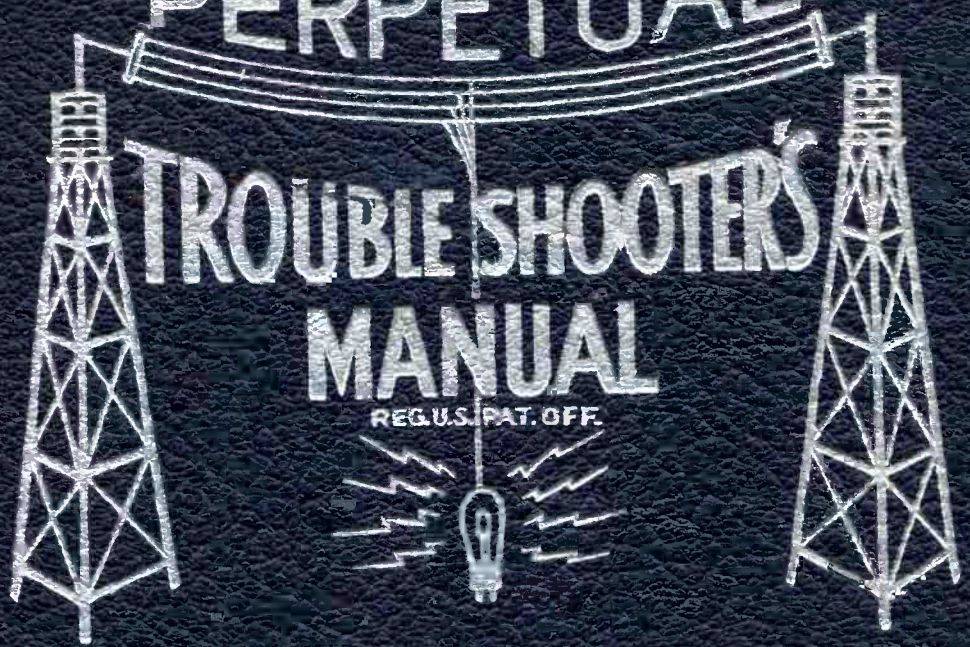
VOLUME XII

PERPETUAL TROUBLE SHOOTER'S MANUAL

REG. U.S. PAT. OFF.



JOHN F. RIDER

Models B2RC, B3RC and B4RC

IMPORTANT

All service adjustments on Motorola Record Changers should be made with the instrument in a normal operating position.

Therefore, the instrument should be supported in such fashion that parts underneath are accessible. A jig consisting of four corner support posts would be helpful. A mirror would also permit the service man to make observations and adjustments without getting into awkward positions.

CHECK THE RECORDS FIRST

Before attempting to service or adjust this Record Changer, check the records first to make sure they are not causing the trouble. The instrument will handle most of the 10 or 12 inch records now available on the market, but it is not guaranteed to handle all of them. Records must be in good mechanical condition, and should not be chipped, particularly around the center hole. Do not try to play automatically, records that are too thick, too thin, or that are oversized or undersized, as regards diameter of record or center hole. Do not mix 10 and 12 inch records on the Changer.

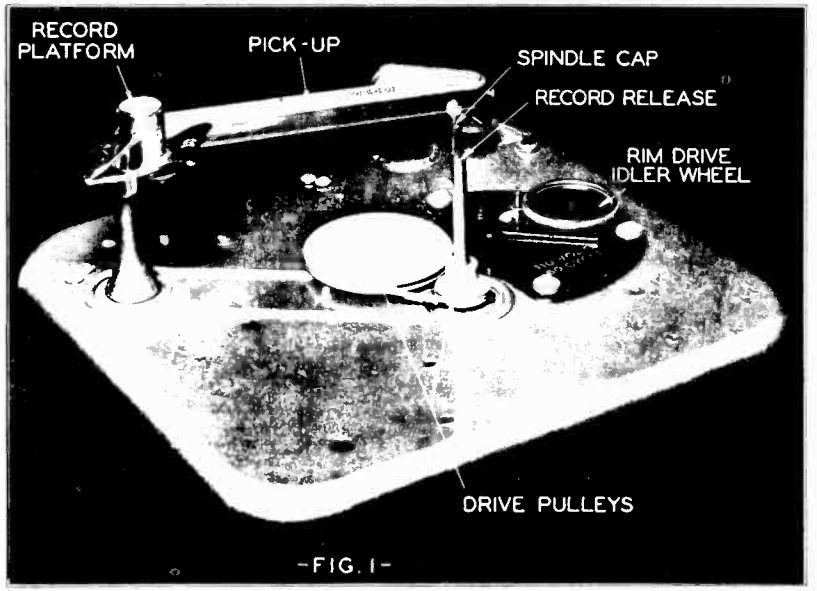
Old records made before the days of automatic record changers may not change automatically, due to the differences in thickness, or to lack of a proper eccentric groove at the finish. Most of the old records, however, may be played one at a time.

THEORY OF OPERATION

As in most modern phonograph turntables, power is derived from an electric motor. This power is transmitted to the turn-table through a geared down rim drive of the friction type.

The turntable is keyed to a small drive pulley, which in turn drives a large (3 inch) pulley, through a spring belt, both of these units being located on top of the base plate. (See Fig. 1). The 3 inch pulley transmits power by direct drive to another small pulley located under the mounting plate. This second small pulley in turn drives the large (4 inch) main drive wheel, also located under the mounting plate.

When the turntable revolves, all of these pulleys and wheels mentioned above, also revolve-regardless of whether or not the Changer is going through a cycle of changing a record. By means of this series of pulleys, a high ratio is obtained between the motor and the changing mechanism, which assures ample power.



-FIG. 1-

SETTING FOR 10 OR 12 INCH RECORDS

The record support platform is adjustable for either 10 or 12 inch records, depending upon which "lip" is turned toward the center of the turntable. The platform may be swung in an arc of 180 degrees, so that either the 10 or 12 inch lip may point toward the spindle.

Underneath the mounting plate, and mounted rigidly to the record platform support shaft is an eccentric mechanism which moves the 10" - 12" selector lever when the platform is moved. The position of this selector lever determines the point where the needle will come down on the record at the end of a changing cycle. In other words, it adjusts the pick-up for playing automatically either 10 or 12 inch records, depending upon the position to which the record support platform is turned. The eccentric cam and the selector lever are shown in Figs. 4 and 6.

START-REJECT SWITCH

The push switch mounted near one corner of the mounting plate is connected in parallel with the automatic change switch previously discussed. When this switch is closed, it energizes the electro magnet exactly in the same fashion as does the automatic change switch, thereby making it possible to start the changing cycle at any time, regardless of whether or not the record has been completely played. By this means a record can be "rejected". The wiring diagram showing switches and magnet can be seen in Fig. 2.

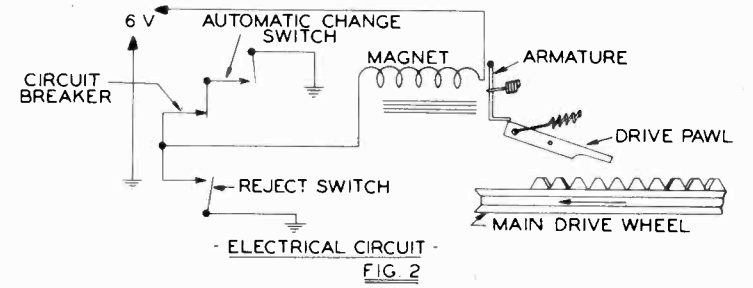
TO ADJUST AUTOMATIC CHANGE SWITCH

The Automatic Switch (See Fig. 7) starts the changing cycle after a record has been completely played. The switch is actuated by the oscillating of the tone arm in the eccentric groove of the record, through the spring clip which grips the movable switch blade.

If the switch fails to operate positively, it may be readily adjusted by means of the adjustment screw (F). (See Fig. 7).

To make the adjustment, place a record on the turntable, start it revolving, and move the pick-up over to the end of the record. Adjust screw (F) until switch closes the magnet circuit and starts the change cycle. Check points visually to make sure they do not remain closed after cycle is completed.

If the Changer immediately starts another cycle, it is an indication that the points are remaining closed or that the clutch release spring (G) (Fig.7) does not have enough tension. This tension may be increased by taking it up another notch.



- ELECTRICAL CIRCUIT -
FIG. 2

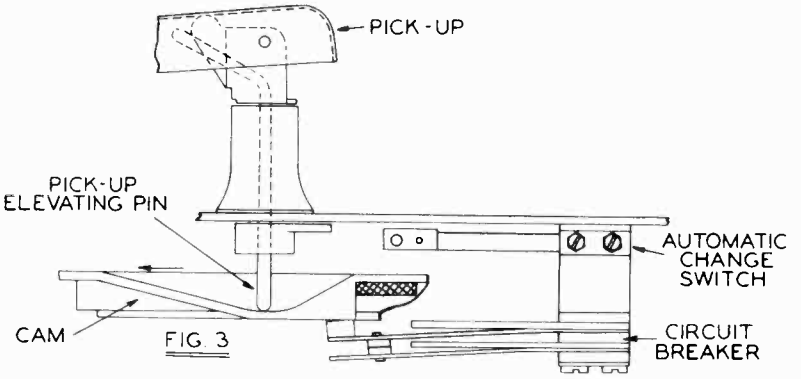


FIG. 3

CHANGING CYCLE

By referring to the various photographs and figures which will be found in this Service Manual, you can readily follow through the changing cycle from the continuity given hereafter.

1. The needle in the pick-up finishes a record and enters the eccentric groove.

2. As the pick-up has slowly approached the eccentric groove, a phosphor bronze spring clip has gripped a fin of the automatic change switch.

3. When the needle enters the eccentric groove on the record, the pick-up oscillates slightly, which in turn causes the automatic change switch to make contact.

4. The first momentary contact of the automatic change switch is all that is necessary to start the changing cycle. When the switch closes, a small electro magnet is energized. The electro magnet pulls an armature back out of the way, permitting a drive pawl which is mounted on the cam wheel to fall down and engage in one of the notches which are provided on the upper surface of the main drive wheel. (See Fig. 2.)

5. Since the main drive wheel is already revolving, the engagement of the pawl now causes the cam wheel to revolve with it.

6. When the cam wheel starts to revolve, it causes several things to occur. In the first few degrees of revolution, it opens a circuit breaker switch (Fig. 3) which automatically opens the magnet circuit, thereby de-energizing it, to prevent "chattering".

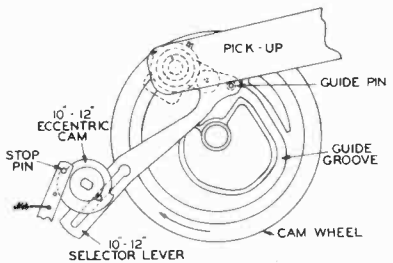


FIG. 4

7. The next few degrees of rotation causes the pick-up elevating pin to ride up on an inclined section of the cam, thereby elevating the pick-up and lifting the needle from the record which has just been played. (See Fig. 3).

8. A few more degrees of revolution cause the pick-up guide groove on top of the cam wheel. This part of the mechanism is not visible, since the cam wheel is mounted too close to the mounting plate, but Fig. 4 shows a drawing of the upper surface of the cam wheel. As the wheel revolves with the pin in the groove, it causes the pick-up to swing out beyond the edge of the record so it will be out of the way when the next record falls on the turntable.

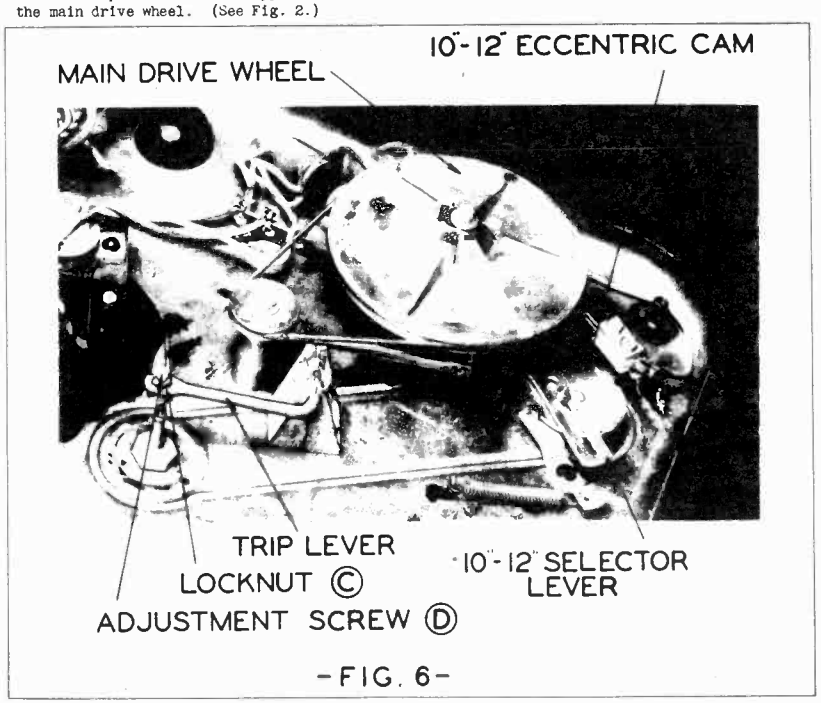
9. The cam wheel continues its revolution, and at another point on its circumference a roller on the end of the trip-lever rides up an inclined section on the cam. This trip-lever is the copper-plated rod which is hinged approximately in the center by running through a die cast fulcrum block. As the roller on one end of the trip-lever rolls up the incline on the cam, the other end of the trip-lever bears against the push rod which operates the record release, which is located near the top of the spindle, causing it to push the next record off its support, thereby dropping it on the turntable. (See Fig. 5).

10. The cam continues to revolve, the groove in the top bringing the pick-up back over the edge of the record to the proper position where the needle will fall near the first groove when it comes down.

11. A few more degrees of revolution, and the pick-up elevating pin rides down another incline, permitting the needle to settle gently on the first groove of the record. (Fig. 3).

12. At this point, the cam has completed one full revolution of 360 degrees. At the same time the needle touches the record, the drive pawl hits the magnet armature, which forces it up, thereby disengaging it from the notch in the drive wheel. The cam wheel therefore stops, the turntable continues to revolve, and the record is played.

13. During the last few degrees of revolution, the circuit breaker switch has again been closed, as its fibre stud rides up an incline on the lower surface of the cam. (Fig. 3). This switch must be closed at all times except when the instrument is going through a changing cycle, otherwise, it would be impossible to start a new changing cycle automatically.



-FIG. 6-

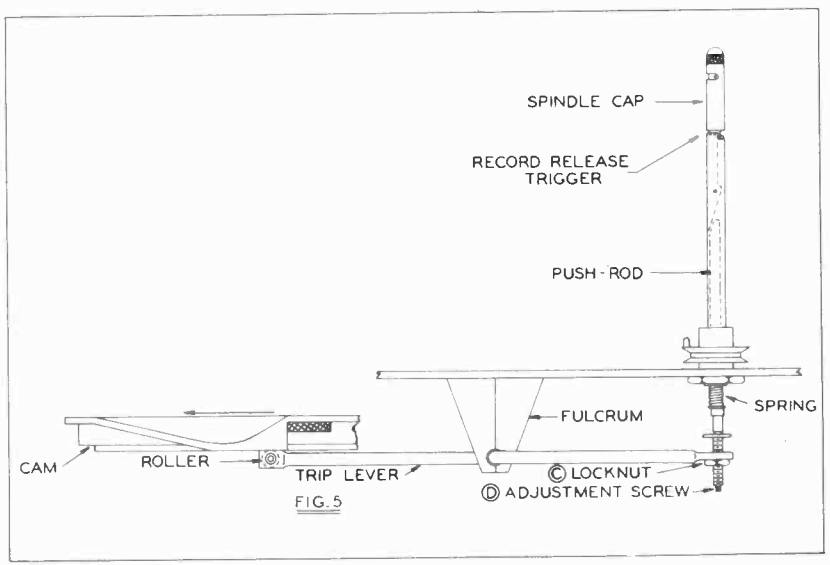
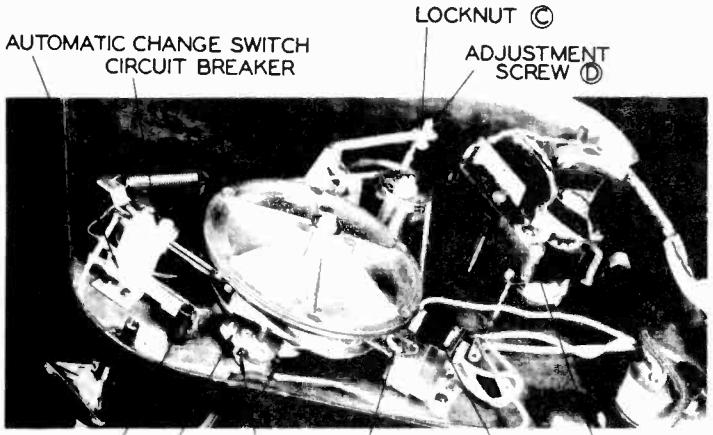


FIG. 5



-FIG. 7-

TO ADJUST RECORD RELEASE

1. Place a stack of 10 inch records on the changer, after turning the record support platform to the "10 inch" position.
2. Start the turntable revolving.
3. Press the "Start-Reject" button.
4. If the first record does not drop to the turntable, double check the record to make sure that it is not too thick, or that the diameter of the center hole is not undersized, causing it to bind.
5. If the record proves to be normal, and is not causing the failure, loosen lock nut (C) which locks adjustment screw (D), as shown in Figs. 5, 6, or 7.
6. With a slab-head wrench, turn screw (D) a fraction of a turn clockwise, and press the "Start-Reject" button again, checking to see if record is released.
7. If the record fails to drop, tighten screw (D) a trifle at a time, testing after each adjustment, until setting is reached, which releases record.
8. Tighten lock nut (C), after which a few more records should be changed, to make sure that this did not alter adjustment of screw (D).

NOTE: If the Changer stalls during the adjustment procedure, it may be an indication that screw (D) is too tight, in which case it should be turned back (counter-clockwise).

TO ADJUST PICK-UP POSITION

This adjustment is made to cause the needle to drop in the first groove of the record, as the Changer completes a changing cycle.

1. Turn the record support to the 10 inch position. (See Fig. 1).
2. Place a standard 10 inch record on the turntable and start it revolving.
3. Press the "Start-Reject" button. The Changer will now start a changing cycle.
4. Do not let the Changer complete the cycle, but stop it at the point where the pick-up starts to drop downward towards the outer rim of the record. If the cycle is stopped at the right point, the pick-up will still be "in cycle" and will not be free to swing back and forth. Check this gently. Do not exert too much sidewise pressure on the pick-up.
5. Now loosen the two hex-head set screws (A) in the bell crank casting (B), which you can see in Fig. 7.
6. With the set screws loose, the pick-up arm can now be moved back and forth. Move it to the point where the needle rests directly over the first groove in the record.

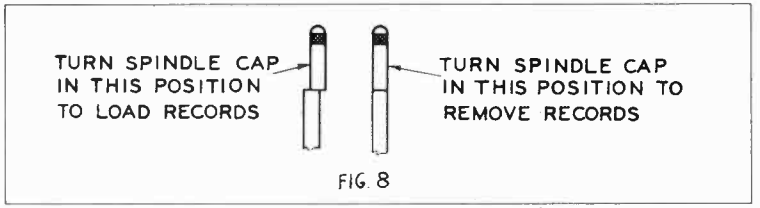


FIG. 8

(The correct dimension for proper adjustment is 4-25/32" from the needle point to the center of the spindle.)

7. Tighten one set screw securely so that the shaft does not move while checking proper position of the pick up arm. After proper position has been located tighten both set screws securely.
8. Now place a 12 inch record on the turntable; turn the record support to the 12 inch position.
9. Press the "Start-Reject" button and let the Changer go through another cycle, watching carefully to make sure the needle comes down on the record at the proper point. If necessary, make minor readjustment.

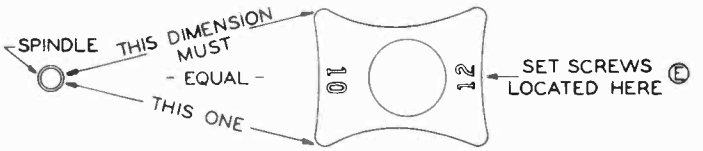
TO LINE UP RECORD PLATFORM

It is important that all points on the "lip" of the record support platform be equidistant from the center point of the spindle. This will assure that all points of the record will leave the platform at the same time. If the record support is too far out of alignment, the record would actually hang on the point nearest the spindle and fail to drop properly.

1. To check this alignment, turn the spindle-cap so it is in alignment with the rest of the spindle, which is the correct position for removing records. (See Fig. 8.)
2. Turn the record support platform to the "10 inch record" position, making sure it is turned all the way to the stop.
3. Slip a standard 10 inch record over the spindle and check to make sure it clears the lip of the platform at all points. (See Fig. 9.)
4. If one point on the lip extends farther than the other, the position of the record support may be adjusted after loosening the two Bristo set screws (E), located directly under the numeral "12" on the record support. (See Fig. 9).

CAUTION: Make sure the eccentric selector cam, which is located under the base, is turned all the way to its stop. (See Fig. 4.)

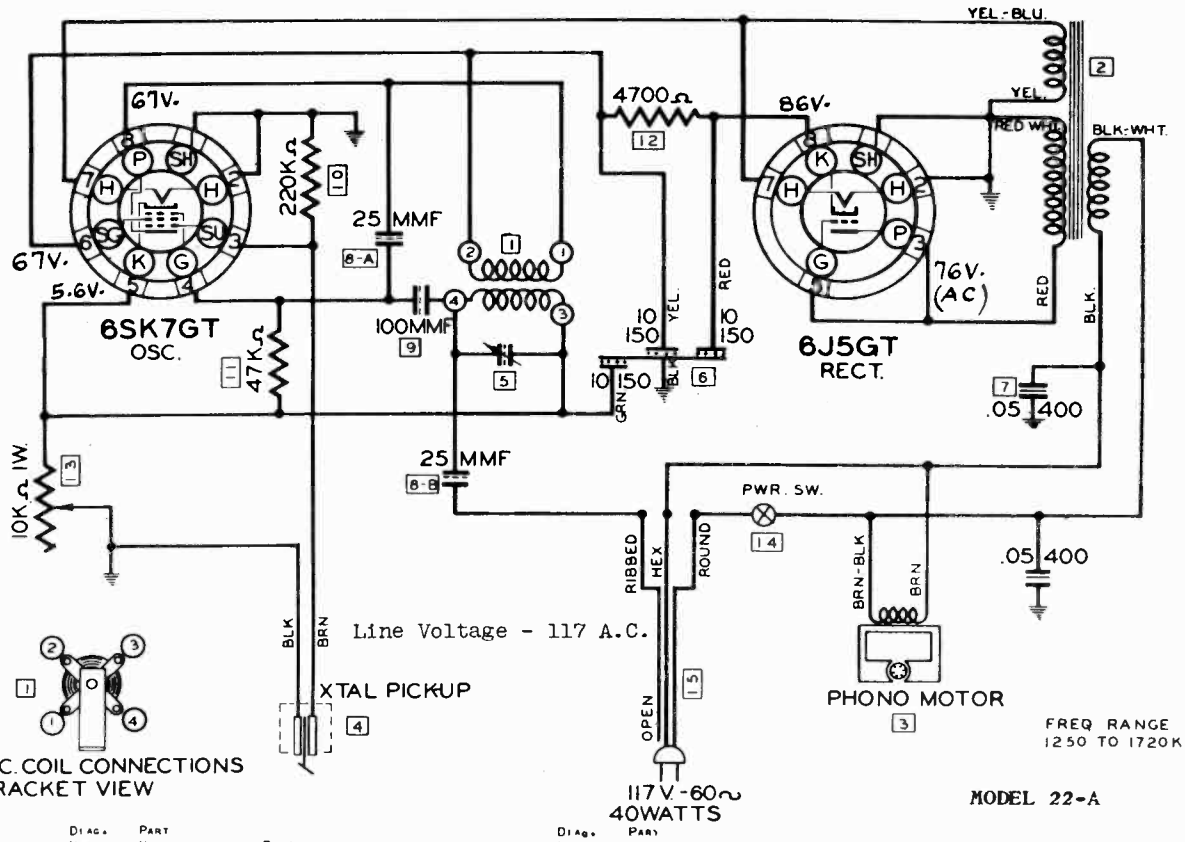
TEST: After tightening the set screws, test the adjustment by running a 10 inch record through a complete cycle and check the point where the needle falls. If the needle misses the record by one inch, the record platform is 180 degrees out of line with the eccentric cam, and should be turned one-half turn without turning the cam.



- RECORD SUPPORT -
FIG. 9

MODELS 22A,
23-RC, 23-RCW

GALVIN MFG. CO.

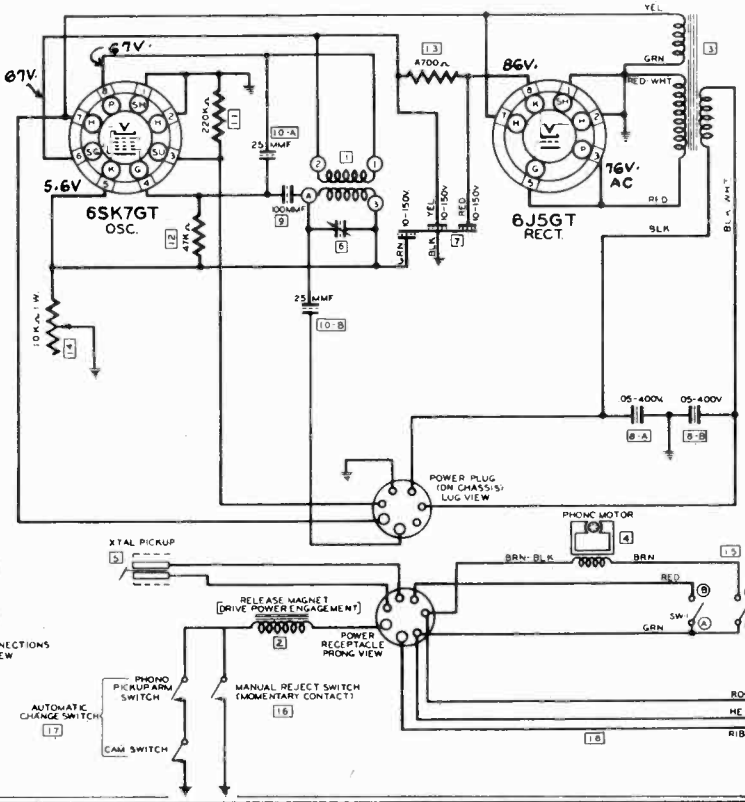


MODEL 22-A

Diag. No.	Part No.	Description
1	24A20892	Osc. Coil (Ceramic) Org-Red
2	25A17449	Power Transformer
3	59X17433	Phono Motor (Complete Less Turn Table)
4	59R20888	Phono Pick-up
5	20A11502	Trimmer & Bracket
6	23A20887	Elect. Cond. & Strap (10-10-10/150V.)
7	859816	Tubular Condenser (.05-400V.)
8-A	21B6535	Molded Mica Condenser (25 mmf) 20%
8-B	21B6535	Molded Mica Condenser (25 mmf) 20%
9	21B6511	Molded Mica Condenser (100 mmf) 20%
10	686003	Carbon Resistor (220,000-1/3-20)N.I.
11	686020	Carbon Resistor (47,000-1/3-20)N.I.
12	686101	Carbon Resistor (4700-1/3-20)N.I.
13	18A20889	Variable Bias Control
14	40X11539	Slider Switch (SPST)
15	30K20095	Line Cord & Plug (3 Conductor)

FOR AUTOMATIC
RECORD-CHANGER

SEE MODEL B2RC



Diag. No.	Part No.	Description
1	24A20892	Osc. Coil Ceramic (Org-Red Dot.)
2	19Z1560	Release Magnet Assembly
3	25B21402	Power Transformer
4	59R21404	Phono Motor & Mtg. Plate
5	59R21503	Phono Pick-up Arm (Less Stylus)
6	20A11502	Trimmer & Bracket (".01 mmf")
7	23A20887	Elect. Cond. & Strap (10-10-10/150V.)
8-A	859816	Tubular Condenser (.05-400V.)
8-B	859816	Tubular Condenser (.05-400V.)
9	21B6511	Molded Mica Condenser (100 mmf) 20%
10-A	21B6535	Molded Mica Condenser (25 mmf) 20%
10-B	21B6535	Molded Mica Condenser (25 mmf) 20%
11	686003	Carbon Resistor (220,000-1/3-20)N.I.
12	686020	Carbon Resistor (47,000-1/3-20)N.I.
13	686101	Carbon Resistor (4700-1/3-20)N.I.
14	18A20889	Variable Bias Control
15	40A21402	Power Switch
16	40A21326	Push Switch (Momentary Contact)
17	19Z1563	Record Changer Switch Assembly
18	30K21528	Line Cord & Plug (3 Conductor)

MODELS 23-RC & 23-RCW

*1 POS	OFF	SW 1&2 OPEN
*2 POS	TUBES	SW 1 CLOSED SW 2 OPEN
*3 POS	MOTOR	SW 1&2 CLOSED

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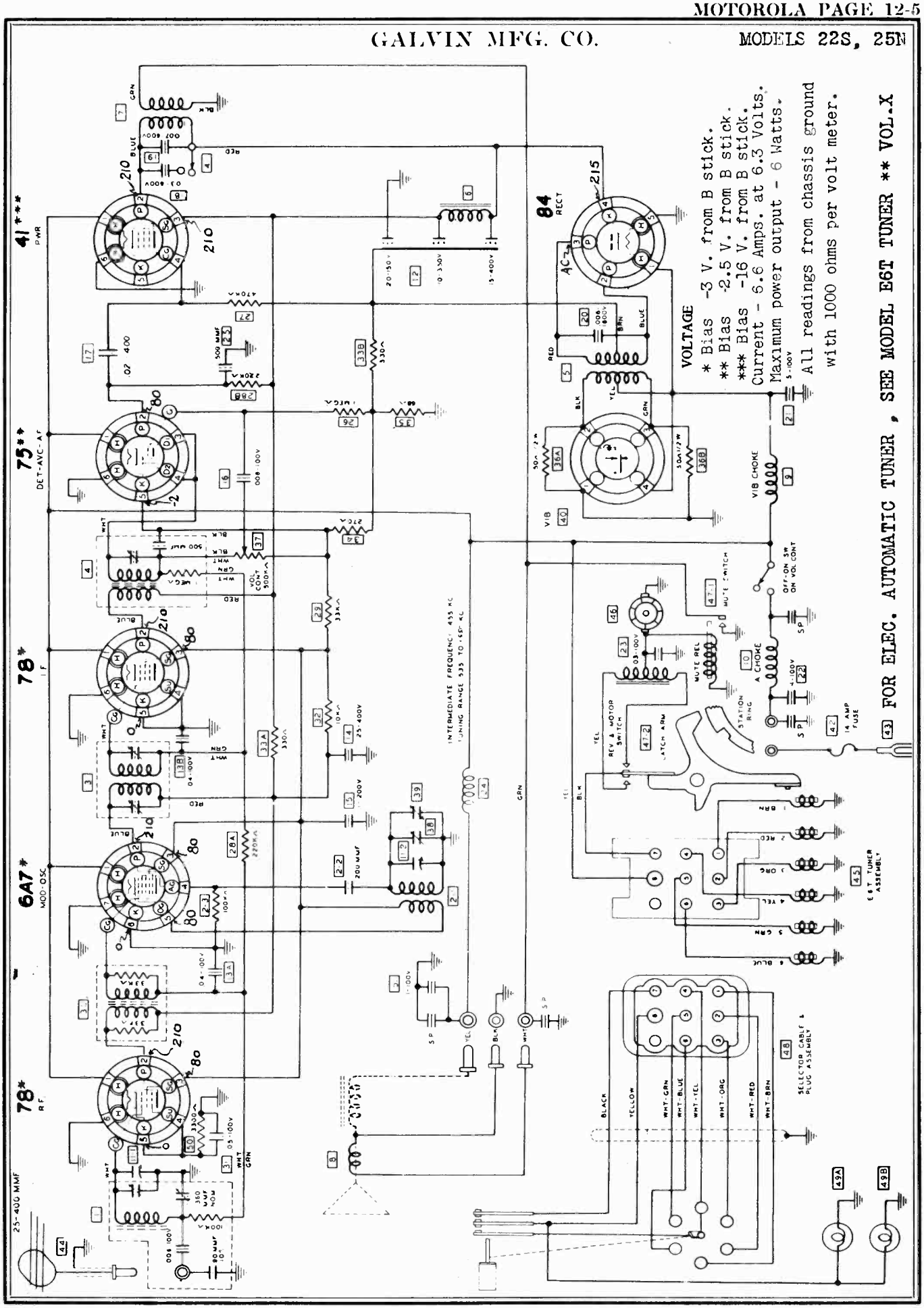
MODELS 22S, 25N



Model 550

ALIGNMENT PROCEDURE

Place the chassis on the service bench with the speaker and battery connected to it.
Turn the volume control to maximum position and leave it there throughout the alignment. reducing the signal generator output if necessary.
NOTE: Do not adjust the trimmer in the R.F. coil can that is covered with Scotch Tape. The original adjustment, made in the factory should not be tampered with. (Fig. 1 below, shows all trimmer locations.)

I.F. ALIGNMENT

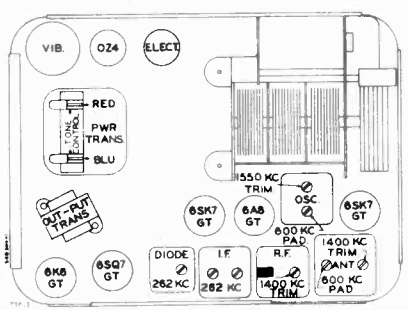
1. Connect the signal generator to the control grid of the Osc.-Mod. tube (6A8GT) through a .1 MF condenser, having first removed the grid cap from the top of the tube. Connect a 500,000 ohm leak resistor from the grid of the tube to the grid cap just removed from the tube. Turn the condenser gang completely out of mesh. Connect an output meter across speaker voice coil.
2. Set the signal generator at 262 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter.
3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.
4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

SETTING THE RANGE

1. Connect the signal generator to the control grid of the R.F. tube (6SK7GT) using the same .1 MF condenser.
2. Set the signal generator at 1550 K.C. and with the condenser gang completely out of mesh adjust the 1550 K.C. oscillator trimmer to the point showing the highest output reading.
3. Set the signal generator at 535 K.C. Turn the condenser gang completely in mesh and adjust the 600 K.C. oscillator padder for the highest output reading.
NOTE: The adjustments above set the range so the receiver will track with the calibrations in the control head.

R.F. AND ANTENNA ALIGNMENT

NOTE: If the radio is to be operated on a Motorola Booster Antenna, a special dummy antenna Motorola part No. 1X18018 must be used in series with the lead from the signal generator to the antenna receptacle. Change the signal generator connection to the antenna lead, using the special dummy.
1. Set the signal generator at 4100 K.C. Turn the condenser gang until the signal is heard. Adjust the 1400 K.C. antenna trimmer in the antenna coil can for maximum output reading.



2. Adjust the 1400 K.C. R.F. trimmer in the R.F. coil can for maximum output reading.
3. Set the signal generator at 600 K.C. and turn the condenser gang until the signal is heard. Adjust the 600 K.C. padder in the antenna coil can for the maximum output reading.
4. Recheck steps 1, 2, and 3, for accuracy.

Model 22-S Model 25-N

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Connect the speaker and battery.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

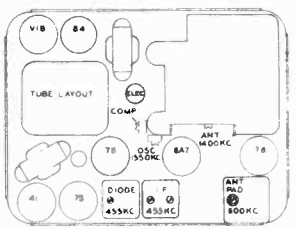


Figure 1--Trimmers

I. F. ALIGNMENT

1. Connect the signal generator to the antenna lead through a .1 MF condenser and to chassis ground. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator if necessary to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. Change to 40 MMF condenser in signal generator lead. Set signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

2. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.

3. Set the signal generator at 600 K.C. and rock the pointer at the 600 K.C. position on the dial scale, while adjusting the antenna padder, until a combination is found which gives highest output reading.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the Signal Generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a special dummy, part No. 1X18018, in place of the .1MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Model 550

AVERAGE MICROVOLT INPUT *	GENERATOR SET AT	GENERATOR FEEDER CONNECTED TO	DUMMY ANTENNA CAPACITY	LEAK RESISTANCE	OUTPUT METER READINGS **
42,000	262 K.C.	I.F. Grid	.1	.5 Meg	1.76
900	262 K.C.	Mod. Grid	.1	.5 Meg	1.76
950	600 K.C.	Mod. Grid	.1	.5 Meg	1.76
40	600 K.C.	R.F. Grid	.1	.5 Meg	1.76
6	600 K.C.	Ant. Lead	***	None	1.76

* For one watt output.
** Meter connected across voice coil.
1.76 volts equals 1 watt output for 3 ohm voice coil.
*** Use special dummy part No. 1X18018.
NOTE: If set is not used with a Motorola Booster antenna, substitute a 40 MMF condenser for the Special Dummy.

Model 22-S Model 25-N

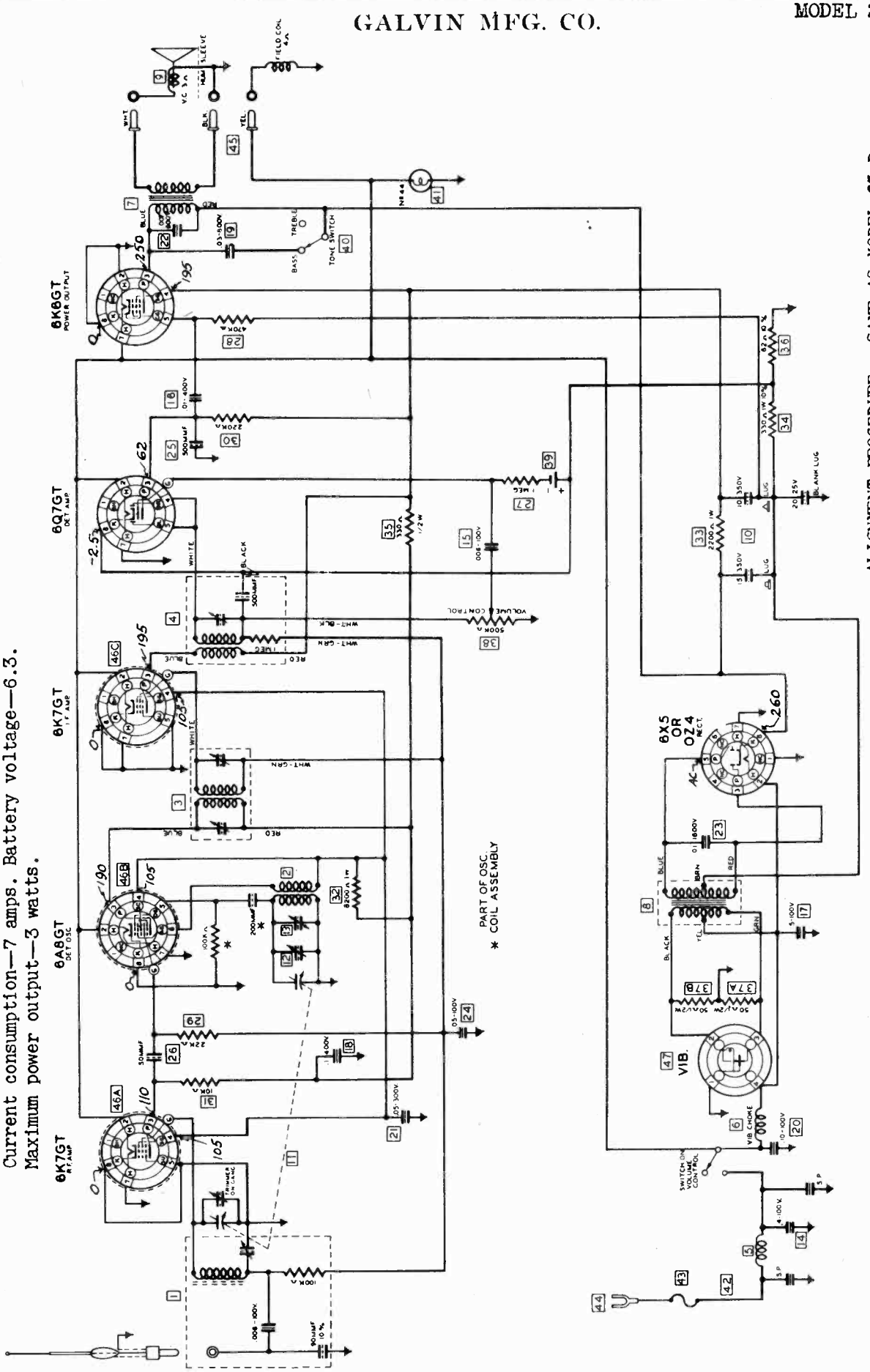
Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
10,000	455 K.C.	IF Grid	.1 MF	.5 Meg	1.74 Volts
150	455 K.C.	Mod. Grid	.1 MF	.5 Meg	1.74 Volts
200	600 K.C.	Mod. Grid	.1 MF	.5 Meg	1.74 Volts
50	600 K.C.	RF Grid	.1 MF	.5 Meg	1.74 Volts
5	600 K.C.	Ant. Lead	40 MMF	None	1.74 Volts

* For one watt output.
** Meter connected across voice coil.
V.C. impedance - 3 ohms at 400 cycles.
1.74 volts equals 1 watt output.

GALVIN MFG. CO.

MODEL 27-D-6

VOLTAGE: All measurements from chassis ground to socket terminal using 1000 ohms per volt meter.
Current consumption—7 amps. Battery voltage—6.3.
Maximum power output—3 watts.



ALIGNMENT PROCEDURE: SAME AS MODEL 27-D.

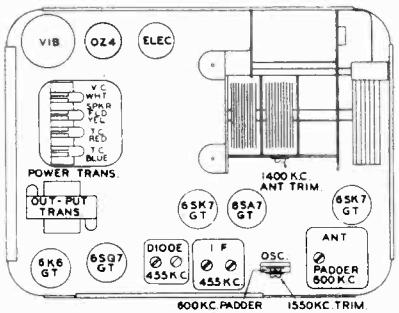
DIAL CORD INSTRUCTIONS: SAME AS MODEL 27-D.

Model No. 27-D-6

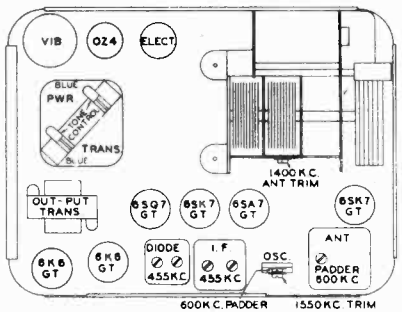
Models 34K-6 and 34K-7
For 1940 PACKARD

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Turn the volume control to maximum and leave it there throughout the alignment, reducing the signal generator output, if necessary.



Model 34-K6
Fig.1



Model 34-K7
Fig.2

I. F. ALIGNMENT

1. Connect the signal generator to the control grid of the oscillator tube and to chassis ground using a .1 Mfd. condenser in series with lead. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the two trimmers in the diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator, if necessary, to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. If the radio is to be operated on a Motorola Booster Antenna, a special dummy antenna Motorola part No. 1X18018 must be used in series with the lead from the signal generator to the antenna receptacle. Change the signal generator connection to the antenna lead, using the special dummy.

2. Set the signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

3. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.

4. Set the signal generator at 600 K.C. and turn the condenser gang until the dial pointer reads 600 K.C. Adjust the oscillator padder to point giving highest output reading.

5. Leaving the signal generator set at 600 K.C., adjust the antenna padder located in the copper antenna coil can to the point giving the highest output reading.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the Signal Generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500 M ohm resistor connected as leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a special dummy, part No. 1X18018, in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same type, due to difference of tube characteristics, etc.

34K6 AVERAGE MICROVOLT INPUT *	34K7 AVERAGE MICROVOLT INPUT *	GENERATOR SET AT	GENERATOR FEEDER CONNECTED TO	DUMMY ANTENNA CAPACITY	LEAK RESISTANCE	OUTPUT METER READINGS **
28,000	13,000	455 K.C.	I.F. Grid	.1	.5 Meg	1.76
900	680	455 K.C.	Mod. Grid	.1	.5 Meg	1.76
1,000	780	600 K.C.	Mod. Grid	.1	.5 Meg	1.76
100	60	600 K.C.	R.F. Grid	.1	.5 Meg	1.76
5	3	600 K.C.	Ant. Lead	***	None	1.76

* For one watt output.
** Meter connected across voice coil.
1.76 volts equals 1 watt output for 3 ohm voice coil.
*** Use special dummy part No. 1X18018 or

NOTE: If set is not used with a Motorola Booster antenna, substitute a 40 MMF condenser for the Special Dummy.

Model No. 27-D-6
Specifically Designed to be Installed in 1940
CHRYSLER DESOTO DODGE PLYMOUTH

SENSITIVITY AND STAGE GAIN MEASUREMENTS

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

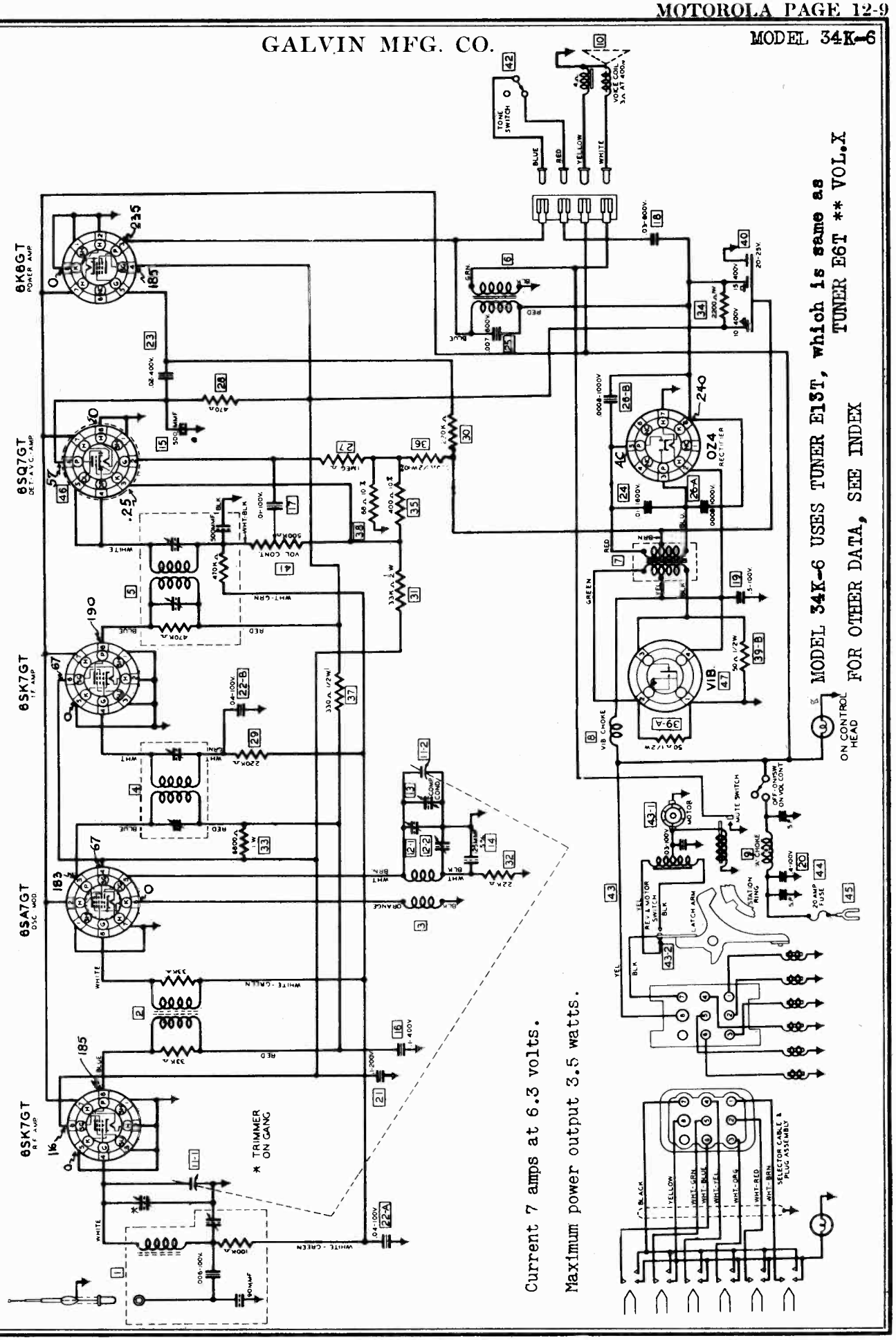
When measuring over-all sensitivity at the antenna terminal, use a special dummy part #1X18018 in place of the .1 MF.*** It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

AVERAGE MICROVOLT INPUT *	GENERATOR SET AT	GENERATOR FEEDER CONNECTED TO	DUMMY ANTENNA CAPACITY	LEAK RESISTANCE	OUTPUT METER READING **
8600	455 K.C.	I.F. Grid	.1 MF	.5 Meg	1.76 Volts
180	455 K.C.	Mod. Grid	.1 MF	.5 Meg	1.76 Volts
220	600 K.C.	Mod. Grid	.1 MF	.5 Meg	1.76 Volts
80	600 K.C.	R.F. Grid	.1 MF	.5 Meg	1.76 Volts
6	600 K.C.	Ant. Lead	***	None	1.76 Volts

** Meter connected across voice coil * For one watt output
1.76 Volts equals 1 watt output for 3 ohm voice coil
*** Use special dummy part No.1X18018, or M434B booster coil Part No.17908 in series with 25 MMF cond.

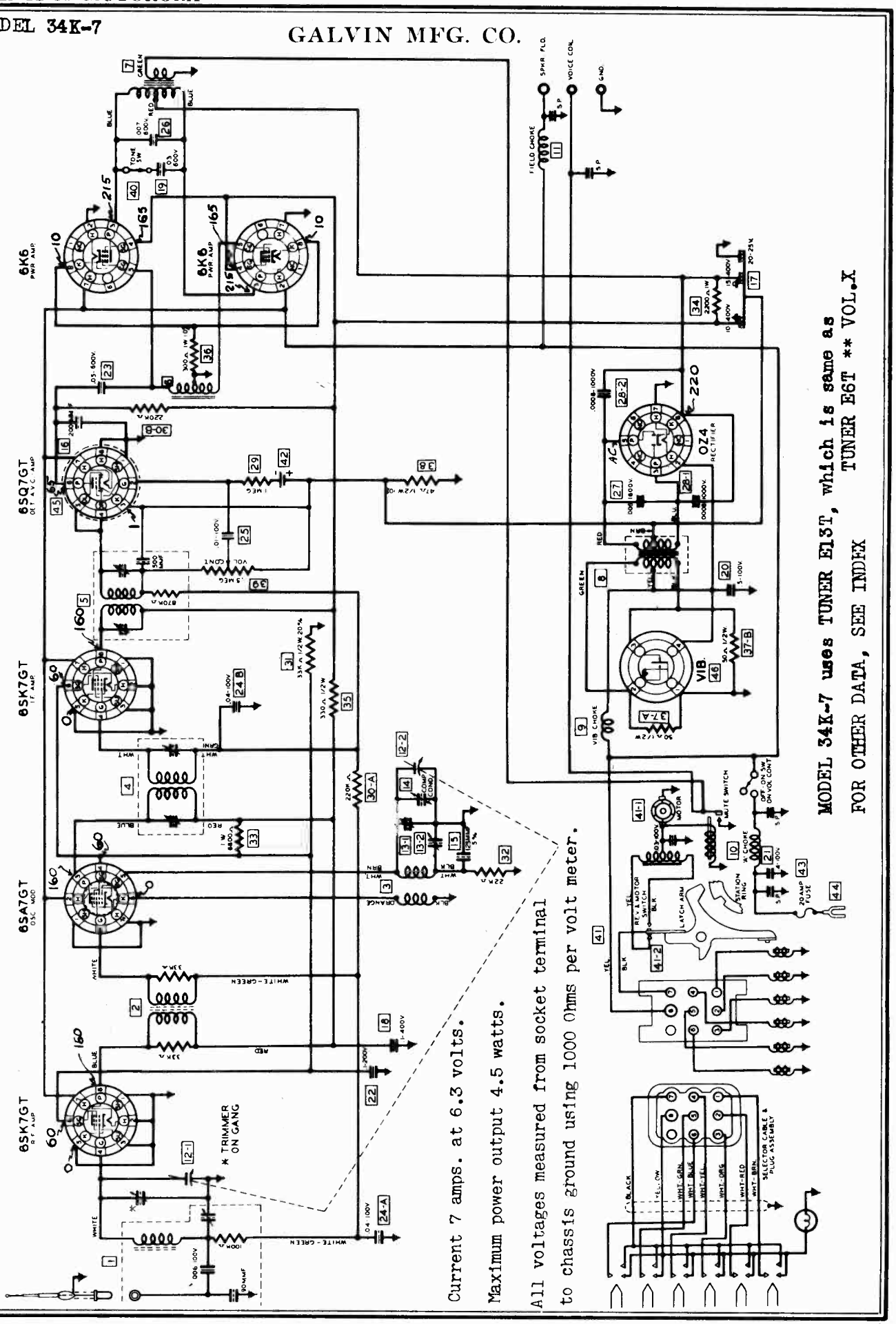
GALVIN MFG. CO.

MODEL 34K-6



MODEL 34K-7

GALVIN MFG. CO.



MODEL 34K-7 uses TUNER E13T, which is same as TUNER E6T ** VOL.X

FOR OTHER DATA, SEE INDEX

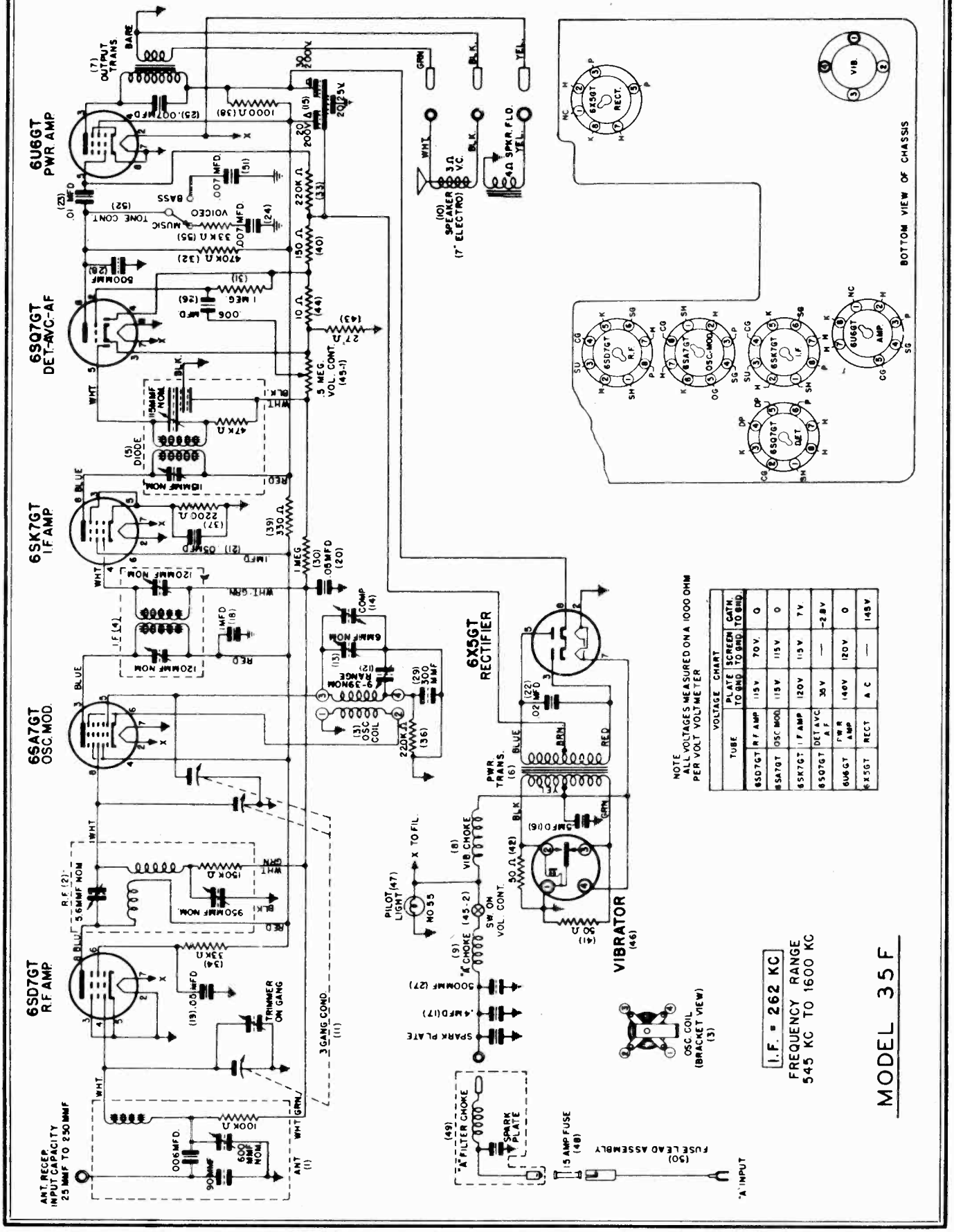
Current 7 amps. at 6.3 volts.

Maximum power output 4.5 watts.

All voltages measured from socket terminal to chassis ground using 1000 Ohms per volt meter.

MODEL 35F

GALVIN MFG. CO.



Model 35-F
SPECIFICALLY DESIGNED TO INSTALL IN 1941 FORD AND MERCURY

ALIGNMENT CHART

OPERATIONS IN ORDER	GANG CONDENSER SET AT	DUMMY ANTENNA	GENERATOR CONNECTED TO	ADJUST TRIMMERS NO.	GENERATOR SET AT
1	Minimum	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	262 K.C.
2	1600 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1600 K.C.
3	545 K.C.	.1 Mfd.	Osc.-Mod. Grid	6	545 K.C.
4	1400 K.C.	*	Special Dummy	7	1400 K.C.
5	1400 K.C.	*	Special Dummy	8	1400 K.C.
6	600 K.C.	*	Special Dummy	9	600 K.C.

* Use special dummy Part No. 1X26767 or Booster Coil Part No. 24K26751 in series with a 35 Mmf. condenser.

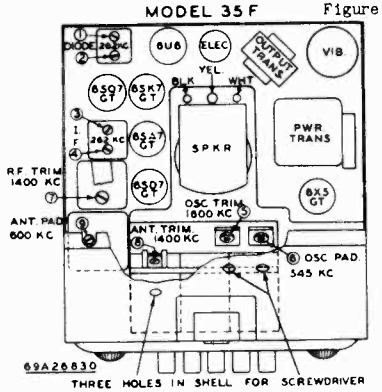
SENSITIVITY AND STAGE GAIN MEASUREMENTS

AVERAGE MICROVOLT INPUT *	GENERATOR SET AT	GENERATOR FEEDER CONNECTED TO	DUMMY ANTENNA CAPACITY	LEAK RESISTANCE	OUTPUT METER READING **
22,250	262 K.C.	I.F. Grid	.1 Mfd.	.5 Meg.	1.74
700	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
710	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
13	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	1.74
3	600 K.C.	Ant. Lead	***	None	1.74

Volume Control Set at Maximum Tone Control Set At Voice
* 1 Watt = 1.74 Volts ** Output meter connected across voice coil.

*** Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24K26751 in series with a 35 Mmf. condenser.

MODEL 35 F Figure 1



DIAL CORD INSTRUCTIONS

TUNING CORD

1. Remove the chassis from the housing, and place on service bench.
2. Remove the broken string.
3. Turn the condenser gang to fully meshed position.
4. Cut a length of 30 lb. silk fish cord 25 inches long.
5. Thread one end of cord through hole (X) in drive pulley and with an ordinary paper clip fasten to tuning control bracket so that cord will stay in place.
6. In a clockwise direction, wind cord one half turn around drive pulley and up to tuning shaft. (See Fig. 2).
7. Route cord 7 turns around tuning shaft as shown in Fig. 2 and down to drive pulley.
8. Continue in a clockwise direction, one full turn to hole (X).

(CONT. IN NEXT COL.)

TUNING CORD—Continued

9. Thread the cord ends (inside pulley) through eyelet (Part No. 5S7824) and knot cord ends together.
10. Fasten one end of spring (Part No. 41A14759) to cord and the other end to hole (Y) in drive pulley.
11. Cut off surplus cord and place a drop of shellac on cord knot.

POINTER CORD

1. Remove the chassis from the housing, and place on service bench.
2. Remove broken string.
3. Set condenser gang to fully closed position.
4. Cut a length of 18 lb. silk fish cord 27 inches long.
5. Thread one end of cord through hole (C) in condenser pulley and with an ordinary paper clip fasten it to the tuner bracket to hold in place. (See Fig. 3).
6. In a clockwise direction run cord to idler pulley No. 1.
7. Route cord around idler pulley No. 1, as shown in Fig. 3, and then across chassis to idler pulley No. 2.
8. Continue around idler pulley No. 2 as shown in Fig. 3 and back across chassis to idler pulley No. 3.
9. Route cord around idler pulley No. 3 and in a clockwise direction around condenser pulley to hole (C).
10. Remove the paper clip from other end of cord and knot the two cord ends together inside of condenser pulley. Fasten one end of tension spring (Part No. 41A11091 to cord and other end to hole (D) in the condenser pulley. Place a drop of shellac on cord knot.
11. Cut off surplus cord and replace pointer.
12. To set pointer to correct frequency, tune in a station of known frequency and adjust pointer on cord. Fasten pointer to cord with a drop of shellac.

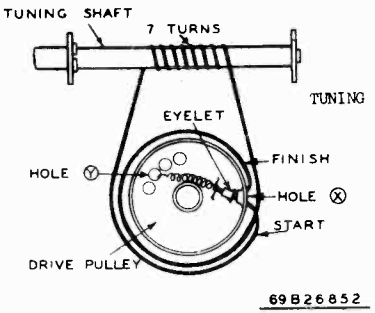


Figure 2

POINTER CORD

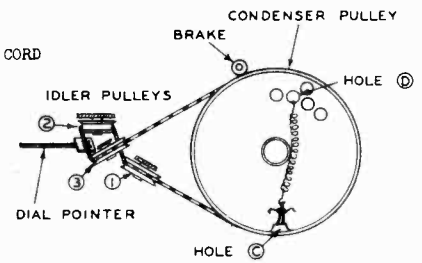
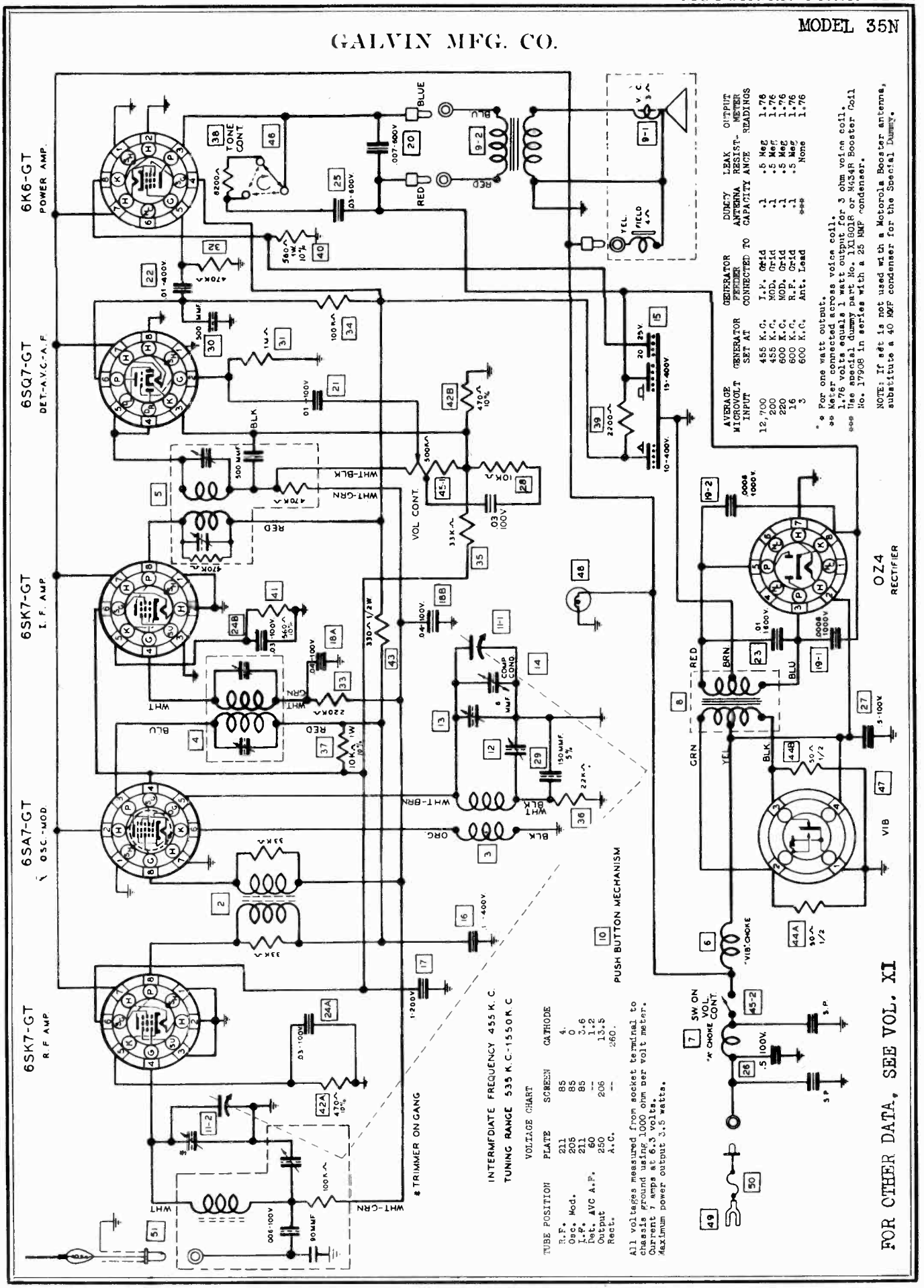


Figure 3

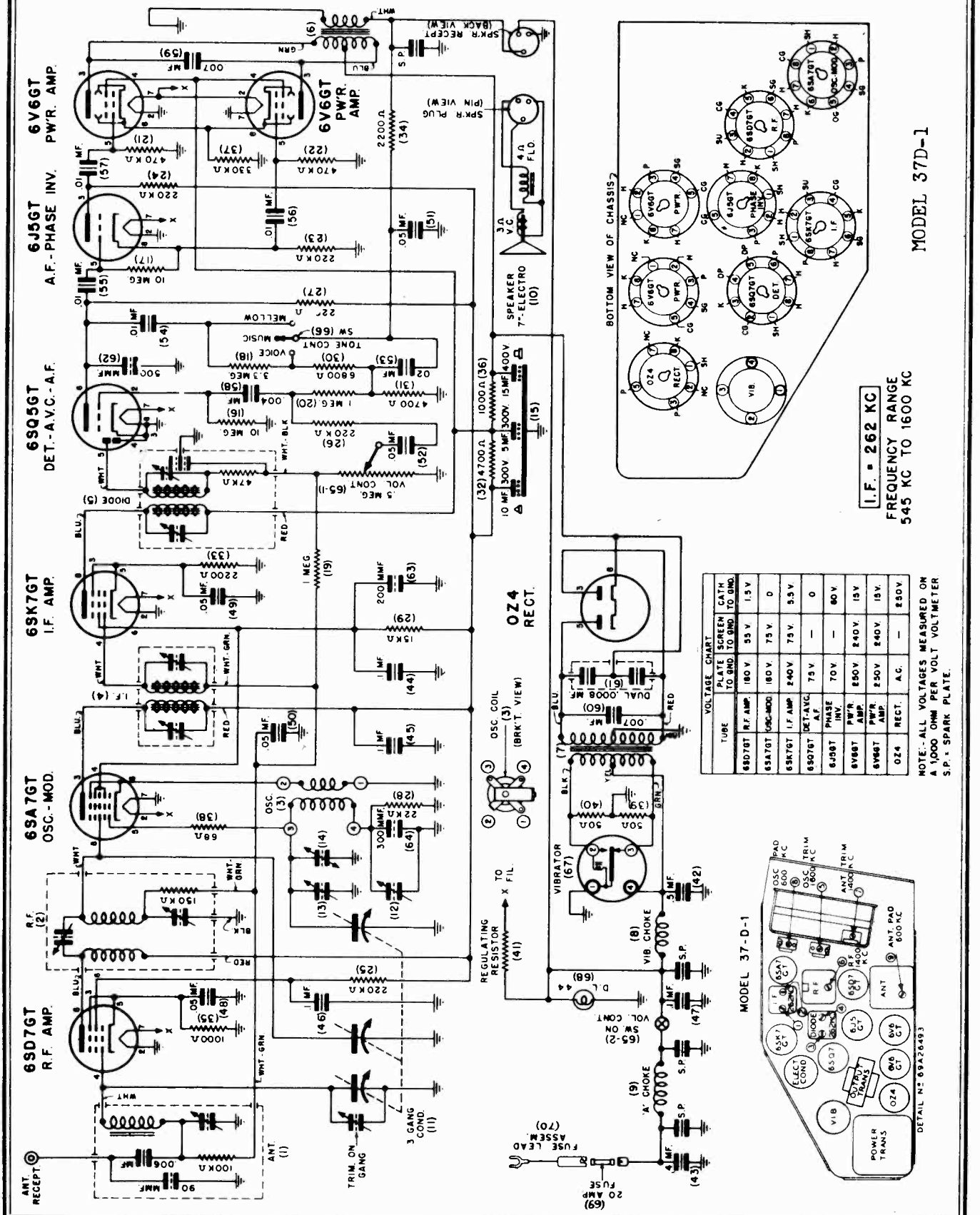
GALVIN MFG. CO.

MODEL 35N



MODEL 37D-1

GALVIN MFG. CO.

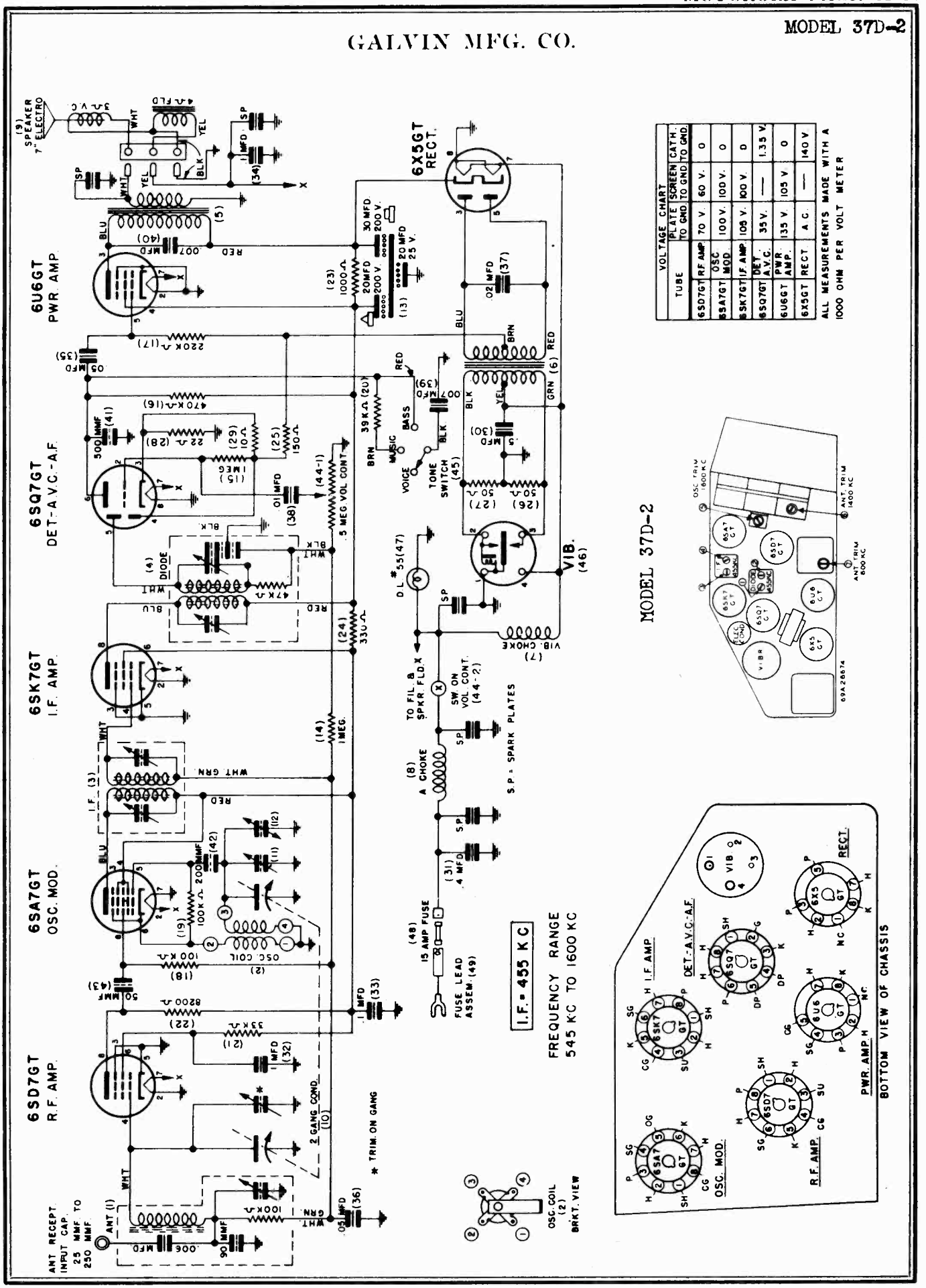


VOLTAGE CHART				
TUBE		PLATE TO GND	SCREEN TO GND	CATH TO GND.
6SD7GT	R.F. AMP.	180 V	55 V	1.5 V
6SA7GT	OSC-MOD.	180 V	75 V	0
6SK7GT	I.F. AMP	240 V	75 V.	3.5 V
6SQ7GT	DET-AVC. A.F.	75 V	—	0
6J5GT	PHASE INV.	70 V	—	80 V
6V6GT	PW'R. AMP.	250 V	240 V.	15 V
6V6GT	PW'R. AMP.	250 V	240 V	15 V.
OZ4	RECT.	A.C.	—	250 V

NOTE:- ALL VOLTAGES MEASURED ON A 1,000 OHM PER VOLT VOLTMETER S.P. = SPARK PLATE.

