)—Package of 5	1.00
5027	Resistor—150,000 ohm—Carbon type—¼ watt (R19)—Package of 5	1.00
11626	Resistor—2.2 megohms—Carbon type—¼ watt (R9, R10, R11)—Package of 5	1.00
5249	Shield—Antenna, detector, or oscillator coil shield	.20
5250	Shield—Intermediate frequency transformer shield	.22
11222	Socket—Dial lamp socket	.18
4794	Socket—4-contact rectifier Radiotron socket	.15
11197	Socket—6-contact Radiotron socket	.14
11198	Socket—7-contact Radiotron socket	.15
11236	Switch—Range switch (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10)	2.44
5224	Switch—Low frequency tone control and power switch (S11, S13)	1.00
5238	Terminal—Antenna terminal board with clip, insulating strip and rivets	.14
11219	Tone Control—High frequency tone control (R22)	.90
11218	Transformer—Audio driver transformer (T2)	2.58
11216	Transformer—First intermediate frequency transformer (L16, L17, C16, C17)	2.15
11217	Transformer—Second intermediate frequency transformer (L18, L19, C20, C21, C22, R7, R8)	3.10
11212	Transformer—Power transformer—105-125 volts—25-50 cycles	7.18
11213	Transformer—Power transformer—250-210-150-125-105 volts—40-60 cycles (T1)	5.10
11205	Volume Control—(R14)	1.30
	DRIVE ASSEMBLIES	
4362	Arm—Band indicator operating arm	.28
10194	Ball—Steel ball—Package of 20	.25
4422	Clutch—Tuning condenser drive clutch assembly—Comprising drive shaft, balls, ring, spring and washers, assembled	1.00
11333	Dial—Station selector dial scale	.60
11227	Drive—Variable tuning condenser drive complete—less dial scale	2.08
11228	Gear—Vernier pointer drive gear	.42
4827	Gear—Spring gear assembly—complete—comprising stud, spring, cover, gears, mounting arm with screws and washers	1.25
11203	Capacitor—10 Mfd. (C53)	1.18
5212	Capacitor—18 Mfd. (C54)	1.16
11215	Capacitor pack—Comprising one 16 Mfd., two 10 Mfd., and two 8 Mfd. capacitors (C29, C35, C36, C55, C56)	3.85
4693	Clamp—Electrolytic condenser mounting clamp—for stock No. 11215	.15
11325	Coil—Antenna coil—X band (L3, L4, C2)	1.56
11326	Coil—Detector coil—X band (L9, L10, C11)	1.60
11327	Coil—Oscillator coil—X band (L14, L23, C45)	1.44
5215	Coil—Antenna coil—A and C bands (L1, L2, L5, L6, C1, C3)	2.32
5216	Coil—Detector coil—A and C bands (L7, L8, L11, L12, C10, C12)	2.34
5217	Coil—Oscillator coil—A and C bands (L13, L15, C43, C47)	2.20
11277	Compensating Pack—Comprising one 8200 ohm and one 27,000 ohm resistors, one .015 Mfd., one .035 Mfd. capacitors (C25, C28, R12, R13)	.92
11214	Condenser—Three-gang variable tuning condenser (C5, C14, C48)	4.20
11697	Cover—Terminal board cover	.12
11202	Foot—Chassis foot and bracket assembly—Package of 2	.78
11710	Lead—Shielded lead—connects antenna terminal to range switch	.40
11303	Indicator—Station selector vernier indicator pointer	.22
11226	Indicator—Band indicator pointer assembly—comprising indicator, arm, link and stud	.20
4475	Indicator—Station selector indicator	.18
4340	Lamp—Dial lamp—Package of 5	.60
3993	Screw—No. 6-32-5/32-in. set screw for band indicator operating arm—Package of 10	.25
4669	Screw—No. 8-32-5/32-in. square head set screw—for tuning condenser shaft—Package of 10	.25
4377	Spring—Band indicator operating arm spring—Package of 5	.25
4378	Stud—Band indicator operating arm stud assembly—Package of 5	.25
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Mounting bracket for output transformer and connector	.14
11304	Cable—Reproducer cable—Complete with female connector	.80
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11234	Coil—Field coil (L-22)	2.15
11233	Coil—Neutralizing coil	.30
11235	Cone—Reproducer cone (L21)—Package of 5	3.50
5040	Connector—4 contact female connector socket for reproducer cable	.25
5039	Connector—4 prong male connector plug for reproducer	.25
9617	Reproducer—Complete	6.60
11229	Transformer—Output transformer (T3)	1.66
11230	Washer—Binders board "C" washer—used to hold field coil securely—Package of 5	.18
	MISCELLANEOUS ASSEMBLIES	
11729	Bolt—Reproducer mounting bolt assembly—Comprising one bolt, one washer, one lockwasher and one nut—Package of 2	.20
11191	Bracket—Tuning lamp mounting bracket—less clamp	.12
11319	Cable—Tuning tube cable—complete with socket	1.38
11192	Clamp—Tuning lamp mounting clamp—less bracket	.12
11276	Escutcheon—Tuning lamp escutcheon	.40
11337	Escutcheon—Station selector escutcheon	.70
6614	Glass—Station selector dial glass	.30
11347	Knob—Volume control, tone control, range switch or power switch knob—Package of 5	.75
11346	Knob—Station selector knob—Package of 5	.75
11382	Resistor—1 megohm—Carbon type—1/10 watt (R27)—Package of 5	.75
4678	Ring—Spring retaining ring for station selector dial glass—Package of 5	.34
11377	Screw—Chassis mounting screw assembly—Comprising one screw, one washer and one lockwasher—Package of 4	.12
11348	Screw—No. 8-32—3/16-in. headless cupped point set screw for knob (Stock No. 11346)—Package of 10	.32
11381	Socket—Tuning tube socket and cover	.45
11349	Spring—Retaining spring for knob (Stock No. 11347)—Package of 5	.15

The prices quoted above are subject to change without notice.

MODEL 15K
Schematic
Pickup

RCA MFG. CO., INC.



Electrical Specifications

FREQUENCY RANGES	
"Long Wave" (X)	150-410 kc
"Standard Broadcast" (A)	530-1,800 kc
"Medium Wave" (B)	1,800-6,400 kc
"Short Wave" (C)	6,400-23,000 kc
"Ultra Short Wave" (D)	23,000-60,000 kc

ALIGNMENT FREQUENCIES	
"Long Wave" (X)	175 kc (osc.), 350 kc (osc., det., ant.)
"Standard Broadcast" (A)	600 kc (osc.), 1,500 kc (osc., det., ant.)
"Medium Wave" (B)	6,000 kc (osc., det., ant.)
"Short Wave" (C)	20,000 kc (osc., det., ant.)
"Ultra Short Wave" (D)	57,000 kc (osc., det., ant.)

Intermediate Frequency .... 460 kc

MODEL 15K
Chassis Wiring

RCA MFG. CO., INC.

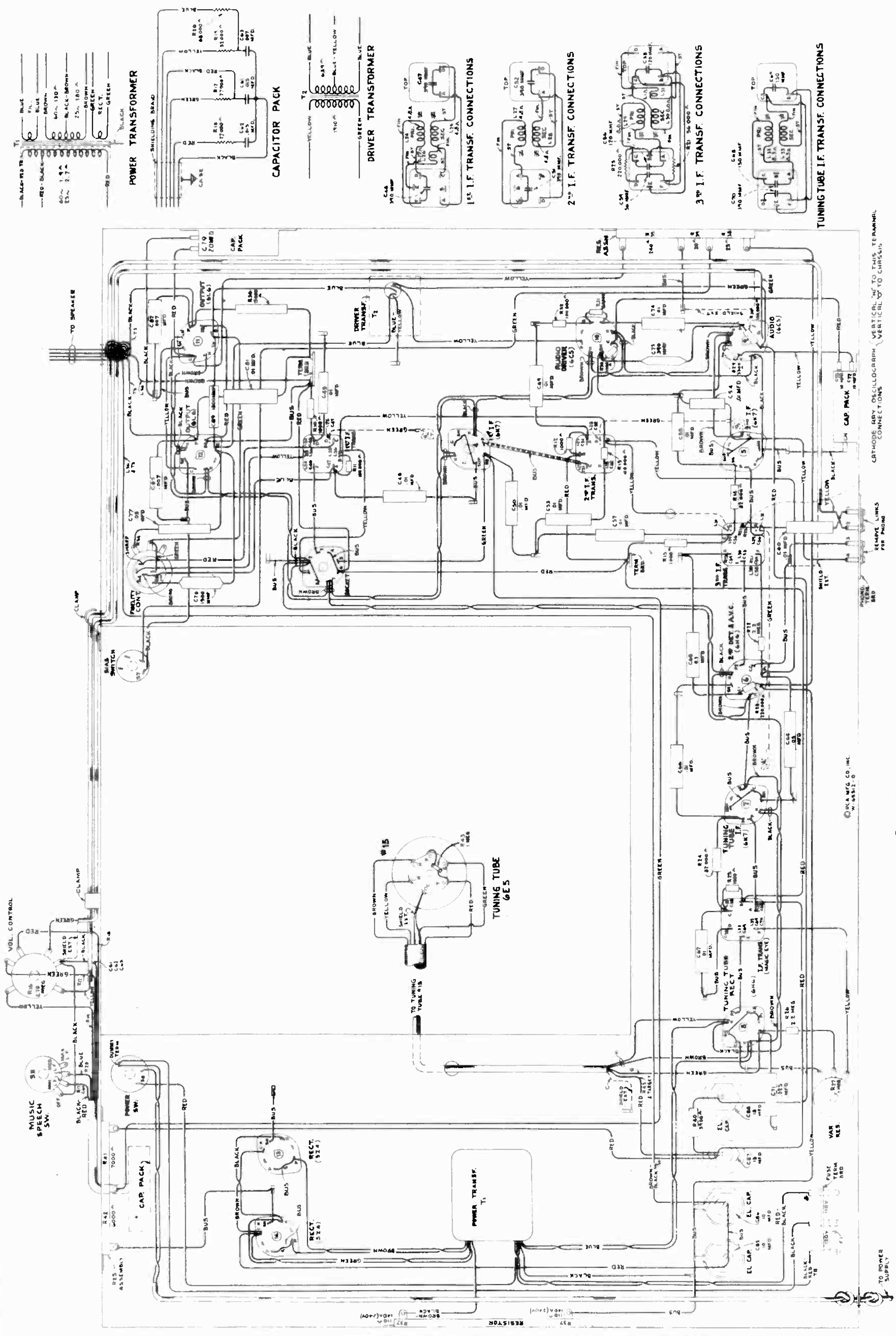


Figure 3—Chassis Wiring Diagram (Less "Magic Brain")

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 165 watts
Rating B	105-125 volts, 25-60 cycles, 165 watts
Rating C	100-130/140-160/195-250 volts, 40-60 cycles, 165 watts

MODEL 15K
"Magic Brain"
Chassis Wiring

RCA MFG. CO., INC.

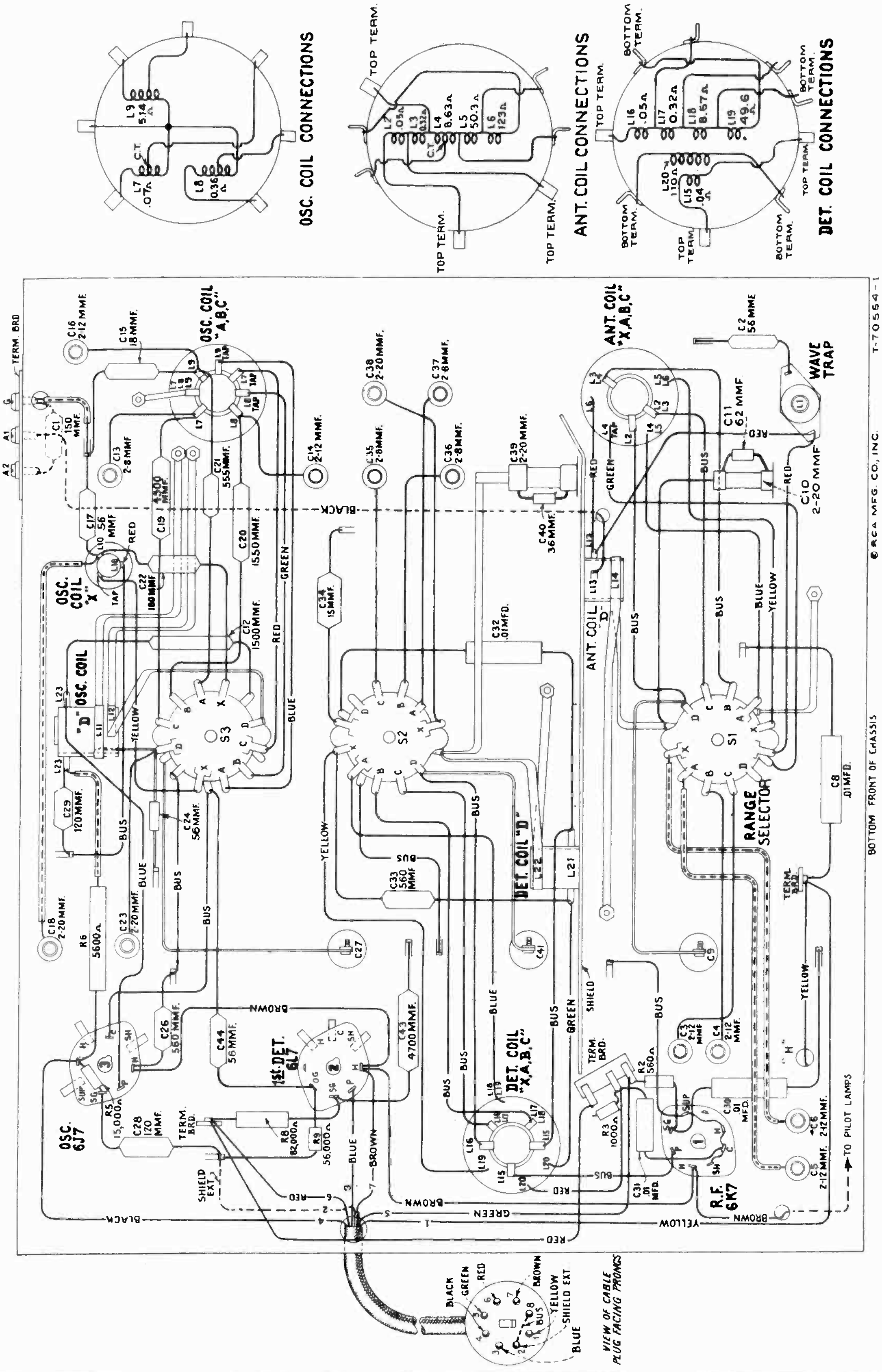


Figure 4—"Magic Brain" Wiring Diagram

LOUDSPEAKER

Type .... Electrodynamic

Impedance (v.c.) .... 11¼ ohms at 400 cycles

POWER OUTPUT

Undistorted .... 20 watts

Maximum .... 30 watts

MODEL 15K Resistance, Voltage

RCA MFG. CO., INC.

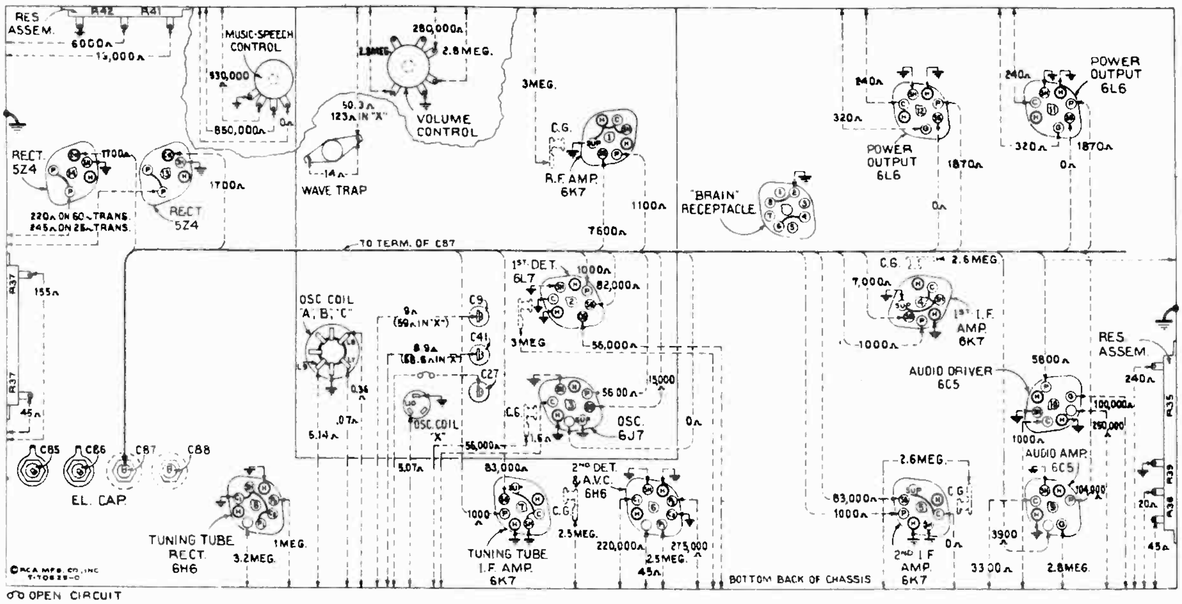


Figure 9—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full-mesh—Range selector in "Standard broadcast" position—Volume control maximum—Fidelity control optional—Music-speech Control Clockwise

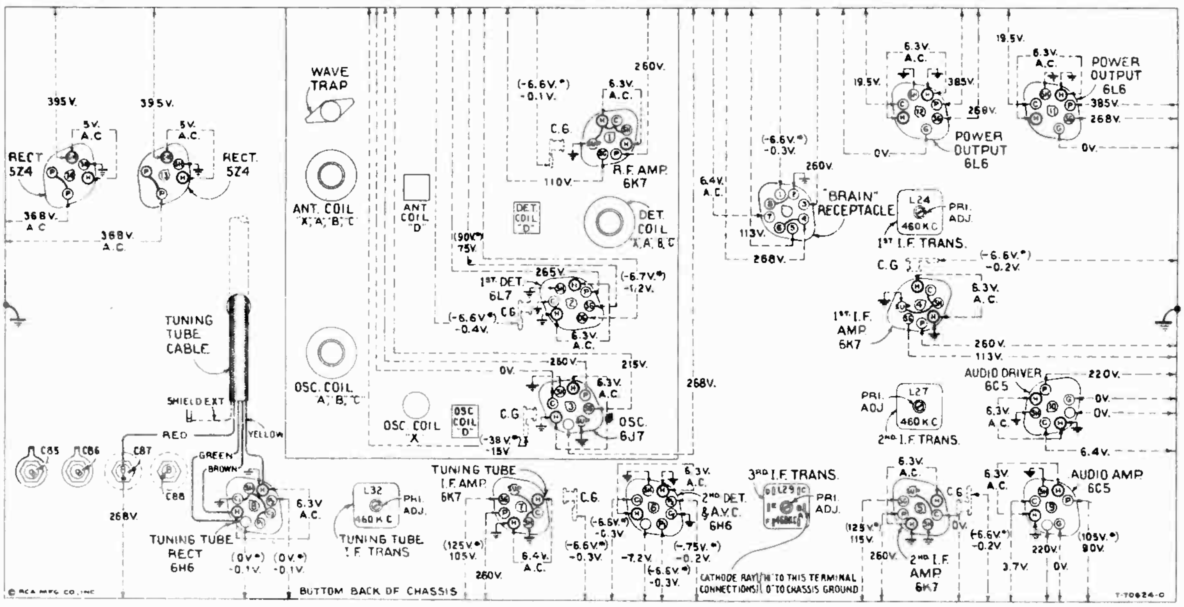


Figure 10—Radiotron Socket Voltages, Coil, and I-F Trimmer Locations

Measured at 115 volts, 60-cycle supply—Tuned to approximately 1,000 kc—No signal being received—Volume control minimum—Fidelity control optional

Note: Two voltage values are shown for some readings. The value shown in parentheses with asterisk (*) indicates operating conditions without voltmeter loading. The other value (generally lower) is the actual measured voltage and differs from the value shown in parentheses because of the additional loading of the voltmeter through the high series circuit resistance.

Radiotron Cathode Current Readings

Measured with Milliammeter Connected at Tube Socket Cathode Terminals under Conditions Similar to Those of Voltage Measurements

(1)	RCA-6K7—R-F Amp.	6.2 ma.
(2)	RCA-6L7—1st Det.	4.0 ma.
(3)	RCA-6J7—Osc.	6.6 ma.
(4)	RCA-6K7—1st I-F Amp.	6.2 ma.
(5)	RCA-6K7—2nd I-F Amp.	7.5 ma.
(6)	RCA-6H6—2nd Det.—A.V.C.	——
(7)	RCA-6K7—Tuning Tube I-F Amp.	7.5 ma.
(8)	RCA-6H6—Tuning Tube Rect.	——
(9)	RCA-6C5—Audio Voltage Amp.	1.25 ma.
(10)	RCA-6C5—Audio Driver Amp.	6.4 ma.
(11)	RCA-6L6—Power Output	43.0 ma.
(12)	RCA-6L6—Power Output	43.0 ma.
(13)	RCA-5Z4—Rectifier	80 ma.*
(14)	RCA-5Z4—Rectifier	80 ma.*
(15)	RCA-6E5—Tuning Tube	3.0 ma.

(*Cannot be measured at socket)

Visual Alignment
Dial Mechanism

RCA MFG. CO., INC.

MODEL 15K
Socket, Trimmers
Transformer, Speaker

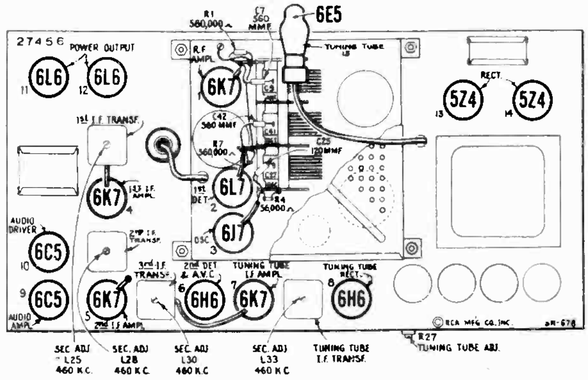
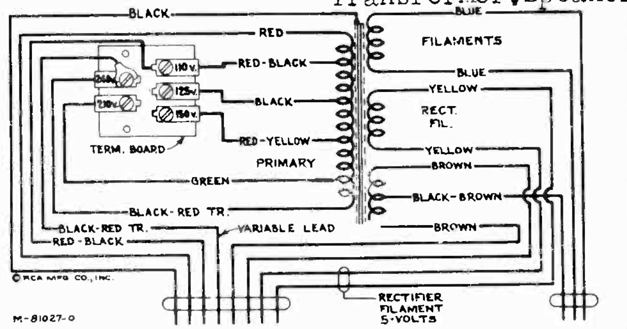
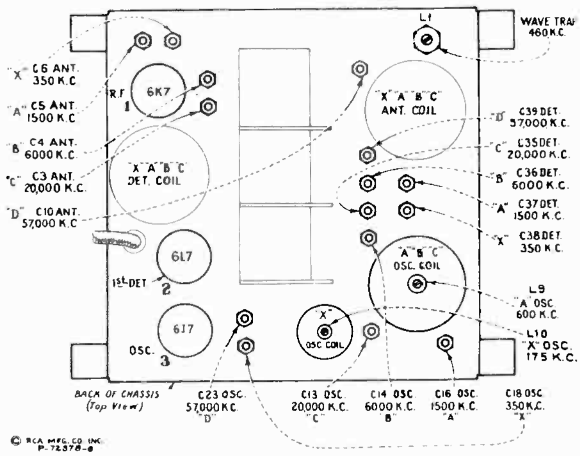


Figure 1—Radiotron and I-F Trimmer Locations



Primary resistance—3.6 ohms total
Secondary resistance—112 ohms total

Figure 8—Universal Transformer



APPROX. DISTANCE IN INCHES—CHASSIS BASE TO TOP OF TRIMMER PLUNGER

BAND	OSC.	DET.	ANT.
D	1 1/2	1 7/8	1 5/8
C	1 7/16	1 1/8	1 1/16
B	1 3/8	1 1/8	1 3/8
A	1 1/2	1	1 1/4
X	1 1/2	1 15/16	1 9/16

Figure 7—"Magic Brain" Trimmer Locations

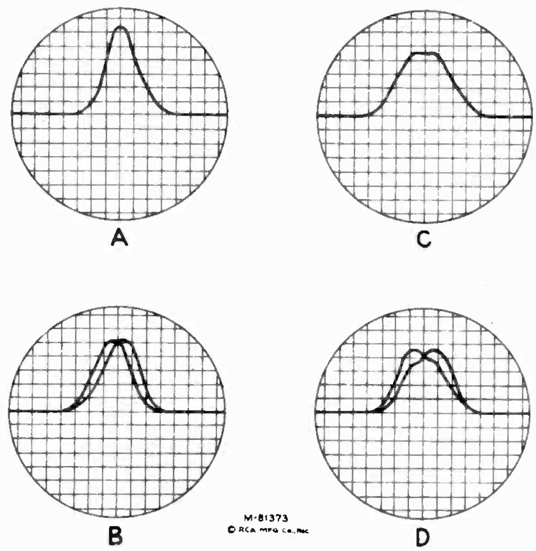


Figure 6—I-F Alignment Oscillograph Curves

A—**Correct** curve showing proper i-f alignment as obtained with fidelity control counter-clockwise.

B—**Incorrect** curve similar to A showing improper alignment of i-f system caused by one or more circuits being slightly detuned.

C—Correct showing broadening of curve A obtained when fidelity control is rotated fully clockwise.

D—**Incorrect** curve showing broadening of curve B obtained when fidelity control is rotated fully clockwise.

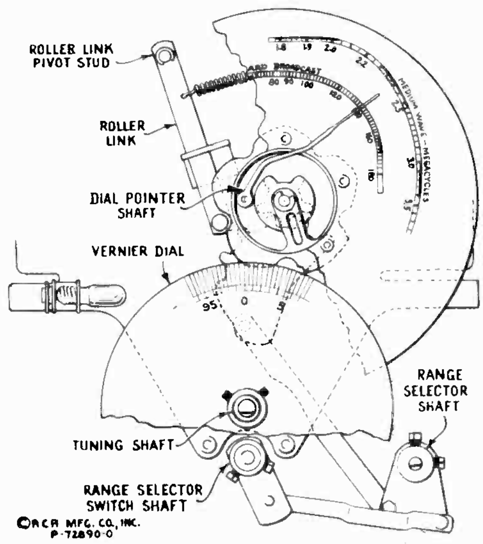


Figure 12—Selector Dial Change Mechanism

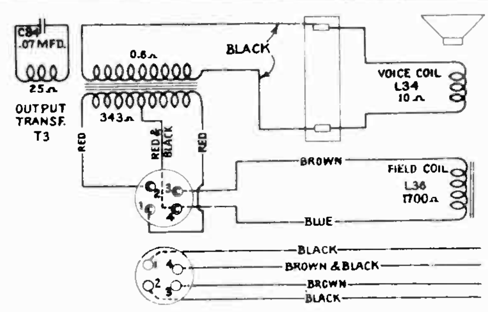


Figure 11—Loudspeaker Wiring

NOTE: For Fig. 5 Alignment Apparatus Connections, refer to Fig. 4 of Model 9K.

MODEL 15K
Circuit Data
Alignment, Part 1

RCA MFG. CO., INC.

General Description

This receiver represents the result of thorough development, design, and substantial manufacture. Noteworthy technical improvements have been applied in achieving marked advantages of operation, and efficiency of performance.

Model 15K is a fifteen-tube, console-type, "Magic Brain" superheterodyne receiver with a twelve-inch electro-dynamic loudspeaker, and the newly developed "Magic Voice." Design features incorporated in this receiver include built-in doublet antenna coupler; "Magic Brain"; improved plunger-type air-dielectric adjustable trimming capacitors in the antenna, detector, and oscillator coil circuits; tuned r-f amplifier; high-efficiency first detector (converter) with separate oscillator; two-stage i-f amplifier; selective "Magic Eye"; push-pull beam-type power amplifier; magnetite core adjusted i-f transformers, low-frequency oscillator tracking, and wave-trap; range-selector sensitivity control; fidelity control, "Magic Voice", three-point aural compensated volume control; music-speech switch; automatic volume control; phonograph terminal board; new selector dial; and a dust-proof aluminum voice-coil, electrodynamic loudspeaker.

Service convenience has been a controlling factor in the layout of the chassis parts and wiring. The assembly of these various elements is such that the number of conductors is minimized, with all important connections being readily accessible. Trimming adjustments are located at accessible points. A double tuning-knob arrangement permits the choice of either a twenty-to-one or a hundred-to-one dial drive ratio. The latter permits ease of tuning, especially in the "Medium wave", "Short wave", and "Ultra short wave" bands.

Circuit Arrangement

The conventional type of superheterodyne circuit is used. It consists of an r-f amplifier stage, first-detector (converter) stage, separate oscillator stage, two signal i-f amplifier stages, tuning tube i-f amplifier and rectifier stages, a diode-detector—automatic-volume-control stage, an audio voltage-amplifier stage, an audio driver-amplifier stage, a push-pull beam-type power-amplifier stage, a tuning indicator "Magic Eye", and a full wave rectifier.

"Magic Brain"

The new "Magic Brain" is constructed as a separate, self-contained, completely shielded, five-band, oscillator-detector-antenna tuning unit which plugs into the main chassis.

A single-wire antenna, or a doublet antenna, when connected to the proper input terminals of the receiver, is coupled to the control grid of the RCA-6K7 r-f amplifier tube through the tuned r-f transformer consisting of L6, L5, L4, L3, and L2 (except when range selector is in "Ultra short wave" position). The primary coil L13 of the "Ultra short wave" (D) band tuned r-f transformer remains in the antenna circuit at all times. A unique method of switching is used. In the "Long wave" (X) band, L6 becomes the primary with L5, L4, L3, and L2 as secondary. In the "Standard broadcast" (A) band, L5 becomes the primary with L4, L3, and L2 as secondary (L6 shorted out). In the "Medium wave" (B) band, L4 becomes the primary with L3 and L2 as secondary (L6 and L5 shorted out). In the "Short wave" (C) band, L3 becomes the primary with L2 as secondary (L6, L5, L4, and tap on L4 shorted out). The tap on L4 is provided to prevent interaction with L3 and L2 when operating receiver in "Short wave" band. In the "Ultra short wave" (D) band, L6, L5, L4, and L3 are shorted out and grounded, and secondary L14 is placed in shunt with L2. The latter connection prevents undesirable interaction of L2 with L14. This method of switching reduces the total number of coils and leads, and results in having a low-loss primary and secondary winding for each band with high efficiency of operation.

The band switching of the detector circuits is similar to that of the antenna circuits. Coils L15, L21, and L20 are always connected in series with the plate circuit of the RCA-6K7 r-f amplifier tube. In the "Long wave" (X) band, L19, L18, L17, and L16 are connected in series as the secondary circuit. The ground of the coil system is at the low end of L19. L20 acts as the primary which transfers energy to the secondary L19. Capacitor C33 resonates primary L20 at the proper frequency. In the "Standard broadcast" (A) band, L18, L17, and L16 are connected in series as the secondary circuit. The ground of the coil system is now between L18 and L19. L19 is used as the primary and is resonated at the proper frequency by capacitors C34 and C35 which are in shunt with this coil. Capacitor C33 is connected to transfer energy to the primary coil L19. In the "Medium wave" (B) band, L17 and L16 are connected in series as the secondary. The ground of the coil system is now between L17 and L18. L18 is used as the primary and is resonated at the proper frequency by capacitor C34 which is in shunt with this coil. L19 is shorted by the range selector. Capacitor C33 transfers the r-f energy from the plate circuit to the primary L18. In the "Short wave" (C) band, L16 is the secondary. The ground of the coil system is now between L16 and L17. L17 is used as the primary and is resonated to the proper frequency by capacitor C34. In addition, L15 acts as a high-frequency primary which resonates above 20 mc and improves the gain at the high-frequency end of the "Short wave" band. Coils L19 and L18 are shorted by the range selector. L21 is effectively r-f bypassed in this position by capacitor C32. In the "Ultra short wave" (D) band, L22 is the secondary, or grid coil, and consists of approximately a single turn of silver plated strap around a ⅞-inch coil form. The primary coils, L21 and L15 are in series on this band, with L21 acting as a low-frequency primary and L15 as a high-frequency primary. L16 is shunted by L22 instead of being shorted directly by the range selector. Any inductive effect of L16 is thus eliminated. L19, L18, and L17 are shorted directly by the range selector.

Separate windings, with the exception of L23, are employed in the oscillator stage for each position of the range selector. L23 (inductively coupled to L11 and L12) is placed in the oscillator plate circuit to provide additional feed-back when operating receiver on the "Ultra short wave" (D) band. This coil is effectively r-f bypassed by capacitor C12, when range selector is in the "Short wave" (C) position, to prevent undesirable reactions. Its effect on the remaining bands is negligible. The inherent stability of the oscillator circuit provides minimum frequency drift which is especially advantageous for high-frequency reception. The locally generated signal is capacitance coupled to grid No. 3 of the RCA-6L7 first detector.

The output of the "Magic Brain" is fed to the i-f amplifier through a plug-in cable. This cable also supplies all power required by the "Magic Brain" unit.

I-F Amplifier (Signal)

The intermediate-frequency amplifier consists of two RCA-6K7 tubes in a two-stage, transformer-coupled circuit. The windings of all three i-f transformers are resonated by fixed capacitors, and are adjusted by molded magnetite cores (both primary and secondary) to tune to 460 kc. A third winding L26, in the first i-f transformer, is placed in series with the main secondary L25 when the fidelity control switch S4 is thrown to "broad" position (see figure 2), thereby increasing the coupling between the primary and secondary circuits with consequent broadening of the band width of the i-f amplifier. The increased band width of the i-f amplifier therefore causes less attenuation of the higher audio modulation side-band frequencies, permitting higher fidelity reception. A third winding L31 in the third i-f transformer supplies signal input to the tuning tube i-f amplifier.

Tuning Tube I-F Amplifier

The i-f signal voltage developed in L31 (third i-f transformer) is applied to the control grid of the RCA-6K7 tuning tube i-f amplifier. The output of this tube is coupled through a sharply tuned transformer to the RCA 6H6 tuning tube rectifier. All or a portion of the voltage which develops across resistor R27 (adjustable from back of chassis, see figure 1) is transferred from the movable arm to the grid of the RCA-6E5 cathode-ray tuning tube through a suitable resistance-capacitance filter. The sharpness of this amplifier permits the receiver to be accurately tuned to the incoming carrier with the tuning tube "Magic Eye" while operating receiver with the fidelity control in extreme clockwise (broad) position.

Detector and A.V.C.

The modulated signal, as obtained from the output of the last i-f stage, is detected by an RCA 6H6 twin-diode tube (No. 2 diode). The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistors R21 and R23, is applied, as automatic control-grid bias to the r-f, first-detector, and i-f tubes. The No. 1 diode of the RCA-6H6 is used to supply residual bias to the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R22, R21, and R23, thereby maintaining the desired operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias diode ceases to draw current and the a.v.c. diode takes over the biasing function. The sensitivity of the receiver is increased in the "Ultra short wave" (D), "Short wave" (C), and "Medium wave" (B) bands by reducing the residual bias on the above mentioned controlled tubes with switch S7 which is operated by the range selector control.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector diode and the input grid of the RCA-6C5 audio voltage-amplifier tube. This control has a three-point tone compensating filter connected to it so that the correct aural balance will be obtained at different volume settings. Phonograph terminals are provided to feed the output of an external phonograph pickup to the control grid of the audio amplifier through this aurally compensated volume control.

The output of the voltage amplifier is resistance-capacitance coupled to the control grid of the RCA-6C5 driver tube. The output of this stage is transformer coupled to the control grids of the RCA-6L6 push-pull power output tubes. The output of this stage is transformer coupled to the voice coil of the electro-dynamic speaker.

The "Music-speech" control consists of a switch S5 which is connected to two of the tone compensating filters. When this control is turned to its No. 1 (Music) position, maximum low audio-frequency response is obtained. When the control is turned to its No. 2 position, resistor R20 is placed in shunt with capacitor C63, giving greater attenuation of the lower frequencies. This position is a compromise between the "Music" and the "Speech" positions. In the No. 3 (Speech) position, operation is the same as No. 2 position except that capacitor C61 is shorted, giving additional low-frequency attenuation (minimum lows).

Fidelity Control

The fidelity control consists essentially of the combination of a conventional high audio-frequency tone control, including the combinations of capacitor C77 and a variable resistor R34, capacitor C78 and switch S6 in shunt with the secondary winding of transformer T2, and means for changing the band width of the i-f amplifier. It performs in the following manner:

When the fidelity control is in its extreme counter-clockwise (sharp) position, the resistance of R34 is minimum, capacitor C78 shunts the secondary of T2, and winding L26 is disconnected from the i-f circuit (S6 and S4 in sharp position, see figure 2). Capacitor C77 is most effective at this point causing maximum attenuation of the higher audio frequencies. As this control is turned clockwise, placing more resistance in series with capacitor C77, the capacitor becomes less and less effective, and the upper frequency range of the audio amplifier is extended. When the fidelity control nears its extreme clockwise position, resistor R34 is disconnected and switches S6 and S4 (operated by fidelity control shaft) respectively disconnect capacitor C78 from the audio circuit and place winding L26 (first i-f transformer) in series with L25 (S6 and S4 in broad position) thereby increasing the higher audio-frequency range of the audio amplifier and broadening the i-f amplifier simultaneously.

Selective "Magic Eye"

An RCA 6E5 cathode-ray tuning tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal. This tube consists of an amplifier section and a cathode-ray section built in the same glass envelope. The adjustable arm of R27 selects the voltage used to actuate the grid of the amplifier section. Maximum voltage is applied to this grid when the receiver is tuned to resonance with an incoming carrier. This condition is evidenced by minimum width of the dark sector on the fluorescent screen.

"Magic Voice"

This receiver is designed with a cabinet incorporating the "Magic Voice." This is accomplished by having the rear of the speaker compartment completely enclosed by a tight-fitting back.

Five metal open end pipes of equal diameter but of three different lengths are inserted in holes in the cabinet base and extend upward in the speaker compartment. The effect is to cause the lower-frequency waves, reaching the front of the cabinet through the pipes, to arrive approximately in-phase with the sound waves emitted from the front of the speaker giving extended low-frequency response without boominess, or cabinet resonance.

SERVICE DATA

The various diagrams in this booklet contain such information as will be needed to locate causes for defective operation if such develops. The values of the various resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagram. Identification titles, such as C1, L2, R1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistance only. Resistance values of less than one ohm are generally omitted.

Alignment Procedure

There are seventeen adjustments required for the alignment of the oscillator, first-detector, and antenna-tuned circuits; one adjustment for the wave-trap; and eight adjustments for the i-f system. Fifteen of these adjustments are made with plunger-type air trimming capacitors and require the use of an **RCA Stock No. 12636 Adjusting Tool.** Each of these capacitors has a lock nut for securing the plunger in place after adjustment. The remaining eleven adjustments are made by means of screws attached to molded magnetite cores. These cores change the inductance of the particular coils in which they are inserted to provide exact alignment. All of these adjustments are accurately made during manufacture and should remain in proper alignment unless affected by abnormal conditions of climate or purported alterations for servicing, or unless altered by other means. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment. Such conditions will usually exist simultaneously. Correct performance of this receiver can only be obtained when these adjustments have been made by a skilled service engineer with the use of adequate and reliable test equipment. The manufacturer of this receiver has such test equipment available for sale through its distributors and dealers.

The extensive frequency range of this receiver necessitates a more or less involved method of alignment. However, if the following directions are carefully applied in the sequence given, normal performance of the instrument will be obtained.

The plunger-type air trimming capacitors have their approximate plunger settings tabulated on figure 7. If the plungers have been disturbed from their original adjustments, they may be roughly set to the specified dimensions prior to alignment.

In performing services on the "Magic Brain", the leads should be restored to their original positions, since the lead-dress is important for proper operation and dial calibration.

Precautionary Dressing of Leads for "Magic Brain" Alignment

(Refer to Figure 4)

Band "X"

1. Keep blue lead A of S1 to antenna coil L4-5 dressed away from chassis, and from yellow lead X of S1 to antenna coil L5-6.
2. Bus lead from C10 to S1 should be as short as possible.
3. Keep blue lead A of S2 to detector coil L18-19 clear of chassis, coil shield, coil, and other leads.
4. Keep spaghetti lead C6 to X of S1 apart from spaghetti lead of C5 to A of S1, and from chassis.

Band "A"

1. Keep green lead terminal S1 to antenna coil tap L4 away from chassis, coil shield, and coil.
2. Keep spaghetti lead C5 to A of S1 apart from spaghetti lead C6 to X of S1 and from chassis.

Band "C"

Lead from C19 to oscillator coil L7 should be maintained as short and straight as possible.

For alignment, the test-oscillator frequency should be quite accurate. A convenient and reliable means of accurately checking the frequency of test oscillators, receivers, etc., is the **RCA Stock No. 9572 Crystal Calibrator.**

If the test oscillator signal cannot be heard as the receiver (heterodyne) oscillator air-trimmer plunger is changed from its minimum-capacity to maximum-capacity position (receiver dial and test oscillator set to the specified frequencies, and the correct oscillator air-trimmer used) it may be an indication that the test oscillator frequency is outside the range covered by the air-trimmer. Under such conditions, when a more accurate setting of the test oscillator cannot be determined, set the oscillator air-trimmer plungers to the approximate settings given on figure 7. Tune the test oscillator until the signal is heard in the speaker. Each of two test-oscillator settings (the fundamentals or the harmonics of which are 920 kc apart) produce a signal. The lower-frequency test-oscillator setting should be used as this places the test-oscillator (signal) frequency 460 kc below the frequency of the receiver heterodyne oscillator.

Holes are provided in the top of the r-f and antenna coil cans on some models to enable a tuning check with the **RCA Stock No. 6679 Tuning Wand.** The hole in the top of the detector coil can has a cinch button which must be removed before insertion of the tuning wand. When the brass end of the wand is inserted in the coil, the inductance of the coil is decreased. If this results in an increase of output, the respective air-trimmer capacitance should be decreased (plunger pulled out). If inserting the iron end of the tuning wand causes an increase in output, resulting from an increase of inductance of the coil, the respective air-trimmer capacitance should be increased (plunger pushed in). If the range of the air trimmer is not sufficient to give the desired results, the lead-dress may be changed in the particular circuit being aligned, so as to cause the circuit to resonate within the range of the trimmer. An increase in the capacity-to-ground of the circuit will be required if the iron end of the tuning wand causes an increase of signal output when the air-trimmer plunger is full-in, while a decrease in the capacity-to-ground will be required if the brass end of the tuning wand causes an increase in signal output when the air-trimmer plunger is full-out.

Two methods of alignment are applicable—one requires use of the cathode-ray oscillograph, and the other requires a voltmeter or glow-type indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave-image which represents the resonance characteristics of the circuit being tuned. This method is preferred because of the i-f characteristics of this receiver. This type of alignment is possible through use of apparatus such as the **RCA Stock No. 9558 Frequency Modulator** and the **RCA Stock No. 9545 Cathode-Ray Oscillograph.** If this equipment is not available, an approximate alignment may be performed by the output-indicator method with an instrument such as the **RCA Stock No. 4317 Neon Glow Indicator** attached across the loud speaker voice coil. Alignment by this method is similar to the cathode-ray method outlined below except that the receiver volume control should be at maximum, the trimmers adjusted to peak response (with the exception of the wave-trap) and the test-oscillator sweeping operations omitted. Either of these methods require the use of a reliable test oscillator such as the **RCA Stock No. 9595.**

Cathode-Ray Alignment

Make alignment apparatus connections shown on figure 5. Remove the plug of the frequency-modulator cable from the test-oscillator jack. Connect the receiver chassis to a good external ground. Connect oscillograph "Vertical" input terminals as indicated on figure 3. Set oscillograph power switch to "On" and adjust "Intensity" and "Focus" controls to give a clearly defined spot, or line, on the screen. Set oscillograph "Ampl. A" switch to "On," "Vertical gain" control full-clockwise, "Ampl. B" switch to "Timing," "Range" switch to No. 2 position, and "Timing" switch to "Int." Place the "Sync." control, "Freq." control, and "Horizontal gain" control to about their mid-positions. For each of the following adjustments, the test-oscillator output must be regulated so that the image obtained on the oscillograph screen will be of the minimum size for accurate observation. The receiver volume-control setting is optional.

I-F Adjustments

(a) Turn range selector to its "Standard broadcast" (A) position and tune receiver to a position of no extraneous signals near 600 kc. Set fidelity control to counter-clockwise position. Connect the "Ant." output of the test oscillator to the grid cap of RCA-6K7 second i-f tube (with grid lead in place) through a .001-mfd. capacitor, with "Gnd." to receiver chassis. Tune the test oscillator to 460 kc and place its modulation switch to "On" and its output switch to "Hi."

(b) Turn on the receiver and test oscillator. Increase the output of the test oscillator until a deflection is noticeable on the oscillograph screen. The figures obtained represent several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave-image formed (400-cycle waves) to be spread completely across the screen by adjusting the "Horizontal gain" control. The image should be synchronized and made to remain motionless by adjusting the "Sync." and "Freq." controls.

(c) Adjust the two magnetite core screws L30 and L29 (see figures 1 and 10) of the third i-f transformer (one on top and one on bottom) to produce maximum vertical deflection of the oscillographic image. This adjustment places the transformer in exact resonance with the 460 kc signal.

(d) Turn tuning tube adjustment screw R27 (see figure 1) to extreme clockwise position. Adjust output of test oscillator until the width of the dark sector on the fluorescent screen in the RCA-6E5 tuning tube is very narrow ("Magic Eye" almost closed). Adjust the two magnetite core screws L33 and L32 (one on top and one on bottom, see figures 1 and 10) of the tuning tube i-f transformer until minimum width of the dark sector on the fluorescent screen is observed. A decrease of the test oscillator output may be necessary before the point of minimum width of the dark sector becomes apparent.

(e) The sweeping operation should follow using the frequency modulator. Shift the oscillograph "Timing" switch to "Ext." Insert plug of frequency-modulator cable in test-oscillator jack. Turn the test-oscillator modulation switch to "Off." Turn on the frequency modulator and place its sweep-range switch to "Hi."

(f) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. If only one wave appears, increase the "Freq." control on the oscillograph to obtain two waves. These waves will be identical in shape, totally disconnected, and appear in reversed positions. They will have a common base line which is discontinuous. Adjust the "Freq." and "Sync." controls of the oscillograph to make them remain motionless on the screen. Continue increasing the test oscillator frequency until these forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will be obtained at a test-oscillator setting of approximately 575 kc.

(g) With the images established as in (f), re-adjust the two magnetite core screws L30 and L29 on the third i-f transformer so that they cause the curves on the oscillograph screen to become

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MODEL 15K
Alignment, Part 2
Parts List

exactly coincident throughout their lengths and have maximum amplitude.

(h) Without altering the adjustments of the apparatus, shift the "Ant." output of the test oscillator to the grid cap of the RCA-6K7 first i-f tube (with grid lead in place), through a .001-mfd. capacitor. Regulate the test-oscillator output so that the amplitude of the oscillographic image is approximately the same as used for adjustment (g) above.

(i) The two second i-f transformer magnetite core screws L28 and L27 (one on top and one on bottom) should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude.

(j) Without altering the adjustments of the apparatus, shift the "Ant." output of the test oscillator to the input of the i-f system, i.e., to the grid cap of the RCA-6L7 first detector, (with grid lead in place) through a .001-mfd. capacitor. Regulate the test-oscillator output so the amplitude of the oscillographic image is approximately the same as used for adjustment (i) above.

(k) The two first i-f transformer magnetite core screws L25 and L24 (one on top and one on bottom) should then be adjusted so that they cause the forward and reverse waves to become coincident throughout their lengths and have maximum amplitude.