GALVIN MFG. CO.

MODEL 37D-2



VOLTAGE CHART

TUBE		PLATE TO GND	SCREEN TO GND	CATH. TO GND
6SD7GT	RF AMP	70 V.	60 V.	0
6SA7GT	OSC MOD	100 V.	100 V.	0
6SK7GT	I.F. AMP	105 V.	100 V.	0
6SQ7GT	DET A.V.C.	35 V.	—	1.35 V
6U6GT	PWR AMP.	135 V.	105 V	0
6X5GT	RECT	A.C.	—	140 V

ALL MEASUREMENTS MADE WITH A 1000 OHM PER VOLT METER

For 1941 PLYMOUTH, DODGE, DE SOTO and CHRYSLER

SENSITIVITY AND STAGE GAIN MEASUREMENTS - MODEL 37D-1

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
30,000	262 K.C.	I.F. Grid	.1 Mmf.	.5 Meg.	1.74 Volts
470	262 K.C.	Mod. Grid	.1 MF	.5 Meg.	1.74 Volts
550	600 K.C.	Mod. Grid	.1 MF	.5 Meg.	1.74 Volts
13	600 K.C.	R.F. Grid	.1 MF	.5 Meg.	1.74 Volts
6	600 K.C.	Ant. Lead	***	None	1.74 Volts

Volume Control Set at Maximum Tone Control Set At Music
* 1 Watt = 1.74 Volts ** Output meter connected across voice coil.
*** Use Special Dummy Part No.1X26767 or Booster Coil Part No.24K26751 in series with a 35 MMF condenser.

SENSITIVITY AND STAGE GAIN MEASUREMENTS - MODEL 37D-2

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
9,500	455 K.C.	I.F. Grid	.1 Mfd.	.5 Meg.	1.74
250	455 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
300	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
95	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	1.74
14	600 K.C.	Ant. Lead	***	None	1.74

Volume Control Set at Maximum Tone Control Set At Voice
* 1 Watt = 1.74 Volts. ** Output meter connected across voice coil.
*** Use Special Dummy Part No.1X26767 or Booster Coil Part No.24K26751 in series with a 35 MMF condenser.

ALIGNMENT CHART MODEL 37D-1

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	262 K.C.
2	1600 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1600 K.C.
3	1400 K.C.	.1 Mfd.	R.F. Grid	6	1400 K.C.
4	1400 K.C.	*	To special dummy	7	1400 K.C.
5	600 K.C.	*	To special dummy	8	600 K.C.
6	600 K.C.	*	To special dummy	9	600 K.C.

* Use special dummy part No. 1X26767, or Booster Coil Part No. 24K26751, in series with a 35 Mmf. condenser.

ALIGNMENT CHART MODEL 37D-2

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1	Osc.-Mod. Grid	1-2-3-4	455 K.C.
2	1600 K.C.	.1	Osc.-Mod. Grid	5	1600 K.C.
3	1400 K.C.	*	To special dummy	6	1400 K.C.
4	600 K.C.	*	To special dummy	7	600 K.C.

* Use special dummy part No. 1X26767 or Booster Coil Part No. 24K26751 in series with a 35 Mmf. condenser.

Fig. 4

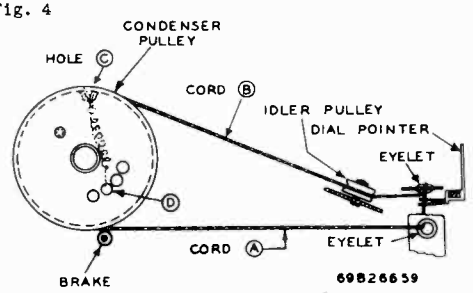
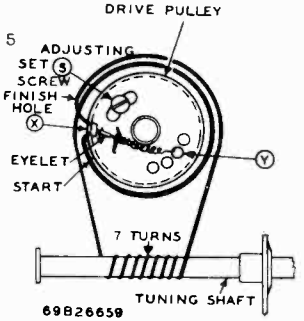


Fig. 5



TO RESTRING POINTER CORD - Models 37D-1 and 37D-2

Remove push-buttons, tone switch assembly, (tone switch on 37D-1 only) and control head from chassis. (This requires removal of three (two on 37D-2) screws from the right hand side of the control head, one from the left hand side (37D-1 only) of the control head, and a "C" washer from the volume control shaft.)
Cut a 30 inch length of 18 lb. silk fish cord.
Lay control head on service bench and route cord through the two eyelet holes and around idler pulley, exactly as shown in Fig. 3.
Adjust cord so both ends are approximately of equal length, and clip to control head as shown in Fig. 3.
Set pointer at approximately 550 K.C. on dial scale and interlace cord on pointer clips. Fasten to pointer with a drop of shellac or household cement.
Mount control head and tone switch (tone switch on 37D-1 only) back on chassis. Replace "C" washer on volume control shaft.
Turn gang to fully meshed position. This will place hole in condenser pulley at the top.
Remove paper clip from cord "A" and fish end of cord under brake shoe and around condenser pulley 1/2 turn to hole (C).
Thread end of cord through hole (C) and clip to control head. (See Fig. 4).
Remove paper clip from cord (B) and route cord the short distance from idler pulley to the hole (C) in condenser pulley.
Tie both ends of cord together inside pulley; then tie in tension spring (Part No. 41A11091). Hook other end of spring in hole (D). Cut off surplus cord.
Place a drop of shellac or household cement on cord knot.
Tune in a station of known frequency and adjust dial pointer to correct dial reading by loosening the screw (S) in the drive pulley, (See Fig. 5) and moving pointer pulley. Tighten screw securely after adjustment.
Reassemble in housing.

TO RESTRING TUNING CORD - Model 37D-1 & 37D-2

Remove the chassis from the housing, and place on service bench with the tubes up.
Remove the broken string.
Turn condenser gang to fully meshed position.
Cut a length of 30 lb. silk fish cord 25 inches long.
Thread one end of cord through hole (X) in drive pulley, and with an ordinary paper clip fasten to volume control bracket so that cord will stay in place.
In a counter-clockwise direction, wind cord one full turn around drive pulley and down to tuning shaft. (See Fig. 5).
Wind cord in a clockwise direction seven turns around tuning shaft and up to drive pulley.
Continue in a counter-clockwise direction one half turn to hole (X).
Thread cord through hole (X) and then thread both ends through eyelet (Part No. 5S7824).
Knot the two ends of cord together and fasten one end of spring (Part No.41A14759) to cord and other end to hole (Y) in drive pulley.
Place a drop of shellac or household cement on cord knot.
Pinch eyelet on cord with a pair of pliers.

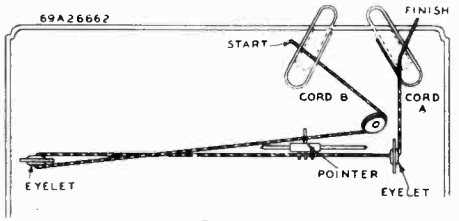
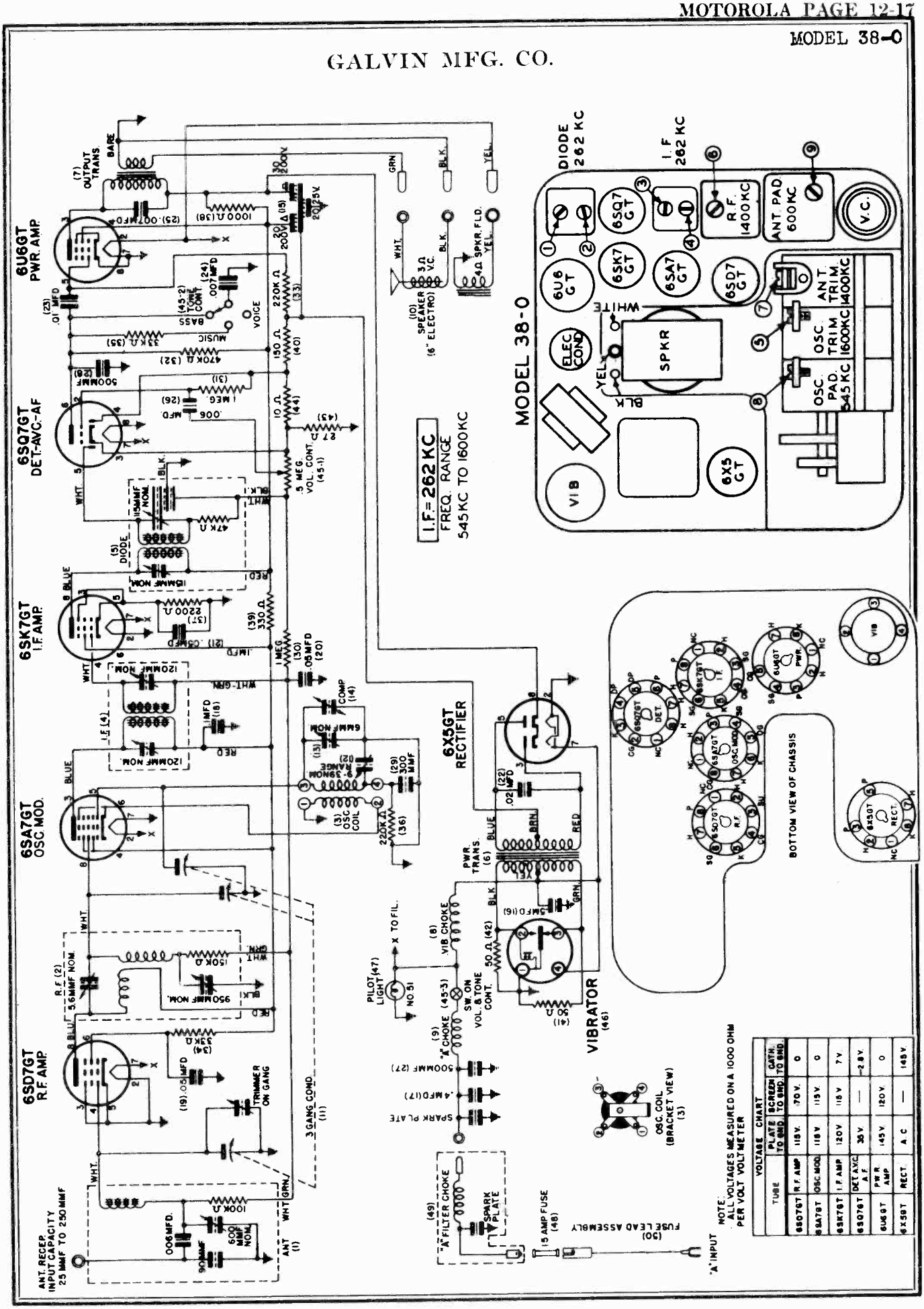


Fig. 3

MODEL 38-0

GALVIN MFG. CO.



VOLTAGE CHART				
TUBE		PLATE TO GND.	SCREEN TO GND.	CATH. TO GND.
6SQ7GT	R.F. AMP	115 V.	70 V.	0
6SA7GT	OSC. MOD.	115 V	115 V	0
6SK7GT	I.F. AMP	120 V	115 V	7 V
6SQ7GT	DET. A.V.C. A.F.	36 V	—	-2.8 V
6U6GT	PWR AMP	145 V	120 V.	0
6X5GT	RECT.	A.C	—	148 V

Model 38-0

Specifically Designed to be Installed in 1941

OLDSMOBILE

TUNING CORD

1. Remove the chassis from the housing, and place on service bench.
2. Remove the broken string.
3. Turn the condenser gang to fully meshed position.
4. Cut a length of 30 lb. silk fish cord 25 inches long.
5. Thread one end of cord through Slot (B) in drive pulley and with an ordinary paper clip fasten to tuning control bracket so that cord will stay in place.
6. In a clockwise direction, wind cord one full turn around drive pulley and up to tuning shaft. (See Fig. 2).
7. Route cord 7 turns around tuning shaft as shown in Fig. 2 and down to drive pulley.
8. Continue in a clockwise direction around drive pulley and through slot (B).
9. Slip the two cord ends through eyelet (Part No.5S7824) inside of pulley.
10. Knot the two cord ends together and fasten to one end of spring (Part No. 41A14759). Hook other end of spring to hole (C) in drive pulley.
11. With a pair of pliers pinch eyelet on cord and place drop of shellac on cord knot.

POINTER CORD

1. Remove the chassis from housing and place on service bench.
2. Remove broken string.
3. Set condenser gang to fully open position.
4. Cut a length of 18 lb. silk fish cord 27 inches long.
5. Thread one end of cord through slot (A) in condenser pulley and with an ordinary paper clip fasten it to the tuning shaft bracket to hold in place. (See Fig. 3).
6. In a clockwise direction run cord around condenser pulley, under brake shoe and over to idler pulley No. 3 and around it in a counter-clockwise direction.
7. Route string across chassis to idler pulley No. 2, and around it in a counter-clockwise direction.
8. Route cord back across chassis and down over idler pulley No. 1.
9. Route cord down and around condenser pulley one-half turn to slot (A).
10. Remove the paper clip from end of cord and knot the two ends of cord together inside of drive pulley and fasten one end of spring (Part No.41A11091) to cord and the other end to hook in condenser pulley.
11. Cut off surplus cord.
12. To set pointer to correct frequency, tune in a station of known frequency and adjust pointer on string.
13. Fasten pointer to string with a drop of shellac. Place a drop of shellac on cord knot.

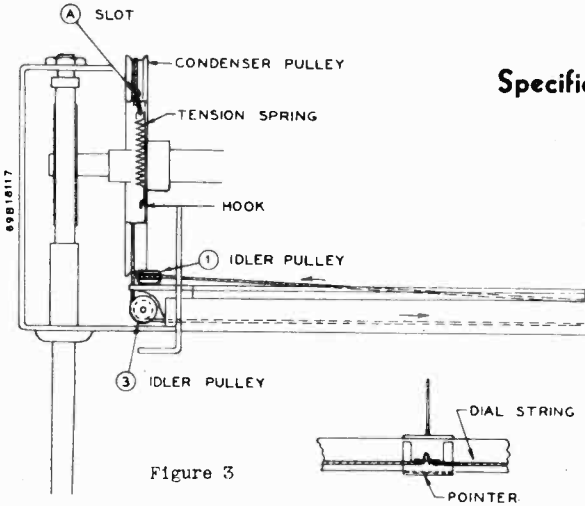


Figure 3

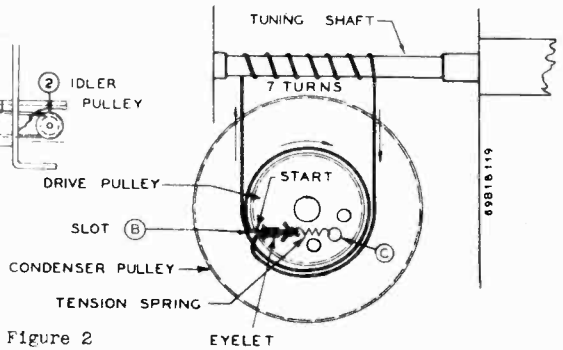


Figure 2

ALIGNMENT CHART MODEL 38-0

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	262 K.C.
2	1600 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1600 K.C.
3	1400 K.C.	.1 Mfd.	R.F. Grid	6	1400 K.C.
4	1400 K.C.	*	To Special Dummy	7	1400 K.C.
5	545 K.C.	*	To Special Dummy	8	545 K.C.
6	600 K.C.	*	To Special Dummy	9	600 K.C.

* Use special dummy Part No.1X26767 or booster coil Part No.24K26751 in series with a 35 Mmf. condenser.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

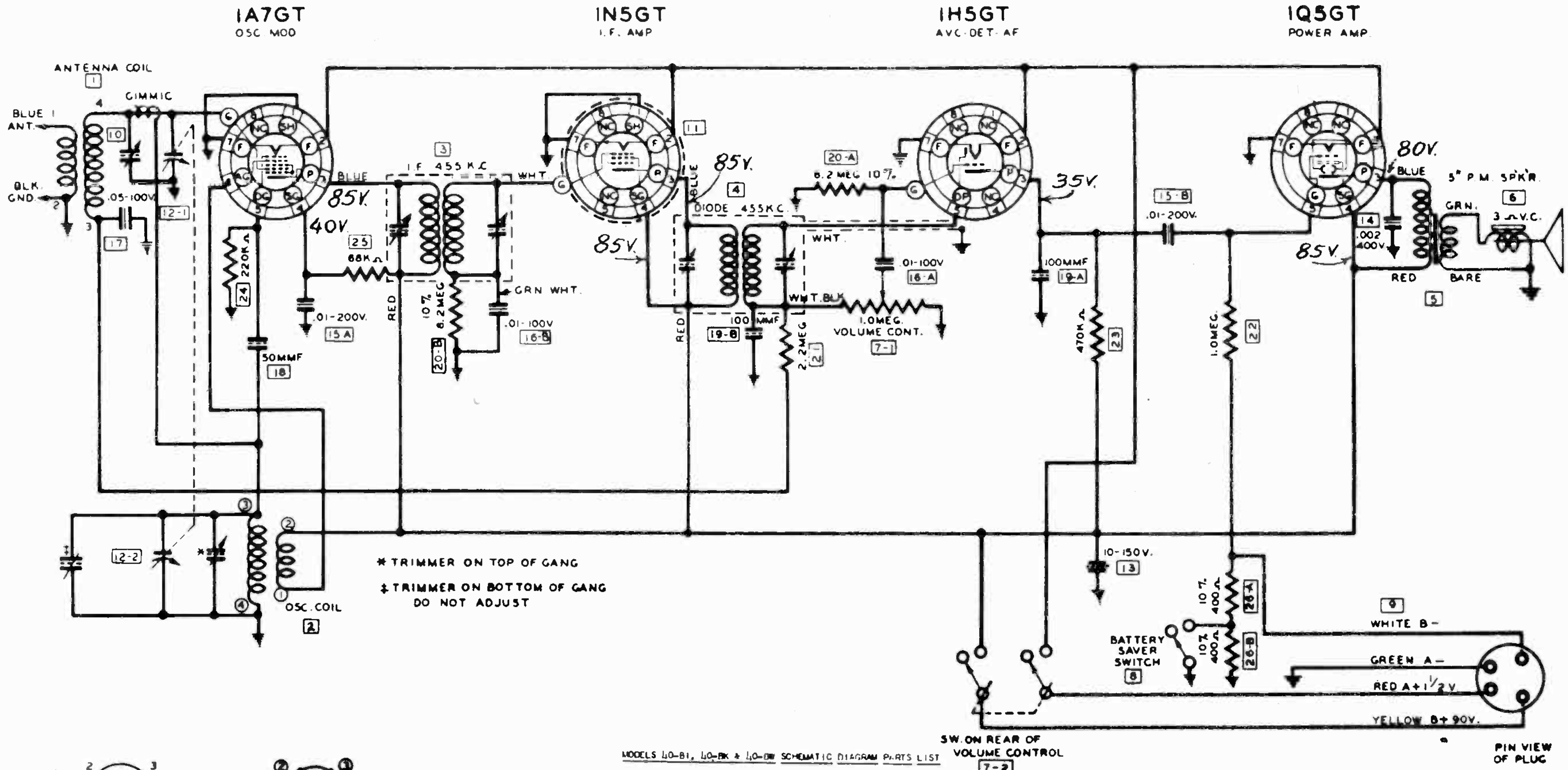
Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
22,750	262 K.C.	I.F. Grid	.1 Mfd.	.5 Meg	1.74
700	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	1.74
700	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	1.74
13	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg	1.74
3	600 K.C.	Ant. Lead	***	None	1.74

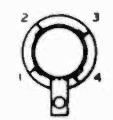
Volume Control Set at Maximum.
* 1 Watt = 1.74 Volts.

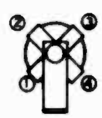
Tone Control Set At Voice.
** Output meter connected across voice coil.
*** Use special dummy Part No.1X26767 or booster coil part No.24K26751 in series with a 35 Mmf. condenser.

GALVIN MFG. CO.

MODELS 40-B1, 40-BK, 40-BW







MODELS 40-B1, 40-BK & 40-BW SCHEMATIC DIAGRAM PARTS LIST

Diag. No.	Part No.	Description
1	24A19975	Antenna Coil
2	24A16227	Osc. Coil (Ceramic) White Dot
3	1X21342	I.F. Coil & Shield Assembly
4	1X21330	Diode Coil & Shield Assembly
5	25A15706	Output Transformer
6	50B19776	Speaker (5" P.M.)
7	1CA19979	Volume Control & Switch (1. meg.)
8	40A15939	Battery Saver Switch
9	1X12179	Battery Cable Assembly (5 feet)
10	20K20911	Trimmer & Bracket (RH)
11	26A14780	Tube Shield (Bantam)
12	1X20506	Gang & Pulley Assembly
13	23A14727	Electrolytic Condenser (10-150V.)
14	859024	Tubular Condenser (.002-400V.)
15-A	359825	Tubular Condenser (.01-200V.)
15-B	859825	Tubular Condenser (.01-200V.)
16-A	859001	Tubular Condenser (.01-100V.)
16-B	859001	Tubular Condenser (.01-100V.)
17	859805	Tubular Condenser (.05-100V.)
18	2106503	Molded Mica Cond. (50 mmf) 20%
19-A	2106511	Molded Mica Cond. (100 mmf) 20%
19-B	2106511	Molded Mica Cond. (100 mmf) 20%
20-A	606297	Carbon Resistor (6.2 meg-1/3-10)N.I.
20-B	686297	Carbon Resistor (6.2 meg-1/3-10)N.I.
21	686049	Carbon Resistor (2.2 meg-1/3-20)N.I.
22	606071	Carbon Resistor (1.0 meg-1/3-20)N.I.
23	606011	Carbon Resistor (470,000-1/3-20)N.I.
24	606003	Carbon Resistor (220,000-1/3-20)N.I.
25	586125	Carbon Resistor (68,000-1/3-20)N.I.
26-A	606025	Carbon Resistor (400-1/3-10)N.I.
26-B	686025	Carbon Resistor (400-1/3-10)N.I.
27	40A21257	Battery Pack (1-1/2V. "A" / 90 V. "B")
		Eveready 758
		Rayovac #AB 82
		Burgess #17-G0-60
		General #600L-11L

BATTERY PACK [27]

Motorola

- Model 40BK -
- Model 40BW -
- Model 40B1 -

MODELS 40-B1, 40-BK, 40-BW, GALVIN MFG. CO. 40-40B, 52XAH1, B-150

ALIGNMENT CHART **MODELS 40-40B, 40-B1, 40-BK, 40-BW**

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmer No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	Osc-Mod. Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	Osc-Mod. Grid	5	1720 K.C.
3	1400 K.C.	200 Mmf.	Antenna Lead	6	1400 K.C.

Volume Control Set at Maximum.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
3600	455	I.F. Grid	.1 Mfd.	.5 Meg	.38
105	455	Mod. Grid	.1 Mfd.	.5 Meg	.38
120	600	Mod. Grid	.1 Mfd.	.5 Meg	.38
22	600	Ant. Terminal	200 Mmf.	None	.38

Volume Control Set at Maximum
* .05 Watts = .38 Volts

** Output Meter Connected Across Voice Coil.

ALIGNMENT CHART **MODEL 52 XAH1**

Operations In Order *	Gang Condenser Set At	Dummy Antenna	Band Switch Set At	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc.-Mod.Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc.-Mod.Grid	5	1720 K.C.
3	600 K.C.	.1 Mfd.	B.C.	Osc.-Mod.Grid	6	600 K.C.
4	1400 K.C.	200 Mmf.	B.C.	External Antenna Terminal	7	1400 K.C.
5	18 M.C.	400 Ohm	S.W.	External Antenna Terminal	8	18 M.C.
6	16 M.C.	400 Ohm	S.W.	External Antenna Terminal	9	16 M.C.

Volume Control set at maximum.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input **	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
3400	455	I.F. Grid	.1 Mfd.	.5 Meg.	.38
40	455	Mod. Grid	.1 Mfd.	.5 Meg.	.38
45	600	Mod. Grid	.1 Mfd.	.5 Meg.	.38
20	600	Antenna Terminal	200 Mmf.	None	.38

Volume Control set at maximum.
* .05 Watts .38 Volts.

** Output meter connected across voice coil.

ALIGNMENT CHART **MODEL B 150**

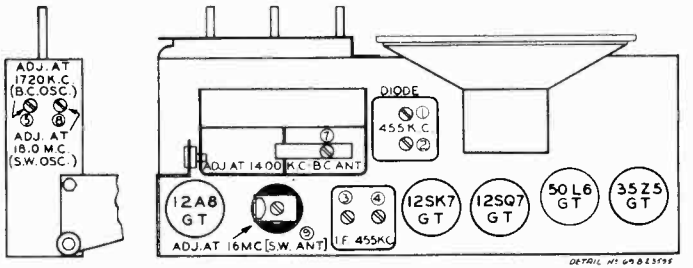
Operations In Order	Tuning Dial Set At	Dummy Antenna	Generator Connected To	Adjust. Trimmers No.	Generator Set At
1	Minimum 1600 K.C.	.1 Mfd	Osc-Mod. Grid	1-2-3	455 K.C.
2	Minimum 1600 K.C.	50 Mmf	Antenna Terminal	4	1600 K.C.
3	1200 K.C.	50 Mmf	Antenna Terminal	5	1200 K.C.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolts Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
4500	455	I.F. Grid	.1 Mfd.	.5 Meg	.32 Volts
85	455	Mod. Grid	.1 Mfd.	.5 Meg	.32 Volts
100	600	Mod. Grid	.1 Mfd.	.5 Meg	.32 Volts
15	600	Ant. Terminal	50 Mmfd.	None	.32 Volts

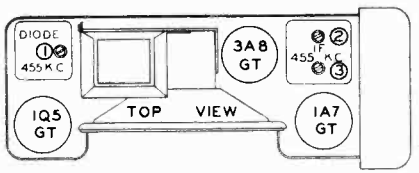
Volume Control Set at Maximum
* .05 Watts = .32 Volts

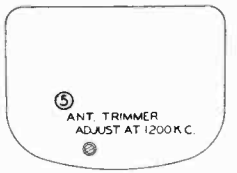
** Output meter connected across voice coil.



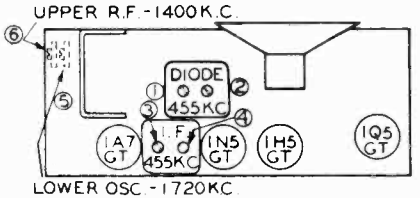
MODEL 52XAH1

52XAH1 TRIMMER ADJ. DETAIL

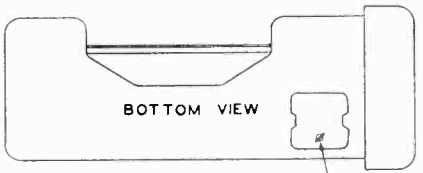


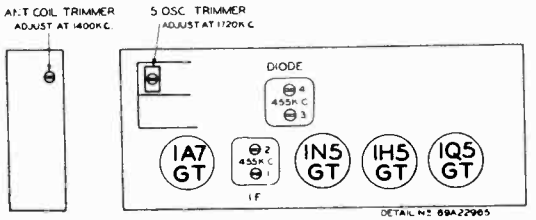


MODEL B-150



— Model **40-40B**



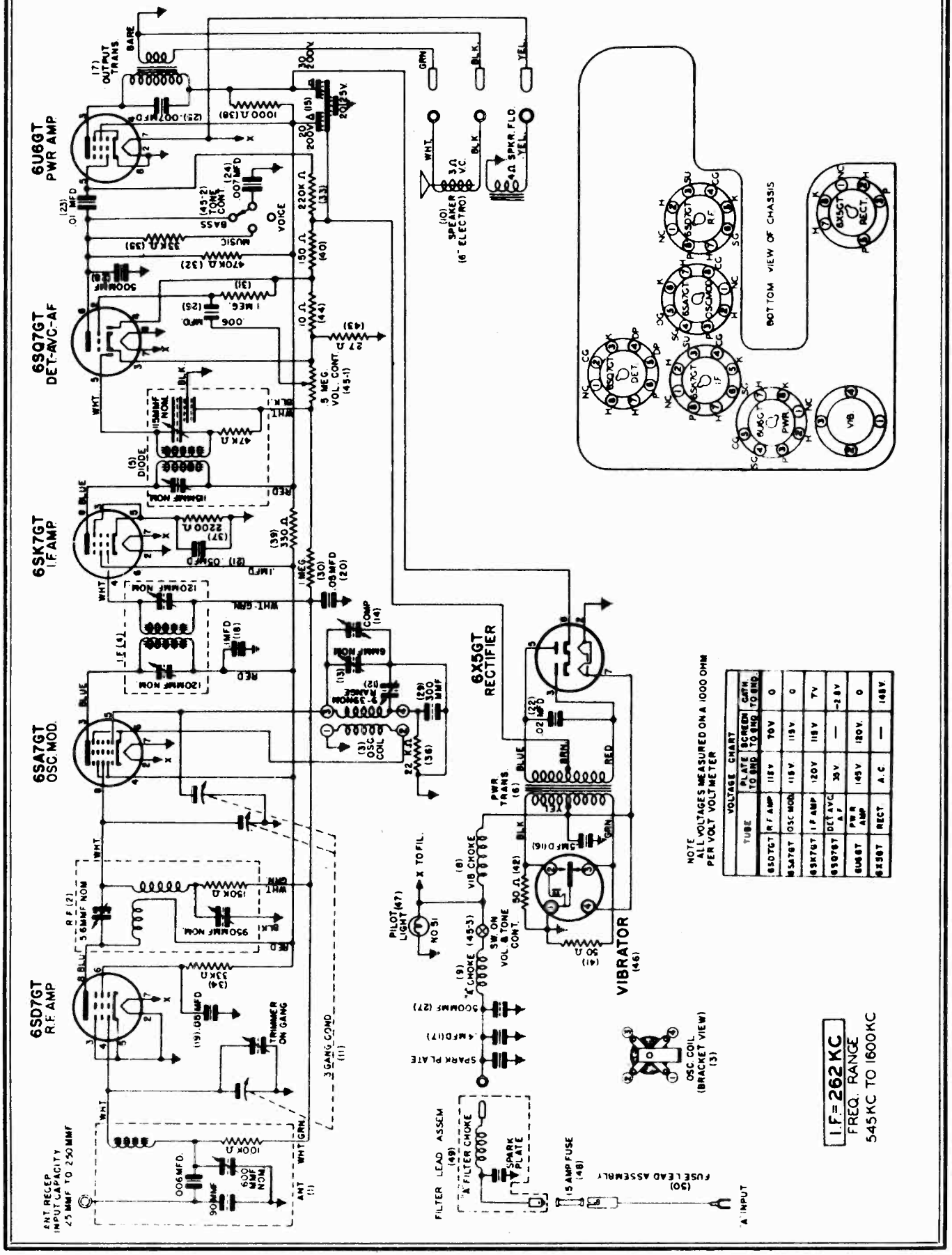


MODELS

40-B1
40-BK
40-BW

MODEL 40P

GALVIN MFG. CO.



VOLTAGE CHART				
TUBE	PLATE TO GND	SCREEN TO GND	CATH. TO GND.	
6SD7GT	R.F AMP	115 V	70 V	0
6SA7GT	OSC MOD.	115 V	115 V	0
6SK7GT	I.F AMP	120 V	115 V	7 V
6SQ7GT	DET AVC A.F	35 V	—	-2.8 V
6U6GT	PWR AMP	145 V	120 V.	0
6X5GT	RECT	A.C	—	148 V

Model 40-P
SPECIFICALLY DESIGNED TO INSTALL IN 1941 PONTIAC

Model 43-H
SPECIFICALLY DESIGNED TO INSTALL IN 1941 HUDSON

Model 44-K
SPECIFICALLY DESIGNED TO INSTALL IN 1941 PACKARD

ALIGNMENT CHART

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	262 K.C.
2	1600 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1600 K.C.
3	545 K.C.	.1 Mfd.	Osc.-Mod. Grid	6	545 K.C.
4	1400 K.C.	*	To Special Dummy	7	1400 K.C.
5	1400 K.C.	*	To Special Dummy	8	1400 K.C.
6	600 K.C.	*	To Special Dummy	9	600 K.C.

* Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24K26751 in series with a 35 Mmf. condenser.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
22,250	262 K.C.	I.F. Grid	.1 Mfd.	.5 Meg.	1.74
700	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
710	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
13	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	1.74
3	600 K.C.	Ant. Lead	***	None	1.74

Volume Control Set at Maximum
* 1 Watt = 1.74 Volts

Tone Control Set At Voice Position.
** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X126767.

MODEL 40 P

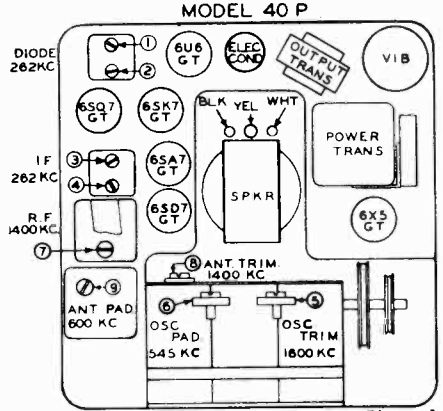


Figure 1

MODEL 43-H

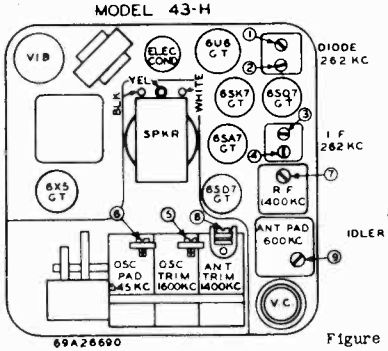


Figure 1

MODEL 40 P DIAL CORD INSTRUCTIONS

POINTER CORD

Remove the chassis from housing and place on service bench.
Remove broken string.
Turn the gang to fully opened position.
Cut a length of 18 lb. silk fish cord 27 inches long.
Thread one end of cord thru hole (A) in pointer pulley and with an ordinary paper clip fasten it to the tuning shaft bracket to hold it in place. See Fig. 2.
In a counter-clockwise direction route cord to idler pulley No. 3 and around it in a clock-wise direction.
Route cord across chassis to idler pulley No. 2 and around it in a clock-wise direction.
Route cord back across chassis and down over idler Pulley No. 1.
Route cord down and around pointer pulley to hole (A).
Remove the paper clip from end of cord and knot the two ends of cord together inside of pointer pulley.
Fasten one end of spring (Part No. 41A11091) to cord and the other end to hook in pointer pulley.
Cut off surplus cord. Place a drop of shellac on cord knot.
To set pointer to correct frequency, tune in a station of known frequency and adjust pointer on string. Fasten to string with a drop of shellac.

TUNING CORD

Remove the chassis from the housing and place on service bench.
Remove the broken string.
Turn the gang to fully meshed position.
Cut a length of 30 lb. silk fish cord 25 inches long.
Thread one end of cord thru hole (B) in drive pulley and with an ordinary paper clip fasten to tuning shaft bracket so that cord will stay in place.
In a counter-clockwise direction, wind cord one full turn around drive pulley and up to idler pulley No. 5.
Continue around idler pulley No. 5 and down to tuning shaft.
Wind cord four full turns in a counter-clockwise direction around tuning shaft and continue down to idler pulley No. 4.
Continue cord in a counter-clockwise direction around idler pulley No. 4 and to hole (B) in drive pulley.
Thread both ends of cord (inside pulley) thru eyelet (Part No. 5S7824) and knot both ends together.
Fasten one end of spring (Part No. 41A14759) to cord and other end to hole in drive pulley. See Fig. 2.
Place a drop of shellac on cord knot.

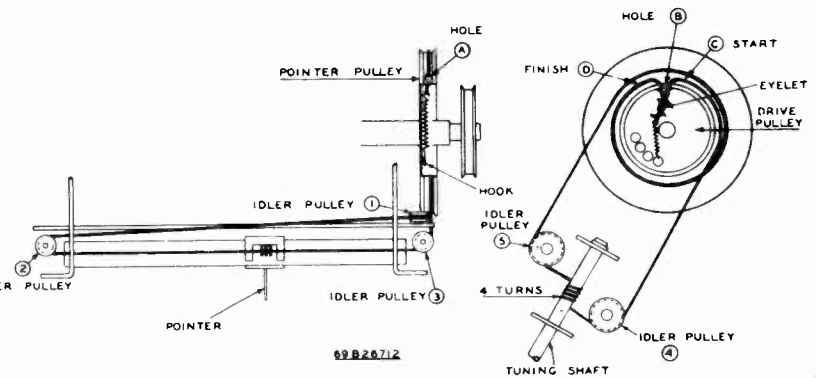
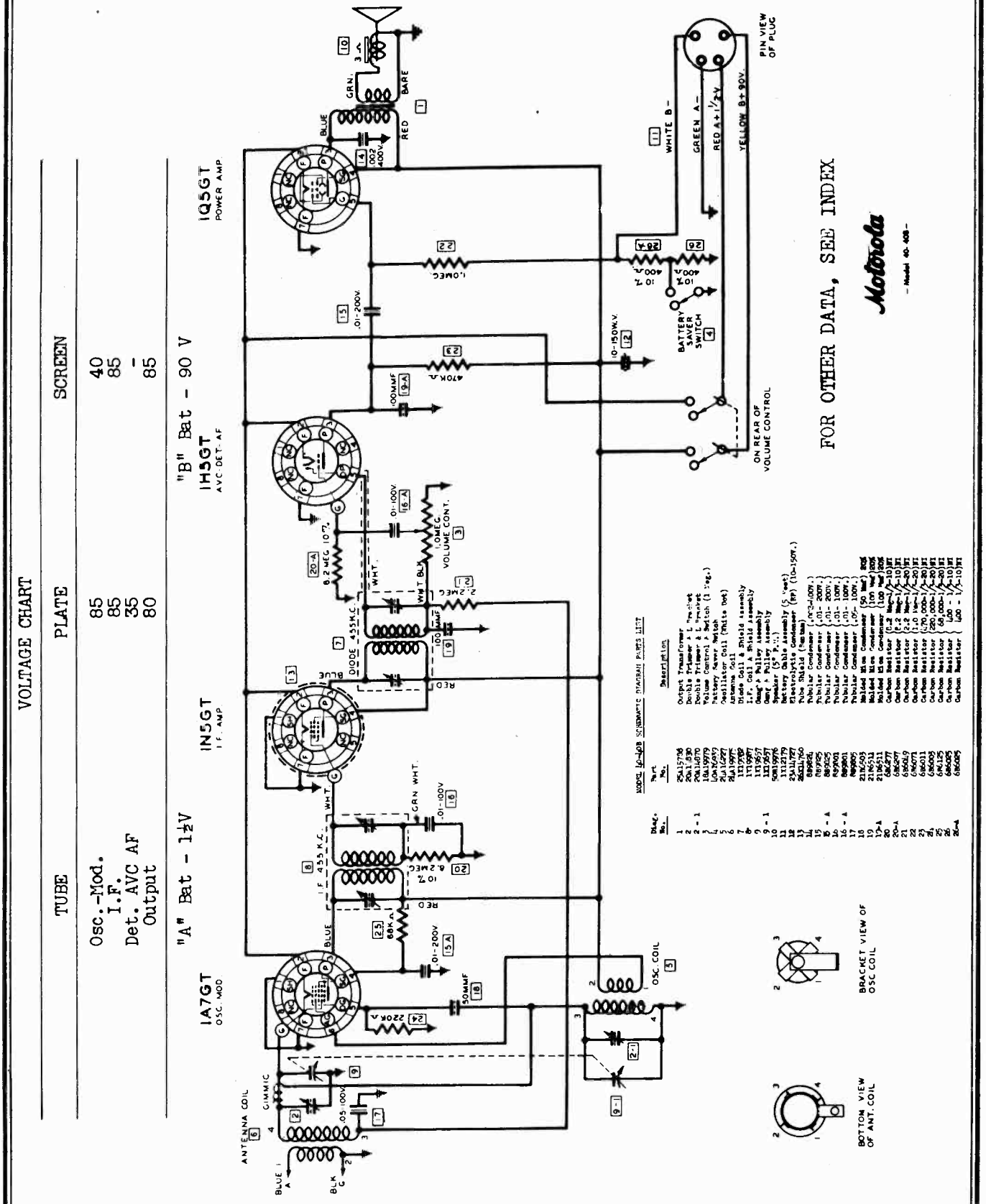


Figure 2

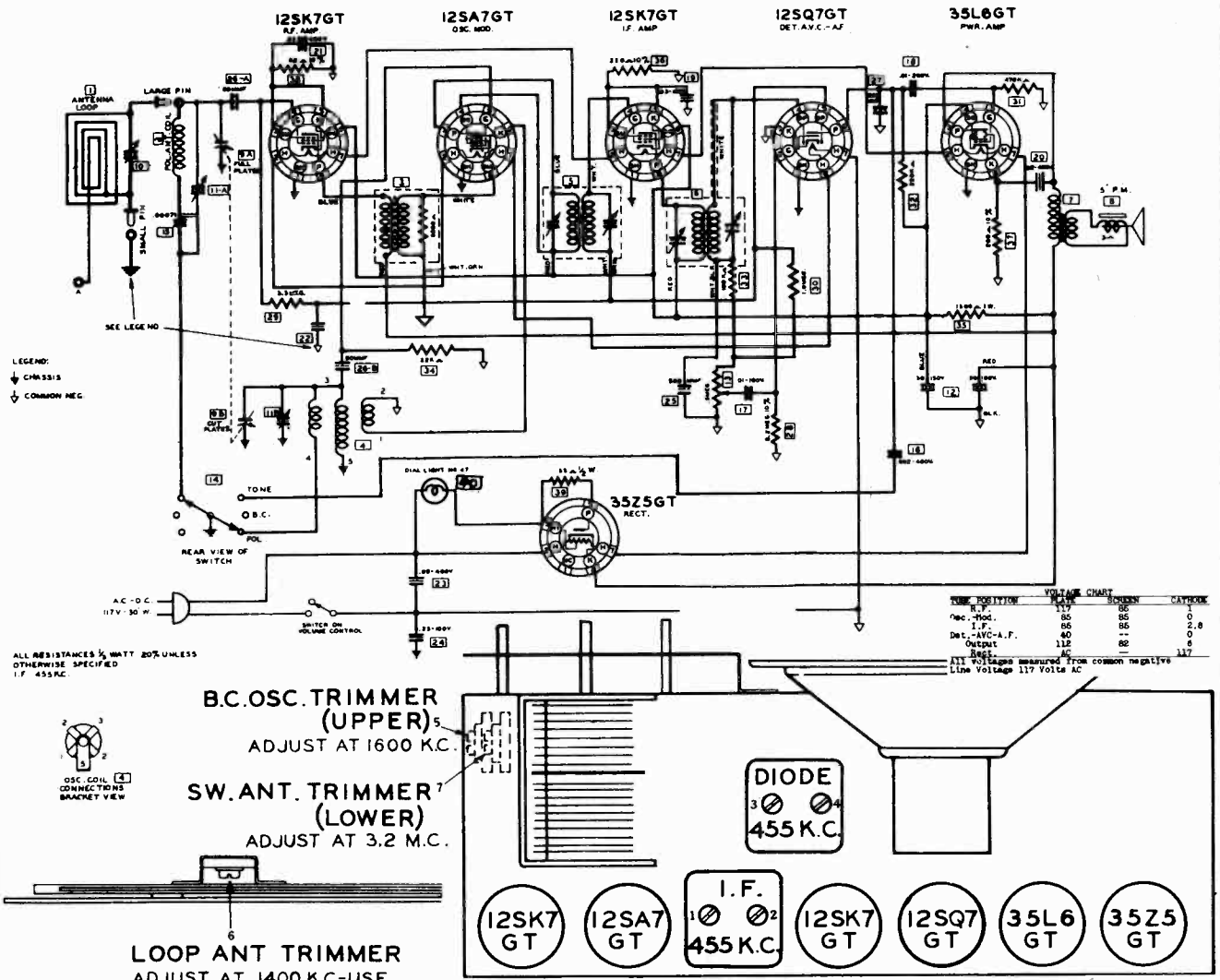
MODEL 40-40B

GALVIN MFG. CO.



MODEL 40--60W

GALVIN MFG. CO.



ALIGNMENT CHART — Volume Control Set at Maximum

OPERATIONS IN ORDER	GANG CONDENSER SET AT	DUMMY ANTENNA	BAND SWITCH SET AT	GENERATOR CONNECTED TO	ADJUST. TRIMMERS NO.	GENERATOR SET AT
1	Minimum 1600 K.C.	.1	B.C.	Osc-Mod. Grid	1-2-3-4	455 K.C.
2	Minimum 1600 K.C.	400 ohms	B.C.	External Antenna Terminal	5	1600 K.C.
3	1400 K.C.	400 ohms	B.C.	External Antenna Terminal	6	1400 K.C.
4	3.2 M.C.	400 ohms	S.W.	External Antenna Terminal	7	3.2 M.C.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

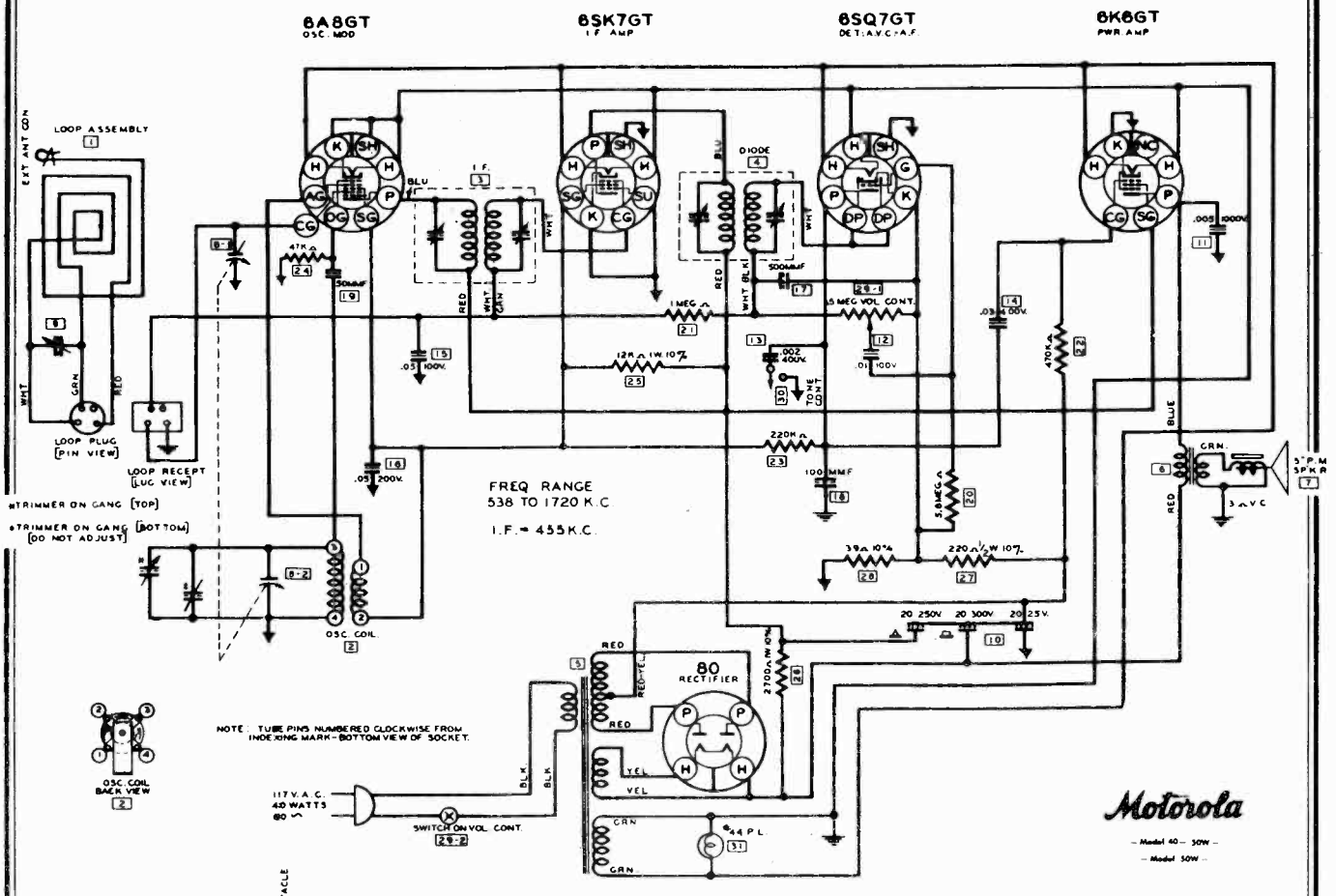
AVERAGE MICROVOLT INPUT *	GENERATOR SET AT	GENERATOR FEEDER CONNECTED TO	DUMMY ANTENNA CAPACITY	LEAK RESISTOR	OUTPUT METER READING **
3200	455	I.F. Grid	.1 Mfd.	.5 Meg.	.38
70	455	Mod. Grid	.1 "	.5 Meg.	.38
90	600	Mod. Grid	.1 "	.5 Meg.	.38
25	600	R.F. Grid	.1 "	.5 Meg.	.38
3	600	Ant. Terminal	400 ohms	None	.38

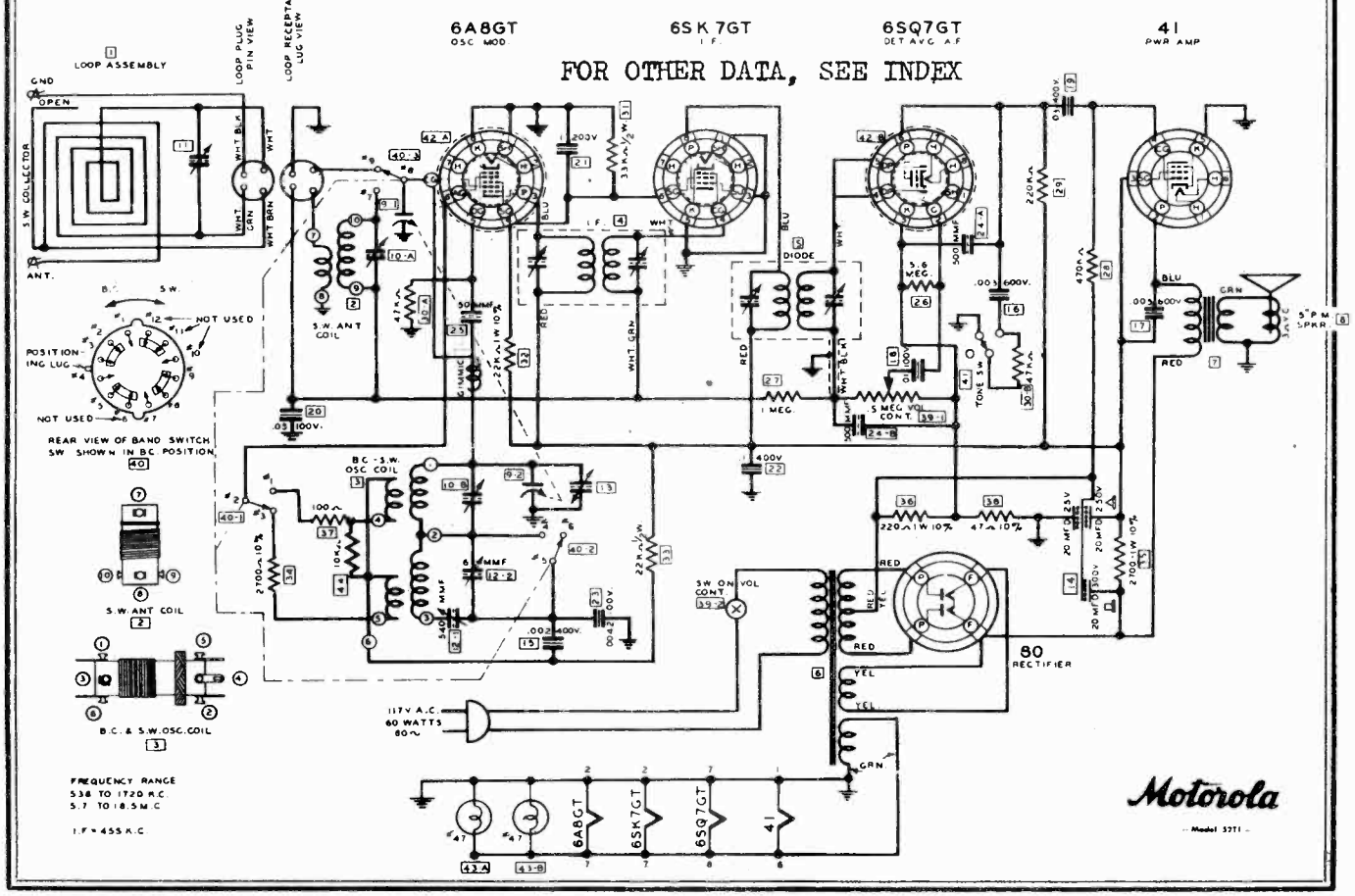
Volume Control set at Maximum
* .05 Watts = .38 Volts

Tone Control set at Center Position
** Output Meter connected across voice coil

GALVIN MFG. CO.

MODEL 40--50W, 50-W, 52T1





MODELS

50X1 50XC4 50XC1 56X1
50X2 50XH1 50XC2 56XA1
50XW 50XH2 50XC3 56XAW

ALIGNMENT CHART

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1720 K.C.
3	1400 K.C.	200 Mmfd.	External Antenna Terminal	6	1400 K.C.

Volume Control Set at Maximum.

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODELS 50X1-50X2-50XW-50XC1-50XC2-50XC3-50XC4

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
3200	455	I.F. Grid	.1 Mfd.	.5 Meg	.38
45	455	Mod. Grid	.1 Mfd.	.5 Meg	.38
50	600	Mod. Grid	.1 Mfd.	.5 Meg	.38
12	600	Ant. Terminal	400 Ohms	None	.38

Volume Control Set at Maximum.
* .05 Watts = .38 Volts

** Output Meter Connected across voice coil.

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODELS 50XH1-50XH2

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
3400	455	I.F. Grid	.1 Mfd.	.5 Meg	.38
50	455	Mod. Grid	.1 Mfd.	.5 Meg	.38
55	600	Mod. Grid	.1 Mfd.	.5 Meg	.38
25	600	Ant. Terminal	200 MMF.	None	.38

Volume Control Set at Maximum.
* .05 Watt = .38 Volts

** Output Meter connected across voice coil.

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODELS 56XA1-56XA2-56XAW-56X1

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
3700	455	I.F. Grid	.1 Mfd.	.5 Meg	.38
50	455	Mod. Grid	.1 Mfd.	.5 Meg	.38
55	600	Mod. Grid	.1 Mfd.	.5 Meg	.38
15	600	Ant. Terminal	400 Ohms	None	.38

Volume Control Set at Maximum.
* .05 Watts = .38 Volts

** Output meter connected across voice coil.

VOLTAGE CHART

Tube	Plate	Screen	Cathode
Osc.-Mod.	85	85	0
I.F.	85	85	2
Det-AVC-AF	40-45	--	0
Pwr.-Amp.	75	85	5
Rect.	A.C.	--	105

All voltages measured from common negative. Line Voltage 117 Volts A.C.

VOLTAGE CHART MODEL 52T1

TUBE	PLATE	SCREEN	CATHODE
Osc. Mod.	185	70	0
I.F.	185	70	0
Det.-AVC-AF	75	-	-2V
Pwr - Amp	220	185	0
Rectifier	A.C.	-	235V(From fil.)

Measurements from socket terminal to chassis ground using 1000 ohms per voltmeter.
Line Voltage - 117 Volts A.C.

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODELS 40-50W, 50W, 52T1

Average Microvolts Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
2300	455	I.F. Grid	.1	.5 Meg	.38
25	455	Mod. Grid	.1	.5 Meg	.38
30	600	Mod. Grid	.1	.5 Meg	.38
4	600	Ant. Terminal	200 Mmfd.	None	.38

Volume Control Set at Maximum. * .05 Watts .38 Volts. ** Output meter connected across voice coil.

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODEL 62T1

Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
2500	455	I.F. Grid	.1.Mfd.	.5 Meg	.38
38	455	Mod. Grid	.1 Mfd.	.5 Meg	.38
40	600	Mod. Grid	.1 Mfd.	.5 Meg	.38
4	600	R.F. Grid	.1 Mfd.	.5 Meg	.38
3	600	Ant. Terminal	200 Mmf.	None	.38

Volume Control Set at Maximum.
* .05 Watts .38 Volts.

Tone Control set in treble position.
** Output meter connected across voice coil.

ALIGNMENT CHART MODEL 50-W
MODEL 40-50W

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected to	Adjust Trimmers No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	Osc-Mod.Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	Osc-Mod.Grid	5	1720 K.C.
3	1400 K.C.	400 Ohms	External Antenna Terminal	6	1400 K.C.

Volume Control Set at Maximum.

ALIGNMENT CHART MODEL 52T1

Operations In Order	Gang Condenser Set At	Dummy Antenna	Band Switch Set At	Generator Connected to	Adjust Trimmers No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc-Mod.Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc-Mod.Grid	5	1720 K.C.
3	538 K.C.	.1 Mfd.	B.C.	Osc-Mod.Grid	6	538 K.C.
4	18 M.C.	.1 Mfd.	S.W.	Osc-Mod.Grid	7	18 M.C.
5	16 M.C.	400 Ohms	S.W.	External Antenna Terminal	8	16 M.C.
6	1400 K.C.	200 Mmf.	B.C.	External Antenna Terminal	9	1400 K.C.

Volume Control Set at Maximum.

ALIGNMENT CHART MODEL 62T1

Operations In Order	Gang Condenser Set At	Dummy Antenna	Band Switch Set At	Generator Connected to	Adjust Trimmers No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc-Mod.Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc-Mod.Grid	5	1720 K.C.
3	538 K.C.	.1 Mfd.	B.C.	Osc-Mod.Grid	6	538 K.C.
4	1400 K.C.	200 Mmf.	B.C.	External Antenna Terminal	7	1400 K.C.
5	18 M.C.	.1 Mfd.	S.W.	Osc-Mod.Grid	8	18 M.C.
6	16 M.C.	400 Ohms	S.W.	External Antenna Terminal	9	16 M.C.
7	1400 K.C.	200 Mmf.	B.C.	External Antenna Terminal	10	1400 K.C.

Volume Control Set at Maximum.

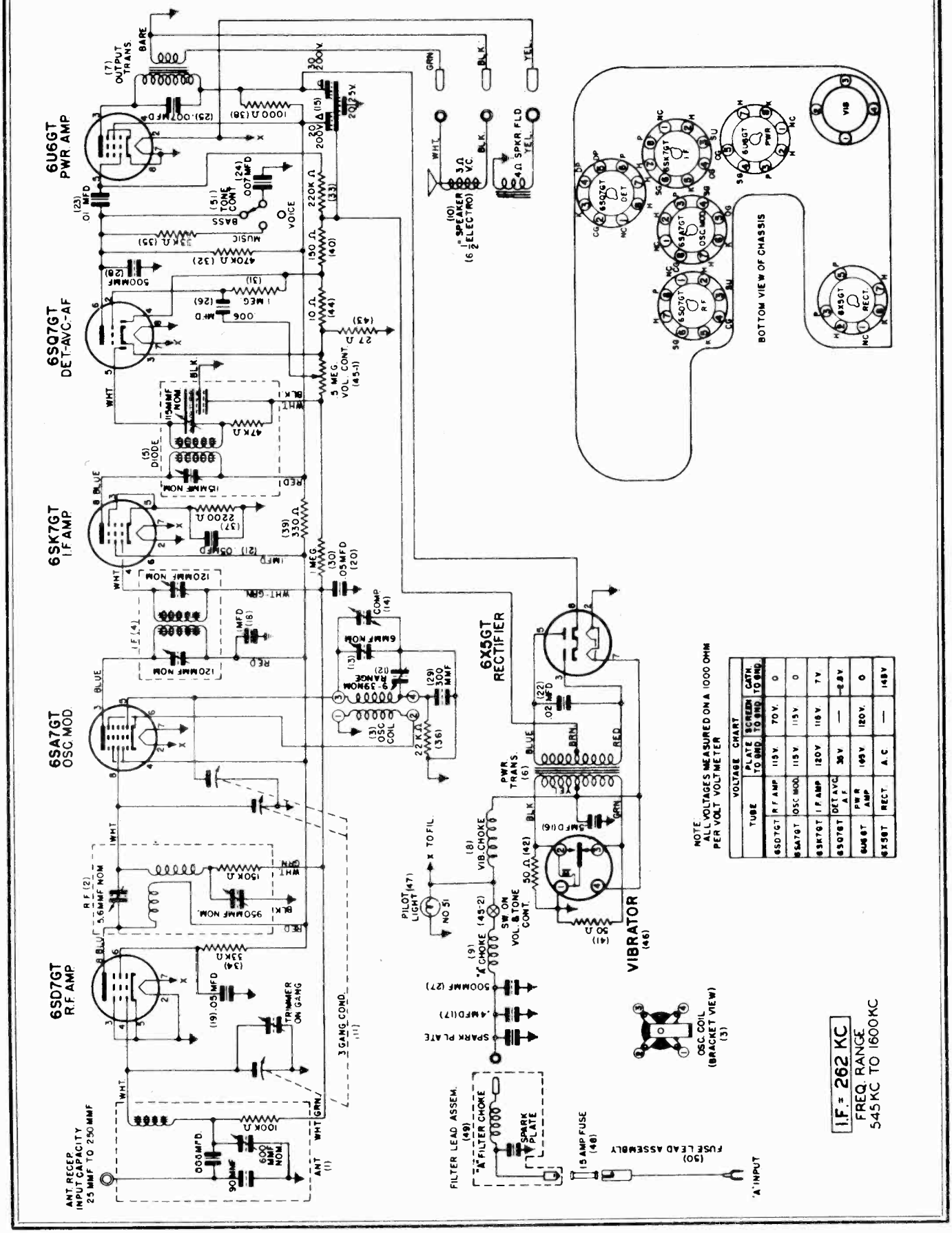
VOLTAGE CHART MODELS 40-50W - 50W

TUBE	PLATE	SCREEN	CATHODE
Osc. Mod.	175V	80V	0
I.F.	175V	80V	0
Det.-AVC-AF	40V	-	-2V
Pwr. Amp.	220V	175V	0
Rec.	A.C.	-	230V(from fil.)

Measurements from socket terminal to chassis ground using 1000 ohms per voltmeter.
Line Voltage - 117 Volts A.C.

MODEL 42S

GALVIN MFG. CO.



NOTE: ALL VOLTAGES MEASURED ON A 1000 OHM PER VOLT VOLTMETER

VOLTAGE CHART

TUBE	PLATE TO GND	SCREEN TO GND	CATH. TO GND
6SD7GT R.F AMP	115 V.	70 V.	0
6SA7GT OSC MOD.	115 V.	115 V.	0
6SK7GT I.F AMP	120 V.	118 V.	7 V.
6SQ7GT DET AVC A.F	30 V.	—	-8 V.
6U6GT PWR AMP	195 V.	120 V.	0
6X5GT RECT.	A.C.	—	149 V.

SPECIFICALLY DESIGNED TO INSTALL IN 1941 STUDEBAKER

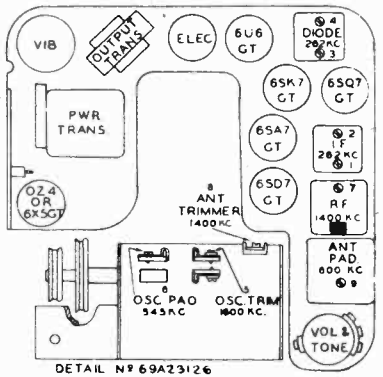


Figure 1

Model 42-S

TUNING CORD

1. Remove the chassis from the housing, and place on service bench.
2. Remove the broken string.
3. Turn the condenser gang to fully meshed position.
4. Cut a length of 30 lb. silk fish cord 25 inches long.
5. Thread one end of cord through Slot (B) in drive pulley and with an ordinary paper clip fasten to tuning control bracket so that cord will stay in place.
6. In a clockwise direction, wind cord one full turn around drive pulley and up to tuning shaft. (See Fig. 2).
7. Route cord 7 turns around tuning shaft as shown in Fig. 2 and down to drive pulley.
8. Continue in a clockwise direction around drive pulley and through slot (B).
9. Slip the two cord ends through eyelet (Part No. 5S7824) inside of pulley.
10. Knot the two cord ends together and fasten to one end of spring (Part No. 41A14759). Hook other end of spring to hole (C) in drive pulley.
11. With a pair of pliers pinch eyelet on cord and place drop of shellac on cord knot.

POINTER CORD

1. Remove the chassis from housing and place on service bench.
2. Remove broken string.
3. Set condenser gang to fully open position.
4. Cut a length of 18 lb. silk fish cord 27 inches long.
5. Thread one end of cord through slot (A) in condenser pulley and with an ordinary paper clip fasten it to the tuning shaft bracket to hold in place. (See Fig. 3).
6. In a clockwise direction run cord around condenser pulley, under brake shoe and over to idler pulley No. 3 and around it in a counter-clockwise direction.
7. Route string across chassis to idler pulley No. 2, and around it in a counter-clockwise direction.
8. Route cord back across chassis and down over idler pulley No. 1.
9. Route cord down and around condenser pulley one-half turn to slot (A).
10. Remove the paper clip from end of cord and knot the two ends of cord together inside of drive pulley and fasten one end of spring (Part No. 41A11091) to cord and the other end to hook in condenser pulley.
11. Cut off surplus cord.
12. To set pointer to correct frequency, tune in a station of known frequency and adjust pointer on string.
13. Fasten pointer to string with a drop of shellac. Place a drop of shellac on cord knot.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
22,250	262 K.C.	I.F. Grid	.1 Mfd.	.5 Meg.	1.74
700	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
710	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
13	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	1.74
3	600 K.C.	To Special Dummy	***	None	1.74

Volume Control Set at Maximum.
* 1 Watt = 1.74 Volts.

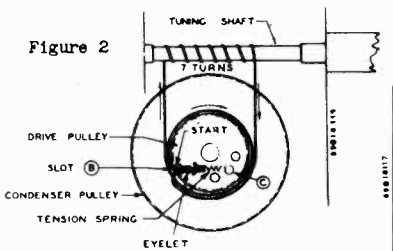
Tone Control Set At Voice.
** Output meter connected across voice coil.
*** Use special dummy Part No. 1X26767.

ALIGNMENT CHART

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	262 K.C.
2	1600 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1600 K.C.
3	545 K.C.	.1 Mfd.	Osc.-Mod. Grid	6	545 K.C.
4	1400 K.C.	*	To Special Dummy	7	1400 K.C.
5	1400 K.C.	*	To Special Dummy	8	1400 K.C.
6	600 K.C.	*	To Special Dummy	9	600 K.C.

* Use Special Dummy Part No. 1X26767 or Booster coil Part No. 24X26751 in series with a 35 Mmf. condenser.

Figure 2



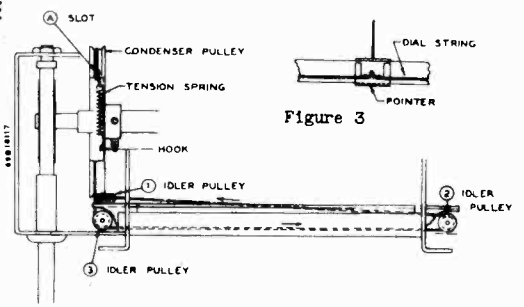
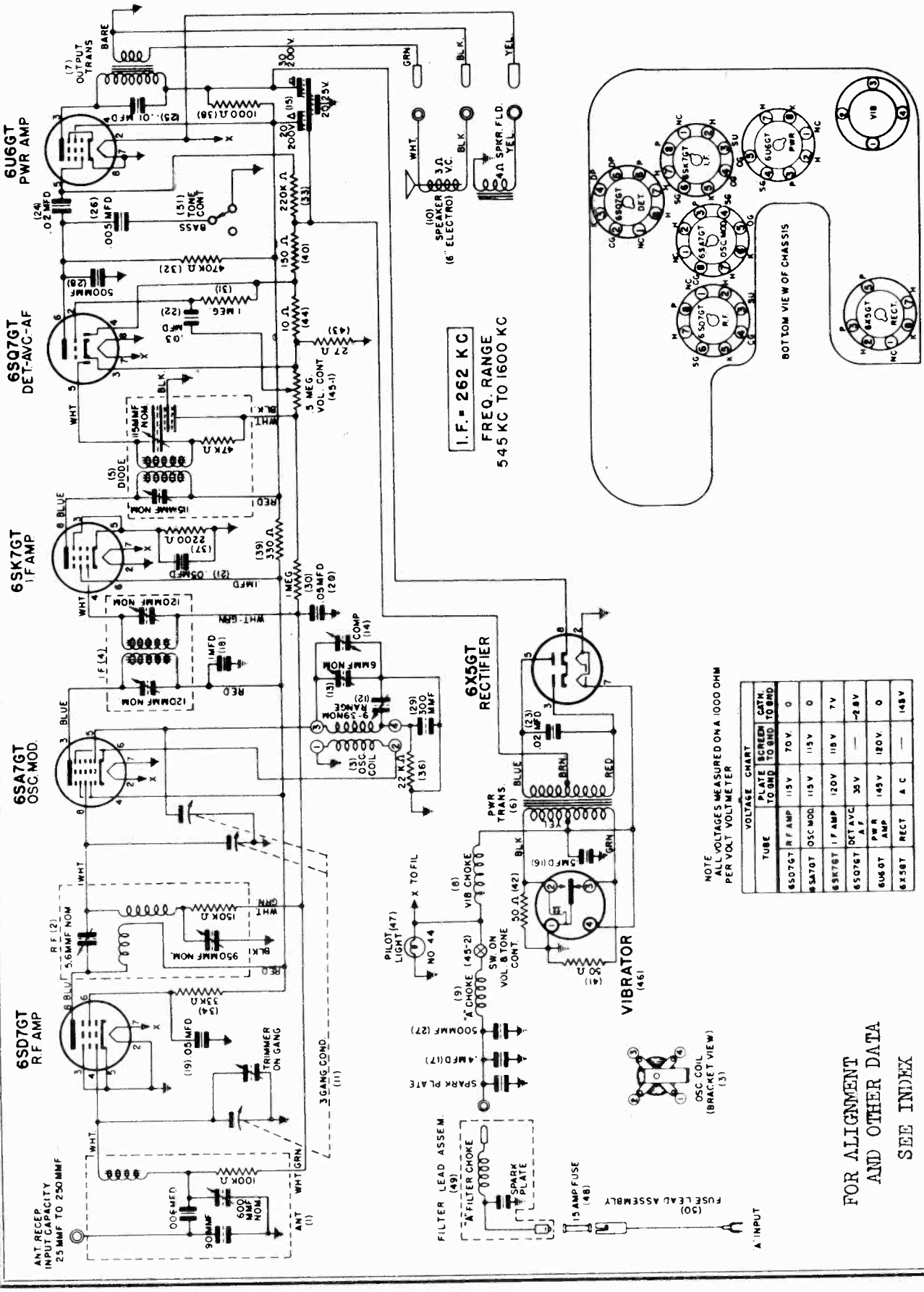


Figure 3

MODEL 43H

GALVIN MFG. CO.



NOTE
ALL VOLTAGES MEASURED ON A 1000 OHM PER VOLT VOLTMETER

VOLTAGE CHART

TUBE		PLATE TO GND	SCREEN TO GND	CATH. TO GND
6SD7GT	R.F. AMP	115 V	70 V.	0
6SA7GT	OSC. MOD.	115 V	115 V	0
6SK7GT	I.F. AMP	120 V	115 V	7 V
6SQ7GT	DET. AVC. A.F.	35 V	—	-2.8 V
6U6GT	PWR. AMP	145 V	120 V.	0
6X5GT	RECT.	A.C.	—	148 V

TUNING CORD

MODEL 43H

1. Remove the chassis from the housing and place on service bench.
2. Remove the broken string.
3. Turn the gang to fully meshed position.
4. Cut a length of 30 lb. silk fish cord 25 inches long.
5. Thread one end of cord thru hole (A) in drive pulley and with an ordinary paper clip fasten to tuning shaft bracket so that cord will stay in place.
6. In a clockwise direction wind cord one full turn around drive pulley and up to tuning shaft. See Fig. 2.
7. Route cord 8 turns around tuning shaft as shown in Fig. 2 and down to drive pulley.
8. Continue in a clockwise direction around drive pulley to hole (A).
9. Thread both ends of cord (inside pulley) thru eyelet (Part No. 557824) and knot ends together.
10. Fasten one end of spring (Part No. 41A14759) to cord and other end to hole (B) in drive pulley.
11. Cut off surplus cord and place drop of shellac on cord knot.
12. Pinch eyelet on cord with a pair of pliers.

POINTER CORD

1. Remove the chassis from housing and place on service bench.
2. Remove broken string.
3. Turn the gang to fully meshed position.
4. Cut a length of 18 lb. silk fish cord 27 inches long.
5. Thread one end of cord thru hole (C) in pointer pulley and with an ordinary paper clip fasten to the tuning shaft bracket to hold it in place. See Fig. 3.
6. In a counter-clockwise direction route cord to idler pulley No. 1 and around it in a clock-wise direction.
7. Route cord across chassis to idler pulley No. 2 and around it in a clock-wise direction.
8. Route cord back across chassis and around idler pulley No. 3.
9. Route cord counter-clockwise around pointer pulley to hole (C).
10. Remove the paper clip from end of cord and knot the two ends of cord together inside of pointer pulley.
11. Fasten one end of spring (Part No. 41A11091) to cord and the other end to hole in pointer pulley.
12. Cut off surplus cord. Place a drop of shellac on cord knot.
13. To set pointer to correct frequency, tune in a station of known frequency and adjust pointer on string. Fasten to string with a drop of shellac.

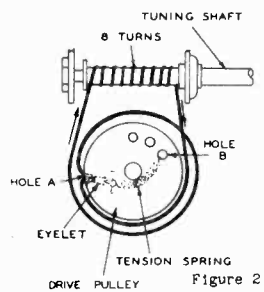


Figure 2

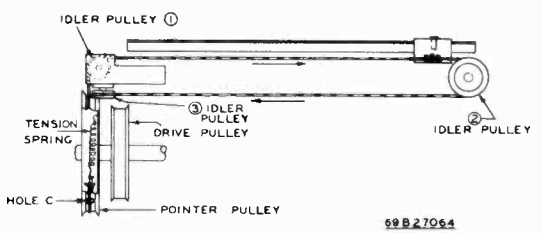


Figure 3

TUNING CORD

MODEL 44K

1. Remove the chassis from the housing, and place on service bench.
2. Remove the broken string.
3. Turn the condenser gang to fully meshed position.
4. Cut a length of 30 lb. silk fish cord 25 inches long.
5. Thread one end of cord through hole (X) in drive pulley and with an ordinary paper clip fasten to tuning control bracket so that cord will stay in place.
6. In a clockwise direction, wind cord one full turn around drive pulley and up to tuning shaft. (See Fig. 2.)
7. Route cord 6 turns around tuning shaft as shown in Fib. 2 and down to drive pulley.
8. Continue in a clockwise direction around drive pulley and to hole (X).
9. Slip the two cord ends through eyelet (Part No. 557824) inside of pulley.
10. Knot the two cord ends together and fasten to one end of spring (Part No. 41A14759). Hook other end of spring to hole (Y) in drive pulley.
11. With a pair of pliers pinch eyelet on cord and place drop of shellac on cord knot.

POINTER CORD

1. Remove the chassis from housing and place on service bench.
2. Remove broken string.
3. Set condenser gang to fully meshed position.
4. Cut a length of 18 lb. silk fish cord 27 inches long.
5. Thread one end of cord through hole (C) in condenser pulley and with an ordinary paper clip fasten it to the tuning shaft bracket to hold in place. (See Fig. 3).
6. Route cord from hole (C) around idler pulley No. 1 in a clockwise direction.
7. Route string across chassis to idler pulley No. 2, and around it in a counter-clockwise direction.
8. Route cord back across chassis and around idler pulley No. 3.
9. Route cord down and around condenser pulley to hole (C).
10. Remove the paper clip from end of cord and knot the two ends of cord together inside of drive pulley; fasten one end of spring (Part No. 41A11091) to cord and the other end to hook in condenser pulley.
11. Cut off surplus cord.
12. To set pointer to correct frequency, tune in a station of known frequency and adjust pointer on string.
13. Fasten pointer to string with a drop of shellac. Place a drop of shellac on cord knot.

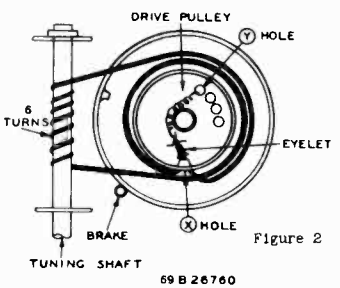


Figure 2

MODEL 44 K

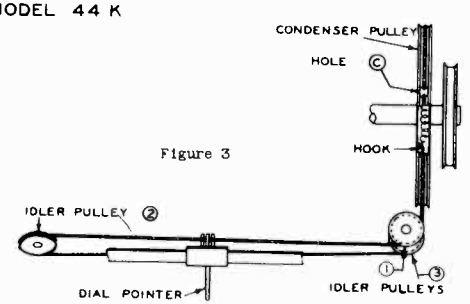
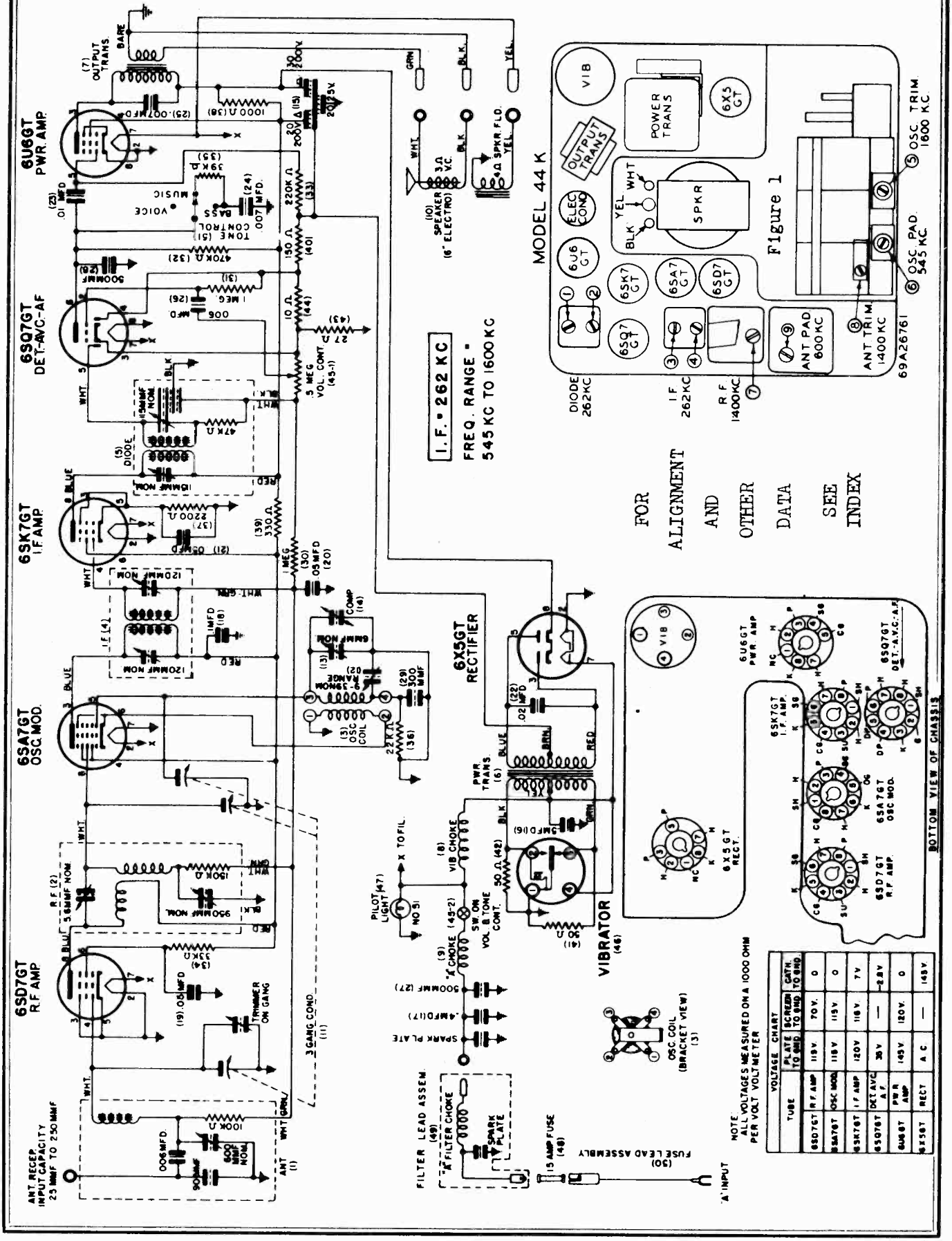


Figure 3

MODEL 44K

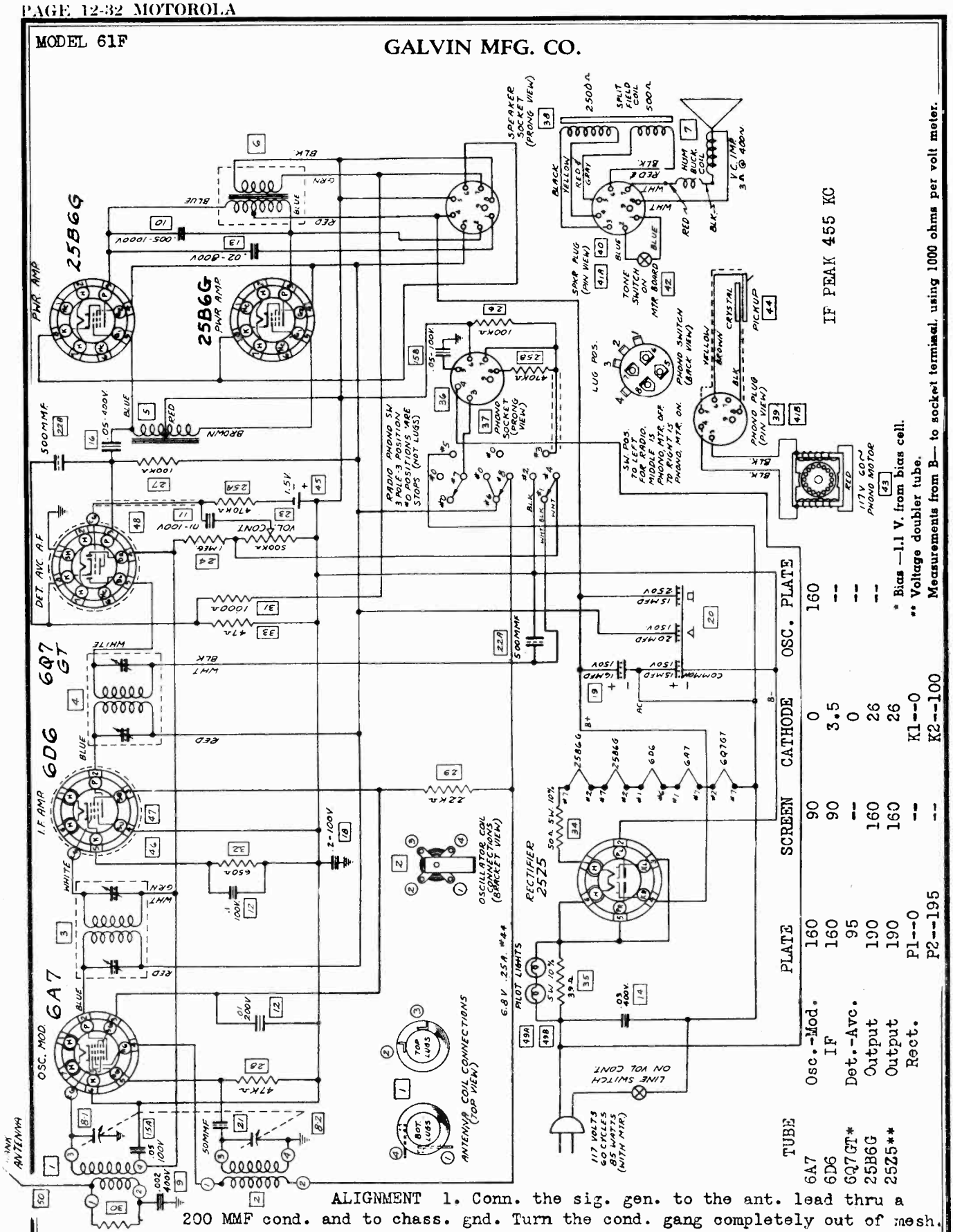
GALVIN MFG. CO.



TUBE	PLATE TO GND	SCREEN TO GND	CATH. TO GND
6SD7GT R.F AMP	115 V.	70 V.	0
6SA7GT OSC MOD.	115 V.	115 V.	0
6SK7GT I.F AMP.	120 V.	110 V.	7 V.
6SQ7GT DET. AVC A.F.	35 V.	—	-2.5 V.
6U6GT PWR AMP.	145 V.	120 V.	0
6X5GT RECT.	A.C.	—	145 V.

MODEL 61F

GALVIN MFG. CO.



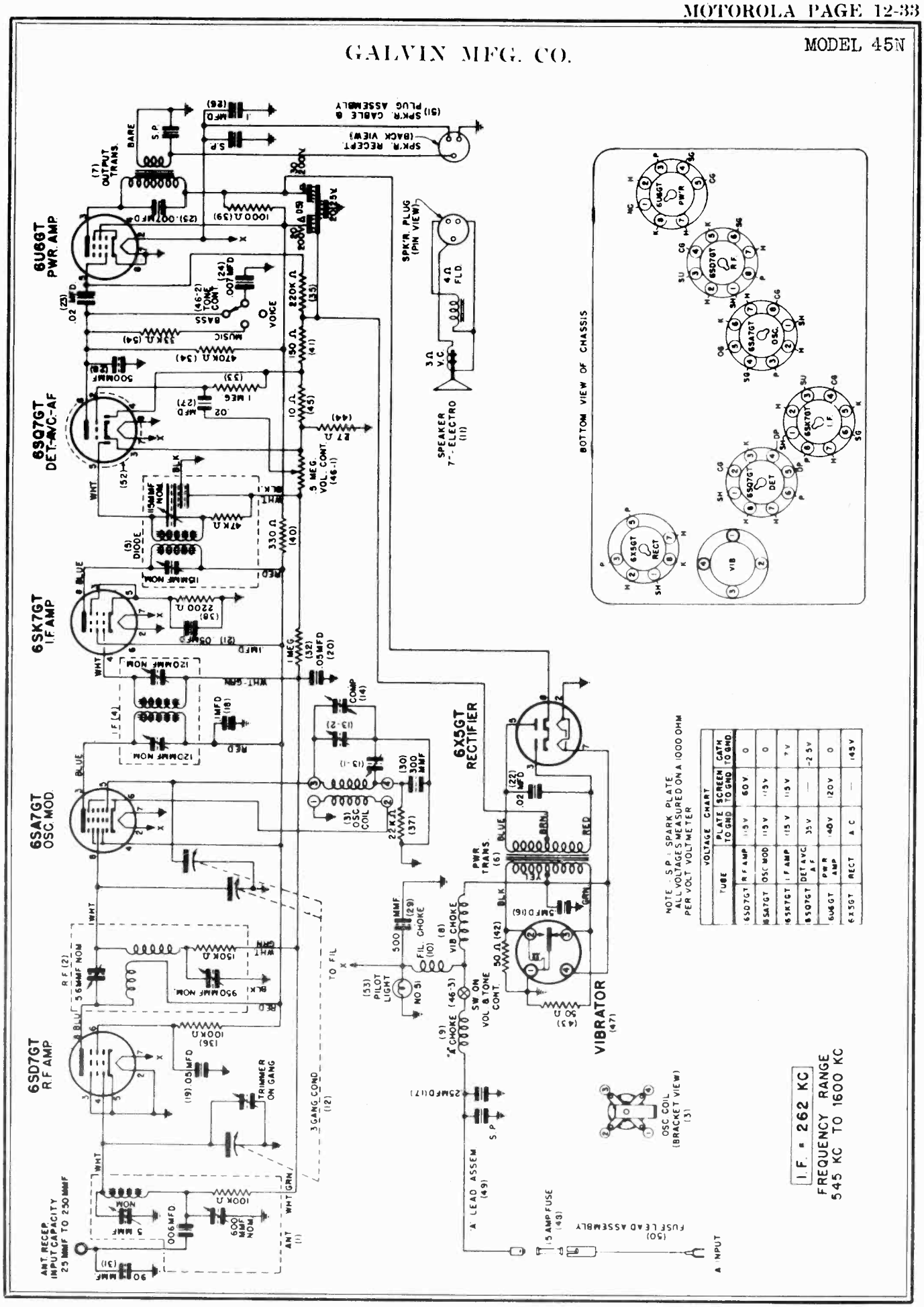
TUBE		PLATE	SCREEN	CATHODE	OSC. PLATE
6A7	Osc.-Mod.	160	90	0	160
6D6	IF	160	90	3.5	--
6Q7GT*	Det.-Avc.	95	--	0	--
25B6G	Output	190	160	26	--
2525**	Output	190	160	26	--
	Rect.	P1--0	--	K1--0	
		P2--195	--	K2--100	

* Bias —1.1 V. from bias cell.
** Voltage doubler tube.
Measurements from B— to socket terminal, using 1000 ohms per volt meter.

ALIGNMENT 1. Conn. the sig. gen. to the ant. lead thru a 200 MMF cond. and to chass. gnd. Turn the cond. gang completely out of mesh. o.p. meter across the spkr. voice coil. 2. Set sig. gen. at 455 KC; carefully adj. the two IF trims. and the two DIODE trims. to point show. highest read. on o.p. meter. Advance sig. gen. atten. if necessary. 3. Turn sig. gen. to 1750 KC, and with cond. gang completely out of mesh adj. OSC. trim. until 1750 KC sig. is heard. 4. Set sig. gen at 1400 Adj. ANT. trim. to point showing highest reading on o.p. meter.

GALVIN MFG. CO.

MODEL 45N



Model 45-N
SPECIFICALLY DESIGNED TO INSTALL IN 1941 NASH

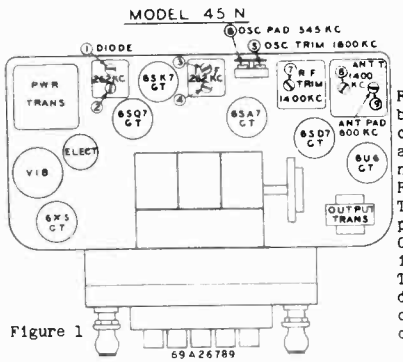


Figure 1

DIAL CORD INSTRUCTIONS

TUNING CORD

Remove the die cast escutcheon and the bottom cover from the receiver. The escutcheon is fastened by means of 9 screws and the bottom cover is fastened with two nuts and lockwashers.
Remove the broken string.
Turn the condenser gang to fully meshed position.
Cut a length of 30 lb. silk fish cord 25 inches long.
Thread one end of cord thru hole (X) in drive pulley and with an ordinary paper clip fasten cord to tuner bracket so that cord will stay in place.

(cont. in next column)

TUNING CORD (cont.)

In a counter-clockwise direction wind cord one turn on drive pulley and route to idler pulley No. 4. (See Fig. 2).
Route cord over idler pulley No. 4 and down to tuning shaft.
Wind four full turns in a clock-wise direction on tuning shaft and continue down to idler pulley.
Route cord under idler pulley No. 5 and to hole (X) in drive pulley.
Thread cord ends through eyelet (Part No. 5S7824) inside of pulley.
Knot cord ends together and fasten to one end of spring (Part No. 41A14759). Hook other end of spring to hole (Y) in drive pulley.
With a pair of pliers pinch eyelet on cord and place drop of shellac on cord knot.

POINTER CORD

1. Remove the die cast escutcheon and the bottom cover from the receiver (see step 1 above).
2. Remove the broken string.
3. Turn gang to fully opened position.
4. Cut a length of 18 lb. silk fish cord 27 inches long.
5. Thread one end of cord thru hole (C) in condenser pulley. See Fig. 3. With an ordinary paper clip fasten to tuner bracket to hold it in place.
6. Route cord in a counter-clockwise direction from hole (C) to idler pulley No. 1.
7. Route cord clockwise around pulley No. 1 and across chassis to idler pulley No. 2.
8. Continue counter-clockwise around pulley No. 2 and back across the chassis to idler pulley No. 3.
9. Continue around idler pulley No. 3 and in a counter-clockwise direction around condenser pulley to hole (C).
10. Remove the paper clip and knot the two ends of cord together inside of pulley. Fasten one end of spring (Part No. 41A11091) to cord and hook other end to hole in condenser pulley. Place a drop of shellac on cord knot.
11. Cut off surplus cord and assemble pointer to cord.
12. To set pointer to correct frequency, tune in a station of known frequency and adjust pointer on cord. Fasten with a drop of shellac.
13. Minor calibration errors may be corrected by loosening set screw (S) in drive pulley and moving condenser pulley. Tighten set screw (S) after adjustment.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
25,000	262 K.C.	I.F. Grid	.1 Mfd.	.5 Meg.	1.74
825	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
835	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
14	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	1.74
3	600 K.C.	Ant. Lead	***	None	1.74

Volume Control Set At Maximum. Tone Control Set At Voice.
* 1 Watt = 1.74 Volts. ** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X26767.

ALIGNMENT CHART

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	262 K.C.
2	1600 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1600 K.C.
3	545 K.C.	.1 Mfd.	Osc.-Mod. Grid	6	545 K.C.
4	1400 K.C.	*	To Special Dummy	7	1400 K.C.
5	1400 K.C.	*	To Special Dummy	8	1400 K.C.
6	600 K.C.	*	To Special Dummy	9	600 K.C.

* Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24K26751 in series with a 35 Mmf. Condenser.

MODEL 45 N

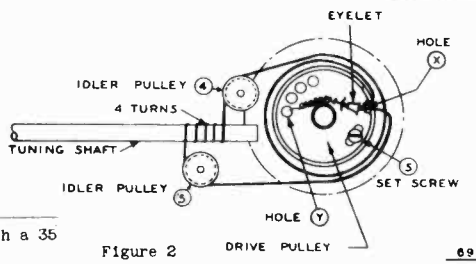


Figure 2

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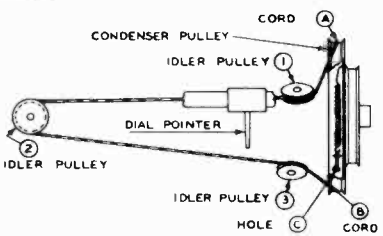
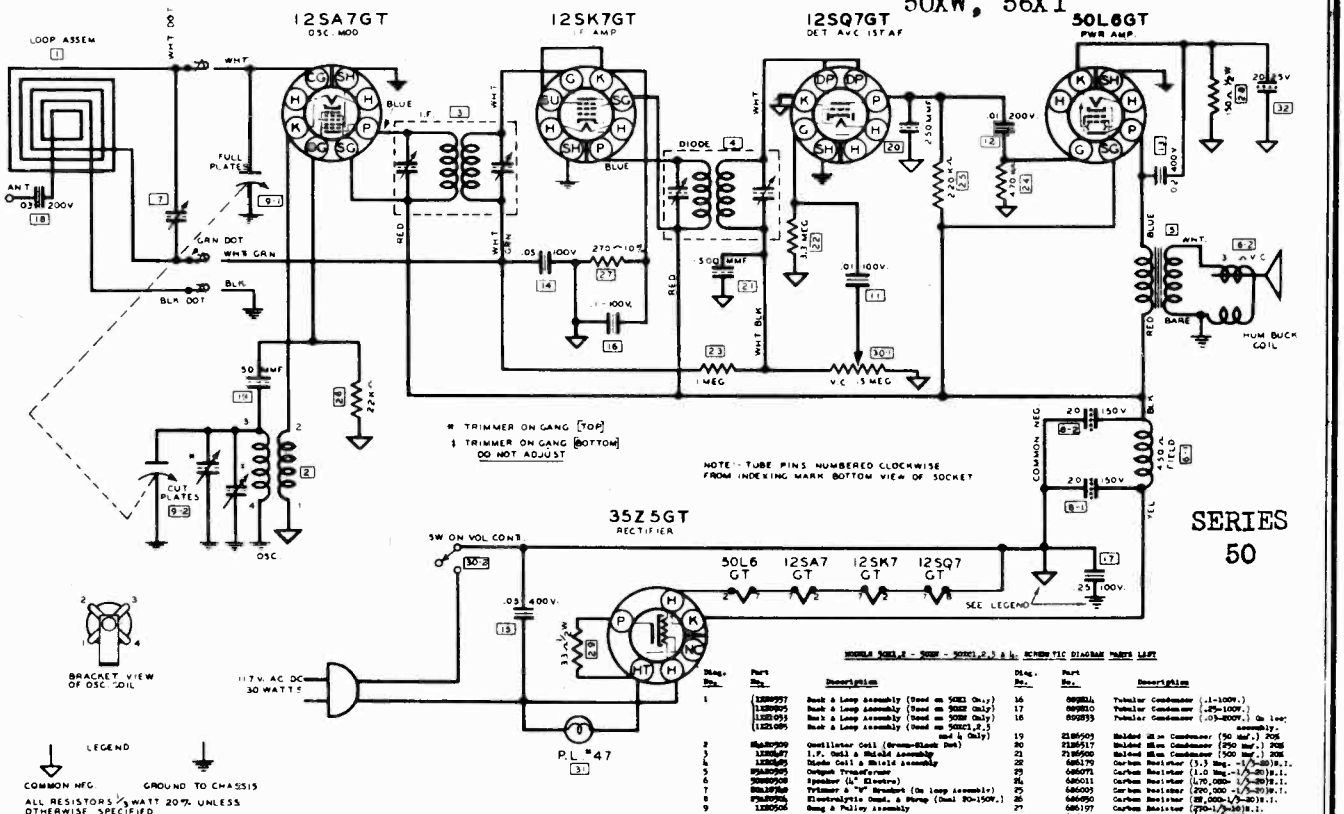
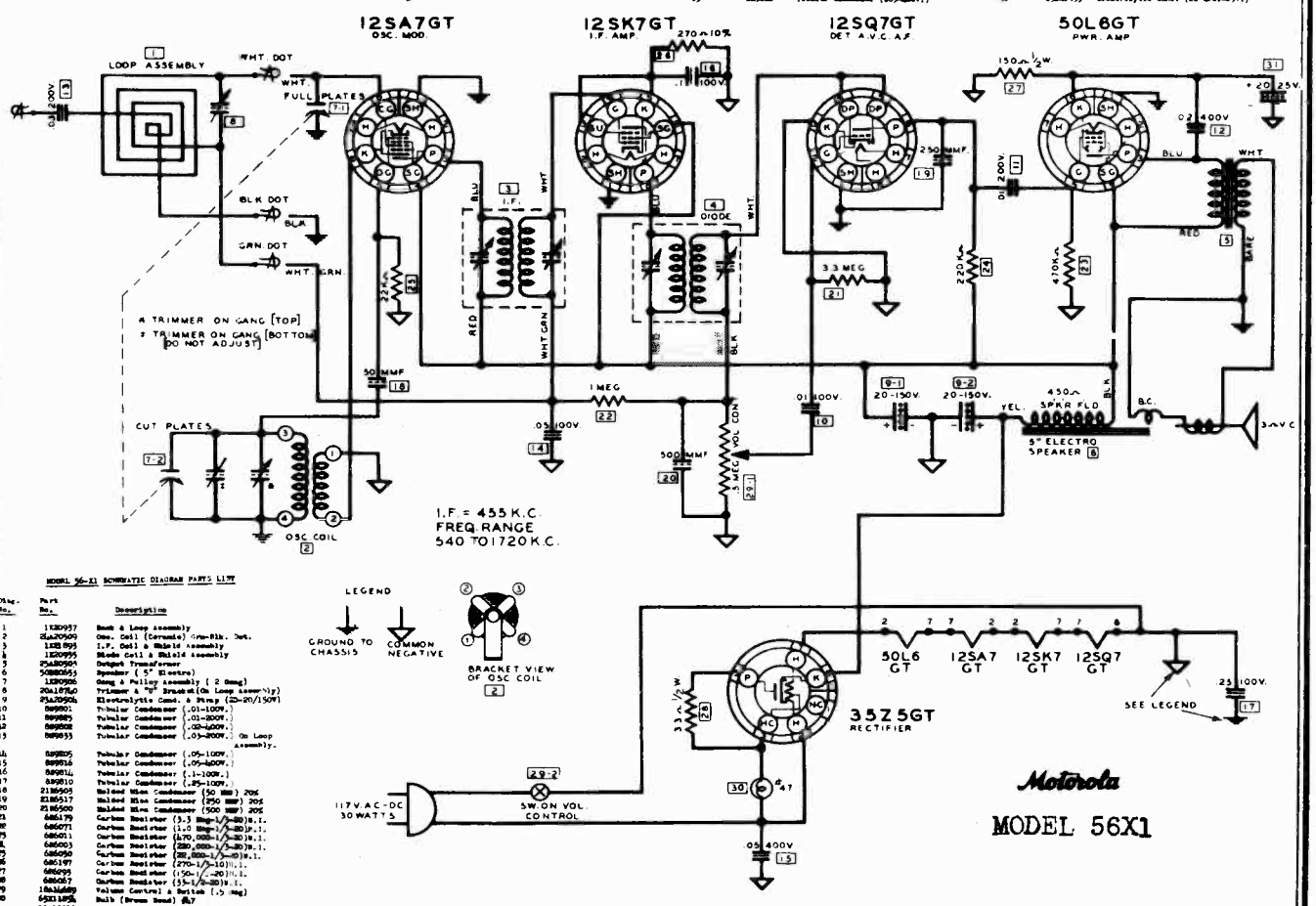


Figure 3

GALVIN MFG. CO.

MODELS 50X1, 50X2, 50XC1, 50XC2, 50XC3, 50XC4, 50XW, 56X1



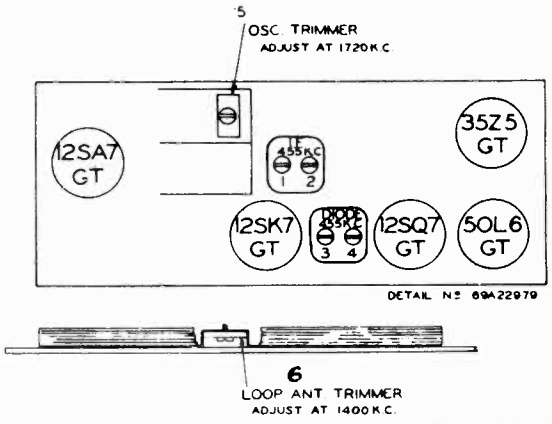


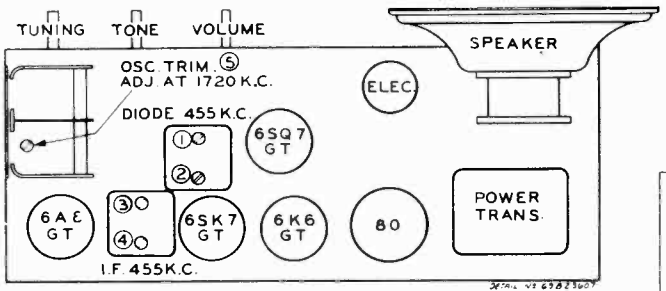
FOR MODELS, See Below

GALVIN MFG. CO.

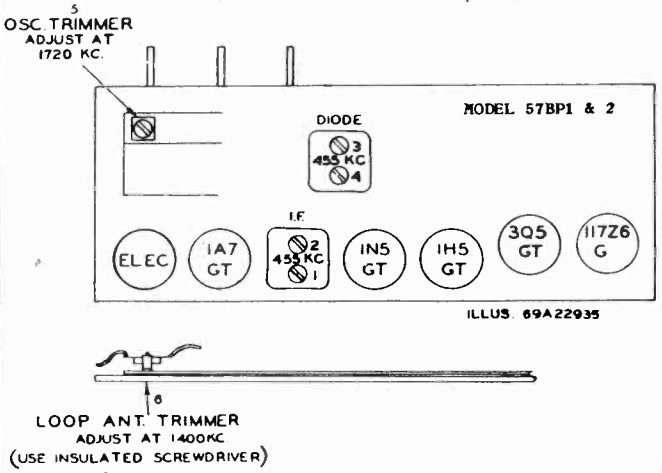
— Model 50X1 — — Model 50X2 — — Model 50XW —

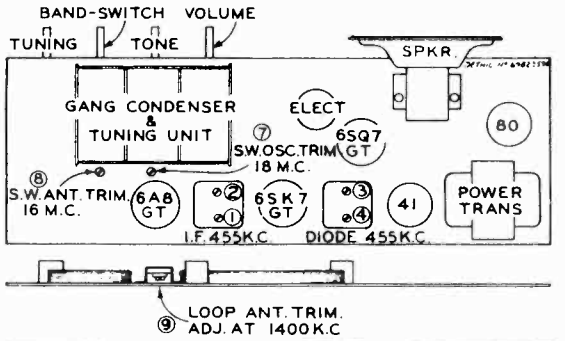
— Model 50XC -1 and 2 — — Model 50XC -3 and 4 —

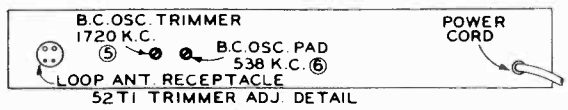


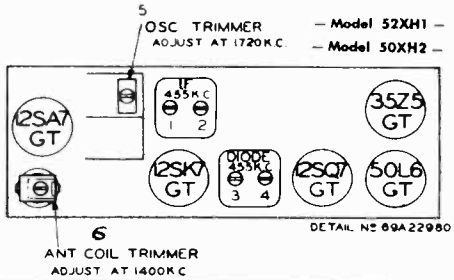


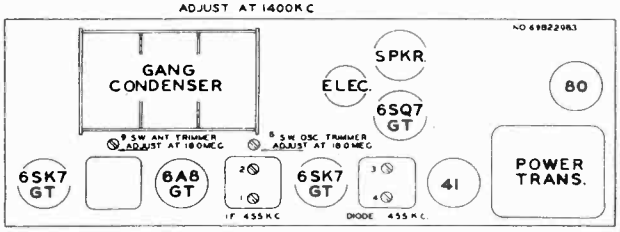
TRIMMER ADJ. DETAIL FOR 50W, 40-50W.



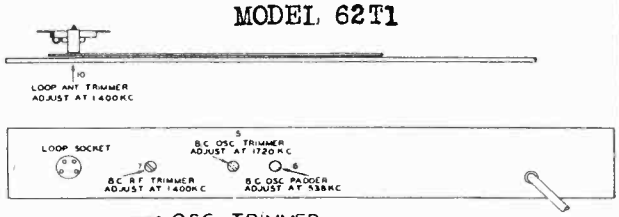


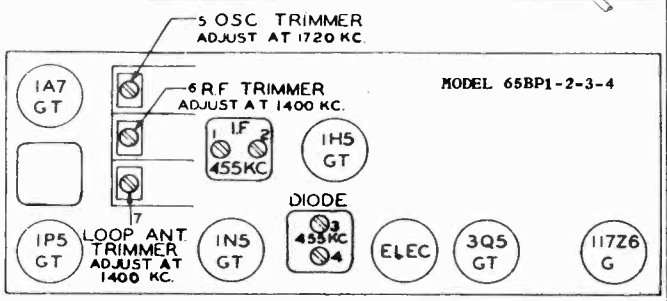


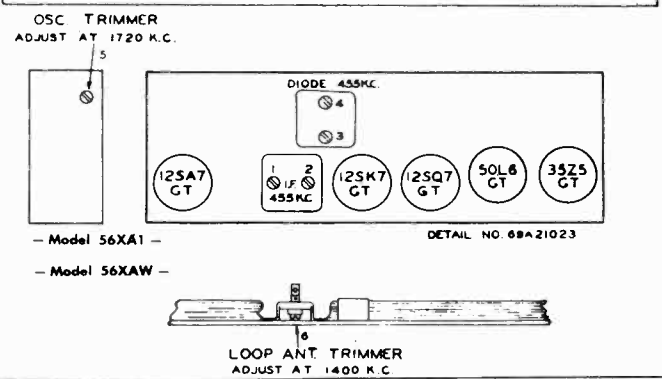




MODEL 62T1

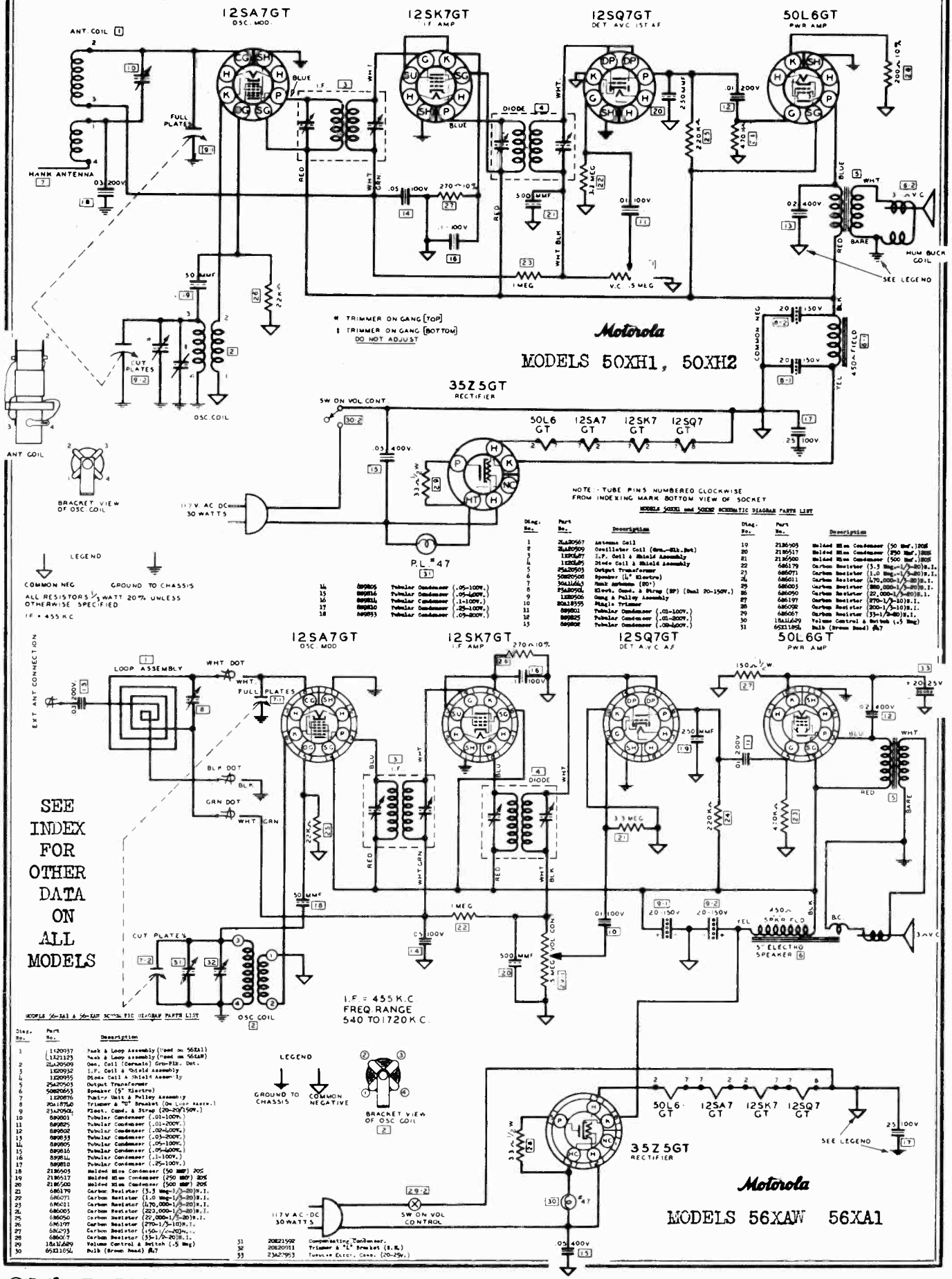






MODELS 50XH1, 50XH2
MODELS 56XA1, 56XAW

GALVIN MFG. CO.

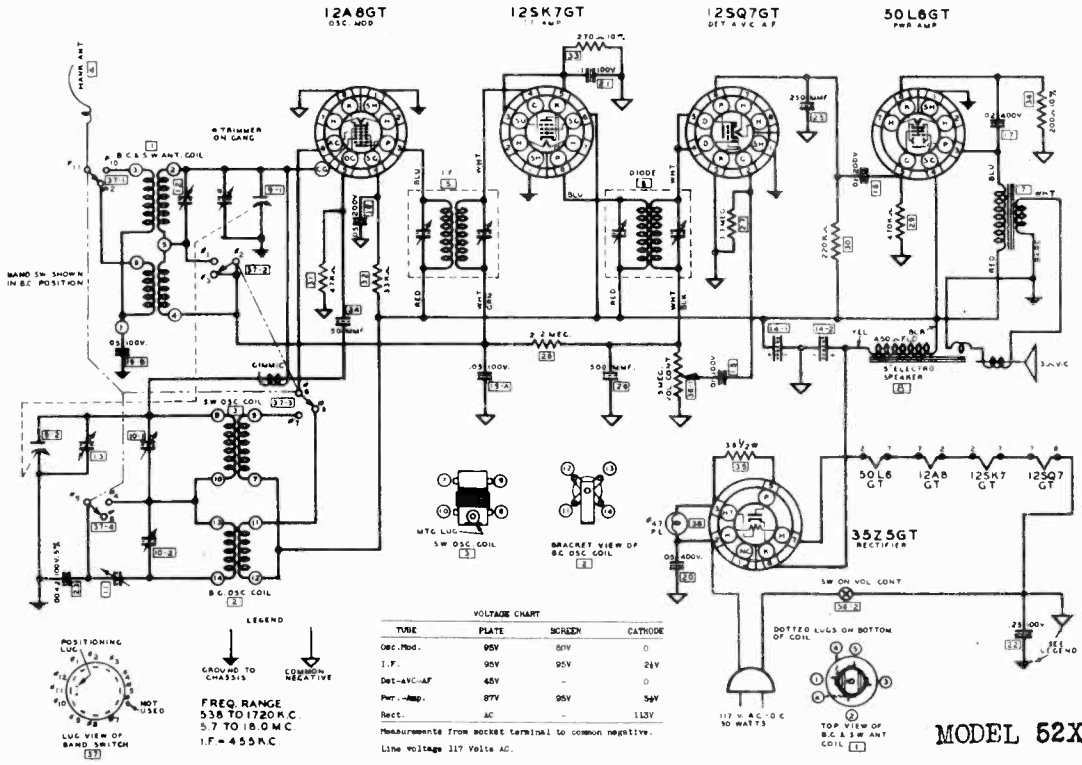


Diag. No.	Part No.	Description
1	2LA20567	Antenna Coil
2	2LA20509	Oscillator Coil (6mc.-8Mc.Brd.)
3	1X2L427	I.F. Coil & Shield Assembly
4	1X2L65	Diode Coil & Shield Assembly
5	25A20503	Output Transformer
6	50B20508	Speaker (4" Electro)
7	50A11643	Hank Antenna (20")
8	25A20504	Elect. Cond. & Strap (BP) (Dual 20-150V.)
9	1X20506	Gang & Pulley Assembly
10	20A18595	Magic Trimmer
11	89801	Tubular Condenser (.02-100V.)
12	89825	Tubular Condenser (.01-200V.)
13	89802	Tubular Condenser (.02-400V.)
14	89805	Tubular Condenser (.05-100V.)
15	89816	Tubular Condenser (.05-400V.)
16	89811	Tubular Condenser (.1-100V.)
17	89810	Tubular Condenser (.25-100V.)
18	2186503	Molded Mica Condenser (50 MMF) 20%
19	2186517	Molded Mica Condenser (250 MMF) 20%
20	2186500	Molded Mica Condenser (500 MMF) 20%
21	686179	Carbon Resistor (3.3 Meg-½-20%) M.I.
22	686071	Carbon Resistor (1.0 Meg-½-20%) M.I.
23	686011	Carbon Resistor (470,000-½-20%) M.I.
24	686003	Carbon Resistor (220,000-½-20%) M.I.
25	686050	Carbon Resistor (22,000-½-20%) M.I.
26	686197	Carbon Resistor (270-½-10%) M.I.
27	686293	Carbon Resistor (150-½-20%) M.I.
28	686047	Carbon Resistor (33-½-20%) M.I.
29	18A12689	Volume Control & Switch (.5 Meg)
30	6SX105A	Bulb (Brown Bead) #47
31	20B21592	Compensating Condenser
32	20B20911	Trimmer & "L" Bracket (B.K.)
33	23A27953	Tubular Elect. Cond. (20-25v.)

MODELS 52XAH1, B-150

Model B-150

GALVIN MFG. CO.



VOLTAGE CHART

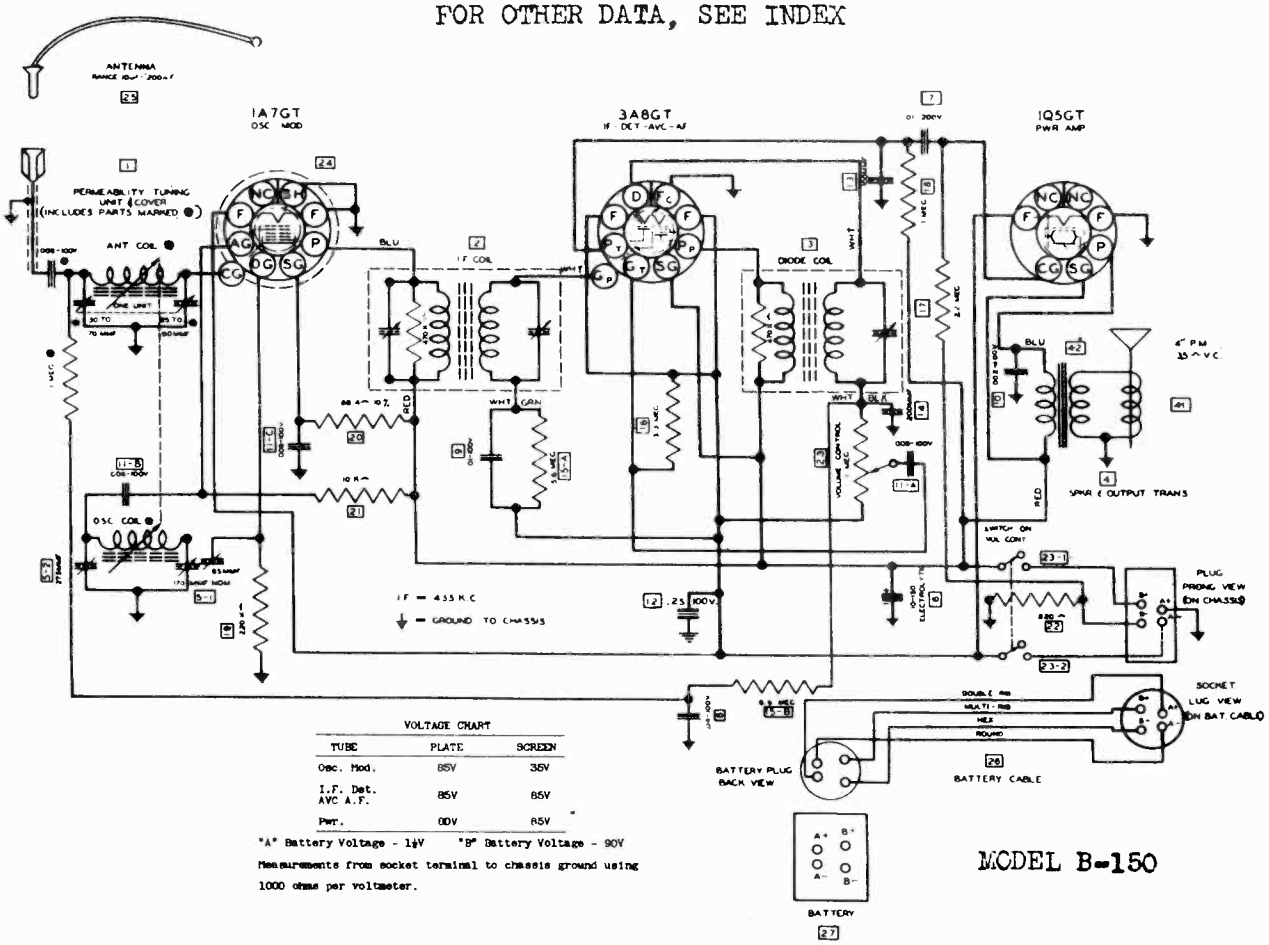
TUBE	PLATE	SCREEN	CATHODE
Osc.Mod.	95V	80V	0
I.F.	95V	95V	2½V
Det-AVC-AF	45V	-	0
Pwr.-Amp.	87V	96V	5½V
Rect.	AC	-	113V

Measurements from socket terminal to common negative.

Line voltage 117 Volts AC.

MODEL 52XAH1

FOR OTHER DATA, SEE INDEX



VOLTAGE CHART

TUBE	PLATE	SCREEN
Osc. Mod.	85V	35V
I.F. Det. AVC A.F.	85V	85V
Pwr.	80V	85V

"A" Battery Voltage - 1½V "B" Battery Voltage - 90V

Measurements from socket terminal to chassis ground using 1000 ohms per voltmeter.

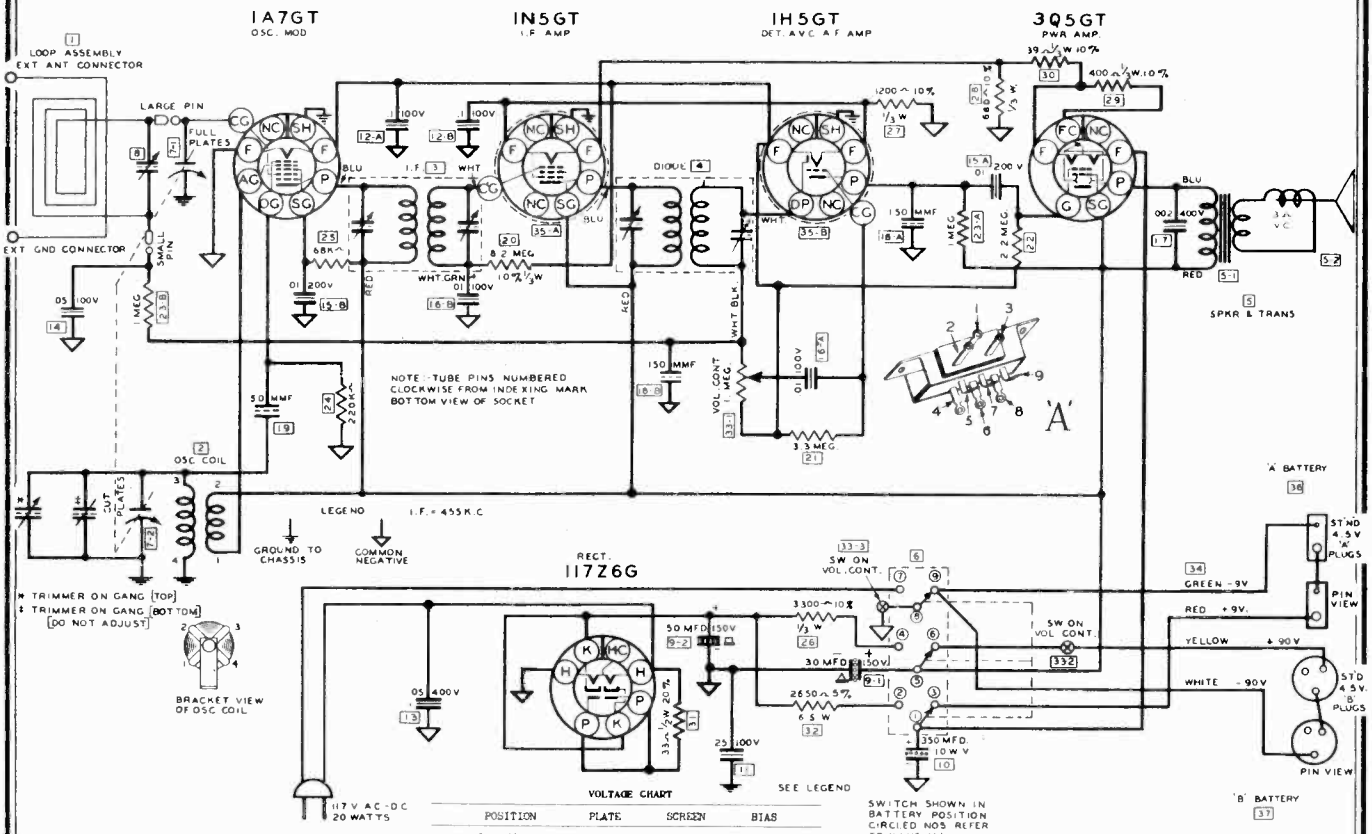
MODEL B-150

GALVIN MFG. CO.

MODELS 65BP1, 65BP2, 65BP3, 65BP4

MODELS 57BP1, 57BP2

CIRCUIT DIAGRAM MODELS 57BP1 & 2



VOLTAGE CHART

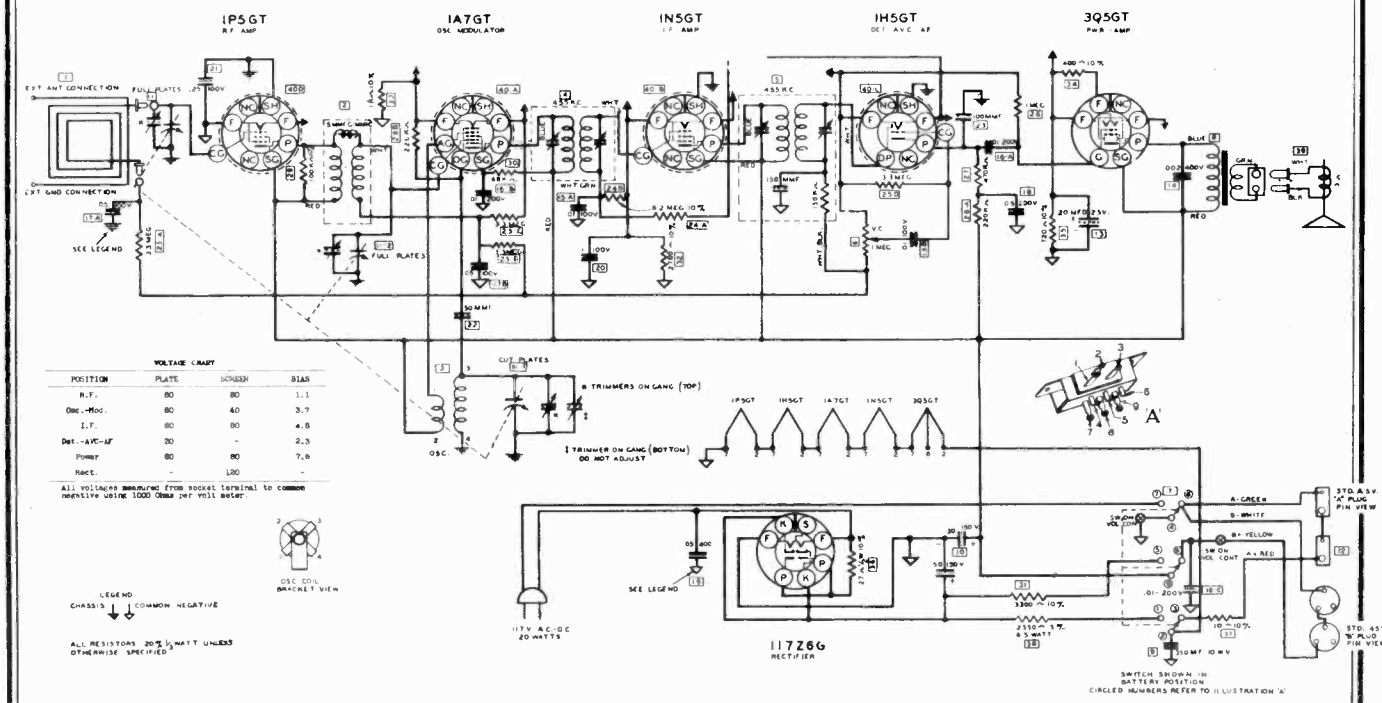
POSITION	PLATE	SCREEN	BIAS
Osc.-Mod.	85	42	1.1
I.F.	85	85	3.7
Det. AVC.-AF	15	-	2.3
Power	85	87	8.5
Rect.	-	123	-

Line Voltage - 117 Volts A.C.

All voltages measured from socket terminal to common negative using 1000 Ohms per volt meter.

FOR OTHER DATA, SEE INDEX

CIRCUIT DIAGRAM MODELS 65BP1-2-3-4



VOLTAGE CHART

POSITION	PLATE	SCREEN	BIAS
R.F.	80	80	1.1
Osc.-Mod.	80	40	3.7
I.F.	80	80	4.8
Det.-AVC-AF	20	-	2.3
Power	80	80	7.8
Rect.	-	120	-

All voltages measured from socket terminal to common negative using 1000 Ohms per volt meter.

ALIGNMENT CHART MODELS 57BP1 & 2

OPERATIONS IN ORDER	GANG CONDENSER SET AT	DUMMY ANTENNA	GENERATOR CONNECTED TO	ADJUST TRIMMERS NO.	GENERATOR SET AT
1	Minimum 1720 K.C.	.1	Osc-Mod. Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	200 Mmf.	External Antenna	5	1720 K.C.
3	1400 K.C.	200 Mmf.	External Antenna	6	1400 K.C.

Volume Control Set at Maximum

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODELS 57BP1 & 2

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
4200	455	I.F. Grid	.1 Mfd.	.5 Meg	.38
85	455	Mod. Grid	.1 Mfd.	.5 Meg	.38
95	600	Mod. Grid	.1 Mfd.	.5 Meg	.38
26	600	Ant. Terminal	400 Ohms	None	.38

Volume Control set at maximum.
* .05 Watts = .38 Volts.

** Output meter connected across voice coil.

ALIGNMENT CHART MODELS 65BP1-2-3-4

OPERATIONS IN ORDER	GANG CONDENSER SET AT	DUMMY ANTENNA	GENERATOR CONNECTED TO	ADJUST TRIMMERS NO.	GENERATOR SET AT
1	Minimum 1720 K.C.	.1	Osc-Mod. Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	200 Mmf.	External Antenna	5	1720 K.C.
3	1400 K.C.	200 Mmf.	External Antenna	6	1400 K.C.
4	1400 K.C.	200 Mmf.	External Antenna	7	1400 K.C.

Volume Control Set at Maximum

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODELS 65BP1-2-3-4

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
7100	455	I.F. Grid	.1 Mfd.	.5 Meg	.38
185	455	Mod. Grid	.1 Mfd.	.5 Meg	.38
200	600	Mod. Grid	.1 Mfd.	.5 Meg	.38
11	600	R.F. Grid	.1 Mfd.	.5 Meg	.38
2	600	Ant. Terminal	400 Ohms	None	.38

Volume Control set at maximum.
* .05 Watts = .38 Volts.

** Output meter connected across voice coil.

ALIGNMENT CHART

MODELS 60X1 - 60X2 - 60XW - 60XA1 - 60XA2

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected to	Adjust Trimmer No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	Osc-Mod Grid	1-2-3-4-	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	Osc-Mod Grid	5	455 K.C.
3	Minimum 1720 K.C.	.1 Mfd.	Osc-Mod Grid	6	1720 K.C.
4	1400 K.C.	200 Mmf.	External Antenna Terminal	7	1400 K.C.

Volume Control set at Maximum
NOTE: Wave Trap adjustment set for minimum deflection on output meter.

ALIGNMENT CHART

MODEL 61XW

Operations In Order	Gang Condenser Set At	Dummy Antenna	Band Switch Set At	Generator Connected to	Adjust Trimmer No.	Generator Set At
1	Minimum 1600 K.C.	.1 Mfd.	B.C.	Osc-Mod. Grid	1-2-3-4	455 K.C.
2	Minimum 1600 K.C.	.1 Mfd.	B.C.	Osc-Mod. Grid	5	455 K.C.
3	Minimum 1600 K.C.	.1 Mfd.	B.C.	Osc-Mod. Grid	6	1600 K.C.
4	1400 K.C.	200 Mmf.	B.C.	External Antenna Terminal	7	1400 K.C.
5	3.2 M.C.	400 ohms	S.W.	External Antenna Terminal	8	3.2 M.C.

Volume Control set at Maximum
NOTE: Wave Trap adjustment set for minimum deflection on output meter.

VOLTAGE CHART

TUBE	PLATE	SCREEN	CATHODE
R.F.	80V	80V	2.2
Osc.-Mod.	80V	80V	0.0
I.F.	80V	80V	2.0
Det-AVC-A.F.	45V	-	0.0
Output	75V	80V	4.5
Rect.	AC	-	100V.

All voltages measured from common negative with 1000 ohm per volt meter.
Line voltage 117 Volts AC

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
6800	455	I.F. Grid	.1 Mfd.	.5 Meg	.38
155	455	Mod. Grid	.1 Mfd.	.5 Meg	.38
170	600	Mod. Grid	.1 Mfd.	.5 Meg	.38
35	600	R.F. Grid	.1 Mfd.	.5 Meg	.38
6	600	Ant. Terminal	200 Mmf.	None	.38

Volume Control set at Maximum * .05 Watts = .38 Volts ** Output meter connected across voice coil.

ALIGNMENT CHART MODEL 83K1

Operations In Order	Gang Condenser Set At	Dummy Antenna	Band Switch Set At	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc.-Mod.Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc.-Mod.Grid	5	1720 K.C.
3	600 K.C.	.1 Mfd.	B.C.	Osc.-Mod.Grid	6	600 K.C.
4	1400 K.C.	400 Ohms	B.C.	External Antenna Terminal	7	1400 K.C.
5	5.8 M.C.	.1 Mfd.	Pol.	Osc.-Mod.Grid	8	5.8 M.C.
6	4.1 M.C.	400 Ohms	Pol.	External Antenna Terminal	9	4.1 M.C.
7	18 M.C.	.1 Mfd.	S.W.	Osc.-Mod.Grid	10	18 M.C.
8	16 M.C.	400 Ohms	S.W.	External Antenna Terminal	11	16 M.C.

Volume Control Set at Maximum. Tone Control Set in Treble Position.

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODEL 83K1

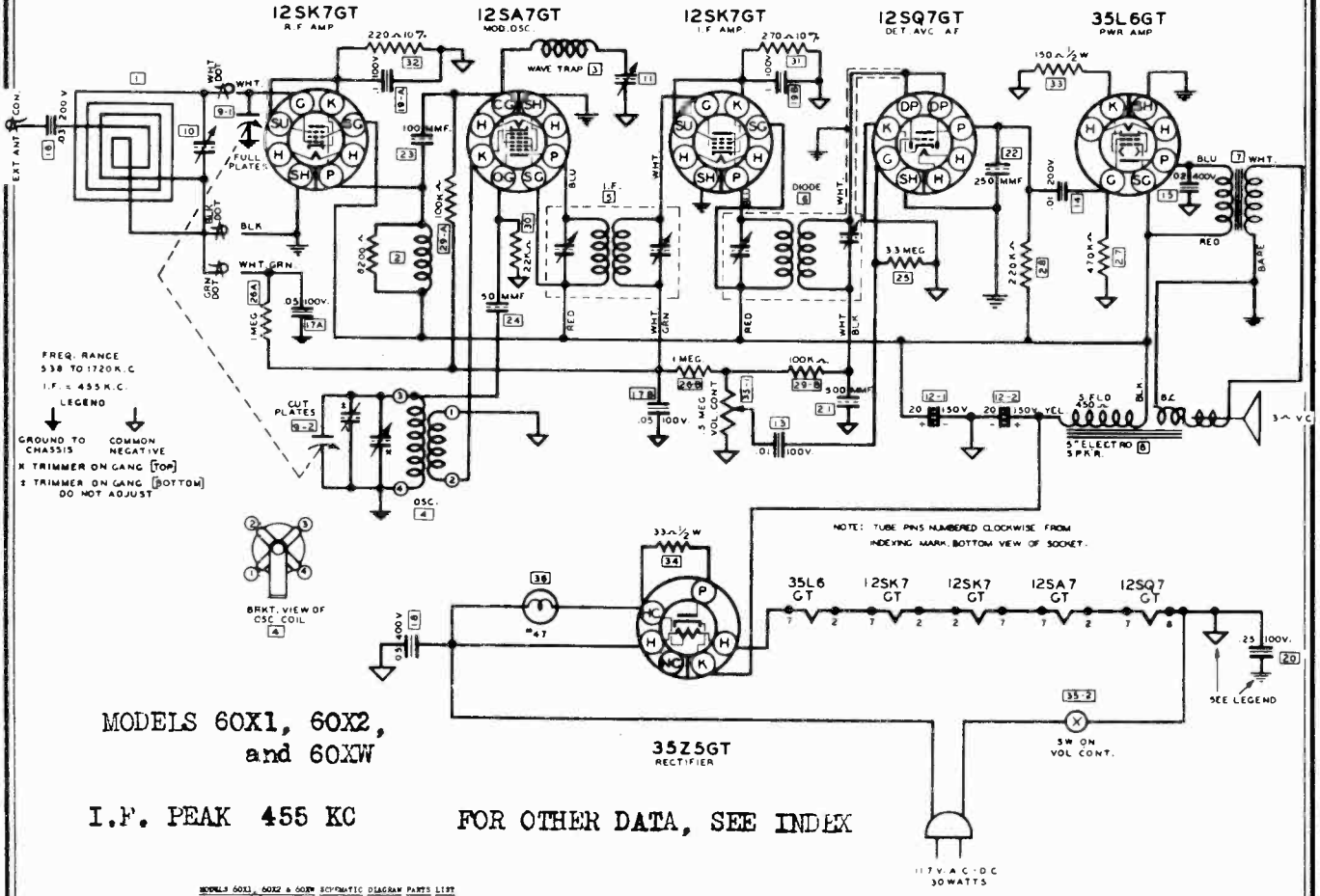
Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
3500	455	I.F. Grid	.1 Mfd.	.5 Meg.	.63
40	455	Mod. Grid	.1 Mfd.	.5 Meg.	.63
45	600	Mod. Grid	.1 Mfd.	.5 Meg.	.63
4	600	R.F. Grid	.1 Mfd.	.5 Meg.	.63
3	600	Antenna Terminal	400 Ohms	None	.63

Volume Control Set at Maximum.
* .05 Watts = .63 Volts

** Output meter connected across voice coil.

MODELS 60X1, 60X2, 60XW

GALVIN MFG. CO.

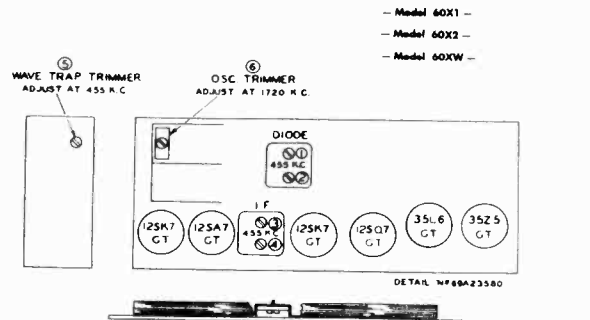


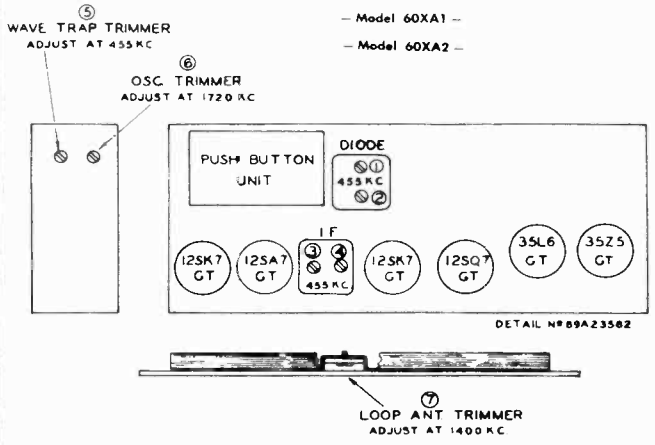
MODELS 60X1, 60X2, and 60XW

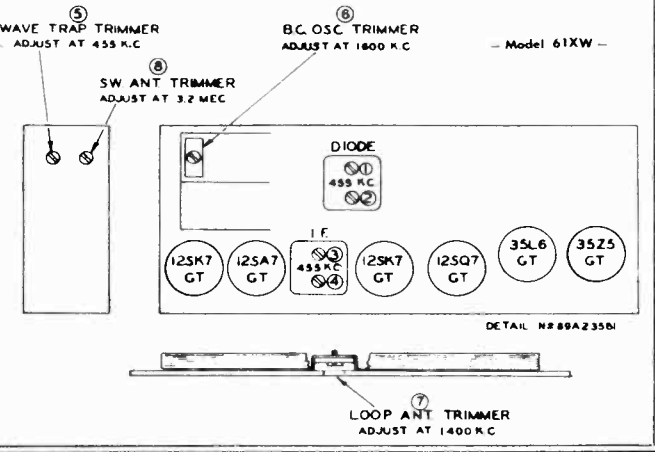
I.F. PEAK 455 KC FOR OTHER DATA, SEE INDEX

MODELS 60X1, 60X2 & 60XW SCHEMATIC DIAGRAM PARTS LIST

Diag. No.	Part No.	Description
	(1)2067L	Back & Loop Assembly (Used on 60X1 Only)
1	(1)20922	Back & Loop Assembly (Used on 60X2 Only)
	(1)21129	Back & Loop Assembly (Used on 60XW Only)
2	21A20559	R.F. Coupling Coil (Orng.-Red)
3	21A21858	Wave Trap Coil
4	21A20509	Oscillator Coil (Green-Black Dot)
5	1120646	I.F. Coil & Shield Assembly
6	1120643	Diode Coil & Shield Assembly
7	25A20503	Output Transformer
8	50A20563	Speaker (5" Electro)
9	1120508	Gang & Pulley Assembly
10	20A18710	Trimmer & "U" Bracket (On loop assembly)
11	20X21878	Trimmer Condenser
12	23A20504	Elect. Cond. & Strap (25-20 MFD/150V.)
13	899801	Tubular Condenser (.01-100V.)
14	899825	Tubular Condenser (.01-400V.)
15	899802	Tubular Condenser (.02-400V.)
16	899833	Tubular Condenser .05-100V.)(On loop assem.)
17-A	899805	Tubular Condenser (.05-100V.)
17-B	899805	Tubular Condenser (.05-100V.)
18	899816	Tubular Condenser (.05-400V.)
19-A	899814	Tubular Condenser (.1-140V.)
19-B	899814L	Tubular Condenser (.1-100V.)
20	899810	Tubular Condenser (.25-100V.)
21	2180500	Molded Mica Condenser (500 Mmf.) 20%
22	2186517	Molded Mica Condenser (250 Mmf.) 20%
23	2180511	Molded Mica Condenser (100 Mmf.) 20%
24	2180503	Molded Mica Condenser (50 Mmf.) 20 %
25	680179	Carbon Resistor (3.3 Meg.-1/2-20)B.I.
26-A	686-71	Carbon Resistor (1.0 Meg.-1/2-20)B.I.
26-B	686071	Carbon Resistor (1.0 Meg.-1/2-20)B.I.
27	686011	Carbon Resistor (470,000-1/2-20)B.I.
28	686003	Carbon Resistor (220,000-1/2-20)B.I.
29-A	686089	Carbon Resistor (100,000-1/2-20)B.I.
29-B	686029	Carbon Resistor (100,000-1/2-20)B.I.
30	686050	Carbon Resistor (22,000-1/2-20)B.I.
31	686197	Carbon Resistor (270-1/2-10)B.I.
32	686295	Carbon Resistor (220-1/2-10)B.I.
33	686298	Carbon Resistor (150-1/2-20)B.I.
34	686067	Carbon Resistor (33-1/2-20)B.I.
35	18A16689	Volume Control & Switch (.5 Meg.)
36	65X1185L	Bulb (Brown Bead) #47

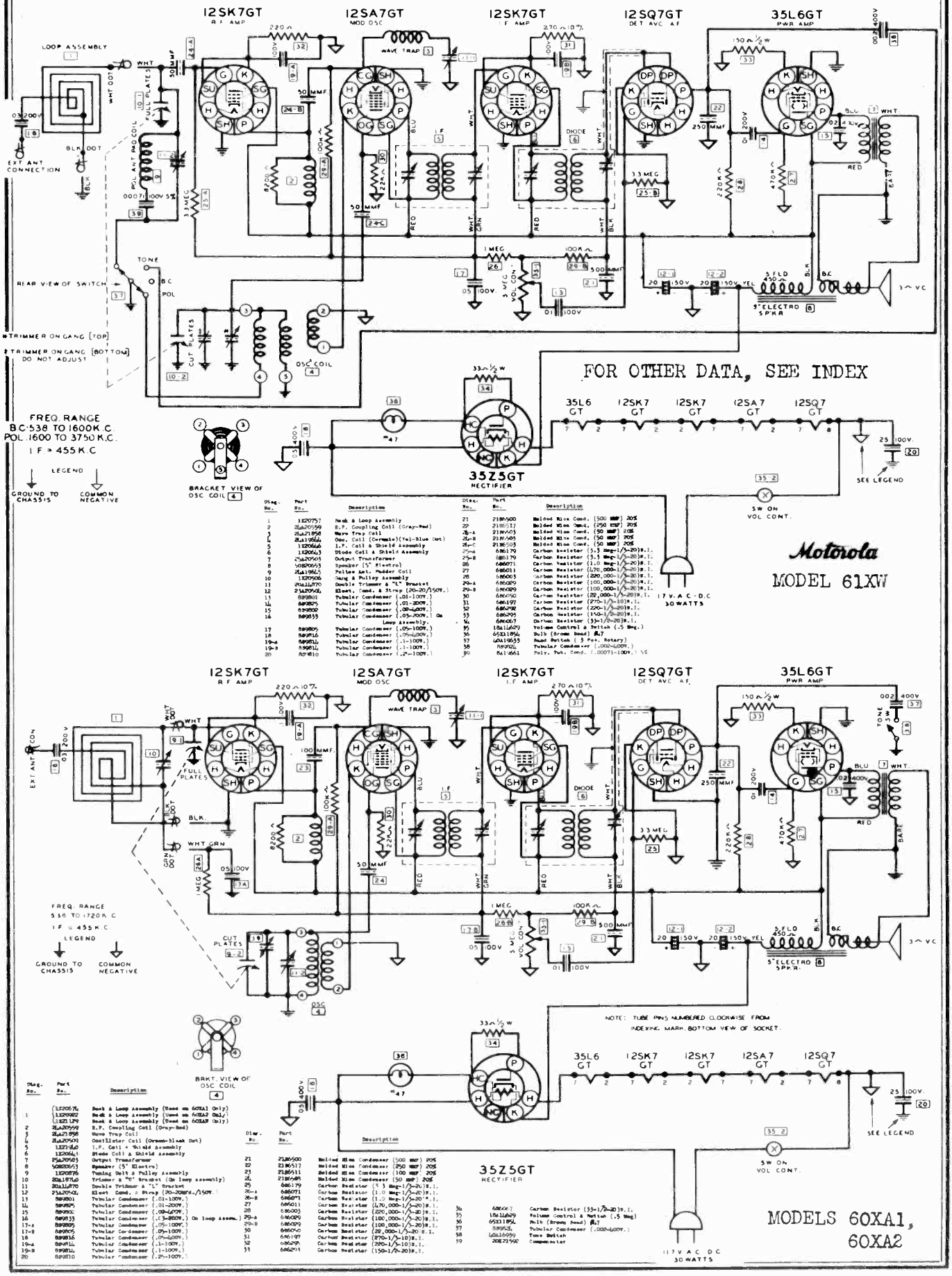






MODELS 60XA1, 60XA2, 61XW

GALVIN MFG. CO.