(l) Note width of oscillographic image at a point which is 50% of maximum amplitude. Turn receiver fidelity control to extreme clockwise position. Note width of oscillographic image at a point which is 50% of maximum amplitude. Under normal conditions the latter measurement should be approximately 60% greater in width than the former measurement. The image should also appear slightly double humped. These conditions indicate proper broadening of the band width of the i-f amplifier. Turn range selector to "Medium wave" (B) band and note increase of amplitude. The amplitude should increase several times. It may be necessary to decrease output of test oscillator to keep image on screen. Turn receiver fidelity control to extreme counter-clockwise position and proceed to "R-F Adjustments."

R-F Adjustments

Make receiver dial adjustments as outlined by "Selector dial," figure 12. Alignment must be made in sequence of "Wave trap," "Ultra short wave" band, "Short wave" band, "Medium wave" band, "Standard broadcast" band, and "Long wave" band.

"Wave-Trap" Adjustment

(a) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" through a 200-mmfd. (important) capacitor. Remove the plug of the frequency modulator cable from the test-oscillator jack. Turn test-oscillator modulation switch to "On." Shift the oscillograph "Timing" switch to "Int." Place receiver range selector in "Standard broadcast" position. Set the receiver dial to a position of no extraneous signals near 600 kc. Tune the test oscillator to 460 kc. Adjust the wave-trap magnetite core screw L1 to the point which causes minimum amplitude of output (maximum suppression of signal) as shown by the waves on the oscillograph. An increase of the test-oscillator output may be necessary before this point of minimum amplitude, obtained by correct adjustment of wave-trap screw, becomes apparent on oscillograph screen.

"Ultra Short Wave" Band

(b) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" of the receiver through a 300-ohm resistor. Set the receiver range selector to its "Ultra short wave" position and its dial pointer to 57,000 kc. Adjust the test oscillator to 19,000 kc. The third harmonic of 19,000 kc is used for this adjustment.

Adjust oscillator air-trimmer C23 for maximum (peak) output. Two positions, each producing maximum output, may be found. The position of minimum capacitance (plunger near out) should be used. This places the receiver heterodyne oscillator 460 kc higher in frequency than the incoming signal. Tighten lock nut. Adjust the detector air-trimmer C39, while slightly rocking the gang tuning condenser back and forth through the signal, for maximum (peak) output. Two peaks may be found on this trimmer. The peak of maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust the antenna air-trimmer C10 for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found on this trimmer which produce maximum output. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to 56,080 kc. If the image signal is received at this position, the adjustment of the oscillator air-trimmer C23 has been correctly made. No adjustments should be made while checking for the image signal.

(c) Re-tune receiver for maximum response to the 57,000 kc input signal (not image response) without disturbing test-oscillator adjustments. Change test oscillator to 6,800—11,000 kc range. Tune test oscillator until signal is heard in speaker (should occur at approximately 14,250 kc, fourth harmonic of test oscillator used). Two test-oscillator settings (230 kc apart) will produce a signal at this point. The lower frequency test-oscillator setting should be used as this places the test-oscillator harmonic 460 kc below the frequency of the receiver heterodyne oscillator. Tune receiver for maximum response at a dial setting of approximately 28,500 kc (image should tune in at a dial setting approximately 27,580 kc) without altering test-oscillator adjustment. Test oscillator second harmonic of 14,250 kc is used for the following check. Check calibration of receiver dial. A receiver dial reading of less than 28,500 kc indicates that the inductance of the oscillator secondary coil L11 is too low and should be increased. If the receiver dial reading is greater than 28,500 kc, the inductance of L11 is too high and should be decreased. If it is necessary to change the inductance of L11, first remove bottom cover of "Magic Brain" and then set receiver dial pointer to 28,500 kc. To decrease inductance, move the grounded ends (straps) of L11 and L12 (see figure 4) nearer chassis. Do not allow straps to touch chassis except where connected. To increase inductance, move the straps farther away from chassis. Adjust position of straps until maximum (peak) output results. The alignment of the detector tuned circuit should next be checked at 28,500 kc without changing either the receiver or test oscillator adjustments. An increase of output when the brass end of a tuning wand is brought near L22 indicates that L22 is too high in inductance while an increase when the iron end is brought near the coil indicates that the inductance is too low. The inductance of L22 may be varied by changing the spacing between the grounded end (strap) of L22 and the strap connected from C41 to contact on S2 (figure 4). An increase of spacing will increase the inductance, while a decrease of spacing will decrease the inductance. Adjust the spacing until maximum (peak) output results. Replace "Magic Brain" bottom cover and repeat adjustments in (b) prior to those of "Short wave" band.

"Short Wave" Band

(d) Set the receiver range selector to its "Short wave" position and its dial pointer to 20,000 kc. Adjust the test oscillator to 20,000 kc. Adjust oscillator air-trimmer C13 until maximum (peak) output is reached. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust detector air-trimmer C35 until maximum (peak) output is reached, while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer C3 until maximum (peak) output is reached while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to 19,080 kc. The image signal should be received at this position indicating that the adjustment of C13 has been correctly made. No adjustments should be made while checking for the image signal.

"Medium Wave Band"

(e) Place receiver range selector to its "Medium wave" position with its dial pointer set to 6,000 kc. Tune the test oscillator to 6,000 kc. Adjust oscillator air-trimmer C14 to produce maximum (peak) output as shown by the waves on the oscillograph. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust the detector air-trimmer C36 for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer C4 to produce maximum (peak) output. Tighten lock nut.

"Standard Broadcast" Band

(f) Remove the 300-ohm resistor from beneath the test-oscillator "Ant." post and receiver antenna terminal "A1" and insert a 200-mmfd. capacitor in its place. Place receiver range selector to "Standard broadcast" position with receiver dial pointer set to 600 kc. Tune the test oscillator to 600 kc. Adjust oscillator magnetite core screw L9 (top of large oscillator coil can) for maximum (peak) output as shown by the waves on the oscillograph screen.

(g) Set receiver dial pointer to 1,500 kc. Tune the oscillator to 1,500 kc (1,500—3,100-kc range) and increase its output to produce a readable image on the oscillograph screen. Carefully adjust the oscillator, detector, and antenna air-trimmers C16, C37, and C5, respectively, to produce maximum (peak) output as shown by the waves on the oscillograph screen. Shift the oscillograph "Timing" switch to "Ext." Place the frequency modulator sweep-range switch to its "Lo" position and insert plug of the frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test-oscillator setting of approximately 1,680 kc. Adjust air-trimmers C16, C37, and C5 again, setting each to the point which produces the best coincidence and maximum amplitude of the images.

(h) Remove the plug of the frequency modulator cable from the test-oscillator jack. Turn test-oscillator modulation switch to "On." Set oscillograph "Timing" switch to "Int." Tune test oscillator to 200 kc (200–400 kc range). Tune receiver for maximum response to this signal at a dial reading of approximately 600 kc. The third harmonic of the 200 kc signal is used for this adjustment. Shift oscillograph "Timing" switch to "Ext." Insert the plug of the frequency modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen. This will occur at a test oscillator setting of approximately 230 kc. Disregarding the fact that the two images may or may not come together, adjust the oscillator magnetite core screw L9 (top of large oscillator coil can) to produce maximum (peak) amplitude of the images. Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Repeat adjustments in (g) above to compensate for any changes caused by the adjustment of L9 core, tightening lock nuts on C16, C37, and C5, respectively, after each is adjusted.

"Long Wave" Band

(i) Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Place receiver range selector to its "Long wave" position. Set the receiver dial pointer to 175 kc. Tune the test oscillator to 175 kc and increase its output until a deflection is noticeable on the oscillograph screen. Adjust oscillator magnetite core screw L10 (located on top of small oscillator coil can) so that maximum (peak) amplitude of output is shown on the oscillograph screen.

(j) Set receiver dial pointer to 350 kc. Tune test oscillator to 350 kc. Adjust the oscillator, detector, and antenna air-trimmers C18, C38, and C6 to produce maximum (peak) output as shown by the waves on the oscillograph screen. Without disturbing the connections, shift the oscillograph "Timing" switch to "Ext." Place the frequency-modulator sweep range switch to its "Hi" position and insert plug of frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (decrease frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test-oscillator setting of approximately 198 kc. This setting places the test-oscillator frequency to 175 kc. The second harmonic is now used for the 350 kc adjustment. Adjust air-trimmers C18, C38, and C6, again, to produce maximum amplitude of the images where they best coincide throughout their lengths.

(k) Re-tune the receiver to approximately 175 kc so that the forward and reverse waves appear on the oscillograph screen. Adjust the oscillator magnetite core screw L10 to produce maximum (peak) amplitude of the waves, disregarding the fact that the two images may or may not come together.

(l) Shift the receiver dial setting to 350 kc without altering any other adjustments (frequency modulator still in operation). Adjust air-trimmers C18, C38, and C6, respectively, to produce maximum amplitude and best coincidence of the waves. These adjustments compensate for any changes caused by the adjustment of the magnetite core screw L10. Tighten lock nuts on C18, C38, and C6, respectively, after each is adjusted.

Tuning Tube Adjustment

An adjustment, R27, is provided on the rear apron of chassis (see figure 1) for regulating the sensitivity of the tuning tube ("Magic Eye"). Adjustment may be performed by first tuning in the strongest local station and then turning adjusting screw until the width of the dark sector on the fluorescent screen in the RCA 6E5 tuning tube is very narrow ("Magic Eye" almost closed). No other adjustment is necessary.

Phonograph Terminal Board

A terminal board is provided for connecting a phonograph into the audio amplifying circuit. Typical methods of connecting a low impedance pickup, or the RCA Victor Models R-93, R-93-2, and R-93-S Record Players are shown on the Schematic Diagram (figure 2).

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

Antenna and Ground Terminals

These receivers are equipped with an antenna-ground terminal board having three terminals. These terminals are marked "A2," "A1," and "G," the latter being the ground terminal and should always be connected to a good external ground. The transmission line leads of the RCA RK-40A antenna system should be connected to terminals "A2" and "A1." The receiver coupling units of the RCA RK 40 and the RCA Spider Web antenna systems should be connected to terminals "A1" and "G." Connect a single wire antenna to terminal "A1."

Selector Dial

Figure 12 illustrates the relation of the various parts of the dial mechanism when in its "Standard broadcast" position with the range switch likewise turned to its "Standard broadcast" position. In re-assembling the dial after repairs, see that the gears are meshed in accordance with the diagram, at the same time noting that the range switch is in its "Standard broadcast" position and the lever attached to the range switch shaft placed in the position shown.

To adjust the dial mechanism, set the range switch to its "Standard broadcast" position. Place a straight-edge across the center of the dial so that its edge is even with the lower (end) marking at both the low-frequency and high-frequency ends of the dial. Under such conditions the straight-edge should be parallel with the top of the chassis base. If the straight edge is not parallel with the top of the chassis base, loosen the nut on the rear of the roller link pivot stud and move the stud up or down until the link roller moves the dial to the desired position so that the end calibration marks obtain the position mentioned above. Tighten the nut on the roller link pivot stud.

Set the gang tuning condenser to its maximum capacity position. Adjust the dial pointer to the low-frequency (end) mark on "Standard broadcast" scale. This is a friction adjustment.

With the gang tuning condenser plates still in full mesh, loosen the two set screws on the vernier-dial hub. Rotate the vernier dial until the "0" marking is in a vertical plane above the center of the shaft. Tighten set screws.

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
12863	Board—Phonograph terminal board	$0.25
12987	Bracket—Mounting bracket for bias switch	.15
4427	Bracket—Volume control and L. F. tone control mounting bracket	$0.18
13024	Cable—Tuning lamp cable and socket	1.25
12511	Cap—Grid contact cap—Package of 5	.15
12629	Capacitor—56 Mmfd. (C59)	$0.20
12404	Capacitor—120 Mmfd. (C56, C58)	.26
13021	Capacitor—150 Mmfd. (C68, C69)	.20
13022	Capacitor—300 Mmfd. (C70)	.25
13034	Capacitor—390 Mmfd. (C73)	.25
13301	Capacitor—390 Mmfd. (C46, C47, C51, C52)	.25
12898	Capacitor—1500 Mmfd. (C78)	.20
13580	Capacitor—1800 Mmfd. (C89)	.25
13033	Capacitor—.007 Mfd. (C82, C83)	.20
4870	Capacitor—.025 Mfd. (C71)	.20
4858	Capacitor—.01 Mfd. (C53, C45, C48, C49, C50, C54, C55, C57, C60, C66, C67, C74)	.25
4937	Capacitor—.01 Mfd. (C81)	.25
4836	Capacitor—.05 Mfd. (C64, C77)	.30
4841	Capacitor—0.1 Mfd. (C65)	.22
11203	Capacitor—10 Mfd. (C85, C86)	1.18
5212	Capacitor—18 Mfd. (C87, C88)	1.16
12470	Capacitor—20 Mfd. (C79)	1.10
13011	Capacitor—Compensating pack comprising two .015 Mfd., one .007 Mfd. capacitors and two 27,000 ohm, one 33,000 ohm, and one 68,000 ohm resistors (C61, C62, C63, R17, R18, R19, R20)	2.00
13025	Capacitor—Pack comprising two 10 Mfd. sections (C72, C75)	1.00
5040	Connector—4 contact female connector for speaker cable	.25
13016	Control—Magic Eye control (R27)	.85
12006	Core—Adjustable core and stud for Stk. Nos. 12981, 12990, 13019 and 13020	.22
5240	Cover—Fuse mounting cover	.24
12870	Dial—Vernier dial scale	.65
10907	Fuse—3 Amp.—Package of 5—(F1)	.40
5226	Lamp—Dial lamp—6.3 volts—Package of 5	.70
12868	Link—Range switch and band indicator operating link complete with set screws	.45
5131	Resistor—2.2 Meg Carbon type 1/10 watt—Package of 5 (R26)	$0.75
12679	Resistor—2.2 Meg Insulated ¼ watt—Package of 5 (R22)	1.00
13017	Resistor—Voltage divider comprising one 7000 ohm and one 6000 ohm sections (R41, R42)	.90
13018	Resistor—Voltage divider comprising one 240 ohm, one 20 ohm and one 25 ohm sections (R35, R38, R39)	.55
4669	Screw—No. 8-32-x5/32 set screw for link assembly Stk. No. 12868—Package of 10	.25
12008	Shield—I. F. transformer shield for Stk. No. 12981, 12990, 13019 and 13020	.28
12581	Shield—Transformer shield top for Magic Eye I. F. transformer	.36
12607	Shield—Transformer shield top for first or second I. F. transformer	.30
13028	Shield—Transformer shield top for third I. F. transformer	.20
11195	Socket—5 contact 5Z4 Radiotron socket	.15
11198	Socket—7 contact 6K7 or 6L6 Radiotron socket	.15
11196	Socket—8 contact 6C5 or 6H6 Radiotron and Magic Brain power supply socket	.15
11381	Socket—Tuning lamp socket and cover	.45
13095	Socket—Upper left or lower right hand dial lamp socket	.25
11222	Socket—Upper right or lower left hand dial lamp socket	.18
12007	Spring—Retaining spring for core Stk. No. 12006—Package of 10	.36
12986	Stud—Stud, nut and washer for connecting link assembly Stk. No. 12868 to sector gear and link Stk. No. 12910—Package of 5	.65
12988	Switch—Bias switch (S7)	.65
13015	Tone Control—Fidelity control (R34, S4, S6)	1.00
13013	Tone Control—Music-speech and power switch (S5, S8)	1.15
13081	Transformer—First I. F. transformer complete (L24, L25, L26, C46, C47)	2.15
12990	Transformer—Second I. F. transformer complete (L27, L28, C51, C52)	1.85
13019	Transformer—Third I. F. transformer complete (L29, L30, L31, C56, C58, C59, R21, R23)	2.00
13023	Transformer—Driver transformer (T2)	2.25
13020	Transformer—Magic Eye I. F. transformer complete (L32, L33, C68, C69, C70)	2.00
13008	Transformer—Power transformer 100-120 volts 50-60 cycles (T1)	7.55
13009	Transformer—Power transformer 100-120 volts 25-50 cycles (T1)	11.20
13010	Transformer—Power transformer 100-250 volts 50-60 cycles (T1)	12.65
13014	Volume Control—(R16)	1.00
	MAGIC BRAIN UNIT ASSEMBLIES	
12806	Board—3 contact antenna and ground terminal board	.25
5237	Bushing—Variable condenser mounting bushing assembly—Package of 3	.43
12886	Cable—Shielded power cable approx. 4 in. long complete with 8 contact male plug	1.50
12511	Cap—Grid contact cap—Package of 5	.15
13012	Mounting—Fuse mounting 100-120 volt models only	.35
13026	Mounting—Fuse mounting 220 volt models only	.35
13027	Resistor—110 ohm wire wound—used in 110 volt models only (R37)	.50
13029	Resistor—140 ohm wire wound—used in 220 volt models only (R37)	.75
13030	Resistor—1,000 ohm Carbon type 1/10 watt—Package of 5 (R12, R25, R33)	.75
5112	Resistor—1000 ohm Carbon type ¼ watt—Package of 5 (R10, R15)	1.00
13031	Resistor—3300 ohm Carbon type 1/10 watt—Package of 5 (R29)	.75
13032	Resistor—3900 ohm Carbon type 1 watt—Package of 5 (R40)	1.10
5114	Resistor—15,000 ohm Carbon type 1 watt—(R36)	.22
11282	Resistor—56,000 ohms Carbon type 1/10 watt—Package of 5 (R21)	.75
11365	Resistor—82,000 ohm Carbon type ¼ watt—Package of 5 (R14, R24)	1.00
11281	Resistor—100,000 ohm Carbon type 1/10 watt—Package of 5 (R11, R13, R32)	.75
12263	Resistor—100,000 ohm Insulated ¼ watt—Package of 5 (R30)	1.00
12478	Resistor—150,000 ohm Carbon type 1/10 watt—Package of 5 (R31)	.75
12264	Resistor—220,000 ohm Insulated ¼ watt—Package of 5 (R28)	1.00
11398	Resistor—220,000 ohm Carbon type 1/10 watt—Package of 5 (R23)	.75
12013	Resistor—1 Meg Carbon type 1/10 watt—Package of 5 (R43)	.75
	DRIVE ASSEMBLIES	
10705	Ball—5/32 in. diameter steel ball for planetary drive—Package of 20	$0.25
10341	Ball—1/8 in. diameter steel ball for planetary drive bearing—Package of 20	.25
12904	Bushing—Plate and bushing assembly for planetary drive mounting	.20
12905	Coupling—Flexible coupling and shaft assembly complete	.50
12909	Dial—Band indicating dial and cam assembly	1.05
12899	Drive—Variable tuning condenser drive complete including mounting bracket, drive dial scale, and indicator less vernier dial Stk. No. 12870 and link Stk. No. 12868	4.40
12906	Gear—Anti-lash drive gear complete	.75
12910	Gear—Sector gear and link assembly for band selector	.20
12908	Indicator—Station selector indicator pointer	.20
8151	Link—Link and roller assembly complete with springs	.30
12911	Screen—Dial lamp screen and light diffuser	.20
4669	Screw—Set screw for flexible coupling or gear stock Nos. 12905 and 12906—Package of 10	.25
12901	Shaft—Direct drive shaft and pinion gear for planetary drive	.75
12900	Shaft—Vernier drive shaft for planetary drive	.25
12903	Spring—Tension spring for planetary drive bearing—Package of 10	.20
12907	Spring—Tension spring for gear stock No. 12906—Package of 10	.20
8052	Spring—Tension spring for link stock No. 8051—Package of 5	.32
	REPRODUCER ASSEMBLIES	
8059	Board—Reproducer terminal board	.14
12640	Bracket—Output transformer mounting bracket	.18
12474	Cone—Reproducer cone and dust cap (L34)	6.80
11577	Coil—Field coil, magnet and cone support (L36)	12.00
5039	Connector—4 contact male connector for reproducer leads	.25
9719	Reproducer Complete	20.40
13007	Transformer—Output transformer (T3, C84)	3.80
	MISCELLANEOUS ASSEMBLIES	
11996	Bracket—Tuning tube mounting bracket and clamp	.22
12915	Crystal—Station selector escutcheon and crystal	1.30
12742	Escutcheon—Tuning tube escutcheon	.22
12699	Knob—Large station selector knob—Package of 5	.68
12700	Knob—Small (vernier) station selector knob—Package of 5	.58
11347	Knob—Volume control, Fidelity control, music-speech and power switch, and range selector knob—Package of 5	.75
11210	Screw—Chassis mounting screw and washer assembly—Package of 4	.28
12916	Shield—Magic brain shield	.90
4982	Spring—Retaining spring for knob stock No. 12699—Package of 10	.50
11349	Spring—Retaining spring for knob stock Nos. 11347, 12700—Package of 5	.25
12714	Capacitor—Adjustable trimmer capacitor (C3, C4, C5, C6, C14, C16)	$0.38
12807	Capacitor—Adjustable trimmer capacitor (C13, C35, C36, C37)	.35
12884	Capacitor—Adjustable trimmer capacitor (C10, C18, C23, C38, C39)	.40
12896	Capacitor—15 Mmfd. (C34)	.20
12722	Capacitor—18 Mmfd. (C15)	.20
12891	Capacitor—36 Mmfd. (C40)	.20
12629	Capacitor—56 Mmfd. (C24)	.20
12895	Capacitor—56 Mmfd. (C17)	.20
12723	Capacitor—56 Mmfd. (C2, C44)	.20
13307	Capacitor—62 Mmfd. (C11)	.20
12724	Capacitor—120 Mmfd. (C25, C28, C29)	.28
12725	Capacitor—150 Mmfd. (C1)	.28
12894	Capacitor—180 Mmfd. (C22)	.20
12727	Capacitor—555 Mmfd. (C21)	.20
12537	Capacitor—560 Mmfd. (C7, C26, C33, C42)	.20
12898	Capacitor—1500 Mmfd. (C12)	.20
12729	Capacitor—1550 Mmfd. (C20)	.26
12728	Capacitor—4500 Mmfd. (C19)	.36
12897	Capacitor—4700 Mmfd. (C43)	.40
4858	Capacitor—.01 Mfd. (C8, C30, C31, C32)	.25
12879	Coil—Antenna coil and shield XABC bands (L2, L3, L4, L5, L6)	1.90
12888	Coil—Antenna coil "D" band (L13, L14	.60
12880	Coil—Detector coil and shield XABC bands (L15, L16, L17, L18, L19, L20)	2.05
12709	Coil—Oscillator coil and shield ABC bands (L7, L8, L9)	2.02
12881	Coil—Oscillator coil and shield X band only (L10)	.80
12890	Coil—Oscillator coil "D" band (L11, L12, L23)	.70
12889	Coil—R. F. Coil "D" band (L21, L22)	.65
12877	Condenser—3 gang variable tuning condenser (C9, C27, C41)	5.10
12887	Connector—8 contact male connector and cover for power cable Stk. No. 12886	.40
12664	Core—Adjustable core and stud for Stk. No. 12654	.22
12800	Core—Adjustable core and stud for Stk. 12709	.20
12882	Core—Adjustable core and stud for Stk. No. 12881	.20
11324	Resistor—560 ohms—Carbon type—¼ watt (R2)—Package of 5	1.00
5112	Resistor—1,000 ohms—Carbon type—¼ watt (R3)—Package of 5	1.00
11298	Resistor—5,600 ohms—Carbon type—1 watt (R6)	.22
3998	Resistor—15,000 ohms—Carbon type—¼ watt (R5)—Package of 5	1.00
11282	Resistor—56,000 ohms—Carbon type—1/10 watt (R4, R9)—Package of 5	.75
8064	Resistor—82,000 ohms—Carbon type—¼ watt (R8)—Package of 5	1.00
11397	Resistor—560,000 ohms—Carbon type—1/10 watt (R1, R7)—Package of 5	.75
12651	Shield—Coil shield for Stk. Nos. 12879 and 12880	.22
12710	Shield—Coil shield for Stk. No. 12709	.28
12883	Shield—Coil shield for Stk. No. 12881	.20
11198	Socket—7 contact 6K7 Radiotron socket	.15
11279	Socket—7 contact 6L7 Radiotron socket	.20
12885	Socket—8 contact 6J7 Radiotron socket	.20
12007	Spring—Retaining spring for core Stk. Nos. 12664, 12800 and 12882—Package of 10	.36
12878	Switch—Range switch and mounting nut (S1, S2, S3)	3.60
12654	Trap—Wave trap complete (L1)	.75

The prices quoted above are subject to change without notice.

MODELS C11-3,C13-3,C15-4
Data

RCA MFG. CO., INC.

RCA VICTOR MODELS C11-3, C13-3, AND C15-4
AND SUPPLEMENT TO
RCA VICTOR MODELS C11-1, C13-2, AND C15-3
TECHNICAL INFORMATION AND SERVICE DATA

With the exception of the cabinets, Models C11-3, C13-3, and C15-4 are respectfully identical to Models C11-1, C13-2, and C15-3 (with metal rectifiers). Schematic and Wiring Diagrams for metal rectifier socket are shown by Figures 1 and 2. Other information is as follows:

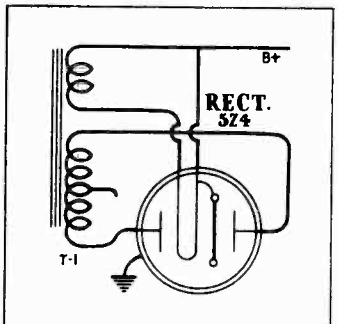


Figure 1

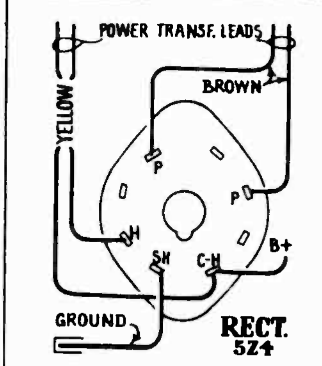


Figure 2

Models C11-1 and C11-3 (with metal rectifier).
Service Data for Model C11-1 are directly applicable to these instruments, except the parts listed below as Substitute and Additional Replacement Parts. Replacement Part changes applying to all Models C11-1 and C11-3 are:
(1) Change description of Stock No. 8053 to read:
Indicator—Station selector vernier indicator pointer.
(2) Capacitor C24 should be replaced with Stock No. 4886 instead of Stock No. 4858.
(3) Add Stock Nos. 4886, 11710, and 11793 as listed below.

Models C13-2 and C13-3 (with metal rectifier).
Service Data for Model C13-2 are directly applicable to these instruments, except the parts listed below as Substitute and Additional Replacement Parts. Replacement Part changes applying to all Models C13-2 and C13-3 are:
(1) Change description of Stock No. 8053 to read:
Indicator—Station selector vernier indicator pointer.
(2) Capacitor C60 should be replaced with Stock No. 4886 instead of Stock No. 4883.
(3) Add Stock Nos. 4886, 11710, and 11793 as listed below.

Models C15-3 and C15-4 (with metal rectifier).
Service Data for Model C15-3 are directly applicable to these instruments, except the parts listed below as Substitute and Additional Replacement Parts. Replacement Part changes applying to all Models C15-3 and C15-4 are:
(1) Change description of Stock No. 8053 to read:
Indicator—Station selector vernier indicator pointer.
(2) Capacitor C47 should be replaced with Stock No. 4870 instead of Stock No. 4858.
(3) Add Stock Nos. 4870, 11710, and 11793 as listed below.

SUBSTITUTE AND ADDITIONAL REPLACEMENT PARTS

	Stock No.	Description	List Price
MODELS C11-1 C11-3 (with metal rectifier)	4886	Capacitor—.05 Mfd. (C24)	.20
	11710	Lead—Shielded antenna lead	.40
	11195	Socket—5-contact rectifier Radiotron socket	.15
	11793	Indicator—Station selector indicator pointer	.15
		Stock Nos. 4858, 11273, and 4794 are not used in chassis having metal rectifier.	
MODELS C13-2 C13-3 (with metal rectifier)	4886	Capacitor—.05 Mfd. (C60)	.20
	11710	Lead—Shielded antenna lead	.40
	11195	Socket—5-contact rectifier Radiotron socket	.15
	11880	Transformer—Power transformer—105-125 volts 50-60 cycles (T1)	5.80
	11887	Transformer—Power transformer—105-125 volts 25-50 cycles	6.95
	11251	Transformer—Power transformer—105/125/150/210/250 volts 40-60 cycles	11.35
	11793	Indicator—Station selector indicator pointer	.15
		Stock Nos. 4883 (C60), 11273, 4794, 8061, 8062, and 11194 are not used in chassis having metal rectifier.	
MODELS C15-3 C15-4 (with metal rectifier)	4870	Capacitor—.025 Mfd. (C47)	.20
	11710	Lead—Shielded antenna lead	.40
	11195	Socket—5-contact rectifier Radiotron socket	.15
	11880	Transformer—Power transformer—105-125 volts 50-60 cycles (T1)	5.80
	11887	Transformer—Power transformer—105-125 volts 25-50 cycles	6.95
	11251	Transformer—Power transformer—105/125/150/210/250 volts 40-60 cycles	11.35
	11793	Indicator—Station selector indicator pointer	.15
		Stock Nos. 4858 (C47), 11273, 4794, 8061, 8062, and 11194 are not used in chassis having metal rectifier.	

The prices quoted above are subject to change without notice.

RCA MFG. CO., INC.

MODEL R-93
Schematic, Motor Details
Wiring Diagram, Pickup

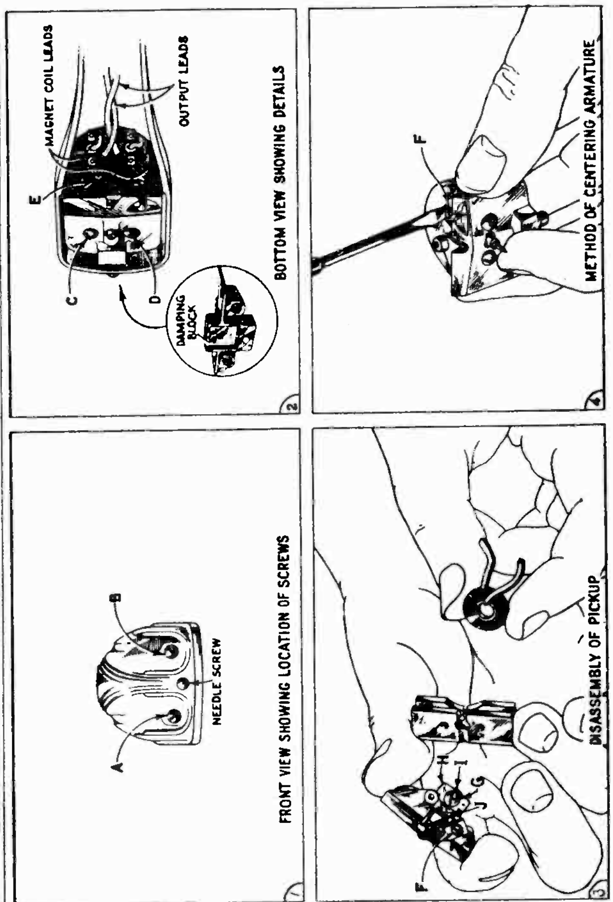


Figure 7—Details of Pickup Assembly

COIL RESISTANCE

First Production	
110 V. 50 or 60 Cycles	218 ohms total
110 V. 25 Cycles	900 ohms total
220 V. 50 Cycles	1270 ohms total
Second Production	
110 V. 50 or 60 Cycles .	200 ohms total
110 V. 25 Cycles	660 ohms total

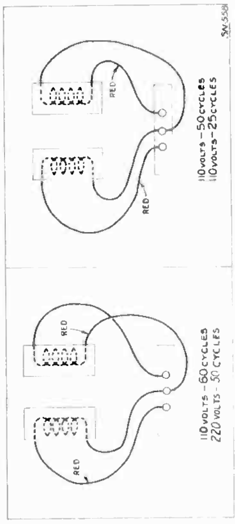


Figure 4—Motor Wiring Connections

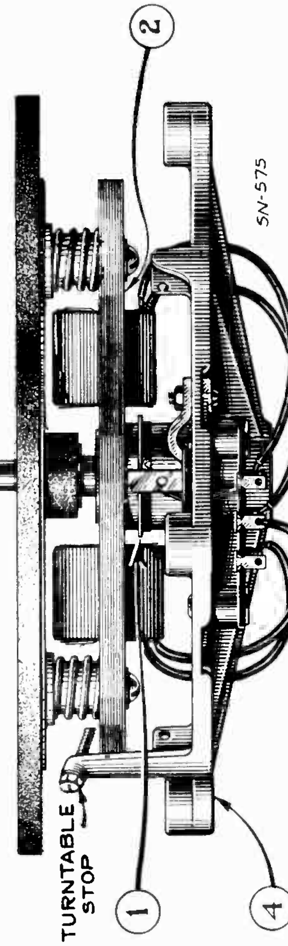
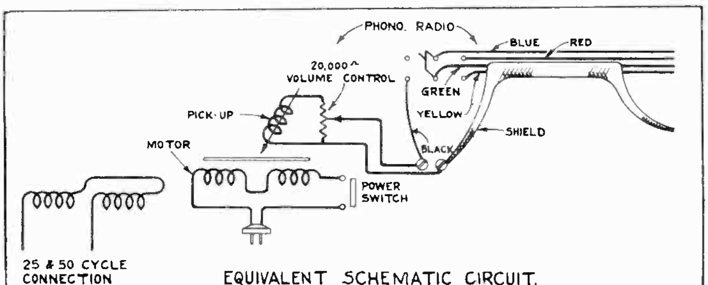


Figure 5—Details of Motor (First Production)

(For details of sections (1), (2), and (4), refer to corresponding sections below)



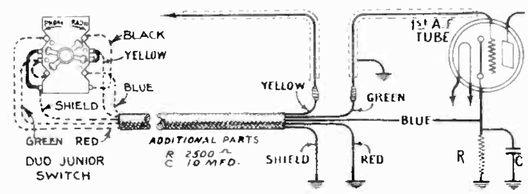


Figure 2—Typical Connections for Model C 15-3

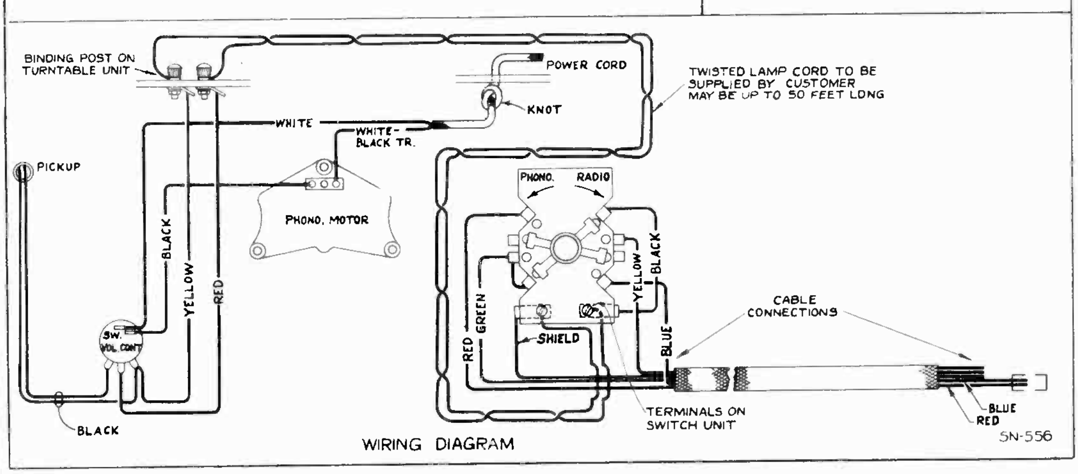


Figure 3—Wiring Diagram and Equivalent Schematic Circuit

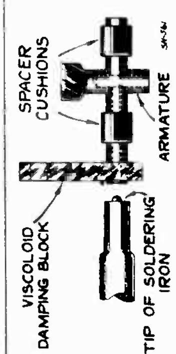


Figure 8—Special Soldering Iron Tip

MODEL R-93
Motor Details(Late)

RCA MFG. CO., INC.

Typical Layout

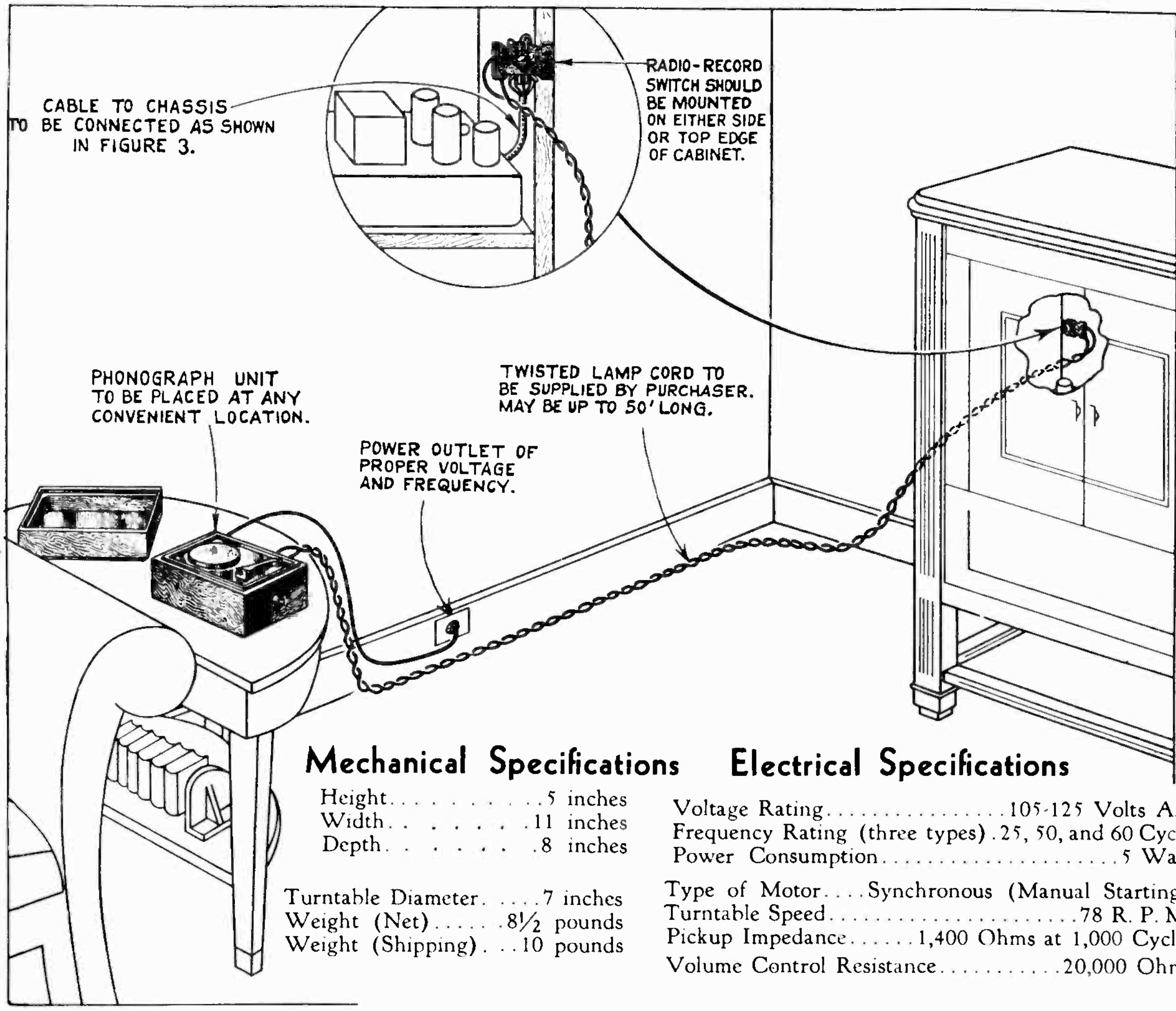


Figure 1—Typical Layout and Connections for Model R-93

Mechanical Specifications

Height	5 inches
Width	11 inches
Depth	8 inches
Turntable Diameter	7 inches
Weight (Net)	8½ pounds
Weight (Shipping)	10 pounds

Electrical Specifications

Voltage Rating	105-125 Volts A.C.
Frequency Rating (three types)	25, 50, and 60 Cycles
Power Consumption	5 Watts
Type of Motor	Synchronous (Manual Starting)
Turntable Speed	78 R. P. M.
Pickup Impedance	1,400 Ohms at 1,000 Cycles
Volume Control Resistance	20,000 Ohms

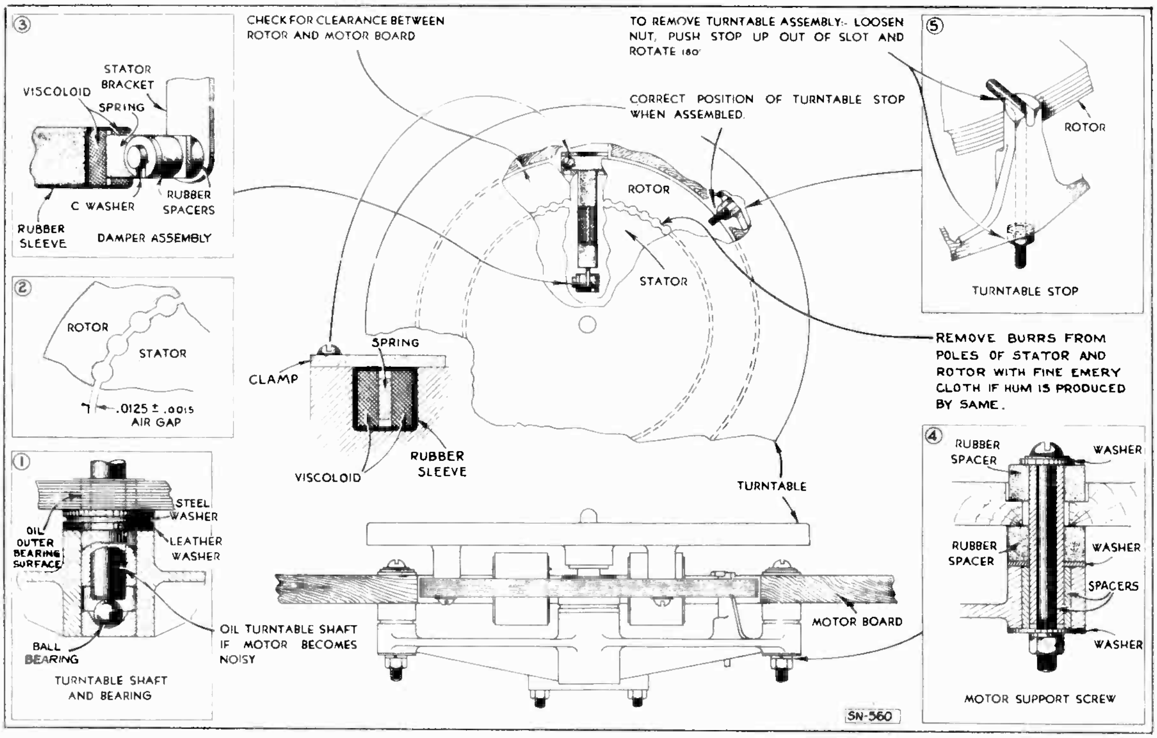


Figure 6—Details of Motor (Second Production)

RCA MFG. CO., INC.

RCA VICTOR RECEIVERS—DETAILS OF LEAD CONNECTIONS

Model	Method of Connection	Green	Yellow	Red	Blue	Shield
R-4, 6, 8, 10, 12, 70, 71, 72, 74, 76, 77	5. Adapter	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-5, 17M, 27	5. Adapter	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Det. Cathode (Yellow)
R-7, 7A	2. Term. Board	Term. 2 (Open Link)	Term. 1	Ant.	Ant. Lead	Term. 4
R-11,21	2. Term. Board	Term. 2 (Open Link)	Term. 3	Term. 4 (Open Link)	Term. 5	Term. 6
R-18W, 22	5. Adapter	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Det. Cathode (Yellow)
RO-23	5. Adapter	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-28	5. Adapter	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-37, 38, 73, 73A, 75, 75A	3. Grid Clip	Grid Cap of Tube	Grid Clip	Ant.	Ant. Lead or Bind. Post	Chassis
Rad. 48	2. Term. Board	Term. 4 (Open Link)	Term. 5	Term. 2 (Open Link)	Term. 3	Term. 5
R-50, 55	2. Term. Board	Term. 3 (Open Link)	Term. 4	Term. 1 (Open Link)	Term. 2	Term. 6
R-78	2. Term. Board	Term. 7 (Open Link)	Term. 8	Term. 1 (Open Link)	Term. 2	Chassis
Rad. 80	5. Adapter	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Bind. Post	Chassis
Rad. 82	2. Term. Board	Term. 2 (Open Link)	Term. 3 (Tie-in Term.1 to Term.3)	Term. 2	Term. 3	Term. 3
R-90, 260, 261	5. Adapter	Det. Cathode	Cathode Socket Contact	I-F Amp.* Cathode	I-F Cathode Socket Contact	Chassis
103	6. Under Chassis	Det. Grid Term.	Grid Lead	Ant.	Ant. Lead	Chassis
110, 111, 115, 210	5. Adapter	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead or Bind. Post	Cathode Socket Contact
114	5. Adapter	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Det. Cathode (Yellow)
117, 118, 119, 120, 121, 122, 124, 125, 128, 211, 214, 220, 221, 222, 224, 225, 226	3. Grid Clip	Grid Cap of Tube	Grid Clip	Ant.	Ant. Lead or Bind. Post	Chassis
140, 141, 240	2. Term. Board	Term. 3	Tape	Term. 1	Term. 2	Term. 1
143, 242	2. Term. Board	Term. 5 (Open Link)	Term. 4	Term. 1 (Open Link)	Term. 2	Chassis
262	2. Term. Board	Term. 2 (Open Link)	Term. 1	I-F Cathode (Adapter)	I-F Cathode Socket Contact	Chassis
280	5. Adapter	Det. Cathode	Cathode Socket Contact	I-F Cathode*	I-F Cathode Socket Contact	Chassis
T 4-8, 4-9	6. Under Chassis	Det. Grid Term.	Grid Lead	Ant.	Ant. Lead	Chassis
T 4-8A, 4-9A, 4-10, 5-2	3. Grid Clip	Grid Cap of Tube	Grid Clip	Ant.	Ant. Lead	Chassis
T 6-1, 6-9, 7-5, 8-14	4. Grid Clip	Grid Cap of Tube	Grid Clip	I-F Cathode (Adapter)	I-F Cathode Socket Contact	Chassis
C 6-2, 7-6, 8-15, 9-4	4. Grid Clip	Grid Cap of Tube	Grid Clip	I-F Cathode (Adapter)	I-F Cathode Socket Contact	Chassis
T 8-16, 9-9 C 8-17, 9-6	2. Term. Board	Term. 2 (Open Link)	Term. 1 (Left Term.)	Term. 3 (OpenLink)	Term. 4	Chassis
T 10-1 C 11-1, 13-2, 15-3	5. Adapter	1st Audio Cathode	Cathode Socket Contact	I-F Cathode*	I-F Cathode Socket Contact	Chassis
T 10-3, 11-8	2. Term. Board	Term. 2 (Open Link)	Term. 1	I-F Cathode (Adapter)	I-F Cathode Socket Contact	Chassis

* Use a second adapter.

MODEL R-93
Connection Data
Pickup Data, Parts

RCA MFG. CO., INC.

General Description

This phonograph turntable and pickup assembly is designed to provide record reproduction to the owner of a modern radio receiver by utilizing the audio amplifier system and loudspeaker of the radio receiver in such a way as to provide quality of reproduction equal to or better than that obtained from radio stations. A switch is provided for changing from radio to record reproduction, or vice versa. Simplicity, compact size, and ease of connections are outstanding features of this instrument.

Electrically, the instrument consists of a magnetic pickup for transforming the mechanical variations of the record grooves to voltage variations, a combined power switch and volume control for turning power on and off and adjusting the output voltage to any desired level, and a radio-record switch for shifting the connections to the receiver so that either radio or record reproduction may be obtained as desired by the user.

Figure 1 shows a typical layout of an ideal installation. Figure 3 shows the schematic and wiring diagrams. The wiring diagram indicates the proper connections to be made between the pickup unit, the switch assembly, and the end of the cable connecting to the switch.

Connecting Phonograph to the Radio Receiver

When connecting a phonograph unit to a radio receiver, a few fundamental facts should be considered. First, the output of the pickup must be connected to the receiver at a point where sufficient audio gain between it and the speaker is available to give normal sound output. Second, when doing this, some attention should be given to the possibilities of introducing hum and undesired noise, both in the audio and in the radio circuits.

In general, it will be found that the grid or cathode circuits of the second detector of a superheterodyne receiver are suitable for phonograph input. However, on receivers using the type 6H6 as a second detector, the grid of the first audio amplifier should be used. On tuned r-f receivers, either the detector cathode or the first audio transformer primary circuit may be employed, depending upon the amount of audio gain and the type of detector used.

On receivers employing a volume control in the audio circuit between the first and second audio stages, it is advisable to set the phonograph volume control to maximum and use the radio receiver volume control for adjusting the phonograph output. In circuits of this type which are aurally compensated, advantage is taken of the compensation feature when the radio receiver volume control is used.

On receivers employing a volume control between the second detector and first audio, or in the antenna, r-f, or i-f circuits, and with the phonograph input connected to the first a-f stage, it will be necessary to control the phonograph output by using the phonograph volume control. The receiver volume control may then be set to minimum to "kill" radio reception.

Investigation of a large number of receivers has shown that six general types of connections (five of which may be made without removing the chassis from the cabinet) cover practically every type of receiver. These connections are as follows:

(1) Receivers having phonograph input jacks and Radio-Record Switches. With these receivers, the cable and switch supplied with the R-93 are not used. The phonograph output is connected direct to the phonograph input jack and the Radio-Record Switch on the receiver is used for changing from Record to Radio reproduction.

(2) Receivers having phonograph terminal board connections. Such connections should be made in accordance with the instructions pertaining to that particular instrument.

(3) Receivers using the type 2B7 or 6B7 second detectors. With receivers of this type, the yellow and green leads are connected in series with the grid cap connection of this tube, the green lead connected to the grid cap itself.

(4) Receivers using the type 6F5 as a first audio tube. On receivers of this type, the yellow and green leads are connected in series with the grid cap connection of this tube, the green lead connected to the grid cap itself.

(5) Receivers not having any of the foregoing features. On receivers of this type, a split cathode connection is necessary. Stock No 4611 five-prong adapter, or Stock No. 4612 six-prong adapter, may be used which is placed under the tube used in the second detector socket of the receiver. Stock No 11957 eight-prong "octal" adapter may be placed under the first audio tube, such as the type 6C5. In the above cases, the yellow and green leads are connected in series with the cathode, the green lead connected to the tube cathode and yellow lead to the cathode socket contact.

(6) Under Chassis Connections. The above connections (3), (4), and (5), are recommended when it is desired to connect the R-93 without removing the chassis and making changes in its wiring. Better results may often be obtained by making permanent connections underneath the chassis. Additional parts (such as a cathode bias resistor and its by-pass capacitor) may be added to supply the necessary bias for phonograph operation when the stage is signal biased. A typical example of such an arrangement as recommended for Model C 15-3 is shown by Figure 2. (Note the additional jumpers added to the switch for killing radio.) All leads should be kept as short as possible and properly shielded. Also, care should be taken in the placement of leads in regard to a-c heater wiring, power transformer, etc., to prevent hum pickup. Receivers using a multi-purpose tube for i-f and second detector (such as Model T 4-8), the yellow and green leads should be connected in series with the detector grid; the connection being made in series with the ground side of the i-f transformer secondary to avoid detuning due to capacity effects.

It will be noted that red and blue leads are brought out from the switch for "killing" the radio circuit during record reproduction. On early receivers, these may be connected in series with the antenna lead to open the antenna circuit during phonograph operation. In the event of unsatisfactory radio suppression with this connection, better results may be obtained by re-connecting the red and blue leads to the adjacent respective lugs on the Radio-Phono Switch and attaching the outer ends to the Ant.-Gnd. terminals of the receiver so as to short-circuit these terminals during phonograph operation. CAUTION: This scheme of connection should be avoided on AC-DC receivers unless a small capacitor (.05 mfd.) is used in series with either switch lead.

For most positive radio suppression, a split cathode adapter should be used in an i-f socket and the red and blue leads connected (standard connection at Radio-Phono Switch) in series with the cathode so that this circuit will be open for phonograph operation.

If the receiver is of the "All-Wave" type, it is recommended that a split cathode adapter always be used in an i-f socket. CAUTION: If a "Doublet" antenna is used, do not place the switch in series with either side of the transmission line as the operation of the antenna system may be affected.

On the preceding page, a list of numerous receivers and their proper connections are given.

RK-24 Phonograph Oscillator

In addition to the above recommended connections of the R-93 to radio receivers, the RCA Stock No 9554 RK-24 Phonograph Oscillator provides a convenient and reliable means for connection and operation of the R-93 with a radio receiver of any type of manufacture. Its proper connections are shown in the RCA Victor RK-24 Service Notes.

Phonograph Motor Service Data

NOTE: The motor used in the Second Production R-93 turntables is somewhat different from that used in the First Production. They are hereinafter designated as (1) First Production and (2) Second Production. Changes denoting the difference between the two types are indicated in Figure 5 (First Production) and Figure 6 (Second Production). Replacement Parts are likewise tabulated separately for each type.

The synchronous motor used in this instrument is designed to be simple and foolproof. Among its many features are constancy of speed, low power consumption, single moving part, ease of starting, viscoloid damper, and long life. The main parts of the motor and the points that may require attention are shown by Figure 5 (First Production) and Figure 6 (Second Production). The motor is started by turning "On" the power switch and giving the turntable a clockwise spin with the hand. If the motor is difficult to start it may be due to the stator failing to rotate on the outer bearing. This may be corrected by applying a slight amount of oil to the bearing surfaces. It is very important that the ball bearing be at the bottom of the main bearing assembly.

Excessive Hum and Vibration

A small amount of hum when starting, decreasing to a negligible amount while running, is normal. If excessive vibration occurs either at starting or running, it may be due to one of the following:

(1) Insufficient lubrication in outer bearing or any other failure that will cause the stator to bind.
(2) Metal washer not above the leather washer at the bottom of the main bearing.
(3) Leather washer not oiled. When replacing the leather washer, make sure that it is thoroughly soaked in oil.
(4) Motor not properly supported from motor board. Unless the motor is properly supported from the motor board, normal vibration will be excessive.
(5) Burrs on salient poles of rotor or stator. They should be removed with fine emery cloth.

Removing Rotor from Stator

The rotor which includes the turntable may be removed as follows:

(1) First Production. Loosen the screw shown in Figure 5 until it clears the rotor. Then lift the turntable, being careful not to lose the steel ball of the end-bearing. After replacing the rotor, tighten the retaining screw securely.
(2) Second Production. Loosen the nut shown in (5) of Figure 6, pushing the stop out of the slot and rotating 180 degrees. Then lift the turntable, being careful not to lose the ball end-bearing. After replacing the rotor, return the stop to its normal position and tighten the nut securely.

PICKUP UNIT SERVICE DATA

The magnetic pickup and tone arm assembly of this instrument is of new design and unique construction. Service work will consist of centering the armature and replacing the spacer cushions, damping block, and replacing the magnet coil.

Disassembling the Pickup

The pickup may be disassembled in the following manner.

(a) Unsolder the two cable connections to the terminal strip.
(b) Remove the needle screw and screws "A" and "B."
(c) Remove the pickup assembly from the arm and housing.
(d) Unsolder the two magnet coil leads attached to the terminals and then remove screw E. This will allow the removal of the terminal board.
(e) If centering the pickup armature is the only adjustment required, such centering can be done without removing the terminal board indicated in (d). The armature is centered by loosening screw F, accessible through the hole shown, and holding the armature with the finger in proper position while screw F is tightened. "Feeling" the armature while deflecting it between its two extremes is the best manner of ascertaining proper centering. When centering, after work has been done or the magnet removed, it is important that the magnet be remagnetized while in place.
(f) If the coil or spacer cushions are to be replaced, the pickup must be further disassembled. This is done by removing the magnet and then removing screws C and D. The pole piece may now be removed and the old coil and sleeve disassembled. Acetone will be found helpful for dissolving the old cement that holds the coil in place. The new coil, with its sleeve, may now be replaced and cemented in a similar position to that occupied by the old coil. Duco household or Ambroid cement may be used to hold the coil in place. Be careful to center the coil with its paper sleeve before cementing. Only rosin core solder should be used for soldering the coil leads in the pickup.
(g) The spacer cushions are replaced by loosening the armature adjusting screw F and removing screw G, clamp H and washer I and removing the armature from its bracket. Damping block J must be removed from the armature. After putting the new spacer cushions in place, a new damping block should be fastened to the armature as outlined in instructions on replacing the damping block. The cushions can then be removed by slipping them from each end of the pivot shaft.

Replacing the Damping Block

If it is desired to replace the damping block, it may be done in the following manner:

(a) Disassemble the pickup as described under the preceding section.
(b) Remove the damping block from the armature and clean the armature shaft with emery paper.
(c) Insert the armature through the new block so that it occupies the same position as that of the old. Also ascertain that the block is in correct vertical alignment with the armature. It will be noted that the hole in the damping block is somewhat smaller than the shaft diameter. This is done so that a snug fit will be obtained.
(d) After properly locating the damping block, a soldering iron should be applied to the armature so that the block will melt slightly at its point of contact with the armature. A special tip, constructed as shown in Figure 8, will prove desirable for fusing the block in place. The iron should be applied only long enough to melt the block sufficiently to cause a small bulge on each side, and must be removed before any bubbling occurs. The pickup should then be reassembled.

It is important to remember that in all operations after reassembling but before placing in the tone arm, the pickup should be magnetized and the armature centered after remagnetizing. Magnetizing should be done by placing the pickup magnet on the magnetizer and sliding it onto the pole pieces, after magnetizing being careful not to break the magnetic circuit.

REPLACEMENT PARTS

Stock No.	Description	List Price
	MOTOR ASSEMBLIES FIRST PRODUCTION	
10194	Ball—Steel ball bearing—Package of 20	$0.25
7657	Base—Motor base and bearing assembly—50-60 cycle—105-125/200-250 volt operation	1.20
9523	Base—Motor base and bearing assembly—25 cycle operation	1.20
9519	Coil—Stator assembly—Comprising coil and laminations—105-125 volt, 60 cycle operation	2.50
9521	Coil—Stator assembly—Comprising coil and laminations—105-125 volt, 50 cycle operation	2.35
9524	Coil—Stator assembly—Comprising coil and laminations—105-125 volt, 25 cycle operation	2.25
9529	Coil—Stator coil assembly—Comprising coil and laminations—50 cycle, 200-250 volt operation	2.50
9515	Motor—105-125 volts—60 cycle motor	8.80
9516	Motor—105-125 volts—50 cycle motor	8.42
9517	Motor—105-125 volts—25 cycle motor	9.00
9528	Motor—200-250 volts—50 cycle motor	9.60
4456	Motor accessories—Comprising 3 nuts, 1 shield and 1 screw	.10
3813	Motor suspension assembly—Comprising one screw, one metal bushing, two rubber bushings, one flat washer, one lockwasher and one nut—Package of 3	.56
4457	Spring, screw and washer assembly—Used to mount rotor laminations to turntable—Comprising 3 springs, 3 screws and 9 washers	.15
9520	Turntable—Turntable assembly complete with rotor laminations—60 cycle operation	4.45
9525	Turntable—Turntable assembly complete with rotor laminations—25 cycle operation	4.85
9522	Turntable—Turntable assembly complete with rotor laminations—105-125/200-250 volt—50 cycle operation	4.25
4083	Washer—Leather washer—Package of 10	20
4084	Washer—Metal washer—Package of 10	.26
	MOTOR ASSEMBLIES SECOND PRODUCTION	
10194	Ball—Steel ball bearing—Package of 20	.25
11740	Base—Motor base and bearing assembly	1.45
11733	Coil—Stator assembly—Comprising coil and laminations—105-125 volt, 60 cycle operation	2.96
11734	Coil—Stator assembly—Comprising coil and laminations—105-125 volt, 50 cycle operation	3.08
11748	Damper—Motor damper assembly—Comprising one damper, one damper plate, one screw, two rubber washers, and one "C" washer	.20
11873	Motor—105-125 volts—60 cycle motor	9.95
11874	Motor—105-125 volts—50 cycle motor	9.95
4456	Motor accessories—Comprising 3 nuts, 1 shield and 1 screw	.10
11876	Turntable—Turntable assembly complete with rotor laminations—60 cycle operation	4.35
11875	Turntable—Turntable assembly complete with rotor laminations—50 cycle operation	4.35
4083	Washer—Leather washer—Package of 10	.20
4084	Washer—Metal washer—Package of 10	.26
	PICKUP AND ARM ASSEMBLIES	
3812	Armature—Pickup armature	.32
4462	Cable—Pickup cable	.20
3810	Coil—Pickup coil	.32
5091	Cushion—Pickup armature spacer cushion—Package of 10	.50
4543	Damper—Damper block complete with damper clamp, washer	.10
4503	Pickup and arm assembly complete	4.95
3811	Screw—Needle holding screw—Package of 10	.46
	CABINET ASSEMBLIES	
X-249	Bottom—Lower section of wood cabinet	2.95
X-248	Cover—Top half of wood cabinet	3.00
	MISCELLANEOUS ASSEMBLIES	
4611	Adaptor—Five-prong split cathode adaptor	1.00
4612	Adaptor—Six-prong split cathode adaptor	1.00
11957	Adaptor—Eight-prong "octal" split cathode adaptor with ground lug	1.00
4461	Cable—5-conductor—Radio-Record switch cable	.28
4459	Bracket—Volume control mounting bracket	10
4463	Foot—Felt foot for bottom cover—Package of 10	.20
3829	Knob—Radio-Record switch knob—Package of 5	1.10
3961	Knob—Volume control knob—Package of 5	.60
4458	Post—Binding post—Package of 10	2.50
4507	Rest—Pickup rest—Package of 5	.60
4119	Screw—No. 8-32-¼-inch headless set screw for knob—Package of 20	.38
4460	Switch—Radio-Record switch	.40
4502	Volume control (R1)	1.16

The prices quoted above are subject to change without notice.

MODEL R-99
Schematic
Loudspeaker

RCA MFG. CO., INC.

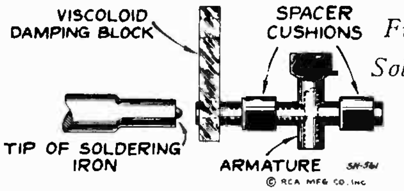


Figure 6—Special Soldering-Iron Tip

Radiotron Cathode Current Readings

Measured with Milliammeter Connected at Tube Socket Cathode Terminal under Conditions Similar to Those of Voltage Measurements

(1)	RCA-6L7—Expander	7.6 ma.
(2)	RCA-6C5—Audio Driver	4.4 ma.
(3)	RCA-2A3—Power Output	41 ma.
(4)	RCA-2A3—Power Output	41 ma.
(5)	RCA-6C5—Expander Amplifier	1.9 ma.
(6)	RCA-6H6—Expander Rectifier	0 ma.
(7)	RCA-5Z3—Rectifier	165 ma.*

(* Cannot be measured at socket)

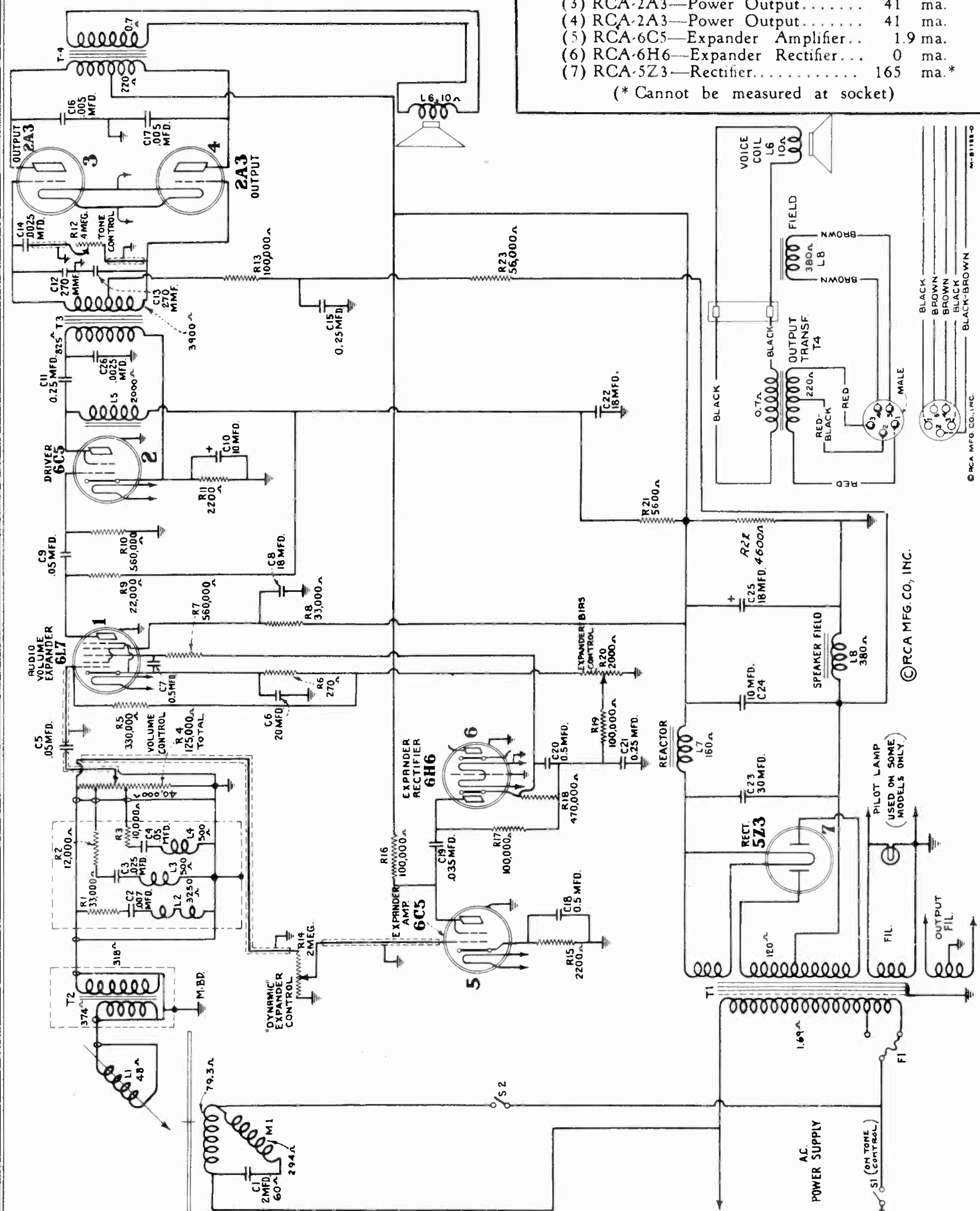
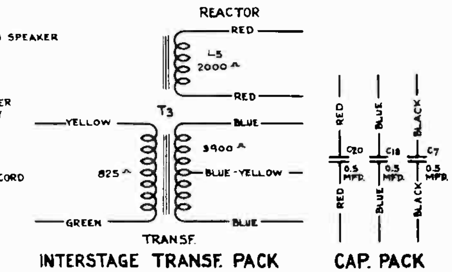


Figure 1—Schematic Circuit Diagram

Figure 10—Loudspeaker Wiring

MODEL R-99
Chassis Wiring
Pickup, Socket

RCA MFG. CO., INC.



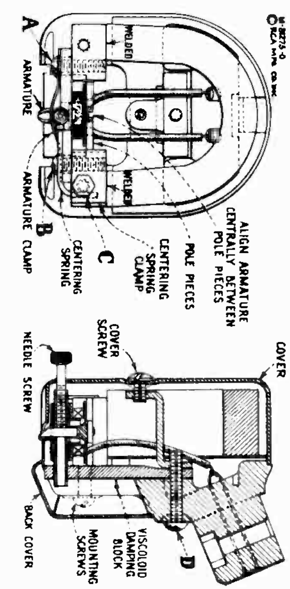


Figure 4— Details of Pickup

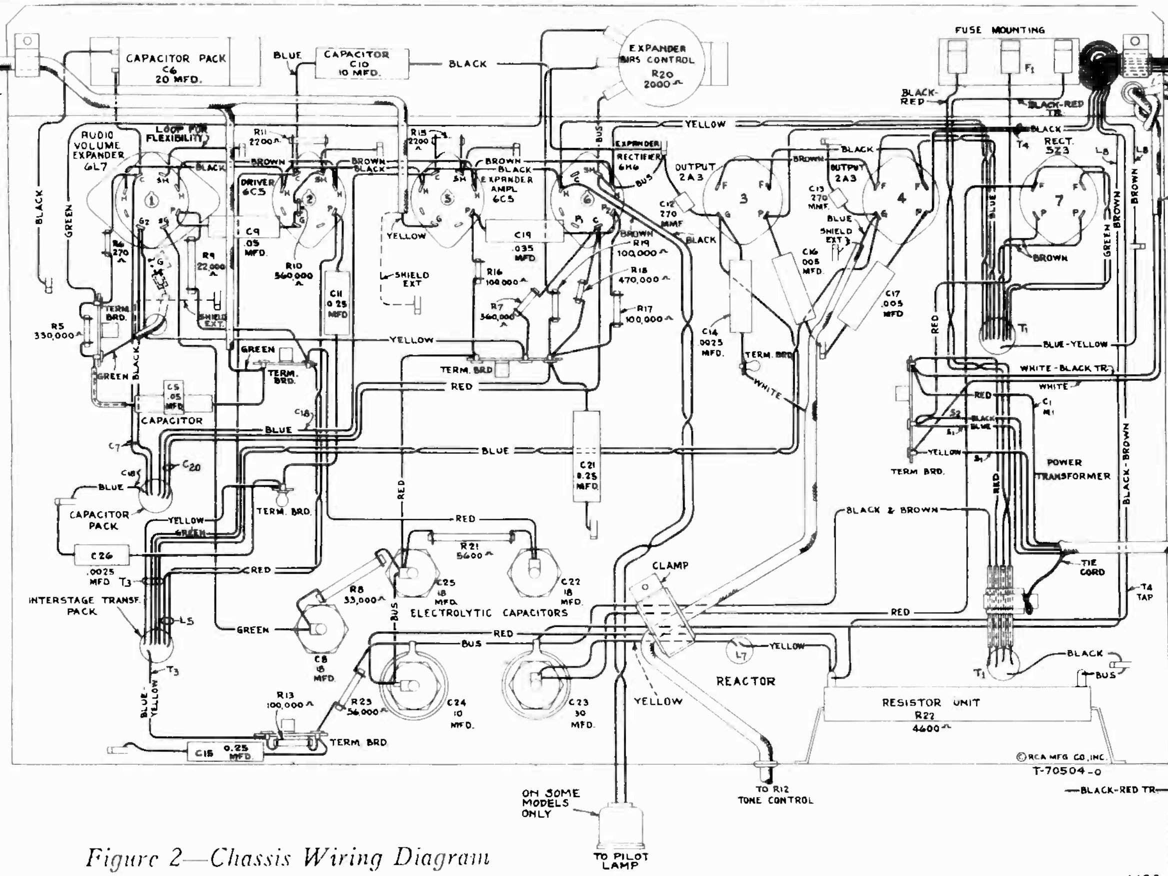
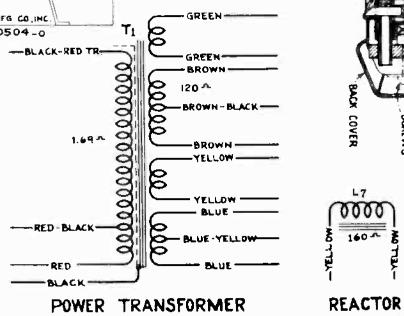


Figure 2—Chassis Wiring Diagram



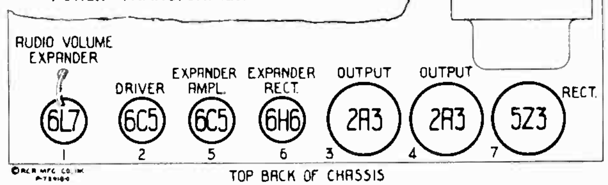


Figure 3—Radiotron Locations

Audio Frequency Range.............................Approximately 30 to 8,000 cycles

POWER OUTPUT
Undistorted...............12 watts
Maximum...............15 watts

PICKUP
Type.....Low Impedance Magnetic
Impedance. 100 ohms at 1,000 cycles

LOUDSPEAKER
Type................Super 12-inch Electrodynamic
Impedance (V.C.)........11¼ ohms at 400 cycles

PHONOGRAPH (MANUAL OPERATED)
Motor.......................Synchronous Type
Speed (at rated frequency)..............78 r.p.m.

POWER-SUPPLY RATINGS
Voltage...105-125 volts
Frequency (two types.............................50 or 60 cycles
Power Consumption...............................180 watts

Voltage

RCA MFG. CO., INC.

MODEL R-99
Resistance

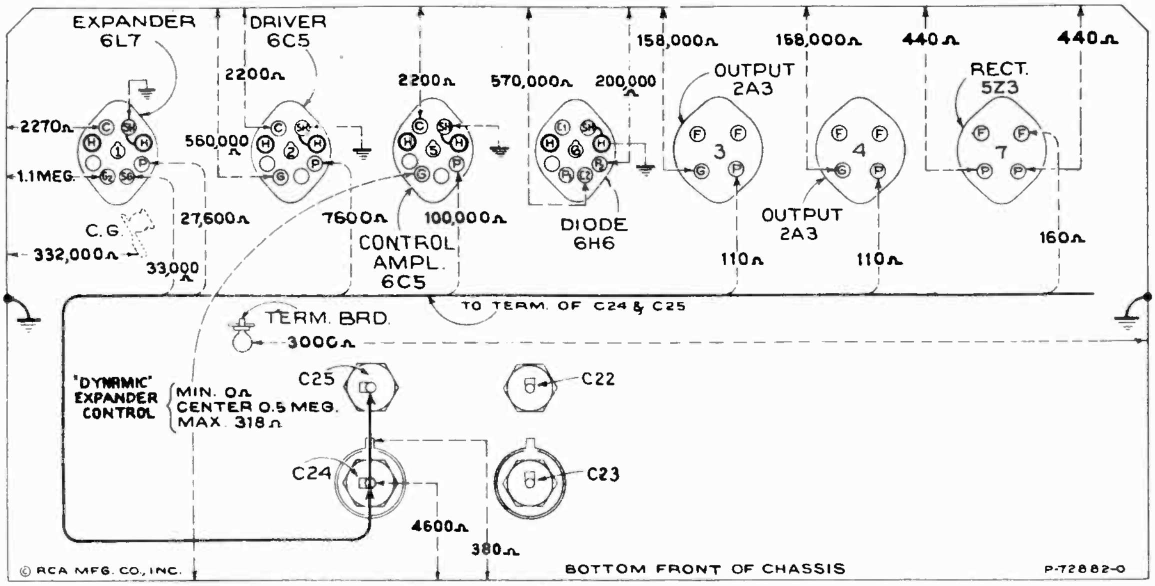


Figure 5—Resistance Diagram

Power supply disconnected—Radiotrons in sockets

The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and amplifier chassis ground, on figure 5, have been carefully selected so as to facilitate a rapid continuity check of the circuits. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 1, and Chassis Wiring Diagram, figure 2, will permit the location of certain troubles which might otherwise be difficult to ascertain. Each value as specified should hold within ±20%. Variations in excess of this limit will usually be indicative of trouble in circuit under test. When measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative terminal of the resistance meter to chassis-ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

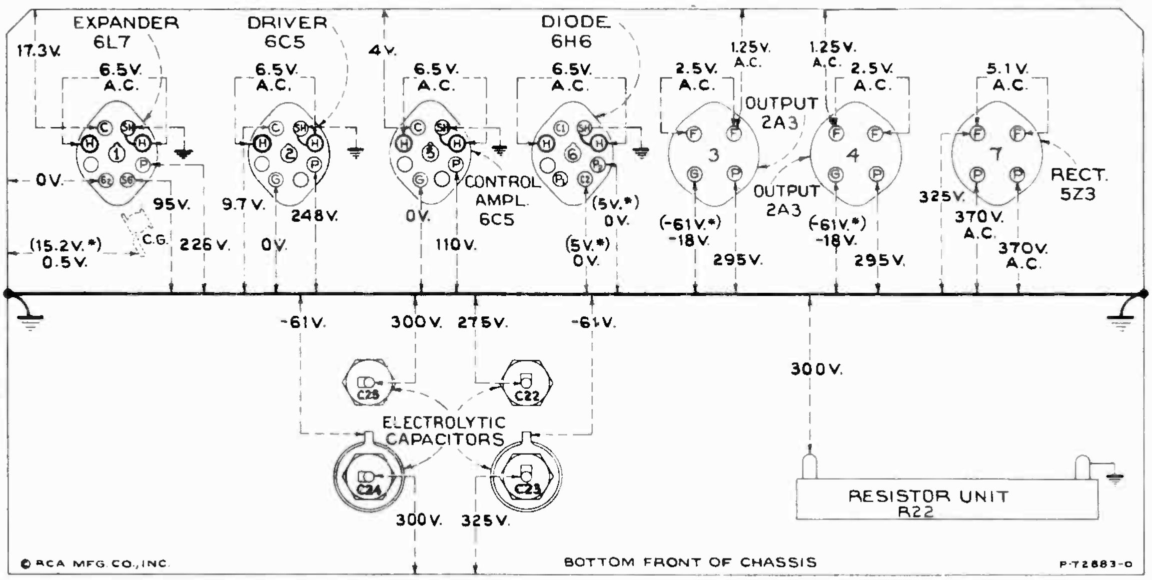


Figure 7—Radiotron Socket Voltages

Measured at 120 volts on 120-volt tap, rated frequency—Volume control minimum—Expander "Dynamic" control minimum—Dynamic amplifier adjusted as per text—No signal

Note: *Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value because of the additional loading of the voltmeter through the high series circuit resistance.*

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to amplifier chassis ground on figure 7 will assist in locating cause for faulty operation. Each value as specified should hold within ±20% when the amplifier is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm-per-volt d-c meter, having ranges of 10, 50, 250, 500, and 1,000 volts. Use the nearest range above the voltage to be measured. A-c voltages were measured with a corresponding a-c meter.

MODEL R-99
Motor Adjustments
Assembly Wiring

RCA MFG. CO., INC.

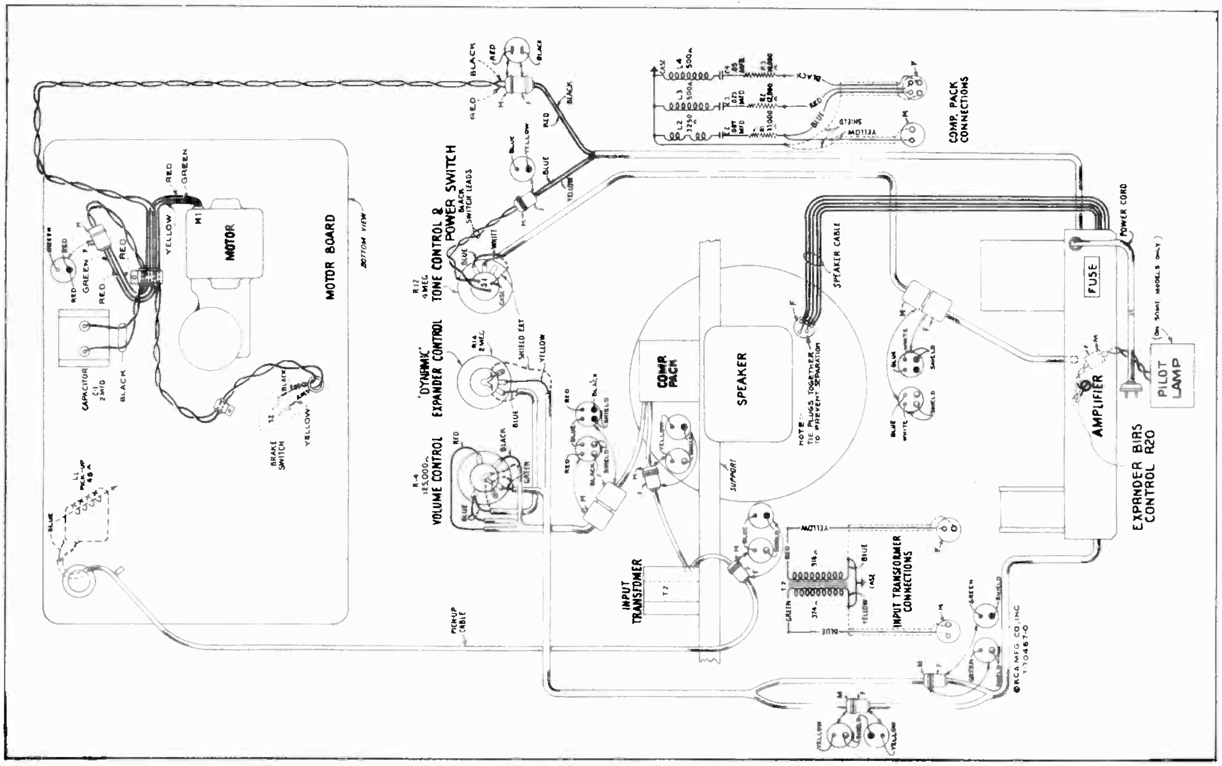


Figure 9—Assembly Wiring

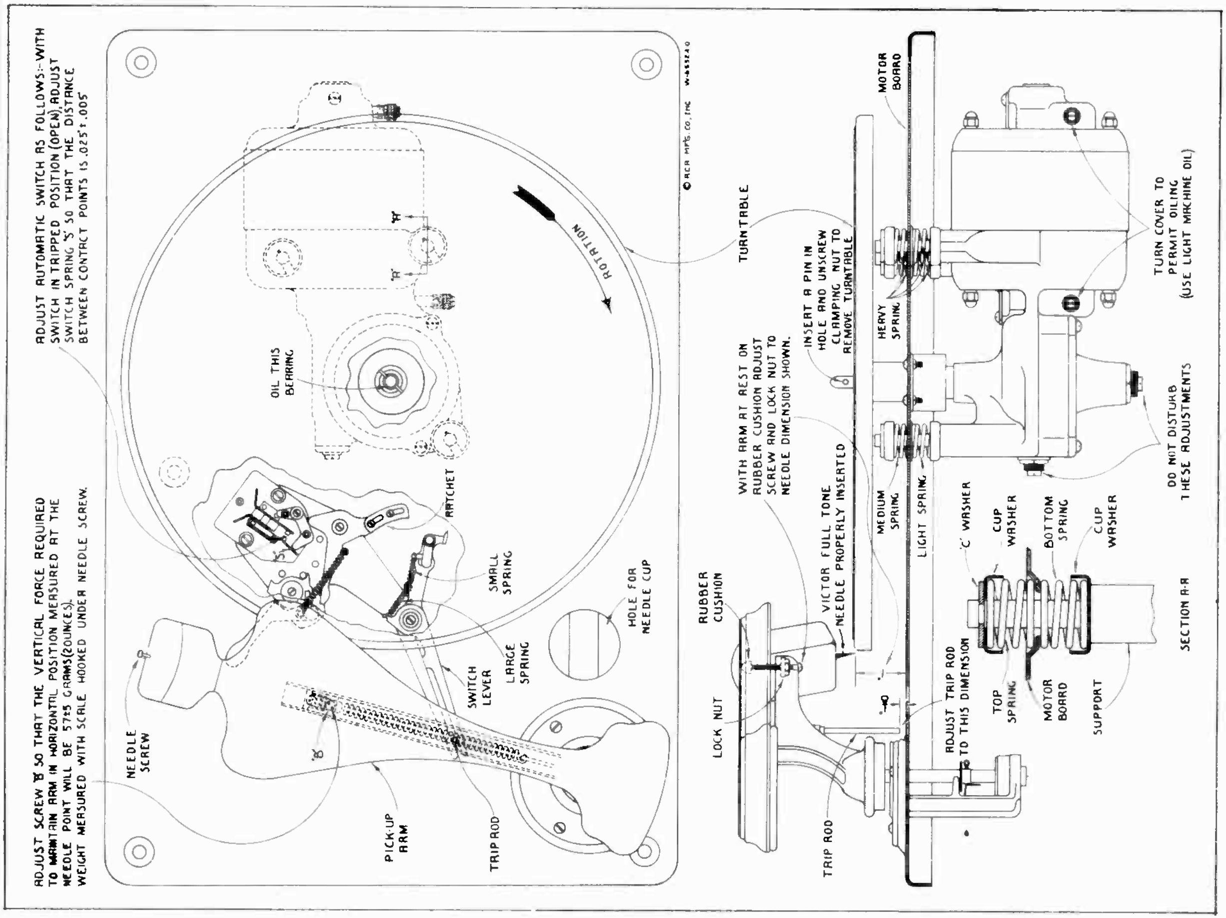


Figure 8—Motor Board Adjustments

MODEL R-99
Circuit Data
Adjustments, Parts

RCA MFG. CO., INC.

General Description

The RCA Victor Model R-99 High Fidelity Electrola comprises the ultimate in present-day record reproduction. It consists of the revolutionary dynamic expander; a high-quality, high-power output, power amplifier; a 12-inch, aluminum voice-coil, electrodynamic loudspeaker with a high-frequency tone diffuser; a light weight, high-fidelity pickup; an acoustically tapered volume control; a spring balanced tone arm, a powerful synchronous motor; and a high audio-frequency tone control. The instrument will play either 10- or 12-inch records.

Dynamic Amplifier

Limitations imposed by present methods of disc recording necessitate a constricted range of sound intensity which may be recorded. The minimum intensity of sound which may be recorded is determined by unavoidable record surface noise which masks the recorded sound when such sound approaches the intensity of the noise. The maximum sound intensity which may be recorded is determined by the thickness of the record groove wall into which the record-cutting stylus makes an impression of the original sound. The amplitude of the lateral cutting is, therefore, regulated so that the stylus will not break over into the adjacent groove. It is because of these upper and lower limits that the volume range of sound reproduction cannot be identical to the original sound which is produced in the recording studio. In order to keep the recorded sound within the limits of the record, the recording control engineer regulates the recording amplifiers accordingly.

The dynamic amplifier of this reproducing instrument is designed to compensate for the above-mentioned recording limitations of volume range. It serves to restore the original intensity relations of the recorded sound by varying the amplification of the reproducing amplifier in direct accordance with the average intensity value of the sound. Thus, when there is a prevailing rise in the intensity of the recorded sound, the dynamic amplifier increases in gain accordingly, producing a further increase in volume, and conversely when there is a prevailing tendency toward a decrease of the recorded sound the dynamic amplifier decreases in gain, and produces a further decrease in volume. The functions of the dynamic amplifier are particularly advantageous in the reproduction of symphonic and certain other types of music where very great ranges of sound intensity are encountered. The dynamic amplifier causes the very loud or fortissimo, and the very soft or pianissimo passages to be reproduced in their natural relations, although they may have been somewhat modified in the actual recording on the record.

Power Amplifier

In order that the dynamic amplifier may bring about its designed purpose, the amplifier and reproducing system into which it works must have an undistorted range of amplification consistent with the degree of volume expansion provided in the dynamic amplifier. The power amplifier is, therefore, designed to have a maximum output of 15 watts.

Loudspeaker

The 12-inch dust-proof electrodynamic loudspeaker provided with this unit is of massive design. It is constructed with an aluminum voice coil, which permits the weight of the moving unit to be greatly reduced, with consequent increase of the frequency range. A high-frequency tone diffuser is provided in front of the cone of the loudspeaker unit to disperse the higher frequency sound waves over a wide acoustic angle instead of being emitted in a concentrated beam directly in front of the unit.

Pickup

The magnetic pickup and tone arm assembly is of an improved design. It is constructed with a short and very light armature for the most delicate response. The tone arm is spring-balanced, allowing the effective weight of the pickup on the record to be materially reduced.

Electrical Circuits

The circuits consist of a phonograph pickup with compensating filters, dynamic expander stage, expander amplifier stage, expander diode-rectifier stage, audio driver stage, push pull power output stage, and a full-wave rectifier.

The electrical impulses, generated in the pickup coil L1, are boosted in the input transformer T2 before they are fed to the dynamic amplifier. A compensation filter is placed in shunt with the output of T2 to correct the frequency response of the reproducing system so as to compensate for the recording characteristic.

Dynamic Amplifier

The signal from the input transformer T2 is supplied to control grid No. 1 of the RCA-6L7 (expander) through the acoustically tapered volume control R4, and is simultaneously applied through the expander control R14 to the control grid of the first RCA-6C5 (expander amplifier). The signal applied to this latter tube is first amplified and then fed to the RCA-6H6 (expander diode-rectifier) tube where it is rectified. The output of the RCA-6H6 is of the nature of a pulsating direct current, the amount varying in direct relation with the average value of intensity of the audio signal. This pulsating voltage appears across resistor R18 and is applied to the second control grid of the RCA-6L7 (expander) through a delay filter (R7 and C7). The value of the bias on this control grid determines the amplification of the RCA-6L7 expander stage. The gain of the dynamic amplifier is, therefore, automatically regulated by the average intensity of the audio signal.

Audio Driver

The audio output of the RCA-6L7 is resistance-capacitance coupled to the control grid of RCA-6C5 audio driver. The output of this tube is shunt fed to the primary of the interstage transformer T3 by means of the reactance L5 and blocking capacitor C11. This arrangement prevents the plate current of the RCA-6C5 from flowing through the primary of T3, permitting increased fidelity.

Power Amplifier

The audio signal developed across the secondary of T3 is applied to the control grids (push-pull) of the RCA-2A3 tubes for final power amplification. The bias for these control grids is developed across the loudspeaker field winding L8 and is applied through a suitable resistance-capacitance filter. The output of the power amplifier stage is transformer-coupled to the voice coil of the electrodynamic loudspeaker.

Power Supply

The power supply system consists of an RCA-5Z3 rectifier tube, which is supplied from an efficiently designed power transformer, and which works into a suitable filter. The potentials required for the plate, screen, control grid, and cathode circuits are obtained from this filter. The electrodynamic loudspeaker field coil is used as a filter reactor.

SERVICE DATA

The various diagrams in the booklet contain such information as will be needed to locate causes for defective operation if such develops. The values of various resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as L1, C2, R1, etc., are provided for reference between the illustrations, and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistance only. Resistance values of less than one ohm are generally omitted.

Dynamic Amplifier Adjustments

It is essential that correct voltages and currents exist at the RCA-6L7 audio expander stage in order that the expanding function may take place in the proper manner. A screw-driver adjustment is accordingly provided to regulate the RCA-6L7 control grid No. 2 bias to the correct operating value. Two methods of adjustment are applicable. Either method requires a normal voltage of 300 volts across the filter output (resistor R22, see figure 7). The one to be preferred (a) requires the use of the **RCA Stock No. 9633 Beat Frequency Oscillator** or the equivalent, a 100-ohm resistor, a 200-ohm resistor, and a 1,000 ohm-per-volt a-c voltmeter (rectifier type) having a "low" range of 1.0 volt and a "high" range of 250 volts or greater. The less accurate method (b) requires the use of the **RCA Stock No. 12353 Split Plate Adapter** (supplied with instrument), and a suitable d-c milliammeter. Both of these procedures are outlined below. **CAUTION: Before using either method, be sure that power supply fuse is in proper position for the line voltage.**

(a) Preferred Method.

Turn power switch (left front) off. Connect the 200-ohm and the 100-ohm resistors in series between the beat-frequency oscillator terminals (upper "250" and "CT") with the 100-ohm resistor connected to "CT." Calibrate the beat-frequency oscillator, adjust it to 1,000 cycles, and reduce its output. Connect the 1,000-ohm-per-volt a-c voltmeter (1-volt range) to the beat frequency oscillator terminals (upper "250" and "CT"). Remove the "M" plug from the "F" receptacle on the shielded cable running between the input transformer T2 and the compensator pack "Comp." (see figure 9). Connect beat-frequency oscillator terminal "CT" to the large pin on the "M" plug. Connect the junction of the 200-ohm and the 100-ohm resistors to the small pin on the "M" plug.

Adjust beat-frequency oscillator output until the voltmeter reads exactly 1.0 volt. Remove the voltmeter leads from beat-frequency oscillator terminals without disturbing any of the oscillator adjustments. Place the voltmeter to its 250-volt or greater range and connect it between the plate prongs of the two RCA-2A3 power output tubes. Connections to the tube prongs may be made by stripping approximately ½ inch of insulation from the ends of two short leads of rubber covered wire, wrapping one bare end around each plate prong (being careful not to allow the bare ends to short on the chassis when the tubes are placed in their sockets), and connecting the voltmeter to these leads. **CAUTION: Do not touch these plate connections after the power is turned on since the potential at these points is rather high and carelessness might result in a serious shock.**

Set the expander "Dynamic" control (center front) to its extreme counter-clockwise position. Set the phonograph volume control (right front) to its extreme clockwise position. Turn on power switch (left front) and rotate this control to its extreme clockwise position, allowing it to remain in this position for all adjustments. Allow a few minutes for the instrument to become stabilized. Adjust the expander bias control R20, on rear apron of amplifier (see figure 9), until the voltmeter reads 195 volts. Turn phonograph volume control to extreme counter-clockwise position. Transfer lead from the junction of the 200 ohm and the 100 ohm resistors to the beat-frequency oscillator (upper "250") terminal without disturbing any of the oscillator adjustments. Adjust phonograph volume control (right front) until the voltmeter reads 50 volts. Turn the expander "Dynamic" control (center front) to its extreme clockwise position allowing maximum expansion to take place. The voltmeter reading should now read not less than 150 volts if the expander circuit is operating correctly. Failure to do so indicates a defect in the system and the usual service procedure should be followed.

(b) Alternate Method.

Turn power switch (left front) off. Place **RCA Stock No. 12353 Split Plate Adapter** under the RCA-6L7. Connect a suitable d-c milliammeter to the adapter. Turn both the phonograph volume control (right front) and the expander "Dynamic" control (center front) to their extreme counter-clockwise positions. Turn on power switch (left front) and allow a few minutes for the instrument to become stabilized. Adjust expander bias control R20, on rear apron of amplifier (see figure 9), to give 1.0 milliampere of plate current with no signal input to the dynamic amplifier.

Magnetic Pickup

The pickup used in the phonograph unit is of an improved design. The horseshoe magnet is rigidly welded to the pole pieces and is irremovable. There is a centering spring attached to the armature to maintain proper adjustment and to provide a limiting effect on the movement of the armature. The frequency response is substantially uniform over a wide range. Service operations which may be necessary on the pickup are as follows:

Centering Armature

Refer to figure 4 showing the pickup inner structure. The armature is shown in its proper relation to the magnet pole pieces, i.e., exactly centered. Whenever this centering adjustment has been disturbed, the screws A, B, and C should be loosened and the armature clamp adjusted to the point where the vertical axis of the armature is at right angles to the horizontal axis of the pole pieces, and centered between them. This centering operation may be facilitated by inserting a small rod or nail into the armature needle hole, using it as a lever to test the angular movement of the armature. The limitations of the movement in each direction will be caused by the armature striking the pole pieces. The proper adjustment is obtained when there is equal angular displacement of the armature and adjustment rod or nail to each side of the vertical axis of the magnet and coil assembly. The screws A and B should then be secured, observing care not to disturb the adjustment of the armature clamp. Then place the pickup in a vise and secure the centering spring-clamp by means of the screw C, allowing the centering spring to remain in the position at which the armature is exactly centered between the pole pieces. With a little practice, the correct adjustment of the armature may be readily obtained. The air gap between the pole pieces and the armature should be kept free from dust, filings, and other such foreign materials which would obstruct the movement of the pickup armature.

Damping Block

The viscoloid block which is attached to the back end of the armature shank serves as a mechanical filter to eliminate undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block, it may be done by removing screw D and the cover support bracket from the mechanism and taking off the old viscoloid block. The surface of the armature which is in contact with the viscoloid should be thoroughly cleaned with fine emery cloth. Then insert the new block so that it occupies the same position as it did originally. Make certain that the block is in correct vertical alignment with the armature. The hole in the new viscoloid block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the viscoloid aligned on the armature, screw D and the cover support bracket should then be replaced. Heat should be applied to the armature (viscoloid side) so that the viscoloid block will fuse at the point of contact and become rigidly attached to the armature. A special-tip soldering iron constructed as shown in figure 6 will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block and cause a small bulge on both sides.