Diag. No.	Part No.	Description	Diag. No.	Part No.	Description
1	1120757	Rod & Loop Assembly	21	2186500	Molded Mica Cond. (500 MMF) 20%
2	21A20559	R.F. Coupling Coil (Gray-Red)	22	2186512	Molded Mica Cond. (250 MMF) 20%
3	21A21958	Wave Trap Coil	23-A	2186503	Molded Mica Cond. (50 MMF) 20%
4	21A19562	Osc. Coil (Ceramic)(Yel-Blue Dot)	24-B	2186505	Molded Mica Cond. (50 MMF) 20%
5	1120666	I.F. Coil & Shield Assembly	24-C	2186505	Molded Mica Cond. (50 MMF) 20%
6	1120614	Diode Coil & Shield Assembly	25-A	686179	Carbon Resistor (3.5 Meg-1/2-20)B.T.
7	25A20503	Output Transformer	25-B	686179	Carbon Resistor (3.5 Meg-1/2-20)B.T.
8	50B20563	Speaker (5" Electro)	26	686071	Carbon Resistor (1.0 Meg-1/2-20)B.T.
9	21A19965	Pulley Ant. Padder Coil	27	686011	Carbon Resistor (470,000-1/2-20)B.T.
10	1120506	Gang & Pulley Assembly	28	686003	Carbon Resistor (220,000-1/2-20)B.T.
11	20A18870	Double Trimmer & "L" Bracket	29-A	686089	Carbon Resistor (100,000-1/2-20)B.T.
12	21A20562	Elect. Cond. & Strap (20-20/150V.)	29-B	686089	Carbon Resistor (100,000-1/2-20)B.T.
13	889801	Tubular Condenser (.01-100V.)	30	686090	Carbon Resistor (22,000-1/2-20)B.T.
14	889825	Tubular Condenser (.01-200V.)	31	686197	Carbon Resistor (270-1/2-10)B.T.
15	889808	Tubular Condenser (.08-400V.)	32	686298	Carbon Resistor (220-1/2-20)B.T.
16	889833	Tubular Condenser (.05-200V., On loop Assem.)	33	686293	Carbon Resistor (150-1/2-20)B.T.
		Loop Assembly.	34	686067	Carbon Resistor (33-1/2-20)B.T.
17	889805	Tubular Condenser (.05-100V.)	35	18A16629	Volume Control & Switch (.5 Meg.)
18	889816	Tubular Condenser (.04-400V.)	36	6S3118S4	Bulb (Brown Bead) #47
19-A	889814	Tubular Condenser (.1-100V.)	37	40A19855	Band Switch (3 Pos. Rotary)
19-B	889814	Tubular Condenser (.1-100V.)	38	889824	Tubular Condenser (.002-400V.)
20	889810	Tubular Condenser (.2-100V.)	39	8A14661	Poly. Tub. Cond. (.00071-100V.) 5%

Motorola

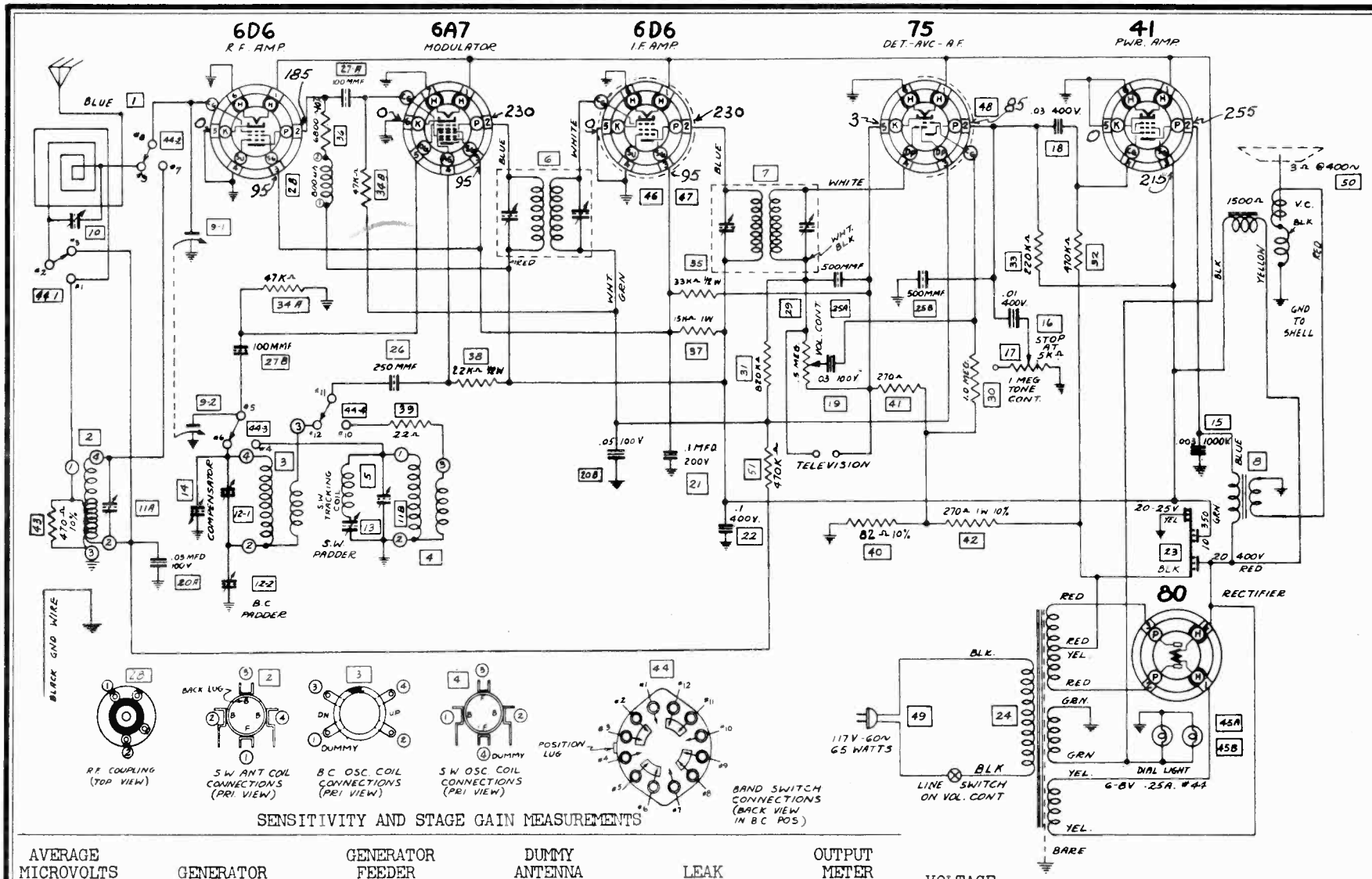
MODEL 61XW

Diag. No.	Part No.	Description
1	1120676	Rod & Loop Assembly (Used on 60XA1 Only)
	1120682	Rod & Loop Assembly (Used on 60XA2 Only)
	1121149	Rod & Loop Assembly (Used on 60XAW Only)
2	21A20559	R.F. Coupling Coil (Gray-Red)
3	21A21958	Wave Trap Coil
4	21A20509	Oscillator Coil (Green-Black Dot)
5	1121146	I.F. Coil & Shield Assembly
6	1120614	Diode Coil & Shield Assembly
7	25A20503	Output Transformer
8	50B20563	Speaker (5" Electro)
9	1120898	Tuning Belt & Pulley Assembly
10	20A18760	Trimmer & "T" Bracket (On loop assembly)
11	20A18870	Double Trimmer & "L" Bracket
12	21A20562	Elect. Cond. & Strap (20-20Mfd./150V.)
13	889801	Tubular Condenser (.01-100V.)
14	889825	Tubular Condenser (.01-200V.)
15	889808	Tubular Condenser (.08-400V.)
16	889833	Tubular Condenser (.5-200V., On loop Assem.)
17-A	889805	Tubular Condenser (.05-100V.)
17-B	889805	Tubular Condenser (.05-100V.)
18	889816	Tubular Condenser (.04-400V.)
19-A	889814	Tubular Condenser (.1-100V.)
19-B	889814	Tubular Condenser (.1-100V.)
20	889810	Tubular Condenser (.2-100V.)

Diag. No.	Part No.	Description
21	2186500	Molded Mica Condenser (500 MMF) 20%
22	2186512	Molded Mica Condenser (250 MMF) 20%
23	2186511	Molded Mica Condenser (100 MMF) 20%
24	2186505	Molded Mica Condenser (50 MMF) 20%
25	686179	Carbon Resistor (3.5 Meg-1/2-20)B.T.
26-A	686071	Carbon Resistor (1.0 Meg-1/2-20)B.T.
26-B	686071	Carbon Resistor (1.0 Meg-1/2-20)B.T.
27	686011	Carbon Resistor (470,000-1/2-20)B.T.
28	686003	Carbon Resistor (220,000-1/2-20)B.T.
29-A	686089	Carbon Resistor (100,000-1/2-20)B.T.
29-B	686089	Carbon Resistor (100,000-1/2-20)B.T.
30	686090	Carbon Resistor (22,000-1/2-20 B.T.
31	686197	Carbon Resistor (270-1/2-10)B.T.
32	686298	Carbon Resistor (220-1/2-20)B.T.
33	686293	Carbon Resistor (150-1/2-20)B.T.

Diag. No.	Part No.	Description
34	686067	Carbon Resistor (33-1/2-20)B.T.
35	18A16629	Volume Control & Switch (.5 Meg)
36	6S3118S4	Bulb (Brown Bead) #47
37	40A19855	Band Switch (3 Pos. Rotary)
38	889824	Tubular Condenser (.002-400V.)
39	40A16699	Tone Switch
40	20B21592	Compensator

MODELS 60XA1, 60XA2



SENSITIVITY AND STAGE GAIN MEASUREMENTS

AVERAGE MICROVOLTS INPUT *	GENERATOR SET AT	GENERATOR FEEDER CONNECTED TO	DUMMY ANTENNA CAPACITY	LEAK RESISTANCE	OUTPUT METER READING **
2800	455	I.F. Grid	.1 Mfd.	.5 Meg	.38
30	455	Mod. Grid	.1 Mfd.	.5 Meg	.38
35	600	Mod. Grid	.1 Mfd.	.5 Meg	.38
7	600	R.F. Grid	.1 Mfd.	.5 Meg	.38
2	600	Ant. Terminal	400 Ohms	None	.38

Volume Control set at maximum. * .05 Watts = .38 Volts ** Output meter connected across voice coil.
Tone Control set in treble position.

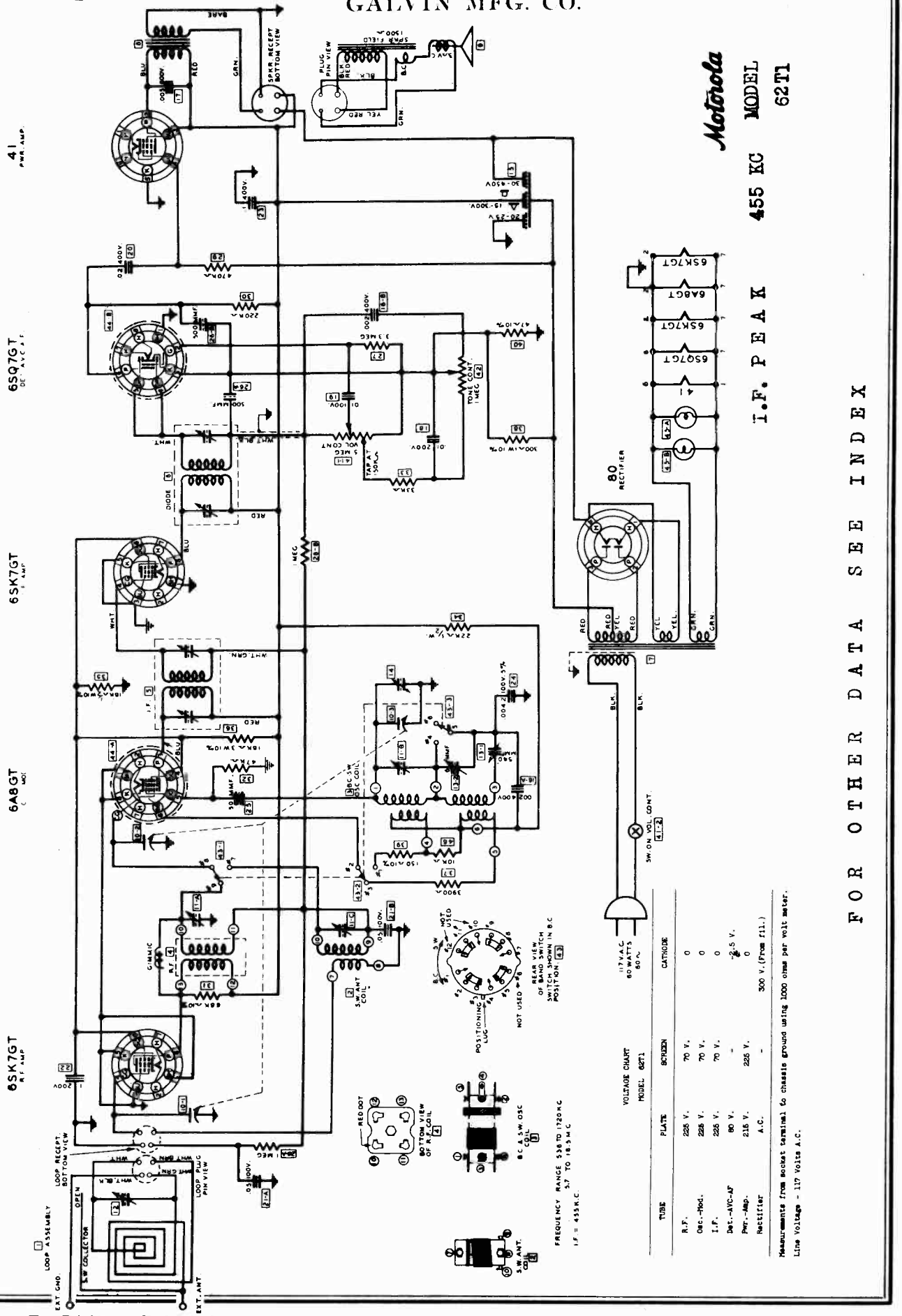
VOLTAGE

Measurements from socket terminal to chassis ground using 1000 ohms per volt meter.
Line Voltage - 117 Volts.

FOR ALIGNMENT, SEE MODEL 61D (with loop) Vol. XI

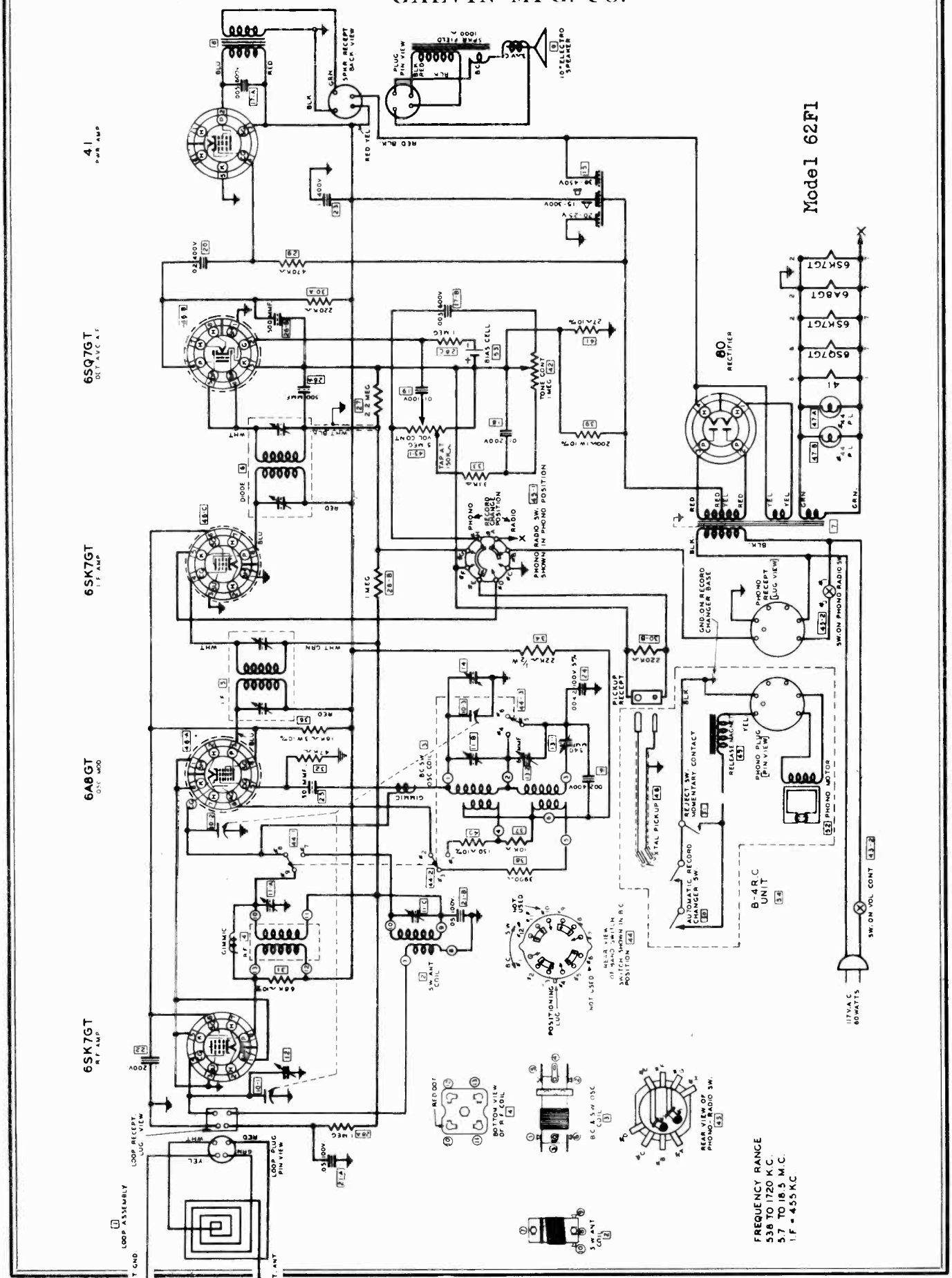
MODEL 62T1

GALVIN MFG. CO.



MODEL 62F1

GALVIN MFG. CO.



ALIGNMENT CHART MODEL 62F1

Operations In Order	Gang Condenser Set At	Dummy Antenna	Band Switch Set At	Generator Connected to	Adjust Trimmers No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc-Mod.Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc-Mod.Grid	5	1720 K.C.
3	538 K.C.	.1 Mfd.	B.C.	Osc-Mod.Grid	6	538 K.C.
4	1400 K.C.	200 Mmf.	B.C.	External Antenna Terminal	7	1400 K.C.
5	18 M.C.	.1 Mfd.	S.W.	Osc-Mod.Grid	8	18 M.C.
6	16 M.C.	400 Ohms	S.W.	External Antenna Terminal	9	16 M.C.
7	1400 K.C.	200 Mmf.	B.C.	External Antenna Terminal	10	1400 K.C.

Volume Control Set at Maximum.

ALIGNMENT CHART MODEL 83F1

Operations In Order	Gang Condenser Set At	Dummy Antenna	Band Switch Set At	Generator Connected to	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	B.C.	Osc.Mod. Grid	1-2-3-4	455 K.C.
2	1720 K.C.	400 Ohms	B.C.	Ext. Ant. Con. Clip	5	1720 K.C.
3	1400 K.C.	400 Ohms	B.C.	Ext. Ant. Con. Clip	6	1400 K.C.
4	* 600 K.C.	400 Ohms	B.C.	Ext. Ant. Con. Clip	7	600 K.C.
5	5.8 M.C.	400 Ohms	Pol.	S.W. Collector Clip on Loop	8	5.8 M.C.
6	4.1 M.C.	400 Ohms	Pol.	S.W. Collector Clip on Loop	9	4.1 M.C.
7	18.0 M.C.	400 Ohms	S.W.	S.W. Collector Clip on Loop	10	18.0 M.C.
8	16.0 M.C.	400 Ohms	S.W.	S.W. Collector Clip on Loop	11	16.0 M.C.

Volume Control Set at Maximum.
* Rock condenser until a combination is found which gives the highest output reading.

VOLTAGE CHART MODEL 62F1

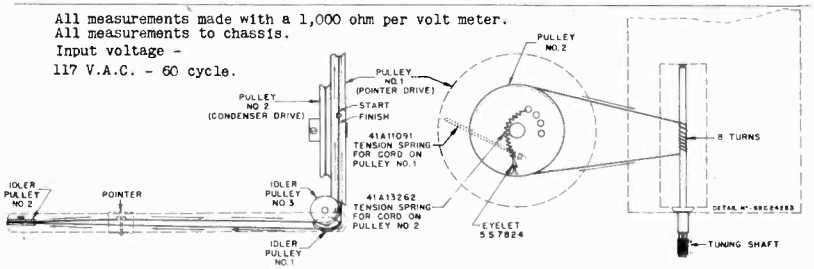
POSITION	PLATE	SCREEN	CATHODE
R.F.	220 V.	80 V.	0
Osc.-Mod.	220 V.	80 V.	0
I.F. Amp.	220 V.	80 V.	0
Det.-AVC.-A.F.	85 V.	-	-1.5 V.
Pwr. Amp.	210 V.	220 V.	0
Rect.	AC	-	280 V. from filament

All measurements made with a 1000 ohm per volt meter.
All measurements to chassis. Input voltage - 117 V. A.C. - 60 cycle.

VOLTAGE CHART MODEL 83F1

POSITION	PLATE	SCREEN	CATHODE
R.F. Amp.	225 V.	90 V.	0
Osc. Mod.	225 V.	90 V.	0
I.F. Amp.	225 V.	90 V.	0
Det. AVC. AF	125 V.	-	-4 V.
Phase Inv.	125 V.	-	-4 V.
Pwr. Amp.	225 V.	235 V.	12 V.
Pwr. Amp.	225 V.	235 V.	12 V.
Rectifier	330 V. AC	-	325 V. from filament

All measurements made with a 1,000 ohm per volt meter.
All measurements to chassis.
Input voltage -
117 V.A.C. - 60 cycle.



MODEL 62F1 SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
2500	455 K.C.	I.F. Grid	.1	.5 Meg.	.38 Volts
35	455 K.C.	Mod. Grid	.1	.5 Meg.	.38 Volts
40	600 K.C.	Mod. Grid	.1	.5 Meg.	.38 Volts
4	600 K.C.	R.F. Grid	.1	.5 Meg.	.38 Volts
3	600 K.C.	Ant. Terminal	200 Mmf.	None	.38 Volts

Volume Control Set at Maximum. Tone Control set at Treble position.
* .05 Watts = .38 Volts. ** Output meter connected across voice coil.

MODEL 83F1 SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
3500	455 K.C.	I.F. Grid	.1 Mfd.	.5 Meg.	.63 Volts
40	455 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	.63 Volts
45	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	.63 Volts
4	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	.63 Volts
3	600 K.C.	Ant. Terminal	400 Ohms	None	.63 Volts

Volume Control Set at Maximum. Tone Control set at Treble position.
* .05 Watts = .63 Volts. ** Output meter connected across voice coil.

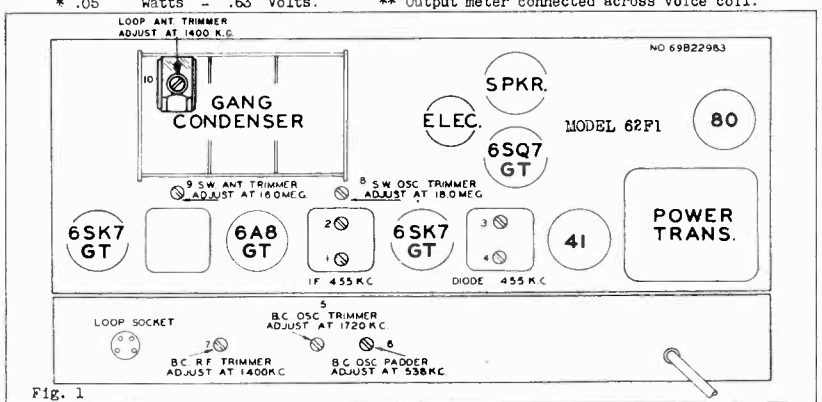


Fig. 1

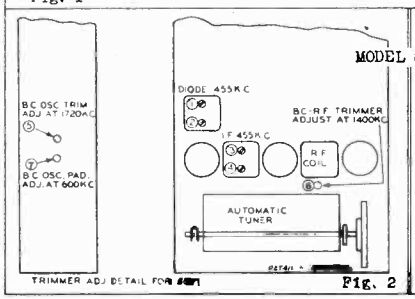


Fig. 2

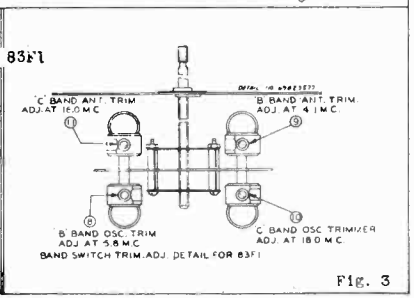
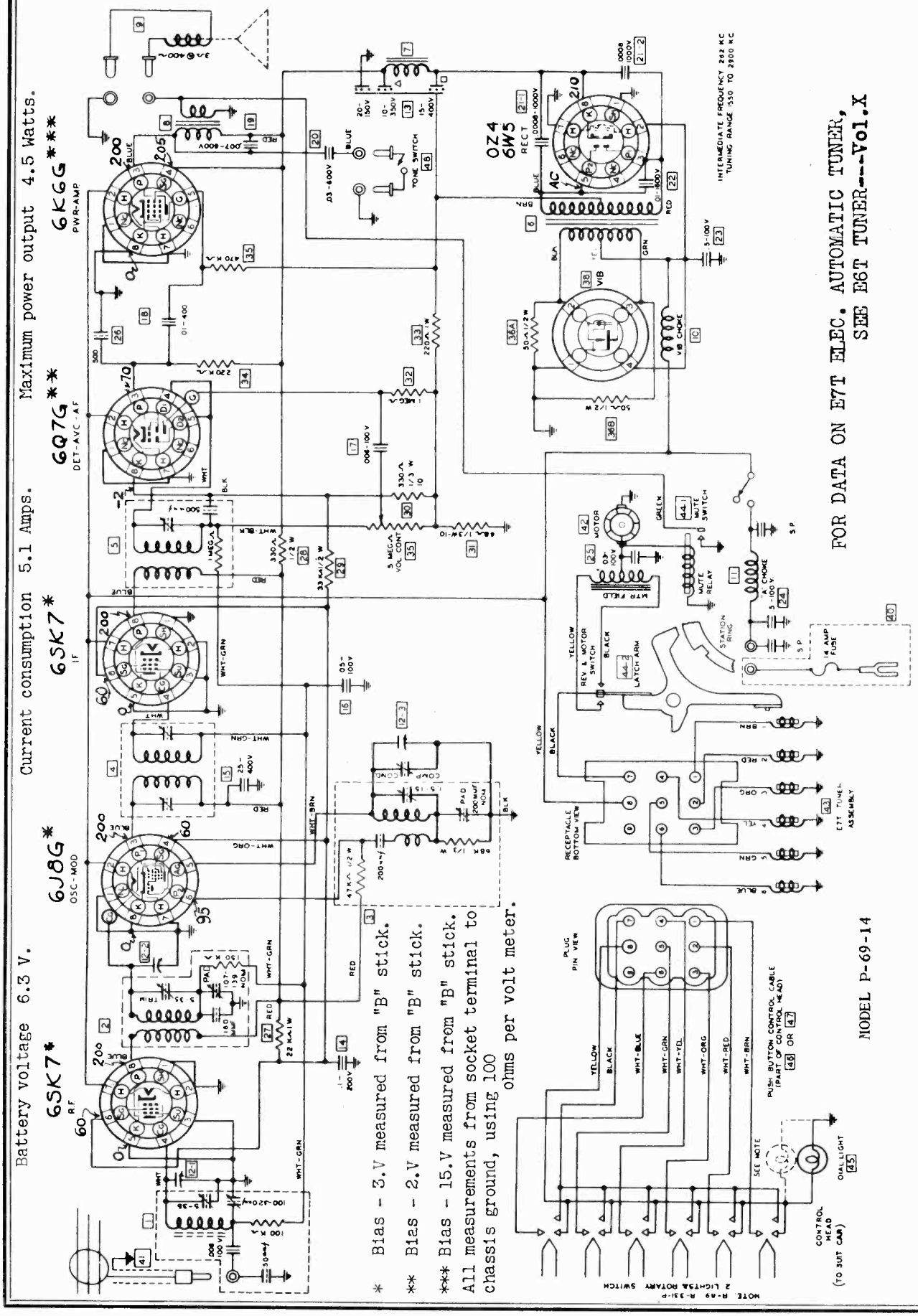


Fig. 3

GALVIN MFG. CO.

MODEL P-69-14



POLICE CRUISER Model P-69-14

ANTENNA ADJUSTMENT

Proceed as follows:

1. Turn the receiver to maximum volume.

2. Turn the dial to a spot near 1600 K.C. that is entirely free from stations.

3. With a screw driver, adjust the antenna trimmer screw for maximum noise level.

4. After first trimming on noise level, tune in a weak station near 1600 K.C. and check the accuracy of the adjustment by readjusting the trimmer for maximum volume.

The antenna trimmer screw may be reached through a small hole in the receiver housing. Replace the plug button after adjustment.

TO SET AUTOMATIC TUNER

NOTE: Before setting any station, let the set warm up for not less than ten minutes. If you wish you can "set" the automatic tuner on the service bench before installing the radio in the car. Use a short aerial and peak the antenna trimmer to it. Then readjust the antenna trimmer after the installation in the car.

IMPORTANT: You will note that the 9-contact plug on the end of the control head cable has one pin that is shorter than the others. For the "setting up" procedure, this plug should be inserted in its receptacle on the receiver only half way. This will cause all of the magnet terminals to be connected, but will not permit the tuning motor to run during the adjustment, since the short pin will not make contact, thereby holding the motor circuit open. The motor should not be run at any time during the "setting up" procedure.

1. Loosen the AUTOMATIC LOCKING SCREW which can be reached by removing a plug button in the receiver housing. This screw should be turned counter-clockwise four or five revolutions - far enough to assure plenty of looseness.

2. Turn the dial all the way to the low frequency end (1550 K.C.)

3. Press the first button and hold it down. A faint "click" should be heard, indicating that the tuning magnet has attracted the latch bar.

4. Holding the magnet energized, turn the dial manually all the way to the high frequency end (2900 K.C.) and then all the way back to the low frequency end (1550 K.C.).

5. Still pressing on the button, tune in the station to be set on that button.

6. Proceed to set the remaining five stations. For each station follow steps 2, 3, 4, and 5, as outlined above. AT NO TIME IN THE SETTING UP PROCEDURE SHOULD THE TUNING MOTOR BE PERMITTED TO RUN.

7. Tighten the automatic locking screw very securely. Do not hold the tuning knob while locking the automatic, but allow the mechanism to turn to its natural stop.

8. Replace the plug button, making sure the spring contact in it touches the locking screw. This is essential for motor noise reasons.

9. Push the plug all the way into the receptacle on the receiver housing so the short motor pin will also make contact.

ALIGNMENT PROCEDURE

Place the radio on the service bench with the front cover removed, but with the speaker and battery connected to it.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

NOTE: Do not adjust the trimmer in the R.F. coil can that is covered with Scotch Tape. The original adjustment, made in the factory, should not be tampered with. (Fig. 3 below, shows all trimmer locations.)

1. Connect the signal generator to the control grid of the Osc.-Mod. tube (6J8G) through a .1 MF condenser, having first removed the grid cap from the top of the tube. Connect a 500,000 ohm leak resistor from the grid of the tube to the grid cap just removed from the tube. (See Fig. 2). Turn the condenser gang completely out of mesh. Connect an output meter across speaker voice coil.

2. Set the signal generator at 262 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter.

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R.F. ALIGNMENT

1. Connect the signal generator to the antenna terminal through a 150 MMF condenser.

2. Set the signal generator at 2900 K.C. and with the condenser gang completely out of mesh adjust the 2900 K.C. trimmer in the oscillator coil can to the point showing the highest output reading.

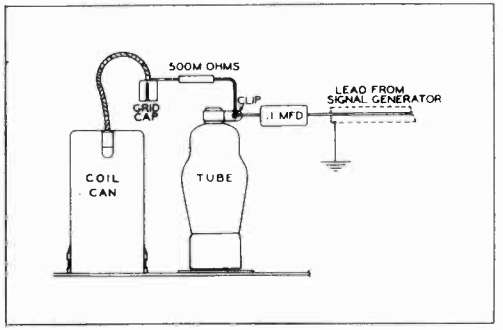


Figure 2

3. Set the signal generator at 1550 K.C. Turn the condenser gang completely in mesh and adjust the 1600 K.C. padder in the Oscillator coil can for the highest output reading.

NOTE: The adjustments above set the range so the receiver will track with the calibrations in the control head.

4. Set the signal generator at 1600 K.C. and turn the condenser gang until the signal is heard. Adjust the 1600 K.C. padder on the antenna coil can for the maximum output reading.

5. Set the signal generator at 2800 K.C. Turn the condenser gang until the signal is heard. Adjust the 2800 K.C. trimmer in the antenna coil can, for maximum output reading.

6. Adjust the 2800 K.C. trimmer in the R.F. coil can for maximum output reading.

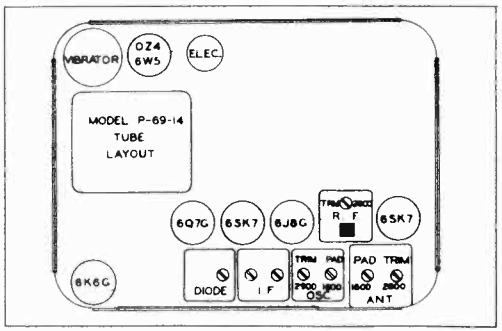
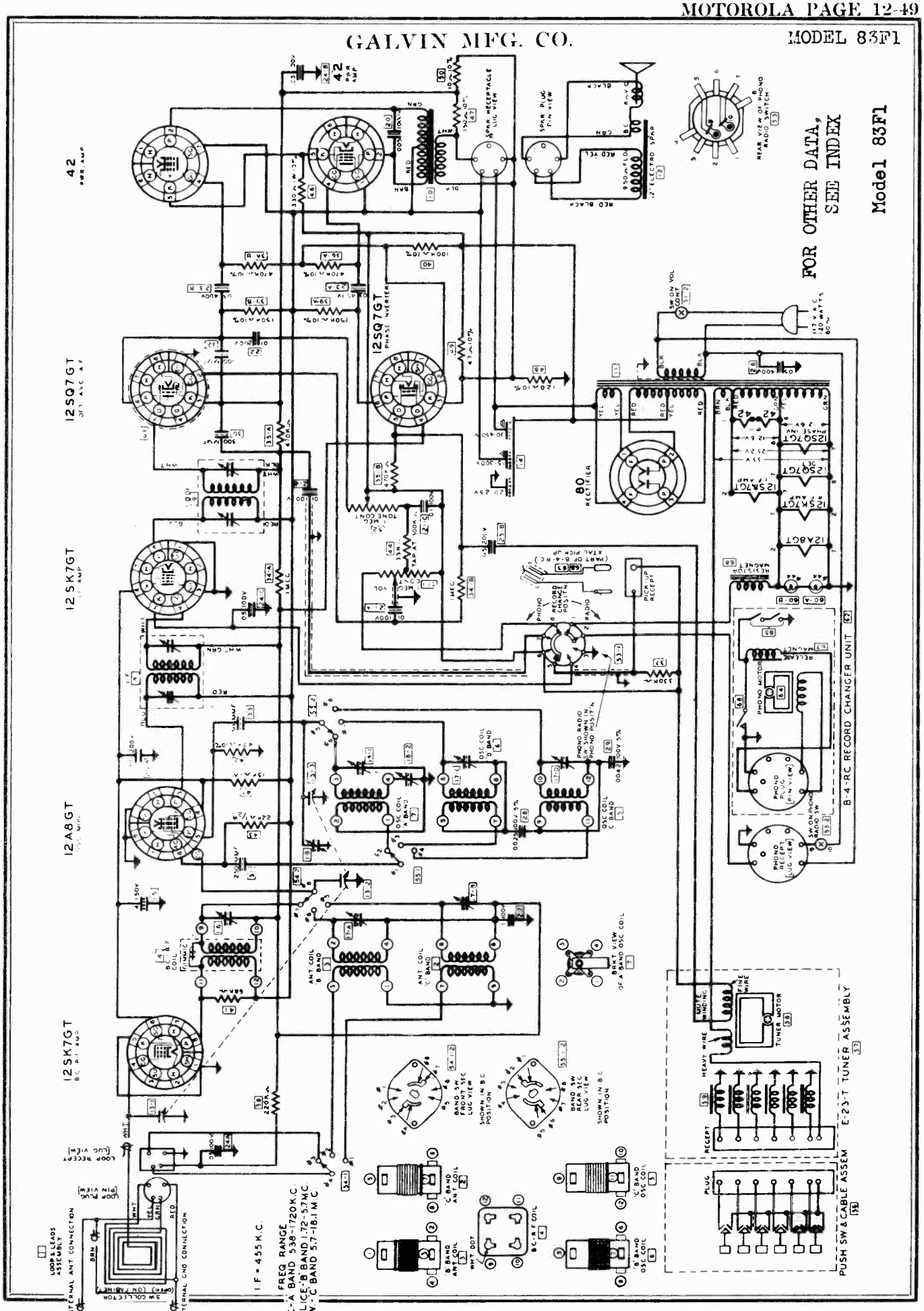


Figure 3



MODELS 83K1
103K1. 103CK2

GALVIN MFG. CO.

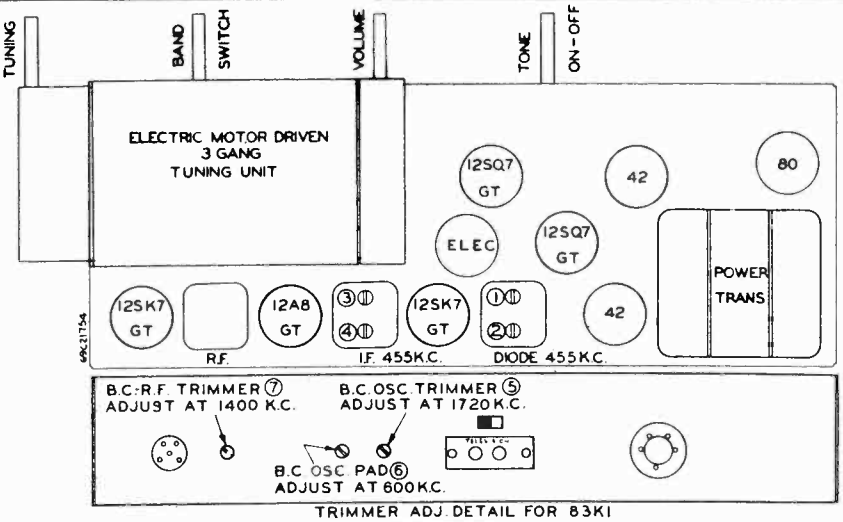
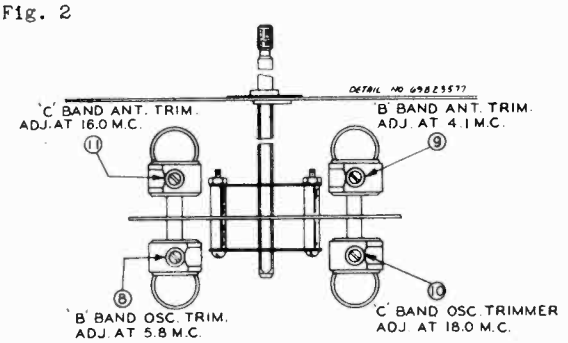


Fig. 1

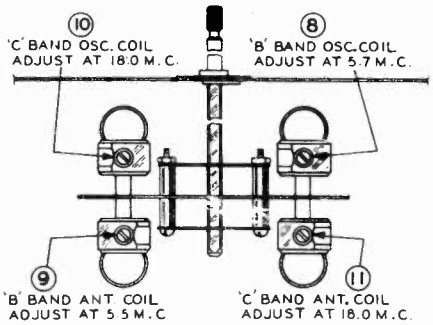
TRIMMER ADJ. DETAIL FOR 83K1

Fig. 2



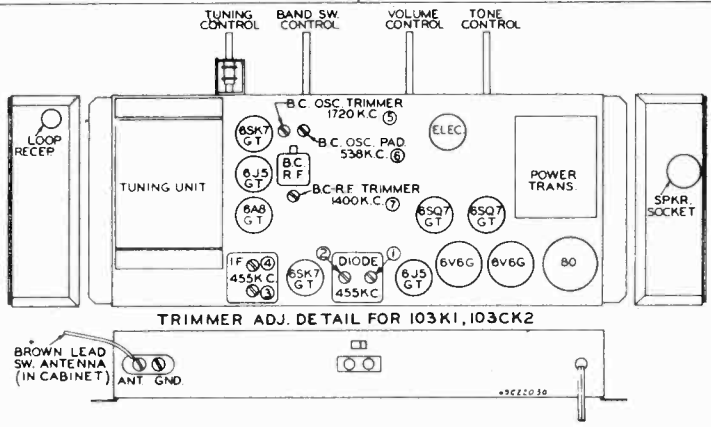
BAND SWITCH TRIM. ADJ. DETAIL FOR MODEL 83K1

Fig. 3



BAND SWITCH TRIMMER ADJ. FOR 103K1, 103CK2

Fig. 4



TRIMMER ADJ. DETAIL FOR 103K1, 103CK2

VOLTAGE CHART

MODEL 83K1

POSITION	PLATE	SCREEN	CATHODE
R.F. Amp.	235 V.	95 V.	0
Osc.-Mod.	235 V.	95 V.	0
I.F. Amp.	235 V.	95 V.	0
Det.AVC.A.F.	135 V.	--	-5.5 V.
Phase Inv.	135 V.	--	-5.5 V.
Pwr. Amp.	225 V.	235 V.	9.0 V.
Pwr. Amp.	225 V.	235 V.	9.0 V.
Rectifier	325 V. AC	--	320 V.(from filament)

Measurements from socket terminal to chassis ground using 1000 Ohms per volt meter.
Line Voltage - 117 Volts.

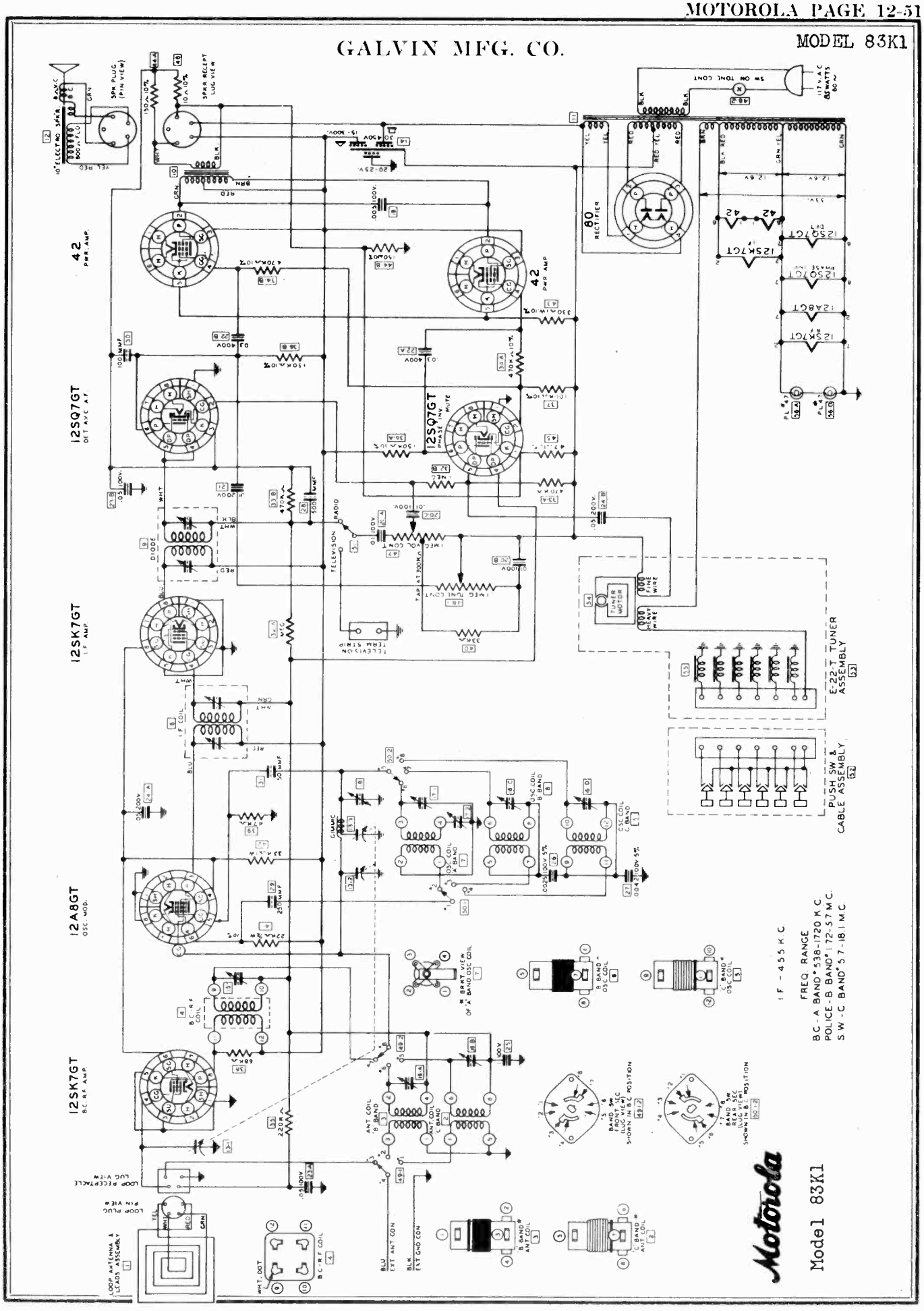
VOLTAGE CHART MODELS 103K1 AND 103CK2

POSITION	PLATE	SCREEN	CATHODE
R.F. Amp.	200 V.	80 V.	1.5 V.
Mixer	265 V.	80 V.	1.5 V.
Osc.	130 V.	-	0
I.F. Amp.	265 V.	80 V.	1.5 V.
Det. AVC.	-	-	-
A.F. Amp.	135 V.	-	0
Phase Inv.	100 V.	-	0
Pwr. Amp.	300 V.	265 V.	15. V.
Pwr. Amp.	300 V.	265 V.	15. V.
Rectifier	355 V. A.C.	-	380 V.(from filament)

Measurements from socket terminal to chassis ground using 1000 Ohms per volt meter.
Line Voltage - 117 Volts.

GALVIN MFG. CO.

MODEL 83K1



TO RESTRING DIAL DRIVE CORDS
Model 83K1

TUNING CORD

1. Cut a length of 24 lb. test silk fish cord 40" long.
2. Turn gang to fully meshed position.
3. Thread end of cord through hole in Gang Drive Pulley. Fasten temporarily in place with an ordinary paper clip. ("A" START.) See Fig. 5.
4. Run cord down to Tuning Shaft.
5. Wind cord counter-clockwise six full turns around Tuning Shaft.
6. Bring end of cord up to Gang Drive Pulley.
7. Wind cord counter-clockwise 1½ turns around Gang Drive Pulley and thread cord through hole. ("A" FINISH)
8. Tie end of cords securely to one end of the Tension Spring (Part No. 41A13262).
9. Hook other end of Tension Spring through center hole in pulley.

POINTER CORD

1. Cut a length of 24 lb. test silk fish cord 40" long.
2. Thread end of cord through hole in Pointer Drive Pulley. ("B" START.) Fasten temporarily in place with an ordinary paper clip.
3. Run cord around Idler Pulley No. 1.
4. Continue cord across top of dial and counter-clockwise around Idler Pulley No. 2.
5. Continue cord across back of dial scale to Idler Pulley No. 3.
6. Continue cord around Idler Pulley No. 3 to Pointer Drive Pulley.
7. Wind cord 1½ turns around Pointer Drive Pulley. (Counter-clockwise)
8. Thread cord through hole in pulley. ("B" FINISH)
9. Tie both ends securely to hook on Tension Spring (Part No. 41A11091).
10. Hook other end of spring to center hole in pulley.
11. Replace Dial Pointer.
12. To set Pointer to correct frequency, tune in a station of known frequency and adjust position of pointer on string.
13. Secure Pointer to string with a drop of shellac or a good grade of household cement.

PLACE A DROP OF SHELLAC OR A GOOD GRADE OF HOUSEHOLD CEMENT ON ALL CORD KNOTS.

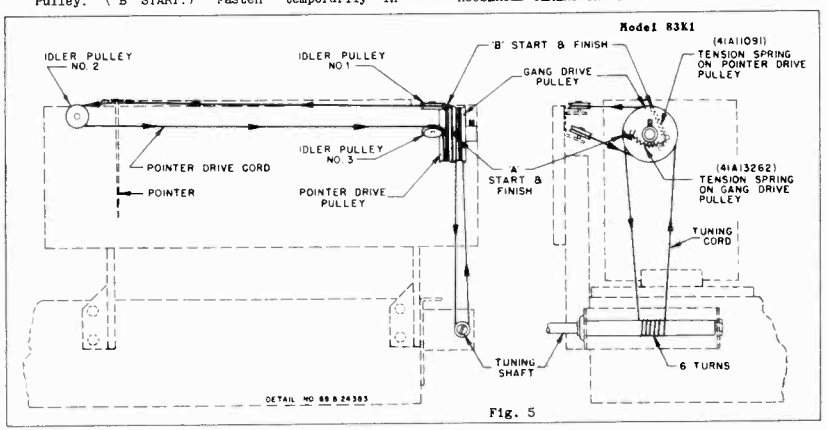


Fig. 5

MODEL 103K1

TUNING CORD

1. Turn gang to fully meshed position.
2. Thread end of Tuning Drive Cord (Part No. 1X24246) through hole in Dial Cord Raceway ("A" START).
3. Wind 9½ turns (clockwise) on Dial Cord Raceway and bring end up to Gang Drive Pulley.
4. Thread end of cord through slot in Gang Drive Pulley ("A" FINISH). Fasten temporarily with an ordinary paper clip.
5. Thread end of second tuning drive cord (Part No. 1X24246) through hole in Dial Cord Raceway ("B" START).
6. Wind 1½ turns (counter-clockwise) on Dial Cord Raceway and bring end up to gang drive pulley.
7. Wind cord 1-2/3 turns in a counter-clockwise direction on gang drive pulley and thread through slot in gang drive pulley ("B" FINISH).
8. Tie ends of tuner drive cords securely to springs (Part No. 41A14759) and hook other ends of springs through center hole of gang drive pulley.
9. Slip the two split lead "B-B-S-" over the cord as shown in the illustration. Clamp tightly with a pair of pliers.

POINTER CORD

1. Take the Pointer Drive Cord (Part No. 1X24248) and thread both ends through the hole in the Pointer Drive Pulley. Use the hole shown in the illustration.
2. Wind long end of the Pointer Cord counter-clockwise on Pointer Drive Pulley.
3. Run cord over idler Pulley No. 1.
4. Continue to Idler Pulley No. 2. (See illustration).
5. Continue across the dial to Idler Pulley No. 3.
6. Continue cord counter-clockwise around Idler Pulley No. 3.
7. Fasten one end of the tension spring (Part No. 41A19231) securely to the cord in the position shown in illustration.
8. Wind other end of Pointer cord clockwise 2 turns and tie securely to the other end of the tension spring. Do not make the pointer cord too tight.
9. Replace dial pointer.
10. To set pointer to correct frequency, tune in a station of known frequency and adjust position of pointer on string.
11. Secure pointer to string with a drop of shellac or a good grade of household cement.

PLACE A DROP OF SHELLAC OR HOUSEHOLD CEMENT ON ALL KNOTS.

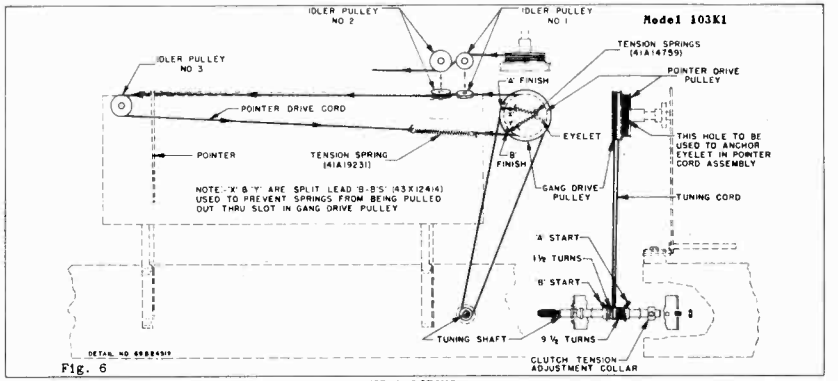


Fig. 6

MODEL 103CK2

TUNING CORD

1. Turn gang to fully meshed position.
2. Thread end of Tuning Drive Cord (Part No. 1X24246) through hole in Dial Cord Raceway ("A" START).
3. Wind 9½ turns (clockwise) on Dial Cord Raceway and bring end up to Gang Drive Pulley.
4. Thread end of cord through slot in Gang Drive Pulley ("A" FINISH). Fasten temporarily with an ordinary paper clip.
5. Thread end of second tuning drive cord (Part No. 1X24246) through hole in Dial Cord Raceway ("B" START).
6. Wind 1½ turns (counter-clockwise) on Dial Cord Raceway and bring end up to gang drive pulley.
7. Wind cord 1-2/3 turns in a counter-clockwise direction on gang drive pulley and thread through slot in gang drive pulley ("B" FINISH).
8. Tie ends of tuner drive cords securely to springs (Part No. 41A14759) and hook other ends of springs through center hole of gang drive pulley.
9. Slip the two split lead "B-B-S-" over the cord as shown in the illustration. Clamp tightly with a pair of pliers.

POINTER CORD

1. Take the Pointer Drive Cord (Part No. 1X24247) and thread both ends through the hole in the Pointer Drive Pulley. Use the hole shown in the illustration.
2. Wind long end of the Pointer Cord counter-clockwise on Pointer Drive Pulley, to Idler Pulley No. 1.
3. Run cord over Idler Pulley No. 1.
4. Continue down and clock-wise around Idler Pulley No. 2.
5. Continue across the dial to Idler Pulley No. 3.
6. Continue cord clock-wise around Idler Pulley No. 3.
7. Fasten one end of the tension spring (Part No. 41A19231) securely to the cord in the position shown in illustration.
8. Wind other end of Pointer cord clockwise 2 turns around Pointer Drive Pulley and tie securely to the other end of the tension spring. Do not make the pointer cord too tight.
9. Replace dial pointer.
10. To set pointer to correct frequency, tune in a station of known frequency and adjust position of pointer on string.
11. Secure pointer to string with a drop of shellac or a good grade of household cement.

PLACE A DROP OF SHELLAC OR HOUSEHOLD CEMENT ON ALL KNOTS.

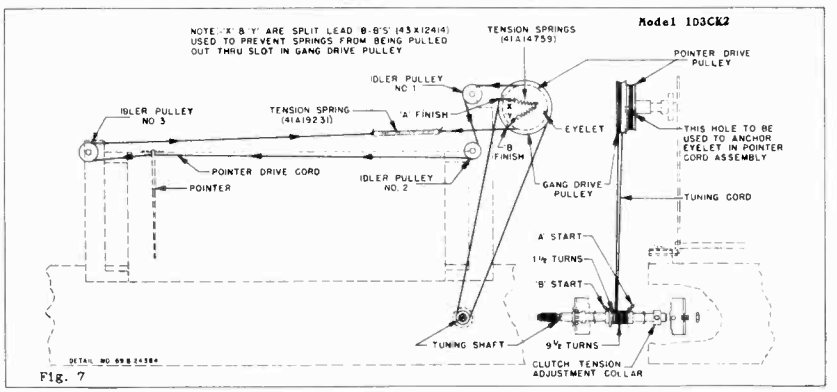
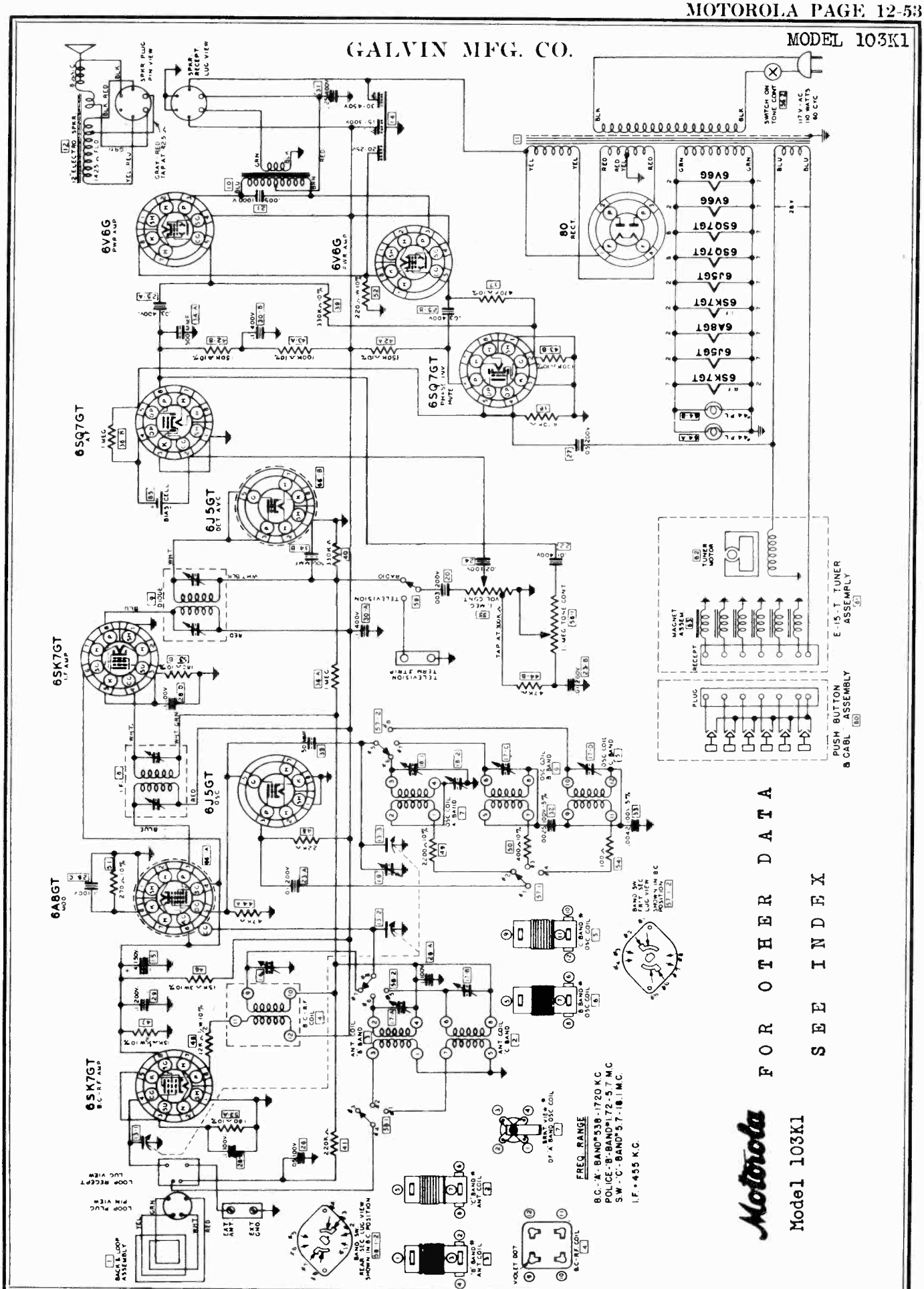
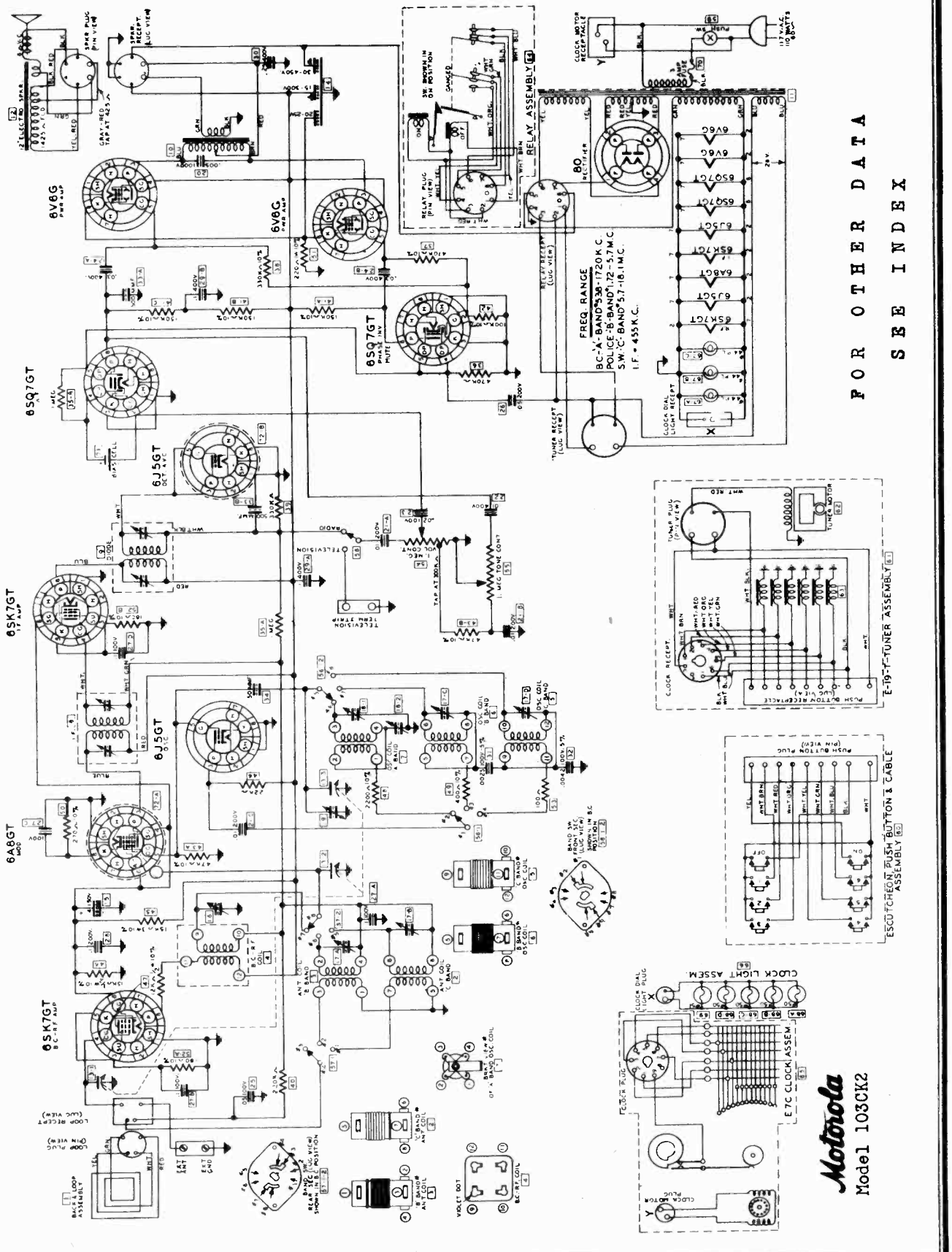


Fig. 7



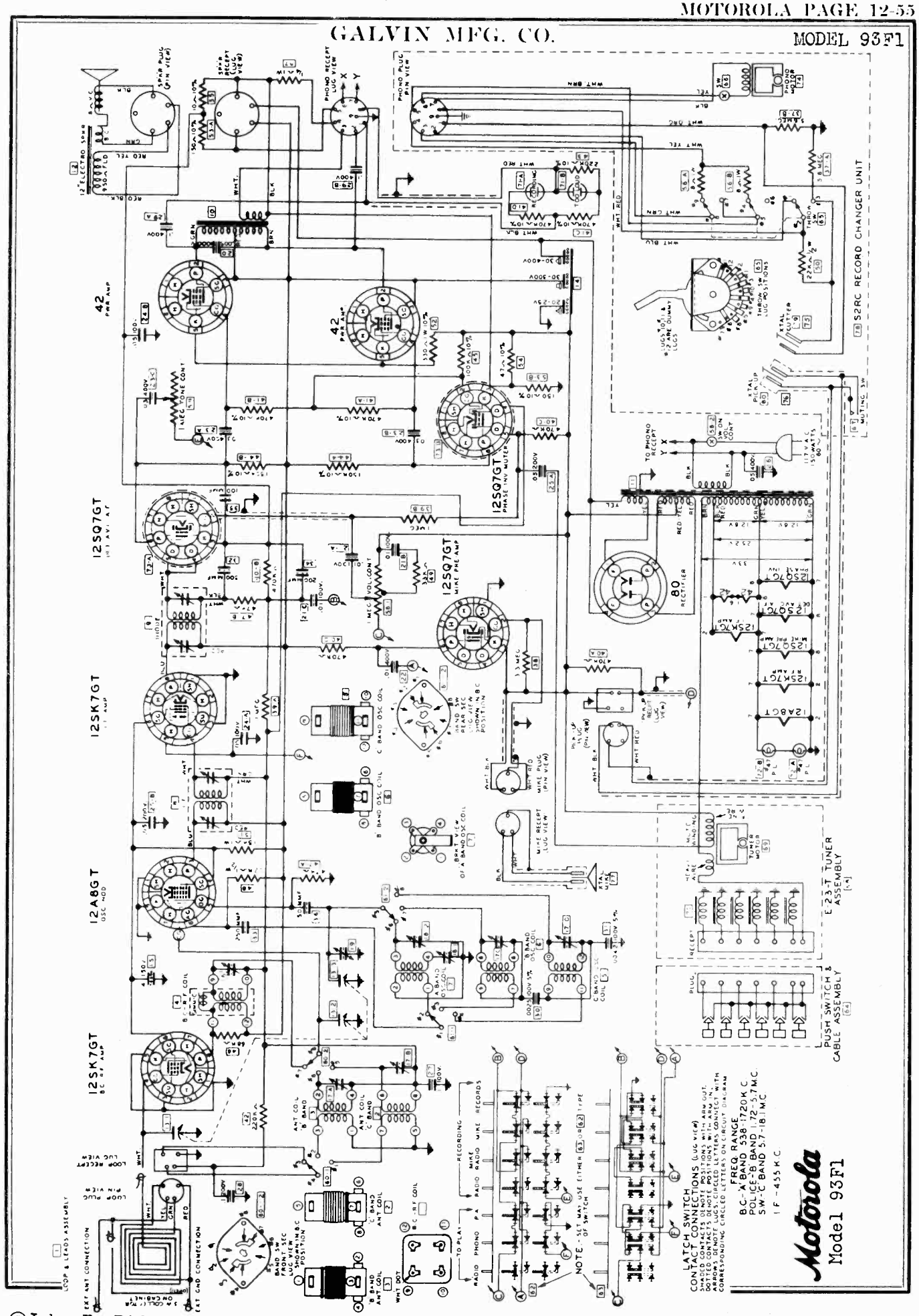
MODEL 103CK2

GALVIN MFG. CO.



GALVIN MFG. CO.

MODEL 93F1



ALIGNMENT CHART MODELS 93F1 - 103F1 - 103F2

Operations In Order	Gang Condenser Set At	Dummy Antenna	Band Switch Set At	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	B.C.	Osc.-Mod.Grid	1-2-3-4-	455 K.C.
2	1720 K.C.	.1 Mfd.	B.C.	R.F. Grid	5	1720 K.C.
3	1400 K.C.	.1 Mfd.	B.C.	R.F. Grid	6	1400 K.C.
4	* 600 K.C.	.1 Mfd.	B.C.	R.F. Grid	7	600 K.C.
5	5.8 M.C.	400 Ohm	Police	Ant.	8	5.8 M.C.
6	4.1 M.C.	400 Ohm	Police	Ant.	9	4.1 M.C.
7	18 M.C.	400 Ohm	S.W.	Ant.	10	18 M.C.
8	16 M.C.	400 Ohm	S.W.	Ant.	11	16 M.C.

* Rock condenser until a combination is found which gives the highest output reading.