Replacing Coil

Whenever there is defective operation due to an open or shorted pickup coil, this coil should be replaced. The method of replacement will be obvious upon inspection of the pickup assembly and by study of the cut-a-way illustrations. Make sure that the new coil is properly centered with the hole in the support strip and glued securely in that position. It is important to re-adjust the armature as previously explained after re-assembly of the mechanism. Only rosin core solder should be used for soldering the coil leads in the pickup. This same type of solder should be used when necessary for soldering the centering spring to the armature.

Magnetizing

Loss of magnetization will not usually occur when the pickup has received normal care because the magnet and pole pieces are one unit and the magnetic circuit remains practically closed at all times. When the pickup has been mishandled, subjected to a strong a-c field, jolted, or dropped, there may be an appreciable loss of magnetic strength, in which case it will be necessary to re-magnetize the entire structure. To do this, it will be necessary to first remove the pickup mechanism from the tone arm, and then remove the magnet assembly. Place the magnet assembly on the poles of a standard pickup magnetizer such as the **RCA Stock No. 9549 Pickup Magnetizer** and charging the magnet in accordance with the instructions accompanying the magnetizer. It is preferable to check the polarity of the pickup magnet and to re-magnetize it so that the same polarity is maintained.

Phonograph Mechanism

The phonograph motor is of the synchronous type and is designed to be simple and foolproof. Under normal operating conditions, service difficulties should be negligible. Occasionally, however, certain adjustments may be required. These adjustments are illustrated and explained in figure 8.

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed by softening its cement with a very light application of acetone using care not to allow the acetone to flow down into the air gap. The dust cover should be cemented back in place with ambroid upon completion of adjustment.

REPLACEMENT PARTS

Stock No.	Description	List Price
14332	Resistor—22,000 ohms, carbon type, 1 watt (R9)—Package of 5	1.10
12487	Resistor—33,000 ohms, carbon type, 2 watt (R8)	.25
12286	Resistor—56,000 ohms, insulated, ¼ watt (R23)—Package of 5	1.00
12263	Resistor—100,000 ohms, insulated, ¼ watt (R13, R16, R17, R19)—Package of 5	1.00
12452	Resistor—330,000 ohms, insulated, ¼ watt (R5)—Package of 5	1.00
12285	Resistor—470,000 ohms, insulated, ¼ watt (R18)—Package of 5	1.00
12486	Resistor—560,000 ohms, insulated, ¼ watt (R7, R10)—Package of 5	1.00
4794	Socket—4-contact 5Z3 or 2A3 Radiotron socket	.15
11197	Socket—6 contact 6C5 Radiotron socket	.14
11198	Socket—7-contact 6H6 or 6L7 Radiotron socket	.15
12464	Transformer—Interstage transformer (T3, L5)	5.95
12463	Transformer—Power transformer, 110-120 volt, 50-60 cycle (T1)	8.58
	MISCELLANEOUS CABLES AND PLUGS	
12547	Cable—2-conductor shielded pickup cable, 25 inches long, complete less female connector, Stock No. 11488	.44
12489	Cable—Power cable, approximately 30 inches long, complete with two female connectors	.58
12563	Cable—Shielded input cable, approximately 9 inches long, complete with 4 contact male connector	.26
12564	Cable—Shielded tone control cable, approximately 20¼ inches long, with 4 contact male connector	.34
12490	Cable—Shielded tone control cable, approximately 14 inches long, complete with female connector	.58
12562	Cable—Shielded volume control cable, approximately 28 inches long, complete with 2 male connectors	.38
12491	Cable—Shielded volume control cable, approximately 17 inches long, complete with 2 female connectors	.68
12492	Cable—Speaker cable, approximately 40 inches long, complete with female connectors	.44
4674	Connector—2-contact male connector for volume control cable, input transformer cable, compensator cable, motor leads, tone control switch leads and indicator lamp cable (socket end)	.25
11488	Connector—2-contacts female connector for pickup cable, Stock No. 12547, or indicator lamp cable (chassis end)	.14
4577	Connector—2-contact male connector for motorboard power leads	.30
12565	Connector—4-contact male tone control and input cable connector	.20
12567	Connector—5-contact male connector plug for reproducer housing	.22
4573	Connector—Power cable 2-contact female connector with oblong openings	.30
12493	Connector—Speaker cable 5-contact female connector	.20
12494	Connector—Tone control or compensator cable 4-contact female connector	.18
	PICKUP AND ARM ASSEMBLIES	
12540	Armature—Pickup armature	.72
12542	Arm—Pickup arm, complete less pickup unit	6.50
11548	Back—Pickup back	.52
10941	Ball—Pickup arm pivot shaft bearing—Package of 20	.25
12543	Bracket—Pickup arm spring adjusting bracket and screw	.12
12541	Coil—Pickup coil (L1)	.64
3521	Cover—Pickup back cover with mounting screws	.18
11708	Cover—Pickup front cover	.15
12850	Damper—Comprising one upper damper and bushing assembly, one lower bushing and one lower bearing	.25
12354	Damper—Pickup damper	.16
3390	Escutcheon—Pickup arm escutcheon and rivets	.46
12538	Pickup—Pickup unit, complete	7.00
12546	Plug—Pickup arm pivot shaft plug—Package of 2	.14
12545	Rod—Pickup arm trip rod and nut—Package of 5	.26
11549	Screw—Pickup front cover screw—Package of 10	.42
12539	Screw—Pickup needle screw—Package of 10	.20
3387	Screw—Screw, nut and washer for mounting pickup to arm—Package of 10	.50
12544	Spring—Pickup arm adjusting spring—Package of 10	.25
	MOTORBOARD ASSEMBLIES	
12051	Capacitor—2 Mfd. motor capacitor, complete with cable and 2-contact male connector (C1)	4.18
6122	Clamp—Brake switch cable clamp—Package of 15	.30
	MOTOR ASSEMBLIES	
9693	Motor—105-125 volts, 50 cycles (M1)	40.85
9692	Motor—105-125 volts, 60 cycles (M1)	40.85
12351	Suspension Spring—Motor mounting spring, washer and stud assembly—comprising 6 springs, 6 cup washers, 3 spring washers and 3 studs	.45
	AUTOMATIC SWITCH ASSEMBLIES	
3944	Cover—Automatic switch cover and screw	.28
10184	Plate—Automatic brake trip latch plate with mounting screws—Package of 5	.40
12550	Springs—Automatic brake springs—Package of 4	.16
12549	Switch—Automatic brake and switch, complete	2.54
3322	Switch—Switch only for automatic brake (S2)	.75
	REPRODUCER ASSEMBLIES	
8059	Board—Reproducer terminal board (2 terminals)	.14
8060	Bracket—Output transformer mounting bracket	.14
8058	Clamp—Cone rim clamp—Package of 5	.44
12566	Coil—Field coil, magnet and cone housing (L8)	11.10
12474	Cone—Reproducer cone (L6)—Package of 5	6.80
12569	Diffuser—Reproducer sound diffuser	.78
9694	Reproducer—Reproducer, complete	18.25
12568	Transformer—Output transformer (T4)	3.30
	MISCELLANEOUS ASSEMBLIES	
12353	Adapter	.48
12557	Bolt—Motorboard suspension bolt and spring assembly, consisting of 1 bolt, 1 C washer, 2 cup washers, 1 bottom spring, 1 top spring, 1 lockwasher and 1 cap nut	.38
5211	Bolt—Reproducer mounting bolt assembly—Package of 2	.24
4594	Box—Used needle box	.30
13103	Cap—Indicator lamp cap—Package of 5	.65
12561	Cap—Turntable spindle cap	.15
6123	Clamp—Volume control and pickup cables clamp—Package of 15	.30
4420	Clamp—Volume control cable clamp—Package of 10	.40
12560	Compensator Pack—with 2 shielded cables, 1 male and 1 female connector assembled (C2, C3, C4, L2, L3, L4, R1, R2, R3)	3.74
11380	Cover—Indicator lamp cover	.12
11193	Cover—Reproducer cover	.82
12559	Cover—Turntable cover	.58
12557	Expander Control (R14)	1.06
11347	Knob—Expander, tone and switch or volume control knob—Package of 5	.75
5226	Lamp—Indicator lamp—Package of 5	.70
3396	Receptacle—Needle receptacle	.52
11210	Screw—Amplifier mounting screw assembly—Package of 4	.28
11573	Socket—Indicator lamp socket	.28
11349	Spring—Retaining spring for knob, Stock No. 11347—Package of 5	.15
12553	Tone control and switch (R12, S1)	1.12
12555	Transformer—Input transformer, complete with 2 shielded cables, 1 male and 1 female connector assembled (T2)	6.00
12558	Turntable—Complete	2.42
12554	Volume Control (R4)	1.52
	AMPLIFIER ASSEMBLIES	
11350	Cap—Grid contact cap—Package of 5	$0.20
12110	Cap—Top shield cap for 6L7 Radiotron	.14
12488	Capacitor—270 Mmfd (C12, C13)	.20
5107	Capacitor—.0025 Mfd (C14, C26)	.16
4838	Capacitor—.005 Mfd (C16, C17)	.20
5196	Capacitor—.035 Mfd (C19)	.18
4886	Capacitor—.05 Mfd (C9)	.20
4518	Capacitor—.05 Mfd (C5)	.52
5170	Capacitor—.25 Mfd (C11)	.25
4840	Capacitor—.25 Mfd (C15, C21)	.30
11240	Capacitor—10 Mfd (C24)	1.08
12472	Capacitor—10 Mfd (C10)	1.00
5212	Capacitor—18 Mfd (C8, C22)	1.16
11496	Capacitor—18 Mfd (C25)	1.15
12470	Capacitor—20 Mfd (C6)	1.10
12467	Capacitor—30 Mfd (C23)	1.40
12465	Capacitor—Capacitor pack, comprising 3 sections, each 0.5 Mfd (C7, C18, C20)	1.50
11272	Clamp—Volume control or speaker cable clamp	.10
5240	Cover—Fuse cover	.24
12468	Expander—Control (R20)	1.00
10907	Fuse—3-ampere fuse (F1)—Package of 5	.40
5239	Mounting—Fuse mounting	.36
12471	Plate—6L7 socket mounting plate assembly, less socket	.15
12466	Reactor—Filter reactor (L7)	2.35
12106	Resistor—270 ohms, insulated, ¼ watt (R6)—Package of 5	1.00
12195	Resistor—2,200 ohms, insulated, ¼ watt (R11, R15)—Package of 5	1.00
12469	Resistor—4,600 ohms, wire wound (R22)	1.25
11298	Resistor—5,600 ohms, carbon type, 1 watt (R21)	.22

The prices quoted above are subject to change without notice.

Electrical Specifications

Radiotron Complement

(1) RCA-6L7 ... Audio Volume Expander
(2) RCA-6C5 ... Audio Driver
(3) RCA-2A3 ... Power Output
(4) RCA-2A3 ... Power Output
(5) RCA-6C5 ... Expander Amplifier
(6) RCA-6H6 ... Expander Rectifier
(7) RCA-5Z3 ... Full-Wave Rectifier

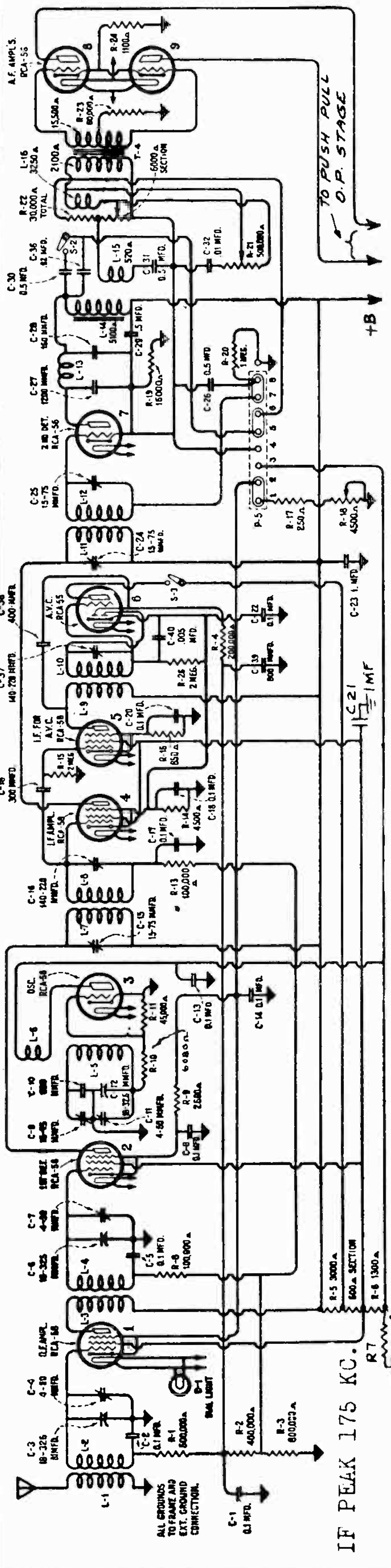
Mechanical Specifications

Height ... 34 inches
Width ... 25⅝ inches
Depth ... 14⅞ inches
Weight (net) ... 112 pounds
Weight (shipping) ... 156 pounds
Amplifier Base Dimensions ... 16¼ inches x 7½ inches x 2¾ inches
Over all Amplifier Height ... 7⅞ inches
Operating Controls ... (1) Power Switch—Tone, (2) Dynamic Expander, (3) Volume

MODEL R-78 with Noise Suppressor

RCA MFG. CO., INC.

Schematic, Voltage Alignment, Notes



RCA R-78 with Noise Suppressor

The schematic diagram, showing the inclusion of noise suppression to the early Model R-78, is shown in the accompanying illustration. If you will compare the schematic diagram of the R-78 that is shown on *RCA page 3-38 of Rider's Volume III and on page 1910 of the Rider-Combination Manual,* with the one given herewith, it will be seen that the 56 AVC tube in the early model has been replaced with a 55 tube and the values of several resistors have been changed. The power pack and output stage is the same in each case.

The untuned i-f. transformer used in the older model has been changed to a natural period plate coil, L-9, and a sharply tuned secondary coil, L-10. Coil L-9 supplies the voltage to operate the AVC circuit and L-10 supplies that used to operate the suppressor circuits. An examination of this circuit will show that with no signal voltage impressed on coil L-10, no current is rectified in the diode plate and hence the grid of the 55 tube operates at zero bias. The plate current is then at maximum—about 10 ma.—and since the cathodes of the 55 tube and the signal channel i-f. tube are common, the i-f. tube is biased to cutoff. This prevents signal voltage from reaching the second detector.

When the set is tuned to a signal, the signal voltage is amplified in the AVC amplifier and impressed on L-9 and L-10. On the positive half of the signal voltage, the signal is rectified in the suppressor circuit which generates a negative potential on the grid of the 55 tube. The plate current is thereby reduced to nearly zero, which releases the high bias potential on the signal channel i-f. amplifier. Signal voltage will then be impressed on the second detector.

AVC bias for the r-f., first detector, and i-f. tubes will be generated when the i-f. voltage on the AVC diode overcomes and exceeds the positive potential on the cathode of the 55. This bias is about 10 volts when the set is tuned to a signal.

The sensitivity control is in the cathode circuit of the r-f. and first detector tubes and is indicated as R-18 on the diagram. The sensitivity of the set is reduced by increasing the residual bias on these two tubes, i.e. the first two 58's in the set. One end of the sensitivity control has a switch, S-3, which is provided so that the noise suppressor circuit may be cut out, then the full sensitivity of the set is obtained.

Alignment:

Remove the oscillator tube and ground the chassis. Couple the output of the test oscillator, set to 175 kc., the i-f. peak of the set, from the control grid of the first detector to ground. With the receiver volume control at maximum, the noise suppressor control at its extreme counter clockwise position, and the noise suppressor switch open, adjust the oscillator output until a deflection is obtained in the output indicator.

Adjust the secondary and primary of the second and then the first i-f. transformer, until a maximum deflection is obtained. Check the adjustments.

Then close the noise suppression control switch by advancing slightly clockwise, but do not advance the control beyond the snapping of the switch. The single noise suppressor circuit should then be adjusted for maximum output. Keep the input signal as low as possible so that every change can be followed in the output indicator.

For other adjustment data and notes that apply to this model see *pages 3-39 and 3-41 in Rider's Volume III and pages 1911 and 1913 in the Rider-Combination Manual.*

Voltage Data:

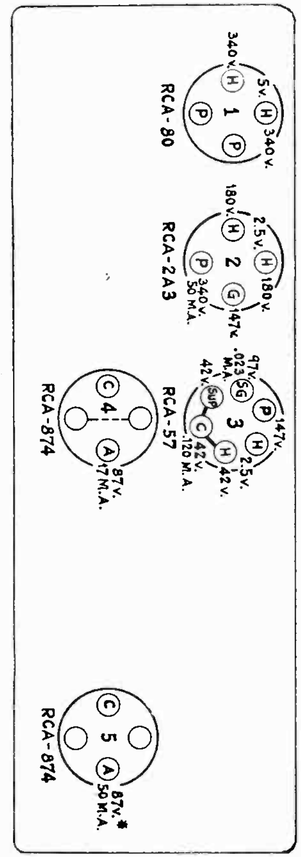
Below will be found the voltage data for the R-78 with noise suppression. Note that the line voltage is 120. The antenna is shorted to ground and no signal.

Tube	Function	Cath. to Cont. Grid	Cath. to Screen	Cath. to Plate	Diode Plate No. 1 to Cath.	Diode Plate No. 2 to Cath.	Plate MA.
58	R.F.	− 3.5	106	212	–	—	6.5
56	Osc.	—	—	65	–	—	4.5
58	1st Det.	− 9	101	206	–	—	1.8
58	I.F.	−12	98	203	–	—	2.0
58	AVC I.F.	− 5	106	210	–	—	4.0
55	AVC Sup.*	0	—	0	0	−12	0
55	AVC Sup.**	0	—	69	0	36	8.0
56	2nd Det.	−15	—	200	–	—	1.0
56	Driver	−11	—	204	–	—	5.0
46	O.P.	0	0	400	–	—	6.0
82	Rect.	462.5 volts R.M.S. each plate. 72 ma. total plate current.					

* Sensitivity control at minimum.
** Sensitivity control at maximum.

MODEL TMV-118-E
Schematic, Socket
Voltage, Data

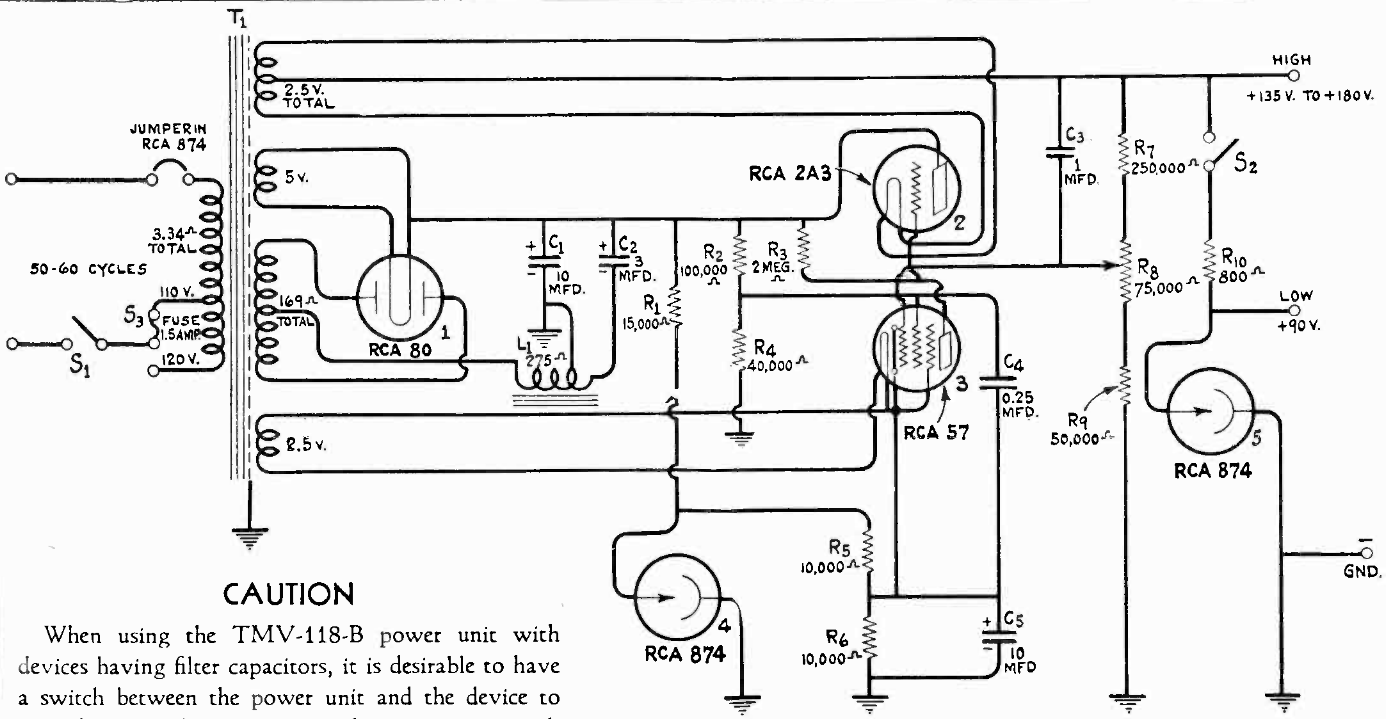
RCA MFG. CO., INC.



* Set output volts to 135—no load with 90-volt switch "on"

All D. C. voltages are to ground except heaters—Voltages are with 180-volt, 50 M. A. load, 90-volt switch "off"—Input voltage 115 volts, 60 cycles—transformer on 110-volt tap.

Voltages at Radiotron Sockets



CAUTION

When using the TMV-118-B power unit with devices having filter capacitors, it is desirable to have a switch between the power unit and the device to open the circuit during a 30-second warming-up period. During this warming-up period, the output voltages may be high and unless the filter or by-pass capacitors are conservatively rated, premature failure may result.

(1) EXCESSIVE HUM

Excessive hum may be caused by operating the TMV-118-B beyond the limits of its capacity. A reference to the curves shown in Figure 4 shows the safe limits and regulation to be expected for such operation. A good test for maximum load is maximum permissible hum. Excessive hum with the equipment in normal condition is an indication of excessive load.

Excessive hum accompanied by high voltage is caused by a defective Radiotron RCA-57.

Excessive hum accompanied by normal voltage is an indication of a defective capacitor C-3.

(2) LOW VOLTAGE

Low voltage may be caused by a low emission Radiotron RCA-80 or RCA-2A3.

(3) HIGH VOLTAGE

High voltage may be caused by a defective Radiotron UX-874 or, if accompanied by hum, a defective RCA-57.

(4) VOLTAGE READINGS

The voltages shown on Figure 4 are those at which the various tubes operate. When taking readings, suitable allowance must be made for the load of the meter.

(5) VOLTAGE REGULATION

Figures 6 to 11, inclusive, show the voltage regulation of the TMV-118-B over a wide range of line voltages, load current and output voltage conditions. A reference to the charts should be made to ascertain the regulation for any given condition, prior to placing the unit in operation.

MODEL TMV-118-B
Chassis Wiring
Transformer, Data
Regulating Circuits

RCA MFG. CO., INC.

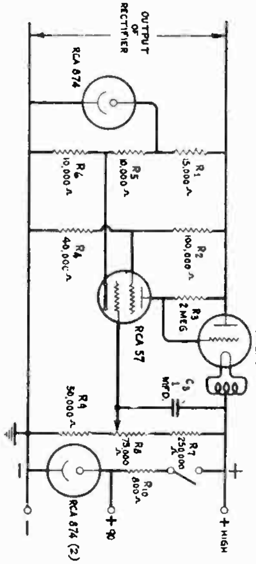


Figure 3—Voltage Regulating Circuits

The RCA Regulated Power Unit, Type TMV-118-B, is a device for converting the usual alternating current line power into direct current suitable for use with devices normally requiring "B" batteries. The voltage regulation is better than that obtained from a set of heavy-duty batteries while the hum is negligible. A special regulating circuit maintains constant output voltages independently of line or load variations over a wide range. A general view of the external appearance of the TMV-118-B Power Unit is shown in Figure 1.

The RCA-874 is a gaseous tube of two elements, using either Neon or Argon. The tube functions to maintain a fairly constant voltage (90 volts) across a circuit, independently of load due to the fact that its resistance varies with the voltage across its terminals. The tube requires 125 volts for starting and maintains an approximately constant D. C. voltage across its terminal for any current from 10 to 50 milliamperes. A link circuit is provided by having two of the tube prongs tied together so that the power circuit may be wired through this link. This prevents power from being applied to the unit without the RCA-874 in place. Excessive voltage might otherwise occur if such a condition existed due to absence of the load of the regulator tube.

A. C. Input Voltage Rating 90–130 Volts
Frequency Rating . . . . 50–60 Cycles
Power Consumption . . . . 70 Watts

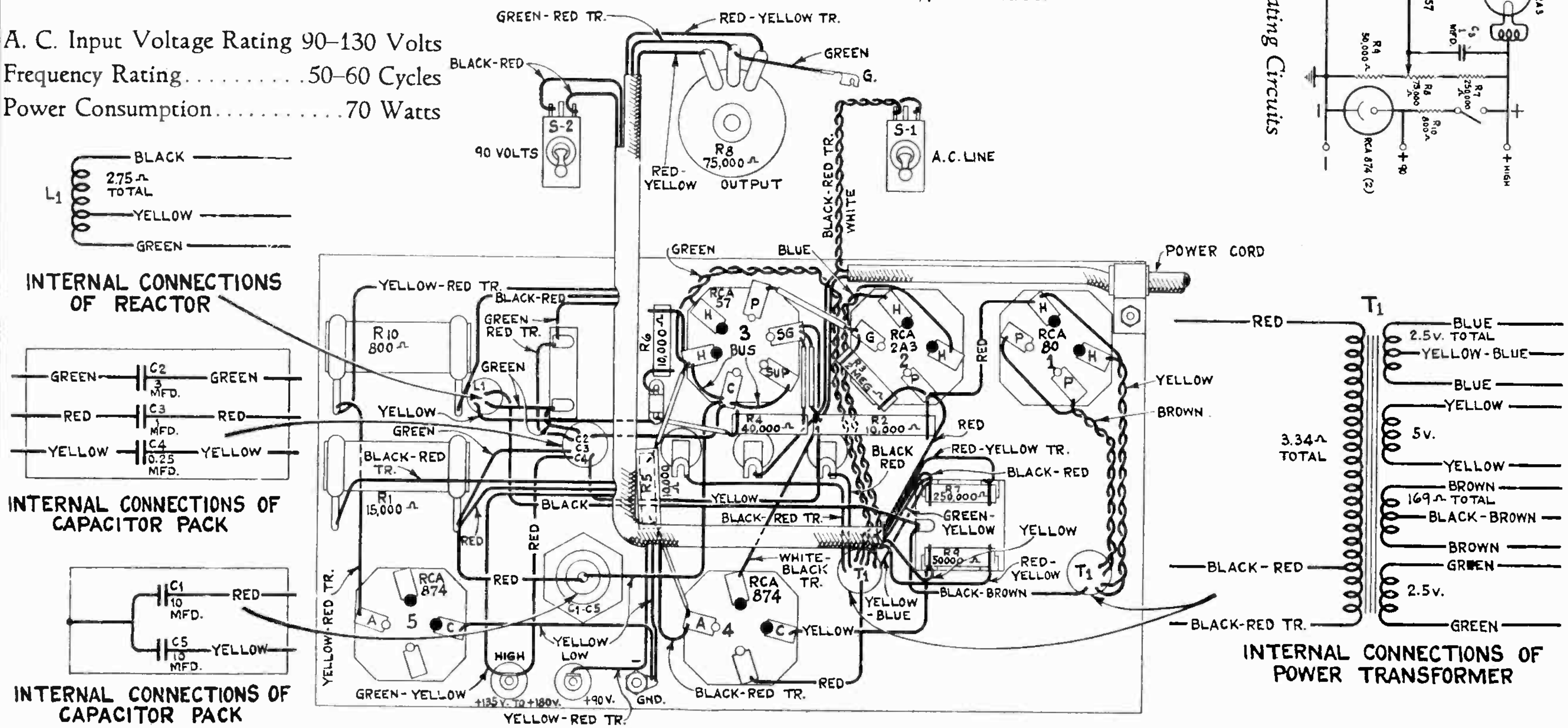


Figure 5—Wiring Diagram

RCA MFG. CO., INC.

INTRODUCTION

The Type TMV-128-A Frequency Modulator is a levice for use with a test oscillator (such as the TMV-97-C or similar) to "sweep" the oscillator frequency and at the same time provide a voltage for synchronizing the timing axis of a cathode-ray oscillograph (such as the TMV-122-B) with the position of the sweep condenser. It consists of a driving motor coupled to a sweep condenser and an impulse generator. Two ranges of sweep capacity are provided, as listed below, and a cable fitted with plugs at each end is furnished for connection to the test oscillator. The unit operates entirely from a 110/120 volt, 50/60 cycle a-c supply.

INSTALLATION

Figure 1 shows the interconnections of the Frequency Modulator with the TMV-97-C Test Oscillator and Cathode-Ray Oscillograph, Type TMV-122-B. This arrangement is commonly used for making r-f and i-f alignment of a radio receiver. For other applications, this set up may be modified according to the requirements of the particular case.

OPERATION

When the units are properly interconnected, select the "Hi" or "Lo" position of the range switch according to the percentage sweep desired (see the curve on the back of this sheet), and turn the motor "On." When through operating, turn the motor switch to the "Off" position.

MAINTENANCE AND SERVICE

Specifications

Power Supply Voltage and Freq.	110/120 Volts, 50/60 Cycles
Power Consumption	25 Watts
Drive Motor	Shaded Pole-Induction; 1/200 HP.
Drive Motor Speed	1550 R.P.M.
Sweep Condenser Capacitance	High Range—25 to 70 Mmfd. Low Range—15 to 37 Mmfd.
Connection Cable Capacitance	40 Mmfd.
Impulse Generator Output	1.5 Volts
Over All Dimensions	Height, 8½ Inches Width, 9¾ Inches Depth, 4½ Inches
Weight	5¼ Pounds

Bearing Lubrication

The small induction drive motor has oil holes at each of its waste-packed bearings. Light engine oil should be used at these points. A ball-bearing support is used at the impulse generator. It is packed with "vaseline," which should be replenished after every 100 hours of operation.

Sweep Condenser

This element of the assembly consists of two conventional type rotary condensers, each having a single rotor plate attached to a revolving shaft. The stators are wired so that one remains connected at all times and a switch is used to parallel the two in order to increase the range of sweep.

The rotor plates should be exactly centered between the stator plates when the mechanism is operating at its normal speed (1550 r.p.m.). If the plates change their relation, they should be re-centered by adjusting the drive shaft in the coupling, or shifting the rotor plates on the shaft. The line-up of the rotor plates in respect to the armature of the impulse generator is important in that it governs the synchronization of the system. The proper adjustment is obtained when the two rotor plates are either at maximum or minimum capacitance, and the armature sets horizontal (air gap minimum). A slight shift may be necessary to center the resonance curve on the screen of the TMV-122-B.

Impulse Generator

A small induction generator is used to furnish means of controlling the frequency of the "Saw Tooth Oscillator" of the Oscillograph. It is necessary to maintain a definite polarity on the output connec-

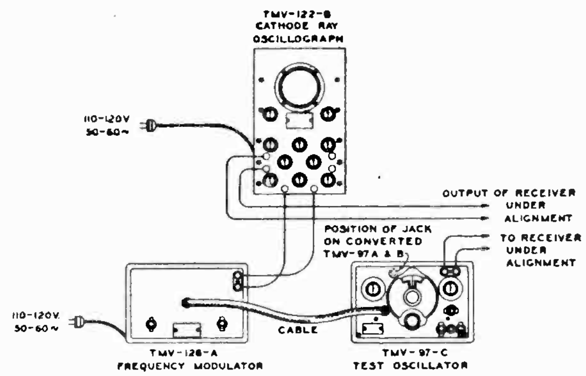


Figure 1

tions of this generator. The horse-shoe magnet should therefore be replaced as originally installed, if it has been removed for repair or service. It is also important to retain the original relation of the coils. Correct polarity exists when a positive swing is obtained on a 200 microampere d-c meter with its plus terminal connected to "high," and the mechanism rotated by hand in such a direction as to cause a decrease in air gap.

Mechanical Alignment

The drive motor, sweep condenser and impulse generator must be in correct physical relations to each other, inasmuch as they all rotate on the same shaft. The motor mounting screws are arranged to permit small lateral adjustments of the motor position. Both the stator and rotor plates of the sweep condenser may be adjusted to obtain the correct centering alignment. End-play of the shaft should be kept at a minimum without affecting the freedom of rotation.

Brush Connection

The point of contact between the revolving shaft and the brush of the sweep condenser circuit should be kept clean at all times. No oil or dirt should be allowed to accumulate. Poor contact is evidenced by ragged wave form on the oscillographic image.

MODEL TMV-128-A
Schematic, Wiring
Characteristics
Parts List

RCA MFG. CO., INC.

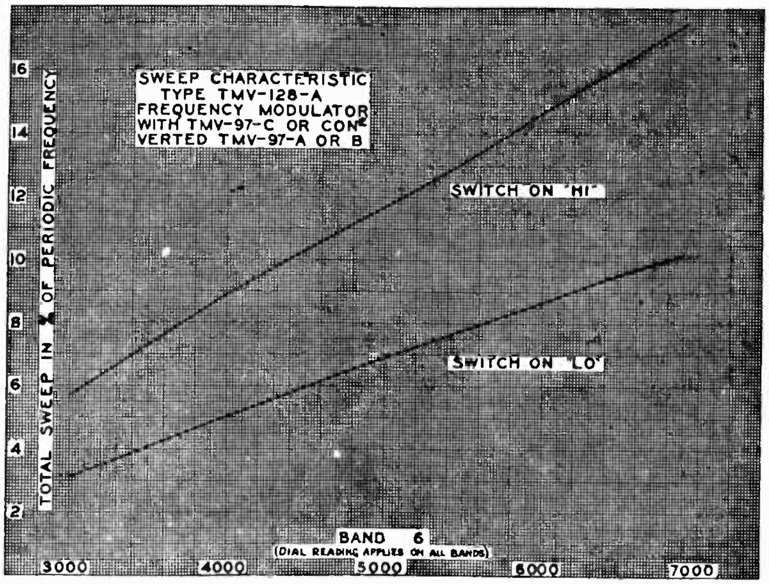


Figure 2—Sweep Characteristics of TMV-128-A with TMV-97-C

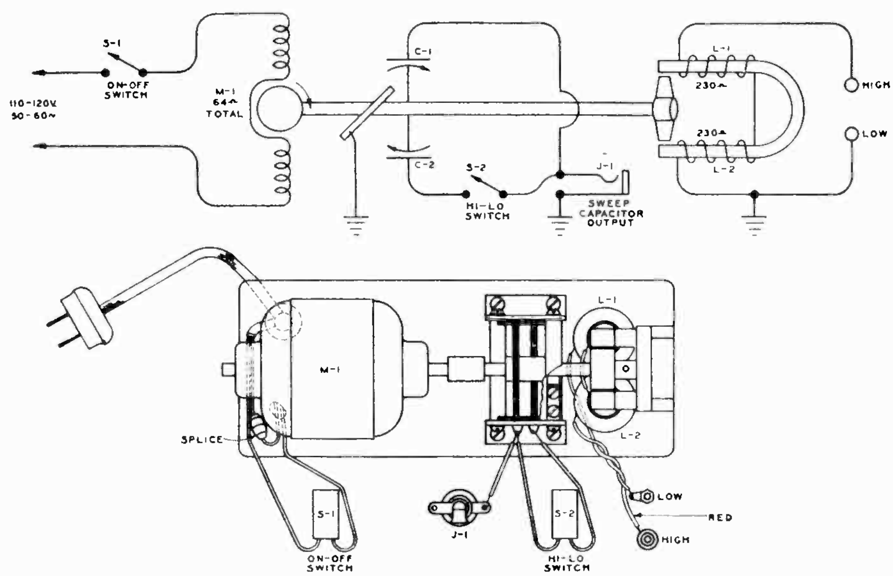


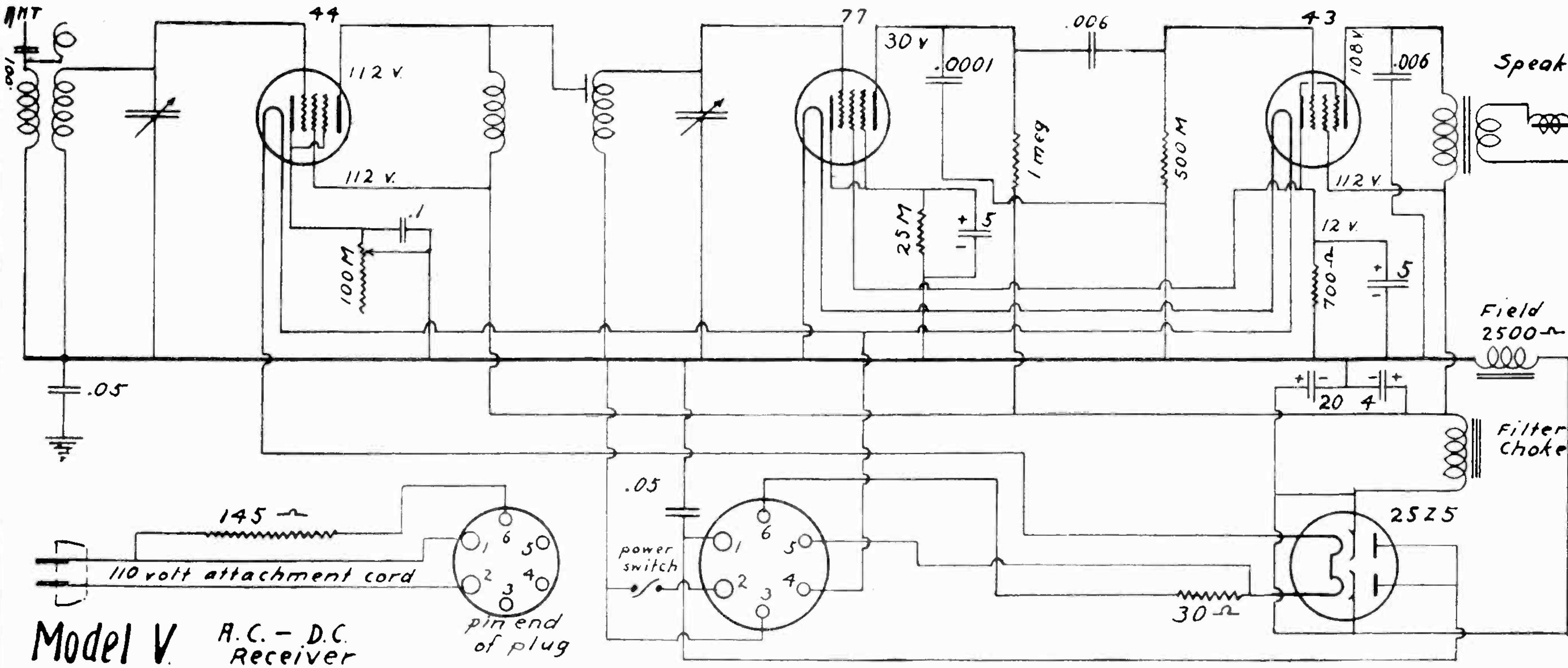
Figure 3—Schematic and Wiring Diagrams, Type TMV-128-A Frequency Modulator

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price
	FREQUENCY MODULATOR (TMV-128-A)		7899	Coupling—Motor coupling	$0.25
			7901	Escutcheon—Off-On switch escutcheon	.28
			7902	Escutcheon—High-Low switch escutcheon	.28
7905	Brush—Grounding brush—Package of 5	$0.85	7903	Jack (J1)	.45
7907	Cable—Connector cable with two plugs	1.50	7898	Motor—Motor complete (M1)	12.00
			7908	Plug—Cable plug	.68
7909	Case—Case complete—Less binding posts, jack, switches and chassis	6.70	7906	Post—Binding post engraved "High"-"Low"	.45
7904	Coil—Impulse coil (L1, L2)	1.25	7900	Switch—Toggle switch (S1, S2)—Off-On, High-Low—Less escutcheon	.75

RADIO CIRCULAR



CAUTION:

This instrument is equipped for operation on 110 volts D. C. or A. C., any frequency from 25 to 133 cycles per second. Before attempting to operate on any other voltage be sure that the proper adaptors are connected and the instructions accompanying them are understood. Special adaptors can be secured from the factory at a slight extra cost, for operating this receiver on automobiles, 32 volt farm light plants and 200 volt A. C. or D. C. ALWAYS plug cord into back of set before plugging into power supply. Cord for 110 volt or 220 volt heats moderately, as the cord contains resistance necessary for operation at these voltages. The 20 ft. aerial wire extending from the back of the set should be unwound, laid out along the floor or hung outside a window and is ordinarily all the aerial required. No ground connection should be used. Sometimes results are better if the tip of the antenna wire is connected to a radiator or other ground connection or to an outside aerial.

PHONOGRAPH:

Connect pick-up leads to single pole toggle switch, which may be mounted in large hole in rear flange of set. Unsolder black wire and 5 mfd condenser from ground lug of coil on under side of chassis and resolder to one side of toggle switch. Solder other side of switch to ground lug of coil.

SERVICE NOTES:

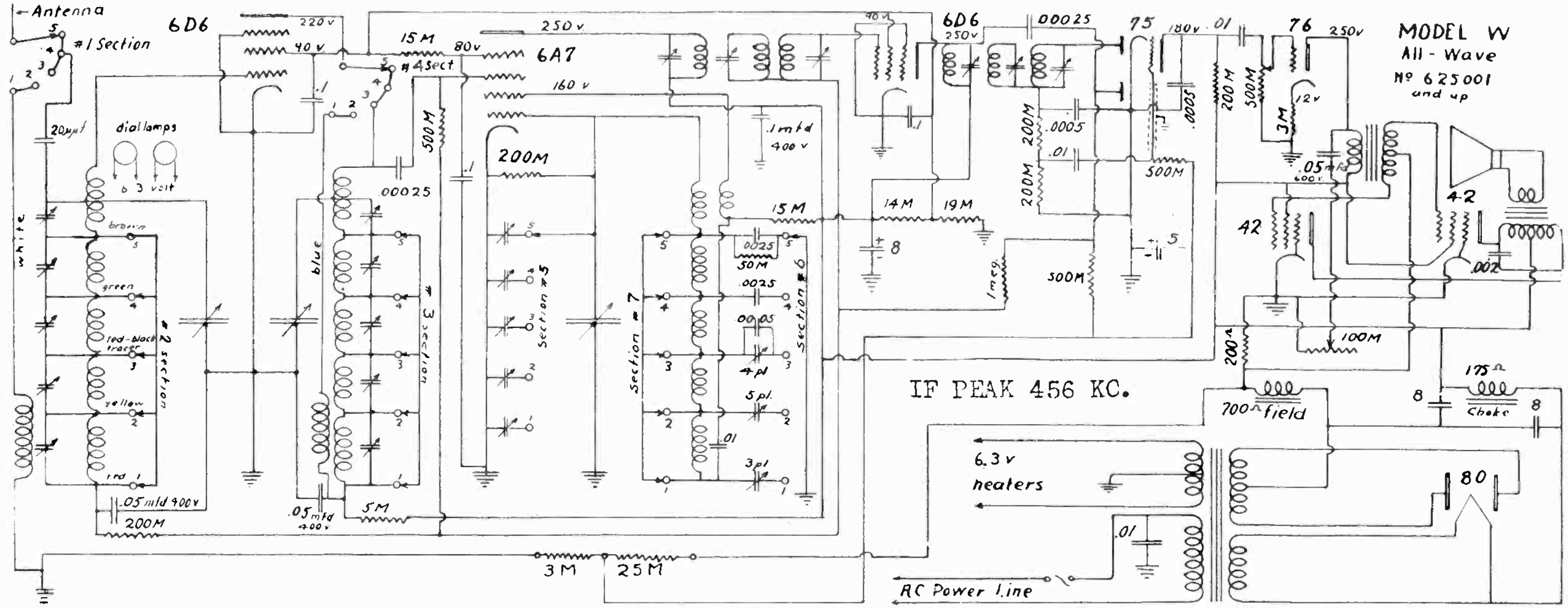
To remove set from cabinet, disconnect from power supply, remove knobs, remove back if compact model, and unscrew the four felt headed screws on bottom of cabinet.

To balance set remove from cabinet, turn tuning condenser plates completely out, attach a test oscillator delivering 1712 K. C. to antenna of set and adjust trimmers on tuning condenser to loudest signal. Change test oscillator signal to 1400 K. C., turn tuning condenser until signal is tuned in and check trimmers again without moving tuning condenser.

If used in automobiles antenna stage should be trimmed to the car antenna at time of installation.

MODEL W, Worldwide
Schematic, Notes
Voltage, Alignment

RADIO CIRCULAR



MODEL W WORLDWIDE

CAUTION—Do not attempt to operate on current other than that noted on the instrument.

INSTALLATION—A good aerial, 25 to 50 feet long, well away from surrounding metal structures and power lines, is essential for best results. Power noise interferes especially with short-wave reception. If the set is located where power noise is prevalent it may be necessary to install an aerial high above the street and use a "transposition" lead-in to the set. A good ground connection (water pipe or equivalent) will also contribute to quieter reception.

CONTROL KNOBS—The left hand knob is, initially, the power switch and thereafter, tone control. The second knob from the left is band selector switch. The third knob from the left is tuning control. The right hand knob is volume control.

OPERATION—After the set has been properly installed by the attachment of suitable aerial and ground connection and the power cord plugged into an outlet of the proper voltage, the left hand knob is turned to the right and a few seconds allowed for the tubes to reach operating temperature. The second knob has five positions, each corresponding to one of the numbers as shown on the dial. The volume control knob is turned full to the right and then the tuning knob turned slowly until the desired station is heard. Note that each frequency band is indicated on the dial by a number corresponding to the various positions of the band selector switch, and also that in connection with each band, there is shown on the dial the type of station that may be tuned in.

SERVICE NOTES—If the radio fails to operate when unpacked, or stops working after a few days, proceed as follows: (1) Have the tubes checked. (2) Remove the chassis from the cabinet and check for loose connections. (3) Have a competent "Radio Service Man" check over entirely. Do not return unless you have made the above tests. This set left the factory carefully inspected.

The intermediate stages are carefully phased to 456KC at the factory. Should rephasing be necessary attach the output lead from a 456 KC test oscillator to the grid cap of the 6A7 tube, keep the signal to a very low audible value and carefully adjust the three trimmer screws, two in the top and one in the bottom of each of the two tall cans, to loudest volume. If an output meter is available it should be used across the two outside black leads at the speaker transformer. An all-wave oscillator having a range from 150 KC to 20 MC will be necessary to rephase the frequency bands. The oscillator output is attached to the aerial lead of the set and the oscillator output kept always at a low audible level. The R. F. coil trimmers are reached through a series of five (5) holes in the side of the R. F. shield cans and correspond to frequency band Nos. 1, 2, 3, 4, and 5, from top down. The oscillator parallel trimmers are seen on the under side of the set when the front of it is raised and are located alongside of the band switch, No. 1 being the one nearest the back of chassis and No. 5 nearest the front. The dual porcelain trimmers at back of chassis are series padders, the left hand for band No. 2 and the right hand one for band No. 1. The series padder for band No. 3 is the single trimmer at the center of the chassis. Each band is trimmed first at the minimum end of its range, band No. 5 being first, No. 4 second, then No. 3, etc. Bands 3, 2, and 1 are also tracked near their maximum ranges, or with the tuning condenser turned well in, by adjusting that series padder belonging to the particular band being used, location of which is given above.

NOTE—Should it be necessary to write to the factory for parts or information, always give the serial number of the set as stamped on the back of the chassis.

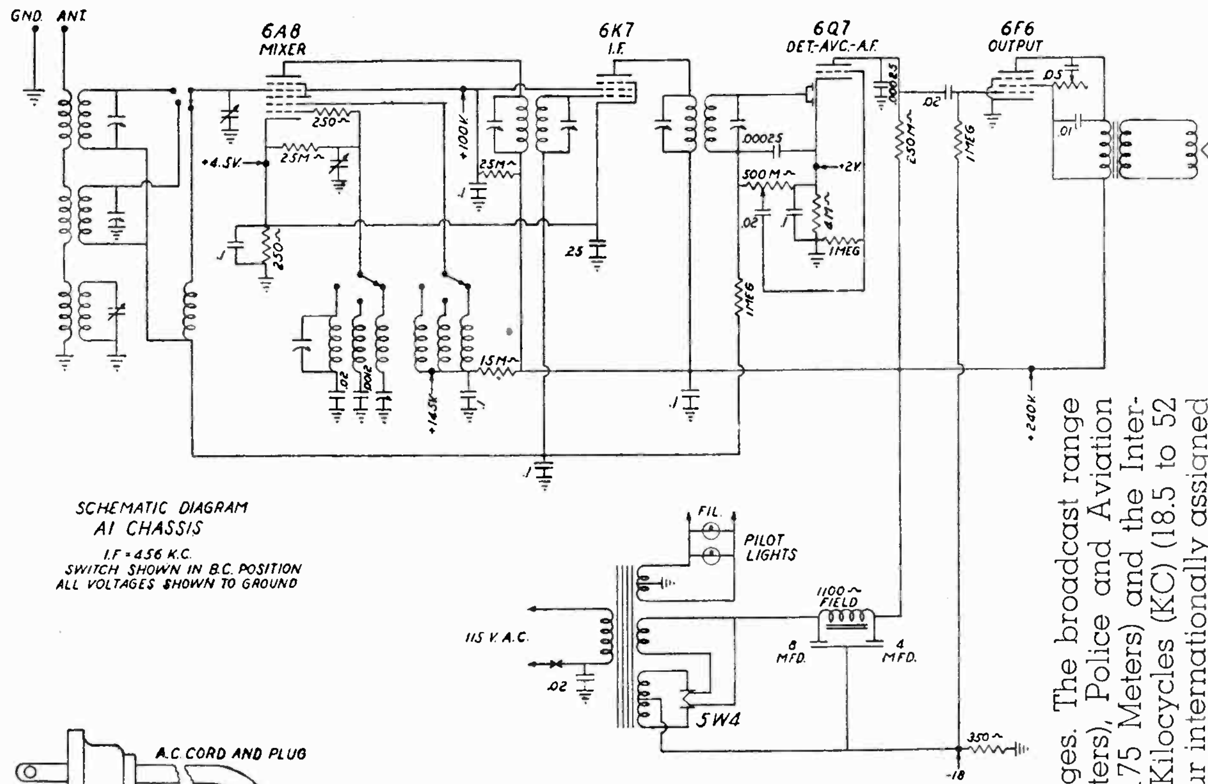
PHONOGRAPH—Install a single pole double throw toggle switch in rear flange of chassis near right-hand end. Disconnect .01 mfd condenser from volume control and connect to one side of switch, connect volume control to center terminal of switch, connect one side of phonograph pickup to other side of switch and remaining pickup terminal to remaining outside volume control terminal.

SHORT WAVE TIPS—In listening for short-wave broadcast DON'T forget to consider the difference in time between the location of the broadcaster and the receiver. DON'T expect to hear a station because it is on the air, as many things govern short-wave reception. DON'T get discouraged if reception is poor one night; it may be fine the next. DON'T expect stations to tune broadly; most stations tune sharply. DON'T tune below 10,000 kilocycles (above 30 meters) for distant stations in daylight. DON'T expect to find stations on all parts of the dial. Short-wave stations are widely separated, except in a few instances. DON'T skim over the dial. It requires some knowledge of tuning to get good results. Tune very slowly. DON'T pass up any weak signal, as it may often be brought in stronger by careful tuning.

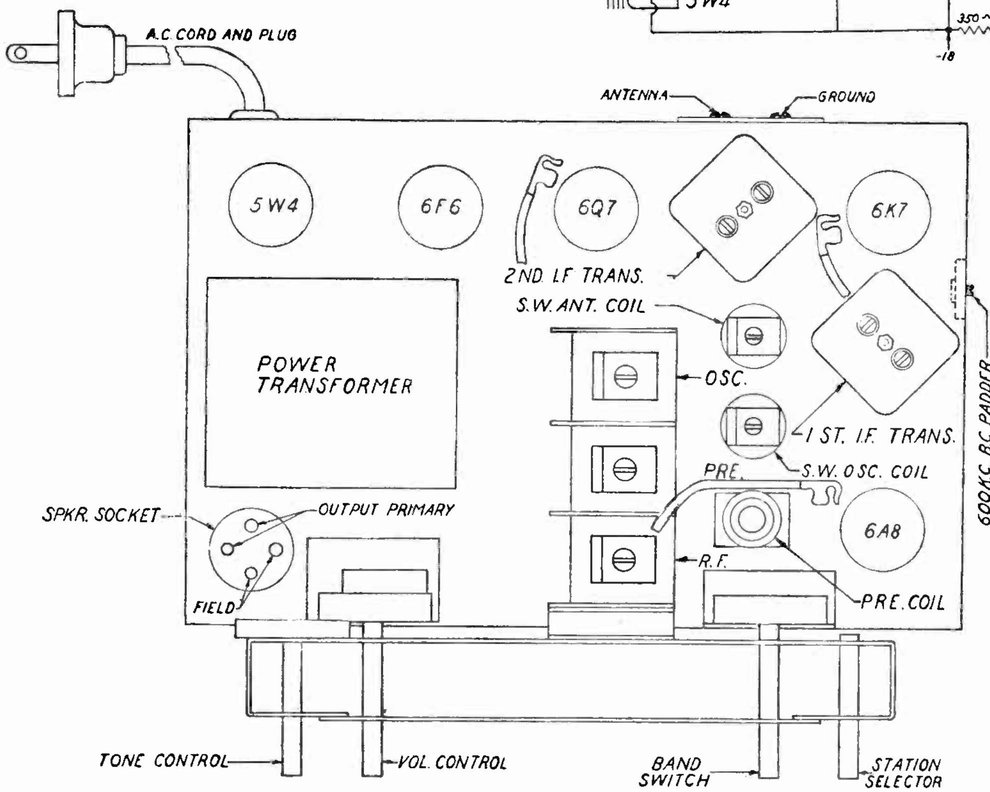
Socket, Trimmers

RADIO PRODUCTS CORP.

MODEL 5-Tube AC Super.
Chassis A-1
Schematic, Voltage



SCHEMATIC DIAGRAM
A1 CHASSIS
I.F. = 456 K.C.
SWITCH SHOWN IN B.C. POSITION
ALL VOLTAGES SHOWN TO GROUND



Five Tube A.C. Superheterodyne
A1 Chassis

This receiver is designed to operate over three tuning ranges. The broadcast range which extends from 545 to 1715 Kilocycles (KC) (175 to 550 meters), Police and Aviation Band which extends from 1715 to 5350 Kilocycles (KC) (56 to 175 Meters) and the International Short Wave Band which extends from 5760 to 16200 Kilocycles (KC) (18.5 to 52 meters). This short wave range is the one which includes the four internationally assigned bands—the 19, 25, 31 and 49 meter bands.

MODEL 5-Tube AC Super
Chassis A-1
Alignment,Parts List

RADIO PRODUCTS CORP.

ALIGNMENT DATA AND SERVICING

GENERAL DATA The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 456, 600, 1400, 1800, 4000, 6000, and 14,000 KC and an output meter to be connected across the primary or secondary of the output transformers. If possible, all alignments should be made with the volume control on maximum and the test oscillator ouput as low as possible, to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE The intermediate frequency (I.F.) stage should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the Broadcast Band should always be the next procedure; after which, either or both of the Short Wave Bands may be aligned.

I.F. ALIGNMENT Adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tubes (6A7) through a .05 or .1 mfd. condenser. The ground on the test oscillator can be connected to the chassis ground. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT Adjust the oscillator to 1400 KC and connect the output to the antenna post marked "A" through a .0001 mfd. mica condenser to give the equivalent of an antenna about 60 feet. Set the receiver pointer to 1400 KC and adjust the rear gang condenser trimmer (oscillator circuit) to peak. After this has been carefully done, the next step is to adjust the center and front trimmers of the gang condenser to peak. The front gang section tunes the R.F. or grid coil of the 6A8 tube and the center condenser section tunes the pre-selector stage circuit.

Next, re-set the dial pointer on the receiver and the test oscillator to 600 KC. Slowly increase or decrease the oscillator padding condenser and at the same time continuously tune back and forth across the signal with the receiver until the maximum reading is obtained on the output meter. This adjustment seems a little complicated but is the easiest way to adjust the oscillator to the pre-selector or R.F. section. The padding condenser is located on the right hand end of the chassis near the 6K7 tube.

Return to 1400 KC and again go over the adjustments of this frequency to be certain that they were not put slightly out of alignment when adjustment was made at 600 KC.

This completes the correct sequence of operations in properly aligning the receiver for the Broadcast Band, and **must always be done before** attempting to align the Short Wave Bands.

FOREIGN BAND The Foreign Band of 18 to 49 meters can be adjusted by the two trimmers on the short wave coil located on the top of the chassis. Set the test oscillator to 14,000 KC. The oscillator coil is located nearest the front of the chassis and the antenna or R.F. coil is located directly in back of the Short Wave oscillator coil. These two trimmers should be adjusted for peak at 14,000 KC and as the inherent design of the circuit has been expressly designed for simplicity in servicing, no other adjustments are necessary for aligning this band. **Note:** Always start this procedure by having the oscillator coil trimmer loose (out all the way), and the antenna coil trimmer fairly tight (in all the way); otherwise it is possible to make a false alignment on the image frequency.

Important: Do not attempt any adjustment of the gang condenser trimmers in aligning the Foreign Band as this will throw the Broadcast Band out of alignment.

POLICE BAND There is only one adjustment to be made in the alignment of the Police Band. Due to the circuit design and correct matching of the coils, no oscillator adjustment is necessary.

Set the dial pointer to 4000 KC (also the test oscillator) and adjust the antenna coil trimmer to resonance. The two police band coils are under the chassis, but the antenna coil trimmer for this band is on top of the chassis and is located at the right front corner along side of wave band switch.

Important: This is the only adjustment necessary for the Police Band. Do not attempt any adjustment of the gang condenser trimmers in aligning the Police Band, otherwise the Broadcast Band will be thrown out of alignment.

49 METER BAND The popular 49 meter band is the area adjacent to the 6 megacycle calibration and offers the most consistent reception from Italy, Germany, Africa and Java. This area also affords the most popular reception of North and South American Short Wave Broadcasts and many other Foreign Countries. (Best evening reception all year round.)

31 METER BAND The 31 meter band is the area extending from 9 to 10 megacycles and lists Spain, Italy, Portugal and Australia as the most favorable of the Foreign Countries in this range. (Late afternoon and early evening.)

25 METER BAND The 25 meter band is the area adjacent to the twelve megacycle calibration and associates itself with the listing of Russia, France, England and Holland. (Late afternoon and early evening. This band is unusually free from static during the summer months when maximum static is prevalent on the Standard Broadcast Band.)

19 METER BAND The 19 meter band is the area extending from the 15 megacycle calibration and lists France, Holland, England and Amateur phones. This band offers the least possibilities for satisfactory reception due to the unreliable character of this particular frequency.

STANDARD BROADCAST BAND (White Scale) **(175 to 550 Meters)**—The upper white scale is calibrated from 55 to 170 (Standard Broadcast). This scale, by adding mentally an "0," gives a correct accurate calibration reading from 550 to 1700 kilocycles (KC).

This band covers all Standard Broadcast frequencies of the United States, Canada, Mexico, Cuba and many Central and South American Countries; also the popular 1712 kilocycle (KC) Police Band.

POLICE BAND (Red Scale) **(56 to 175 Meters)**—The scale is graduated from 450 to 170, which also reads directly in kilocycles (KC) by adding an "0" mentally. This scale covers reception of Short Wave Police Bands, Airplanes, Amateurs, and Ships at Sea.

FOREIGN AND AMERICAN SHORT WAVE BAND (Green Scale) **(18.5 to 52 Meters)**—The entire lower half of the scale is devoted to this band which covers the most popular Foreign and American Short Wave Broadcasts. This scale is numerically graduated from 6 to 15 megacycles. Mentally adding three "0s" converts megacycles to kilocycles (KC); i.e., 6 megacycles equals 6,000 kilocycles (KC) and 15 megacycles is equivalent to 15,000 kilocycles (KC).

ANTENNA

An antenna post is provided for the use of a regular antenna. Any of the doublet or transmission line types may be used.

DOUBLET OR TRANSPOSED LEAD-IN TYPE **Without matching transformer** — Connect two transposed lead-in wires to two posts marked **"A"** and **"G"** respectively.

TRANSMISSION LINE TYPE **With line matching transformers** — Connect leads from matching transformer to antenna posts marked **"A"** and **"G."** The use of a good ground on the ground post may be necessary in some cases.

PARTS LIST

Part No.	Description	List Price
P940	3 Gang Condenser	4.00
P934	Volume Control & "On-Off" Switch	1.10
P933	Wave Change Switch	.75
P934	Tone Control	1.00
P136	250 Ohm 1/4 Watt Resistor	.10
P757	1000 Ohm 1/4 Watt Resistor	.10
P258	15,000 Ohm 1/4 Watt Resistor	.10
P166	25,000 Ohm 1/4 Watt Resistor	.10
P165	25,000 Ohm 1 Watt Resistor	.20
P139	250,000 Ohm 1/4 Watt Resistor	.10
P162	1 Megohm 1/4 Watt Resistor	.10
P143	.02 Mfd. 400 Volt Condenser	.20
P142	.1 Mfd. 200 Volt Condenser	.20
P276	.1 Mfd. 400 Volt Condenser	.20
P141	.25 Mfd. 200 Volt Condenser	.20
P334	.05 Mfd. 400 Volt Condenser	.20
P335	.01 Mfd. 600 Volt Condenser	.20
P478	.0012 Mfd. 200 Volt Condenser	.20
P147	.00025 Mica Condenser	.20
P480	.0001 Mica Condenser	.20
P435	6" Speaker Cone Only	.35
P439	Speaker Field Coil	1.00
G564	Spider & Voice Coil Unit-Complete	.40
	6 Dynamic Speaker	5.00
P634	Knob	.15
P938	Convex Glass	.20
G982	Dial & Scale-Complete	2.00
P124	Pilot Light	.20
P950	Electrolytic Condenser	1.50
P170	350 Ohm Resistor	.20
P173	Oscillator Coil	.50
P176	A. C. Plug & Cord	.35
P182	Speaker Output Transformer	1.00
P189	1st I. F. Transformer	1.20
P190	2nd I. F. Transformer	1.20
P617	Padding Condenser	40
G560	Short Wave Antenna Coil	.50
G561	Short Wave Oscillator Coil	.50
P678	Pre-Selector Coil	.85
P306	Power Transformer	3.25
G562	Police Band Antenna Coil	.45
G563	Police Oscillator Coil	.45

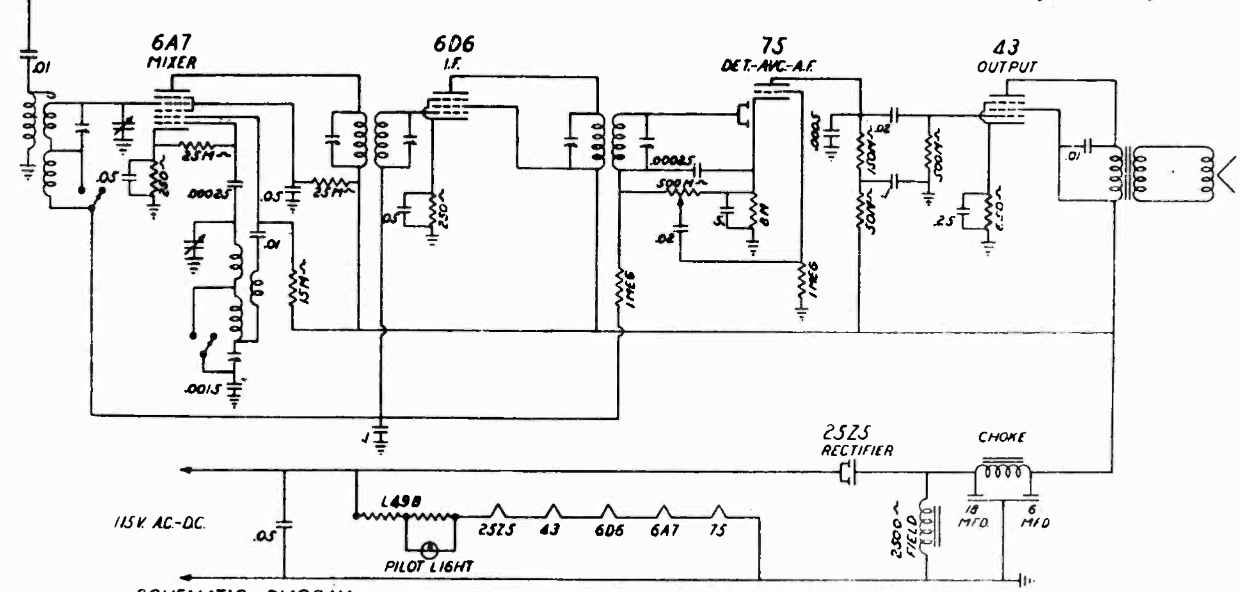
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Five Tube A. C.

All Wave

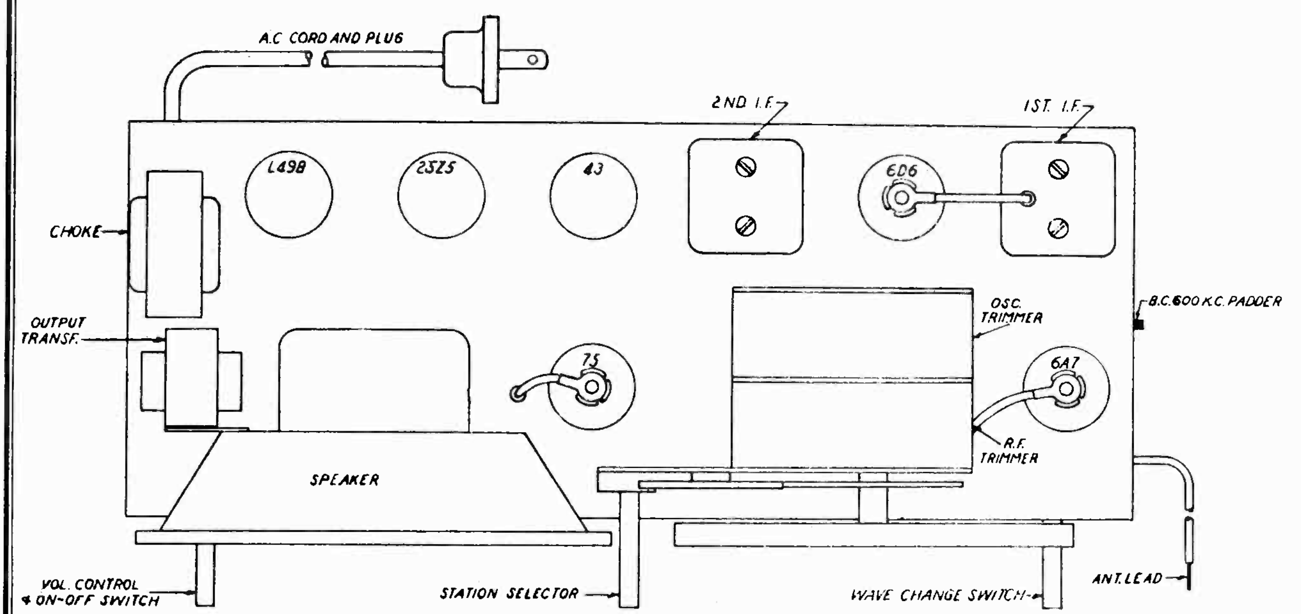
Superheterodyne

RADIO PRODUCTS CORP. MODEL 6-Tube AC-DC Super Chassis B-2 Schematic, Socket, Trimmers



SCHEMATIC DIAGRAM
B2 CHASSIS
6 TUBE AC-DC. 2 BAND { BC.- 540 TO 1720 KC. / S.W. 2000 TO 7000 KC
I.F. = 456 KC.
SWITCH SHOWN IN B.C. POSITION

Six Tube A C - D C Superheterodyne B2 Chassis



TUNING IN STATIONS

RIGHT HAND KNOB **(Manual Volume Control and "On-Off" Switch)**—Turn the right hand knob to the extreme right. The switch will click and the dial will become illuminated, with volume wide open. Wait about a minute for the tubes to become heated.

RIGHT HAND KNOB **(Two Position Wave Band Selecting Switch)**—Turned to the right, it is set for Standard Broadcast Band; turned to the extreme left, it is set for Foreign and American Short Wave Reception, Police, Aviation, Amateurs, and Ships at Sea.

CENTER KNOB **(Station Selector)** — Rotate the indicator needle slowly over a narrow range of the dial at a point where the desired station is located, until the station is received with maximum volume; then readjust the volume control to the proper level. **Never** use the station selector to adjust volume as this practice results in distorted tone quality and deficient bass response. The Volume Control **only** is to be used for this purpose. The indicator needle should be adjusted to the center of the area covered by the station being received.

MODEL 6-Tube AC-DC Super
Chassis B-2
Alignment, Parts List

RADIO PRODUCTS CORP.

ALIGNMENT DATA AND SERVICING

GENERAL DATA The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 456, 600, 1400, and 6000 KC and an output meter to be connected across the primary or secondary of the output transformers. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible, to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE The intermediate frequency (I.F.) stage should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the Broadcast Band should always be the next procedure; after which, the Short Wave Band may be aligned.

I.F. ALIGNMENT Adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tubes (6A7) through a .05 or .1 mfd. condenser. The ground on the test oscillator can be connected to the chassis ground. Align all four I.F. trimmers to peak or maximum reading on the ouput meter.

BROADCAST BAND ALIGNMENT Adjust the oscillator to 1400 KC and connect the output to the antenna lead (Blue) through a .0001 mfd. mica condenser to give the equivalent of an antenna about 60 feet. Set the receiver pointer to 1400 KC and adjust the rear gang condenser trimmer (oscillator circuit) to peak. After this has been carefully done, the next step is to adjust the front trimmer of the gang condenser to peak.

Next, re-set the dial pointer on the receiver and the test oscillator to 600 KC. Slowly increase or decrease the oscillator padding condenser and at the same time continuously tune back and forth across the signal with the receiver until the maximum reading is obtained on the output meter. This adjustment seems a little complicated but is the easiest way to adjust the oscillator to the pre-selector or R.F. section. The padding condenser is located on the right hand end of the chassis near the 6A7 tube.

Return to 1400 KC and again go over the adjustments of this frequency to be certain that they were not put slightly out of alignment when adjustment was made at 600 KC.

This completes the correct sequence of operations in properly aligning the receiver for the Broadcast Band, and **must always be done before** attempting to align the Short Wave Band.

SHORT WAVE BAND There is only one adjustment to be made in the alignment of the Short Wave Band. Due to the circuit design and correct matching of the coils, no oscillator adjustment is necessary.

Set the dial pointer to 600 KC (also the test oscillator) and adjust the antenna and antenna trimmer to resonance. The short wave band coils are under the chassis and are located at the right front corner along side of wave band switch.

IMPORTANT: This is the only adjustment necessary for the Short Wave Band. Do not attempt any adjustment of the gang condenser trimmers in aligning the Short Wave Band, otherwise the Broadcast Band will be thrown out of alignment.

Return to 1400 KC and again go over the adjustments of this frequency to be certain that they were not put slightly out of alignment when adjustment was made at 6000 KC.

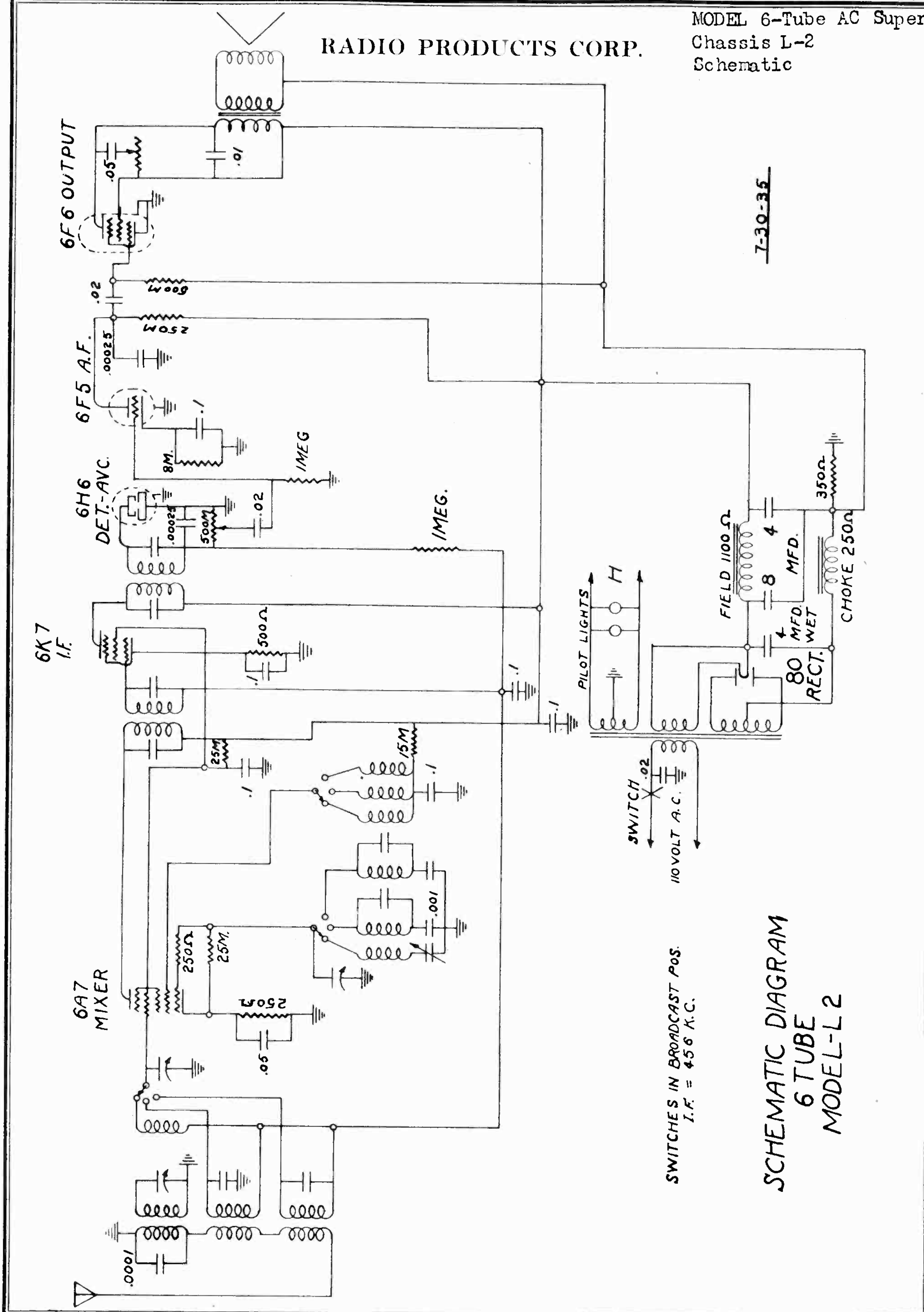
This completes the correct sequence of operations in properly aligning the receiver for the Broadcast Band, and MUST ALWAYS BE DONE BEFORE attempting to align the Short Wave Band.

Part No.	Description	List Price
P189	1st I. F. Transformer	1.25
P190	2nd I. F. Transformer	1.25
P948	Antenna Coil	1.00
P949	Oscillator Coil	.75
P341	Choke Coil	1.00
P913	Wave Change Switch	.50
P911	2 Gang Variable Cond	3.75
P912	Volume Control with Sw	1.00
P617	Padding Condenser	.35
P544	Small Trimmer Condenser	.15
P194	Tube Shield	.10
P195	Tube Shield Cap	.05
P506	6A7 Tube Socket	.15
P521	75 Tube Socket	.15
P560	43 Tube Socket	.15
P559	25Z5 Tube Socket	.15
P947	L49B Tube Socket	.15
P928	Speaker With Output	4.25
P929	AC Cord & Plug	.40
P930	Knob	.10
P921	Pointer	.10
P922	Dial Scale	.50
P923	Dial Glass	.25
P124	Pilot Light	.20
P136	250 Ohm 1/4 Watt Resistor	.15
P953	650 Ohm 1/2 Watt Resistor	.20
P168	8,000 Ohm 1/4 Watt Resistor	.15
P258	15,000 Ohm 1/4 Watt Resistor	.15
P419	20,000 Ohm 1/4 Watt Resistor	.15
P166	25,000 Ohm 1/4 Watt Condenser	.15
P417	50,000 Ohm 1/4 Watt Resistor	.15
P418	150,000 Ohm 1/4 Watt Resistor	.15
P137	500,000 Ohm 1/4 Watt Resistor	.15
P162	1 Megohm 1/4 Watt Resistor	.15
P142	.10-200 Volt Condenser	.20
P143	.02-400 Volt Condenser	.20
P147	.00025 Mica Condenser	.20
P148	.05-200 Volt Condenser	.15
P276	.10-400 Volt Condenser	.25
P335	.01-600 Volt Condenser	.20
P336	.0005 Mica Condenser	.20
P927	.0015 Mica Condenser	.25
P304	5.0-30 Volt Electrolytic Condenser	.80
P337	18-6 Mfd.-200 Volt Electrolytic Condenser	2.00
P141	.25-200 Volt Condenser	.20

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

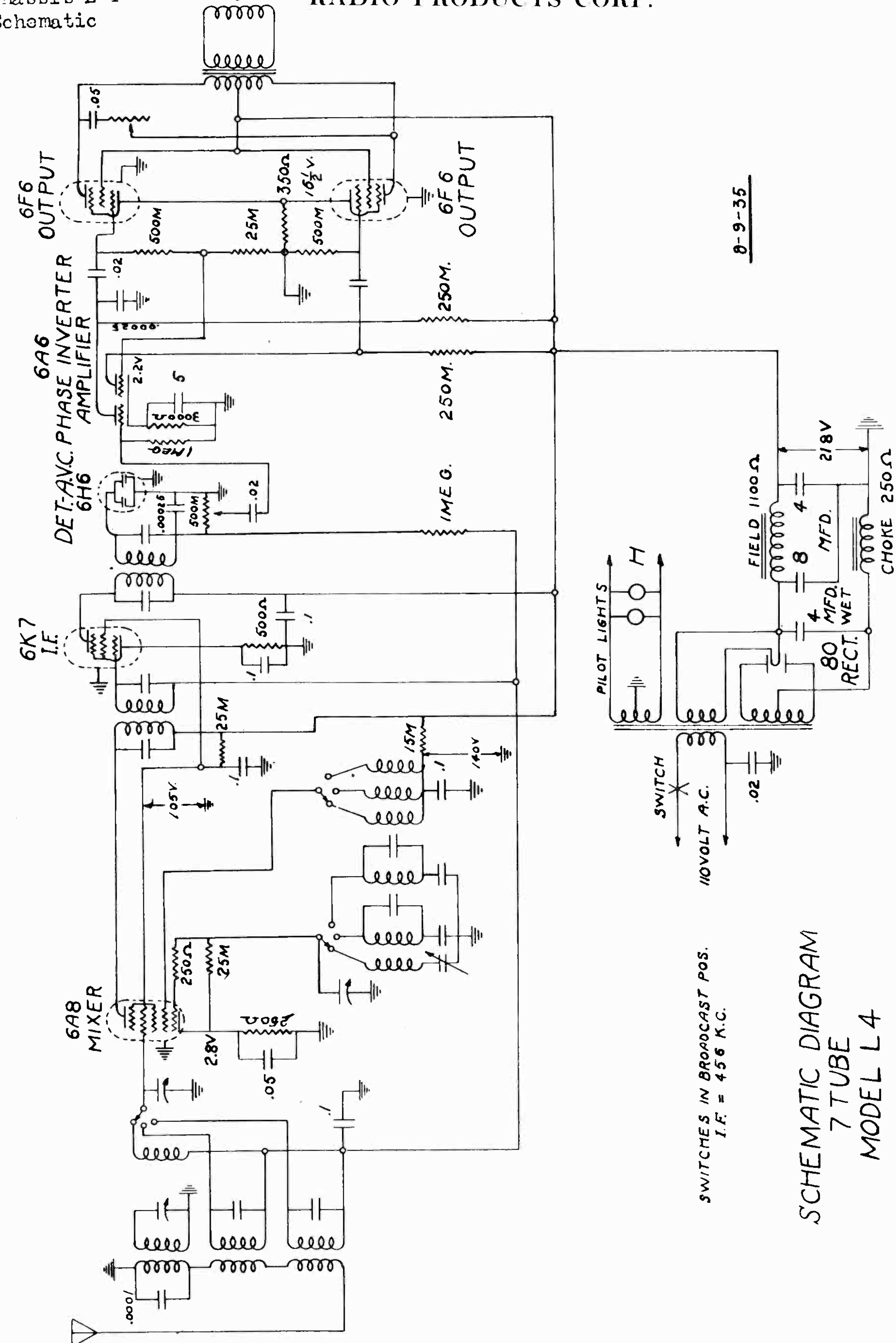
MODEL 6-Tube AC Super
Chassis L-2
Schematic

RADIO PRODUCTS CORP.



MODEL 7-Tube AC Super
Chassis L-4
Schematic

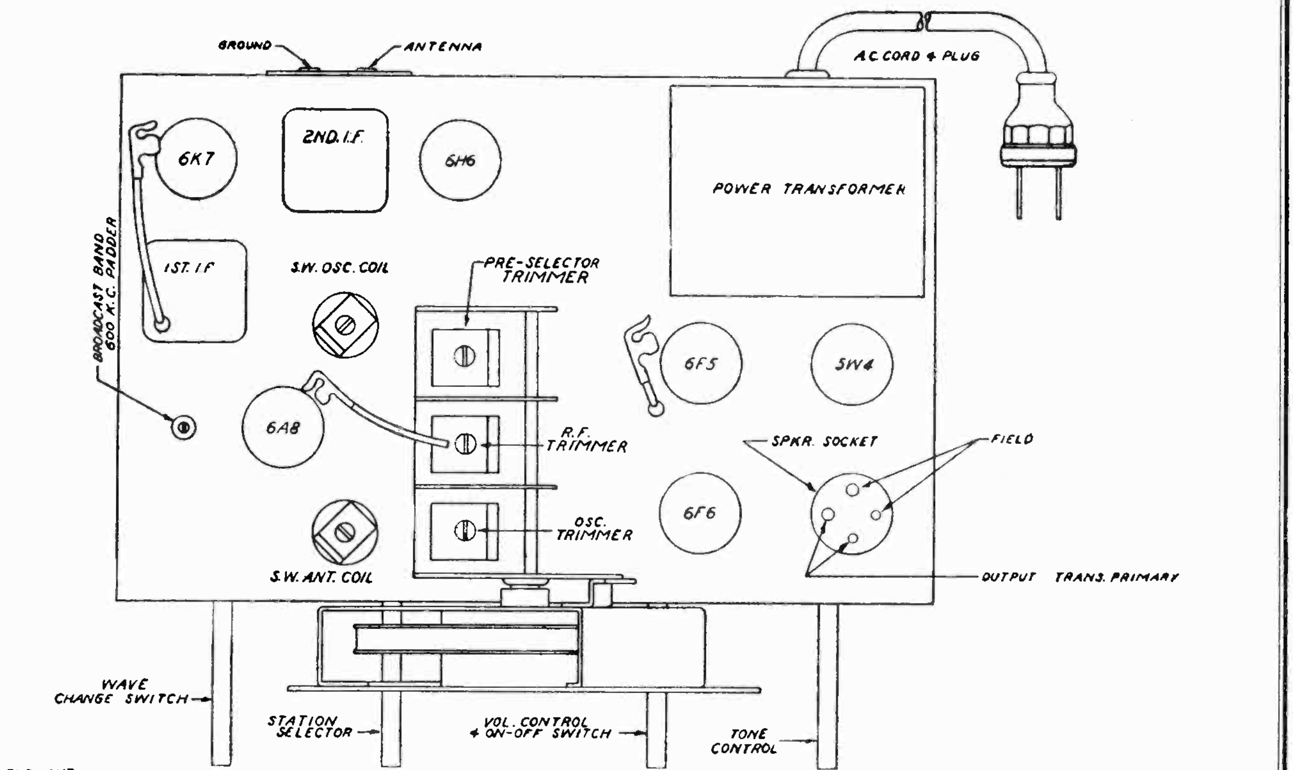
RADIO PRODUCTS CORP.

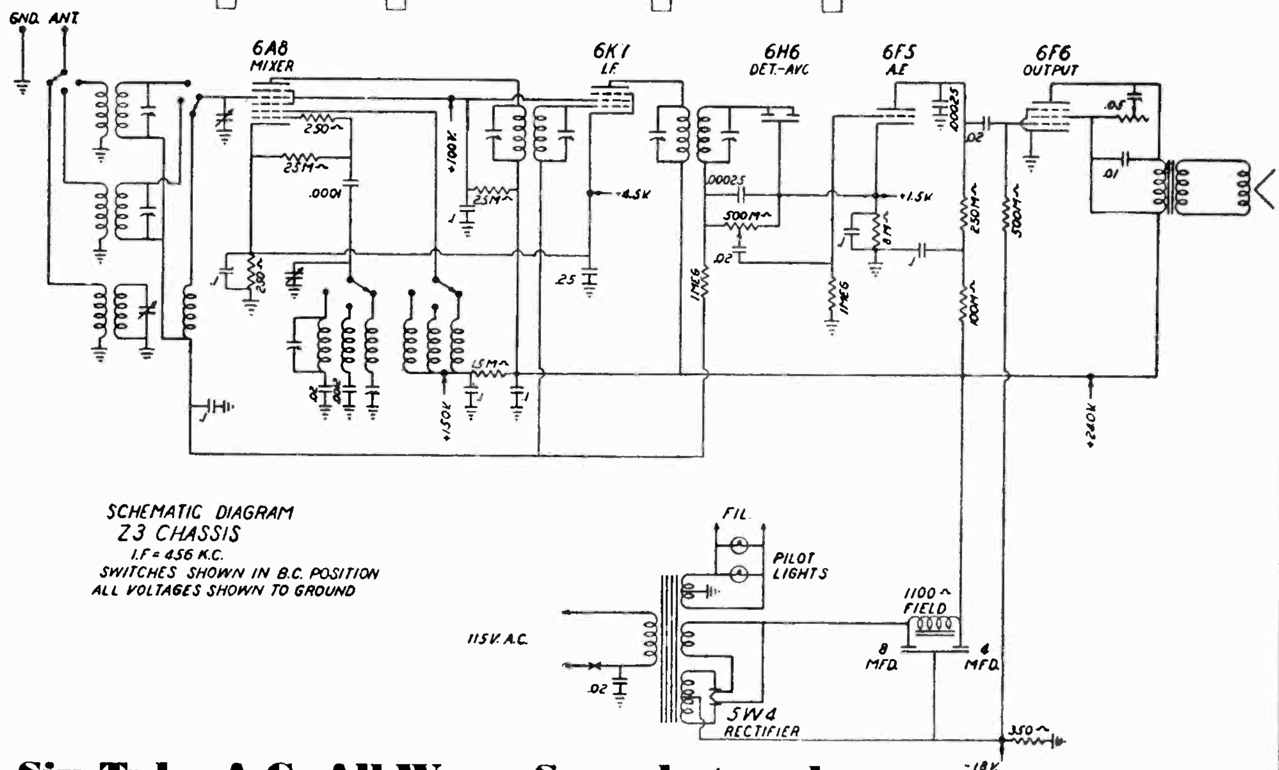


Schematic, Voltage Socket, Trimmers

RADIO PRODUCTS CORP.

MODEL 6-Tube AC-AW Super Chassis Z-3





SCHEMATIC DIAGRAM
Z3 CHASSIS
I.F. = 456 K.C.
SWITCHES SHOWN IN B.C. POSITION
ALL VOLTAGES SHOWN TO GROUND

Six Tube A.C. All Wave Superheterodyne
Z3 Chassis

This receiver is designed to operate from a power supply main of 110-120 volts, 60 cycle alternating current (AC). **Never plug into a DC outlet.**

MODEL 6-Tube AC-AW Super
Chassis Z-3
Alignment, Parts List

RADIO PRODUCTS CORP.

ALIGNMENT DATA AND SERVICING

GENERAL DATA The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 456, 600, 1400, 1800, 4000, 6000, and 14,000 KC and an output meter to be connected across the primary or secondary of the output transformers. If possible, all alignments should be made with the volume control on maximum and the test oscillator ouput as low as possible, to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE The intermediate frequency (I.F.) stage should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the Broadcast Band should always be the next procedure; after which, either or both of the Short Wave Bands may be aligned.

I.F. ALIGNMENT Adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tubes (6A7) through a .05 or .1 mfd. condenser. The ground on the test oscillator can be connected to the chassis ground. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT Adjust the oscillator to 1400 KC and connect the output to the antenna post marked "A" through a .0001 mfd. mica condenser to give the equivalent of an antenna about 60 feet. Set the receiver pointer to 1400 KC and adjust the rear gang condenser trimmer (oscillator circuit) to peak. After this has been carefully done, the next step is to adjust the center and front trimmers of the gang condenser to peak. The front gang section tunes the R.F. or grid coil of the 6A8 tube and the center condenser section tunes the pre-selector stage circuit.

Next, re-set the dial pointer on the receiver and the test oscillator to 600 KC. Slowly increase or decrease the oscillator padding condenser and at the same time continuously tune back and forth across the signal with the receiver until the maximum reading is obtained on the output meter. This adjustment seems a little complicated but is the easiest way to adjust the oscillator to the pre-selector or R.F. section. The padding condenser is located on the right hand end of the chassis near the 6K7 tube.

Return to 1400 KC and again go over the adjustments of this frequency to be certain that they were not put slightly out of alignment when adjustment was made at 600 KC.

This completes the correct sequence of operations in properly aligning the receiver for the Broadcast Band, and **must always be done before** attempting to align the Short Wave Bands.

FOREIGN BAND The Foreign Band of 19 to 49 meters can be adjusted by the two trimmers on the short wave coil located on the top of the chassis. Set the test oscillator to 14,000 KC. The oscillator coil is located near the 1st I.F. Transformer and the antenna or R.F. coil is located directly in front of the Short Wave oscillator coil and about midway between the 1st I.F. Transformer and the 6A7 tube. These two trimmers should be adjusted for peak at 14,000 KC and as the inherent design of the circuit has been expressly designed for simplicity in servicing, no other adjustments are necessary for aligning this band. **Note:** Always start this procedure by having the oscillator coil trimmer loose (out all the way), and the antenna coil trimmer fairly tight (in all the way); otherwise it is possible to make a false alignment on the image frequency.

Important: Do not attempt any adjustment of the gang condenser trimmers in aligning the Foreign Band as this will throw the Broadcast Band out of alignment.

POLICE BAND There is only one adjustment to be made in the alignment of the Police Band. Due to the circuit design and correct matching of the coils, no oscillator adjustment is necessary.

Set the dial pointer to 4000 KC (also the test oscillator) and adjust the antenna coil trimmer to resonance. In preparing the test oscillator for alignment of this band, connect a 400 ohm carbon resistor in series with the .0001 mfd. condenser on the output lead of the test oscillator. This resistor is used with the test oscillator only on the Short Wave Bands and should not be used for Broadcast Band alignment. The two police band coils are under the chassis and the antenna coil trimmer is mounted on the end of the antenna coil.

Important: This is the only adjustment necessary for the Police Band. Do not attempt any adjustment of the gang condenser trimmers in aligning the Police Band, otherwise the Broadcast Band will be thrown out of alignment.

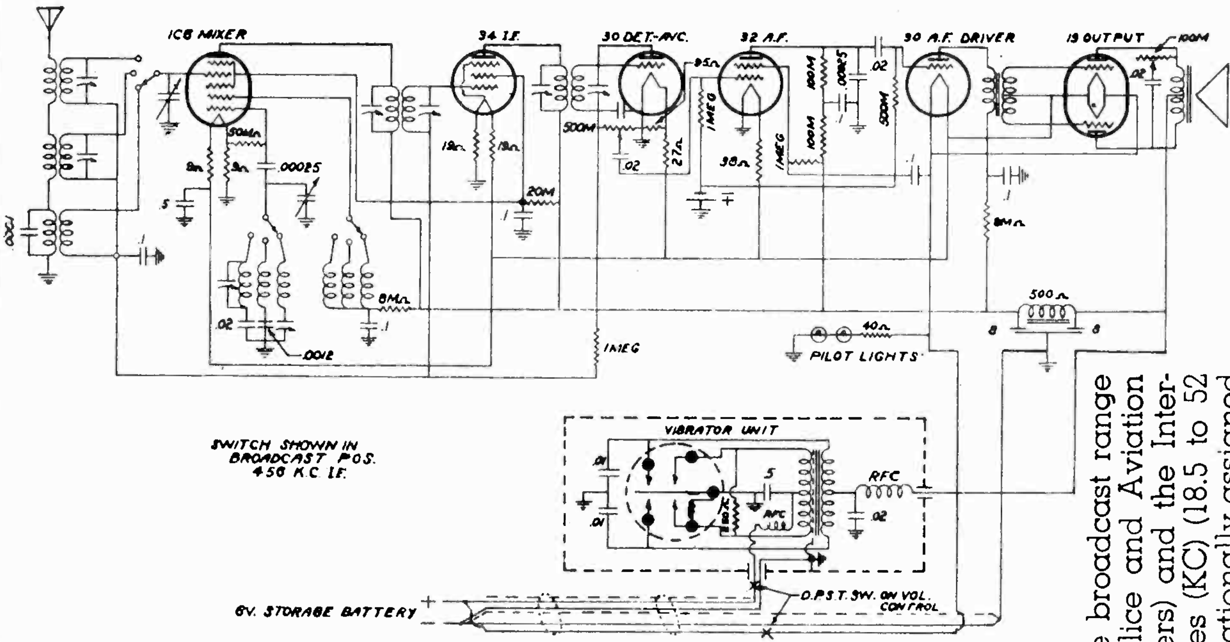
This receiver is designed to operate over three tuning ranges. The broadcast range which extends from 545 to 1715 Kilocycles (KC) (175 to 550 meters), Police and Aviation Band which extends from 1715 to 5350 Kilocycles (KC) (56 to 175 Meters) and the International Short Wave Band which extends from 5760 to 16200 Kilocycles (KC) (18.5 to 52 meters). This short wave range is the one which includes the four internationally assigned bands—the 19, 25, 31 and 49 meter bands.