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODEL 93F1

Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
3500	455 K.C.	I.F. Grid	.1 Mfd.	.5 Meg	.63 Volts
40	455 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	.63 Volts
45	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	.63 Volts
4	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg	.63 Volts
3	600 K.C.	Ant. Terminal	400 Ohms	None	.63 Volts

Volume Control Set at Maximum
* .05 Watts = .63 Volts

Tone Control Set At Treble Position.
** Output meter connected across voice coil.

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODELS 103F1 - 103F2

Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
2850	455 K.C.	I.F. Grid	.1 Mfd.	.5 Meg	2.83
40	455 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	2.83
45	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	2.83
3	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg	2.83
2	600 K.C.	Ant. Terminal	400 Ohms	None	2.83

Volume Control Set at Maximum
* 1 Watt = 2.83 Volts

Tone Control Set At Treble Position.
** Output meter connected across voice coil.

VOLTAGE CHART MODEL 93F1

POSITION	PLATE	SCREEN	CATHODE
R.F. Amp.	245 V.	110 V.	0
Osc. Mod.	245 V.	110 V.	0
I.F. Amp.	245 V.	110 V.	0
Det.-AVC.-A.F.	125 V.	-	-4.5 V.
Phase Inv.	125 V.	-	-4.5 V.
Pwr. Amp.	240 V.	245 V.	12 V.
Pwr. Amp.	240 V.	245 V.	12 V.
Mike Pre-Amp.	50 V.	-	-5.5 V.
Rectifier	330 V. A.C.	-	335 V. (from filament)

Measurements from socket terminal to chassis ground using 1000 ohm per volt meter.
Line Voltage 117 V. A.C.

VOLTAGE CHART MODEL 103F1 & 103F2

POSITION	PLATE	SCREEN	CATHODE
R.F. Amp.	290 V.	80 V.	2.5 V.
Osc. Mod. (103F1 Only)	290 V.	80 V.	2.5 V.
Osc. (103F2 Only)	150 V.	-	-
I.F. Amp.	290 V.	80 V.	2.75 V.
Det. AVC	0	0	0
A.F. Amp.	155 V.	-	0
Phase Inv.	100 V.	-	0
Pwr. Amp.	325 V.	290 V.	20 V.
Pwr. Amp.	325 V.	290 V.	20 V.
Mike Pre-Amp. (103F1 Only)	70 V.	-	0
Rectifier	350 V.	-	375 V. (from filament)

Measurements from socket terminal to chassis ground using 1000 ohms per volt meter.
Line Voltage 117 V. A.C.

SENSITIVITY AND STAGE GAIN MEASUREMENTS MODELS 103K1 AND 103CK2

Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
2800	455	I.F. Grid	.1 Mfd.	.5 Meg.	.63
40	455	Mod. Grid	.1 Mfd.	.5 Meg.	.63
45	600	Mod. Grid	.1 Mfd.	.5 Meg.	.63
3	600	R.F. Grid	.1 Mfd.	.5 Meg.	.63
2	600	Antenna Terminal	200 Mmf.	None	.63

Volume Control Set at Maximum.
* .05 Watts = .63 Volts

** Output meter connected across voice coil.

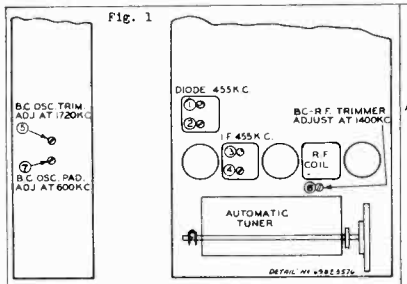
ALIGNMENT CHART MODELS 103K1 AND 103CK2

Operations In Order	Gang Condenser Set At	Dummy Antenna	Band Switch Set At	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc.-Mod.Grid	1-2-3-4	455 K.C.
2	Minimum 1720 K.C.	.1 Mfd.	B.C.	Osc.-Mod.Grid	5	1720 K.C.
3	538 K.C.	.1 Mfd.	B.C.	Osc.-Mod.Grid	6	538 K.C.
4	1400 K.C.	200 Mmf.	B.C.	External Antenna Terminal	7	1400 K.C.
5	5.7 M.C.	.1 Mfd.	Pol.	Osc.-Mod.Grid	8	5.7 M.C.
6	5.5 M.C.	400 Ohms	Pol.	External Antenna Terminal	9	5.5 M.C.
7	18. M.C.	.1 Mfd.	S.W.	Osc.-Mod.Grid	10	18 M.C.
8	18. M.C.	400 Ohms	S.W.	Osc.-Mod.Grid	11	18 M.C.

Volume Control Set at Maximum.

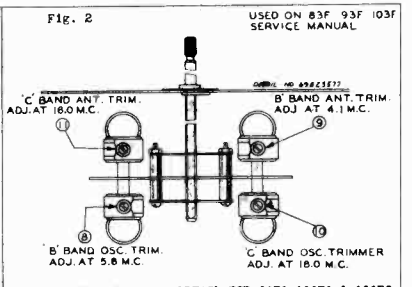
Tone Control Set in Treble Position.

Fig. 1



TRIMMER ADJ. DETAIL FOR 93F1, 103F1 & 103F2.

Fig. 2



BAND SWITCH TRIM. ADJ. DETAIL FOR 93F1, 103F1 & 103F2.

TUNING CORD

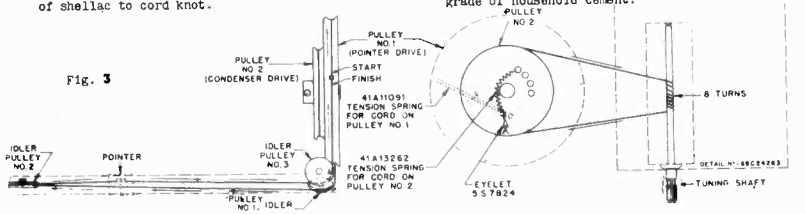
TO RESTRING DIAL DRIVE CORDS 93F1, 103F1 and 103F2

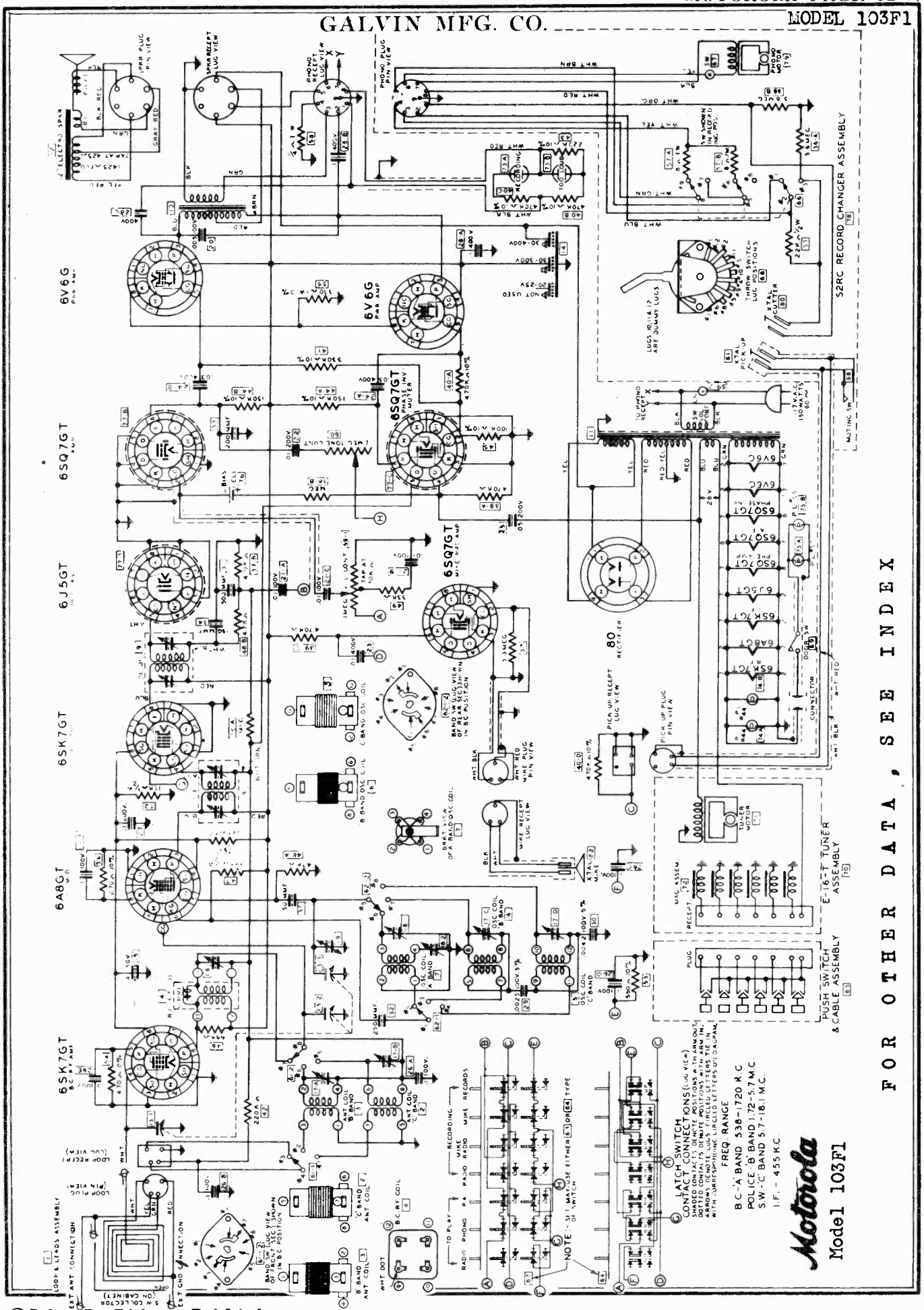
1. Remove the large pulley.
2. Cut a length of 24 lb. test silk fish cord 29 inches long.
3. Turn the gang to fully meshed position.
4. Thread end of cord through hole in rim of small pulley.
5. With an ordinary paper clip fasten cord to pulley to hold in place.
6. Wind cord in a clockwise direction around the condenser pulley and down to the tuning shaft.
7. Wind cord in a clockwise direction eight times around the tuning shaft and up to the condenser pulley.
8. Thread end of cord through hole in condenser pulley.
9. Slip both ends of cord through eyelet (Part No. 53782A) and knot both ends of cord together securely.
10. Hook one end of tension spring (Part No.41A13262) to cord.
11. Connect the other end of the spring to the hole in the condenser pulley as shown in drawing. (See Fig. 3)
12. Pinch the eyelet tightly on cord and apply drop of shellac to cord knot.

POINTER CORD

1. Place large pointer pulley in position on shaft as shown in Fig. 3. Tighten set screws securely.
2. Cut a length of 24 lb. test silk fish cord 35 inches long.
3. Thread end of cord through hole in rim of large pulley.
4. With an ordinary paper clip fasten cord to pulley to hold in place.
5. Wind cord in a clockwise direction around the pointer pulley and up to idler pulley No.1.
6. Continue cord clockwise (as seen from front) around idler pulley No. 2 and around idler pulley No. 3 to pointer pulley.
7. Thread end of cord through hole in pointer pulley and knot both ends together securely.
8. Hook one end of tension spring (Part No.41A11091) to cord.
9. Connect other end or spring to hook on pointer pulley.
10. Replace dial pointer.
11. To set pointer to correct frequency, tune in a station of known frequency and adjust position of pointer on string.
12. Clamp pointer on string with a pair of pliers and secure with a drop of shellac or a good grade of household cement.

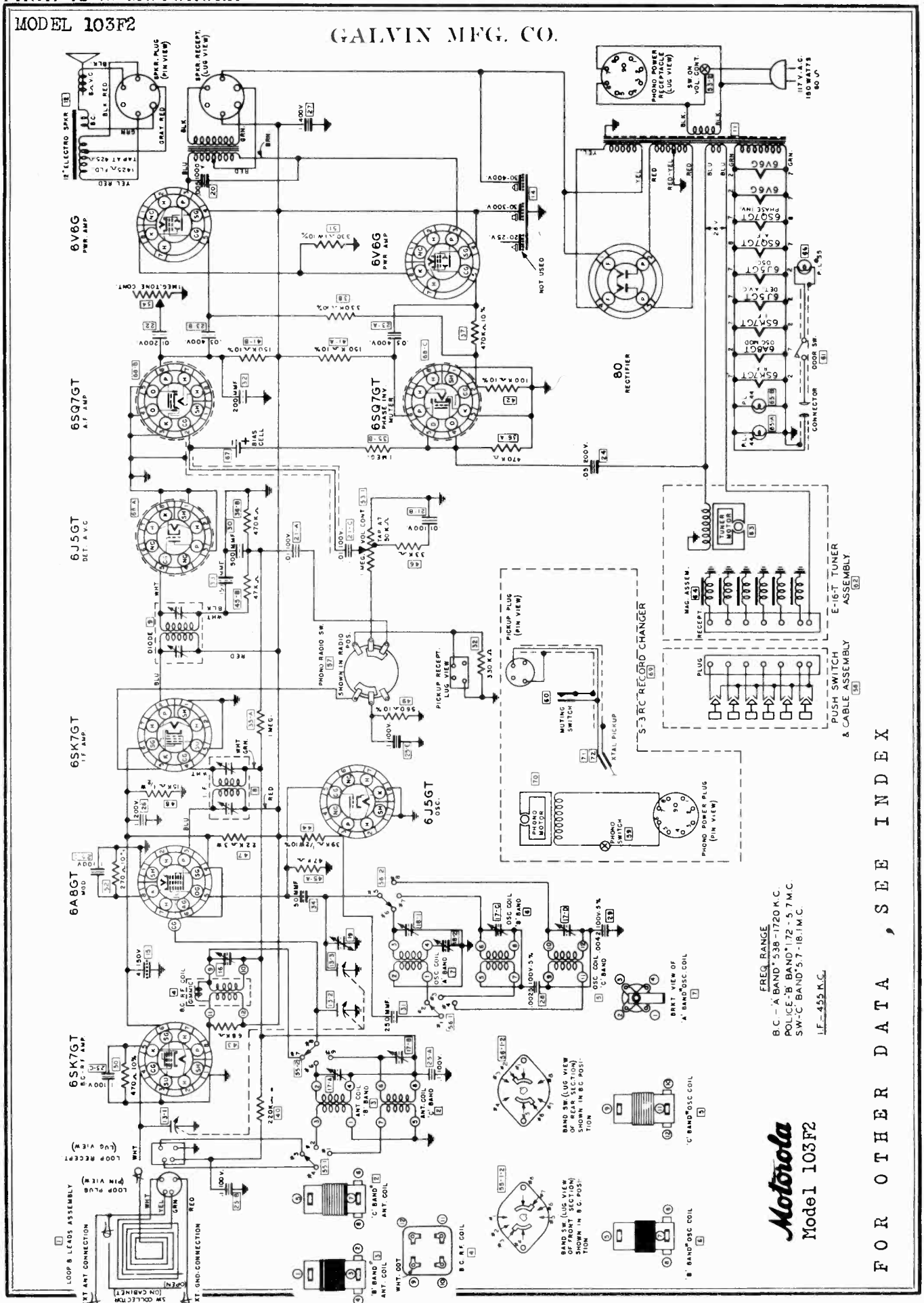
Fig. 3





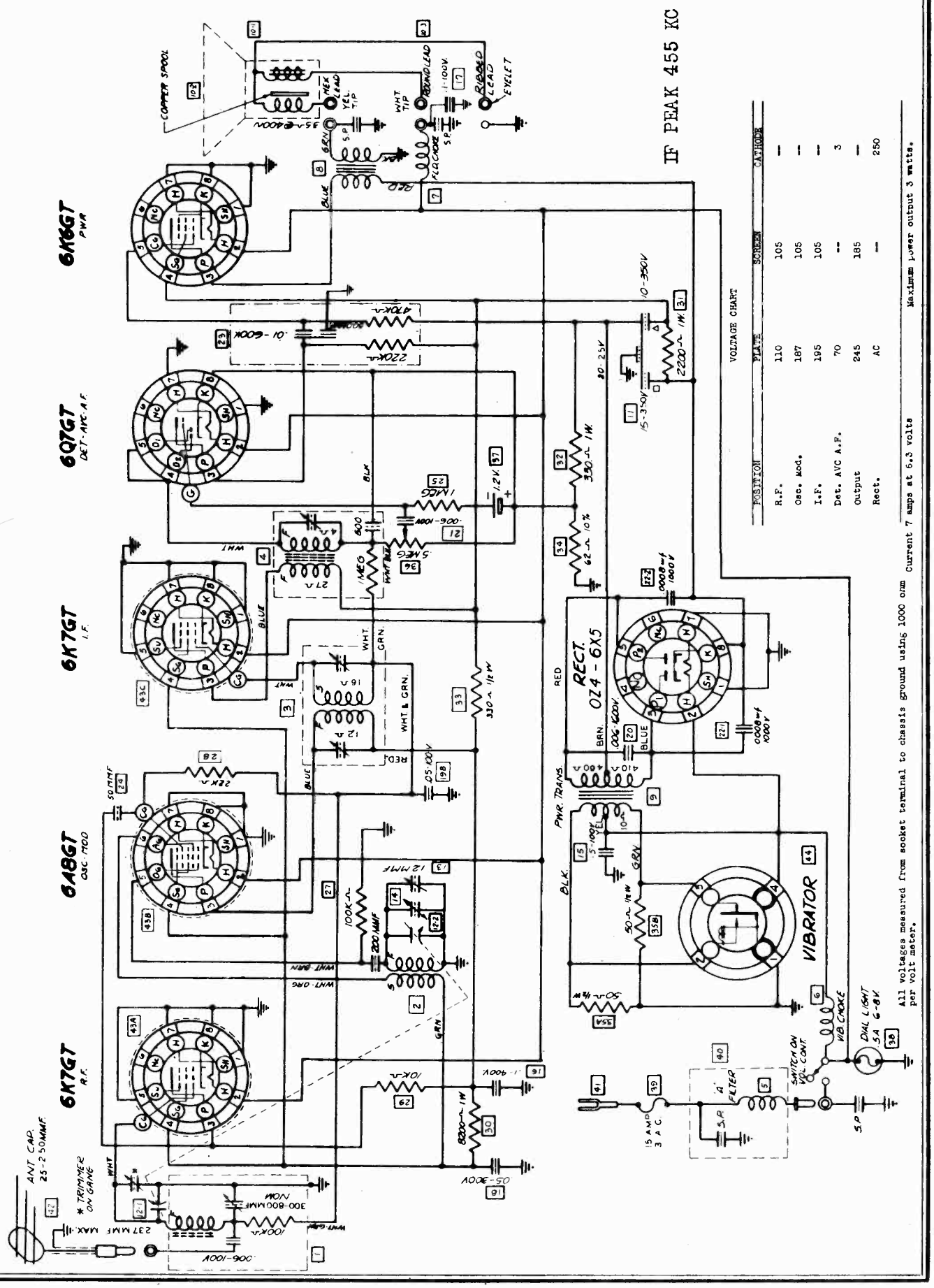
MODEL 103F2

GALVIN MFG. CO.



GALVIN MFG. CO.

MODEL 250



ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Connect the speaker and battery.

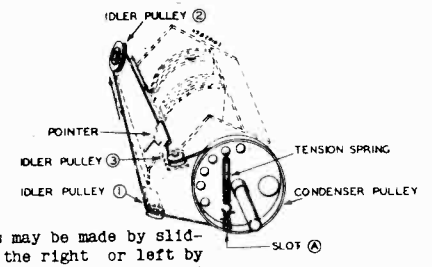
Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

1. Connect the signal generator to the antenna lead through a .1 MF condenser and to chassis ground. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.
2. Set the signal generator at 455 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator if necessary to pick up signal.) See Fig. 1.
3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.
4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.
1. If the radio is to be operated on a Motorola Booster Antenna, a special dummy antenna Motorola Part No. 1X18018 must be used in series with the lead from the signal generator to the antenna receptacle. Change the signal generator connection to the antenna lead, using the special dummy.
2. Set the signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.
3. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.
4. Set the signal generator at 600 K.C. and turn the condenser gang until the dial pointer reads 600 K.C. Rock the pointer at the 600 K.C. position on the dial scale, while adjusting the antenna padder, until a combination is found which gives highest output reading.
5. Recheck step No. 3.

NOTE: The antenna padder is reached through a hole in the bottom of the chassis base, directly under the antenna coil can.

POINTER CORD INSTRUCTIONS

1. Remove the chassis from the housing.
2. Remove the broken string.
3. Set the condenser gang to fully opened position.
4. Cut a length of 24 lb. dial cord 24 inches long.
5. Thread one end of the cord through slot "A" in the condenser pulley, and with an ordinary paper clip fasten it to the idler pulley bracket to hold it in place. (See Fig. 2).
6. Run the cord over to idler pulley No. 1, and around it in a clockwise direction.



NOTE: Minor corrections may be made by sliding the dial scale to the right or left by loosening the self-tapping screws which hold it in position.

FIGURE 2

7. Route string across chassis to idler pulley No. 2, and around it in a clockwise direction.
8. Route cord back across chassis and around idler pulley No.3, in a counter-clockwise direction.
9. Route cord around condenser pulley three-quarters turn to slot "A".
10. Remove the paper clip from end of cord and knot the two ends of cord together inside of pulley. Fasten one end of the tension spring (41A11091) to the cord and the other end to hole in the condenser pulley.
11. Cut off surplus cord.
12. To set pointer to correct frequency, tune in a station of known frequency, preferably one between five and six hundred K.C. and attach the pointer to the cord so that the proper frequency is indicated, because the pointer cannot be slid on the cord.

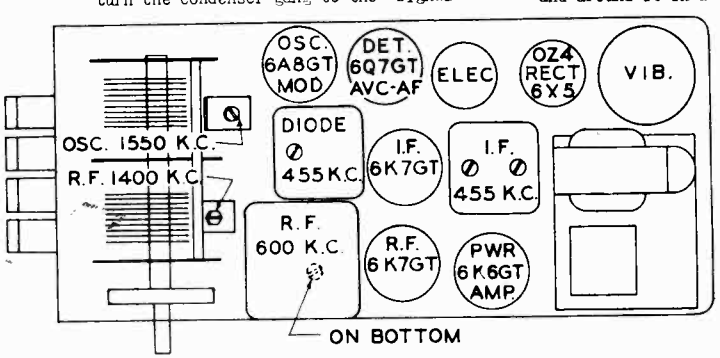


FIGURE 1

SENSITIVITY DATA - Model 250

Microvolt Input *	Generator Set at	Generator connected to	Dummy Ant. Capacity	Leak Resistance	Output Meter Reading **
8900	455 K.C.	I.F. Grid	.1	.5 Meg	1.76
185	455 K.C.	Mod. Grid	.1	.5 Meg	1.76
220	600 K.C.	Mod. Grid	.1	.5 Meg	1.76
80	600 K.C.	R.F. Grid	.1	.5 Meg	1.76
7	600 K.C.	Ant. Lead	40 MMF	None	1.76

* For one watt output
** Meter connected across voice coil
1.76 volts equals 1 watt output for 3 ohm voice coil

NOTE: If a Motorola Booster antenna is used substitute a Special Motorola dummy part No. 1X18018 or M434B Booster coil No.17908 in series with a 25 MMF condenser in place of the 40 MMF condenser.

GALVIN MFG. CO.

MODEL 251

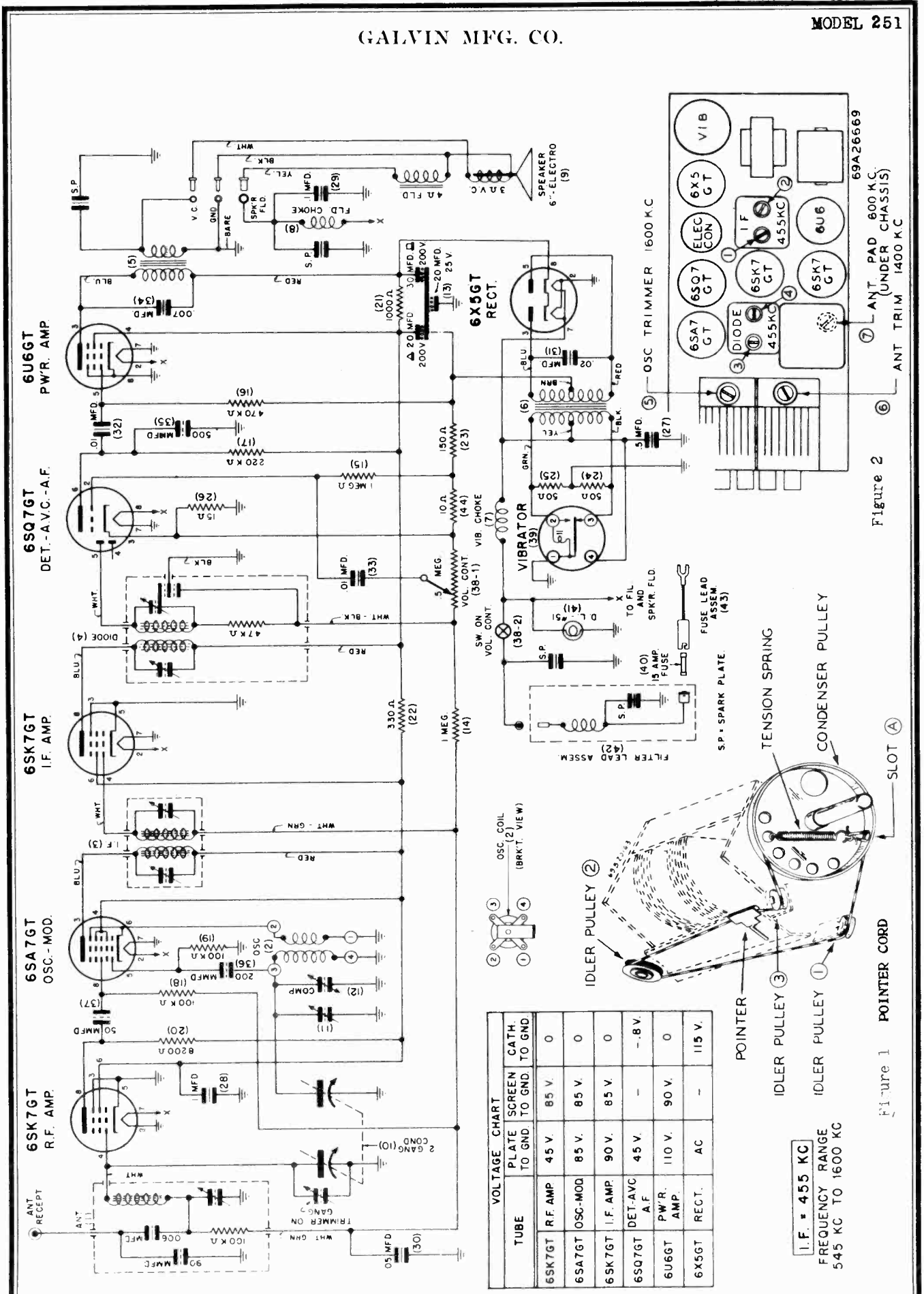


Figure 1

Figure 2

VOLTAGE CHART				
TUBE		PLATE TO GND	SCREEN TO GND.	CATH. TO GND
6SK7GT	R.F. AMP	45 V.	85 V.	0
6SA7GT	OSC-MOD	85 V.	85 V.	0
6SK7GT	I.F. AMP.	90 V.	85 V.	0
6SQ7GT	DET-AVC A.F	45 V.	—	-.8 V.
6U6GT	PW'R. AMP.	110 V.	90 V.	0
6X5GT	RECT.	AC	—	115 V.

MODEL 251

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
10,000	455 K.C.	I.F. Grid	.1 Mfd.	.5 Meg	1.74
600	455 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	1.74
250	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	1.74
90	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg	1.74
15	600 K.C.	Ant. Lead	***	None	1.74

Volume Control Set At Maximum
* 1 Watt = 1.74 Volts

** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

ALIGNMENT CHART MODEL 251

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	455 K.C.
2	1600 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1600 K.C.
3	1400 K.C.	*	To Special Dummy	6	1400 K.C.
4	600 K.C.	*	To Special Dummy	7	600 K.C.

* Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

MODEL 501

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
12,250	262 K.C	I.F. Grid	.1 Mfd.	.5 Meg.	1.74
335	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
425	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
7	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	1.74
2	600 K.C.	Ant. Lead	***	None	1.74

Volume Control Set At Maximum
* 1 Watt = 1.74 Volts

Tone Control Set At Voice
Sensitivity Control Set at Country
** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

MODEL 401

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
2,800	262 K.C.	I.F. Grid	.1 Mfg.	.5 Meg.	1.74
420	262 K.C.	Mod. Grid	.1 Mfg.	.5 Meg.	1.74
510	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
8	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	1.74
2	600 K.C.	Ant. Lead	***	None	1.74

Volume Control Set At Maximum
* 1 Watt = 1.74 Volts

Tone Control Set At Voice
** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

MODEL 451

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
34,000	262 K.C.	I.F. Grid	.1 Mfd.	.5 Meg.	1.74
640	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
677	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
11	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg	1.74
3	600 K.C.	Ant. Lead	***	None	1.74

Volume Control Set At Maximum
* 1 Watt = 1.74 Volts

Tone Control Set At Voice
** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

MODEL 301

SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
9,300	262 K.C.	I.F. Grid	.1 Mfd.	.5 Meg	1.74
330	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	1.74
355	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg	1.74
8	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg	1.74
4	600 K.C.	Ant. Lead	***	None	1.74

Volume Control Set At Maximum
* 1 Watt = 1.74 Volts

** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

ALIGNMENT CHART MODELS 301,351,501,551,701

Operations In Order	Gang Condenser Set	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	262 K.C.
2	1600 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1600 K.C.
3	545 K.C.	.1 Mfd.	Osc.-Mod. Grid	6	545 K.C.
4	1400 K.C.	*	To Special Dummy	7	1400 K.C.
5	1400 K.C.	*	To Special Dummy	8	1400 K.C.
6	600 K.C.	*	To Special Dummy	9	600 K.C.

* Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

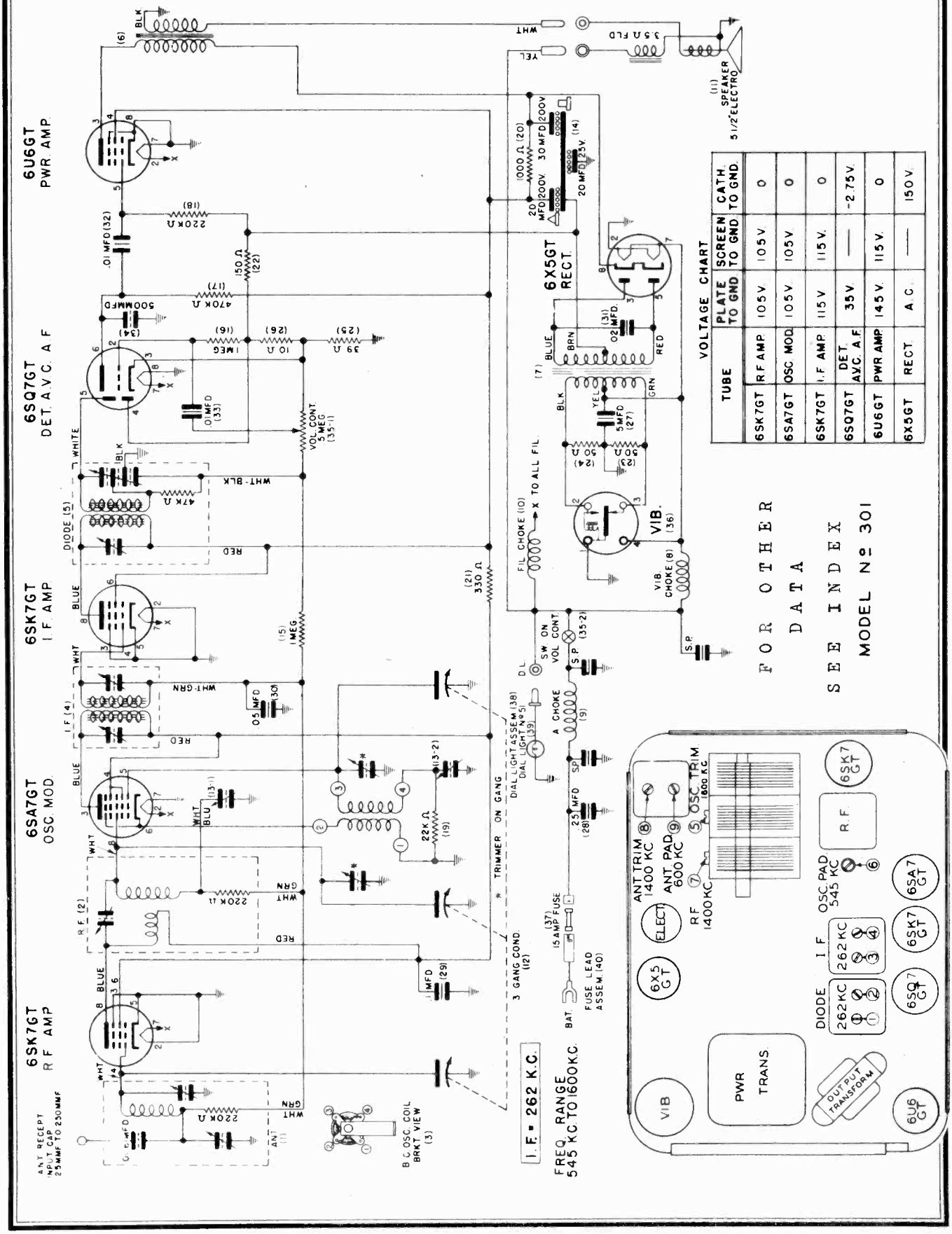
ALIGNMENT CHART MODELS 401,451

Operations In Order	Gang Condenser Set At	Dummy Antenna	Generator Connected To	Adjust Trimmers No.	Generator Set At
1	Minimum	.1 Mfd.	Osc.-Mod. Grid	1-2-3-4	262 K.C.
2	1600 K.C.	.1 Mfd.	Osc.-Mod. Grid	5	1600 K.C.
3	600 K.C.	.1 Mfd.	Osc.-Mod. Grid	6	600 K.C.
4	1400 K.C.	*	To Special Dummy	7	1400 K.C.
5	1400 K.C.	*	To Special Dummy	8	1400 K.C.
6	600 K.C.	*	To Special Dummy	9	600 K.C.

* Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

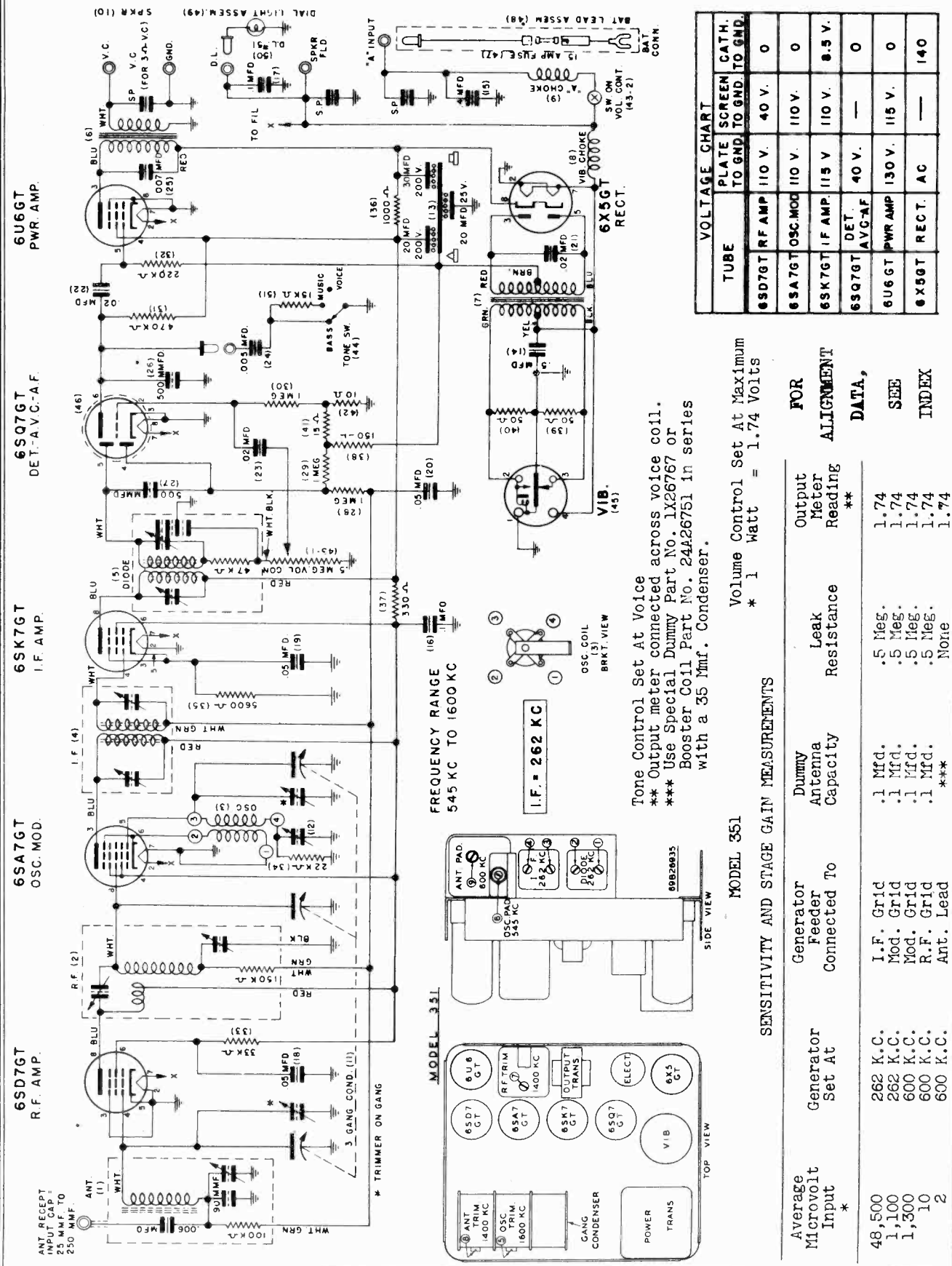
MODEL 301

GALVIN MFG. CO.



MODEL 351

GALVIN MFG. CO.



VOLTAGE CHART				
TUBE		PLATE TO GND.	SCREEN TO GND.	CATH. TO GND.
6SD7GT	R.F. AMP	110 V.	40 V.	0
6SA7GT	OSC. MOD	110 V.	110 V.	0
6SK7GT	I.F. AMP.	115 V	110 V.	8.5 V.
6SQ7GT	DET. AVC-AF	40 V.	—	0
6U6 GT	PWR AMP	130 V.	115 V.	0
6X5GT	RECT.	AC	—	140

Tone Control Set At Voice
** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

Volume Control Set At Maximum
* 1 Watt = 1.74 Volts

MODEL 351

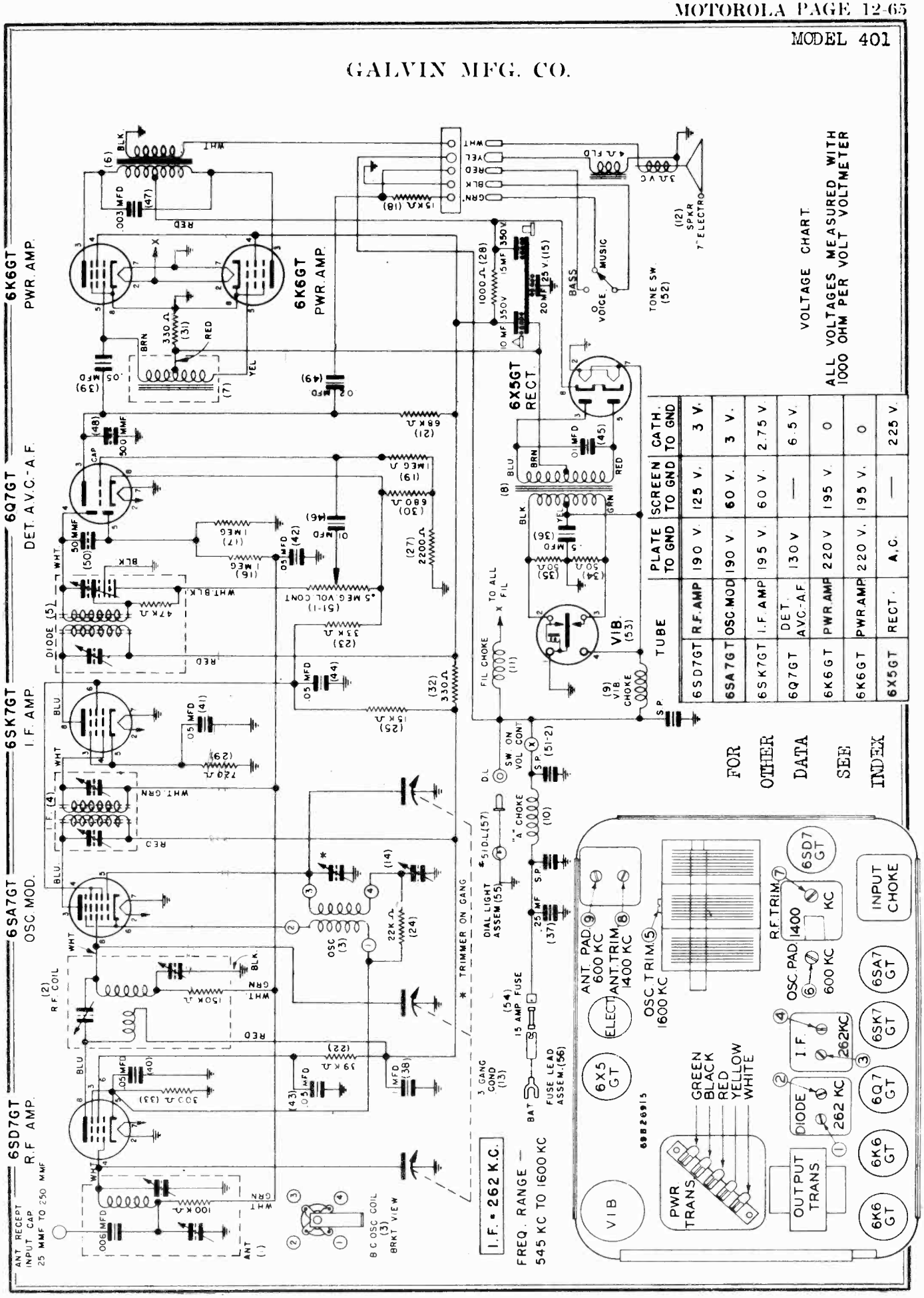
SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
48,500	262 K.C.	I.F. Grid	.1 Mfd.	.5 Meg.	1.74
1,100	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
1,300	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
10	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	1.74
2	600 K.C.	Ant. Lead	***	None	1.74

FOR ALIGNMENT DATA, SEE INDEX

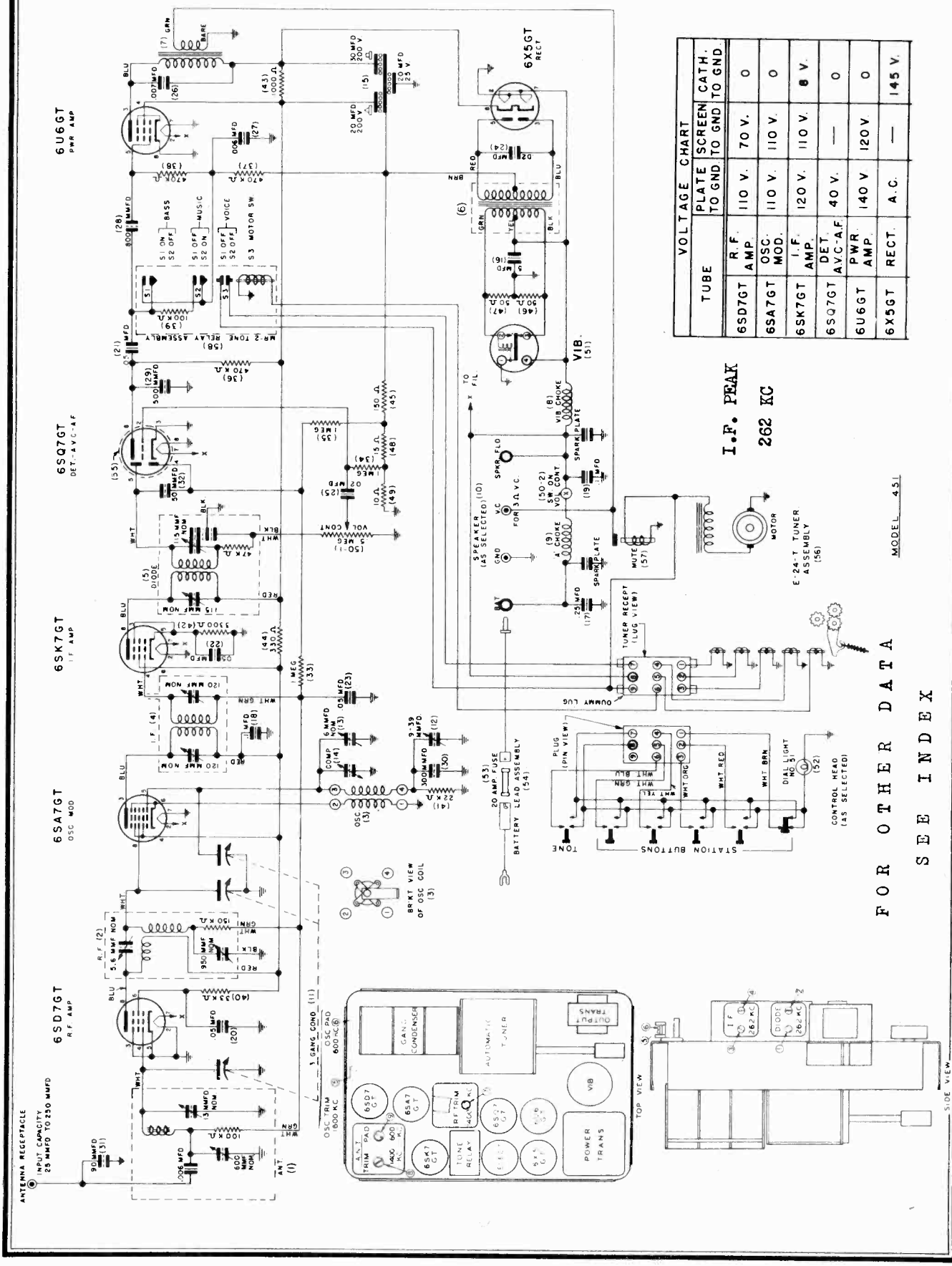
MODEL 401

GALVIN MFG. CO.



MODEL 451

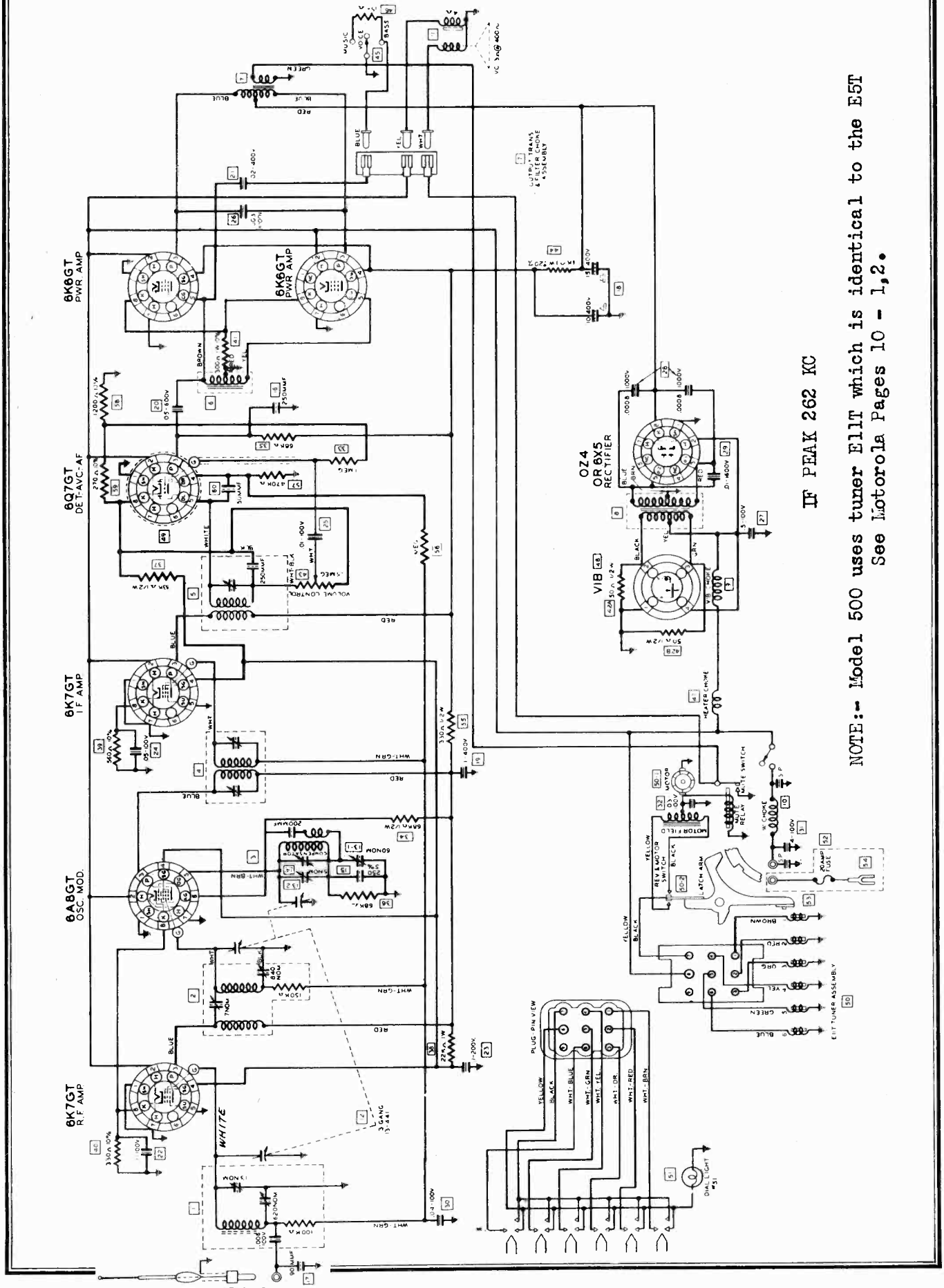
GALVIN MFG. CO.



VOLTAGE CHART			
TUBE	PLATE TO GND	SCREEN TO GND	CATH. TO GND
6SD7GT R.F. AMP.	110 V.	70 V.	0
6SA7GT OSC. MOD.	110 V.	110 V.	0
6SK7GT I.F. AMP.	120 V.	110 V.	6 V.
6SQ7GT DET. AVC-A.F.	40 V.	—	0
6U6GT PWR. AMP.	140 V	120 V.	0
6X5GT RECT.	A.C.	—	145 V.

MODEL 500

GALVIN MFG. CO.



MODEL 500

GALVIN MFG. CO.

ALIGNMENT PROCEDURE

Place the chassis on the service bench with the speaker and battery connected to it.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

NOTE: Do not adjust the trimmer in the R.F. coil can that is covered with Scotch Tape. The original adjustment, made in the factory should not be tampered with. (Fig. 1 below, shows all trimmer locations.)

I.F. ALIGNMENT

1. Connect the signal generator to the control grid of the Osc.-Mod. tube (6A8GT) through a .1 MF condenser, having first removed the grid cap from the top of the tube. Connect a 500,000 ohm leak resistor from the grid of the tube to the grid cap just removed from the tube. Turn the condenser gang completely out of mesh. Connect an output meter across speaker voice coil.

2. Set the signal generator at 262 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter.

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

SETTING THE RANGE

1. Connect the signal generator to the control grid of the R.F. tube (6K7GT) using the same .1 MF condenser.

2. Set the signal generator at 1550 K.C. and with the condenser gang completely out of mesh adjust the 1550 K.C. oscillator trimmer to the point showing the highest output reading.

3. Set the signal generator at 535 K.C. Turn the condenser gang completely in mesh and adjust the 600 K.C. Oscillator padder for the highest output reading.

NOTE: The adjustments above set the range so the receiver will track with the calibrations in the control head.

R.F. AND ANTENNA ALIGNMENT

NOTE: If the radio is to be operated on a Motorola Booster Antenna, a special dummy antenna Motorola Part No. 1X18018 must be used in series with the lead from the signal generator to the antenna receptacle. Change the signal generator connection to the antenna lead, using the special dummy.

1. Set the signal generator at 1400 K.C. Turn the condenser gang until the signal is heard. Adjust the 1400 K.C. antenna trimmer in the antenna coil can for maximum output reading.

2. Adjust the 1400 K.C. RF trimmer in the RF coil can for maximum output reading.

3. Set the signal generator at 600 K.C. and turn the condenser gang until the signal is heard. Adjust the 600 K.C. padder in the antenna coil can for the maximum output reading.

4. Recheck steps 1, 2, and 3, for accuracy.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

All stage-gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500 M Ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF

It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

AVERAGE MICROVOLT INPUT *	GENERATOR SET AT	GENERATOR FEEDER CONNECTED TO	DUMMY ANTENNA CAPACITY	LEAK RESISTANCE	OUTPUT METER READING **
26,000	262 K.C.	I.F. Grid	.1 MF	.5 Meg	1.76 Volts
565	262 K.C.	Mod. Grid	.1 MF	.5 Meg	1.76 Volts
565	600 K.C.	Mod. Grid	.1 MF	.5 Meg	1.76 Volts
30	600 K.C.	R.F. Grid	.1 MF	.5 Meg	1.76 Volts
4	600 K.C.	Ant. Lead	40 MMF***	None	1.76 Volts

* For one watt output.
** Meter connected across voice coil.
1.76 volts equals 1 watt output for 3 ohm voice coil.
*** Use special dummy part No. 1X18018 or M434B Booster Coil No. 17908 in series with a 25 MMF condenser.

NOTE: If set is not used with a Motorola Booster antenna, substitute a 40 MMF condenser for the Special Dummy.

VOLTAGE CHART - MODEL 500

POSITION	PLATE	SCREEN	CATHODE
RF	195	72	2.7
Osc.-Mod.	195	72	2.7
I.F.	195	72	2
Det. Avc. AF	110	-	0
Output	205	200	13
Output	205	200	13
Rect.	AC	-	210

All voltages measured from socket terminal to chassis ground using 1000 Ohms per volt meter.
Current 6.5 amps at 6.3 volts. Maximum power output 5 watts.

MODEL 500 PARTS PRICE LIST

(Note: Numbers in first column refer to squared numbers on circuit diagram)

DRAWING NO.	PART NO.	DESCRIPTION	LIST
		MAJOR PARTS	
48	48A5067	Vibrator (3333)	$2.50
18	23A17190	Electrolytic Condenser (FP)	1.00
50	1X18718	E11T Tuner Assembly	16.00
	15C18947	Bottom cover	.75
	62D18952	Housing Overlay (Plated)	3.00
1	1X18981	Ant. Coil & Shield Assembly	2.40
8	25B19058	Power Transformer (Shielded)	2.55
7	25A19041	Output Transformer	1.00
45	40A19065	Tone Switch	.40
4	1X19076	I.F. Coil & Shield Assembly	1.40
2	1X19078	R.F. Coil & Shield Assembly	1.80
3	1X19060	Osc. Coil & Leads Assembly	.75
	1B19084	Spark Plate Assembly	.40
	1X19094	Housing Assembly	3.50
	24X19103	Heater Choke	.10
	1X19110	Input Choke & Bracket Assembly	2.00
	18A19341	Vol. Cont. & Switch (.5 Meg.)	.75
43	1X19343	Vol. Control & Shaft Assembly	.85
10	1X19475	"A" Choke Assembly	.35
11	50B20197	Speaker 7 1/2" Electro	3.75
		Speaker Exchange	2.20
11	50B20198	Speaker 8" Electro	3.75
		Speaker Exchange	2.20
5	1X20267	Diode Coil & Shield Assembly	1.10
9	24A20649	Vibrator Choke (4 Double Pie wnd.)	.35
		RESISTORS	
34	6B6001	Carbon Resistor 68000-1/2-20	.DOZ. .60
42	6B6005	Carbon Resistor 50-1/2-20	.DOZ. .60
55	6B6009	Carbon Resistor 330-1/2-20	.DOZ. .60
57	6B6011	Carbon Resistor 470,000-1/3-20	.DOZ. .60
37	6B6012	Carbon Resistor 33,000-1/2-20	.DOZ. .60
38	6B6016	Carbon Resistor 22,000-1-20 N.I	.10
40	6B6042	Carbon Resistor 330-1/3-10	.DOZ. .60
	6B6070	Carbon Resistor 150,000-1/3-20 N.I	.DOZ. .60
33	6B6071	Carbon Resistor 1 M50-1/3-20 N.I	.DOZ. .60
36	6B6125	Carbon Resistor 68,000-1/3-20 N.I	.DOZ. .60
56	6B6159	Carbon Resistor 1 M22-1/3-20 INS	.DOZ. .60
44	6B6194	Carbon Resistor 1000-1-20 N.I	.10
41	6B6187	Carbon Resistor 300-1-10 N.I	.10
58	6B6198	Carbon Resistor 1200-1/3-10 N.I	.DOZ. .60
39	6B6224	Carbon Resistor 560-1/3-10 N.I	.DOZ. .60
35	6B6256	Carbon Resistor 68,000-1/3-20 Ins	.DOZ. .60
59	6B6272	Carbon Resistor 270-1/3-10 Ins	.DOZ. .60
46	6B6284	Carbon Resistor 15,000-1/3-20 Ins	.DOZ. .60
		CONDENSERS	
25	8A1400	Tubular Condenser .01-100V	.15
22	8A3302	Tubular Condenser .1-100V	.15
23	8A3310	Tubular Condenser .1-200V	.15
27	8A4588	Tubular Condenser .5-100V	.30

DRAWING NO.	PART NO.	DESCRIPTION	LIST
		CONDENSERS CONT'D.	
17	21A4607	Molded Mica Condenser 90 MMF 10%	$ .20
28	8A4925	Dual Tub. Condenser .0008-.0004-1000V	.28
	21B6501	Molded Mica Condenser 200 MMF-20%	.15
60	21B6503	Molded Mica Condenser 50 MMF-20%	.15
16	21B6517	Molded Mica Cond. 250 MMF-20%	.15
32	6A10306	Tubular Condenser & Strap .05-100V	.15
29	8A10434	Tubular Condenser .01-1000V	.35
30	8A12898	Tubular Condenser & Strap .04-100V	.20
	6A13014	Condenser Res. .0008-100V-100K	.25
26	6K13165	Tubular Condenser .003-1000V	.18
24	8A13514	Tubular Condenser .05-100V	.15
31	8A14095	Tubular Condenser .4-100V	.30
	21A16369	Ceramic Condenser 10 MMF 1% MPF	.25
20	8A17536	Tubular Condenser & Strap .05-600V	.24
14	20A18179	Compensating Condenser	.25
13	20A18391	Osc. Trimmer & Padder	.35
19	8A19078	Tubular Condenser & Strap .1-400	.25
15	21A19098	Ceramic Condenser 250 MMF .5%	.20
21	8A19940	Tubular Condenser & Strap .02-400V	.15

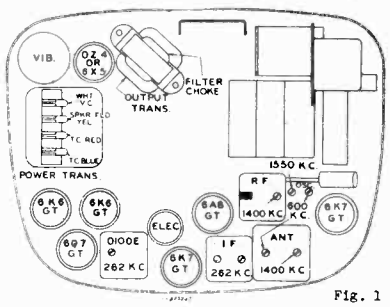
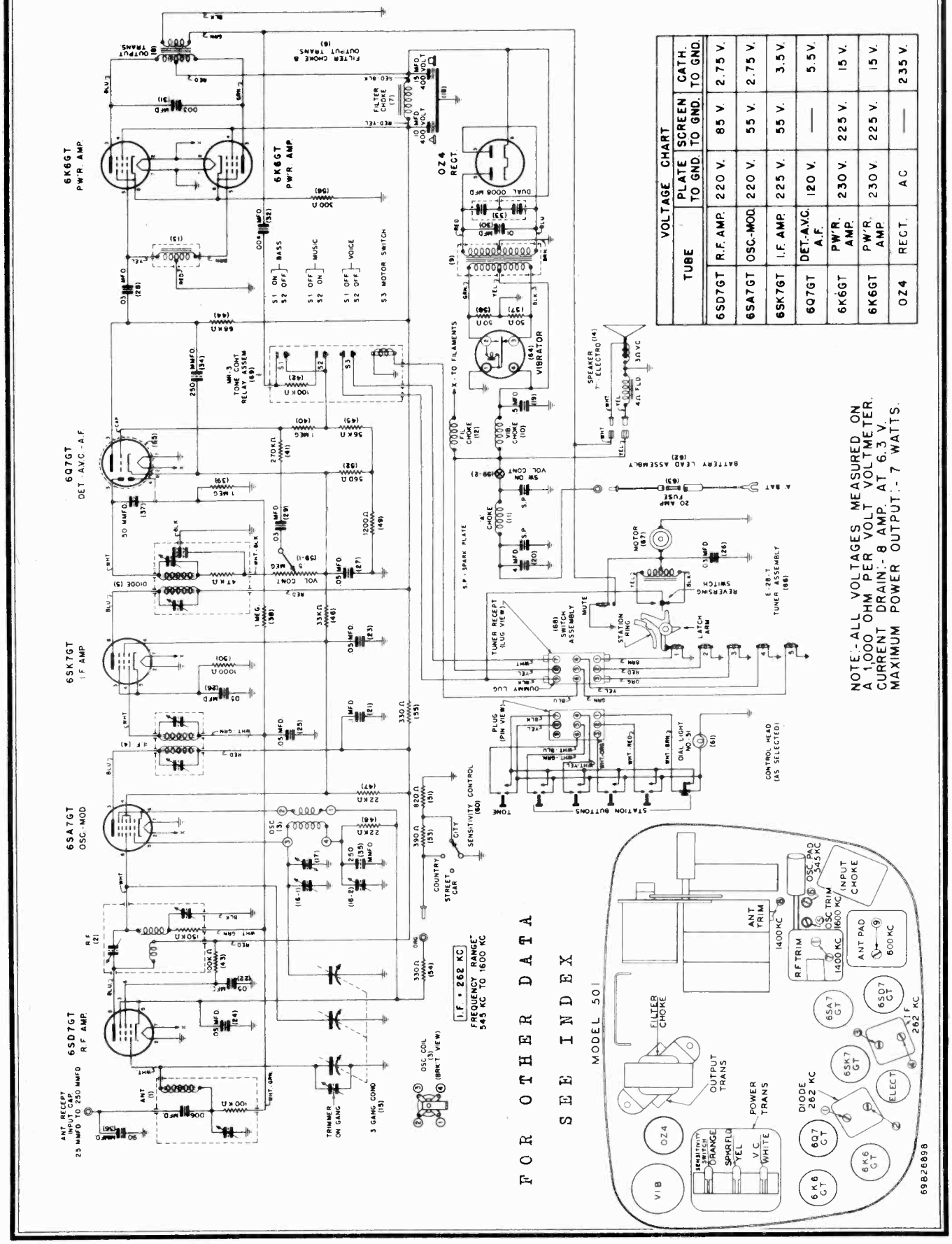


Fig. 1

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

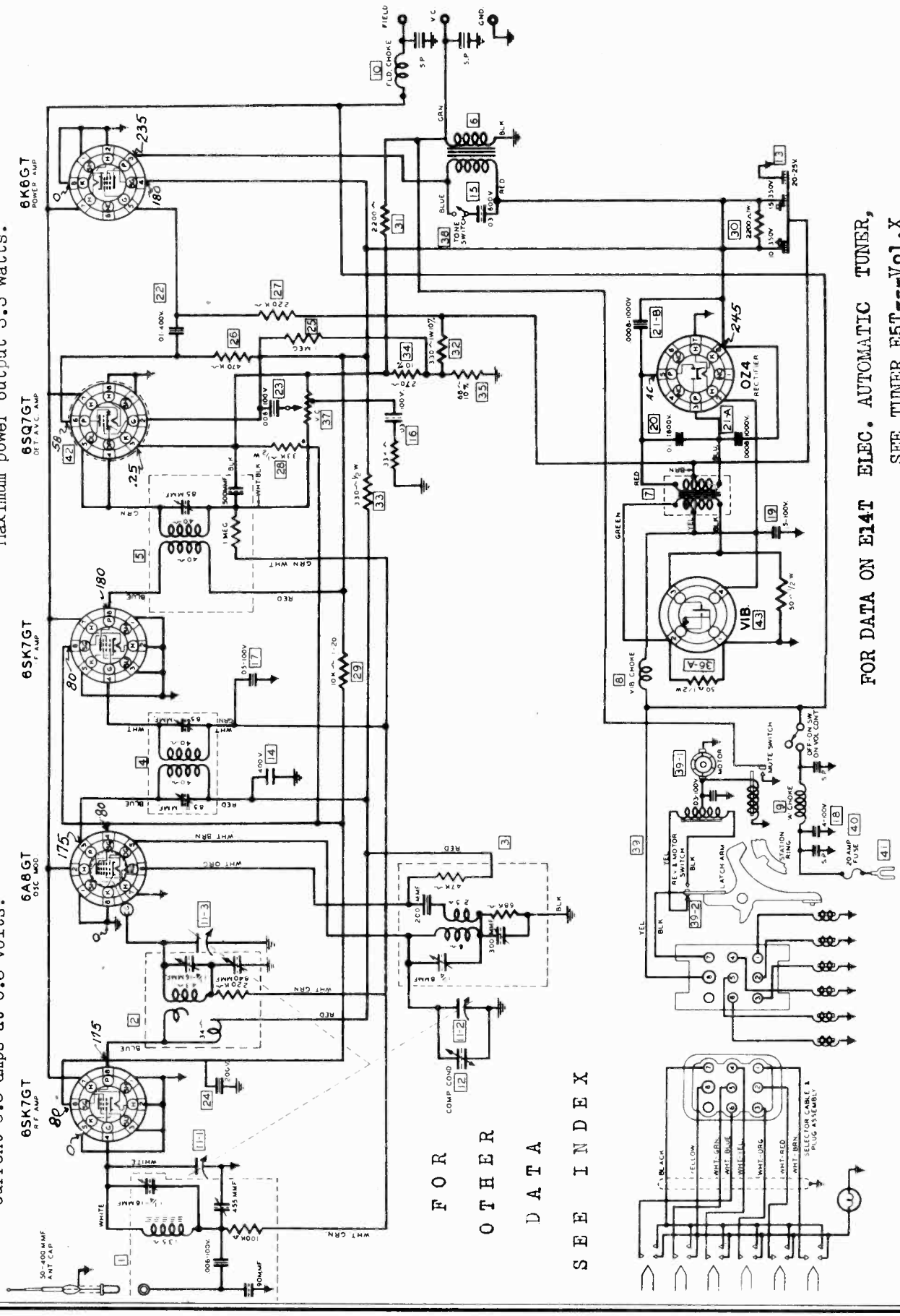
MODEL 501

GALVIN MFG. CO.



MODEL 550

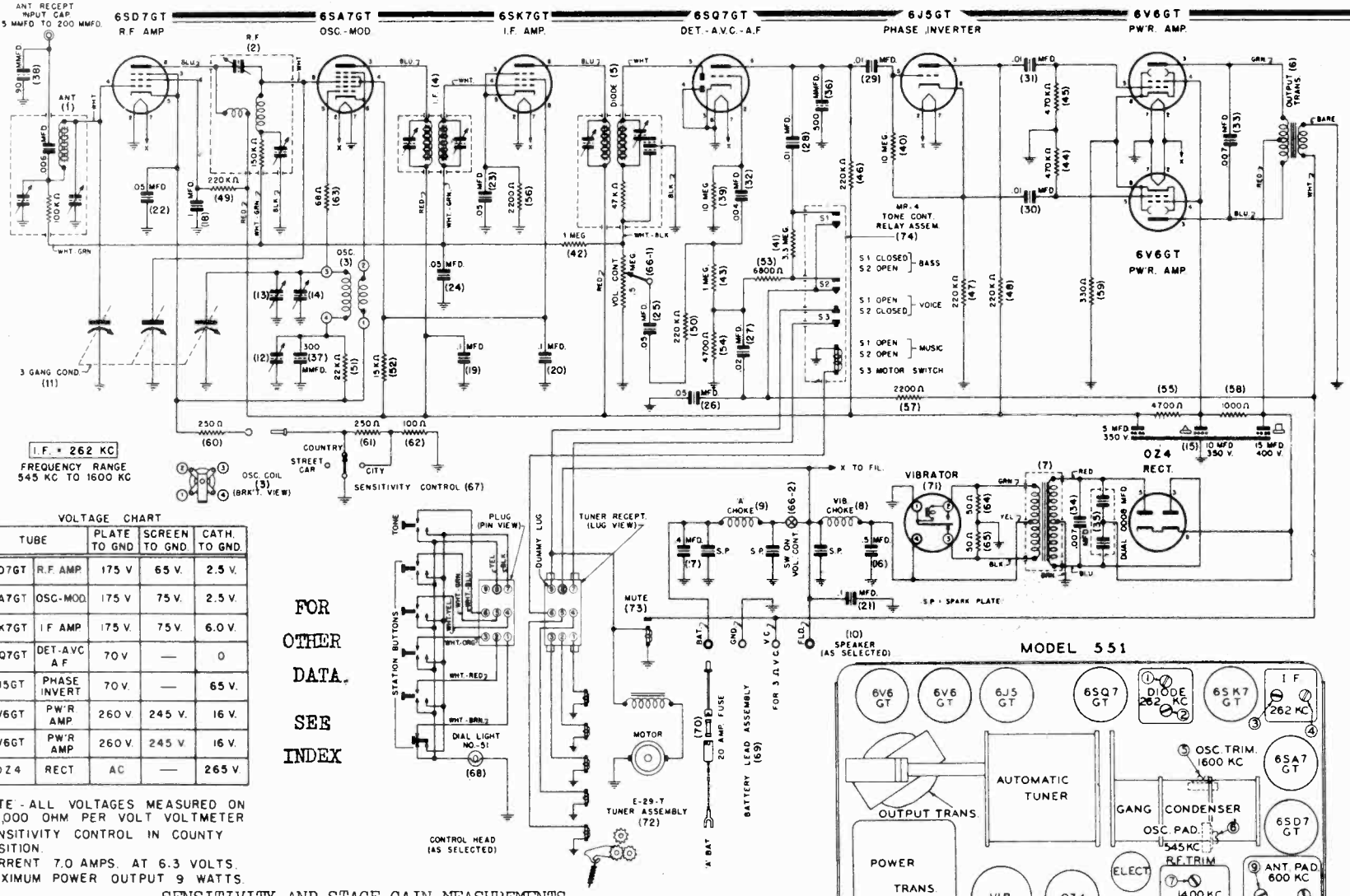
GALVIN MFG. CO.



All voltages measured from socket terminal to chassis ground using 1000 Ohm per volt meter.
Current 6.5 amps at 6.3 volts.
Maximum power output 3.5 watts.

FOR DATA ON E14T ELEC. AUTOMATIC TUNER, SEE TUNER E5T--Vol.X

FOR OTHER DATA SEE INDEX



VOLTAGE CHART

TUBE		PLATE TO GND.	SCREEN TO GND.	CATH. TO GND.
6SD7GT	R.F. AMP.	175 V.	65 V.	2.5 V.
6SA7GT	OSC.-MOD.	175 V.	75 V.	2.5 V.
6SK7GT	I.F. AMP.	175 V.	75 V.	6.0 V.
6SQ7GT	DET.-AVC A.F.	70 V.	—	0
6J5GT	PHASE INVERT.	70 V.	—	65 V.
6V6GT	PW'R AMP.	260 V.	245 V.	16 V.
6V6GT	PW'R AMP.	260 V.	245 V.	16 V.
OZ4	RECT.	AC	—	265 V.

NOTE - ALL VOLTAGES MEASURED ON A 1,000 OHM PER VOLT VOLTMETER SENSITIVITY CONTROL IN COUNTY POSITION. CURRENT 7.0 AMPS. AT 6.3 VOLTS. MAXIMUM POWER OUTPUT 9 WATTS.