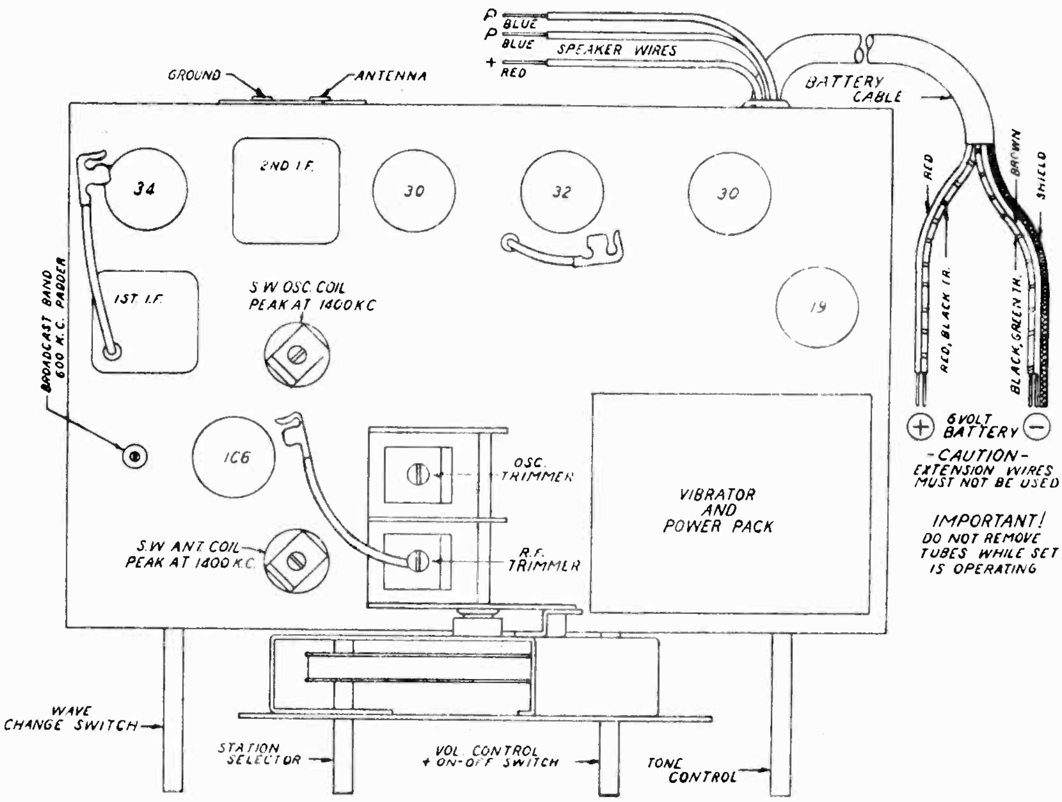
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

PARTS LIST

Part No.	DESCRIPTION	LIST PRICE
P950	Electrolytic Condenser	1.50
P934	Volume Control & "On-Off" Switch	1.10
P994	Wave Change Switch	.75
P995	Tone Control	1.00
P173	Oscillator Coil	.50
P176	A. C. Plug & Cord	.35
P990	Power Transformer	4.00
P987	3 Gang Condenser	4.00
P189	1st I. F. Transformer	1.20
P190	2nd I. F. Transformer	1.20
P678	Pre-Selector Coil	.85
P617	Padding Condenser	.40
G560	Short Wave Antenna Coil	.50
G561	Short Wave Oscillator Coil	.50
G562	Police Band Antenna Coil	.45
G563	Police Band Oscillator Coil	.45
P170	350 Ohm Resistor	.20
P136	250 Ohm ¼ Watt Resistor	.10
P168	8,000 Ohm ¼ Watt Resistor	.10
P258	15,000 Ohm ¼ Watt Resistor	.10
P166	25,000 Ohm ¼ Watt Resistor	.10
P165	25,000 Ohm 1 Watt Resistor	.20
P280	100,000 Ohm ¼ Watt Resistor	.10
P139	250,000 Ohm ¼ Watt Resistor	.10
P137	500,000 Ohm ¼ Watt Resistor	.10
P162	1 Megohm ¼ Watt Resistor	.10
P143	.02 Mfd. 400 Volt Condenser	.20
P142	.1 Mfd. 200 Volt Condenser	.20
P276	.1 Mfd. 400 Volt Condenser	.20
P141	.25 Mfd. 200 Volt Condenser	.20
P147	.00025 Mica Condenser	.20
P334	.05 Mfd. 400 Volt Condenser	.20
P335	.01 Mfd. 600 Volt Condenser	.20
P478	.0012 Mfd. 200 Volt Condenser	.20
P182	Speaker Output Transformer	1.00
G573	8 Speaker Cone Only	.45
G564A	8" Spider & Voice Coil Unit Complete	.50
G725	8 Dynamic Speaker with B. C.	6.00

RADIO PRODUCTS CORP. MODEL 6-Tube Batt. Super. Chassis Z-5 Schematic, Socket, Trimmers





This receiver is designed to operate over three tuning ranges. The broadcast range which extends from 545 to 1715 Kilocycles (KC) (175 to 550 meters), Police and Aviation Band which extends from 1715 to 5350 Kilocycles (KC) (56 to 175 Meters) and the International Short Wave Band which extends from 5760 to 16200 Kilocycles (KC) (18.5 to 52 meters). This short wave range is the one which includes the four internationally assigned bands—the 19, 25, 31 and 49 meter bands.

Six Tube 6 Volt Battery Superheterodyne Z5 Chassis

MODEL 6-Tube Batt. Super.
Chassis Z-5
Alignment, Parts List

RADIO PRODUCTS CORP.

DOUBLET OR TRANSPOSED LEAD-IN TYPE **Without matching transformer** — Connect two transposed lead-in wires to two posts marked **"A"** and **"G"** respectively.

TRANSMISSION LINE TYPE **With line matching transformer** — Connect leads from matching transformer to antenna posts marked **"A"** and **"G."** The use of a good ground to the ground post may be necessary in some cases.

ALIGNMENT DATA AND SERVICING

GENERAL DATA The alignment of this receiver requires the use of a test oscillator which will cover the frequencies of 456, 600, 1400, 1800, 4000, 6000, and 14,000 KC and an output meter which is to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible, to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE The intermediate frequency (I.F.) stage should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the Broadcast Band should always be the next procedure; after which, either or both of the Short Wave Bands may be aligned.

I.F. ALIGNMENT Adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (1C6) through a .05 or .1 mfd. condenser. The ground on the test oscillator can be connected to the chassis ground. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT Adjust the oscillator to 1400 KC and connect the output to the antenna post marked "A" through a .0001 mfd. mica condenser to give the equivalent of an antenna about 60 feet. Set the receiver pointer to 1400 KC and adjust the rear gang condenser trimmer (oscillator circuit) to peak. After this has been carefully done, the next step is to adjust the front trimmer of the gang condenser to peak. The front condenser section tunes the RF or grid circuit of the 1C6 tube. Next, re-set the dial pointer on the receiver and the test oscillator to 600 KC. Slowly increase or decrease the oscillator padding condenser and at the same time continuously tune back and forth across the signal with the receiver until the maximum reading is obtained on the output meter. This adjustment may seem a little complicated but is the easiest way to adjust the oscillator to the R.F. section. The padding condenser is located on the left hand side of the chassis, directly to the left of the 1C6 tube and in front of the first I.F. transformer. Return to 1400 KC and again go over the adjustments of this frequency to be certain that they were not put slightly out of alignment when adjustment was made at 600 KC.

This completes the correct sequence of operations in properly aligning the receiver for the Broadcast Band, and **must always be done before** attempting to align the Short Wave Bands.

FOREIGN BAND ALIGNMENT The Foreign Band of 19 to 49 meters can be adjusted by the two trimmers on the short wave coils located on the top of the chassis. Set the test oscillator to 14,000 KC. In preparing the test oscillator for alignment of this band, connect a 400 ohm carbon resistor in series with the .0001 mfd. condenser on the output lead of the test oscillator. The oscillator coil is located near the 1st I.F. Transformer and the antenna or R.F. coil is located directly in front of the Short Wave oscillator coil and alongside the front section of the gang condenser. These two trimmers should be adjusted for peak at 14,000 KC and as the inherent design of the circuit has been expressly developed for simplicity in servicing, no other adjustments are necessary for aligning this band. **Note:** Always start this procedure by having the oscillator coil trimmer loose (out all the way), and the antenna coil trimmer fairly tight (in all the way); otherwise it is possible to make a false alignment on the image frequency. In order to prevent alignment on the image frequency, it is suggested that the following check be made: Readjust the pointer to 13,100 KC where the image frequency should be found. If properly aligned, the image frequency will be found to be weaker. If, however, the signal at 13,100 KC is found to be stronger than the signal at 14,000 KC, it signifies that alignment was incorrectly made on the image frequency.

IMPORTANT: Do not attempt any adjustment of the gang condenser trimmers in aligning the Foreign Band as this will throw the Broadcast Band out of alignment.

POLICE BAND ALIGNMENT There is only one adjustment to be made in the alignment of the Police Band. Due to the circuit design and correct matching of the coils, no oscillator adjustment is necessary. Set the dial pointer to 4000 KC (also the test oscillator) and adjust the antenna coil trimmer to resonance. In preparing the test oscillator for alignment of this band, connect a 400 ohm carbon resistor in series with the .0001 mfd. condenser on the output lead of the test oscillator. This resistor is used with the test oscillator only on the Short Wave Bands and should not be used for Broadcast Band alignment. The two police band coils are under the chassis and the antenna coil trimmer is mounted on the end of the antenna coil. **Important:** This is the only adjustment necessary for the Police Band. Do not attempt any adjustment of the gang condenser trimmers in aligning the Police Band, otherwise the Broadcast Band will be thrown out of alignment.

SERVICE DATA FOR ALL BANDS

If it is suspected that the oscillator has stopped but is doubtful due to the presence of the usual amount of noise level, it is suggested that the oscillator plate voltage be checked. To ascertain whether the tube is oscillating, ground the oscillator grid of the 1C6 (short stator and rotor plates of oscillator section on gang condenser). If oscillating properly, grounding the grid will cause an appreciable drop in oscillator voltage.

BATTERY SELECTION This receiver is designed to operate entirely from a 6 volt storage battery. It requires no other batteries. It will operate from any storage battery having a capacity ranging from 90 to 175 ampere hours. It is suggested, for the sake of greatest economy, that the largest possible capacity battery be used. The following is a schedule giving the number of hours of service on a single charge from batteries of standard capacities. A fully charged battery will provide satisfactory power for the periods specified before requiring additional charge.

90 Ampere Hour Capacity provides	60 hours use.
100 Ampere Hour Capacity provides	66 hours use.
110 Ampere Hour Capacity provides	73 hours use.
120 Ampere Hour Capacity provides	80 hours use.
150 Ampere Hour Capacity provides	100 hours use.
170 Ampere Hour Capacity provides	113 hours use.

Note: The above tabulation is rated very conservatively and in most cases, with new or correctly rated batteries in good condition, many additional hours of service can be obtained from each charge. If, for any reason, the proper hours of service are not obtained, it will be due to the use of an old battery whose condition and rating are no longer up to standard. If a brand new battery fails to give the required hours of service, it is due to the battery being wrongly rated.

BATTERY CONNECTIONS At the rear of the receiver there will be found extending from the left end of the chassis, the battery connecting cable. Observation will show that 5 wires are brought out from the braided cable. The **red** and **red with black tracer** wires are joined together and should **both** be securely fastened to the positive (+) terminal of the 6 volt storage battery. The other 3 wires which are **brown, black with green tracer** and **Metallic shield lead** are also joined together and should be securely connected to the negative (—) post of the battery.

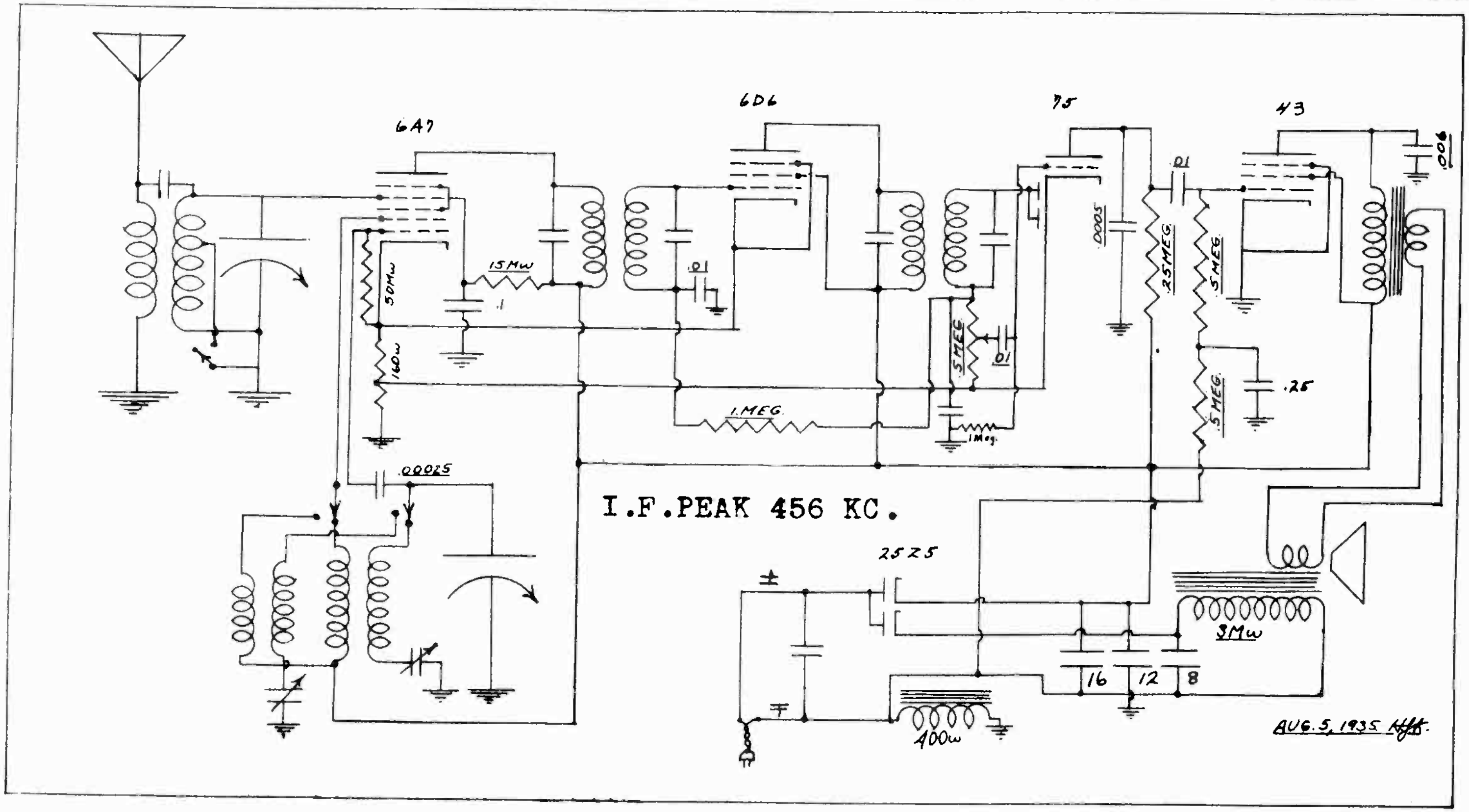
Note: It is extremely important that only the best possible means of obtaining a secure connection to the battery terminals be employed. If a battery with automobile terminal posts is used, the **large** post is the positive (+) post; the **smaller post** is the **negative** (—) terminal. It is suggested, when using a battery with auto type posts that large heavy lead covered battery clips be used in making connections. Make sure that **all wires** are firmly connected to clips (solder if possible). Also see that the jaw teeth of the clips are clean, and firmly bite into the post. It is very important that the battery posts and battery clip teeth be cleaned at frequent intervals to assure maintaining good connections. Corrosion may be readily removed by cleaning with a solution of 3 tablespoons of bicarbonate of soda (baking soda) and one cup of water. This solution neutralizes the acid coating that causes the corrosion and leaves a protective condition that retards further corrosion. It is important that this solution does not in any way enter the interior of the battery.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Part No.	DESCRIPTION	LIST PRICE	Part No.	DESCRIPTION	LIST PRICE	Part No.	DESCRIPTION	LIST PRICE
P173	Oscillator Coil	.50	P937	Escutcheon Plate	.80	P551	Type 30 Socket	.15
P189	1st I. F. Transformer	1.20	P938	Convex Glass	.20	P553	Type 34 Socket	.15
P190	2nd I. F. Transformer	1.20	P939	Glass Retainer Ring	.15	P554	Type 1C6 Socket	.15
P194	Tube Shield	.10	P941	Escutcheon Ring	.20	P555	Type 32 Socket	.15
P298	Antenna & Ground Post	.15	P961	Volume Control with Switch	1.10	P687	Type 19 Socket	.15
P382	Antenna Coil	.75	P962	Tone Control	.70	P136	250 Ohm ¼ Watt Resistor	.10
P392	Battery Cord	.75	P684	6/32 Wing Nuts	.10	P137	500,000 Ohm ¼ Watt Resistor	.10
P958	Dual 8-Electrolytic Condenser	2.00	P688	Bias Cell	.25	P162	1-Megohm ¼ Watt Resistor	.10
P402	Vibrator Unit	5.00	P689	Bias Cell Panel	.15	P168	8,000 Ohm ¼ Watt Resistor	.10
P406	Vibrator Socket	.15	P719	Input Transformer	1.50	P280	100,000 Ohm ¼ Watt Resistor	.10
P411	Filter Choke 500-ohm	.75	G989	Power Unit Complete with Vibrator	12.00	P417	50,000 Ohm ¼ Watt Resistor	.10
P422	40-Ohm Candohm Resister	.20	P954	Power Transformer	2.00	P419	20,000 Ohm ¼ Watt Resistor	.10
P446	Pilot Light 2V.-06-M.A.	.35	P777	Candohm 19-9-Ohm Resistor	.30	P142	.1-MFD-200V Condenser	.15
P452	Tube Shield	.15	P778	Candohm Gang Resistor	.50	P143	.02-MFD-400V Condenser	.20
P854	R. F. Choke	.50	P933	Wave Switch	.85	P147	.00025-Mica-20% Condenser	.20
P457	A. Choke	.50	G560	Short Wave Antenna Coil	.50	P335	.01-MFD-600V Condenser	.15
P932	Pilot Light Bracket	.15	G561	Short Wave Oscillator Coil	.50	P395	.5-10V Condenser	.35
P970	2-Gang Condenser	2.75	G562	Police Band Antenna Coil	.45	P478	.0012-MFD-200V Condenser	.20
P544	Trimmer Condenser	.15	G563	Police Band Oscillator Coil	.45	P480	.0001 Mica Condenser	.15
P617	Padding Condenser	.40	P975	6" Per. Magnet Spkr.	7.00	P672	.001 Mica Condenser	.20
G985	Dial & Scale Complete	3.00	P980	8" Perm. Mag. Spkr.	7.50			
P634	Knob	.25						

RADOLEK CO.

MODEL 10926
Schematic
Notes



This receiver is a five-tube superheterodyne type which operates on EITHER AC OR DC CURRENT at a frequency of 25 to 60 cycles and at 110 volts. It has two bands, covering the standard broadcast from 1500 to 540 kilocycles, and the police band from 4500 to 1650 kilocycles. Refer to tube layout on bottom of cabinet for position of tubes.

ANTENNA

A 20-foot coil of antenna wire is supplied connected to the receiver. This is usually sufficient for most locations if it is unrolled and laid on the floor or thrown out of window. However, in some buildings of steel construction it may be necessary to use an outside antenna to obtain satisfactory results. Connect it to end of the antenna supplied.

GROUND

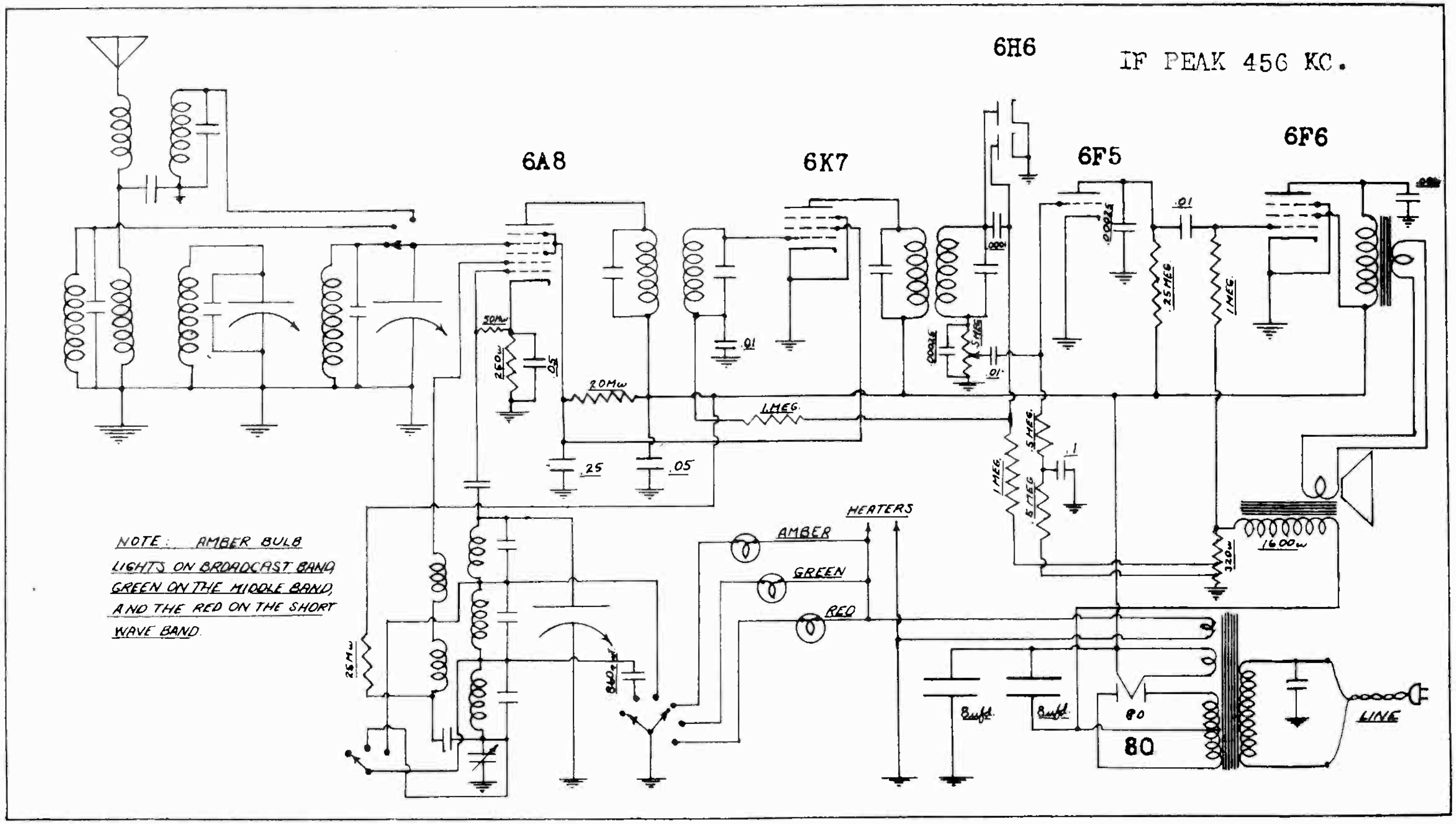
No ground connection is necessary. There is no provision made for its use on this set.

OPERATION OF SET

The set is turned on with the left hand knob; when turned to the right, it switches on the set, illuminating the dial, and when turned further acts as the volume control. The right hand knob is the station selector with which the stations are tuned in. A knob at the rear of the set switches on the short wave band. Best reception on the short wave can only be expected with the attachment of the antenna lead to an outside aerial. This will help to bring in more distant stations and will eliminate background noise. The wall plug may have to be reversed in its socket if set does not play, as on DC current, it will play only in one position, but on AC current, will play in either position....Do not become alarmed at warmth of cord, as it is asbestos lined, and is the means of escape of the heat generated in the radio.

MODEL 10927
Schematic
Notes

RADOLEK CO.



This radio is a six-tube Superheterodyne type which operates ON AC CURRENT ONLY at a frequency of 60 cycles and at 110 volts.
It covers three wave bands, as follows:

Standard Broadcast band - 540-1750 kc - AMBER light
Police and Amateur band - 1650-5000 kc - GREEN light
Short wave, American & Foreign - 18-5.7 meg.-RED light

Antenna and Ground

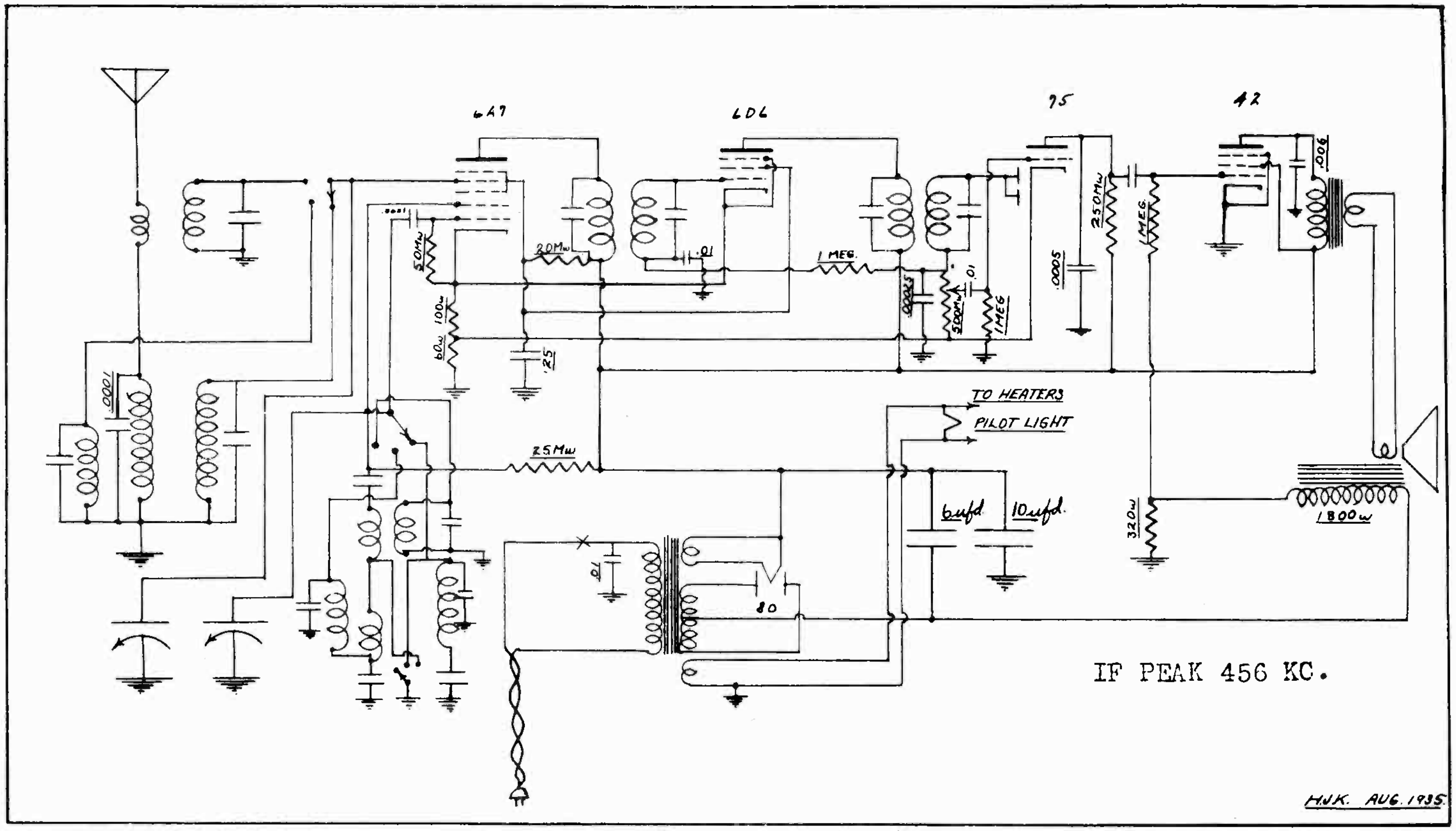
An outside antenna is desirable with this radio in order to obtain the maximum in performance. With an efficient outside antenna, foreign reception is guaranteed. The short red wire in the rear should be connected to the antenna. It is desirable to have this antenna clear of surrounding objects and as high as possible from the ground. The black wire is the grounding terminal. If the lighting circuit is not already grounded, reception will be improved by connecting this black wire to the cold water pipe or radiator; otherwise the ground wire can be left free.

Operation of Set

The right hand knob switches on the set, and thereafter acts as the volume control. The upper middle knob is the station selector with which the stations are tuned in. The lower middle knob is the variable tone control, allowing you to control the tone for base or sharp timbre. The left hand knob controls the three wave bands of the set. When turned to the extreme left, the broadcast band is on, showing an AMBER light; switched to the center, the police and amateur band is on, showing a GREEN light; the extreme right brings in the short wave, showing a RED light. Success with short wave requires more careful tuning than with the broadcast band and necessitates study of a chart to ascertain location of the principal short wave broadcasting stations. Air conditions are not always favorable to short wave reception, under which conditions nothing can be done, but with reasonable atmospheric clearance, good foreign reception may be had.

MODEL 10928
Schematic
Notes

RADOLEK CO.



This radio is a five-tube Superheterodyne type which operates on AC CURRENT ONLY at a frequency of 60 cycles and at 110 volts. It covers three wave bands, as follows:

Standard broadcast band -- 540-1750 kc - No. 1
on left-hand knob
Police & Amateur band -- 1650-5000 kc - No. 2
on left-hand knob
Short wave, American & Foreign - 18-5.7 meg. No. 3
on left-hand knob

Antenna and Ground

An outside antenna is desirable with this radio in order to obtain the maximum in performance. With an efficient outside antenna, foreign reception is guaranteed. The short red wire in the rear should be connected to the antenna. It is desirable to have this antenna clear of surrounding objects and as high as possible from the ground. The black wire is the grounding terminal. If the lighting circuit is not already grounded, reception will be improved by connecting this black wire to the cold water pipe or radiator; otherwise the ground wire can be left free.

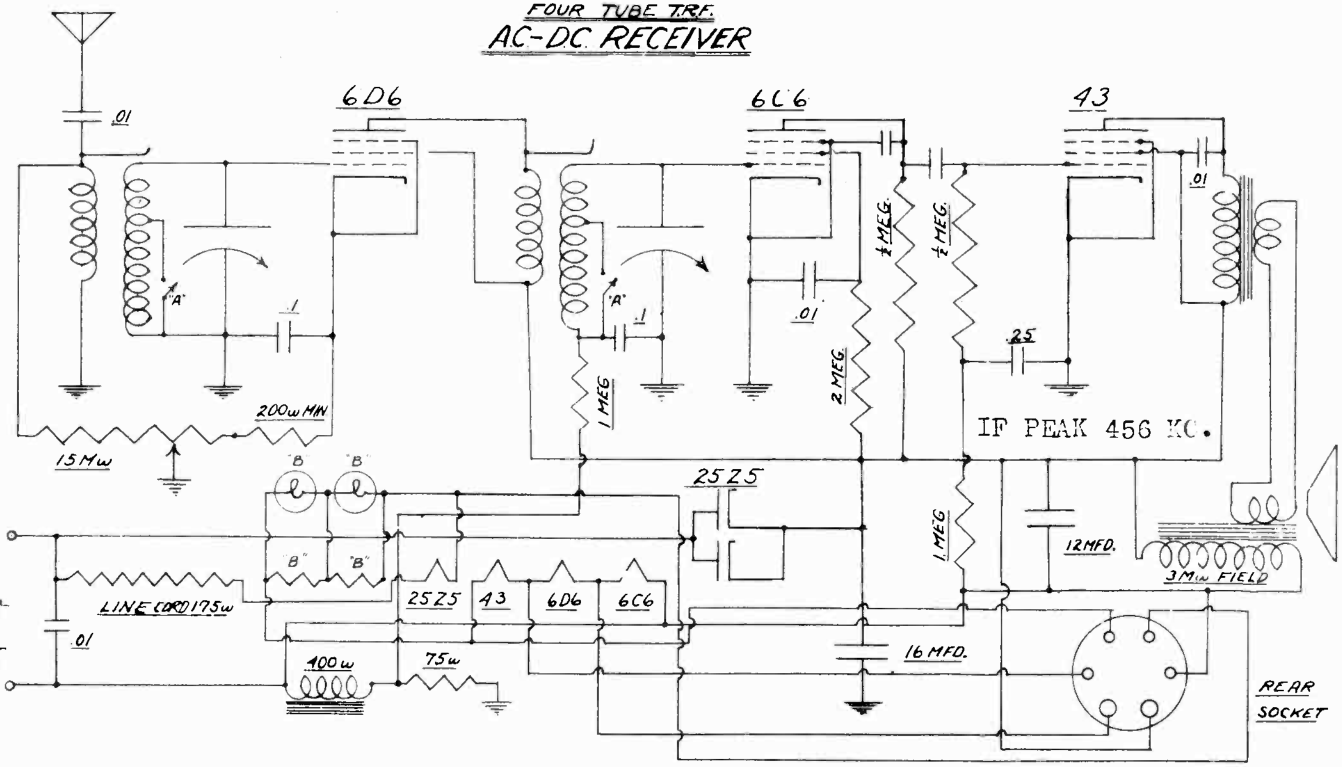
Operation of Set

The right hand knob switches on the set, and thereafter acts as the volume control. The center knob is the station selector with which the stations are tuned in. The left hand knob controls the three wave bands. The line on the knob properly aligned with the numbers 1, 2, or 3 shown on the face of the cabinet will bring in the respective bands shown above. Success with short wave requires more careful tuning than with the broadcast band, and necessitates study of a chart to ascertain location of the principal short wave broadcasting stations. Air conditions are not always favorable to short wave reception, but with reasonable atmospheric clearance, good foreign reception is guaranteed.

MODEL 10931
Schematic
Notes

RADOLEK CO.

FOUR TUBE T.R.F. AC-DC RECEIVER



NOTE:
OMIT "A" ON SETS WITHOUT S.W.
OMIT "B" ON SETS NOT USING PILOT LIGHTS.

POWER SOURCE
DIRECT OR ALTERNATING CURRENT
25-60 CYCLES AT 115 VOLTS

OPERATION OF SET

Turn the set on with left hand knob allowing a few seconds for the tubes to warm up, then tune in on station desired with right hand knob. The left hand knob, once turned on, thereafter acts as a volume control. This set covers the station broadcast bands from 550 to 1500 kilocycles, or 175 to 550 meter. 175 meter police may be tuned in at bottom of the dial. If this set has short wave, 125 meter police may also be obtained on it. The cord that plugs into the light socket is known as the resistance cord. This cord is asbestos lined and is used as a means of permitting the heat generated from the set and tubes to pass through it, causing this cord to become warm. Do not become alarmed therefore at the temperature of this co

ANTENNA

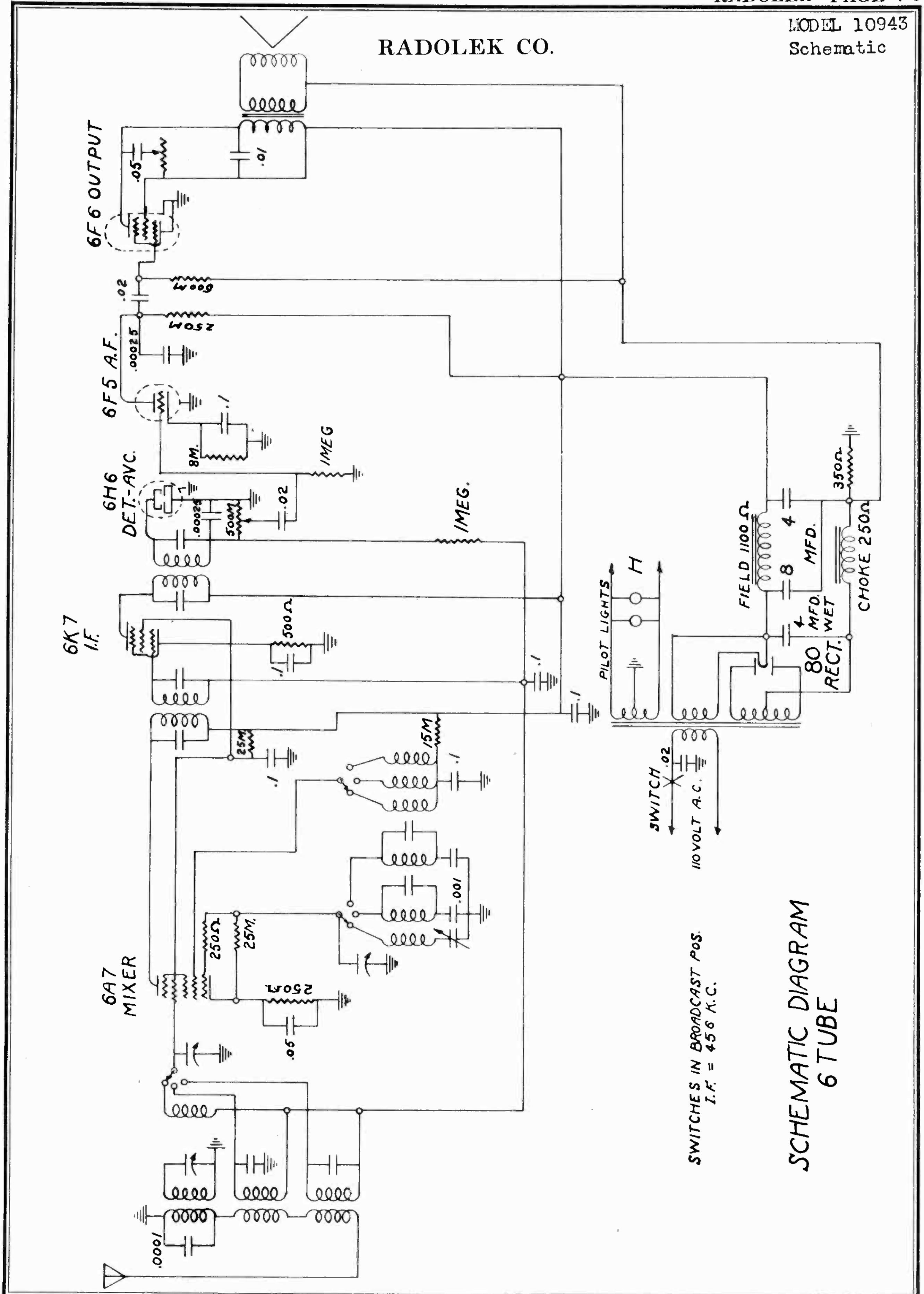
A 20 foot coil of antenna wire is supplied connected to the receiver. This is usually sufficient for most locations if it is unrolled and laid on the floor or thrown out of window. However, in some buildings of steel construction it may be necessary to use an outside antenna to obtain satisfactory results. Connect it to end of the antenna supplied.

GROUND

No ground connection is necessary. There is no provision made for its use on this set.

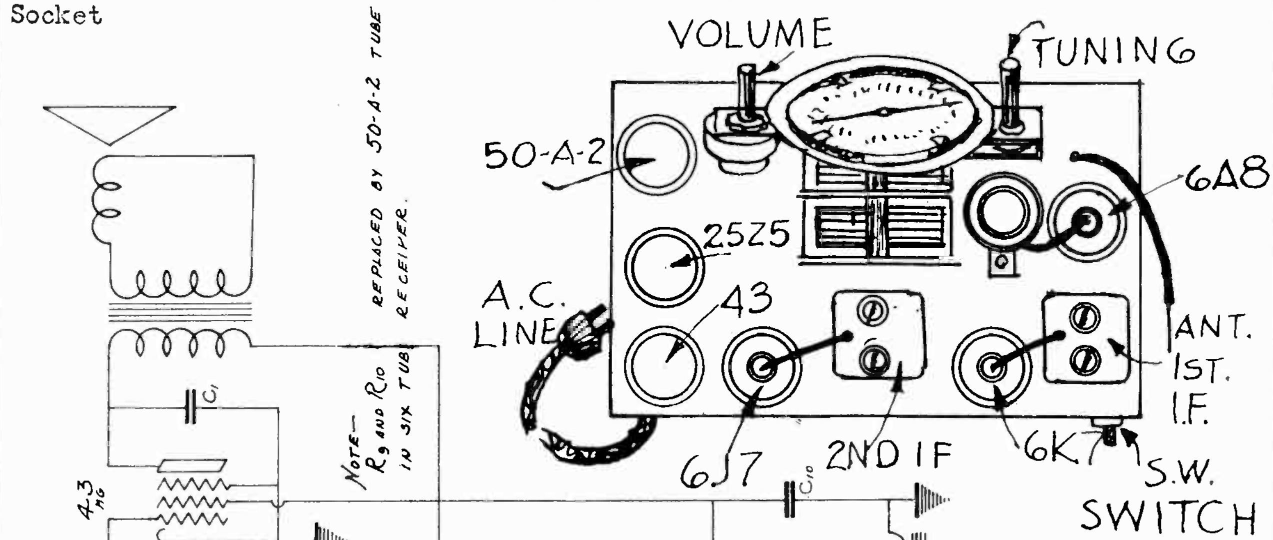
RADOLEK CO.

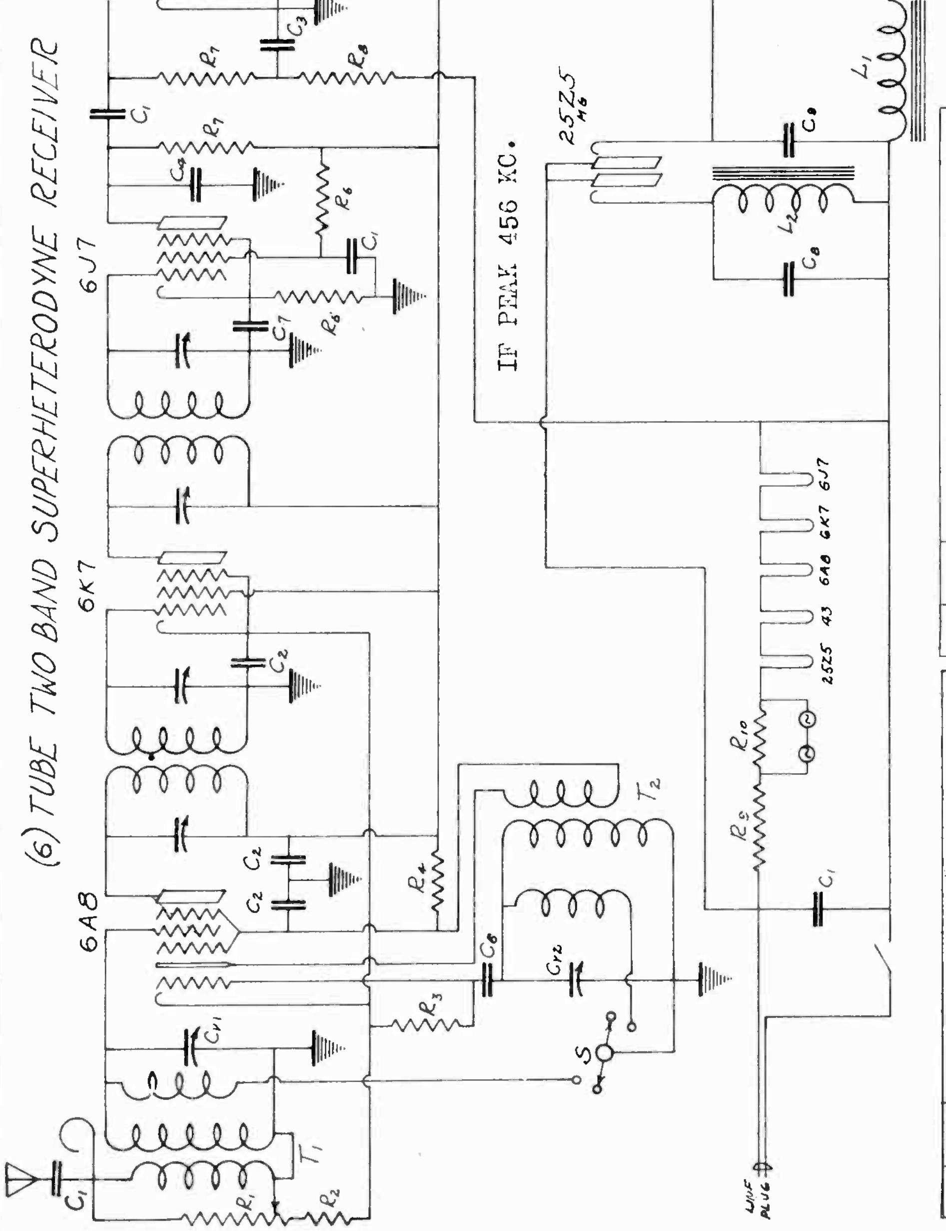
MODEL 10943
Schematic



MODEL 11908
Schematic
Socket

RADOLEK CO.





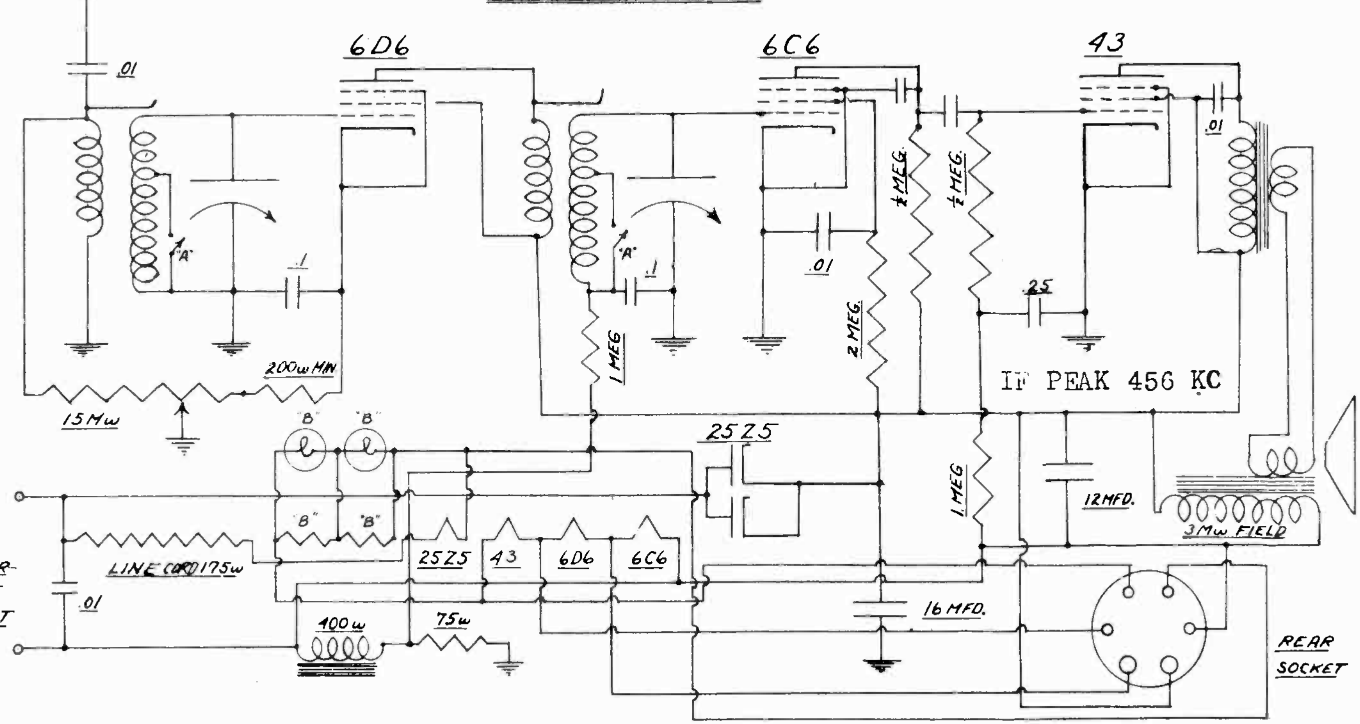
C_1	1082	.01 mfd. 400V. Tubular Condenser
C_2	1080	.1 mfd. 200V. " "
C_3	1095	.25 mfd. 200V. " "
C_4	1090	.00025 mfd. Mica Condenser
C_6	1091	.0001 mfd. " "
$C_{7\text{-}8\text{-}9\text{-}10}$	2027	5 mfd. 25V. 8 mfd. - 12 mfd. - 4 mfd. - 200V.
$R_{1\text{-}2}$	1059	10,000 ohm Volume Control, 250 w R.H.
R_3	1071	50,000 ohm Carbon Resistor, ½ watt
R_4	1060	5000 " " " " "

R_5	1063	25,000 " " " " "
R_6	1073	3 meg ohm " " " "
R_7	1061	½ " " " " "
R_8	1063	250,000 ohm " " " "
R_9	1029	110 ohm Resistor Cord
R_{10}	1078	40 ohm Candohm Resistor
$T_{1\text{-}2}$	471	Translator Coil
S	759	Short Wave Switch
L_1	750	400 ohm, 10 hy., 40 M.A. Filter Choke

RADOLEK CO.

MODEL 11910
Schematic
Notes

FOUR TUBE T.R.F. AC-DC RECEIVER



NOTE:
OMIT "A" ON SETS WITHOUT S.W.
OMIT "B" ON SETS NOT USING PILOT LIGHTS.

POWER SOURCE DIRECT OR ALTERNATING CURRENT 25-60 CYCLES AT 115 VOLTS

SUPPLY VOLTAGE

This receiver operates from any 110 volt light socket of any frequency AC or straight DC. When operating on a DC socket, the plug may have to be reversed in the socket to obtain the correct polarity, as it will work only in one position on DC current, but in either position on AC current.

ANTENNA

A 20 foot coil of antenna wire is supplied connected to the receiver. This is usually sufficient for most locations if it is unrolled and laid on the floor or thrown out of window. However, in some buildings of steel construction it may be necessary to use an outside antenna to obtain satisfactory results. Connect it to end of the antenna supplied.

GROUND

No ground connection is necessary. There is no provision made for its use on this set.

OPERATION OF SET

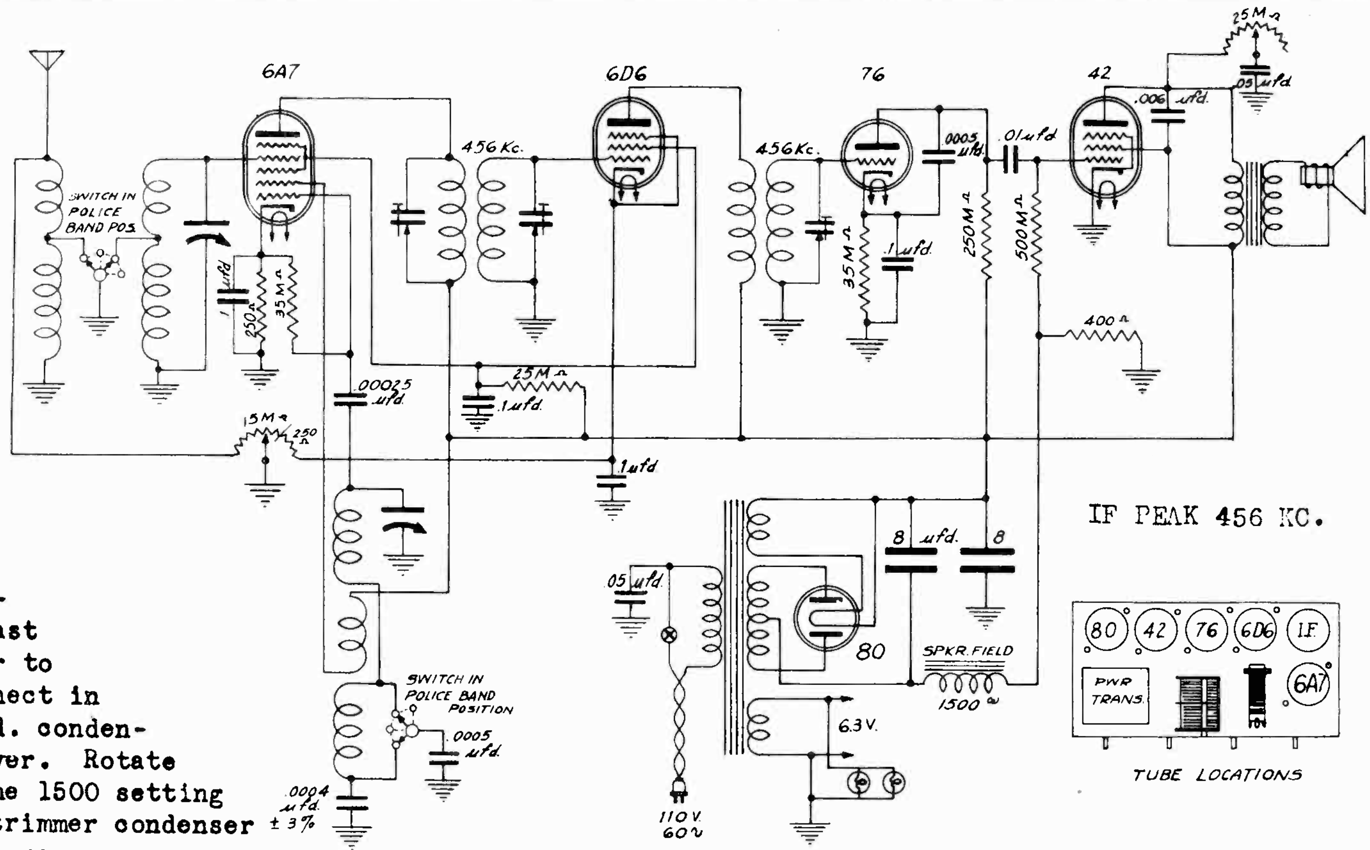
Turn the set on with left hand knob allowing a few seconds for the tubes to warm up, then tune in on station desired with right hand knob. The left hand knob, once turned on, thereafter acts as a volume control. This set covers the station broadcast bands from 550 to 1500 kilocycles, or 175 to 550 meter. 175 meter police may be tuned in at bottom of the dial. If this set has short wave, 125 meter police may also be obtained on it. The cord that plugs into the light socket is known as the resistance cord. This cord is asbestos lined and is used as a means of permitting the heat generated from the set and tubes to pass through it, causing this cord to become warm. Do not become alarmed therefore at the temperature of this co

MODEL 11911
Schematic, Alignment

RADOLEK CO.

CIRCUIT DIAGRAM

5 Tube A.C.
Superheterodyne
Broadcast and
Police Bands



IF PEAK 456 KC.

TUBE LOCATIONS

R. F. ALIGNMENT:

With the wave-change switch in broadcast position, set oscillator to 1500 kilocycles and connect in series with a .00025 mfd. condenser to Antenna of receiver. Rotate variable condenser to the 1500 setting on the dial and adjust trimmer condenser of oscillator section to resonance.

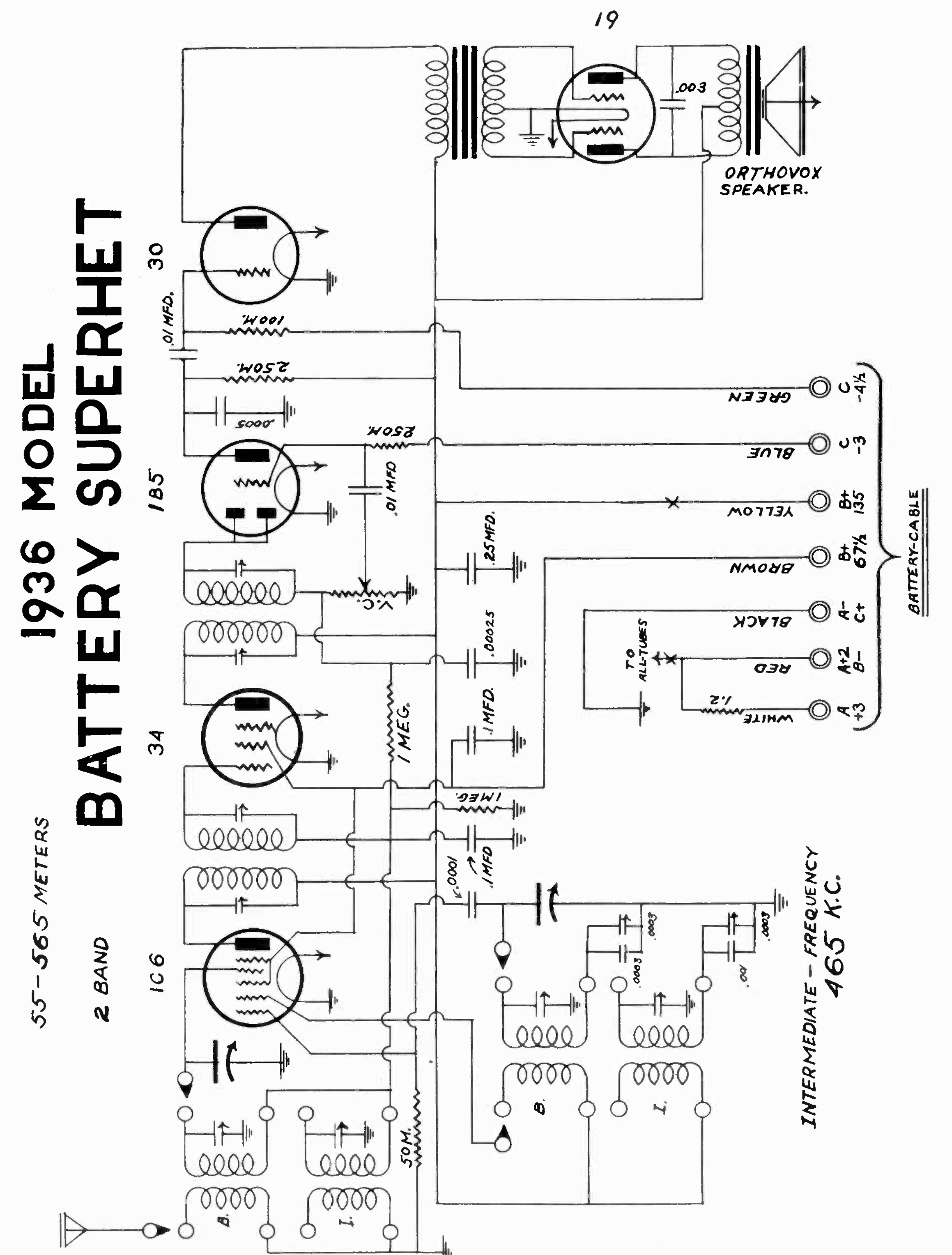
The oscillator section is the rear section of variable condenser. Re-set oscillator to 1400 kilocycle dial setting. Now adjust antenna section trimmer (front section) to resonance. Set oscillator to 600 and 1000 kilocycles and check alignment at these frequencies. If necessary, bend plates of antenna section for low frequency alignment. Do not bend plates of oscillator section. No adjustment should be necessary for the police band. However, set test oscillator to 1.6 and 4.0 megacycles and check alignment at these frequencies.

I. F. ALIGNMENT:

Connect an output meter to the screen and plate terminals of the 42 tube. Rotate gang condenser to maximum capacity and turn volume control on full. Now connect a test oscillator in series with a .00025 mfd. condenser to the grid of the 6D6 tube. Set the test oscillator to 456 kilocycles. Tune the second I.F. transformer to 456 kc. by adjusting the trimmer across the secondary of the I.F. transformer. This trimmer is located under the chassis. Then connect the oscillator to the grid of the 6A7 tube and adjust the first I.F. trimmers to resonance.

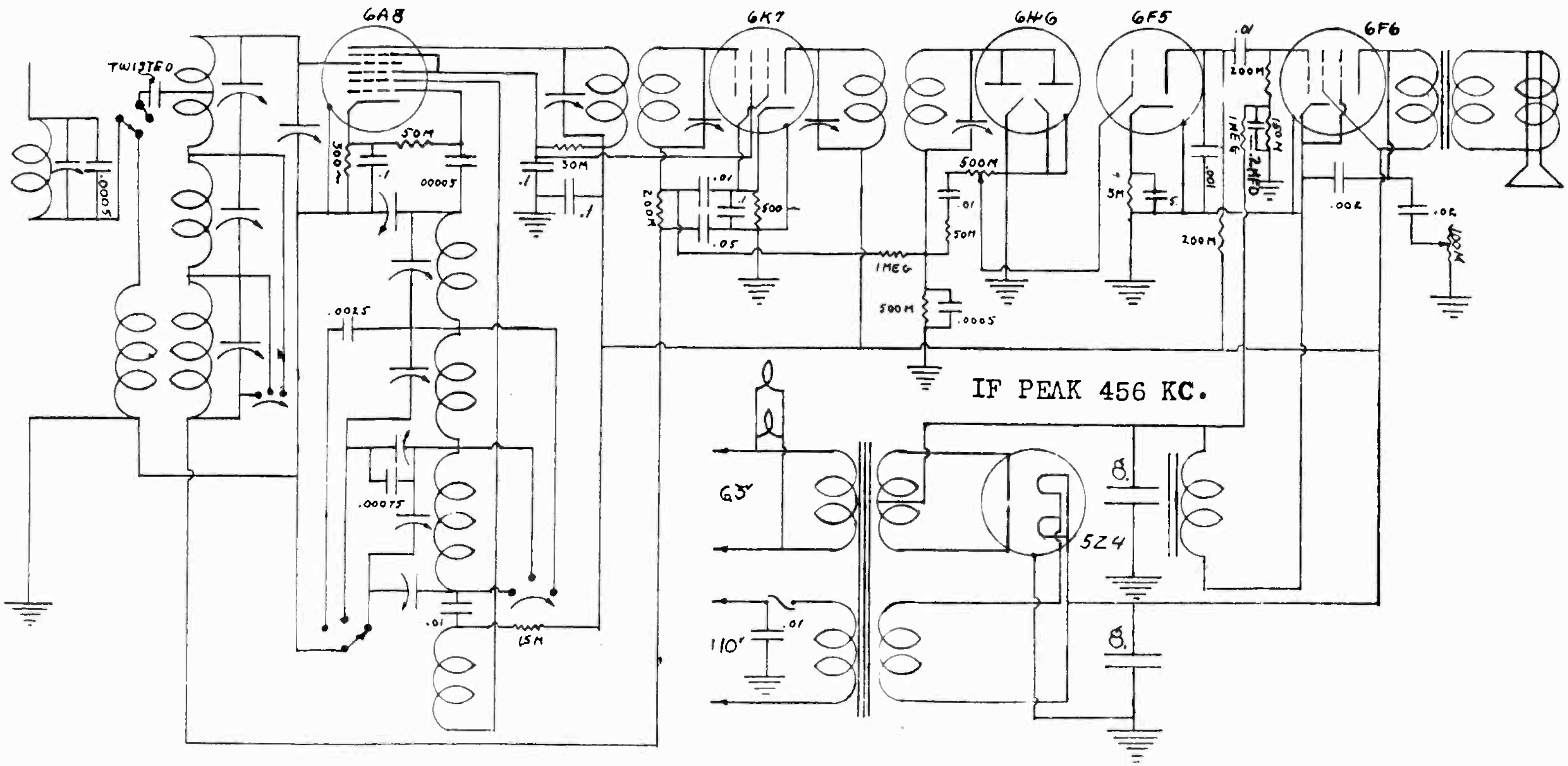
MODEL 11935
Schematic

RADOLEK CO.



MODEL 11947
Schematic
Alignment

RADOLEK CO.



SERVICE NOTES: If the radio fails to operate when unpacked, or stops working after a few days, proceed as follows: (1) Have the tubes checked. (2) Remove the chassis from the cabinet and check for loose connections. (3) Have a competent "Radio Service Man" check over entirely. This set left the factory carefully inspected. Should rephasing be necessary, attach the output lead from a 456 KC test oscillator to the grid cap of the converter tube, keep the signal to a very low audible value and carefully adjust the two trimmer screws in the top of I. F. coils to loudest volume. If an output meter is available it should be used across the voice coil leads at the speaker transformer. An oscillator covering a frequency from 550 KC to 16 megacycles should be used to rephase the R. F. The test oscillator output is attached to the aerial lead of the set. At all times keep the oscillator signal turned down to a low point of audibility. Trim the short-wave band first, next the intermediate band, and then the broadcast band, to a frequency near the high frequency end of the dial in each case. Looking at underside of chassis with controls toward front the trimmers on oscillator coil from right to left are short-wave, intermediate and broadcast, respectively. The trimmers for the R. F. are in can on topside of chassis and are in the same order with short-wave closest to base. The porcelain base trimmer in the center of chassis is the intermediate band padding condenser, and the porcelain base trimmer closest to front is for broadcast. These are adjusted to set the low frequency ends of the intermediate and broadcast bands to correct location on the dial.

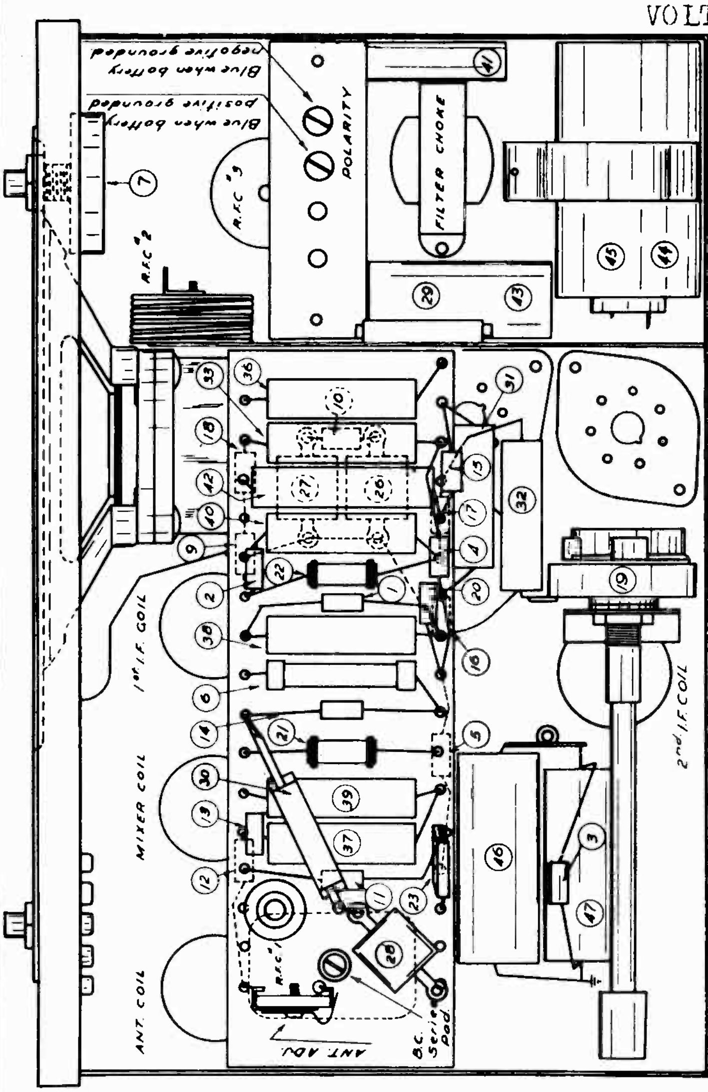
NOTE: On E Models (European) the three-plate bakelite trimmer connected from porcelain trimmer to band switch is the long wave trimmer. The trimmer on the left of oscillator coil is turned tight and should not need adjustment. The porcelain trimmer in center of chassis is long wave, and the one closest to front is broadcast. These two padding condensers are adjusted to set the low frequency ends of the broadcast and long wave bands to correct location on the dial.

PHONOGRAPH: Install a single pole double-throw toggle switch near the 75 tube, disconnect the .01 mfd. condenser from the volume control and connect to one side of switch, connect the volume control to center terminal of the switch, connect one side of the phonograph pickup to remaining side of the switch and the other side of the pickup to "B" minus.

Socket Voltage

REMLER COMPANY, LTD.

MODEL 37
Schematic,



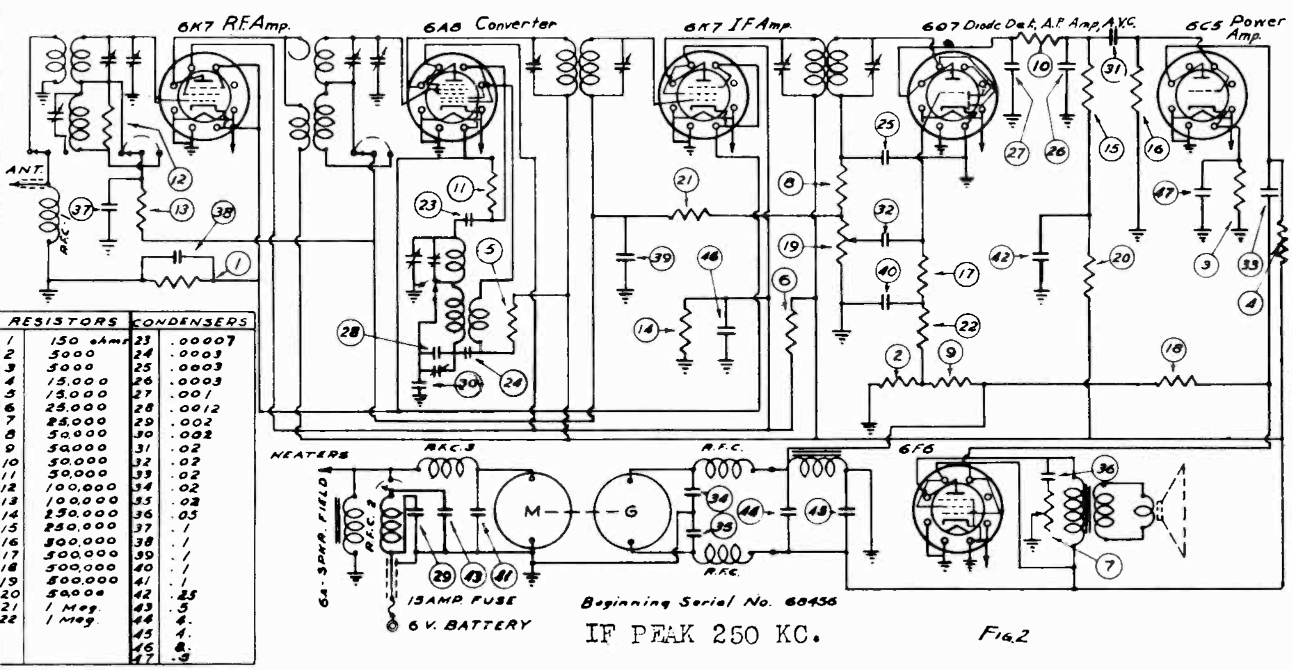
VOLTAGES TO CHASSIS - NO SIGNAL:

	6 Volts
Battery, hot side	215
Plate supply from gen.	215
6K7 - R.F. Plate	80
6K7 - R.F. Screen	3
6K7 - R.F. Cathode	215
6A8 - Mixer - Plate	80
6A8 - Mixer - Screen	3
6A8 - Cathode	150
6A8 - Oscillator Plate	215
6K7 - I.F. Plate	
6K7 - I.F. Screen	80
6K7 - I.F. Cathode	3
6Q7 - Det. A.V.C. Plate	85
6Q7 - Det. A.V.C. Grid	1.5
6C5 - A.F. Plate	155
6C5 - A.F. Cathode	9
6F6 - Power Plate	195
6F6 - Screen	215
6F6 - Grid	15

Battery current 6 7-Amp.

A dynamotor mounted in the receiver is used for plate power supply. This unit does not require lubrication. All leads from this power unit are brought to a terminal strip as shown in Figure 1.

The short wave circuit trimmers are located in the R.F. shield can tops. The I.F. trimmers are in the I.F. transformer shields. Use a weak signal, or oscillator input, and an output meter when aligning the set.



RESISTORS		CONDENSERS	
1	150 ohms	23	.00007
2	5000	24	.0003
3	5000	25	.0003
4	15,000	26	.0003
5	15,000	27	.001
6	25,000	28	.0012
7	25,000	29	.002
8	50,000	30	.002
9	50,000	31	.02
10	50,000	32	.02
11	50,000	33	.02
12	100,000	34	.02
13	100,000	35	.02
14	250,000	36	.05
15	250,000	37	.1
16	500,000	38	.1
17	500,000	39	.1
18	500,000	40	.1
19	500,000	41	.1
20	50,000	42	.25
21	1 Meg.	43	.5
22	1 Meg.	44	4.
		45	4.
		46	8.
		47	.5

Beginning Serial No. 68456

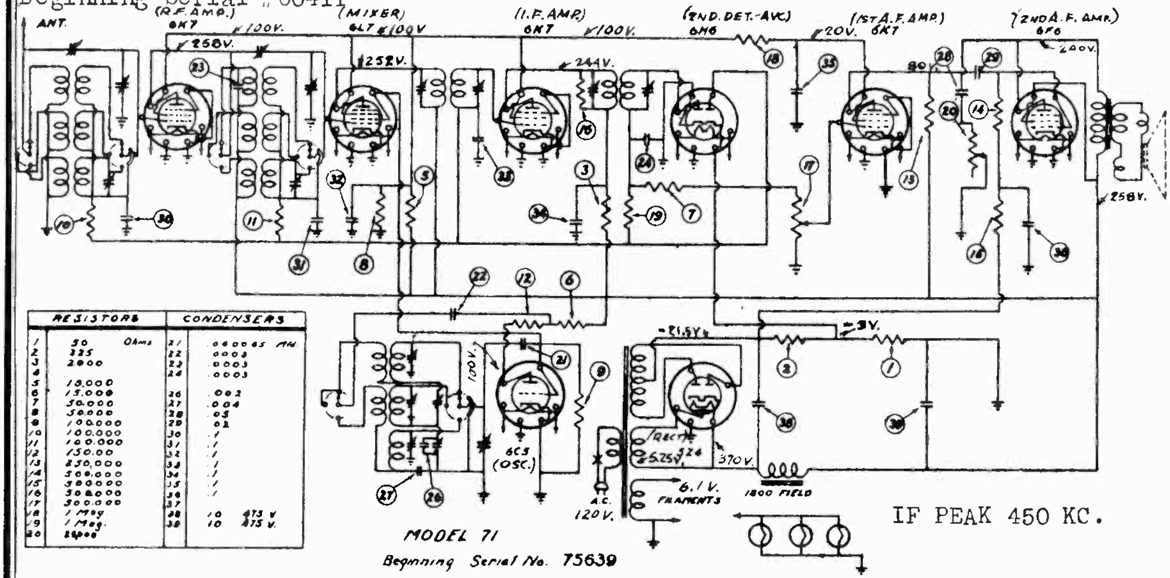
IF PEAK 250 KC.

Fig.2

MODEL 40 (Late)
Beginning Serial #66746
MODEL 41
Beginning Serial #60411

REMLER COMPANY, LTD.

MODEL 71
Beginning Serial #75639
Schematics, Voltage, Data



RESISTORS			CONDENSERS	
1	50	Ohms	21	.000045 Mfd
2	325		22	.0003
3	2000		23	.0003
4			24	.0003
5	10,000			
6	15,000		26	.002
7	50,000		27	.004
8	50,000		28	.05
9	100,000		29	.02
10	100,000		30	.1
11	100,000		31	.1
12	150,00		32	.1
13	250,000		33	.1
14	300,000		34	.1
15	300000		35	.1
16	300,000		36	.1
17	300,000		37	
18	1 Meg		38	10 475 V
19	1 Meg.		39	10 475 V.
20	2400			

The R.F. Mixer and oscillator coils are located in the square shields on the right end of the chassis. Trimmers for these circuits are mounted along the end of the chassis in the following order from front to rear:- R.F. short wave, mixer short wave, oscillator short wave, oscillator medium wave, oscillator broadcast. The R.F. broadcast and the mixer broadcast trimmers are mounted on the S.W. switch assembly.

Oscillator pads are located on the back of the chassis. The broadcast pad is nearest the end of the chassis and the medium wave next.

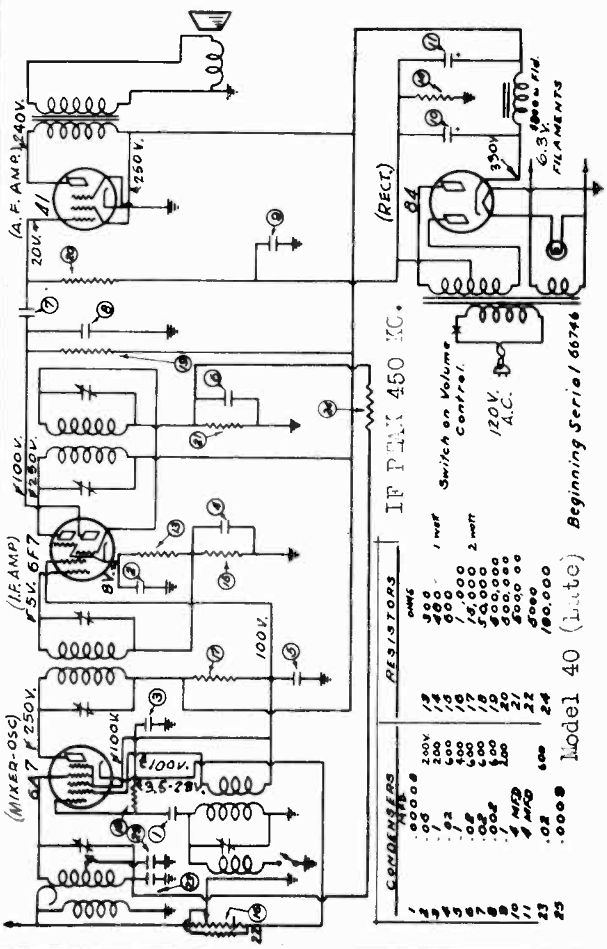
Model 40 (late)

The first I.F. transformer is in the aluminum shield at the back of the variable condenser. The mixer coil is trimmed by the back section trimmer, and is located over the variable condenser. The oscillator coil is within the chassis and is trimmed by the front section trimmer on the variable condenser. The second I.F. transformer is also located within the chassis and may be trimmed by the condensers mounted thereon. The intermediate frequency used is 450 kilocycles.

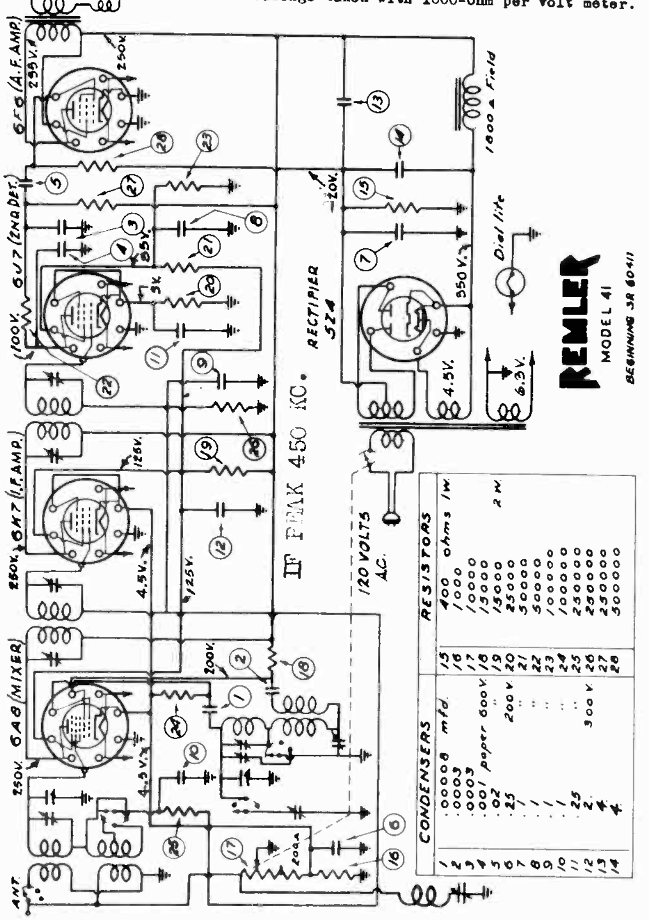
Model 41

The antenna and mixer coils are located over the variable condenser, while the oscillator coils are at the rear of the condenser. The trimmer for the short-wave section of the mixer coil is located at the end of the form. The oscillator series padding condenser for the broadcast range is mounted at the right end of the chassis. The I.F. transformers are located within the chassis. In moving the chassis from the cabinet, pry off the knobs with a wooden screwdriver and pull off the pointer from the condenser shaft.

D.C. VOLTAGES: (No signal; volume control full on)
Readings taken with 1000-Ohm per volt meter.



CONDENSERS	Mfd.		RESISTORS	Ohms	
1	.00008		13	300	1 watt
2	.05	200V.	14	400	
3	.1	200	15	600	
4	.02	600	16	1,000	
5	.1	400	17	15,0000	
6	.05	600	18	50,0000	2 watt
7	.02	600	19	500,0000	
8	.002	600	20	500,0000	
9	.1	200	21	500,0 00	
10	4 MFD		22	5000	
11	4 MFD		24	100,0000	
23	.02	600			
25	.0008				

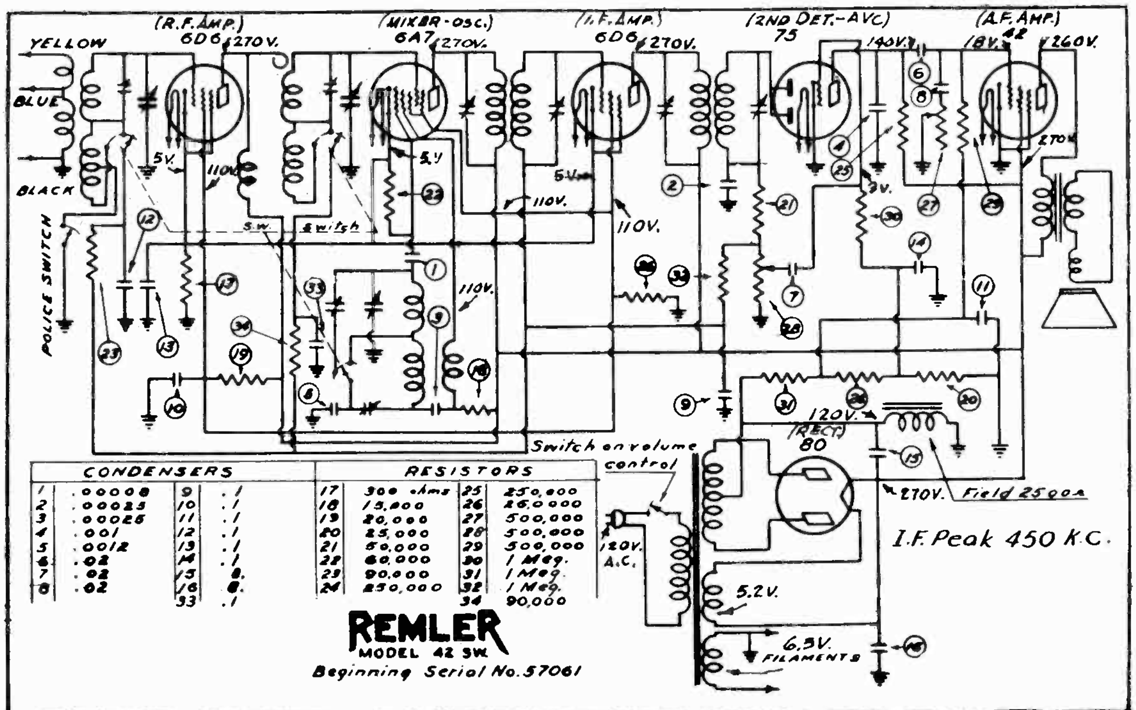


CONDENSERS			RESISTORS		
1	.00008 mfd.		15	400 ohms 1W	
2	.0003		16	1000	
3	.0003		17	10000	
4	.001 paper	600V.	18	15000	2W
5	.02	"	19	15000	
6	.25	200V.	20	25000	
7	.1	"	21	50000	
8	.1	"	22	50000	
9	.1	"	23	100000	
10	.1	"	24	100000	
11	.25	"	25	250000	
12	2	300V.	26	250000	
13	4		27	250000	
14	4		28	300000	

MODEL 43
Beginning Serial #62761
Schematics, Voltage, Data

REMLER COMPANY, LTD.

MODEL 42 SW
Beginning Serial #57061



CONDENSERS				RESISTORS			
1	.00008	9	.1	17	300 ohms	25	250,000
2	.00025	10	.1	18	15,000	26	250,000
3	.00025	11	.1	19	20,000	27	500,000
4	.001	12	.1	20	25,000	28	500,000
5	.0012	13	.1	21	50,000	29	500,000
6	.02	14	.1	22	60,000	30	1 Meg.
7	.02	15	8.	23	90,000	31	1 Meg.
8	.02	16	8.	24	250,000	32	1 Meg.
		33	.1			34	90,000

The antenna and R.F. coils are in the shielding can nearest the front of the chassis and the mixer coil is in the shield within the chassis. The first I.F. transformer is mounted in the shield between the 6A7 and 6D6 tubes; while the second I.F. transformer is located between the 6D6 and 75 tubes. The oscillator coil is within the set and is trimmed by the trimming condenser mounted adjacent to the coil.

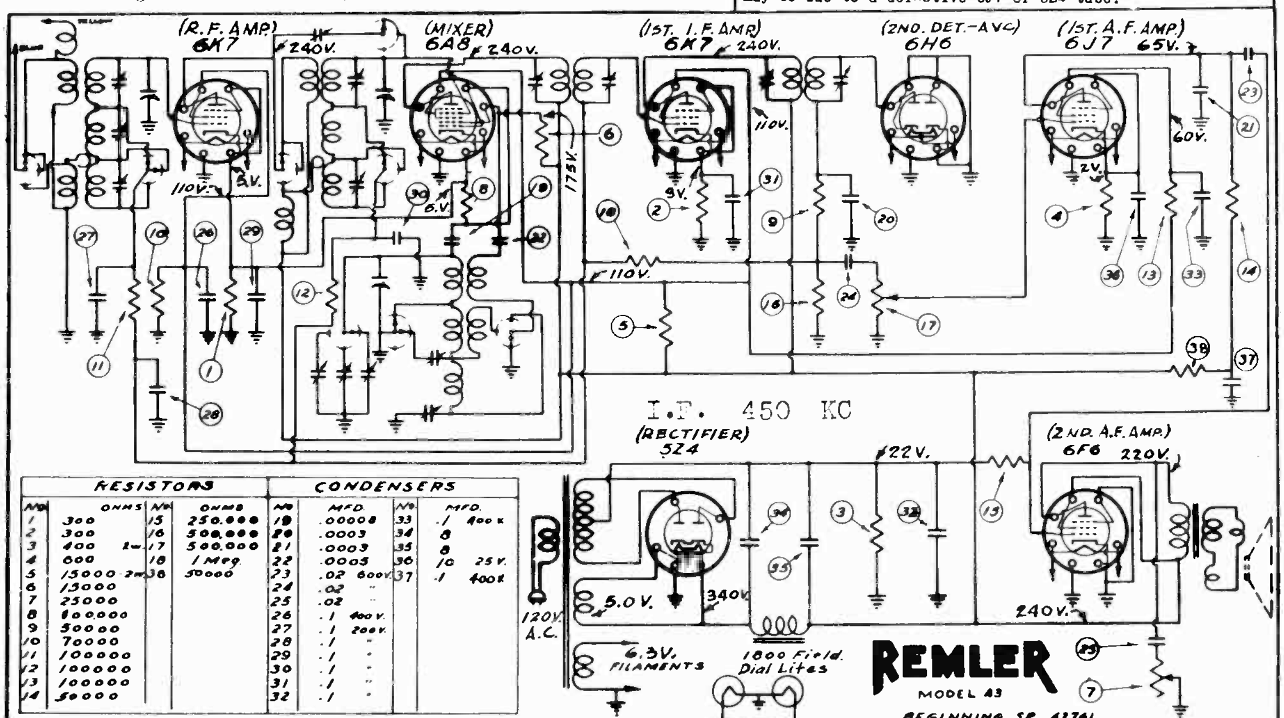
Trimmers for the short wave position are located at the top of the R.F. coil and on the right end of the chassis within the coil shields. No trimmer is provided for the oscillator short wave position. The oscillator padding condenser for the broadcast position is located at the right end of the chassis.

The R.F. stage coils are located in the shield at the back of the variable condenser and the mixer coils in the shield between the 6K7 R.F. amplifier tube and the first I.F. stage. The oscillator coils are within the shield nearest the front of the chassis. Trimmers for the oscillator coils are mounted at the bottom of the coil and are accessible from within the chassis. The B.C. trimmer is nearest the front of the chassis, with the M.W. and S.W. sections next in order from front to rear. The trimmers for the S.W., R.F. and mixer coils are located in the tops of the respective coil shields. The trimmer nearest the back of the gang switch trims the M.W. R.F. coil, while the trimmer between the first and second switch sections is a coupling condenser from the R.F. to mixer stages.

Poor performance on the low frequency portion of the S.W. range may be traced to a weak 6A8 tube. Excessive hum may be due to a defective 6J7 or 5Z4 tube.

D.C. VOLTAGES (No signal):

Readings taken with 1000-Ohm per volt meter.

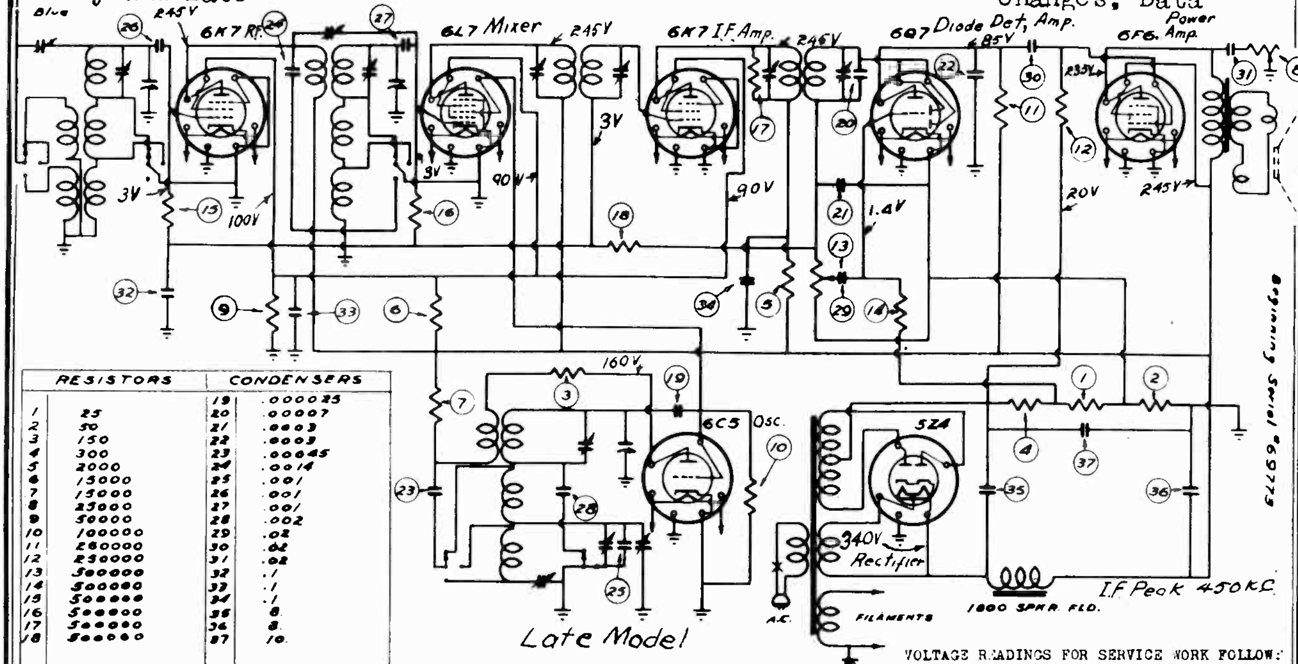


RESISTORS				CONDENSERS			
No.	OHMS	No.	OHMS	No.	MFD.	No.	MFD.
1	300	15	250,000	19	.00008	33	.1 400 V.
2	300	16	500,000	20	.0003	34	8
3	400 2w	17	500,000	21	.0003	35	8
4	600	18	1 Meg.	22	.0005	36	10 25 V.
5	15000-2w	38	50000	23	.02 600 V.	37	.1 400 V.
6	15000			24	.02 "		
7	25000			25	.02 "		
8	100,000			26	.1 400 V.		
9	50000			27	.1 200 V.		
10	70000			28	.1 "		
11	100000			29	.1 "		
12	100000			30	.1 "		
13	100000			31	.1 "		
14	50000			32	.1 "		

MODEL 44
Early and Late

REMLER COMPANY, LTD.

Schematics, Voltage Changes, Data



	RESISTORS		CONDENSERS
		19	.000025
1	25	20	.00007
2	50	21	.0003
3	150	22	.0003
4	300	23	.00045
5	2000	24	.0014
6	15000	25	.001
7	15000	26	.001
8	25000	27	.001
9	50000	28	.002
10	100000	29	.02
11	250000	30	.02
12	250000	31	.02
13	500000	32	.1
14	500000	33	.1
15	500000	34	.1
16	500000	35	8
17	500000	36	8
18	500000	37	10

Late Model

The R.F. stage coils are located in the shield at the back of the variable condenser and the mixer coils in the shield between the 6K7 R.F. amplifier tube and the first I.F. stage The oscillator coils are within the shield nearest the front of the chassis. Trimmers for the oscillator coils are mounted at the bottom of the coil and are accessible from within the chassis. The B.C. trimmer is nearest the front of the chassis and the S.W. section next. The trimmers for the S.W., R.F. and mixer coils are located in the tops of the respective coil shields. The trimmer nearest the back of the gang switch trims the M.W. R.F. coil, while the trimmer between the switch and the end of the chassis is a coupling condenser from the R.F. to mixer stages.

Trimmers for the I.F. transformers are adjusteble through holes in the transformer shield cans. The I.F. frequency is 450 K.C.

Use a weak signal or oscillator input when adjusting the trimmers.

Added to Late Model — The trimmer nearest the back of the gang switch trims the B.C. R.F. coil, while the trimmer on the bottom of the mixer coil is a coupling condenser from the R.F. to mixer stages, and is used for trimming the broadcast band.