FOR OTHER DATA. SEE INDEX

MODEL 551

SENSITIVITY AND STAGE GAIN MEASUREMENTS

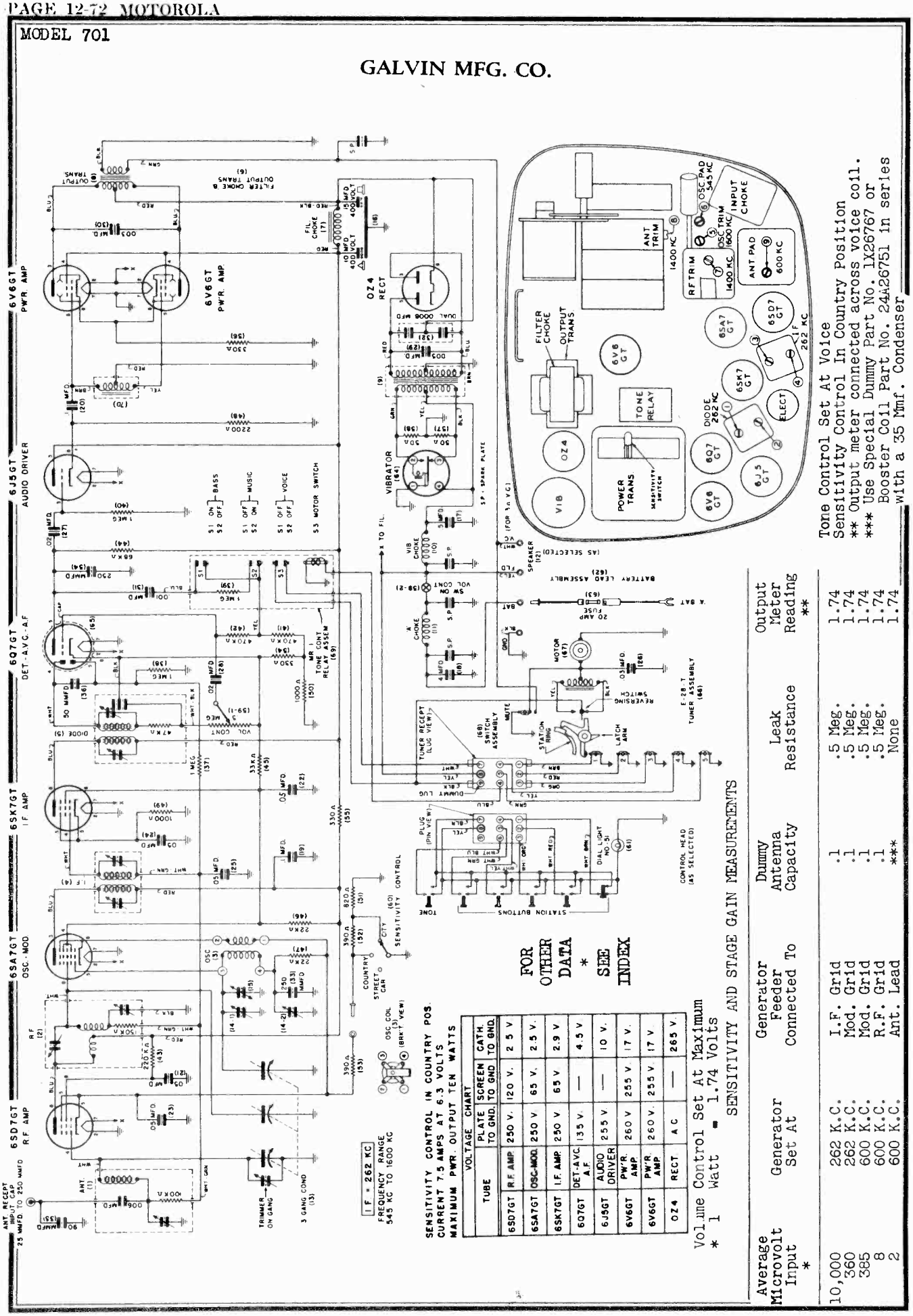
Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
34,000	262 K.C.	I.F. Grid	.1 Mfd.	.5 Meg.	1.74
590	262 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
677	600 K.C.	Mod. Grid	.1 Mfd.	.5 Meg.	1.74
11	600 K.C.	R.F. Grid	.1 Mfd.	.5 Meg.	1.74
3	600 K.C.	Antenna	***	None	1.74

Volume Control Set At Maximum
* 1 Watt = 1.74 Volts

Tone Control Set At Music
Sensitivity Control Set At Country
** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24A26751 in series with a 35 Mmf. Condenser.

MODEL 701

GALVIN MFG. CO.



SENSITIVITY CONTROL IN COUNTRY POS.
CURRENT 7.5 AMPS AT 6.3 VOLTS
MAXIMUM PWR. OUTPUT TEN WATTS

VOLTAGE CHART

TUBE		PLATE TO GND.	SCREEN TO GND	CATH. TO GND.
6SD7GT	R.F. AMP	250 V.	120 V.	2.5 V
6SA7GT	OSC-MOD.	230 V	65 V.	2.5 V.
6SK7GT	I.F. AMP	230 V	65 V	2.9 V
6Q7GT	DET-AVC. A.F.	135 V.	—	4.5 V
6J5GT	AUDIO DRIVER	255 V	—	10 V.
6V6GT	PW'R AMP.	260 V	255 V.	17 V.
6V6GT	PW'R AMP	260 V.	255 V	17 V
OZ4	RECT	A C	—	265 V.

Volume Control Set At Maximum
* 1 Watt = 1.74 Volts

SENSITIVITY AND STAGE GAIN MEASUREMENTS

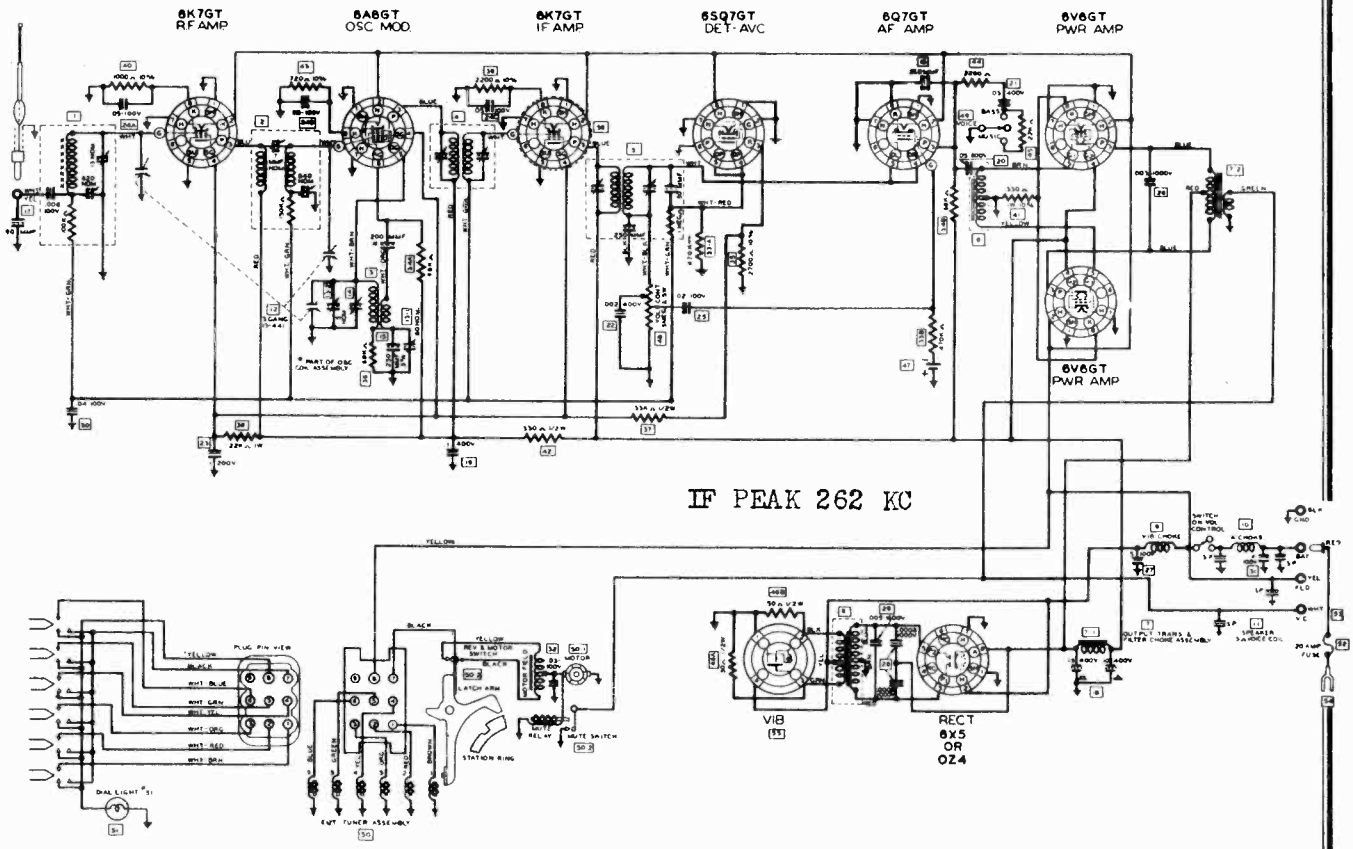
Average Microvolt Input *	Generator Set At	Generator Feeder Connected To	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
10,000	262 K.C.	I.F. Grid	.1	.5 Meg.	1.74
360	262 K.C.	Mod. Grid	.1	.5 Meg.	1.74
385	600 K.C.	Mod. Grid	.1	.5 Meg.	1.74
8	600 K.C.	R.F. Grid	.1	.5 Meg.	1.74
2	600 K.C.	Ant. Lead	***	None	1.74

FOR OTHER DATA * SEE INDEX

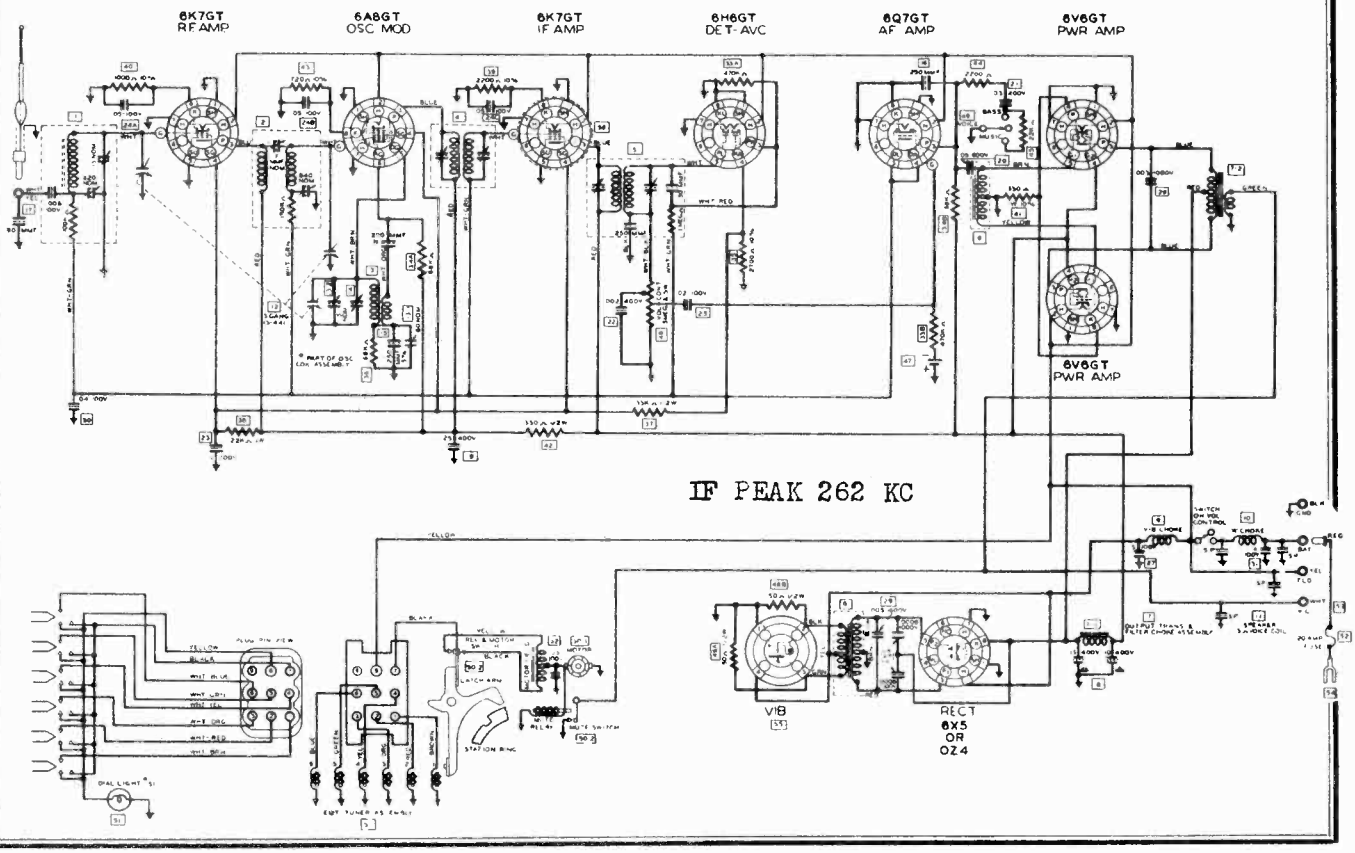
Tone Control Set At Voice
Sensitivity Control In Country Position
** Output meter connected across voice coil.
*** Use Special Dummy Part No. 1X26767 or Booster Coil Part No. 24426751 in series with a 35 Mmf. Condenser

GALVIN MFG. CO.

MODEL 700
Early, Late



NOTE:- Model 700 uses tuner E12T which is identical to the E5T
See Motorola Pages 10 - 1,2.



MODEL 700
Early, Late

GALVIN MFG. CO.

ALIGNMENT PROCEDURE

Place the chassis on the service bench with the speaker and battery connected to it.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

NOTE: Fig. 1 below shows all trimmer locations.

I. F. ALIGNMENT

1. Connect the signal generator to the control grid of the Osc.-Mod. tube (6A8GT) through a .1 MF condenser, having first removed the grid cap from the top of the tube. Connect a 500,000 ohm leak resistor from the grid of the tube to the grid cap just removed from the tube. Turn the condenser gang completely out of mesh. Connect an output meter across speaker voice coil.

2. Set the signal generator at 262 K.C. and carefully adjust the two trimmers in the Diode coil can to the point showing the highest reading on the output meter.

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

SETTING THE RANGE

1. Connect the signal generator to the control grid of the R.F. tube (6K7GT) using the same .1 MF condenser.

2. Set the signal generator at 1550 K.C. and with the condenser gang completely out of mesh adjust the 1550 K.C. oscillator trimmer to the point showing the highest output reading.

3. Set the signal generator at 535 K.C. Turn the condenser gang completely in mesh and adjust the 600 K.C. oscillator padder for the highest output reading.

NOTE: The adjustments above set the range so the receiver will track with the calibrations in the control head.

R. S. AND ANTENNA ALIGNMENT

NOTE: If the radio is to be operated on a Motorola Booster Antenna, a special dummy antenna Motorola part No. LX18018 should be used in series with the lead from the signal generator to the antenna receptacle. Change the signal generator connection to the antenna lead, using the special dummy.

1. Set the signal generator at 1400 K.C. Turn the condenser gang until the signal is heard. Adjust the 1400 K.C. antenna trimmer in the antenna coil can for maximum output reading.

2. Adjust the 1400 K.C.R.F. trimmer in the R.F. coil can for maximum output reading.

3. Set the signal generator at 600 K.C. and turn the condenser gang until the signal is heard. Adjust the 600 K.C. padder in the antenna coil can for the maximum output reading.

4. Recheck steps 1, 2, and 3, for accuracy.

SENSITIVITY AND STAGE GAIN MEASUREMENT

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a special dummy part #LX18018 in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

AVERAGE MICROVOLT INPUT *	GENERATOR SET AT	GENERATOR FEEDER CONNECTED TO	DUMMY ANTENNA CAPACITY	LEAK RESISTANCE	OUTPUT METER READING **
11,500	262 K.C.	I.F. Grid	.1 MF	.5 Meg	1.76 Volts
255	262 K.C.	Mod. Grid	.1 MF	.5 Meg	1.76 Volts
14	600 K.C.	Mod. Grid	.1 MF	.5 Meg	1.76 Volts
12	600 K.C.	R.F. Grid	.1 MF	.5 Meg	1.76 Volts
1.5	600 K.C.	Ant. Lead	***	None	1.76 Volts

* For one watt output

** Meter connected across voice coil
1.76 Volts equals 1 watt output for 3 ohm voice coil

*** Use special dummy part No. LX18018.

NOTE: If set is not used with a Motorola Booster antenna, substitute a 40 MMF. condenser for the special dummy.

VOLTAGE CHART

TUBE POSITION	PLATE	SCREEN	CATHODE
R.F.	235	80	3.8
Osc. Mod.	235	80	3.8
I.F.	235	80	4
Det. AVC	-	-	50
A.F.	130	-	0
Output	242	235	16
Output	242	235	16
Rect.	AC	-	250

All voltages measured from socket terminal to chassis ground using 1000 ohm per volt meter.

Current 8 amps. at 6.3 volts. Maximum power output 10 watts.

Model 700 PARTS PRICE LIST

NOTE: Numbers in first column refer to squared numbers on circuit diagram.

Drawing No.	Part No.	Description	List
		MAJOR PARTS	
6	25B10954	Input Choke	$1.75
56	46K11026	Vibrator (3333)	2.50
18	23A17190	Electrolytic Condenser (FP)	1.00
	62D18954	Housing Overlay, - Chrome	3.00
	1X18981	Ant. Coil & Shield Assembly	2.40
1	24A19055	Vibrator Choke (8 Pie)	.35
9	40A19065	Tone Switch	.40
49	1X19076	I.F. Coil & Shield Assembly	1.40
4	1X19078	R.F. Coil & Shield Assembly	1.80
2	1X19080	Osc. Coil & Leads Assembly	.75
3	1K19086	Vol. Control & Coupling Assembly	.95
48	25B19243	Power Transformer	3.50
8	25B19244	Output Trans. & Filter Choke	2.30
7	35B19247	Output Trans. Only	1.50
7-2	25K19248	Filter Choke Only	.80
7-1	1X19252	Diode Coil & Shield Assembly	1.80
5	1B19257	Spark Plate Assembly	.75
	1K19265	Housing Assembly	3.25
10	1K19475	"A" Choke Assembly	.35
		CONDENSERS	
25	8A1697	Tubular Condenser (.02-100V.)	.15
23	8A3310	Tubular Condenser (.1-200V)	.15
	8A4383	Tubular Condenser & Strap (.25-400.)	.35
27	8A4388	Tubular Condenser (.5-100.)	.30
22	8A7736	Tubular Condenser (.002-400.)	.15
17	21A4807	Molded Mica Condenser (90 MMF) 10%	.20
28	8A4925	Dual Tub. Cond. (.0008-1000V)	.25
	2136501	Molded Mica Condenser (200 MMF-20%)	.15
	2136503	Molded Mica Condenser (50 MMF-20%)	.15
16	2136517	Molded Mica Condenser. (250-MMF-20%)	.15
32	8A10306	Tubular Cond. & Strap .05-100V.	.15
21	8A11968	Special Condenser .05-400	.25
30	8A12898	Tubular Condenser & Strap (.04-100V)	.20
	8A13014	Condenser Res. (.006-100V-100K)	.25
26	8A13165	Tubular Condenser (.003-1000V.)	.15
24	8A13514	Tubular Condenser (.05-100V.)	.15
31	8A14095	Flat Tubular Condenser (.4-100V.)	.30
29	8A15370	Tubular Condenser (.006-1600V.)	.35
	21A18120	Molded Mica Condenser (90 MMF-10%)	.20
14	20A18179	Compensating Condenser	.25
13	20A18391	Osc. Trimmer & Padder	.35
15	21A19088	Ceramic Condenser (250 MMF) 5%	.20
20	8K13842	Ceramic Condenser & Strap. (.05-600V)	.25

Drawing No.	Part No.	Description	List
		RESISTORS	
46	6B6005	Carbon Resistors (50-1/2-20) .DOZ.	$ .60
42	6B6010	Carbon Resistor (330-1/2-20 INS) .DOZ.	.60
33	6B6011	Carbon Resistor (470,000-1/3-20) .DOZ.	.60
37	6B6012	Carbon Resistor (32000-1/2-20) .DOZ.	.60
38	6B6016	Carbon Resistor (22000-1-20. N.I.)	.10
44	6B6072	Carbon Resistor (2200-1/3-20. N.I.) .DOZ.	.60
40	6B6088	Carbon Resistor (1000-1/3-10. N.I.) .DOZ.	.60
41	6B6103	Carbon Resistor (330-1-10. N.I.)	.10
36	6B6125	Carbon Resistor (68000-1/3-20. N.I.) .DOZ.	.60
	6B6159	Carbon Resistor (1 MEG-1/3-20 INS) .DOZ.	.60
39	6B6198	Carbon Resistor (1200-1/3-10 N.I.) .DOZ.	.60
45	6B6212	Carbon Resistor (22000-1/3-20. INS) .DOZ.	.60
43	6B6234	Carbon Resistor (560-1/3-10. N.I.) .DOZ.	.60
34	6B6256	Carbon Resistor (68000-1/3-20 INS) .DOZ.	.60
35	6B6275	Carbon Resistor (2700-1/3-10. INS) .DOZ.	.60

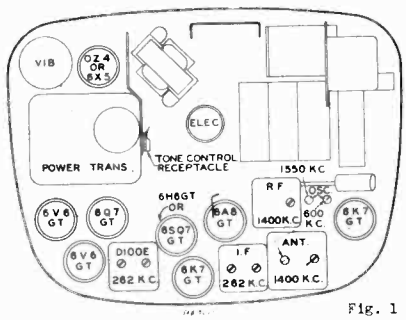


Fig. 1

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 609

GAMBLE-SKOGMO, INC.

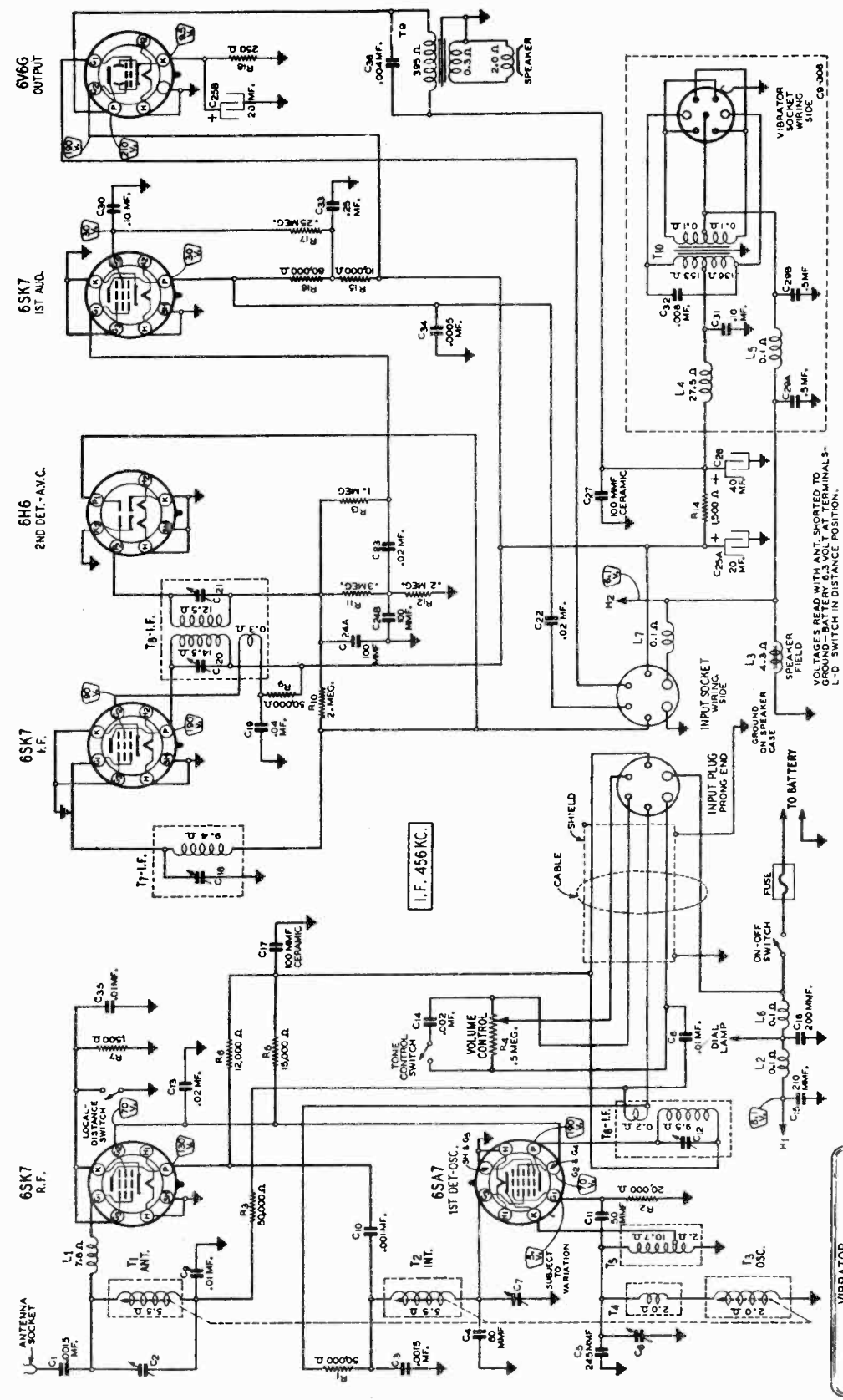


Fig. 5—Schematic Circuit Diagram

Power Consumption - 6.8 Amperes at 6.3 Volts

Power Output - - - - 3 Watts Undistorted

Sensitivity - - - 1.5 Microvolts at .5 Watt Output
(L-D Switch in Distance Position)

Selectivity - 39 KC Broad at 1000 Times Signal

Tuning Frequency Range - - - 540 to 1560 KC

Intermediate Frequency - - - - - - - 456 KC

Speaker - - - - - - - 6" Electro-Dynamic

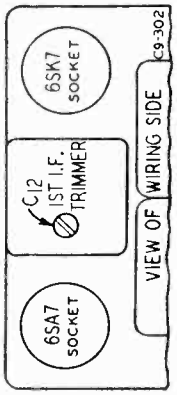


Fig. 6—Location of 1st I.F. Trimmer in Tuning Unit

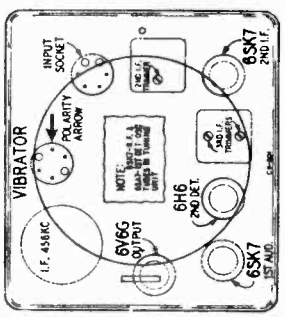


Fig. 2—Tube and Vibrator Location

Procedure for Setting the Station Buttons

There are 5 buttons on the automatic tuning dial by means of which 5 stations may be set.

Any button may be used for any station you can receive.

Make a list of your favorite stations, those which you tune in regularly.

It is better to list the station with the lowest kilocycle number first, the station with the next higher kilocycle number next, and so on.

Depress the manual tuning button AND KEEP IT DEPRESSED DURING THE ENTIRE SETTING OPERATION AS DESCRIBED BELOW. See Fig. 1 for location of buttons. Turn the manual tuning knob so that the indicator moves toward the 1500 KC end of the dial until the stop is reached.

UNLOCK THE TUNING MECHANISM by inserting a screwdriver, as shown in Fig. 1, in the locking screw opening at the bottom of the tuning unit. Loosen the locking screw by turning it counter-clockwise as far as it will go.

TO SET STATIONS ACCURATELY, DO NOT JAR THE RADIO OR BUTTONS WHILE THE MECHANISM IS UNLOCKED.

KEEP THE MANUAL TUNING BUTTON DEPRESSED WITH ONE HAND and, with the other hand, depress the first (left hand) station button. Both will remain depressed.

Select the first station from the list you have made and tune in this station by means of the manual tuning knob.

TURN THE MANUAL TUNING KNOB CAREFULLY BACK AND FORTH UNTIL THE ABOVE MENTIONED STATION IS ACCURATELY TUNED IN TO THE LOUDEST POINT. This station is now set on button No. 1.

CAUTION—Do not touch this button again while the mechanism is unlocked as the setting may be altered.

Next KEEP THE MANUAL TUNING BUTTON DEPRESSED WITH ONE HAND and, with the other hand, depress the second station button FIRMLY AND GENTLY. Then proceed to set the second station on your list in the same manner as described above.

Then continue to set any additional stations on your list on the remaining buttons.

After all desired stations have been set, release any station button which is depressed as follows: KEEP THE MANUAL TUNING BUTTON DEPRESSED WITH ONE HAND and, with the other hand, push in the OFF button a slight amount—only enough to release any station button which is depressed. Should the OFF button be pushed all the way in to the depressed position, no harm will be done except that the dial will not be illuminated.

Turn the manual tuning knob so that the indicator moves toward the 1500 KC end of the dial, until the stop is reached.

NOW LOCK THE TUNING MECHANISM by inserting a screwdriver, as shown in Fig. 1, in the locking screw opening and turning the locking screw in a clockwise direction until it is tight.

Insert a celluloid reinforcement tab half-way in the slot at the front of station button No. 1—See Fig. 3.

Fig. 3—Inserting Station Tab

Remove the correct station call letter tab for button No. 1 from the sheet supplied by bending the sheet back and forth at the score marks. Place the call letter tab in front of the celluloid reinforcement tab and insert it in slot. Push both tabs all the way in the button slot. Follow the same procedure for inserting the station call letter tabs in any other buttons.

After the stations are set and the mechanism is locked, tune in each of them by depressing the proper button. If any of them does not appear to be properly tuned in after the button has been depressed, reset the station for that button following the procedure outlined above. Changing the setting of one button will not affect the setting of the others.

Alignment Procedure

Remove grille and speaker from speaker unit.

Remove the chassis from tuning unit case in accordance with the article under "General Installation Items" in this manual.

Set the signal generator for 456 KC and connect the output of the signal generator through a .05 mf. condenser to the control grid of the 6SA7 1st detector tube (prong No. 8). Connect the ground lead of the signal generator to the tuning unit chassis. Set the volume control at maximum and the Local-Distance switch to the distance position. Attenuate the signal from the signal generator to prevent the levelling off action of the AVC.

Then adjust the 4 I.F. trimmers until maximum output is obtained. Three of the trimmers are in the speaker unit—See Fig. 2. One trimmer is at the top of the tuning unit—See Fig. 6.

Insert the antenna cable plug in the antenna socket on the tuning unit. The total capacity of the antenna cable and dummy antenna should be 60 mmf. If the cable, for example, has a capacity of 25 mmf., use a 35 mmf. condenser for a dummy antenna. Connect the other end of the antenna cable through the dummy antenna capacity to the output of the signal generator.

Set the signal generator for 1560 KC. Turn the tuning knob until the iron cores are as far out of the tuning coils as they will go. Then adjust the oscillator trimmer C6 (Fig. 1) until maximum output is obtained.

Set the signal generator for 1000 KC. Turn the tuning knob until maximum output is obtained. Adjust interstage trimmer C7 and antenna trimmer C2 for maximum output—See Fig. 1.

Reassemble the radio and install it in the automobile. Insert the car antenna cable. Tune in a weak signal near 1000 KC and readjust the antenna trimmer C2 for maximum output.

Calibration—If it is necessary to calibrate the radio, remove the chassis from the tuning unit case—See article on that subject in this manual. Accurately tune in a signal of known frequency near 1000 KC. Loosen the set screw of the large gear that drives the dial drum. Turn the dial drum until the indicator line is at the frequency of the station tuned in. Tighten the set screw and reassemble.

Adjusting Antenna Trimmer

After the antenna is connected, tune in a weak signal at approximately 1000 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna trimmer (C2) up or down until maximum output is obtained. See Fig. 1 for location of this trimmer.

Antenna

A shielded antenna cable with bayonet connector plug is required.

The plug on the antenna cable is inserted in the socket at the bottom of the tuning unit case as shown in Fig. 1. The wire at the other end of the cable is connected to the antenna.

LOW CAPACITY ANTENNA

This radio is designed for a low capacity car antenna. The total capacity of antenna and shielded cable should be 35 to 60 mmf.

Types of Low Capacity Antennas —Door hinge; fishpole; over-the-roof types which are mounted quite a distance from the metal roof of the car.

The antenna should be mounted on the same side of the car as the tuning unit.

HIGH CAPACITY ANTENNA

If this radio is to be installed with a high capacity car antenna (200 mmf. total capacity of antenna and shielded cable) an adapter must be used. The adapter is inserted in the socket at the bottom of the tuning unit case. Then the antenna plug is inserted in the adapter.

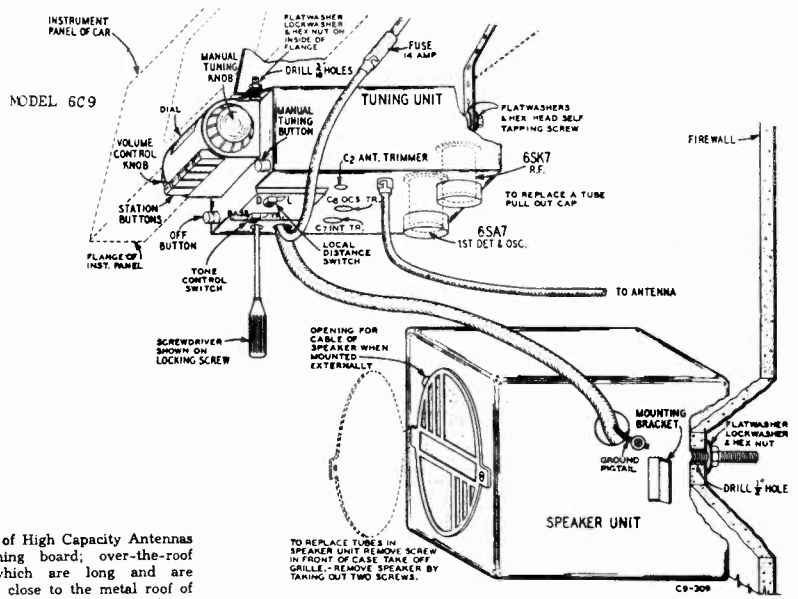


Fig. 1—Details of Mounting Tuning and Speaker Units

Types of High Capacity Antennas — Running board; over-the-roof types which are long and are mounted close to the metal roof of the car; ordinary built in roof antennas (not metal roof).

ANTENNA CABLE

The total capacity of antenna and shielded cable should be 35 to 60 mmf.

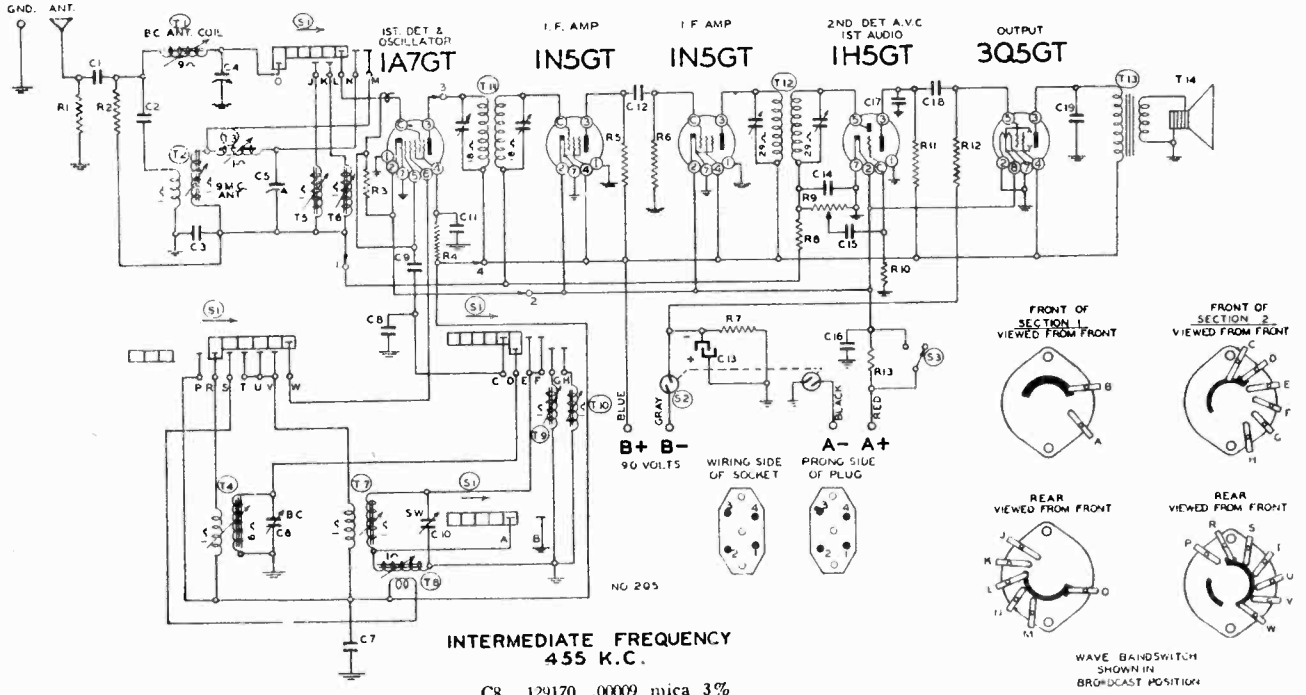
Keep the antenna cable as far away from car wiring as possible and ground the pigtail of the antenna cable shield at the antenna end, otherwise ignition noise may be picked up. The length of the pigtail from the grounding point to the end of the antenna cable should be kept as short as possible, preferably not over one inch.

For the door hinge and over-the-roof type antennas, the antenna lead must be shielded the entire distance from the radio to the point where the lead goes through the car body to the outside. In the case of a running board antenna, the antenna lead shielding must extend all the way to the antenna.

When the antenna cable is connected to an antenna lead coming down the pillar post, the shielded cable should be pushed SEVERAL inches up into the PILLAR POST.

MODEL C509

GAMBLE SKOGMO, INC.



Code No.	Part No.	Description

RESISTORS

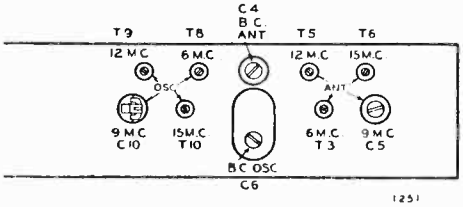
R1	13012	50M ohm—⅓ w. 20%
R2	13020	100M ohm—⅓ w. 20%
R3	1309	200M ohm—⅓ w. 20%
R4	13094	50M ohm—⅓ w. 10%
R5	130176	20M ohm—⅓ w. 10%
R6	13019	1 megohm—⅓ w. 20%
R7	13079	400 ohm—⅓ w. 10%
R8	13038	2 megohm—⅓ w. 20%
R9	101236	Volume Control
R10	130223	10 megohm—⅓ w. 20%
R11	13011	250M ohm—⅓ w. 20%
R12	13019	1 megohm—⅓ w. 20%
R13	130325	1 ohm—⅓ w. 10%
	130326	2.3 ohm—1½ Watt 10% in "A" Cable Adapter

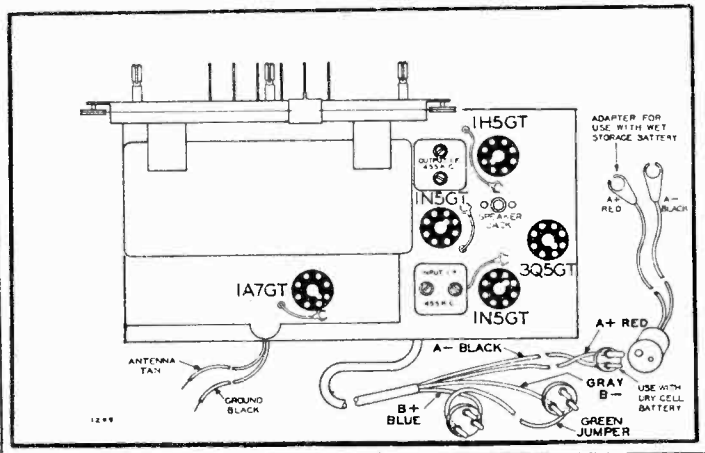
CONDENSERS

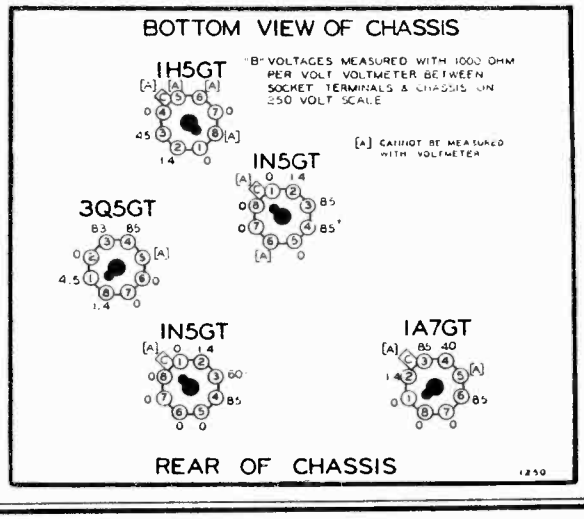
C1	129158	.0002 mica 10%
C2	100112	.001 x 200 volt
C3	1009	.05 x 200 volt
C4	124138	B.C. ant. trimmer
C5	124138	9 mc. ant. trimmer
C6	124139	B.C. osc. trimmer
C7	10064	.25 x 200 volt
C8	129170	.00009 mica 3%
C9	1295	.0001 mica 20%
C10	124145	9 mc. osc. trimmer
C11	100124	.1 x 200 volt
C12	100112	.001 x 200 volt
C13	119116	20 mfd. x 25 volt lytic
C14	12912	.00025 mica 20%
C15	10025	.002 x 600 volt
C16	100104	.5 x 100 volt
C17	1295	.0001 mica 20%
C18	10026	.02 x 400 volt
C19	10012	.003 x 600 volt

MISCELLANEOUS

T1	111216	B.C. ant. coil
T2	111213	9 mc. ant. coil
T3	111212	6 mc. ant. coil
T4	110168	B.C. osc. coil
T5	111214	12 mc. ant. coil
T6	111215	15 mc. ant. coil
T7	110165	9 mc. osc. coil
T8	110164	6 mc. osc. coil
T9	110166	12 mc. osc. coil
T10	110167	15 mc. osc. coil
T11	108177C	Input I.F. complete
T12	108185B	Output I.F. complete
T13	105119	Output transformer
T14	114220	P.M. speaker
S1	125138	Band switch
S2		On-off switch on volume control
S3	12588B	Battery switch







MODEL 509
MODEL C800

GAMBLE SKOGMO, INC.

Do not realign the band spread scales unless you are positive they are out of adjustment. When adjustment is necessary proceed as follows.

First refer to the "Iron Core Adjustment View" now turn the tuning knob until the drive bar comes within 1/64 to 1/32 from the stops. (A piece of blotting paper is about the right thickness and will serve as a gauge). The clearance of the bar must be the same at both stops. If far off you can raise one drive screw gently and equalize them. Minor adjustments may be made with the drive bar adjustments.

Next rotate each iron core until the fine score marks are even with the edge of the coil forms.

You are now ready to continue with the trimmer adjustments as shown on the alignment chart.

Setting the Pushbuttons

Make a list of your 6 favorite stations. Push out the call letters of these stations from the call letter sheets supplied. Insert a call letter in the slot on top of each pushbutton.

Next pull one of the pushbuttons all the way out as far as it will come (pull, with fingers on top and bottom of button). Now tune in the station you want with the tuning knob—Tune back and forth until the station is clear and distinct. Now push the button hard all the way in to lock the station in place, (push directly on front of button). Continue setting each pushbutton in the same way. Pressing the proper button will now tune the station you want. If it does not do so you did not push the button hard enough to lock it in place when setting up the station.

To change stations simply repeat the procedure above.

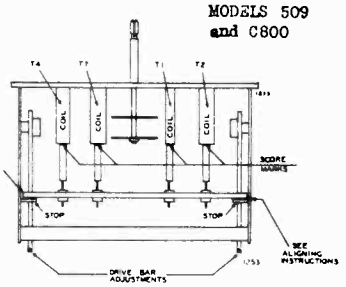
MODELS 509 and C800

MODEL 509

Power Consumption
- A Battery - - - 300 MA
- B Battery - - - 13.5 MA

Power Output - - - - 210 MW Undistorted
Sensitivity for 50 Milliwatt Output: 10 Microvolts Average
Selectivity - 38 KC Broad at 1000 Times Signal at 1000 KC
Tuning Frequency Range Broadcast Band - 535 to 1730 KC
- 49M Band - - - 5.9 to 6.1 MC
- 31M Band - - - 9.1 to 10 MC
- 25M Band - - 11.4 to 12.1 MC
- 19M Band - - 14.9 to 15.4 MC

Intermediate Frequency - - - - - - 455 KC
Speaker - - - - - - - 6 in. PM Dynamic



IRON CORE ADJUSTMENT VIEW

- Tone control—Treble.
- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

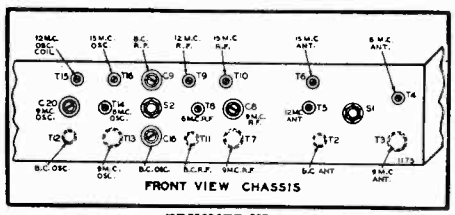
The following equipment is required for aligning:
- An all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—.1 mf., 200 mmf., and 400 ohms.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Dial Pointer Setting	Trimmers Adjusted In Order Shown	Trimmer Function	Adjustment
I. F.	455 Kc.	.1 MFD.	Grid of 1N5 (I.F.)	Broadcast	Set Dial at 1730 Kc.	Two Trimmers on Top	Output I. F.	Adjust to maximum output
	455 Kc.	.1 MFD.	Grid of 1A7	Broadcast	Set Dial at 1730 Kc.	Two Trimmers on Top	Input I. F.	Adjust to maximum output
31 METER BAND	9.6 Mc.	400 ohms	Antenna lead	31M	Set Dial at 9.6 Mc.	(See Trimmer View) C10 (See Trimmer on Top) C5	Osc. Ant.	Adjust to maximum output
49 METER BAND	6.1 Mc.	400 ohms	Antenna lead	49M	Set Dial at 6.1 Mc.	(See Trimmer View) T8 (See Trimmer View) T3	Osc. Ant.	Adjust to maximum output
25 METER BAND	11.8 Mc.	400 ohms	Antenna lead	25M	Set Dial at 11.8 Mc.	(See Trimmer View) T9 (See Trimmer View) T5	Osc. Ant.	Adjust to maximum output
19 METER BAND	15.2 Mc.	400 ohms	Antenna lead	19M	Set Dial at 15.2 Mc.	(See Trimmer View) T10 (See Trimmer View) T6	Osc. Ant.	Adjust to maximum output
BROAD-CAST BAND	1730 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1730 Kc.	(See Trimmer View) C6 ((See Trimmer View) C4	Osc. Ant.	Adjust to maximum output
	1400 Kc.	200 mmf.	Antenna lead	Broadcast	Tune to Generator Sig.	Rotate Core T1 (See Iron Core Adjustment View)	Ant.	Adjust to maximum output

MODEL C800

Power Consumption - - - - - - 100 Watts
Power Output - - - - - 5 Watts Undistorted
Sensitivity for 500 Milliwatt Output: 10 Microvolts Average
Selectivity - 35 KC Broad at 1000 Times Signal at 1000 KC
Tuning Frequency Range Broadcast Band - 540 to 1600 KC
- 49M Band - - - 5.9 to 6.1 MC
- 31M Band - - - 9.1 to 10 MC
- 25M Band - - 11.4 to 12.1 MC
- 19M Band - - 14.9 to 15.4 MC

Intermediate Frequency - - - - - - 455 KC
Speaker - - - - - - 10 in. Electro Dynamic



TRIMMER VIEW

- Tone control—Treble.
- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

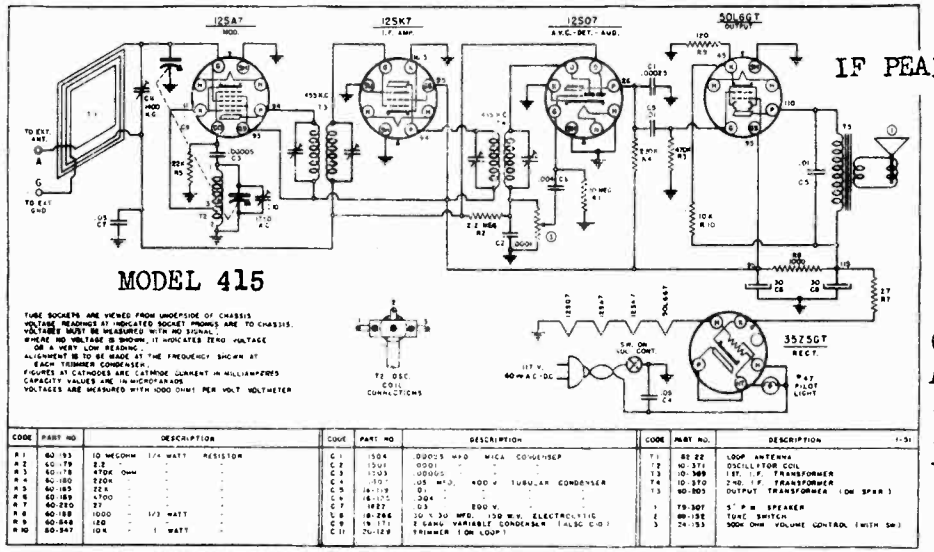
The following equipment is required for aligning:
- An all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—.1 mf., 200 mmf., and 400 ohms.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Dial Pointer Setting	Trimmers Adjusted In Order Shown	Trimmer Function	Adjustment
I. F.	455 Kc.	.1 MFD.	Grid of 6SK7 (I.F.)	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top	Output I. F.	Adjust to maximum output
	455 Kc.	.1 MFD.	Grid of 6SA7	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top	Input I. F.	Adjust to maximum output
31 METER BAND	9.6 Mc.	400 ohms	Antenna lead	31M	Set Dial at 9.6 Mc.	(See Trimmer View) C20 (See Trimmer View) C8 (See Trimmer on Top) C4	Osc. R. F. Ant.	Adjust to maximum output
49 METER BAND	6.1 Mc.	400 ohms	Antenna lead	49M	Set Dial at 6.1 Mc.	(See Trimmer View) T14 (See Trimmer View) T8 (See Trimmer View) T4	Osc. R. F. Ant.	Adjust to maximum output
25 METER BAND	11.8 Mc.	400 ohms	Antenna lead	25M	Set Dial at 11.8 Mc.	(See Trimmer View) T15 (See Trimmer View) T9 (See Trimmer View) T5	Osc. R. F. Ant	Adjust to maximum output
19 METER BAND	15.2 Mc.	400 ohms	Antenna lead	19M	Set Dial at 15.2 Mc.	(See Trimmer View) T16 (See Trimmer View) T10 (See Trimmer View) T6	Osc. R. F. Ant.	Adjust to maximum output
BROAD-CAST BAND	1600 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1600 Kc.	(See Trimmer View) C16 (See Trimmer View) C9 (See Trimmer on Top) C3	Osc. R. F. Ant.	Adjust to maximum output
	1400 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1400 Kc.	Rotate Core T11 Rotate Core T2 (See Iron Core Adjustment View)	R. F. Ant.	Adjust to maximum output

Model 415 is a 5-tube superheterodyne radio receiver for operation on a 117 volt A.C., 60 cycle or 117 volt D.C. supply.

This receiver covers a frequency range from 540 Kilocycles to 1750 Kilocycles (K.C.)

IF PEAK 455 KC



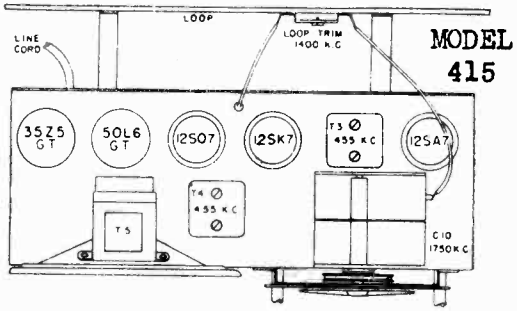
MODEL 415

TUBE SOCKETS ARE VIEWED FROM UNDERSIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO CHASSIS.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
WHERE NO VOLTAGE IS SHOWN, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.
ALIGNMENT IS TO BE MADE AT THE FREQUENCY SHOWN AT EACH TRIMMER CONDENSER.
FIGURES AT CATHODES ARE CATHODE CURRENT IN MILLIAMPERES.
CAPACITY VALUES ARE IN MICROFARADS.
VOLTAGES ARE MEASURED WITH 1000 OHM PER VOLT VOLTMETER

CODE	PART NO.	DESCRIPTION
R1	60-193	10 MEGOHM 1/4 WATT RESISTOR
R2	60-179	2.2 - - -
R3	60-178	470K OHM - - -
R4	60-180	220K - - -
R5	60-185	22K - - -
R6	60-189	4700 - - -
R7	60-220	27 - - -
R8	60-188	1000 1/3 WATT - -
R9	60-848	120 - 1 WATT -
R10	60-347	10K - - -

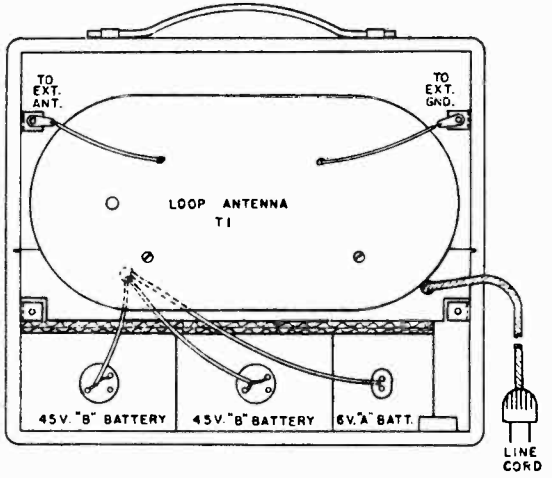
CODE	PART NO.	DESCRIPTION
C1	1504	.00025 MFD. MICA CONDENSER
C2	1501	.0001 - - -
C3	1503	.00065 - - -
C4	1507	.05 MFD. 400 V. TUBULAR CONDENSER
C5	16-119	.01 - - -
C6	16-115	.1 - - -
C7	1827	.03 - 200 V. -
C8	19-266	20 X 30 MFD. 150 W.V. ELECTROLYTIC
C9	19-171	2 GANG VARIABLE CONDENSER (ALSO C10)
C11	20-129	TRIMMER (ON LOOP)

CODE	PART NO.	DESCRIPTION
T1	82-22	LOOP ANTENNA
T2	90-371	OSCILLATOR COIL
T3	10-369	1ST. I.F. TRANSFORMER
T4	10-370	2ND. I.F. TRANSFORMER
T5	80-205	OUTPUT TRANSFORMER (ON SPKR.)
1	79-307	5" P.M. SPEAKER
2	69-152	TONE SWITCH
3	24-153	500K OHM VOLUME CONTROL (WITH SW.)



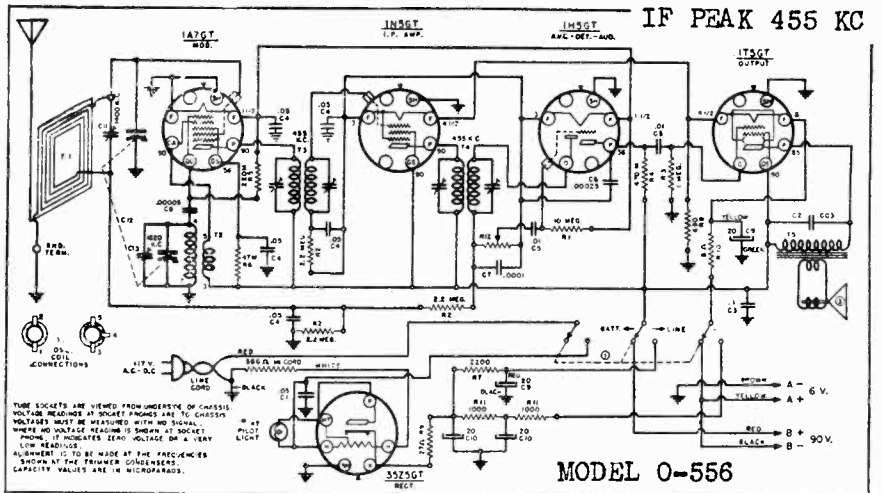
LOCATION OF PARTS ON TOP OF CHASSIS

CONVENTIONAL ALIGNMENT. SEE SPECIAL SECTION OF VOLUME VIII.



LOCATION OF PARTS IN CABINET

IF PEAK 455 KC



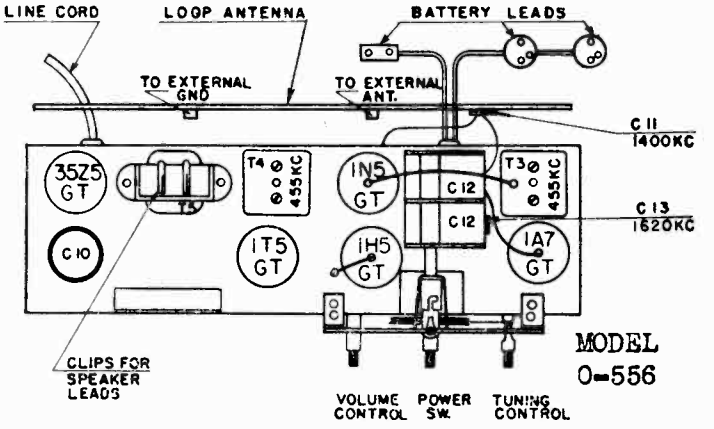
MODEL 0-556

TUBE SOCKETS ARE VIEWED FROM UNDERSIDE OF CHASSIS.
VOLTAGE READINGS AT SOCKET PRONGS ARE TO CHASSIS.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
WHERE NO VOLTAGE READING IS SHOWN AT SOCKET PRONG, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.
ALIGNMENT IS TO BE MADE AT THE FREQUENCIES SHOWN AT THE TRIMMER CONDENSERS.
CAPACITY VALUES ARE IN MICROFARADS.

CODE	PART NO.	DESCRIPTION
C1	1807	.05 MFD. 400 V. TUBULAR COND.
C2	16-139	.003 - - -
C3	16-115	.1 - 200 V. -
C4	1682	.08 - - -
C5	16-121	.01 - - -
C6	1504	.00025 MFD. MICA CONDENSER
C7	1501	.0001 - - -
C8	1503	.00065 - - -
C9	19-263	20 X 20 - 150 W.V. ELECTROLYTIC
C10	19-262	20 X 20 - 150 W.V. -
C11	20-129	TRIMMER ON LOOP
C12	19-187	2 GANG VARIABLE COND. ALSO C13

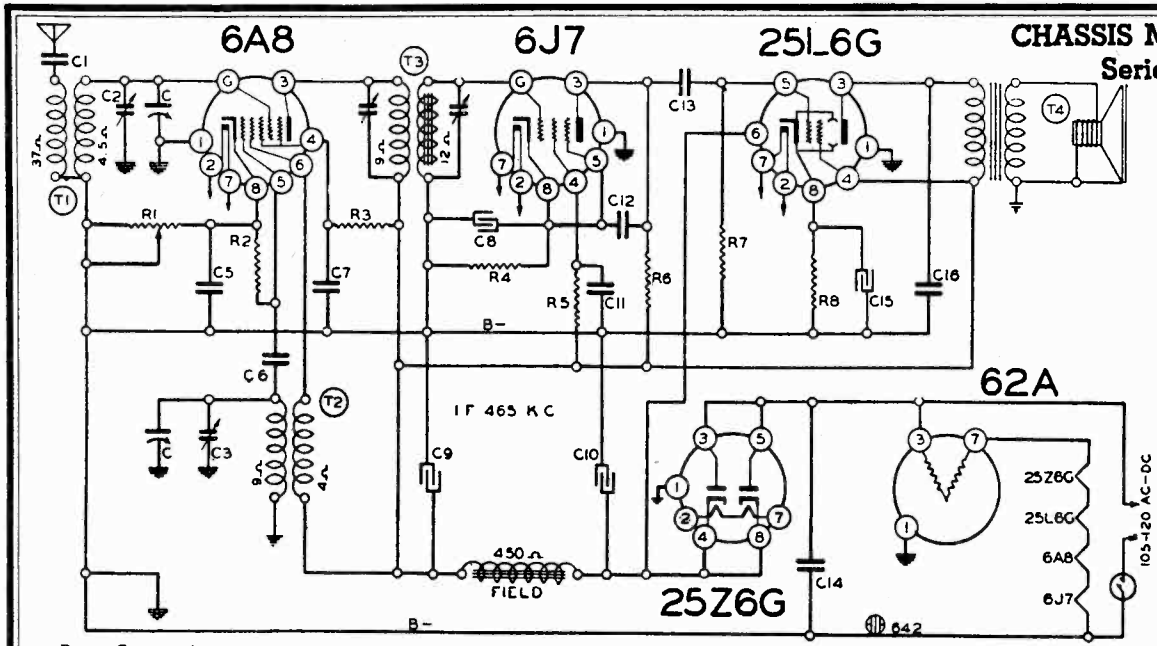
CODE	PART NO.	DESCRIPTION
R1	60-193	10 MEGOHM 1/4 W. RESISTOR
R2	60-179	2.2 - - -
R3	60-193	10 - - -
R4	60-178	470 M OHM - -
R5	60-180	220 M - -
R6	60-177	47 M - -
R7	60-193	2200 - -
R8	60-319	680 - -
R9	60-320	27 - -
R10	60-128	8 - 1/2 W.
R11	60-644	1000 - 5 W.
R12	24-150	1 MEGOHM VOLUME CONTROL

CODE	PART NO.	DESCRIPTION
T1	82-20	LOOP ANTENNA
T2	10-310	OSCILLATOR COIL
T3	10-355	1ST. I.F. TRANSFORMER
T4	10-343	2 ND. - - -
T5	80-204	OUTPUT TRANSFORMER
1	69-151	POWER SWITCH
3	79-303	5" P.M. SPEAKER } ALTERNATIVE
3	79-304	5" P.M. SPEAKER }



MODEL 0-556

CHASSIS MODEL 520
Series A



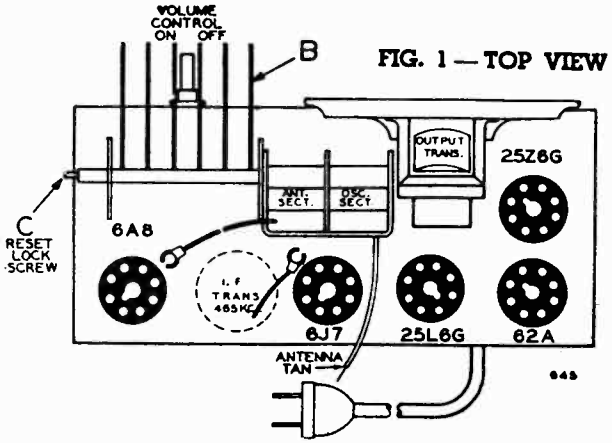


FIG. 1 — TOP VIEW

Broadcast Band A. C.-D. C. Superheterodyne Receiver

Frequency Range 530-1720 Kilocycles

Power Consumption ..... 45 Watts
Power Output ..... 800 Milliwatts Undistorted, 1300 Milliwatts Maximum

I. F. Frequency 465 K. C.

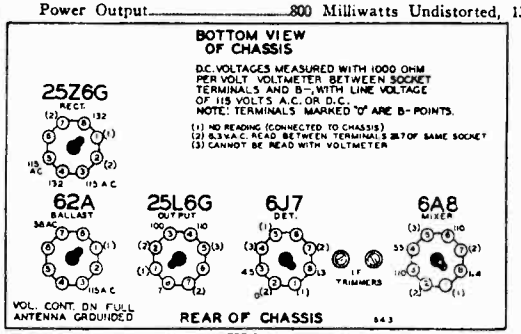


FIG. 3

Code No.	Part No.	Description
		RESISTORS
R1	101138	20M ohm volume control
R2	13012	50M ohm—½ w.
R3	130194	35M ohm—½ w.
R4	13082	10M ohm—½ w.
R5	13038	2 megohm—½ w.
R6	13045	250M ohm—½ w.
R7	1303	500M ohm—½ w.
R8	130251	160 ohm—½ w.
		CONDENSERS
C	10287	2 gang variable condenser
C1	1292	.0005 mica
C2		Antenna Trimmer
C3		Oscillator Trimmer
C5	1009	.05 x 200 v.
C6	12912	.00025 mica
C7	1009	.05 x 200 v.
C8	11971	5 mfd. x 25 v. lytic
C9	11970	30 mfd. x 150 v. lytic
C10	11970	30 mfd. x 150 v. lytic
C11	10020	.1 x 200 v.
C12	1292	.0005 mica
C13	10026	.02 x 400 v.
C14	1001	.1 x 400 v.
C15	11970	40 mfd. x 25 w. v. lytic
C16	10095	.035 x 400 v.

C9, C10 and C15 in one unit, part no. 11970

Code No.	Part No.	Description
		PARTS
T1	111110	Antenna Coil
T2	11095	Oscillator Coil
T3	108123	I. F. Transformer—465 kc.
T4	114130	5 inch Dynamic Speaker

ALIGNMENT PROCEDURE

FREQUENCY RANGE
530 to 1720 K.C.

- Volume control—Maximum all adjustments.
- Connect B - of radio chassis to ground post of signal generator through .1 Mfd. condenser.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

- An all wave signal generator.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—.1 mf., 100 mmf.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Variable Condenser Setting	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 6A8	Rotor full open (Plates out of mesh)	Two trimmers (See Fig. 3)	I. F.	Adjust to maximum output
BROADCAST BAND	1720 Kc.	100 mmf.	Antenna Lead	Rotor full open (Plates out of mesh)	Trimmer—Top of rear section of gang (See Fig. 1)	Broadcast Oscillator	Adjust to maximum output
	1400 Kc.	100 mmf.	Antenna Lead	Set dial at 1400 Kc.	Trimmer—Top of front section of gang (See Fig. 1)	Broadcast Antenna	Adjust to maximum output

The tube complement of this chassis consists of the following octal base glass and metal tubes.

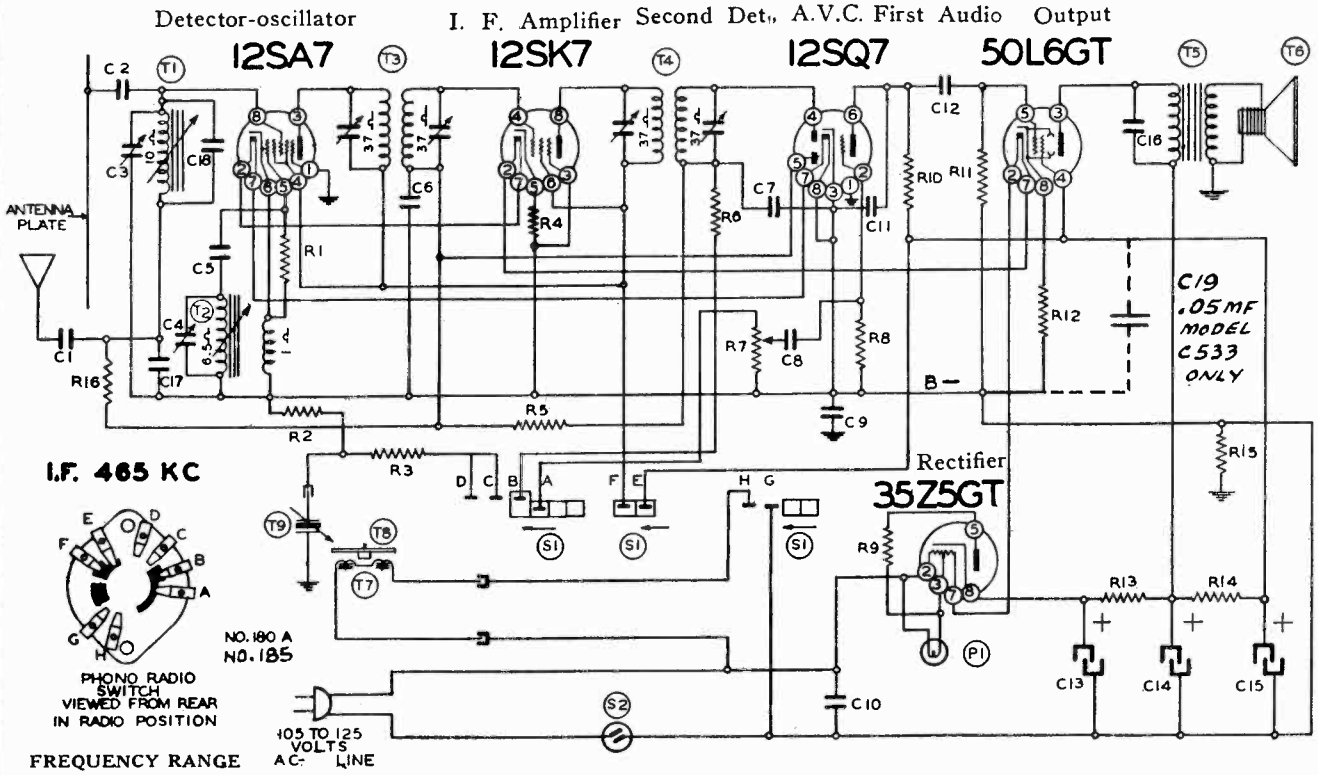
The type and function of each tube is as follows:

1—Type 6A8 Pentagrid Mixer, First Detector-oscillator.
1—Type 6J7 Second Detector.
1—Type 25L6G Beam Output Amplifier.
1—Type 25Z6G High Vacuum Rectifier.
1—Type 62A Ballast Tube.

FOR
TUNER ADJUSTMENTS
SEE
GAMBLE-SKOGMO
MODEL 527-A, VOLUME X
PAGE 10-8

GAMBLE SKOGMO, INC.

MODEL 533, Series B
Ser. No. OC371605B up,
MODEL C533, Series C



FREQUENCY RANGE
535 to 1690 K.C.

MODEL 533 Series B (Serial No. OC371605B and up)

Power Consumption.....Radio Only 30 Watts
Power Output.....900 Milliwatts Undistorted, 1.7 Watts Maximum

Circuit Diagram Ref. No. | Part No. | Description — 3-40

RESISTORS

R1	130176	20M ohm—⅓ w.
R2	130118	600M ohm—⅓ w.
R3	130118	600M ohm—⅓ w.
R4	13056	100 ohm—⅓ w.
R5	130170	3 megohm—⅓ w.
R6	13012	50M ohm—⅓ w.
R7	101217	½ megohm—volume control
R8	130257	5 megohm—⅓ w.
R9	130215	25 ohm—½ w.
R10	1309	200M ohm—⅓ w.
R11	13037	750M ohm—⅓ w.
R12	130166	150 ohm—⅓ w.
R13	13097	200 ohm—⅓ w.
R14	130287	1200 ohm—1 watt
R15	1309	200M ohm—⅓ w.
R16	1309	200M—⅓ w.

CONDENSERS

C1	1295	.0001 Mica Condenser
C2	129114	.0003 mfd. mica
C3	124136	Antenna Trimmer
C4	124136	Oscillator Trimmer
C5	1295	.0001 mica
C6	1009	.05 x 200 v.
C7	1295	.0001 mica
C8	10025	.002 x 600 v.
C9	100119	.1 x 400 v.
C10	1001	.1 x 400 v.
C11	12912	.00025 mica
C12	10019	.006 x 600 v.
C13	11994	40 mfd. lytic—150 w. v.
C14	11994	20 mfd. lytic—150 w. v.
C15	11994	20 mfd. lytic—150 w. v.
C16	10011	.01 x 400 v.
C17	129162	.0008 Mica Condenser
C18	129163	.000025 Ceramicon Condenser

C3 and C4 in same unit

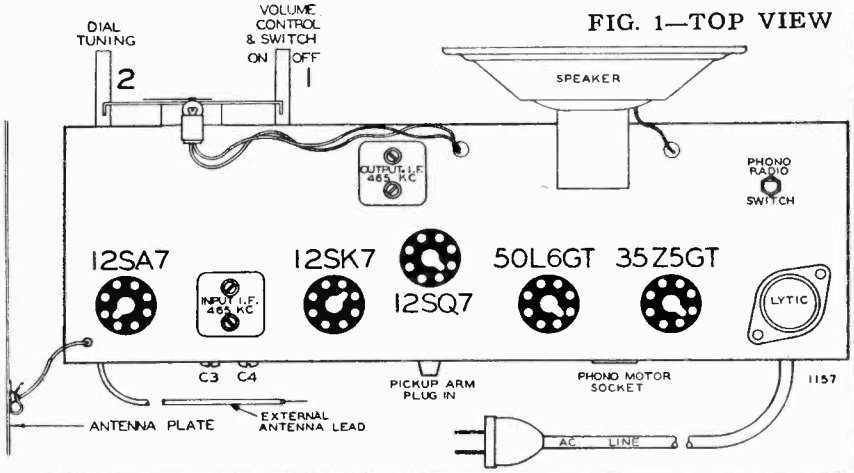
C13, C14 and C15 are in same unit

PARTS

T1	112767	Antenna Coil—Permeability tuning assembly complete
T2	112767	Oscillator Coil
T3	108140F	Input I. F. Coil—465 kc.
T4	108145D	Output I. F. Coil—465 kc.
T5	105108	Output Transformer
T6	114193	5" P.M. Speaker
T7	104206	Phono Motor
T8	12228	Turntable
T9	114194	Phono pick up arm
S1	125113	Phono Switch
S2		Switch on volume control
P1	107249	Pilot light T47

T1 and T2 in same unit

FIG. 1—TOP VIEW



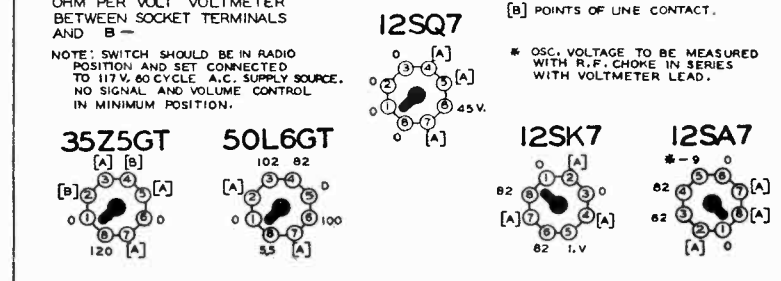
BOTTOM VIEW OF CHASSIS

VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTMETER BETWEEN SOCKET TERMINALS AND B—

NOTE: SWITCH SHOULD BE IN RADIO POSITION AND SET CONNECTED TO 117 V, 60 CYCLE A.C. SUPPLY SOURCE. NO SIGNAL AND VOLUME CONTROL IN MINIMUM POSITION.

[A] CANNOT BE MEASURED WITH D.C. VOLTMETER.
[B] POINTS OF LINE CONTACT.

* OSC. VOLTAGE TO BE MEASURED WITH R.F. CHOKE IN SERIES WITH VOLTMETER LEAD.



REAR OF CHASSIS

1160

IMPORTANT: See Aligning Instructions

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect — B of radio chassis to ground post of signal generator through .1 Mfd. condenser.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

- An all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—.1 Mfd., and 200 Mmf.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Iron Cores (Dial Setting)	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Connect to Terminal "A" (See Fig. /)	Iron Cores All the way out	Two trimmers on top (See Fig. 1)	Output I. F.	Adjust to maximum output
	465 Kc.	.1 MFD.	Connect to Terminal "A" (See Fig. /)	Iron Cores All the way out	Two trimmers on top (See Fig. 1)	Input I. F.	Adjust to maximum output
BROAD-CAST BAND	1690 Kc.	.1 MFD.	Connect to Terminal "A" (See Fig. /)	Iron Cores All the way out	Trimmer (C4) (See Fig. /)	Oscillator	Adjust to maximum output
	1690 Kc.	200 MMF.	Connect to Terminal "B" (See Fig. /)	Iron Cores All the way out	Trimmer (C3) (See Fig. 1)	Antenna	Adjust to maximum output
	1400 Kc.	200 MMF.	Connect to Terminal "B" (See Fig. /)	Turn Dial to 1400 Kc.	Adjust position of antenna coil right or left. (See Fig. 3)	Antenna Coil Adjustment	(See Note "A") Adjust to maximum output
	1690 Kc.	200 MMF.	Connect to Terminal "B" (See Fig. /)	Turn Dial to 1690 Kc.	Adjust trimmer (C3) (See Fig. 1)	Antenna	Check for tracking (See Note "B")

ALIGNING INSTRUCTIONS:

CAUTION:—No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltage, defective tubes, condensers and resistors. In order to properly align this radio, the chassis should be removed from the cabinet.

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control at minimum, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on the voltage chart are measured with 117 volt 60 cycle A.C. line

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D. C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

NOTE "A"—The antenna coil assembly is made so that it is movable right or left. When making the adjustment as given in the alignment procedure move the coil assembly very slowly. It can be moved by hand or by pivoting one edge of the blade of a screwdriver in the hole and engaging the blade in the gear teeth of the coil form.

NOTE "B"—After the antenna coil has been tracked at 1400 Kc. it is necessary to check the antenna trimmer. (C3) adjustment again at 1690 Kc. If no appreciable change in trimmer adjustment is made the coil is in track, if the trimmer requires considerable change it will be necessary to again adjust the position of the antenna coil at 1400 Kc. These two adjustments should be tried several times until no change of trimmer adjustment is required at 1690 Kc.

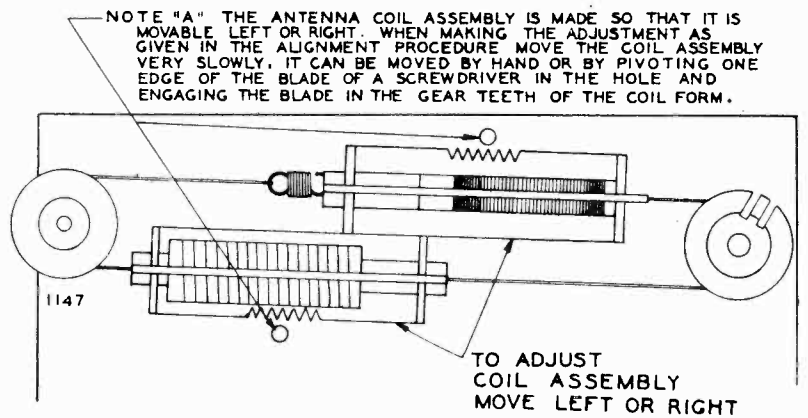
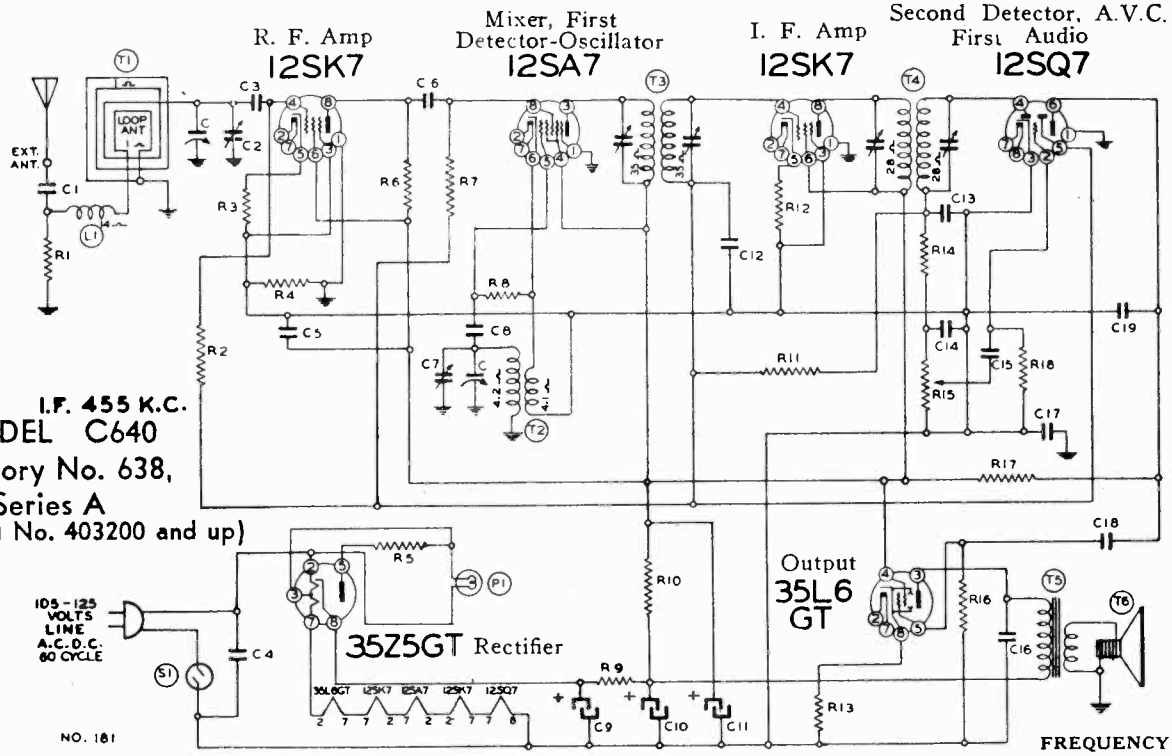


FIG. 3.—TUNING ASSEMBLY

GAMBLE SKOGMO, INC.

GAMBLE SKOGMO, INC.

MODEL C640



I.F. 455 K.C.

MODEL C640

Factory No. 638, Series A

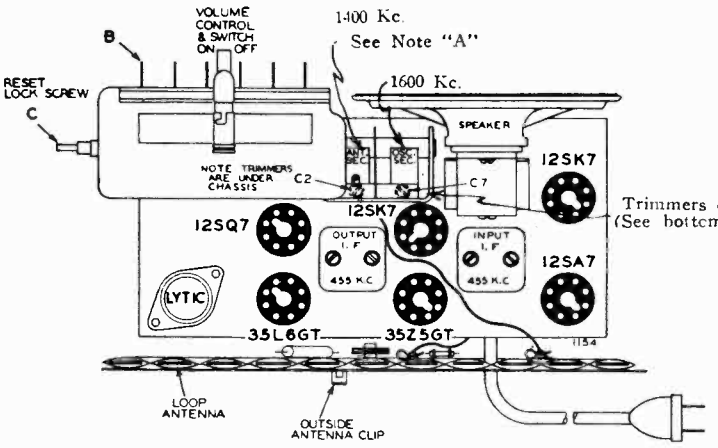
(Serial No. 403200 and up)

4-40

FREQUENCY RANGE
540 to 1600 K.C.

Power Consumption.....35 Watts

Power Output.....1 Watt Undistorted, 1.5 Watts Maximum

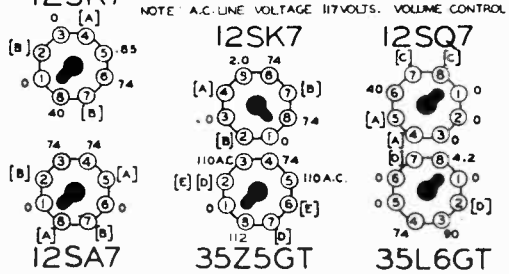


BOTTOM VIEW OF CHASSIS

VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTMETER BETWEEN SOCKET TERMINALS AND B—

[A] CANNOT BE MEASURED WITH VOLTMETER.
[B] 12 VOLTS A.C MEASURED ACROSS PINS 2 & 7.
[C] 12 VOLTS A.C MEASURED ACROSS PINS 7 & 8.
[D] 30 VOLTS A.C MEASURED ACROSS PINS 2 & 7.
[E] 117 VOLTS A.C MEASURED ACROSS PINS 2 & 8.

NOTE: A.C. LINE VOLTAGE 117 VOLTS. VOLUME CONTROL AT MINIMUM.



REAR OF CHASSIS

1156

Code No.	Part No.	Description
		RESISTORS
R1	13018	4M ohm—⅓ w.
R2	13019	1 megohm—⅓ w.
R3	130168	100 ohm—⅓ w.
R4	130100	150M ohm—⅓ w.
R5	130215	25 ohm—½ w.
R6	130218	5M ohm—⅓ w.
R7	13020	100M ohm—⅓ w.
R8	13012	50M ohm—⅓ w.
R9	130296	200 ohm—1 w.
R10	130287	1200 ohm—1 w.
R11	130170	3 megohm—⅓ w.
R12	13024	400 ohm—⅓ w.
R13	130166	150 ohm—⅓ w.
R14	13012	50M ohm—⅓ w.
R15	101218	1 megohm volume control
R16	1303	500M ohm—⅓ w.
R17	1309	200M ohm—⅓ w.
R18	130257	5 megohm—⅓ w.
		CONDENSERS
C	102116	2 gang variable condenser
C1	10025	.002 x 600 v.
C2		B. C. Antenna Trimmer on Gang Con.
C3	1292	.0005 Mica
C4	1001	.1 x 400 v.
C5	1006	.25 x 200 v.
C6	1295	.0001 mica
C7		B. C. Oscillator Trimmer on Gang Con.
C8	1295	.0001 mica
C9	11994	40 mfd. lytic x 150 w. v.
C10	11994	20 mfd. lytic x 150 w. v.
C11	11994	20 mfd. lytic x 150 w. v.
C12	1009	.05 x 200 v.
C13	129161	.0001 mica
C14	129161	.0001 mica
C15	10025	.002 x 600 v.
C16	10026	.02 x 400 v.
C17	100110	.2 x 400 v.
C18	100106	.004 x 600 v.
C19	1295	.0001 mica
		C9, C10, C11 are in same unit
		C13, C14 are in same unit
		PARTS
T1	111180	Loop Antenna complete
T2	110152	Oscillator Coil
T3	108140H	Input I. F. Coil—455 Kc.
T4	108145	Output I. F. Coil—455 Kc.
T5	105104	Output Transformer
T6	114197	5" P. M. Speaker
L1	12310	Loading Coil
S1		On-off switch on volume control
P1	107249	T47 Pilot light bulb

NOTE "A" Lay the output lead from the generator in back of the loop antenna. Turn up the output of the generator, picking up the energy in the loop antenna without any electrical connection from the generator.

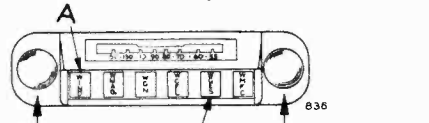
MODEL 678, Issue C

PROCEDURE FOR SETTING THE AUTOMATIC PUSHBUTTONS:

There are six pushbuttons on the Remote Tuner Unit by means of which six stations may be set up for automatic tuning (see B, Fig. 2).

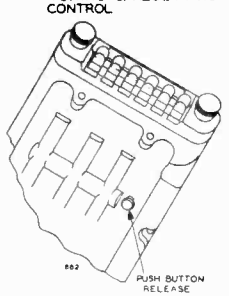
Make a list of local stations you tune in regularly; any number up to and including six.

Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.



678, Issue C

Fig. 2—Front View of Remote Tuner Unit



678, Issue C

Fig. 2A—

Bottom View of Remote Tuner Unit Showing Push Button Release Pin.

On the top of each pushbutton a slot is provided for inserting the call letter tabs, (see A, Fig. 2).

Insert the call letter tabs.

NOW, PROCEED AS FOLLOWS:—

1. Push the dial tuning knob in hard enough to make it latch in.
2. Rotate the dial tuning knob to the left (counter-clockwise), until the knob can not be turned any further without forcing.

   You will note that as the knob is rotated it will turn easily until the pointer reaches the end of the dial scale and then a slight amount of force will be required to actually start unlocking the tuner mechanism. Beyond this point the knob will turn quite easily again until the tuner mechanism is completely unlocked. At this point do not force the knob any further. The tuner mechanism is now unlocked.

   (NOTE:—Automatic tuner mechanism is locked tight when radio is shipped from the factory.)
3. Push in all the way any one of the pushbuttons and at the same time hold in firmly the dial tuning knob. Both the dial tuning knob and the pushbutton should be pushed hard enough to make them stay latched in. The reason for holding the dial tuning knob in firmly when the pushbutton is pressed in is due to the latching mechanism in the Remote Tuner unit which is so constructed to release the dial tuning knob entirely when a pushbutton is pressed in. When setting up stations for automatic tuning, however, it is necessary that both the dial tuning knob and the pushbutton be latched in together.
4. Press in on the pushbutton which is latched in. Holding it in firmly, tune in by means of the dial tuning knob the station indicated on the station call letter tab on this pushbutton. Turn the dial tuning knob very slowly back and forth (while still pressing in firmly on the pushbutton), until the station is clearest. The station will then be accurately tuned in.
5. Push in all the way another pushbutton, at the same time holding the dial tuning knob in so that both the pushbutton and the dial tuning knob are latched in together. Holding the pushbutton in firmly, tune in the station indicated on the call letter tab on this pushbutton.
6. Follow this procedure until you have tuned in all of your favorite stations.
7. When the last pushbutton has been properly set up, it is necessary to release it from the latched-in position before the tuner mechanism can be locked. To release this pushbutton, press the pushbutton release pin on the bottom of the tuner unit. This will trip the latching mechanism and all the pushbuttons will be released to out position, (See Fig. 2A).
8. Now, Press on the dial tuning knob hard enough to make it latch in. Rotate the dial tuning knob to the right (clockwise) until the knob can not be turned any further without forcing it.
   This will lock the tuner mechanism and all the stations that have been set up on the pushbuttons will be locked in place for automatic tuning.
9. Press in any one of the pushbuttons and—YOUR FAVORITE STATION IS SELECTED.

The important steps to remember when setting up stations on the pushbuttons for automatic tuning are:

1. To unlock the tuner mechanism press on the dial tuning knob hard enough to make it stay latched in. Rotate the dial tuning knob to the left (counterclockwise) until the knob cannot be turned any further without forcing it.
2. To set a pushbutton, Push in all the way and hold in firmly both the pushbutton and the dial tuning knob so that both latch in. Hold in firmly the pushbutton and tune in the station by means of the dial tuning knob. Set all the pushbuttons in the same manner.
3. To release the last pushbutton press the pushbutton release pin on the bottom of the tuner unit.
4. To lock the tuner mechanism push on the dial tuning knob hard enough to make it stay latched in. Rotate the dial tuning knob to the right (clockwise) until the knob can not be turned any further without forcing it. (NOTE: All the pushbuttons must be in out position when locking the tuner mechanism.)

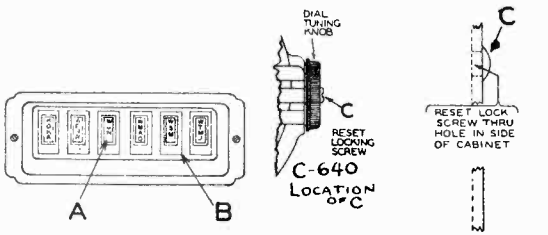


FIG. 2.

PROCEDURE FOR SETTING THE AUTOMATIC TUNER PUSH BUTTONS

MODEL C640 Model 796

1. Make a list of six stations you tune in regularly. There are six push buttons on the front of the radio by means of which six stations may be tuned automatically. (See "B," Fig. 2.)

2. Punch out the call letters of the stations you have selected from the set of station call letter tabs supplied.

   On the front of each automatic tuner button an opening is provided for inserting the call letter tabs, (See "A" Fig. 2).

   Insert the call letter tabs in the rectangular openings in each of the automatic tuner push buttons.

3. Stations may be set up in any sequence desired. Press any one of the automatic tuner push buttons down all the way.

4. Hold the push button down firmly, and tune set very carefully to station desired, until station is heard clearly and with maximum volume.

   Release the push button.

5. Press down another automatic tuner push button. **Hold** it down FIRMLY and carefully tune in next station desired. Release this push button.

   Follow this procedure until you have selected all of your favorite stations.

6. Now rotate the tuning knob to the right (clockwise) as far as it will turn, and with a coin (quarter), tighten the special locking screw ("C") in the center of the tuning knob, (See Fig. 2).

   It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

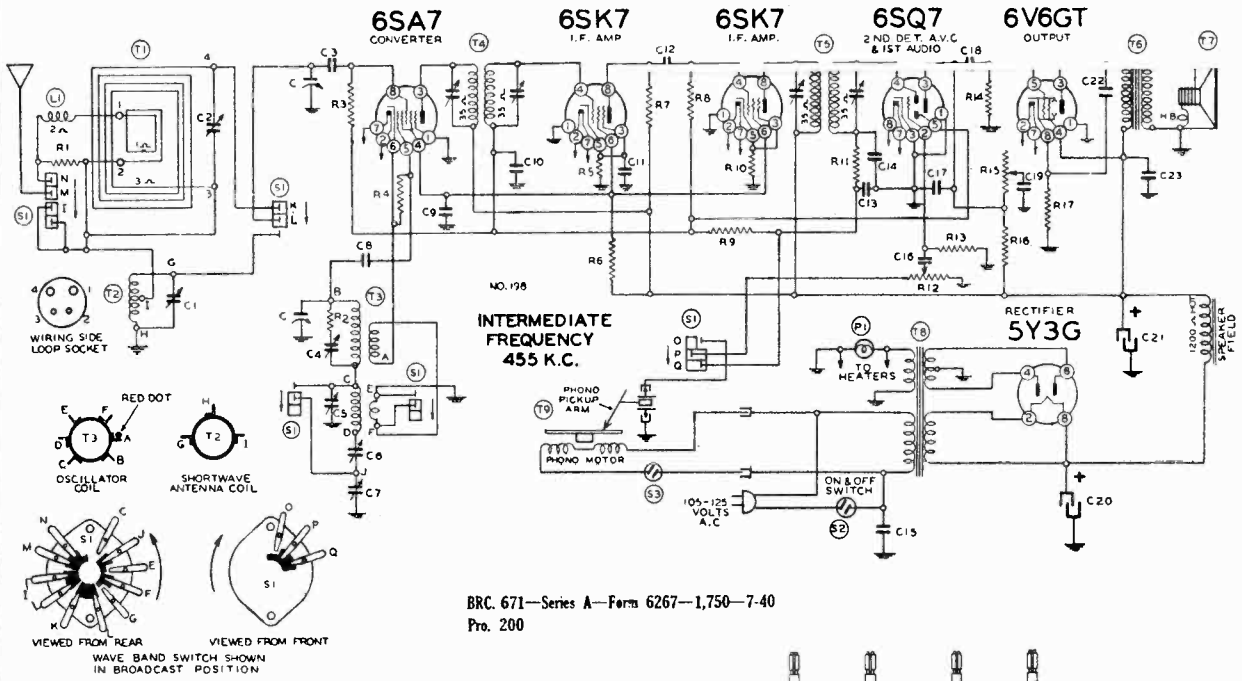
   This screw will lock in place all the stations you have selected on the automatic tuner push buttons. (Note: Locking screw "C" is loose when radio is shipped from factory.)

CHANGING STATIONS:

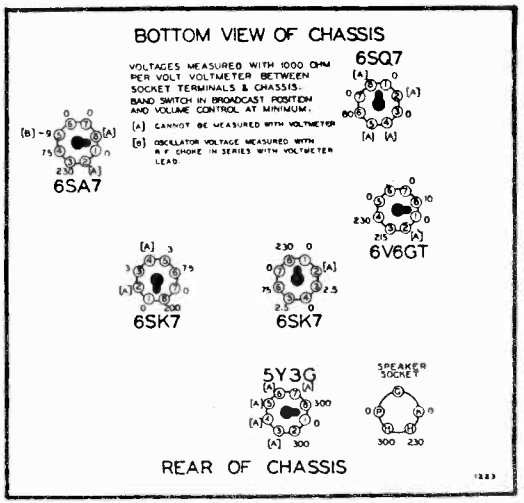
If you should desire to change any station you have selected to another, loosen the locking screw "C" one or two turns. Hold in push button on which the station is to be changed and tune in new station desired. Release the push button. (Note: If the dial mechanism works hard when setting up a new station for one of the automatic tuner buttons it is due to the locking screw being too tight. Loosen the locking screw "C" until the dial mechanism works freely with the tuner push button pressed in.

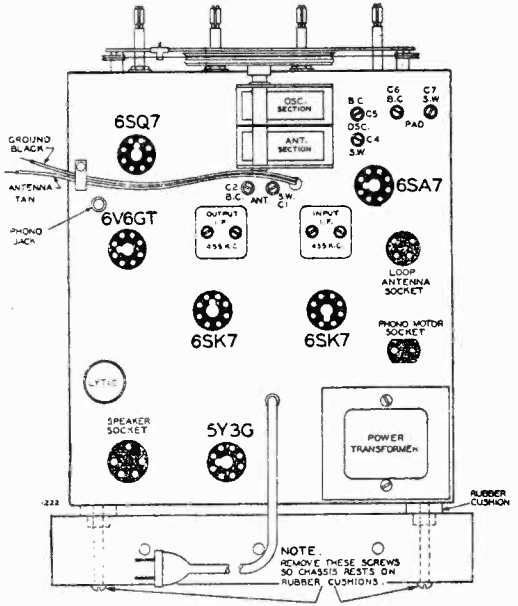
Be sure to retighten the locking screw, otherwise the stations you have previously selected will not stay adjusted to the push buttons.

The set is now set up for automatic tuning.



BRC. 671—Series A—Form 6267—1,750—7-40
Pro. 200





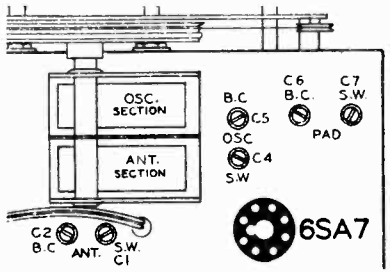
Code No.	Part No.	Description
		RESISTORS
R1	13071	4000 ohm—⅓ w.
R2	130128	20 ohm—⅓ w.
R3	13019	1 megohm—⅓ w.
R4	130236	30M ohm—⅓ w.
R5	130283	750 ohm—⅓ w.
R6	130324	18M ohm—1 watt
R7	130218	5M ohm—⅓ w.
R8	13020	100M ohm—⅓ w.
R9	130170	3 megohm—⅓ w.
R10	130222	350 ohm—⅓ w.
R11	13012	50M ohm—⅓ w.
R12	101232	1 megohm volume control
R13	130223	10 megohm—⅓ w.
R14	1303	500M ohm—⅓ w.
R15	101231	1 megohm tone control
R16	130172	250M ohm—⅓ w.
R17	130323	270 ohm—1 watt
		CONDENSERS
C	102137	Two gang variable condenser
C1	124149	S. W. Antenna trimmer
C2	124149	B. C. Antenna trimmer
C3	1292	.0005 mica
C4	124142	S. W. Oscillator trimmer
C5	124142	B. C. Oscillator trimmer
C6	124146	B. C. Padding Condenser
C7	124146	S. W. Padding Condenser
C8	12960	150 mmfd. mica
C9	10013	.05 x 400 v.
C10	10022	.05 x 200 v.
C11	1009	.05 x 200 v.
C12	1292	.0005 mica
C13	129161	.0001 mica
C14	129161	.0001 mica
C15	10061	.02 x 600 v.
C16	10025	.002 x 600 v.
C17	12912	.00025 mica
C18	10026	.02 x 400 v.
C19	10071	.004 x 600 v.
C20	119115	16 mfd. x 400 w. v. lytic
C21	119115	16 mfd. x 400 w. v. lytic
C22	10019	.006 x 600 v.
C23	1001	.1 x 400 v.

C1 and C2 are in same unit C4 and C5 in same unit
C6 and C7 are in same unit C13 and C14 in same unit
C20 and C21 are in same unit

		PARTS
T1	111208	Loop antenna assembly
T2	111184	S. W. Antenna Coil
T3	110154	B. C. and S. W. Oscillator Coil
T4	108169E	Input I. F. Coil—455 kc.
T5	108106U	Output I.F. Coil—455 kc.
T6	105118	Output Transformer
T7	114216	8" Electro Dynamic Speaker
T8	104225B	60 cycle power transformer
and	104238B	25 cycle power transformer
T9	104228	60 cycle Seeburg Record Changer and Phono Assembly
and	104229	25 cycle Seeburg Record Changer and Phono Assembly
S1	125132	Phono-band switch
S2		Switch on volume control
S3		Switch on record changer
L1	12312	R. F. Choke coil
P1	10794	Pilot light bulb No. T-44

TECHNICAL DATA—Model No. C671

Power Consumption	Radio Only	70 Watts
	Motor Only	20 Watts
Power Output		2.1 Watts Undistorted
Sensitivity for 500 Milliwatt Output:		15 Microvolts Average
Selectivity - 51 KC Broad at 1000 Times Signal at 1000 KC		
Tuning Frequency Range Broadcast Band - 530 to 1600 KC		
Shortwave Band - 5.46 to 18.3 MC		
Intermediate Frequency		455 KC
Speaker		8 in. Electro Dynamic



TRIMMER VIEW

Band and Phono Switch

This knob switches the tuning from the broadcast stations to the shortwave band, and also to the "Phono" position. Turn the knob to "Broadcast" for broadcast stations and to "Phono" to play records. The points marked 49M-31M-25M-20M-19M-16M on the dial scale are shortwave broadcast channels —The 49M and 31M channels are best during darkness—The other channels are best in daylight. Tune short waves very slowly.

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect radio ground to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

- An all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—.1—mf., 200 mmf., 400 ohms.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Variable Condenser Setting	Trimmers Adjusted (In Order Shown)	Trimmer Function	Adjustment
I. F.	455 Kc.	.1 MFD	Grid of 6SA7 Mixer	Broadcast	Rotor full open (Plates out of mesh)	Trimmers on top (See Top View)	Input and Output I. F.	Adjust to maximum output
SHORT WAVE BAND (See Note A)	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	Trimmer C4	Short Wave oscillator	Adjust to maximum output
	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	Trimmer C1	Short Wave antenna	Adjust to maximum output
	6 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 6 Mc.	Trimmer C7	Short Wave oscillator series pad	Adjust to maximum rock dial. (See note "C")
BROAD-CAST BAND (See Note A)	1600 Kc.	200 mmf.	Grid of 6SA7	Broadcast	Rotor full open (Plates out of mesh)	Trimmer C5	Broadcast oscillator	Adjust to maximum output
	530 Kc.	200 mmf.	Grid of 6SA7	Broadcast	Rotor full closed	Trimmer C6	Broadcast oscillator series pad	Adjust to maximum output
LOOP ALIGN-MENT (See Note B)	1400 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 1400 Kc.	Trimmer C2 (See Top View)	Broadcast antenna	Adjust to maximum output
	600 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 600 Kc.	Trimmer C6 (See Top View)	Broadcast oscillator series pad	Adjust to maximum output

NOTE "A"—The signal generator is connected to the "ANT." and "GND" leads when aligning the **Short Wave Band** and to the grid of the 6SA7 tube and ground terminal when setting the **Broadcast Band** oscillator end frequencies, (1600 and 530 K. C.).

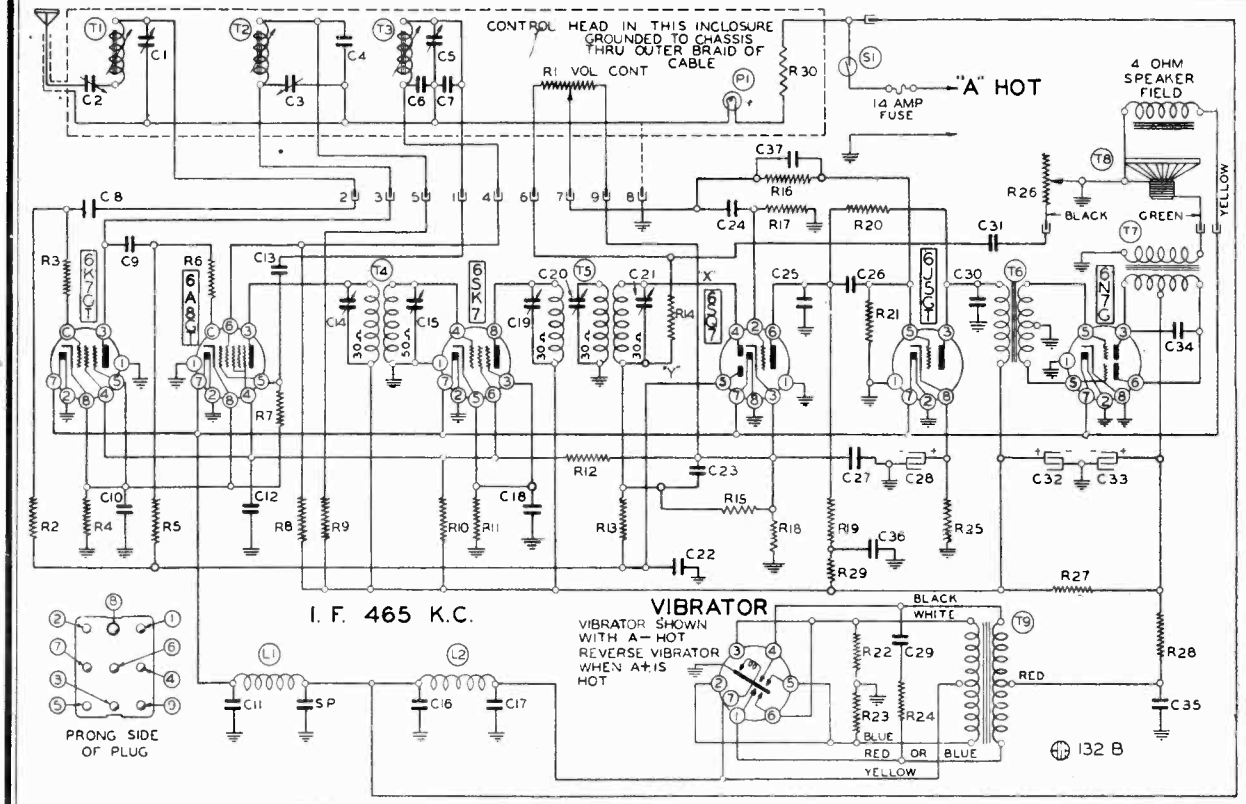
The loop antenna should be connected to the radio when making these adjustments.

NOTE "B"—Loop alignment is made with the chassis mounted in the cabinet and the loop antenna connected. The signal generator is connected to the "ANT." and "GND." leads.

NOTE "C"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each band is completed, repeat the procedure as a final check.



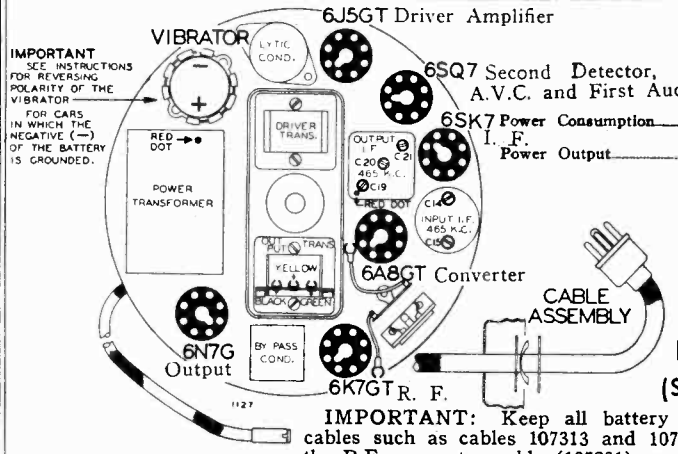


Fig. 3—Top View of Chassis

Power Consumption ..... 7.7 Amperes at 6.3 Volts
Power Output ..... 7 Watts Undistorted, 9 Watts Maximum

FREQUENCY RANGE
535 to 1565 Kc.

MARCH 1940
MODEL 678, Issue C
(Serial No. 14302 and up)

IMPORTANT: Keep all battery connecting wires and cables such as cables 107313 and 107315 as far away from the R.F. connector cable (107231) as possible. This will reduce any interference which may be present in these battery wires from being radiated back into the R.F. connector cable 107231.

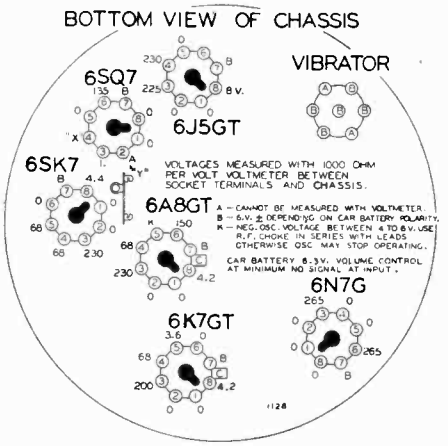


FIG. 5

CONDENSERS

C1	12483	Antenna Shunt Trimmer
C2	12481	Antenna Series Trimmer
C3	12480	R. F. Shunt Trimmer
C4	100102	.15 x 400 v.
C5	12480	Oscillator Shunt Trimmer
C6	129137	.0005 Mica
C7	129136	.00017 Mica
C8	12997	.00005 Ceramicon—5%
C9	1292	.0005 Mica
C10	11625	.05 x 200 v.
C11	1296	.002 Mica
C12	11625	.25 x 400 v.
C13	12912	.00025 Mica
C14		Plate Trimmer on Input I.F. Trans.
C15		Grid Trimmer on Input I.F. Trans.
C16	10031	.5 x 120 v.
C17	10031	.5 x 120 v.
C18	1009	.05 x 200 v.
C19		Plate Trimmer on Output I.F. Trans.
C20		Tertiary Trimmer on Output I.F. Trans.
C21		Grid Trimmer on Output I.F. Trans.
C22	11625	.05 x 200 v.
C23	1295	.0001 Mica
C24	10011	.01 x 400 v.
C25	1295	.0001 Mica
C26	10011	.01 x 400 v.
C27	10026	.02 x 400 v.
C28	11988	20 mfd.—25 w. v. lytic
C29	100101	.0055 x 1600
C30	129114	.0003 Mica
C31	10047	.002 x 600 v.
C32	11988	15 mfd.—450 w. v. lytic
C33	11988	15 mfd.—450 w. v. lytic
C34	100103	.004 x 800 v.
C35	1001	.1 x 400 volt
C36	10013	.05 x 400 v.
C37	12967	.00004 Mica

RESISTORS

R1	101161	1.2 megohm volume control
R2	13019	1 megohm—½ w.
R3	130275	500 ohm—½ w.
R4	13079	400 ohm—½ w.
R5	13019	1 megohm—½ w.
R6	130275	500 ohm—½ w.
R7	13012	50M ohm—½ w.
R8	13012	50M ohm—½ w.
R9	13021	20M ohm—½ w.
R10	130196	30M ohm—1 watt
R11	130235	1500 ohm—½ w.
R12	1307	40M ohm—½ w.
R13	13019	1 megohm—½ w.
R14	13020	100M ohm—½ w.
R15	130118	600M ohm—½ w.
R16	130257	5 megohm—½ w.
R17	13019	1 megohm—½ w.
R18	130101	600 ohm—½ w.
R19	13011	250M ohm—½ w.
R20	13038	2 megohm—½ w.
R21	1303	500M ohm—½ w.
R22	130269	100 ohm—½ w.
R23	130269	100 ohm—½ w.
R24	13071	4M ohm—½ w.
R25	13092	1M ohm—½ w.
R26	101162	1 megohm tone control
R27	130199	1500 ohm Resistor—1 watt
R28	130231	75 ohm—½ w.
R29	13020	100M ohm—½ w.
R30	130299	10 ohm—½ w.

PARTS.

T1	111118	P. B. Antenna Coil Assembly Complete
T2	10949	P. B. R. F. Coil Assembly Complete
T3	110109	P.B. Oscillator Coil
T4	108120B	Input I.F. Coil—465 kc.
T5	108115B	Output I.F. Coil—465 kc.
T6	10584	Audio Driver Transformer
T7	10583	Output Transformer
T8	114155	8" Dynamic Speaker
T9	104158	Power Transformer
L1	10566	"A" Choke
L2	10519	"A' Choke
P1	10797	6-8 v. Pilot Light T51
S1		Off-on Switch on volume control
	1269	Vibrator (130 cycle synchronous)

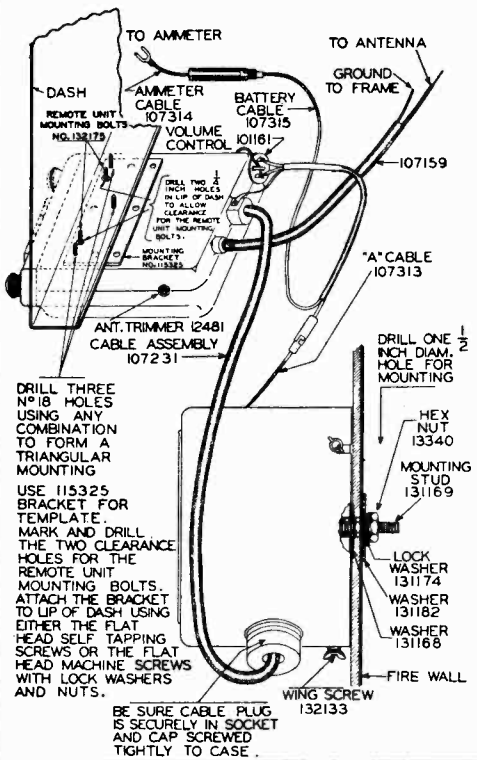
ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

- An all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—.1 mf., 125 mmf.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Remote Tuner Dial Setting	Trimmers Adjusted (In Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 6SK7 I. F. Tube	Set dial at 1400 Kc.	Trimmers C19, C20 (See Fig. 3)	Output I. F.	See note "A" Adjust to maximum output
	465 Kc.	.1 MFD.	Grid of 6SK7	Set dial at 1400 Kc.	Trimmer C21 (See Fig. 3)	Output I. F.	See note "B" Adjust to maximum output
	465 Kc.	.1 MFD.	Grid of 6A8GT	Set dial at 1400 Kc.	Trimmers C14, C15 (See Fig. 3)	Input I. F.	Adjust to maximum output
BROAD-CAST BAND	1565 Kc.	125-mmf.	Antenna lead	Set dial at 1565 Kc.	Trimmer C5 (See Fig. 4)	Oscillator	Adjust to maximum output
	1400 Kc.	125 mmf.	Antenna lead	Set dial at 1400 Kc.	Trimmers C1, C3 (See Fig. 4)	Antenna and R. F.	Adjust to maximum output
	600 Kc.	125 mmf.	Antenna lead	Set dial at 600 Kc.	Trimmer C2 (See Fig. 4)	Antenna series adj.	See note "C"



NOTE "A" IMPORTANT: To align the output I. F. transformer without using a cathode ray oscillograph a 10M ohm resistor must be shunted across the diode tuned circuit. Connect the resistor as indicated by points "X" and "Y" on the circuit diagram and the bottom view of the radio chassis Fig. 5. A red dot on top of output I. F. can designates location of trimmer "C19."

NOTE "B" Before adjusting trimmer C21 disconnect the 10M ohm resistor. Under no circumstances re-adjust trimmers C19 or C20 after the 10M ohm resistor has been removed.

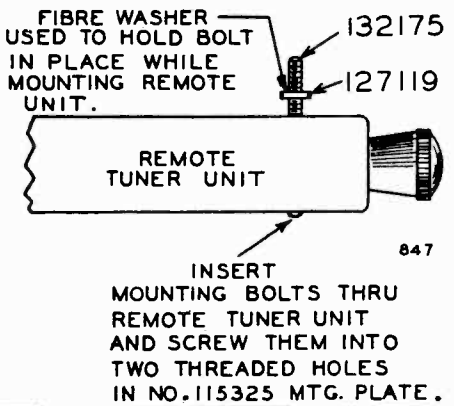
For alignment of the output I. F. transformer using a cathode ray oscillograph the 10M ohm resistor is not used.

NOTE "C" Maximum gain for this adjustment depends on the capacity of the antenna system of the car in which the radio is installed. For the proper alignment of this adjustment see "Adjusting Antenna Trimmer," page 3.

ALIGNMENT OF THE IRON CORES

The iron cores for the antenna, R. F. and oscillator permeability coils have been very carefully adjusted at the factory and require no further adjustment, unless it becomes necessary to replace a coil, or if the adjustments have been tampered with.

The procedure for aligning the iron cores will be supplied with replacement coils when ordered.



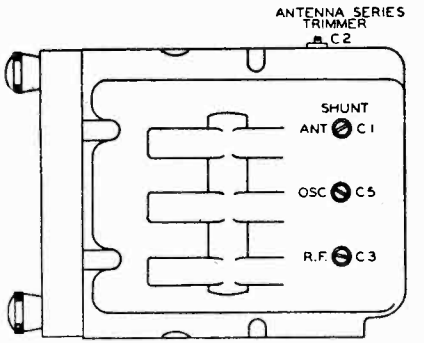


Fig. 4.—Bottom View of Remote Tuner

IMPORTANT—ADJUSTING ANTENNA TRIMMER:

Tune in any weak station between 600 and 800 kc.

Make sure that the antenna shunt trimmer on the **Bottom of the Remote Tuner** is turned all the way out (counter clockwise), (see adjustment "C1," Fig. 4)

Adjust antenna series trimmer **on the side of the remote Tuner Unit.** For maximum output. (See adjustment "C2," Fig. 4, Page 7).

NOTE: If resonance (maximum output) cannot be obtained within the range of the antenna series trimmer "C2," turn the adjustment screw all the way out (counter clockwise) and then adjust the antenna shunt trimmer "C1" on **the bottom of the remote tuner unit** for a peak of maximum output.

The above arrangement will cover any antenna capacity that is now in use.

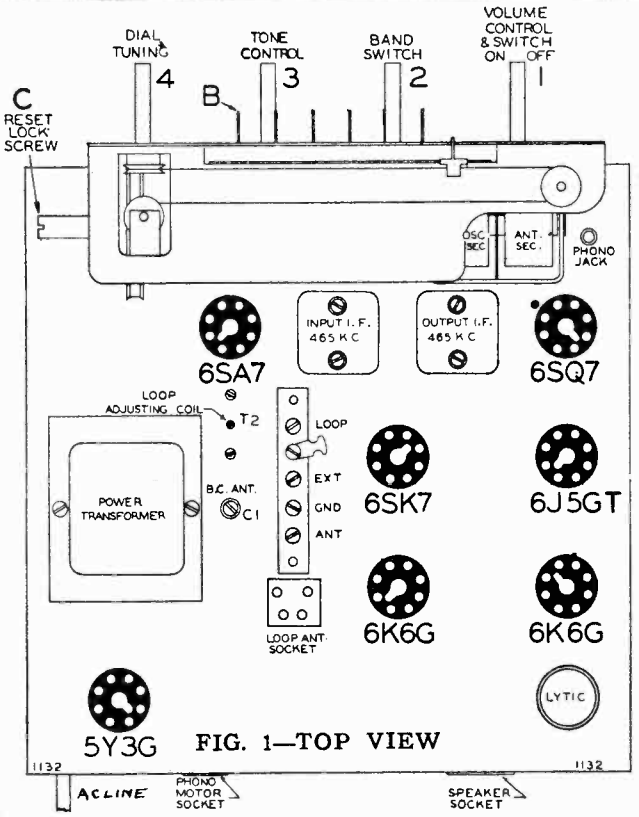
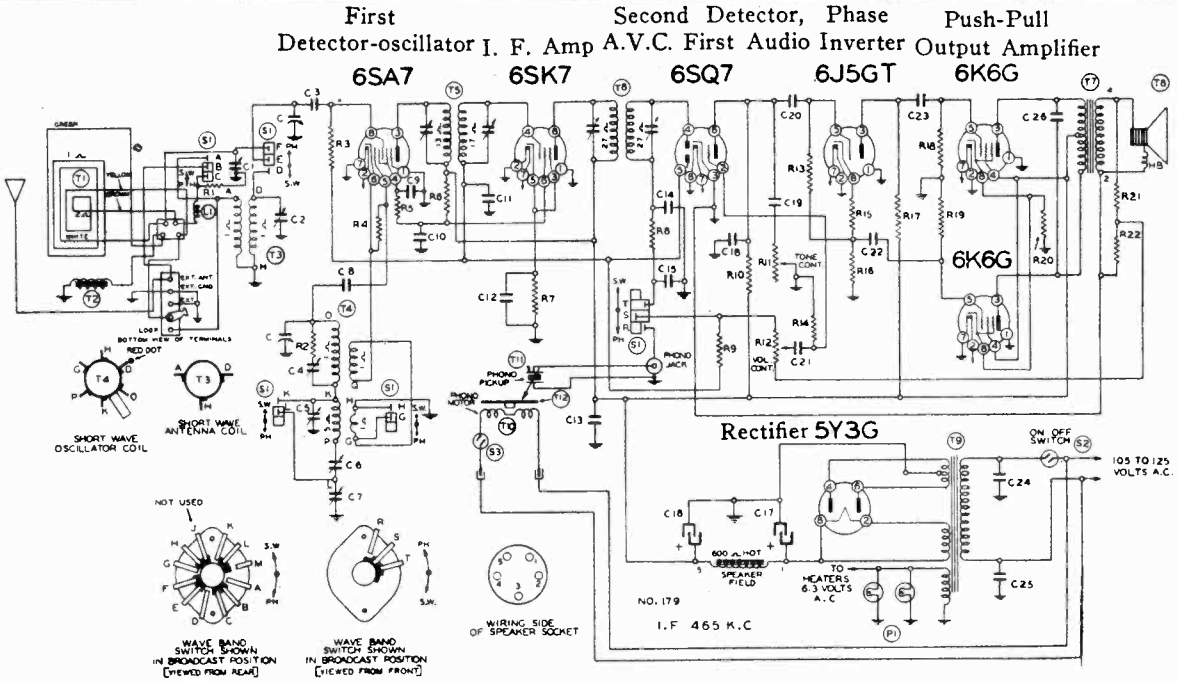


FIG. 1—TOP VIEW



FOR OTHER DATA SEE INDEX

BAND SWITCH	BAND	FREQUENCY RANGE
Extreme Right Rotation	Short Wave	5.4 to 18.3 MC.
Center Position	Broadcast	532 to 1570 KC.

Power Consumption (Radio Chassis only, less Phono Motor)—85 Watts
Power Output—4.5 Watts Undistorted, 6 Watts Maximum
Intermediate Frequency—465 K.C.

Model 796

Series A

(Serial No. OC362500 and up)

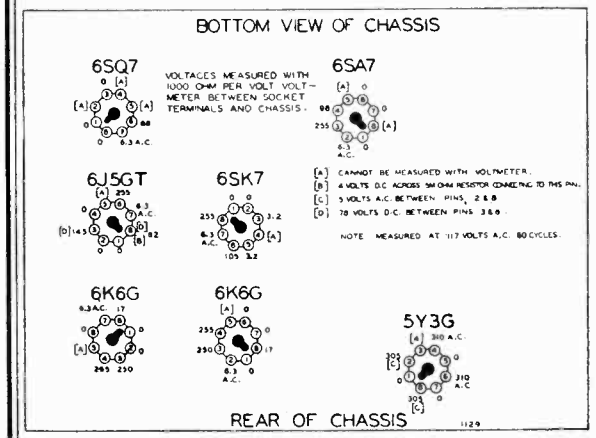


FIG. 3

Circuit Diagram Ref. No.	Part No.	Description
		RESISTORS
R1	13018	4M ohm—⅓ w.
R2	130197	20 ohm—⅓ w.
R3	1304	3 megohm—⅓ w.
R4	130236	30M ohm—⅓ w.
R5	13092	1000 ohm—⅓ w.
R6	130116	15M ohm—1½ watt
R7	13083	300 ohm—⅓ w.
R8	130103	100M ohm—⅓ w.
R9	1304	3 megohm—⅓ w.
R10	13011	250M ohm—⅓ w.
R11	101216	1 megohm—tone control
R12	101215	1 megohm volume control
R13	1303	500M ohm—⅓ w.
R14	130257	5 megohm—½ w.
R15	130218	5M ohm—⅓ w.
R16	130103	100M ohm—⅓ w.
R17	130103	100M ohm—⅓ w.
R18	1303	500M ohm—⅓ w.
R19	1303	500M ohm—⅓ w.
R20	130227	250 ohm—1 watt
R21	130168	100 ohm—⅓ w.
R22	130197	20 ohm—⅓ w.

Circuit Diagram Ref. No.	Part No.	Description
		CONDENSERS
C	102131	2 gang variable condenser
C1	124117	B.C. Antenna Trimmer
C2	124116	S.W. Antenna Trimmer
C3	1292	.0005 Mica
C4	124112	S.W. Oscillator Trimmer
C5	124112	B.C. Oscillator Trimmer
C6	124134	B.C. Series Pad
C7	124134	S.W. Series Pad
C8	12991	.00015 Mica
C9	10013	.05 x 400 v.
C10	1001	.1 x 400 v.
C11	1009	.05 x 200 v.
C12	1009	.05 x 200 v.
C13	1001	.1 x 400 v.
C14	129161	.0001 mica
C15	129161	.0001 mica
C16	119108	Lytic—16 mfd. 450 w.v.
C17	119108	Lytic—16 mfd. 450 w.v.
C18	12940	.0001 Mica
C19	100118	.008 x 600 v.
C20	10026	.02 x 400 v.
C21	10025	.002 x 600 v.
C22	10013	.05 x 400 v.
C23	10013	.05 x 400 v.
C24	10061	.02 x 600 v.
C25	10061	.02 x 600 v.
C26	10019	.006 x 600 v.

C4 and C5 are in same unit
C6 and C7 are in same unit
C14 and C15 are in same unit
C16 and C17 are in same unit

3-40

Circuit Diagram Ref. No.	Part No.	Description
		PARTS
T1	111165E	Loop Antenna Assembly
T2	111153	Loop Adjustable Coil
T3	111163	Short Wave Antenna Coil
T4	110150	B.C. S.W. Oscillator Coil
T5	108162B	Input I.F. Coil—465 kc.
T6	108132D	Output I.F. Coil—465 kc.
T7	10554E	Output Transformer
T8	114192	10" Electrodynamic speaker
T9	104170B	Power Transformer
S1	125112	Band Switch
S2		On-off Switch on Volume Control
P1	10794	(2) Pilot light Bulbs T44
L1	1239	R. F. Choke Coil
S3		Phono Motor Switch
T10, T11	104174	[Phono Motor; Phono Pickup Arm & Record Changer Complete
T12		Phono Turntable

IMPORTANT: See Aligning Instructions.

ALIGNMENT PROCEDURE

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Variable Condenser Setting	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 6SK7 I. F.	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Output I. F.	Adjust to maximum output
	465 Kc.	.1 MFD.	Grid of 6SA7 Mixer	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Input I. F.	Adjust to maximum output
SHORT WAVE BAND (See Note A)	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	Trimmer C4 (See Fig. 4)	Short Wave oscillator	Adjust to maximum output
	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	Trimmer C2 (See Fig. 4)	Short Wave antenna	Adjust to maximum output
	6 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 6 Mc.	Trimmer C7 (See Fig. 4)	Short Wave oscillator series pad	Adjust to maximum rock dial. (See note "C")
BROAD-CAST BAND (See Note A)	1570 Kc.	200 mmf.	Grid of 6SA7	Broadcast	Rotor full open (Plates out of mesh)	Trimmer C5 (See Fig. 4)	Broadcast oscillator	Adjust to maximum output
	532 Kc.	200 mmf.	Grid of 6SA7	Broadcast	Set Dial at 532 K.C.	Trimmer C6 (See Fig. 4)	Broadcast oscillator series pad	Adjust to maximum output
LOOP ALIGN-MENT (See Note B)	1400 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 1400 Kc.	Trimmer C1 (See Fig. 5)	Broadcast antenna	Adjust to maximum output
	600 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 600 Kc.	Trimmer T2 (See Fig. 5)	Iron Core Tracking Coil	Adjust to maximum output

NOTE "A"—The signal generator is connected to the "ANT." and "GND." terminals on the rear of the chassis when aligning the **Short Wave Band** and to the grid of the 6SA7 tube and ground terminal when setting the **Broadcast Band** oscillator end frequencies, (1570 and 532 K. C.).

The loop antenna need not be connected to the radio when making these adjustments.

NOTE "B"—Loop alignment is made with the chassis mounted in the cabinet and the loop antenna connected to the terminal board. The signal generator is connected to the "ANT." and "GND." terminals and the jumper on the terminal board connected to "EXT." terminal. (See Fig. 1).

NOTE "C"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.
Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each band is completed, repeat the procedure as a final check.

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on the voltage chart are measured with 115 volts A. C. on the primary of the power transformer.

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

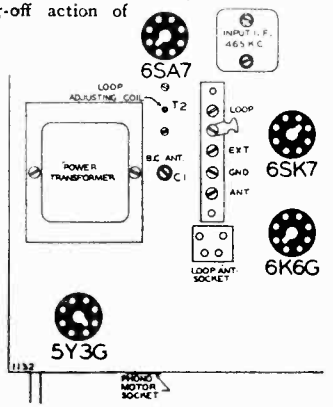


FIG. 5—TOP VIEW

Excessive hum, stuttering, low volume and a reduction in all D. C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

ALIGNING INSTRUCTIONS:

CAUTION:—No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet.

It is important during loop alignment that the same distance between the loop antenna and the chassis be maintained as when the chassis is installed in the cabinet.

To remove the chassis from the cabinet, pull off the knobs and take out the 4 bolts holding the chassis flange to the control panel.

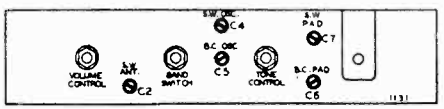
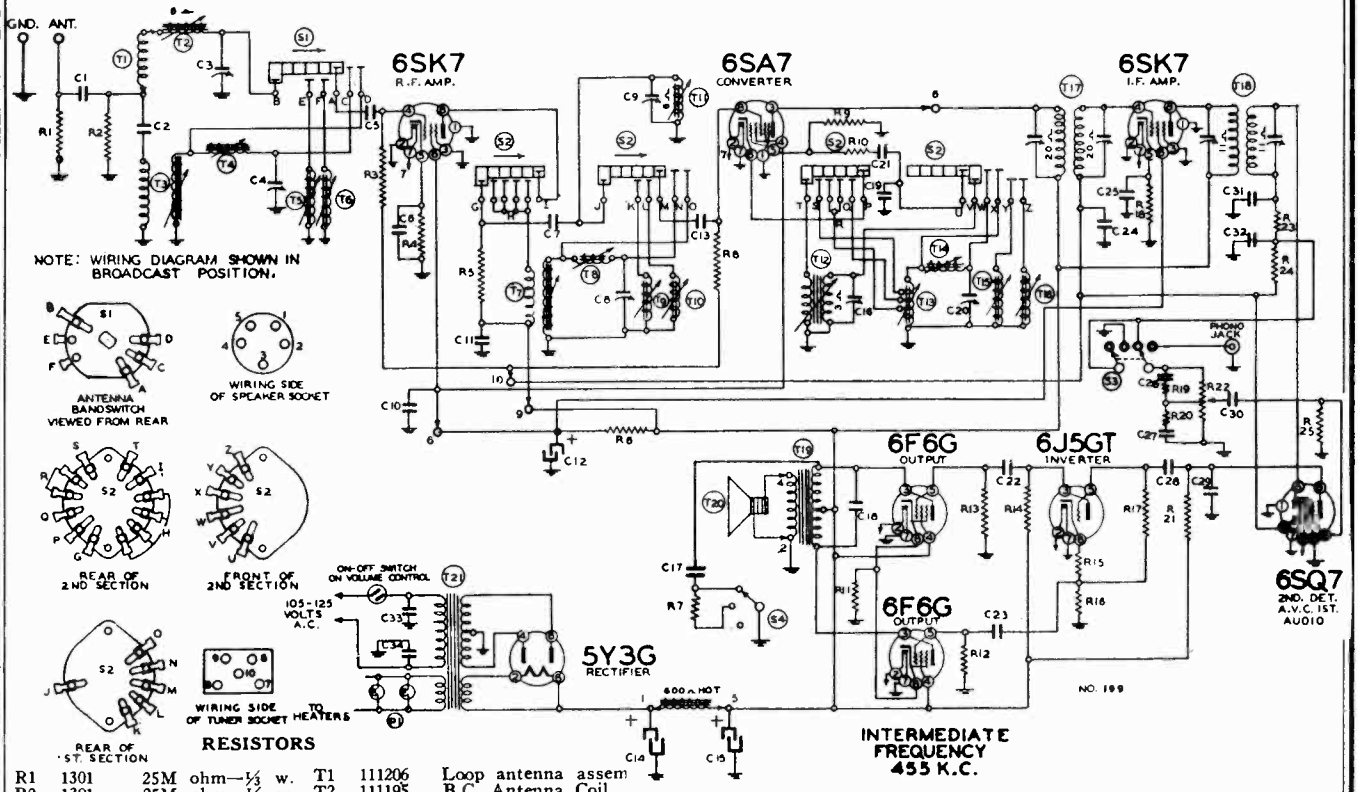


FIG. 4

GAMBLE-SKOGMO, INC.

MODEL C800



RESISTORS

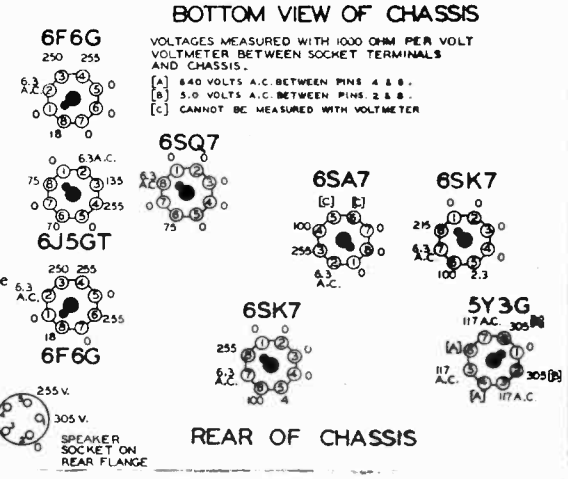
R1	1301	25M ohm—½ w.	T1	111206	Loop antenna assem
R2	1301	25M ohm—½ w.	T2	111195	B.C. Antenna Coil
R3	13019	1 megohm—½ w	T3	111190	9 mc. Antenna Coil
R4	130239	250 ohm—½ w.	T4	111189	6 mc. Antenna Coil
R5	130218	5M ohm—½ w.	T5	111191	12 mc. Antenna Coil
R6	10662	12,500 ohm—3 w.	T6	111192	15 mc. Antenna Coil
R7	13064	3500 ohm—½ w.	T7	10959	9 mc. R.F. Coil
R8	13019	1 megohm—½ w.	T8	10958	6 mc. R.F. Coil
R9	130232	25M ohm—½ w.	T9	10960	12 mc. R.F. Coil
R10	130174	50 ohm—½ w.	T10	10961	15 mc. R.F. Coil
R11	130220	300 ohm—1 w.	T11	10962	B.C. R.F. Coil
R12	1303	500M ohm—½ w.	T12	110161	B.C. Oscillator Coil
R13	1303	500M ohm—½ w.	T13	110157	9 mc. Oscillator Coil
R14	130103	100M ohm—½ w	T14	110156	6 mc. Oscillator Coil
R15	130218	5M ohm—½ w.	T15	110158	12 mc. Oscillator Coil
R16	130103	100M ohm—½ w	T16	110159	15 mc. Oscillator Coil
R17	13019	1 megohm—½ w.	T17	108177	Input I.F. Coil—455 kc.
R18	13070	500 ohm—½ w.	T18	108176	Output I.F. Coil—455 kc.
R19	13011	250M ohm—½ w.	T19	105111	Output Transformer
R20	130149	15M ohm—½ w.	T20	114206	10" Dynamic Speaker
R21	13011	250M ohm—½ w	T21	104202B	Power Transformer—For 50-60 Cycle
R22	101233	Volume Control	or	104203B	Power Transformer—For 25 Cycle
R23	13012	50M ohm—½ w.	S1	125118	Antenna Bandswitch
R24	1304	3 megohm—½ w.	S2	125117	R.F. & Osc. Bandswitch
R25	130257	5 megohm—½ w.	S3	125129	Radio-Phono Switch
			S4	125130	Tone Control Switch
			P1	10794	(2) 6-8 Volt Pilot Lights—T44

CONDENSERS

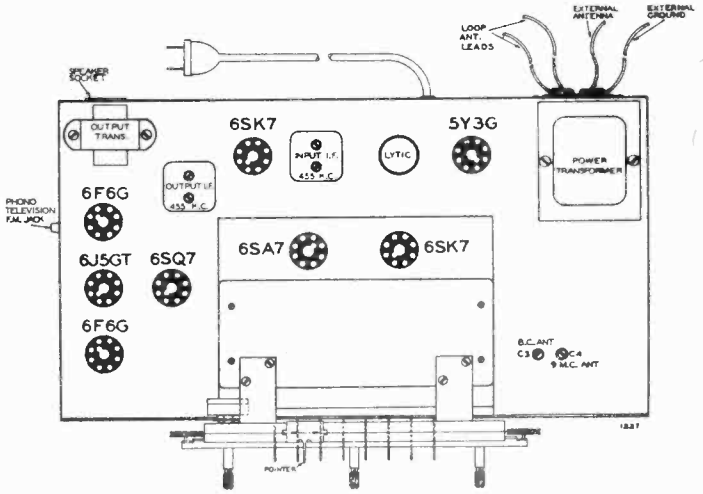
C1	1292	.0005 mica
C2	10047	.002 x 600 v.
C3	124143	B.C. Antenna Trimmer
C4	124143	9 mc. Ant. Trimmer
C5	1292	.0005 mica
C6	10020	.1 x 200 v.
C7	129168	.00001 mica
C8	124138	9 mc. R.F. Trimmer
C9	124139	B.C. R.F. Trimmer
C10	10074	.1 x 400 v.
C11	10074	.1 x 400 v.
C12	119109	10.0 mfd. x 350 w.v. lytic
C13	1292	.0005 mica
C14	119109	15.0 mfd. x 450 w.v. lytic
C15	119109	15.0 mfd. x 450 w.v. lytic
C16	124144	B.C. Oscillator Trimmer
C17	10013	.05 x 400 v.
C18	10071	.004 x 600 v.
C19	129167	.0002 silver mica
C20	124145	9 mc. Oscillator Trimmer
C21	12938	.00005 mica
C22	10013	.05 x 400 v.
C23	1009	.05 x 200 v.
C24	10026	.02 x 400 v.
C25	10020	.1 x 200 v.
C26	129114	.0003 mica
C27	100122	.03 x 200 v.
C28	10026	.02 x 400 v.
C29	12921	.0002 mica
C30	10019	.006 x 600 v.
C31	129165	.00005 mica
C32	129165	.00005 mica
C33	10061	.02 x 600 v.
C34	10061	.02 x 600 v.

C12 and C14 and C15 in same unit
C31 and C32 in same unit

BOTTOM VIEW OF CHASSIS

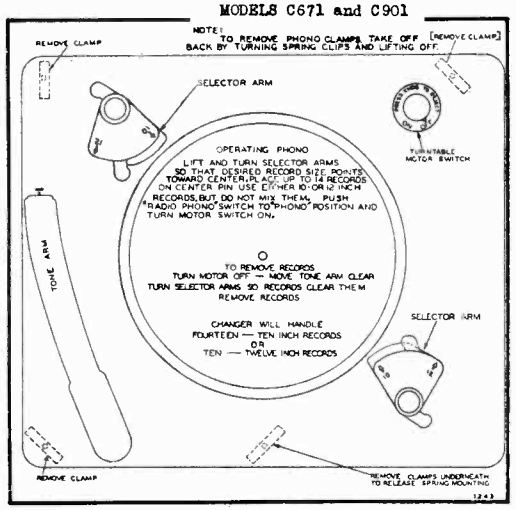


FOR ALIGNMENT AND TUNER DATA, SEE INDEX



Automatic Record Changer--Operating Instructions

MODELS C671 and C901



Setting for Size of Record

The Changer plays up to fourteen 10" or ten 12" records at one loading. **All records must be the same size for each loading.**

On each post you will see selecting arms. The position of these arms determines the setting for different size records. To set for 10 or 12 inch records, it is merely necessary to grasp the posts by the knobs at the top, lift, and turn until the 10" or 12" arrows are pointing toward the center of the turntable. When in either the 10" or 12" position, the posts will snap into place except when they are lifted by hand. Be sure to set both posts for the same size record.

Loading

See that the selecting arms of both posts are turned toward the center of the turntable as indicated by the engraved arrows, and that both sets of arms are set for the same size (10" or 12") records as described in the preceding paragraph.

Place the stack of records (up to fourteen 10" or ten 12") over the center pin so that they will rest on the selecting arms.

Starting the Changer

1. Turn on the radio (allowing approximately 30 seconds for the tubes to warm up) and turn the phonograph-radio knob, to the phonograph position.

2. Turn the switch knob on the Record Changer panel to "ON". The motor will then start and the record changer will go into automatic operation of its own accord.

How to Reject a Record

Merely press the switch knob on the Changer panel. You can do it any time after the needle has come into contact with that record.

Playing Individual Records

Should it be desired to play an individual record merely set up the machine as described above for the proper size (10" or 12" as indicated on the selecting arms), place the record on top of the arms as described under "Loading," and set the machine in operation by means of the switch knob described under "Starting the Changer." In other words, play an individual record in the same manner as you would play a stack of that size.

Unloading

First switch off the motor. Grasp each post by its knob at the top and turn them out of the way.

Lift the played records from the turntable. Then return the posts to the proper playing position as indicated by the arrows on the selecting arms.

The Changer may then be loaded with a new stack of records according to the size shown on the selecting arms.

Turning Off Changer

Throw Changer switch knob to "OFF" position.

Lift tone arm and place it in the rest position. (If you happen to turn off the Changer switch while the mechanism is going through a "change cycle," you will notice that it does not stop until the cycle has been completed, and the tone arm is again in playing position, at which point it is ready to be lifted to the rest position. If you prefer to turn off your Changer with the radio switch, be sure to turn it off while needle is resting upon a record; otherwise, the selecting arms cannot be correctly reset.

To avoid warping of records, never leave records resting on posts.

If Changer is Left Running

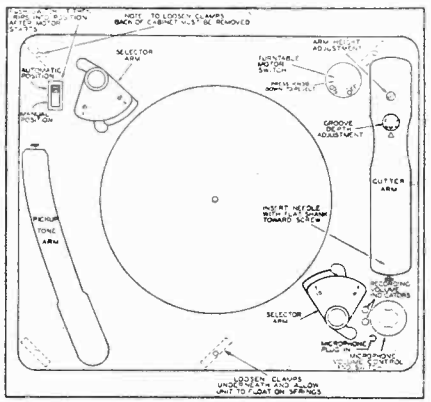
No damage will be done if you forget to turn off Changer after it has played its entire load of records. It will simply repeat the last record until stopped or reloaded.

Phonograph Needles

In general there are two types of needles which can be satisfactorily used on an Automatic Record Changer: those which require changing after approximately 12 records, and the so-called permanent type needles which are rated in terms of "hours of service." In no case should the manufacturers' claims for these needles be exceeded, since in all probability the needles are rated in terms of their maximum life.

Operating the Recorder

MODEL C901



NOTE—Some radios of this model are equipped with a recording arm on the record changer with which you can make your own records. If your radio has the recording unit follow the instructions below for making records.

The Mike volume control must be turned off (all the way left) except when recording with the microphone.

The two volume indicator lights along side the microphone volume control are used for setting the proper recording level. When recording radio programs the radio volume control should be adjusted so that the red indicator light remains off while the white continues to flicker. When recording with the microphone the lights should be adjusted in the same manner but using the microphone volume control.

Operating the Phono on Home Recordings

Turn radio on. Put phono switch in "Phono" position.

Push manual switch toward manual side to play home recordings.

Put your record on turntable and start motor. Place playback arm on record and control tone and volume with the radio volume and tone control knobs.

Recording Radio Programs

Turn the radio on and tune in the program you wish to record. Put manual switch in manual position. Start motor and then gently lower cutting needle onto blank record, about ¼" from outer edge. Radio Volume will drop—Adjust volume control so red volume indicator light is off and white indicator light continues to flicker.

Be sure mike control is turned off when playing records.

Microphone Recording

Turn the mike volume control well up. Phono pushbutton should be in "Phono" position. Put manual switch in manual position. Start motor, and set cutting needle gently on start of record. Adjust volume indicator lights the same as in recording radio programs.

NOTE: The cutting arm must be raised about three inches to move it freely across the record.

How to Make Perfect Recordings

Cutting Needle

The cutting stylus is razor sharp and must not be dropped on the record or allowed to rest on the turntable.

For best operation, the instrument should be level in all directions. To check this, place a small level, if you have one, on the turntable. If you do not have a level, a marble will do. If the marble rolls off the turntable, it is low in the direction in which it rolls. Place something under the cabinet until the machine is reasonably level.

Shavings

The cutting stylus cuts out a fine shaving that is just a little thicker than a human hair. These shavings should not be allowed to gather under the cutting stylus.

While cutting, gently brush the shavings from the left side of the record in, toward the center pin, allowing them to collect there until the recording is completed.

Do Not Use Too Much Volume

The most frequent cause of poor recordings is too much volume or overloading. If some passages of your recording are smooth and clear while others are raspy, rough and distorted, you are probably using too much volume. Overloading occurs most often on strong passages. The remedy is to reduce the volume slightly and watch the volume indicator lights.

Too little volume will show up when you play the record back. The volume control on playbacks will have to be turned up quite high and needle scratch will be excessive.

Cutting Arm Adjustments

The cutting arm is adjusted at the factory for proper operation, however, with various types of blanks this adjustment may sometimes have to be altered. With a blank record on the table, the height adjustment on the cutter arm should be adjusted so that the needle screw is centered in the slot when the needle rests on a blank record.

Several blank grooves should now be cut to see if the groove is the proper depth. The depth adjustment screw on the cutter arm will increase the depth of the groove if turned to the letter "H" and will decrease the groove if turned to the letter "L"—For a medium groove turn to "M".

If the groove is too shallow, the playback needle will not stay in the groove. If it is too deep, not enough wall will be left between grooves and the playback needle will break through from one track to the next after a few playings.