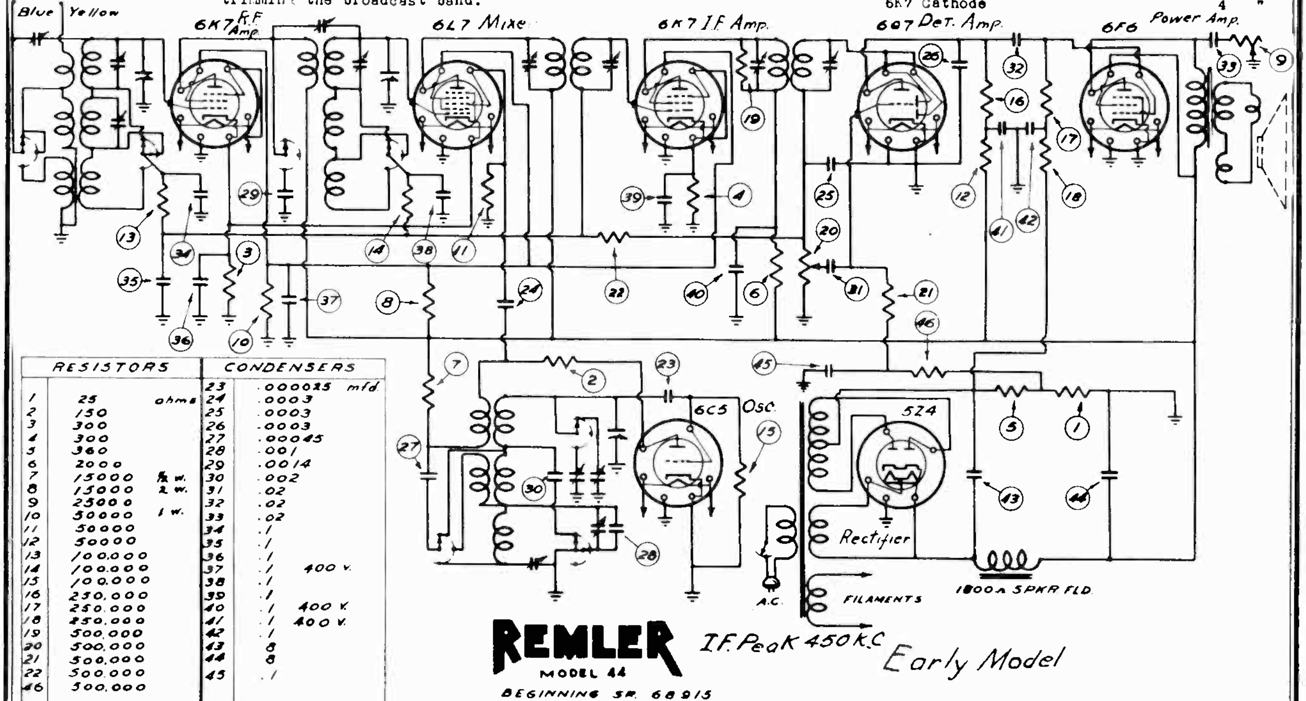
VOLTAGE READINGS FOR SERVICE WORK FOLLOW:

A.C. VOLTAGES:

Line	120 volts
Filaments, 6K7, 6L7, 6K7, 6C5, 6Q7, 6F6	6.3 "
Filament, 5Z4	5 "

D.C. VOLTAGES: (No signal) Early Model
Readings taken with 1000-Ohm per volt meter.
From ground to:

5Z4 Rectifier filament	340 volts
6F6 Plate	235 "
6F6 Screen grid	245 "
6F6 Grid bias supply	19 "
6Q7 Plate	85 "
6Q7 Grid bias supply	1.4 "
6K7 I.F. Plate	245 "
6K7 I.F. Screen grid	100 "
6K7 I.F. Cathode	3 "
6L7 Mixer plate	245 "
6L7 Screen grid	100 "
6L7 Cathode	4 "
6C5 Oscillator plate	160 "
6K7 R.F. Plate	245 "
6K7 R.F. Screen grid	100 "
6K7 Cathode	4 "

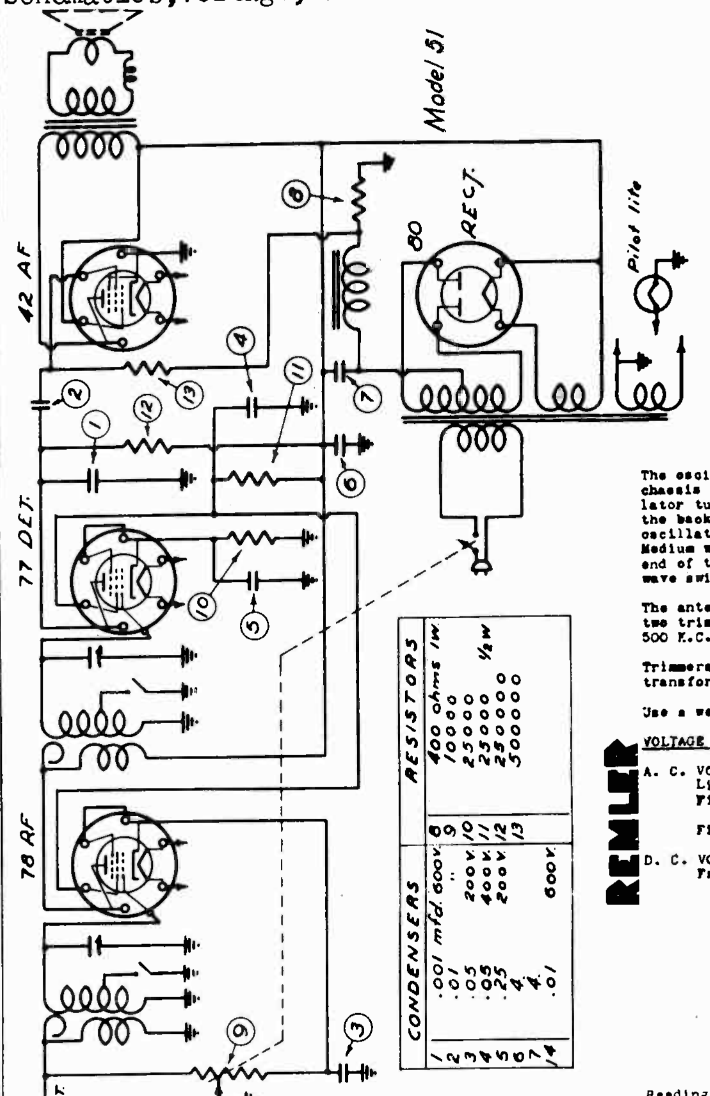


	RESISTORS			CONDENSERS	
			23	.000025	mfd
1	25	ohms	24	.0003	
2	150		25	.0003	
3	300		26	.0003	
4	300		27	.00045	
5	360		28	.001	
6	2000		29	.0014	
7	15000	½ w.	30	.002	
8	15000	2 w.	31	.02	
9	25000		32	.02	
10	50000	1 w.	33	.02	
11	50000		34	.1	
12	50000		35	.1	
13	100.000		36	.1	
14	100.000		37	.1	400 v.
15	100.000		38	.1	
16	250.000		39	.1	
17	250.000		40	.1	400 V.
18	250.000		41	.1	400 V.
19	500.000		42	.1	
20	500.000		43	8	
21	500.000		44	8	
22	500.000		45	.1	
46	500.000				

MODEL 51
Schematics, Voltage, Data

REMLER COMPANY, LTD.

MODEL 45
Beginning Serial #72409



RESISTORS	
8	400 ohms 1W
9	100000
10	250000
11	2500000 1/2W
12	5000000
13	

CONDENSERS	
1	.001 mfd. 600V.
2	.01 "
3	.05 200V.
4	.05 400V.
5	.25 200V.
6	4
7	4
14	.01 600V.

MODEL 51

A.C. VOLTAGES:

Line	120 volts
Secondary	670 volts
Filaments - #80	5.5 "
#77 - 78 - 42	6.3 "

D.C. VOLTAGES: Full volume, no signal

From ground to:

80	Rectifier filament	235 volts
•42	Plate	225 "
42	Screen grid	235 "
42	Grid - bias	18.5 "
77	Plate	90 "
77	Screen grid	135 "
77	Cathode	7 "
78	Plate	235 "
78	Screen grid	135 "
78	Cathode	3 "
Voltage across field		115 "

Voltages read with 1000-Ohm per volt meter

Model 45

The oscillator coils are located in the square shield on the end of the chassis and the mixer coils in the square can adjacent to the 6C5 oscillator tube. Trimmers for these coils are mounted within the chassis along the back edge. From the side of the chassis toward the center these are, oscillator Short wave, oscillator Medium wave; oscillator Broadcast, mixer Medium wave, mixer Short wave. The oscillater series pad is mounted on the end of the chassis. The mixer broadcast trimmer is mounted on the Short wave switch.

The antenna filter system is located near the front of the chassis. The two trimming condensers are adjusted for minimum response at 450 K.C. and 500 K.C. respectively.

Trimmers for the I. F. transformers are adjustable through holes in the transformer shield cans. The I. F. frequency is 450 K.C.

Use a weak signal or oscillator input when adjusting the trimmers.

REMLER

VOLTAGE READINGS FOR SERVICE WORK FOLLOW:

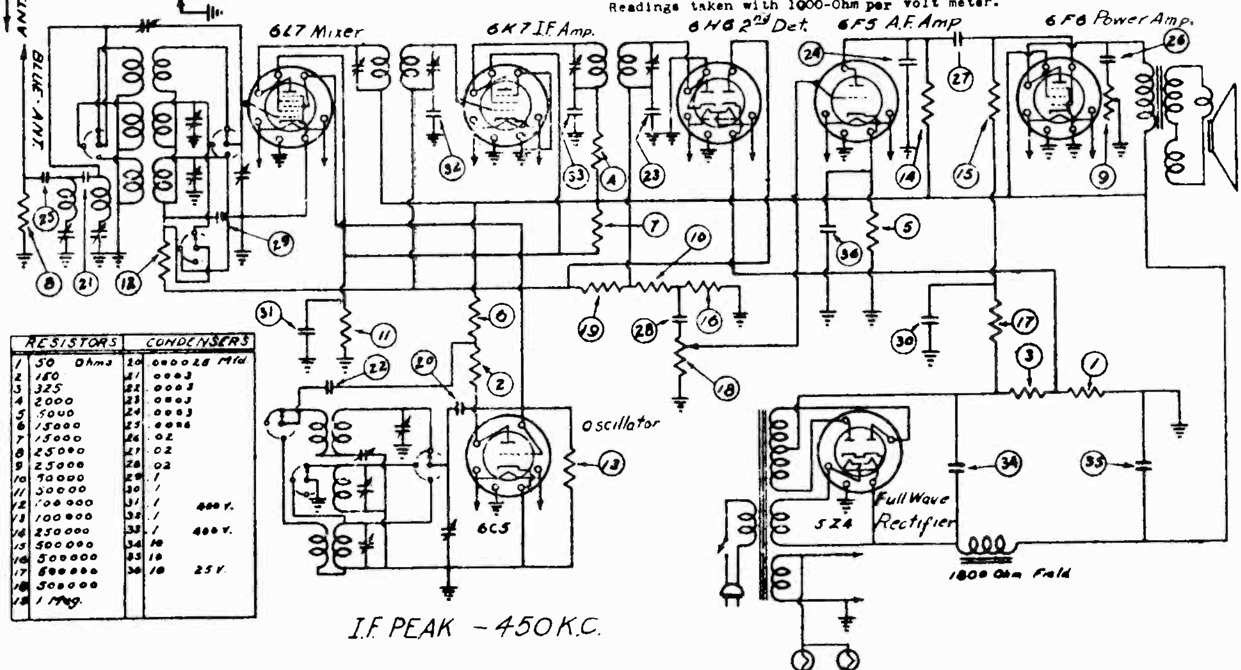
A. C. VOLTAGES:

Line		120 volts
Filaments	6L7, 6K7, 6C5, 6F6, 6H6, 6F5	6.3 "
Filament	5Z4	5 "

D. C. VOLTAGES: (No Signal)
From ground to:

5Z4	Rectifier filament	340 "
6F6	Plate	235 "
6F6	Screen grid	245 "
6F6	Grid bias supply	20 "
6F5	Plate	115 "
6F5	Cathode	2 "
6K7	I. F. Plate	235 "
6K7	I. F. Screen grid	100 "
6K7	I. F. Grid bias	3.5 "
6L7	Mixer Plate	245 "
6L7	Screen Grid	100 "
6L7	Grid bias	3.5 "
6C5	Oscillator Plate	160 "

Readings taken with 1000-Ohm per volt meter.



RESISTORS		CONDENSERS	
1	50 Ohms	20	.000025 Mfd
2	150	21	.0003
3	325	22	.0003
4	2000	23	.0003
5	5000	24	.0003
6	15000	25	.0006
7	15000	26	.02
8	25000	27	.02
9	25000	28	.02
10	50000	29	.1
11	50000	30	.1
12	100000	31	.1 400 V.
13	100000	32	.1
14	250000	33	.1 400 V.
15	500000	34	10
16	500000	35	10
17	600000	36	10 25 V.
18	500000		
19	1 Meg.		

I.F. PEAK - 450 K.C.

Beginning Serial No. 72409 MODEL 45

MODEL 60
Beginning Serial #72250

REMLER COMPANY, LTD.

MODEL 62
Beginning Serial #60600
Schematics, Voltage, Data

Model 60

The antenna and mixer coils are located adjacent to the variable condenser while the oscillator coil is located under the condenser. The short-wave coils are mounted near the broadcast oscillator coil. Trimmers for the oscillator and mixer circuits are on the variable condenser. The first I.F. transformer is in the shield at the rear of the chassis while the second I.F. transformer is below the chassis. The I.F. frequency is 450 K.C.

VOLTAGE READINGS FOR SERVICE WORK FOLLOW: *Model 60*

A.C. Voltages

Line	120
Filaments	6
Filament rectifier	4.5

D.C. Voltages (No signal)
From ground to:

80	Rectifier filament	200
42	Plate	200
42	screen grid	215
42	Grid bias supply	16.5
75	Plate	120
75	Cathode	1.5
6D6	Plate	215
6D6	Screen grid	100
6D6	Cathode	4.5
6A7	Plate	215
6A7	Screen grid	100
6A7	Cathode	4.5
6A7	Oscillator anode	100

Readings with 1000 Ohm per volt meter.

I.F. 450 KC

REMLER
MODEL 62
BEGINNING SR 60600

Model 62

VOLTAGE READINGS FOR SERVICE WORK FOLLOW:

A.C. VOLTAGES:

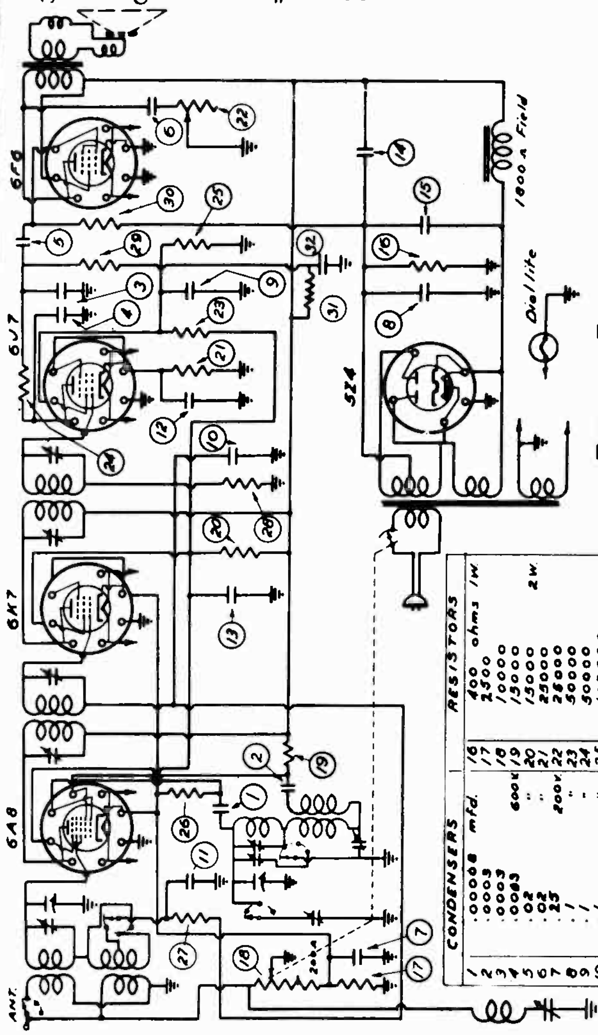
Line	120 volts
Filaments, 6A8, 6K7, 6J7 and 6F6	6.3 "
Filaments, 5Z4	4.5 "

D.C. VOLTAGES: (No signal; volume control full on)

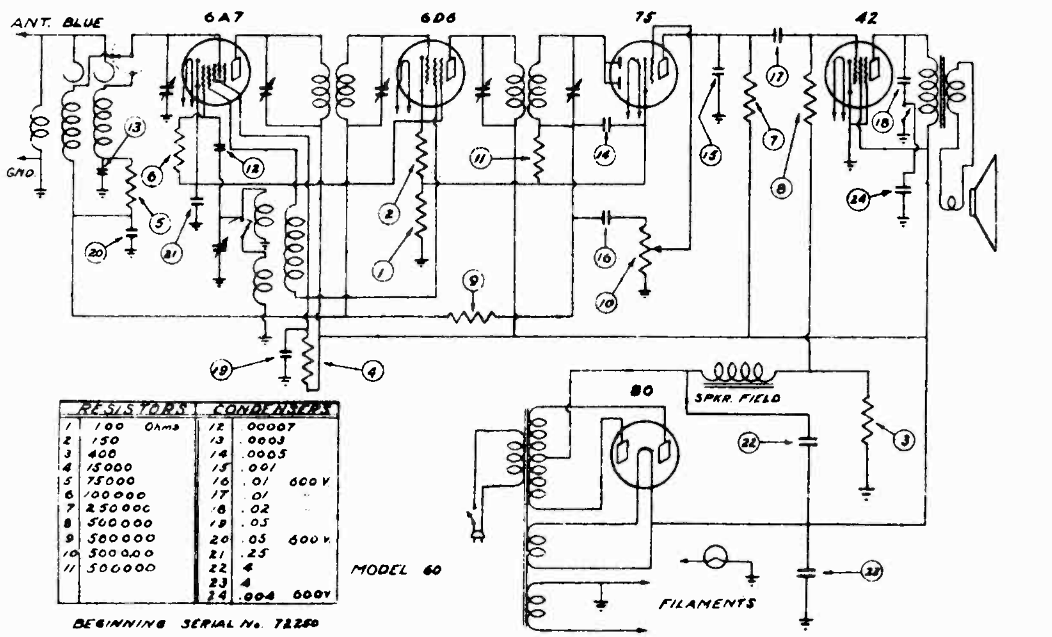
From ground to:

5Z4	Rectifier filament	350 volts
6F6	Plate	235 "
6F6	Screen grid	250 "
6F6	Grid bias supply	20 "
6J7	Plate	100 "
6J7	Screen grid	85 "
6J7	Cathode	5 "
6K7	Plate	250 "
6K7	Screen grid	125 "
6K7	Cathode	4.5 "
6A8	Amplifier plate	250 "
6A8	Oscillator plate	200 "
6A8	Screen grid	125 "
6A8	Cathode	4.5 "

Readings taken with 1000-Ohm per volt meter.



CONDENSERS	mfd.		RESISTORS	ohms	1W
1	.00008		16	400	
2	.0005		17	2500	
3	.0003		18	10000	
4	.00083	600V.	19	15000	
5	.02	"	20	15000	2W.
6	.02	"	21	25000	
7	.25	200V.	22	25000	
8	.1	"	23	50000	
9	.1	"	24	50000	
10	.1	"	25	100000	
11	.1	"	26	100000	
12	.25	"	27	250000	
13	2	300V.	28	250000	
14	10		29	250000	
15	10		30	500000	
32	.1	400V.	31	50000	



RESISTORS		CONDENSERS	
1	100 Ohms	12	.00007
2	150	13	.0003
3	400	14	.0005
4	15000	15	.001
5	75000	16	.01 600V
6	100000	17	.01
7	250000	18	.02
8	500000	19	.05
9	500000	20	.05 600V
10	500000	21	.25
11	500000	22	4
		23	4
		24	.004 600V

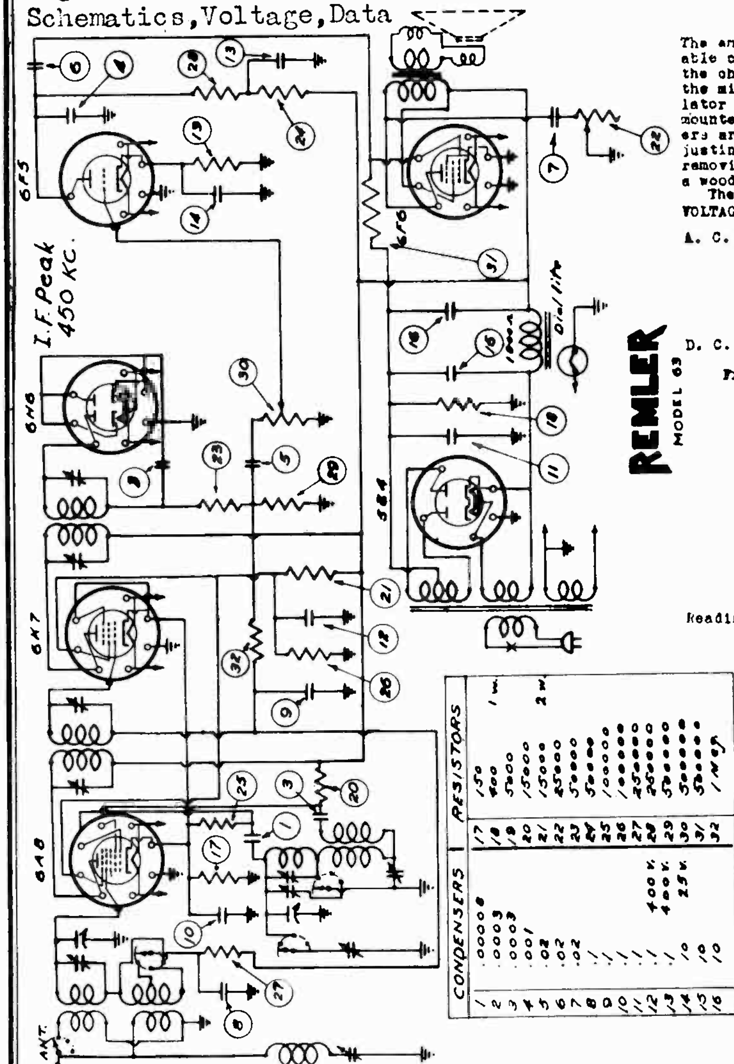
BEGINNING SERIAL No. 72250

The antenna and mixer coils are located adjacent to the variable condenser, while the oscillator coils are mounted below the chassis floor. The trimmer for the short-wave section of the mixer coil is located on top of the coil form. The oscillator series padding condenser for the broadcast range is mounted at the right end of the chassis. The I.F. transformers are located within the two shield cans; trimmers for adjusting these are located in the tops of the shield cans. In removing the chassis from the cabinet, pry off the knobs with a wooden screwdriver where set screw knobs are not used.

MODEL 64
Beginning Serial #73914
Schematics, Voltage, Data

REMLER COMPANY, LTD.

MODEL 63
Beginning Serial #69116



RESISTORS		CONDENSERS	
17	150	1	.00008
18	400 1 w.	2	.0003
19	5000	3	.0003
20	15000	4	.001
21	15000 2 w	5	.02
22	25000	6	.02
23	50000	7	.02
24	50000	8	.1
25	100000	9	.1
26	100000	10	.1
27	250000	11	.1
28	250000	12	.1 400v.
29	500000	13	.1 400v.
30	500000	14	10 25v.
31	500000	15	10
32	1 Meg	16	10

Model 64

The antenna and mixer coils are located adjacent to the variable condenser, while the oscillator coils are mounted below the chassis floor. The trimmer for the short-wave section of the mixer coil is located on top of the coil form. The oscillator series padding condenser for the broadcast range is mounted at the right end of the chassis. The I.F. transformers are located within the two shield cans; trimmers for adjusting these are located in the tops of the shield cans. In removing the chassis from the cabinet, pry off the knobs with a wooden screwdriver where set screw knobs are not used.

The I. F. frequency is 450 K. C.

VOLTAGE READINGS FOR SERVICE WORK FOLLOW: Model 64

A. C. VOLTAGES:

Line	120 volts
Filaments, 6A8, 6K7, 6H6, 6F5, 6F6	5.9 "
Filament, 5Z4	4.5 "

D. C. VOLTAGES: (No signal)

From ground to:

5Z4 Rectifier filament	345 volts
6F6 Plate	250 "
6F6 Screen Grid	240 "
6F6 Grid bias supply	19 "
6F5 Plate	115 "
6F5 Cathode	1.5 "
6K7 Plate	240 "
6K7 Screen Grid	120 "
6K7 Grid bias supply	3 "
6A8 Amplifier plate	240 "
6A8 Oscillator plate	130 "
6A8 Screen Grid	120 "
6A8 Grid bias supply	3 "

Readings taken with 1000-Ohm per volt meter.

VOLTAGE READINGS FOR SERVICE WORK FOLLOW: Model 63

A.C. VOLTAGES:

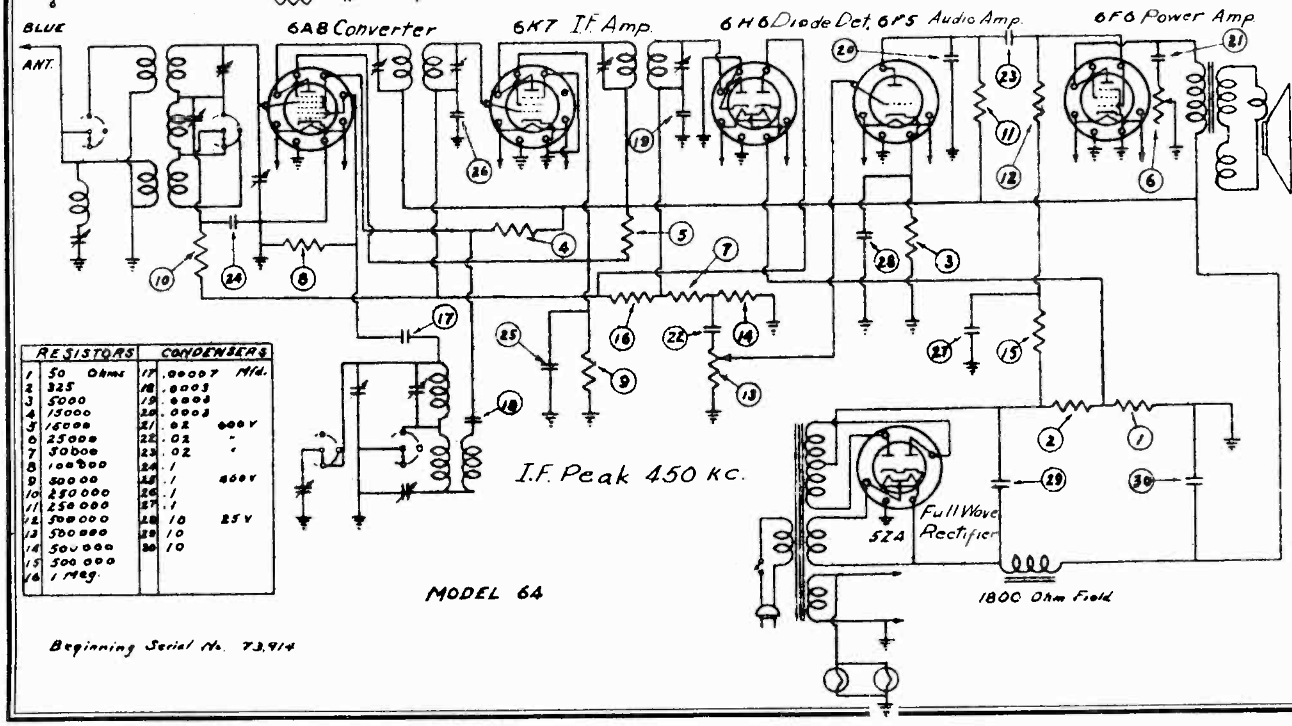
Line	120 volts
Filaments, 6A8, 6K7, 6H6, 6F5, 6F6	6.3 "
Filaments, 5Z4	4.5 "

D.C. VOLTAGES: (No signal; volume control full on)

From ground to:

5Z4 Rectifier filament	350 volts
6F6 Plate	235 "
6F6 Screen grid	250 "
6F6 Grid bias supply	18 "
6F5 Plate	100 "
6F5 Cathode	1.5 "
6K7 Plate	250
6K7 Screen grid	125 "
6K7 Cathode	4.5 "
6A8 Amplifier plate	250 "
6A8 Oscillator plate	200 "
6A8 Screen grid	125 "
6A8 Cathode	4.5 "

Readings taken with 1000-Ohm per volt meter.



RESISTORS		CONDENSERS	
1	50 Ohms	17	.00007 Mfd.
2	325	18	.0003
3	5000	19	.0003
4	15000	20	.0003
5	16000	21	.02 600v
6	25000	22	.02 "
7	50000	23	.02 "
8	100000	24	.1
9	50000	25	.1 600v
10	250000	26	.1
11	250000	27	.1
12	500000	28	10 25v
13	500000	29	10
14	500000	30	10
15	500 000		
16	1 Meg.		

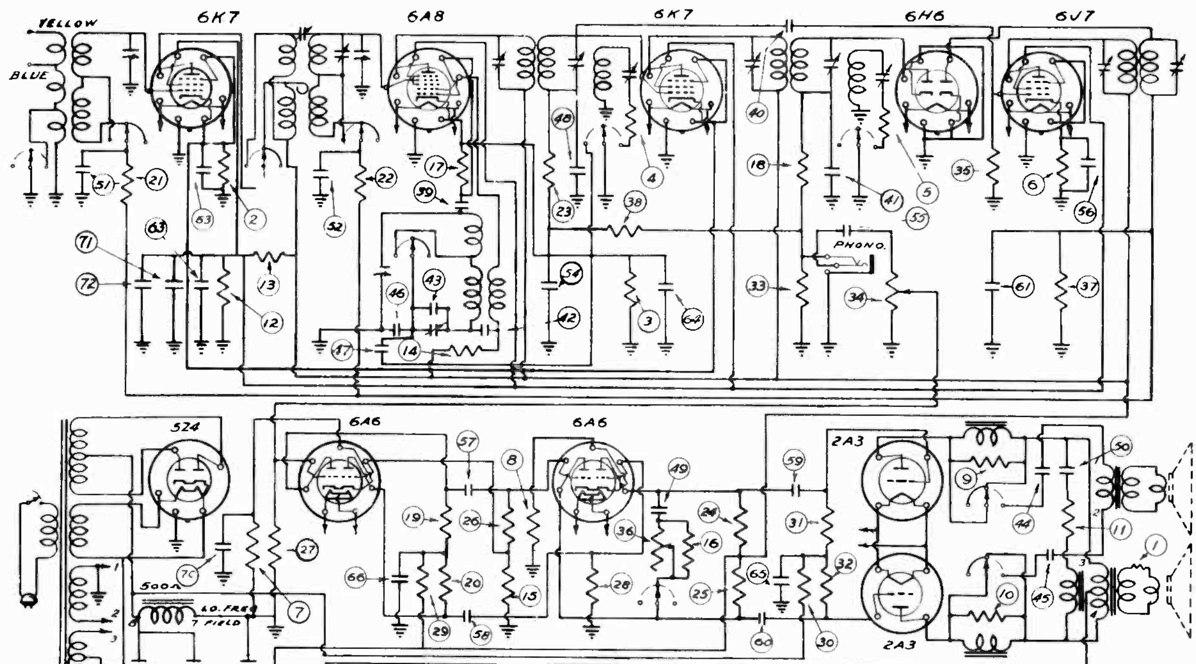
MODEL 64

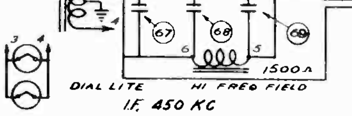
Beginning Serial No. 73,914

MODEL 88
Schematics, Data

REMLER COMPANY, LTD.

MODEL 91
Beginning Serial #72759





I.F. 450 KC

REMLER
MODEL 88

RESISTORS						CONDENSERS					
1	7 ohms	13	15.000	25	100.000	39	.00008	51	.1	63	.25
2	350	14	15.000	26	200.000	40	.00025	52	.1	64	.25
3	600	15	15.000	27	250.000	41	.0001	53	.1	65	.5
4	600	16	15.000	28	250,000	42	.0003	54	.1	66	4
5	600	17	100000	29	250.000	43	.00045	55	.1	67	8
6	1000	18	50.000	30	250,000	44	.002	56	.1	68	8
7	1000	19	50.000	31	250.000	45	.002	57	.1	69	8
8	1000	20	50.000	32	250,000	46	.002	58	.1	70	10
9	1000	21	100.000	33	500.000	47	.002	59	.1	71	4
10	1000	22	100.000	34	500.000	48	.02	60	.1	72	4
11	50000	23	100.000	35	500.000	49	.02	61	.1		
12	15000	24	100.000	36	500,000	50	.02	62	.1		
		38	1 Meg.	37	1 Meg.						

SPEAKER COLOR CODE	
1	white
2	white
3	blue
4	blue
5	red
6	green
7	black
8	yellow

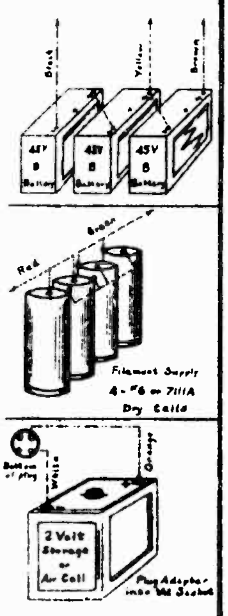
The location of the antenna coil is near the variable condenser. The oscillator coil is mounted under the chassis with the short wave coil adjacent. Trimmers for the broadcast band are located on the side of the variable condenser. The I. F. transformers are within the square shields on the top of the chassis with trimmers adjustable thru holes in the tops of the shields. The I. F. frequency is 450 K. C.

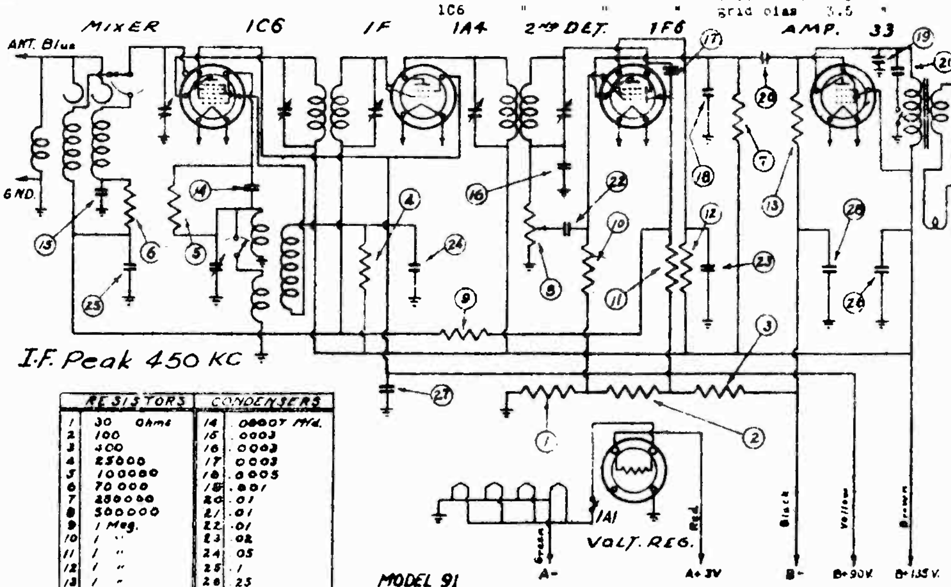
VOLTAGE READINGS FOR SERVICE WORK:

With fresh batteries, no signal.

From chassis to:-

33	power amplifier	tube	plate	118	volts
33	" "	"	screen	122	"
33	" "	"	grid bias	13	"
1F6	duplex diode	"	plate	45	"
1F6	" "	"	screen	20	"
1F6	" "	"	grid bias	1	"
1A4	I.F. amplifier	"	plate	122	"
1A4	" "	"	screen	90	"
1A4	" "	"	grid bias	3.5	"
1C6	pentagrid converter	"	plate	122	"
1C6	" "	"	screen	90	"
1C6	" "	"	osc. anode	75	"
1C6	" "	"	grid bias	3.5	"





I.F. Peak 450 KC

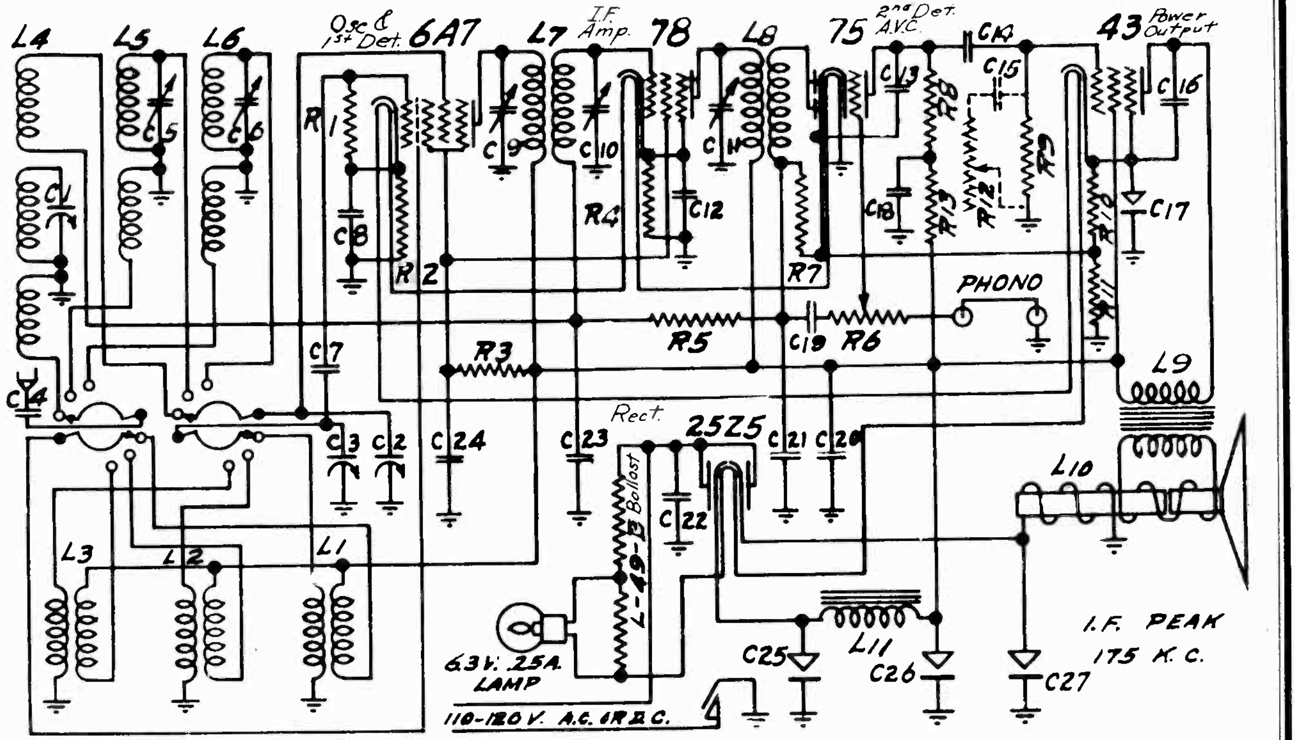
MODEL 91

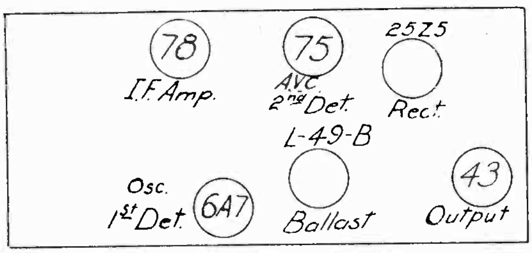
RESISTORS		CONDENSERS	
1	30 Ohms	14	.00007 Mfd.
2	100	15	.0003
3	400	16	.0003
4	25000	17	.0003
5	100000	18	.0005
6	70 000	19	.001
7	250000	20	.01
8	500000	21	.01
9	1 Meg.	22	.01
10	1 "	23	.02
11	1 "	24	.05
12	1 "	25	.1
13	1 "	26	.25
		27	.25
		28	10

Beginning Serial No 72738

REPUBLIC INDUSTRIES

MODEL 42
Schematic, Voltage
Socket, Parts List





Front

TUBE VOLTAGES

Tube	Pl. to Gnd.	Scr. to Gnd.	K to Gnd.	2 Pl to Gnd.	2 G to Gnd.
6A7	105	40	1.0	105	.6
78	105	40	1.4		
75	40	--	.6		
43	98	105	15		
25Z5	Line Drop				
L-49B	49				

43 G. to Gnd. 0
Spkr. Field Voltage 120
B+ Voltage 105

CODE	PART NO.	CONDENSERS
C1	77-833	366 MMFD. Preselector Section of 3 Gang
C2	77-833	366 MMFD. Preselector Section of 3 Gang
C3	77-833	328 MMFD. Oscillator Section of 3 Gang
C4	75-2003	.01 Mfd. 400 V. Paper Antenna Series Cond.
C5	78-2010	3-30 MMFD. Police Band Preselector Trimmer
C6	78-2010	3-30 MMFD. Foreign Band Preselector Trimmer
C7	76-2002	.00005 Mfd. Mica Oscillator Grid Condenser
C8	75-2005	.1 Mfd. 200 V. Paper Oscillator Cathode Cond.
C9	78-2008	First I. F. Primary Trimmer
C10	78-2011	First I. F. Secondary Trimmer
C11	78-2009	Second I. F. Primary Trimmer
C12	75-2005	.1 Mfd. 200 V. Paper 78 Cathode By-Pass Cond.
C13	76-255	.001 Mfd. Mica 75 Plate Filter Condenser
C14	75-2003	.01 Mfd. 400 V. Paper Audio Feed Cond.
C15	75-2003	.01 Mfd. 400 V. Paper Tone Control Cond. on A-17
C16	75-2002	.004 Mfd. 600 V. Paper Output Plate Filter Cond.
C17	18-928	25 Mfd. 25 V. Elect. Output Cathode By-Pass Cond.
C18	75-2005	.1 Mfd. 200 V. Paper 75 Plate Hum Filter Cond.
C19	75-2003	.01 Mfd. 400 V. Paper Audio Feed Condenser
C20	78-2011	.5 Mfd. 200 V. Paper B Supply By-Pass Cond.
C21	76-307	.0005 Mfd. Mica Diode Filter Condenser
C22	75-2005	.1 Mfd. 200 V. Paper Line By-Pass Condenser
C23	75-2005	.1 Mfd. 200 V. Paper A.V.C. Network By-Pass Cond.
C24	75-2005	.1 Mfd. 200 V. Paper Screen By-Pass Condenser
C25	18-2003	11 Mfd. 150 W.V. Dry Electrolytic Filter Cond.
C26	18-2003	4 Mfd. 150 W.V. Dry Electrolytic Filter Cond.
C27	18-2003	4 Mfd. 150 W.V. Dry Electrolytic Filter Cond.

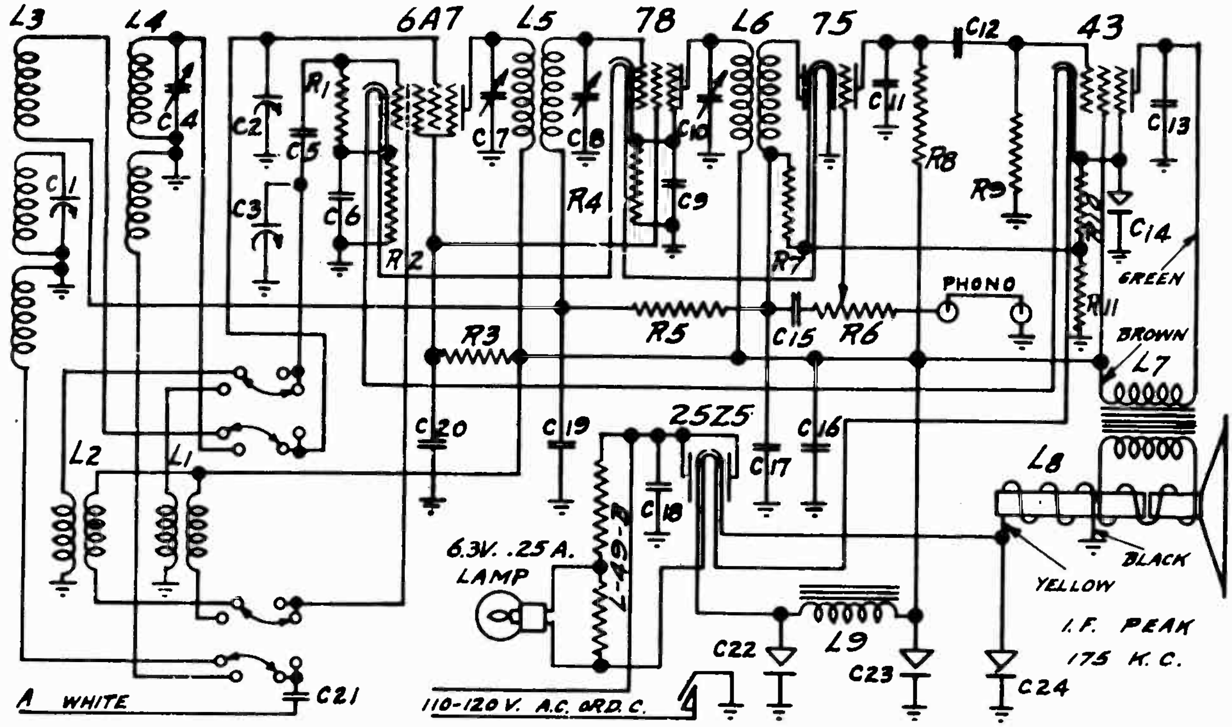
CODE	PART NO.	RESISTORS
R1	53-898	50,000 Ohm Oscillator Grid Resistor
R2	53-1062	250 Ohm Oscillator Cathode Resistor
R3	53-1042	25,000 Ohm 6A7 & 78 Screen Resistor
R4	53-1063	500 Ohm 78 Cathode Resistor
R5	53-926	1 Meg Ohm A.V.C. Network Resistor
R6	19-1291	500,000 Ohm Volume Control & Switch
R7	53-925	500,000 Ohm Diode Resistor
R8	53-924	250,000 Ohm 75 Plate Resistor
R9	53-925	500,000 Ohm 43 Grid Resistor
R10	53-1062	500 Ohm 43 Cathode Resistor
R11	53-1122	40 Ohm 75 Cathode Resistor
R12	19-1317	250,000 Ohm Tone Control on Model A-17
R13	53-898	50,000 Ohm 75 Plate Hum Resistor

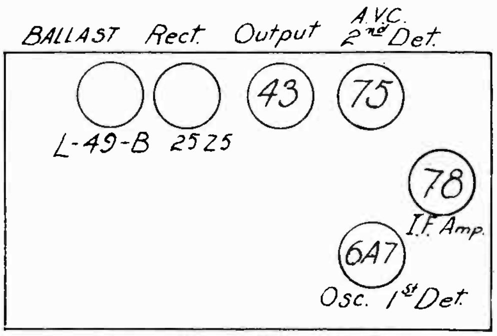
CODE	PART NO.	INDUCTANCES
L1	17-2106	Broadcast Oscillator Coil Assembly
L2	17-2105	Police Band Oscillator Coil Assembly
L3	17-2095	Foreign Band Oscillator Coil Assembly
L4	17-2100	Broadcast Preselector Coil Assembly
L5	17-2104	Police Band Preselector Coil Assembly
L6	17-2096	Foreign Band Preselector Coil Assembly
L7	68-2012	First I. F. Transformer Assembly
L8	17-2102	Second I. F. Transformer Assembly
L9	64-1260	6½" Speaker 43 Output Trans. on L10
L10	64-1260	6½" Speaker 3000 Ohm Field
L11	14-940	20 Henry Filter Choke

MODEL 51
Schematic, Voltage

REPUBLIC INDUSTRIES

Socket, Parts List





TUBE VOLTAGES

Tube	Pl. to Gnd.	Scr. to Gnd.	K to Gnd.	2 Pl to Gnd.	2 G to Gnd.
6A7	105	50	1.3	105	-4.4
78	105	50	2		
75	45	--	1.2		
43	98	105	15		
25Z5	Line Drop				
L-49B	49				

43 Gr. to Gnd 0
Spkr. Field Voltage 110
B+ Voltage 105

CONDENSERS

C1	77-833	366 MMFD. Preselector Section of 3 Gang
C2	77-833	366 MMFD. Preselector Section of 3 Gang
C3	77-833	328 MMFD. Oscillator Section of 3 Gang
C4	78-2010	3-30 MMFD. Foreign Band Preselector Trimmer Cond.
C5	76-2002	.00005 Mfd. Mica Oscillator Grid Condenser
C6	75-2005	.1 Mfd. 200 Volt Paper 6A7 Cathode By-Pass Cond.
C7	78-2008	First I.F. Primary Trimmer Condenser
C8	78-2011	First I.F. Secondary Trimmer Condenser
C9	75-2005	.1 Mfd. 200 Volt Paper 78 Cathode By-Pass Cond.
C10	78-2009	Second I.F. Trimmer Condenser
C11	76-285	.001 Mfd. Mica 75 Plate Filter Condenser
C12	75-2003	.01 Mfd. 400 Volt Paper Audio Feed Condenser
C13	75-2002	.004 Mfd. 600 Volt Paper 43 Plate Filter Condenser
C14	18-928	25 Mfd. 25 Volt Dry Electrolytic Condenser
C15	75-2003	.01 Mfd. 400 Volt Paper Audio Feed Condenser
C16	75-2011	.5 Mfd. 200 Volt Paper B Supply By-Pass Condenser
C17	76-307	.0005 Mfd. Mica Diode Filter Condenser
C18	75-2006	.1 Mfd. 200 Volt Paper Line By-Pass Condenser
C19	75-2005	.1 Mfd. 200 Volt Paper A.V.C. Network By-Pass Cond.
C20	75-2006	.1 Mfd. 200 Volt Paper 6A7 & 78 Screen By-Pass Cond.
C21	75-2003	.01 Mfd. 400 Volt Paper Antenna Series Condenser
C22	18-2003	11 Mfd. 150 W.V. Dry Electrolytic Condenser
C23	18-2003	4 Mfd. 150 W.V. Dry Electrolytic Condenser
C24	18-2003	4 Mfd. 150 W.V. Dry Electrolytic Condenser

INDUCTANCES

L1	17-2077	Foreign Band Oscillator Coil Assembly
L2	17-2079	Broadcast Oscillator Coil Assembly
L3	17-2080	Broadcast Preselector Coil Assembly
L4	17-2078	Foreign Band Preselector Coil Assembly
L5	68-2012	First I.F. Transformer Assembly
L6	17-2064	Second I.F. Transformer Assembly
L7	64-2006	5" Speaker 43 Output Transformer on L8
L8	64-2006	5" Speaker 3000 Ohm Field
L9	14-940	20 Henry Filter Choke

RESISTORS

CODE	PART NO.	
R1	53-898	50,000 Ohm Oscillator Grid Resistor
R2	53-1062	250 Ohm Oscillator Cathode Resistor
R3	53-1042	25,000 Ohm 6A7 & 78 Screen Resistor
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R11	53-1122	40 Ohm 75 Cathode Resistor