A properly cut groove will leave a shaving just a little heavier than a human hair.

GAMBLE-SKOGMO, INC.

Radio Set Schematic Ref. No. | Part No. | Description

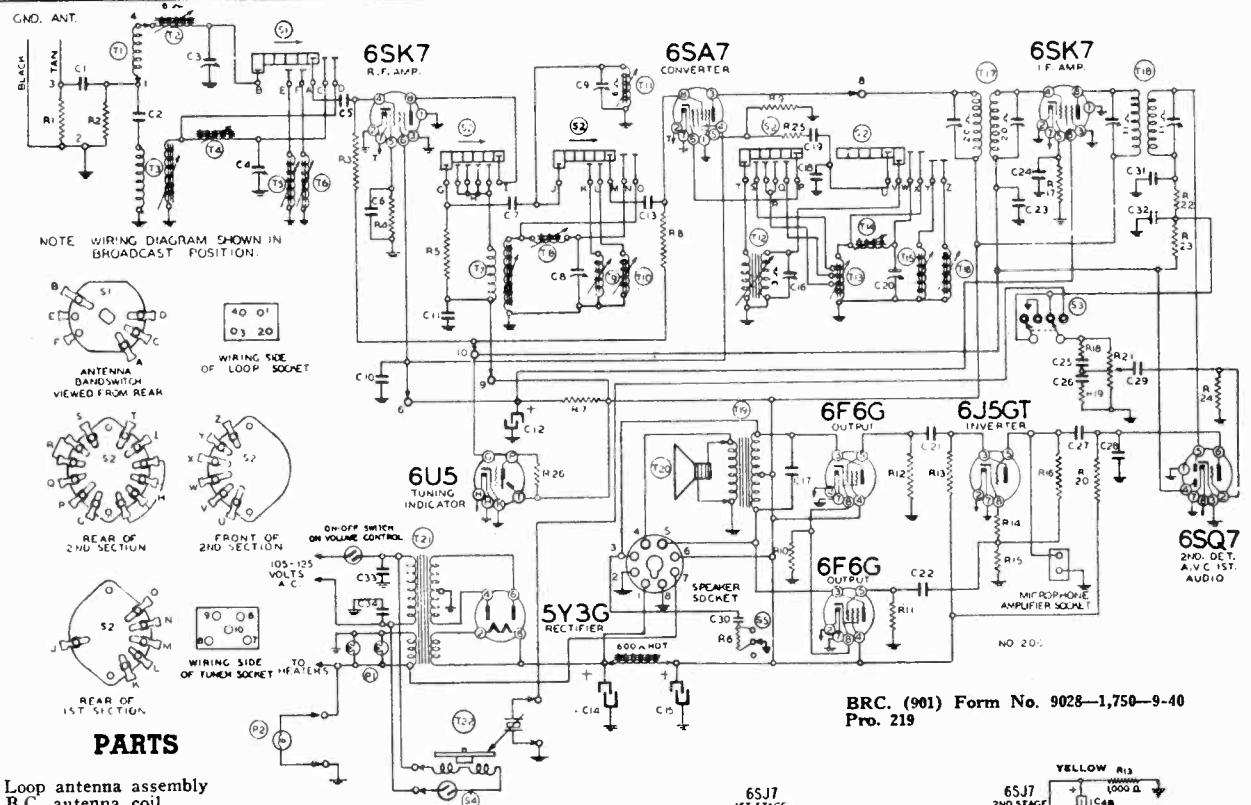
RESISTORS

R1	1301	25M ohm—⅓ w.
R2	1301	25M ohm—⅓ w.
R3	13019	1 megohm—⅓ w.
R4	130239	250 ohm—⅓ w.
R5	130218	5M ohm—⅓ w.
R6	13064	3500 ohm—⅓ w.
R7	10662	12,500 ohm—3 w.
R8	13019	1 megohm—⅓ w.
R9	130232	25M ohm—⅓ w.
R10	130220	300 ohm—1 w.
R11	1303	500M ohm—⅓ w.
R12	1303	500M ohm—⅓ w.
R13	130103	100M ohm—⅓ w.
R14	130218	5M ohm—⅓ w.
R15	130103	100M ohm—⅓ w.
R16	13019	1 megohm—⅓ w.
R17	13070	500 ohm—⅓ w.
R18	13011	250M ohm—⅓ w.
R19	130149	15M ohm—⅓ w.
R20	13011	250M ohm—⅓ w.
R21	101233	½ megohm volume control and on-off switch.
R22	13012	50M ohm—⅓ w.
R23	1304	3 megohm—⅓ w.
R24	130257	5 megohm—⅓ w.
R25	130174	50 ohm—⅓ w.
R26	130110	1 megohm—1/10 w. in tuning indicator cable.

CONDENSERS

C1	1292	.0005 mica
C2	10047	.002 x 600 v.—10%
C3	124143	B.C. antenna trimmer
C4	124143	9 mc. antenna trimmer
C5	1292	.0005 mica
C6	10020	.1 x 200 v. tubular
C7	129168	.00001 mica
C8	124138	9 mc. R.F. trimmer
C9	124139	B.C. R.F. trimmer
R10	10074	.1 x 400 v.
C11	10074	.1 x 400 v.
C12	119109	10.0 x 350 w.v.
C13	1292	.0005 mica
C14	119109	15.0 x 450 w.v.
C15	119109	15.0 x 450 w.v.
C16	124144	B.C. oscillator trimmer
C17	10071	.004 x 600 v.
C18	129167	.0002 silver mica
C19	12938	.00005 mica
C20	124145	9 mc. oscillator trimmer
C21	10013	.05 x 400 v.
C22	1009	.05 x 200 v.
C23	10026	.02 x 400 v.
C24	10020	.1 x 200 v.
C25	129114	.0003 mica
C26	100122	.03 x 200 v.
C27	10026	.02 x 400 v.
C28	12921	.0002 mica
C29	10019	.006 x 600 v.
C30	10013	.05 x 400 v.
C31	129165	.00005 mica
C32	129165	.00005 mica
C33	10061	.02 x 600 v. bakelite
C34	10061	.02 x 600 v. bakelite

C12, C14 and C15 in same unit.
C31 and C32 in same unit.



BRC. (901) Form No. 9028—1,750—9-40
Pro. 219

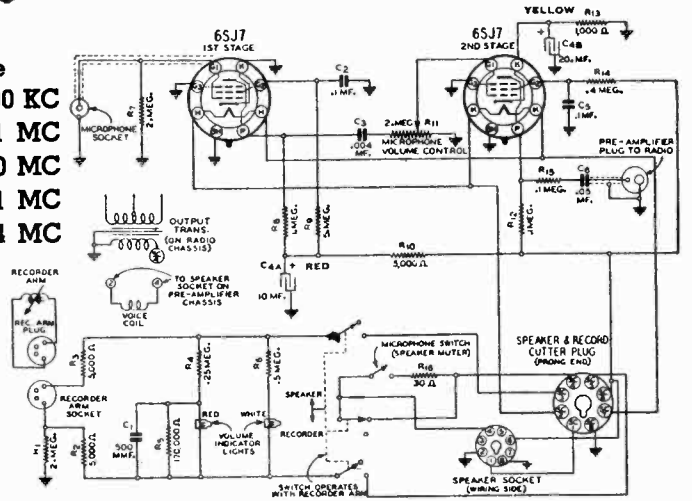
PARTS

T1	111210	Loop antenna assembly
T2	111195	B.C. antenna coil
T3	111190	9 mc. antenna coil
T4	111189	6 mc. antenna coil
T5	111191	12 mc. antenna coil
T3	111190	9 mc. antenna coil
T7	10959	9 mc. R.F. coil
T8	10958	6 mc. R.F. coil
T9	10960	12 mc. R.F. coil
T10	10961	15 mc. R.F. coil
T11	10962	B.C. R.F. coil
T12	110161	B.C. osc. coil
T13	110157	9 mc. oscillator coil
T14	110156	6 mc. oscillator coil
T15	110158	12 mc. oscillator coil
T16	110159	15 mc. oscillator coil
T17	108177	Input I.F. coil—455 kc.
T18	108176	Output I.F. coil—455 kc.
T19	105111	Output transformer
T20	114208	Speaker—Dynamic
T21	104202B	Power transformer—50-60 cycle
	104203B	Power transformer—25 cycle
T22	104234	Automatic record changer—60 cycle
	104232	Automatic record changer—25 cycle
	104233	Automatic record changer—50 cycle
S1	125118	Antenna bandswitch
S2	125117	R.F. & osc. bandswitch
S3	125129	Radio-phono switch
S4		Switch on record changer
S5	125130	Tone control switch
P1	10794	(2) 6-8 volt pilot lights T44
P2	10794	Indicator light T-44

Tuning Frequency Range

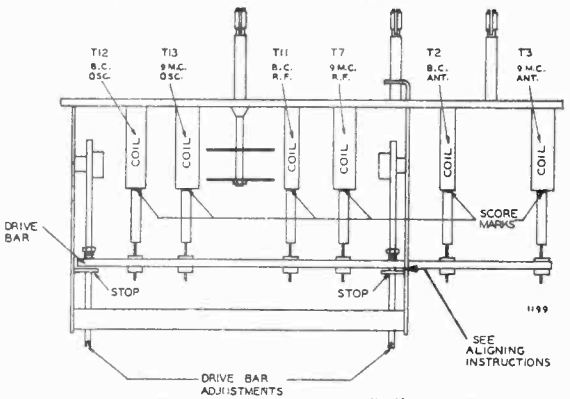
Broadcast Band - 540 to 1600 KC
49M Band - - - 5.9 to 6.1 MC
31M Band - - - 9.1 to 10 MC
25M Band - - 11.4 to 12.1 MC
19M Band - - 14.9 to 15.4 MC

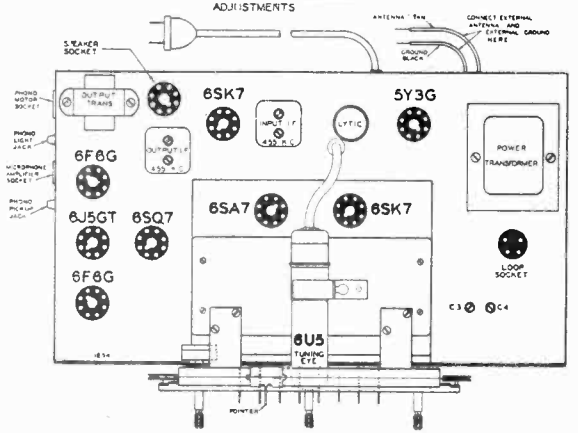
INTERMEDIATE FREQUENCY 455 K.C.



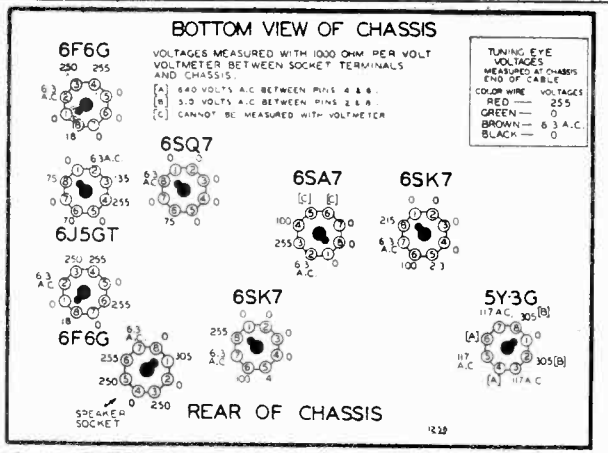
CIRCUIT DIAGRAM OF MICROPHONE AMPLIFIER

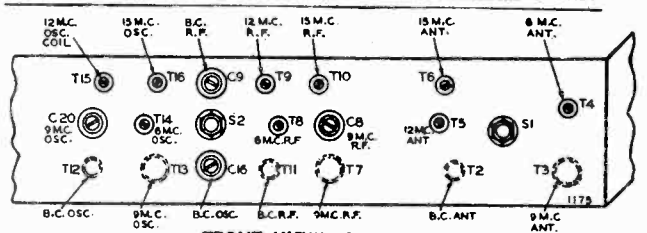
IRON CORE ADJUSTMENT VIEW





BOTTOM VIEW OF CHASSIS





FRONT VIEW CHASSIS

Power Consumption, Radio only - - - 100 Watts
Power Output - - - - - 5 Watts Undistorted
Sensitivity for 500 Milliwatt Output: 10 Microvolts Average
Selectivity - 35 KC Broad at 1000 Times Signal at 1000 KC

Do not realign the band spread scales unless you are positive they are out of adjustment. When adjustment is necessary proceed as follows.

First refer to the "Iron Core Adjustment View" now turn the tuning knob until the drive bar comes within 1/64 to 1/32 from the stops. (A piece of blotting paper is about the right thickness and will serve as a gauge). The clearance of the bar must be the same at both stops. If far off you can raise one drive screw gently and equalize them. Minor adjustments may be made with the drive bar adjustments.

Next rotate each iron core until the fine score marks are even with the edge of the coil forms.

Television and Fm. Jack

If television or frequency modulation (FM) programs ever become available in your community this radio may still be used in conjunction with the necessary converters.

The jack marked phono-pickup jack in the chassis view will accommodate either the Phono or a television or FM converter.

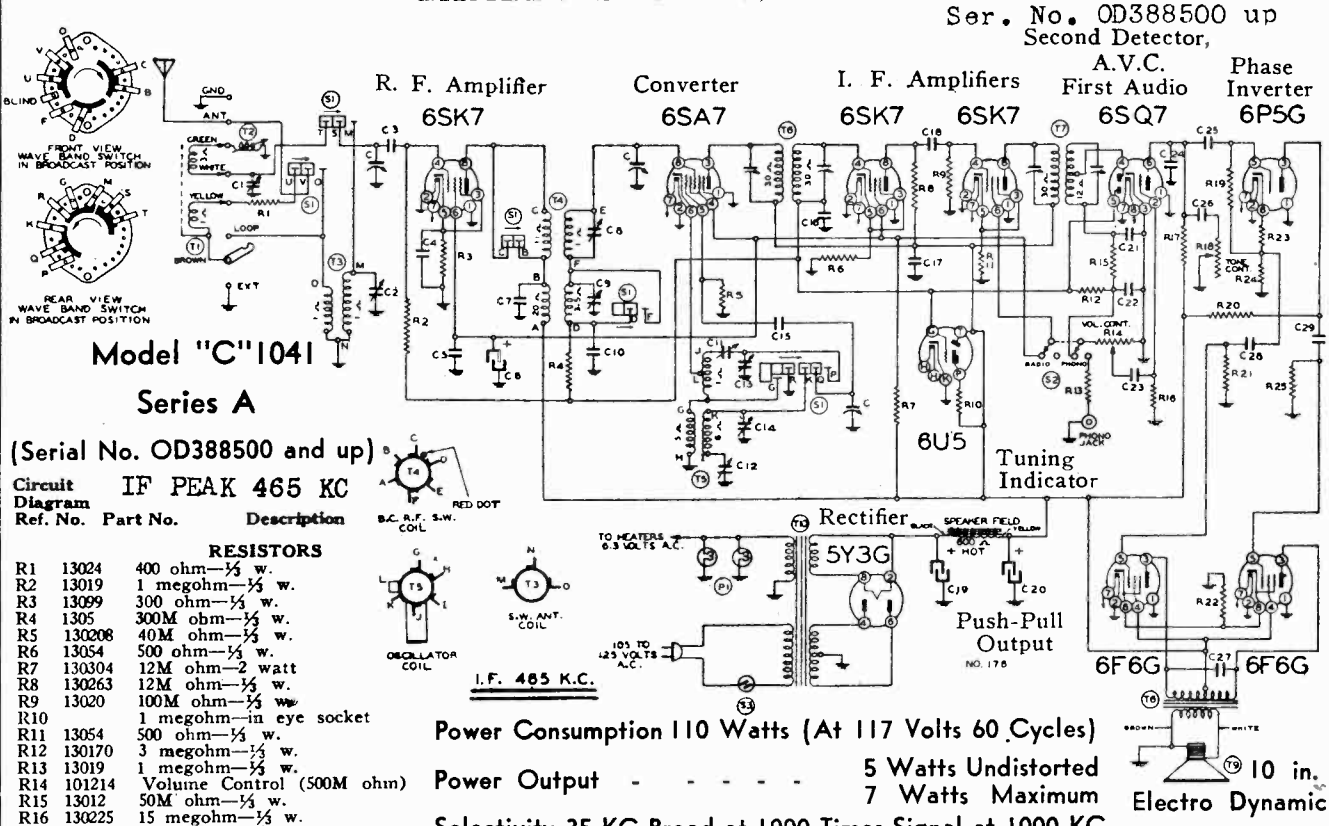
Speaker 10 In. Electro Dynamic

SIGNAL GENERATOR

BAND	Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Dial Pointer Setting	Trimmers Adjusted in Order Shown	Trimmer Function	Adjustment
I. F.	455 Kc.	.1 MFD.	Grid of 6SK7 (I.F.)	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top	Output I. F.	Adjust to maximum output
	455 Kc.	.1 MFD.	Grid of 6SA7	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top	Input I. F.	Adjust to maximum output
31 METER BAND	9.6 Mc.	400 ohms	Antenna lead	31M	Set Dial at 9.6 Mc.	(See Trimmer View) C20 (See Trimmer View) C8 (See Trimmer on Top) C4	Osc. R. F. Ant.	Adjust to maximum output
49 METER BAND	6.1 Mc.	400 ohms	Antenna lead	49M	Set Dial at 6.1 Mc.	(See Trimmer View) T14 (See Trimmer View) T8 (See Trimmer View) T4	Osc. R. F. Ant.	Adjust to maximum output
25 METER BAND	11.8 Mc.	400 ohms	Antenna lead	25M	Set Dial at 11.8 Mc.	(See Trimmer View) T15 (See Trimmer View) T9 (See Trimmer View) T5	Osc. R. F. Ant.	Adjust to maximum output
19 METER BAND	15.2 Mc.	400 ohms	Antenna lead	19M	Set Dial at 15.2 Mc.	(See Trimmer View) T16 (See Trimmer View) T10 (See Trimmer View) T6	Osc. R. F. Ant.	Adjust to maximum output
BROAD-CAST BAND	1600 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1600 Kc.	(See Trimmer View) C16 (See Trimmer View) C9 (See Trimmer on Top) C3	Osc. R. F. Ant.	Adjust to maximum output
	1400 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1400 Kc.	Rotate Core T11 Rotate Core T2 (See Iron Core Adjustment View)	R. F. Ant.	Adjust to maximum output

GAMBLE SKOGMO, INC.

MODEL "C" 1041, Series A
Ser. No. OD388500 up



RESISTORS

R1	13024	400 ohm—½ w.
R2	13019	1 megohm—½ w.
R3	13099	300 ohm—½ w.
R4	1305	300M obm—½ w.
R5	130208	40M ohm—½ w.
R6	13054	500 ohm—½ w.
R7	130304	12M ohm—2 watt
R8	130263	12M ohm—½ w.
R9	13020	100M ohm—½ w.
R10		1 megohm—in eye socket
R11	13054	500 ohm—½ w.
R12	130170	3 megohm—½ w.
R13	13019	1 megohm—½ w.
R14	101214	Volume Control (500M ohm)
R15	13012	50M ohm—½ w.
R16	130225	15 megohm—½ w.
R17	13011	250M ohm—½ w.
R18	101213	Tone Control—(1 Megohm)
R19	13019	1 megohm—½ w.
R20	13020	100M ohm—½ w.
R21	1303	500M ohm—½ w.
R22	130311	300 ohm—1 watt
R23	13022	5M ohm—½ w.
R24	13020	100M ohm—½ w.
R25	1303	500M ohm—½ w.

CONDENSERS

C	102129	Three Gang Variable Condenser
C1	124132	B.C. Ant. Trimmer
C2	124117	SW Antenna Trimmer
C3	1292	.0005 Mica
C4	10020	.1 x 200 v.
C5	100117	.25 x 400 v.
C6	119106	10 mfd. lytic—350 w. v.
C7	129160	.0004 mica
C8	124131	S.W. R.F. Trimmer
C9	129131	B.C. R.F. Trimmers
C10	10026	.02 x 400 v.
C11	129156	.0024 Compression S.W. Pad
C12	129157	.000525 Compression B.C. Pad
C13	124130	S.W. Oscillator trimmer
C14	124130	B.C. Oscillator trimmer
C15	12939	.00005 Mica
C16	10026	.02 x 400 v.
C17	100117	.25 x 400 v.
C18	1292	.0005 mica
C19	119106	10 mfd. lytic—450 w. v.
C20	119106	15 mfd. lytic—450 w. v.
C21	1295	.0001 mica
C22	1295	.0001 mica
C23	10025	.002 x 600 v.
C24	12912	.00025 mica
C25	10026	.02 x 400 v.
C26	10011	.01 x 400 v.
C27	10071	.004 x 600 v.
C28	1009	.05 x 200 v.
C29	10013	.05 x 400 v.

C6, C19 and C20 in one unit
C8 and C9 in one unit
C13 and C14 in one unit

PARTS

T1	111154D	Loop Antenna Assembly
T2	111153	Loop Adjustable Coil
T3	111176	S.W. Antenna Coil
T4	10957	B.C. S.W. R.F. Coil
T5	110149	B.C. S.W. Oscillator Coil
T6	108169C	Input I.F.—465 kc.
T7	108130C	Output I.F.—465 kc.
T8	10554B	Output Transformer
T9	114136	10" Dynamic Speaker (600 Ohm Field)
T10	104202	Power Transformer
S1	125111	Wave Band Switch
S2	12570	Phono Switch
S3		On-off switch on volume control
P1	10794	(2) Pilot light bulbs T-44

Power Consumption 110 Watts (At 117 Volts 60 Cycles)

Power Output - - - - - 5 Watts Undistorted
7 Watts Maximum

Selectivity 35 KC Broad at 1000 Times Signal at 1000 KC

Sensitivity (for .5 Watts Output) - - - -
Broadcast Band—10 Microvolts Average
Shortwave Band—10 Microvolts Average

Tuning Frequency Range
540 to 1580 KC
5.5 to 18.5 MC

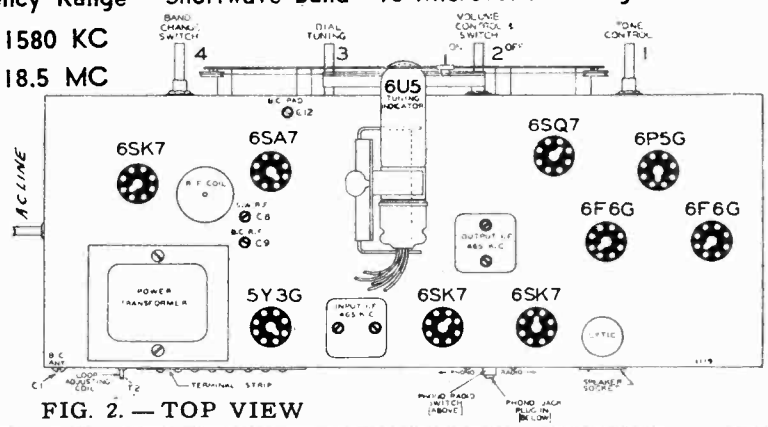
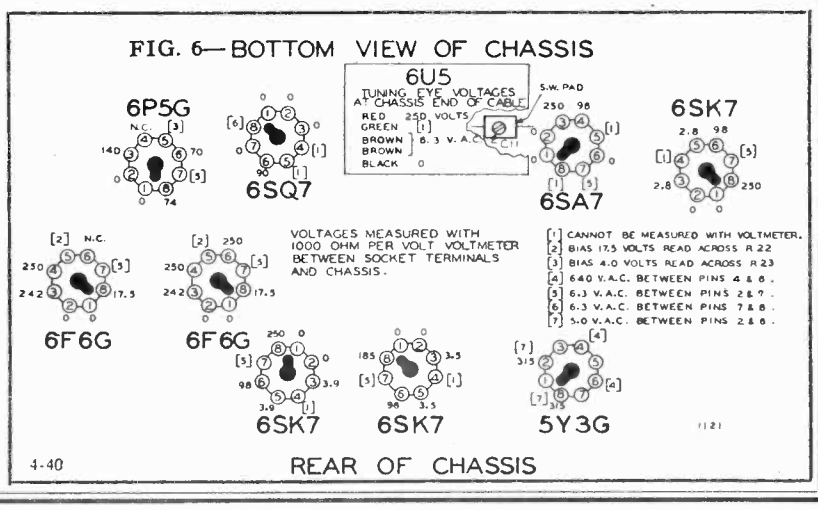


FIG. 2.—TOP VIEW



IMPORTANT: SEE ALIGNING INSTRUCTIONS.

ALIGNMENT PROCEDURE

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Variable Condenser Setting	Trimmers Adjusted (In Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 6SK7 I. F.	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 2)	Output I. F.	Adjust to maximum output
	465 Kc.	.1 MFD.	Grid of 6SA7 Mixer	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 2)	Input I. F.	Adjust to maximum output
SHORT WAVE BAND (See Note A)	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	Trimmer C13 (See Fig. 4)	Short Wave oscillator	Adjust to maximum output
	17 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 17 Mc.	Trimmers C8, C2 (See Figs. 2 & 4)	Short Wave R. F. and S. W. Antenna	Adjust to maximum output
	6 Mc.	400 Ohms	External Antenna and Ground	Short Wave	Set Dial at 6 Mc.	Trimmer C11 (See Fig. 6)	Short Wave oscillator series pad	Adjust to maximum rock dial. (See note "C")
BROAD-CAST BAND (See Note A)	1580 Kc.	200 mmf.	Grid of 6SK7 R. F. Tube	Broadcast	Rotor full open (Plates out of mesh)	Trimmer C14 (See Fig. 4)	Broadcast oscillator	Adjust to maximum output
	540 Kc.	200 mmf.	Grid of 6SK7 R. F. Tube	Broadcast	Set Dial at 540 Kc. (Plates in Mesh)	Trimmer C12 (See Fig. 2)	Broadcast oscillator series pad	Adjust to maximum output
	1400 Kc.	200 mmf.	Grid of 6SK7 R. F. Tube	Broadcast	Set Dial at 1400 Kc.	Trimmer C9 (See Fig. 2)	Broadcast R. F.	Adjust to maximum output
LOOP ALIGN-MENT (See Note B)	1400 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 1400 Kc.	Trimmer C1 (See Fig. 2)	Broadcast antenna	Adjust to maximum output
	600 Kc.	200 mmf.	External Antenna and Ground	Broadcast	Set Dial at 600 Kc.	Trimmer T2 (See Fig. 2)	Iron Core Tracking Coil	Adjust to maximum output

NOTE "A"—The signal generator is connected to the "ANT." and "GND." terminals on the rear of the chassis when aligning the **Short Wave Band** and to the grid of the 6SK7 R.F. Tube and ground terminal when setting the **Broadcast Band** oscillator end frequencies, (1580 and 540 K. C.).

The loop antenna need not be connected to the radio when making these adjustments.

NOTE "B"—Loop alignment is made with the chassis mounted in the cabinet and the loop antenna connected to the terminal board. The signal generator is connected to the "ANT." and "GND." terminals and the jumper on the terminal board connected to "EXT." terminal. (See Fig. 1).

NOTE "C"—Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.
Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each band is completed, repeat the procedure as a final check.

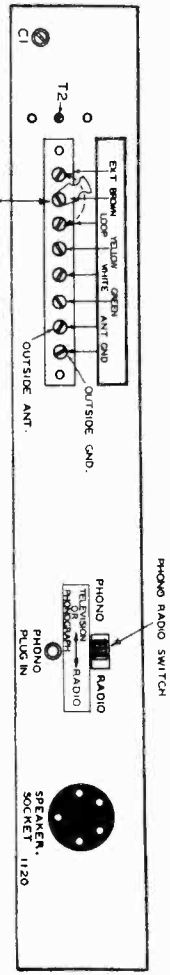


FIG 1.—REAR VIEW OF CHASSIS

ALIGNING INSTRUCTIONS:

CAUTION:—No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. **No aligning adjustments should be attempted with the chassis in the cabinet.**

It is important during **loop alignment** that the loop antenna and the chassis be installed in the cabinet.

To remove the chassis from the cabinet, remove the two chassis mounting bolts which are used to hold the chassis to the cabinet shelf; take the knobs off their shafts and disconnect the loop antenna.

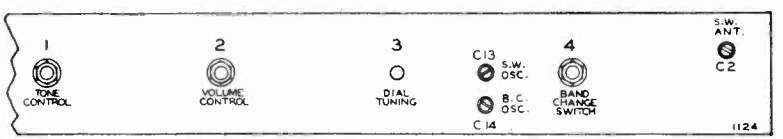


FIG. 4—FRONT OF CHASSIS

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on the voltage chart are measured with 117 volts A. C. on the primary of the power transformer.

Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagrams.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D. C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

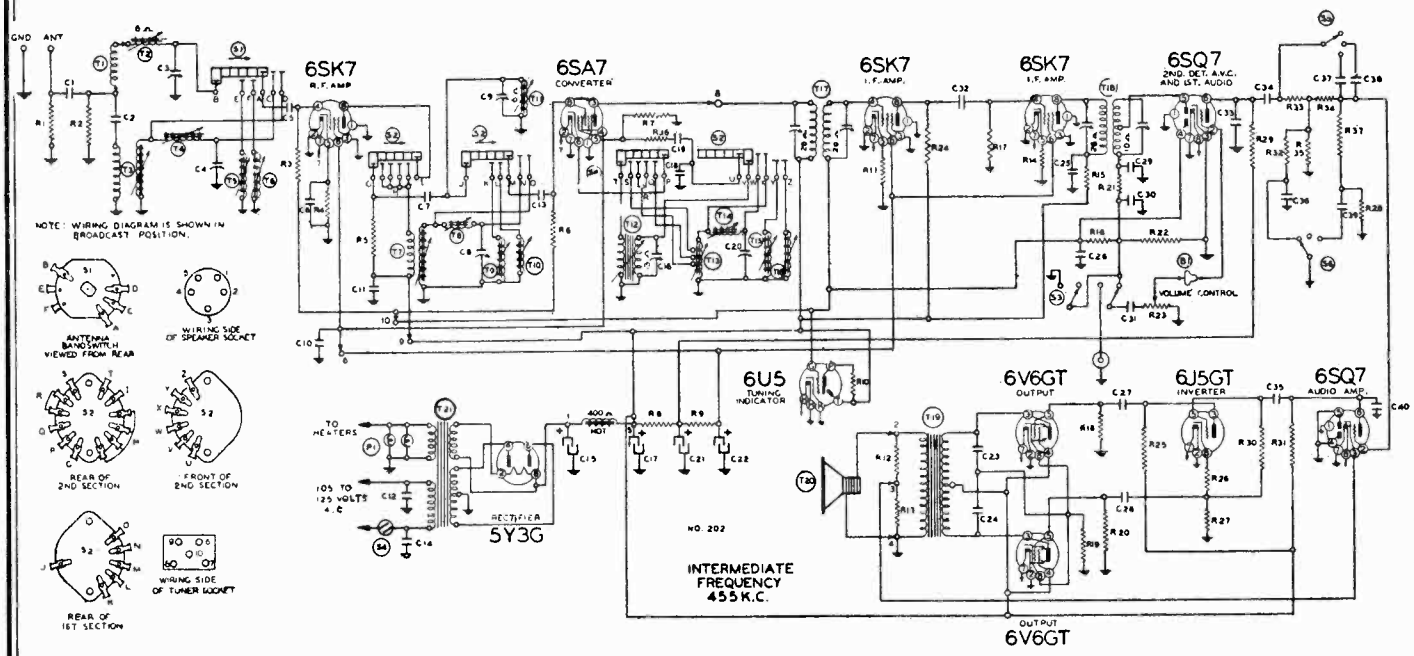
PHONOGRAPH CONNECTIONS:

A phonograph connector and switch are provided on the rear of the chassis. To operate: Insert plug on end of phonograph pick-up lead into connector on chassis—and move phonograph switch to "Phono" position.

Volume and tone may be controlled by using the controls on the front of the radio.

TELEVISION CONNECTIONS:

Television will not be available for nation wide use for some time to come; however, Television audio connections are provided on this radio for the reception of Television sound. Connect audio output leads of television receiver to connector provided on rear of receiver chassis as shown in above illustration and snap switch to "Television" position.



BRC (C1100) Series A Form No. 1129-2750—8-40

Pro. 203

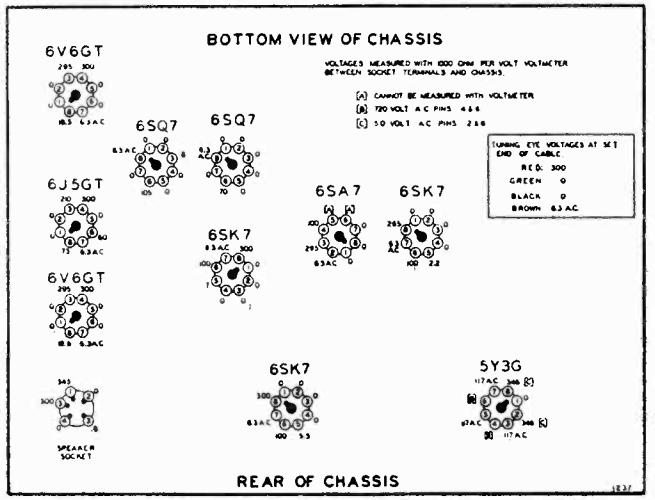
11 TUBE A. C.

5 BAND

BUILT-IN AERIAL

PUSHBUTTON

TUNING



C39 10037 .003 x 600 v.
C40 12912 .00025 mica
C3 and C4 in same unit
C15, C17 and C21 in same unit
C29 and C30 in same unit

C33 12912 .00025 mica
C34 1001 .1 x 400 v.
C35 10013 .05 x 400 v.
C36 100118 .008 x 600 v.
C37 12936 .0003 mica
C38 129166 .000125 mica

PARTS

T1	111207	Loop Antenna Assembly
T2	111195	B.C. Antenna Coil
T3	111190	9 mc. Antenna Coil
T4	111189	6 mc. Antenna Coil
T5	111191	12 mc. Antenna Coil
T6	111192	15 mc. Antenna Coil
T7	10959	9 mc. R.F. Coil
T8	10958	6 mc. R.F. Coil
T9	10960	12 mc. R.F. Coil
T10	10961	15 mc. R.F. Coil
T11	10962	B.C. R.F. Coil
T12	110161	B.C. Oscillator Coil
T13	110157	9 mc. Oscillator Coil
T14	110156	6 mc. Oscillator Coil
T15	110158	12 mc. Oscillator Coil
T16	110159	15 mc. Oscillator Coil
T17	108177B	Input I.F. Coil—455 Kc.
T18	108130E	Output I.F. Coil—455 Kc.
T19	105115	Output Transformer
T20	114207	12" Dynamic Speaker
T21	104217	Power Transformer—50-60 cycles
S1	125118	Antenna Bandswitch
S2	125117	R.F. Oscillator Bandswitch
S3	125133	Radio-phono Switch
S4		On-off Switch on volume control
S5	125130	Treble Switch
S6	125131	Bass Switch
P1	10794	2 6-8 Volts Pilot Lights T44
B1	11622	1.25 Volt Bias Cell

Code No.	Part No.	Description

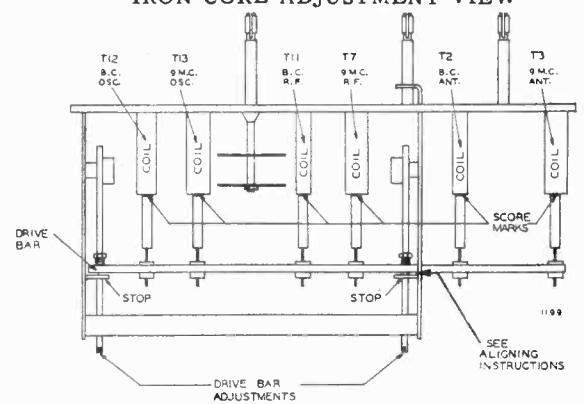
RESISTORS

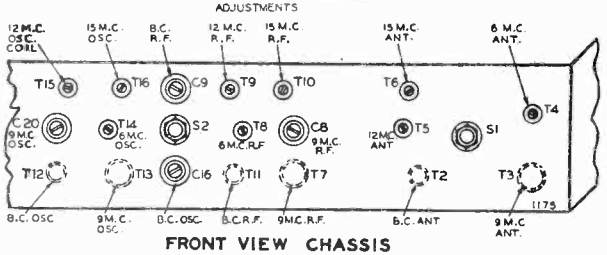
R1	130232	25M ohm—⅓ w.
R2	130232	25M ohm—⅓ w.
R3	13019	1 megohm—⅓ w.
R4	130239	250 ohm—⅓ w.
R5	130218	5M ohm—⅓ w.
R6	13019	1 megohm—⅓ w.
R7	130232	25M ohm—⅓ w.
R8	130318	6M ohm—2 watt
R9	130319	10M—2 watt
R10		1 megohm in tuning indicator cable
R11	130200	700 ohm—⅓ w.
R12	13082	10M ohm—⅓ w.
R13	130235	1500 ohm—⅓ w.
R14	130235	1500 ohm—⅓ w.
R15	130192	2M ohm—⅓ w.
R16	13019	1 megohm—⅓ w.
R17	13020	100M ohm—⅓ w.
R18	1303	500M ohm—⅓ w.
R19	130317	250 ohm—2 watt
R20	1303	500M ohm—⅓ w.
R21	13020	100M ohm—⅓ w.
R22	130238	400M ohm—⅓ w.
R23	101234	500M ohm volume control and line switch (S4)
R24	13073	15M ohm—⅓ w.
R25	13094	50M ohm—⅓ w.
R26	130218	5M ohm—⅓ w.
R27	13094	50M ohm—⅓ w.
R28	1303	500M ohm—⅓ w.
R29	130172	250M ohm—⅓ w.
R30	1303	500M ohm—⅓ w.
R31	130172	250M ohm—⅓ w.
R32	1307	40M ohm—⅓ w.
R33	13080	150M ohm—⅓ w.
R34	130309	350M ohm—⅓ w.
R35	130172	250M ohm—⅓ w.
R36	130174	50 ohm—⅓ w.
R37	13080	150M ohm—⅓ w.

CONDENSERS

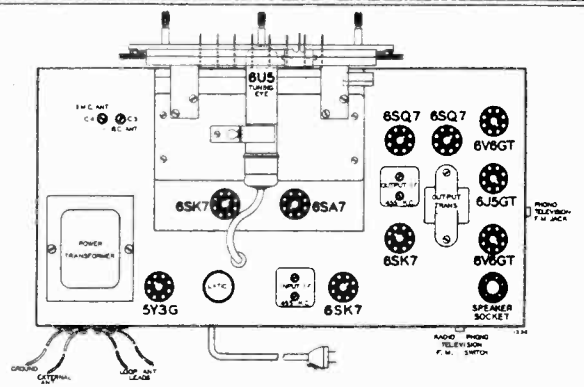
C1	1292	.0005 mica
C2	10047	.002 x 600 v.
C3	124143	B.C. Antenna Trimmer
C4	124143	9 mc. Antenna Trimmer
C5	1292	.0005 mica
C6	10020	.1 x 200 v. Tubular
C7	129168	.00001 mica
C8	124138	9 mc. R.F. Trimmer
C9	124139	B.C. R.F. Trimmer
C10	10074	.1 x 400 v.
C11	10074	.1 x 400 v.
C12	10061	.02 x 600 v.
C13	1292	.0005 mica
C14	10061	.02 x 600 v.
C15	119112	30.0 mfd. lytic
C16	124144	B.C. Oscillator Trimmer
C17	119112	30.0 mfd. lytic x 450 w.v.
C18	129167	.0002 silver mica
C19	12938	.00005 mica
C20	124145	9 mc. Oscillator Trimmer
C21	119112	10.0 mfd. lytic
C22	11969	16 mfd. x 350 w.v.
C23	10065	.015 x 600 v.
C24	10065	.015 x 600 v.
C25	1001	.1 x 400 v.
C26	10022	.05 x 200 v.
C27	10013	.05 x 400 v.
C28	1009	.05 x 200 v.
C29	129161	.0001 mica
C30	129161	.0001 mica
C31	10020	.1 x 200 v.
C32	1292	.0005 mica

IRON CORE ADJUSTMENT VIEW





FRONT VIEW CHASSIS



Power Consumption - - - - - - **120 Watts**
Power Output - - - - - **10 Watts Undistorted**
Sensitivity for 500 Milliwatt Output: 10 Microvolts Average
Selectivity - 27 KC Broad at 1000 Times Signal at 1000 KC
Intermediate Frequency - - - - - - **455 KC**
Speaker - - - - - - **12 in. Electro Dynamic**

- Tone control—Treble
- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Dummy antennas—.1 mf., 200 mmf., and 400 ohms.

Tuning Frequency Range

Broadcast Band - 540 to 1600 KC
49M Band - - - 5.9 to 6.1 MC
31M Band - - - 9.1 to 10 MC
25M Band - - 11.4 to 12.1 MC
19M Band - - 14.9 to 15.4 MC

Phonograph-Television and Fm. Jack

Should you wish to use an external phonograph it should be plugged into the phono jack shown in the chassis view—The radio-phono switch on the chassis will then switch from radio to phono operation.

If television or frequency modulation (FM) programs ever become available in your community this radio may still be used in conjunction with the necessary converters.

The jack marked phono-television-FM in the chassis view will accommodate either the Phono or a television or FM converter.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Dial Pointer Setting	Trimmers Adjusted In Order Shown	Trimmer Function	Adjustment
I. F.	455 Kc.	.1 MFD.	Grid of 6SK7 (I.F.)	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top	Output I. F.	Adjust to maximum output
	455 Kc.	.1 MFD.	Grid of 6SA7	Broadcast	Set Dial at 1600 Kc.	Two Trimmers on Top	Input I. F.	Adjust to maximum output
31 METER BAND	9.6 Mc.	400 ohms	Antenna lead	31M	Set Dial at 9.6 Mc.	(See Trimmer View) C20 (See Trimmer View) C8 (See Trimmer on Top) C4	Osc. R. F. Ant.	Adjust to maximum output
49 METER BAND	6.1 Mc.	400 ohms	Antenna lead	49M	Set Dial at 6.1 Mc.	(See Trimmer View) T14 (See Trimmer View) T8 (See Trimmer View) T4	Osc. R. F. Ant.	Adjust to maximum output
25 METER BAND	11.8 Mc.	400 ohms	Antenna lead	25M	Set Dial at 11.8 Mc.	(See Trimmer View) T15 (See Trimmer View) T9 (See Trimmer View) T5	Osc. R. F. Ant.	Adjust to maximum output
19 METER BAND	15.2 Mc.	400 ohms	Antenna lead	19M	Set Dial at 15.2 Mc.	(See Trimmer View) T16 (See Trimmer View) T10 (See Trimmer View) T6	Osc. R. F. Ant.	Adjust to maximum output
BROAD-CAST BAND	1600 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1600 Kc.	(See Trimmer View) C16 (See Trimmer View) C9 (See Trimmer on Top) C3	Osc. R. F. Ant.	Adjust to maximum output
	1400 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1400 Kc.	Rotate Core T11 Rotate Core T2 (See Iron Core Adjustment View)	R. F. Ant.	Adjust to maximum output

Do not realign the band spread scales unless you are positive they are out of adjustment. When adjustment is necessary proceed as follows.

First refer to the "Iron Core Adjustment View" now turn the tuning knob until the drive bar comes within 1/64 to 1/32 from the stops. (A piece of blotting paper is about the right thickness and will serve as a guage). The clearance of the bar must be the same at both stops. If far off you can raise one drive screw gently and equalize them. Minor adjustments may be made with the drive bar adjustments.

Next rotate each iron core until the fine score marks are even with the edge of the coil forms.

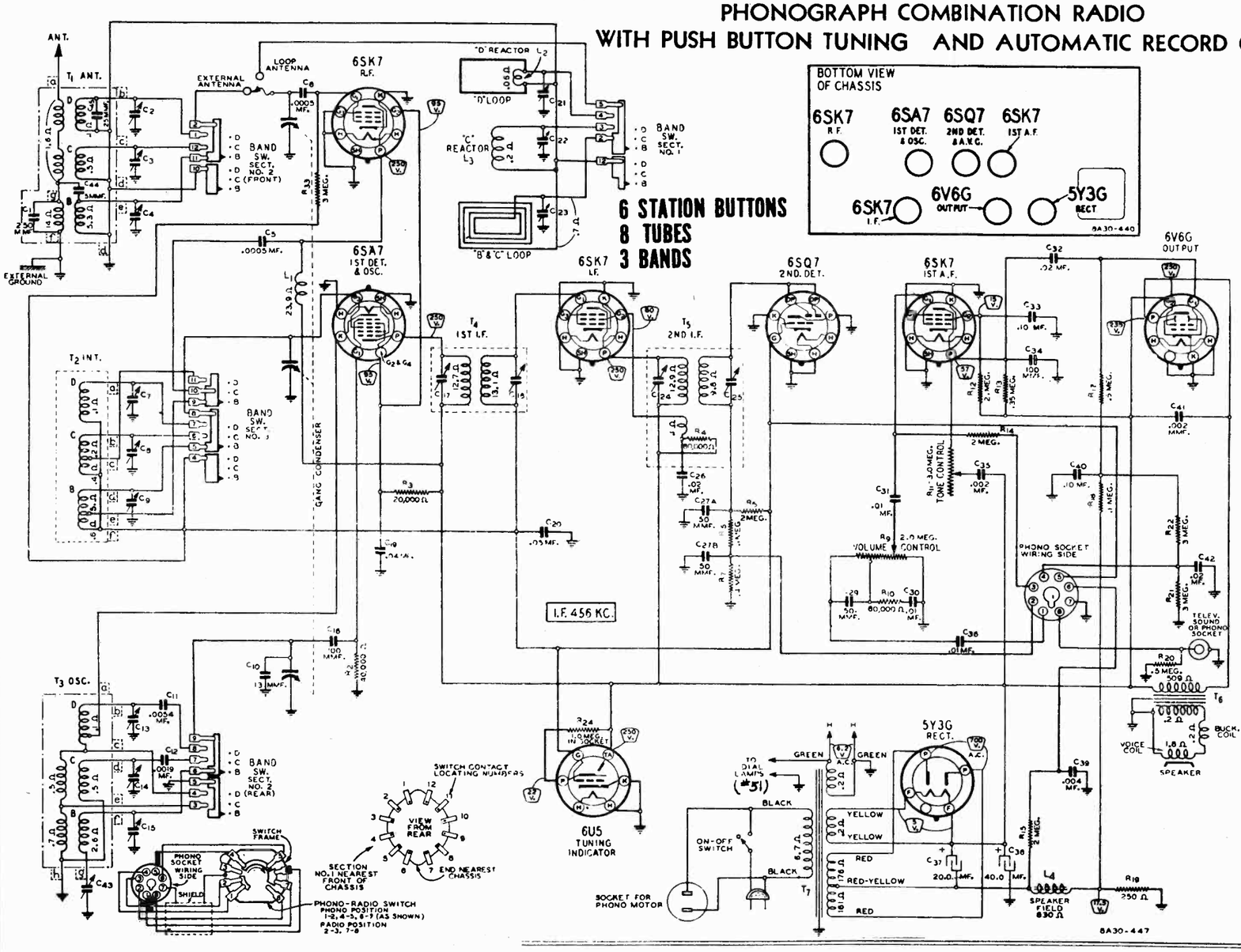
You are now ready to continue with the trimmer adjustments as shown on the alignment chart.

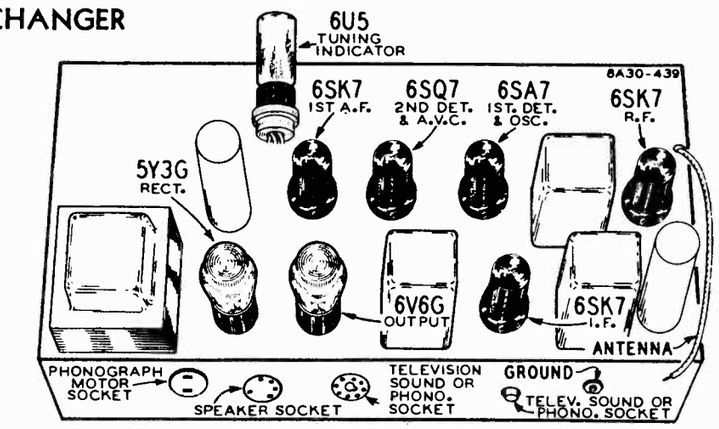
GAMBLE-SKOGMO, INC.

MODEL 4956

PHONOGRAPH COMBINATION RADIO
WITH PUSH BUTTON TUNING AND AUTOMATIC RECORD CHANGER

6 STATION BUTTONS
8 TUBES
3 BANDS





Antenna and Ground

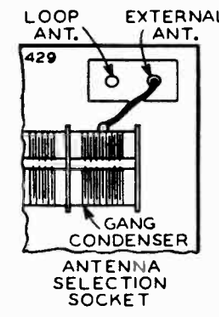
Two loop antennas are incorporated in the speaker chamber and may be used for broadcast band and short wave reception. For the reception of local or nearby stations, an outside antenna is usually not required. The use of the loop antenna may, in some locations, provide best broadcast band operation.

In general, however, more stations will be heard and noise will sometimes be reduced by using an outside antenna.

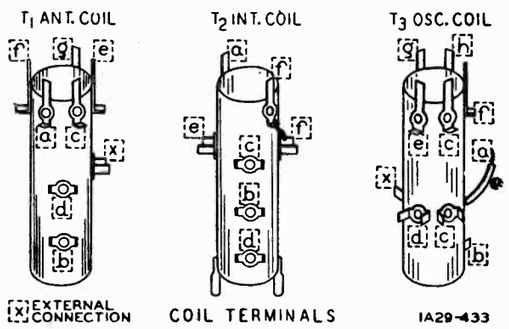
For best reception of short wave stations, an outside antenna is recommended.

A white wire will be found coming out of the chassis. Connect this wire to the outside antenna lead.

On the back panel of the chassis base is a screw (marked GND) under which the ground wire should be fastened.



ANTENNA SELECTION SOCKET—At the right front corner of the chassis base (from back of cabinet) is a 2 hole pin tip socket—See illustration. If it is desired to operate the radio using the loop antennas, the pin tip should be inserted in the hole farthest from the side of the chassis. If it is desired to operate the radio using an external antenna, insert the pin tip in the hole nearest the side of the chassis. The socket may be reached after removing the four wing nuts holding the cover over the opening in the cabinet back.



SPECIFICATIONS

Power Consumption 71 Watts (At 117 volts 60 cycles)
88 Watts (Phonograph Operating)

Power Output - - - - - - 4.0 Watts Undistorted
5.0 Watts Maximum

Selectivity - - 30 KC Broad at 1000 times Signal

Intermediate Frequency - - - - - - - 456 KC

Speaker - - - - - - - - 10" Electro-Dynamic

Receivers of this model which are to be used on 25 cycle, 230 volt, or other service are so marked on label.

Tuning Frequency Range

B Range	528 to 1730 KC
C Range	2200 to 7000 KC
D Range	7000 to 22000 KC

Sensitivity (For 0.5 Watt output)

B Range	1.0 Microvolt Average
C Range	1.0 Microvolt Average
D Range	3.0 Microvolts Average

FOR OTHER DATA SEE INDEX

Important—A good antenna and ground are essential for best operation of this radio. Connections should be clean and tight. Do not use an old outside antenna as in most cases it will be unsatisfactory.

Voltages at Sockets

Line Voltage—117.
Volume Control—Maximum.
Antenna Shorted to Ground.

Readings taken with 1000 ohm-per-volt meter. Plate and screen voltages are read on 500 volt scale.

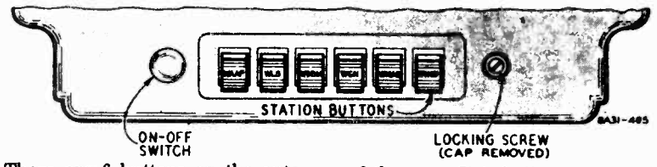
GAMBLE-SKOGMO, INC. MODEL 4956

MODULATION HUM Dec.8,1939.

In case modulation hum (hum with signal) is encountered on the above model , the trouble may be due to the 6SK7 1st A.F. tube. Interchange this tube with the 6SK7 R.F and 6SK7 I.F. tubes. Note the results. The 6SK7 1st A.F. tube may be left in either the R.F. or I.F. tube sockets if the arrangement reduces the hum.

If the hum is still appreciable after the above procedure try out several new 6SK7 1st A.F. tubes. Use the one which reduces the hum to a minimum.

Setting the Station Buttons



There are 6 buttons on the automatic tuning dial by means of which 6 stations may be set for quick tuning.

It is better to list the station with the lowest kilocycle number first, the station with the next higher kilocycle number next, and so on.

Any button may be used for any station you can receive, although it will be more convenient to set the stations so that the kilocycle numbers decrease from left to right.

Setting a Station Button

Turn the manual tuning knob so that the pointer moves toward 1700 KC until the stop is reached.

At the right side of the escutcheon (from the front) will be seen a cap which covers a hole in the escutcheon —See illustration. Pull off this cap.

At the end of the tube in back of the hole in the escutcheon is the locking screw. Using a small handle screwdriver, unlock the mechanism by turning this screw several turns in a counter-clockwise direction.

Select the first station from the list you have prepared, and carefully tune in this station by means of the manual tuning knob using the tuning eye as a guide.

With one hand, hold the manual tuning knob to prevent it from turning and with the other hand, push one of the station buttons shown in the illustration *all the way down*. It will go down easily at first and then a firm gentle pressure must be applied to push it down the rest of the way. It is better to start with the left hand button.

Hold *this* button all the way down. With the other hand, see whether or not this station is still accurately tuned in by moving the tuning knob a slight amount back and forth while observing the tuning eye. *Be sure to hold the button all the way down.*

Release the button after the station is tuned in.

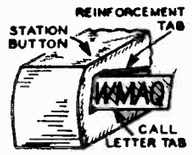
Carefully tune in the second station on your list. Then hold the tuning knob and push the second button slowly and firmly all the way down. Check for accurate tuning.

Proceed in the same manner to set any additional stations on your list on the remaining station buttons.

After all the stations are set, it will be necessary to lock the mechanism so that the settings will not change. Turn the manual tuning knob so that the pointer moves toward 1700 KC until the stop is reached. Then, with the SMALL HANDLE screwdriver, turn the locking screw in a clockwise direction until it is tight. Tighten the locking screw firmly but not excessively to avoid stripping the threads. Replace the cap over the hole.

Insert a celluloid reinforcement tab half way in the slot at the front of the first station button.

Remove the correct station call letter tab for this button from the sheet supplied by bending the sheet back and forth at the score marks. Place the call letter tab in front of the celluloid reinforcement tab and insert it in slot. Push both tabs all



the way in the button slot. Follow the same procedure for inserting the station call letter tabs in any other buttons.

If at any time you wish to change the setting of a button from one station to another, repeat the above procedure. Changing the setting of one button will not affect the setting of any of the other buttons.

Television Sound Connections

If Television programs ever become available in your community, the audio amplifier and speaker of this radio may be used to reproduce Television sound in conjunction with any "Television Picture Receiver and Sound Converter."

On the back panel of the chassis base is a socket to which is connected the phono cable shielded pin tip. Upon removal of this pin tip, the connector on the cable from a television receiver can be inserted in the socket. (The cable connector must be a single shielded pin tip type, part No. M93.)

When Television sound reproduction is desired, the knob located above the dial of the radio should be turned to the Phonograph (P) position. For radio reception, the knob should be in the Radio (R) position.

MODEL 4956 GAMBLE-SKOGMO, INC.

ALIGNMENT PROCEDURE

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I. F.					
456 KC	Grid of 1st Det.	.1 mf.	B Range See Note A	Turn Rotor to Full Open	1st I.F. (C17) & (C18) 2nd I.F. (C24) & (C25)
RANGE B					
1730 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C15)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note B	Ant. Range B (C4) Int. Range B (C9)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C43) (C16 on 1A29) Rock Rotor—See Note C
RANGE C					
7000 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Full Open	Oscillator Range C (C14)
6000 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Max. Output	Antenna Range C (C3) Int. Range C (C8)
RANGE D					
22,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C13)
21,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C2) Int. Range D (C7) Rock Rotor—See Note C
LOOP RANGE B					
1500 KC See Note D	None—See Note D		B Range	Turn Rotor to Max. Output	Loop Trimmer (C23) See Note E
LOOP RANGE C					
6000 KC See Note D	None—See Note D		C Range	Turn Rotor to Max. Output	Loop Trimmer (C22) See Note E
LOOP RANGE D					
21,000 KC See Note D	None—See Note D		D Range	Turn Rotor to Max. Output	Loop Trimmer (C21) Rock Rotor—See Note C

Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each range is completed, repeat the procedure as a final check.

NOTE A—For all adjustments, with the exception of the 3 loop range adjustments, the pin tip should be in the external antenna hole of the Antenna Selection Socket—See illustration on page one.

NOTE B—If the pointer is not at 1500 KC on the dial remove pointer from drive cord. Tune in a 1500 KC signal. Set pointer at the 1500 KC mark on the dial scale. Attach pointer to drive cord.

NOTE C—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE D—Re-install set in cabinet. Connect a loop approximately one foot in diameter across the antenna and ground posts of the signal generator. Place signal generator so that this loop is between 3 and 10 feet from loop in cabinet. Insert pin tip in loop antenna hole of Antenna Selection Socket—See illustration on schematic page.

Note E (CONSOLE MODELS)—Turn knob of loop until output is maximum.

CAUTION—When aligning the short wave bands, be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC, or 4088 KC on the dial. It may be necessary to increase the input signal to hear the image.

Drive Cord Replacement

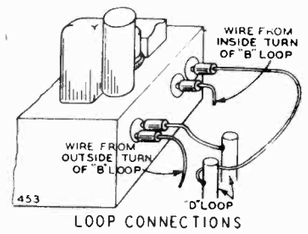
Use a drive cord approximately 70 inches in length. Tie a large knot with a small loop at one end of the new drive cord. Thread other end of cord up through hole in rim of condenser drive pulley. Pull cord through hole until large knot is flush against pulley rim.

Turn gang condenser to completely closed position. Remove guide arm from front of chassis—See illustration.

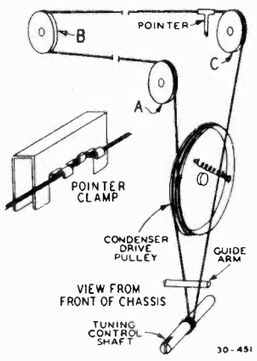
Wind ¼ turn in a clockwise direction (from right side of chassis) around condenser drive pulley. Wind cord over pulleys A, B, and C as shown. Wind 4½ turns in a clockwise direction (from front of chassis) around tuning control shaft. Turns should progress toward the chassis.

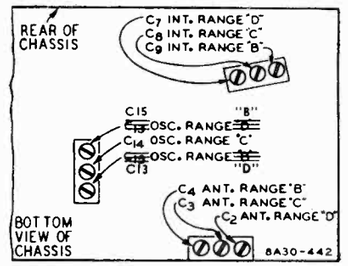
Wind 1¾ turns in a clockwise direction (from right side of chassis) around condenser drive pulley. This turn should be at left side (from front of chassis) of pulley groove. Pass cord through hole in pulley rim. Secure tension spring to cord loop. Knot other end of cord to spring. Stretch spring and secure free end to hook on drive pulley. Replace guide arm.

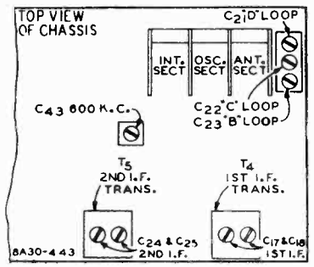
Dial Pointer Attachment—Tune in a signal of known frequency. Set the pointer at this frequency on the dial scale. Secure pointer to cord—See illustration.



LOOP CONNECTIONS

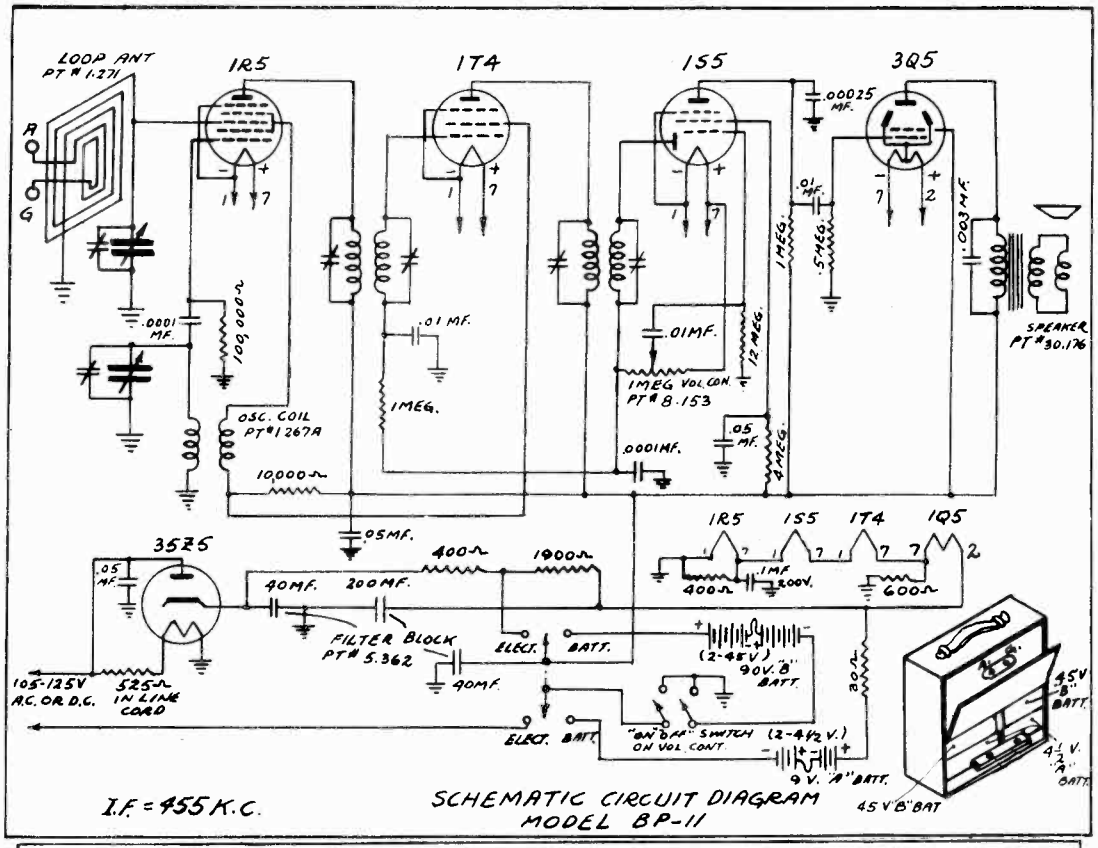


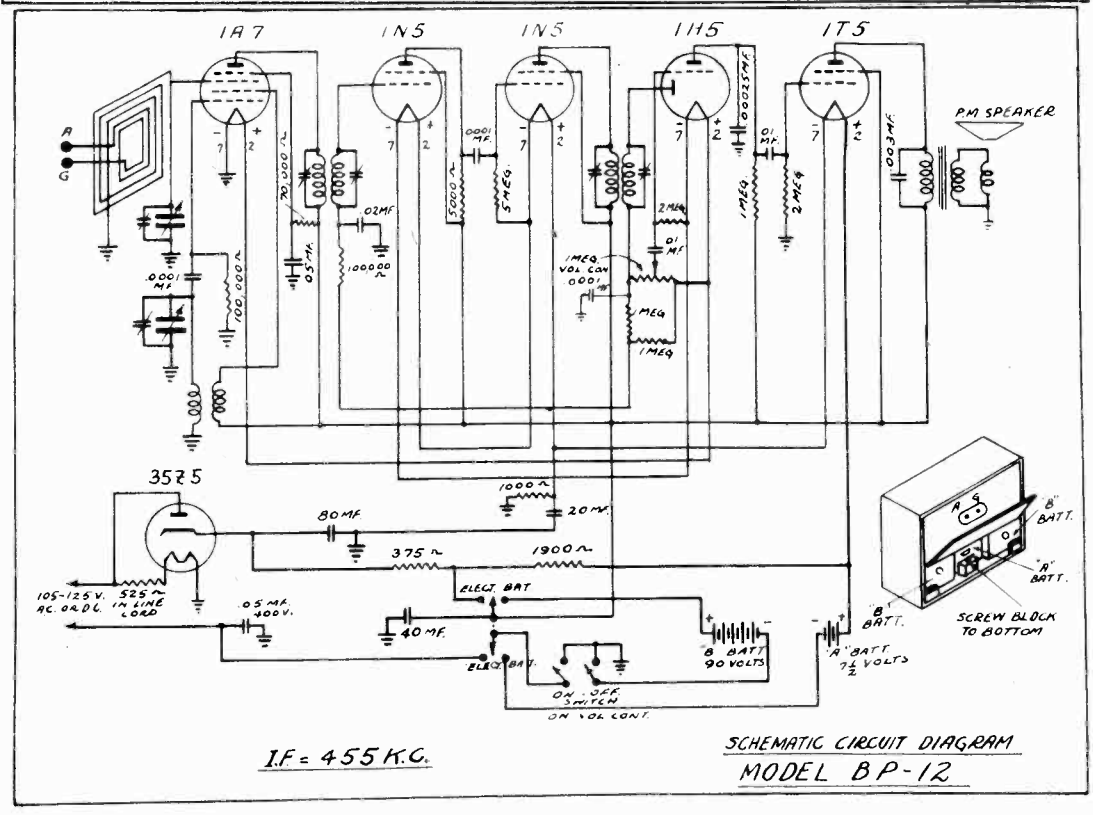




GAROD RADIO CORP.

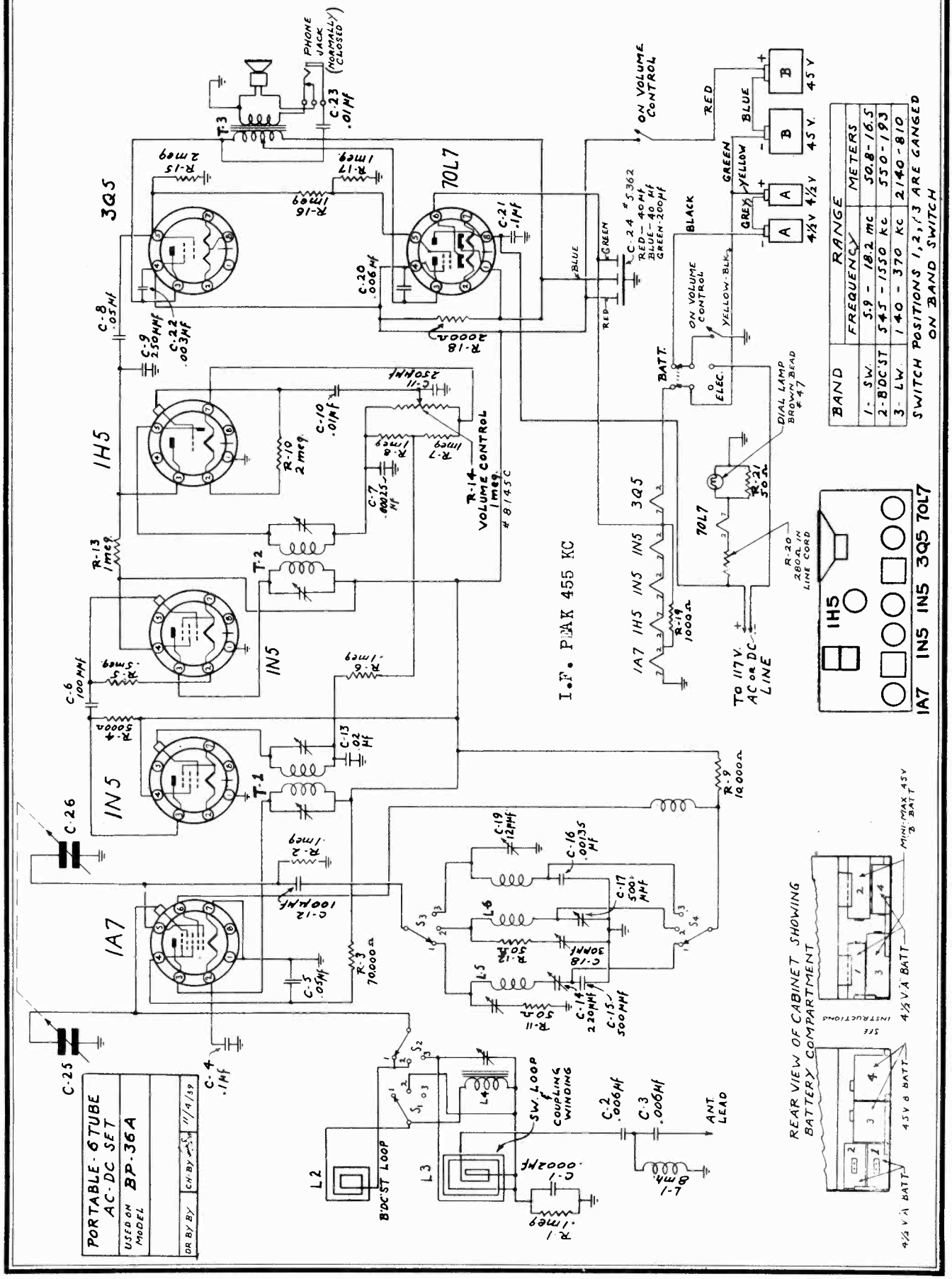
MODEL BP11
MODELS BP12,
BP12A, BP12B





MODEL BP36A

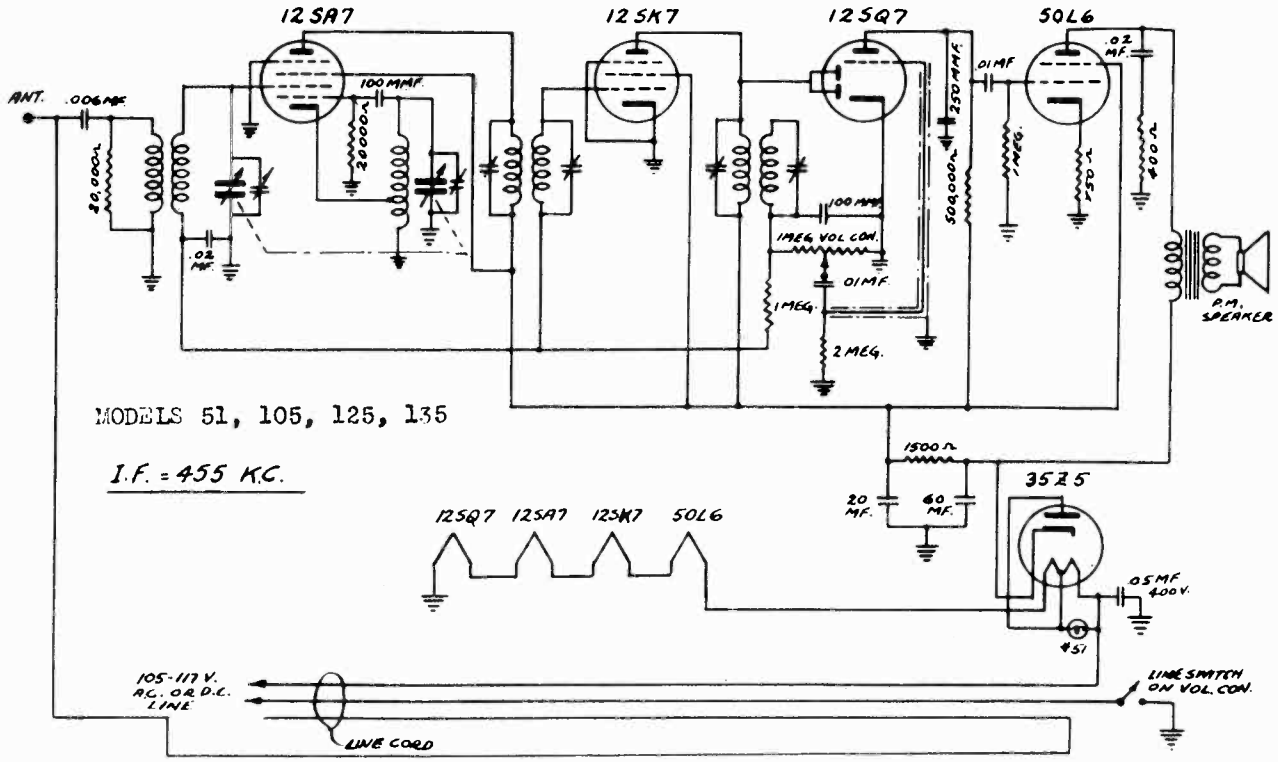
GAROD RADIO CORP.



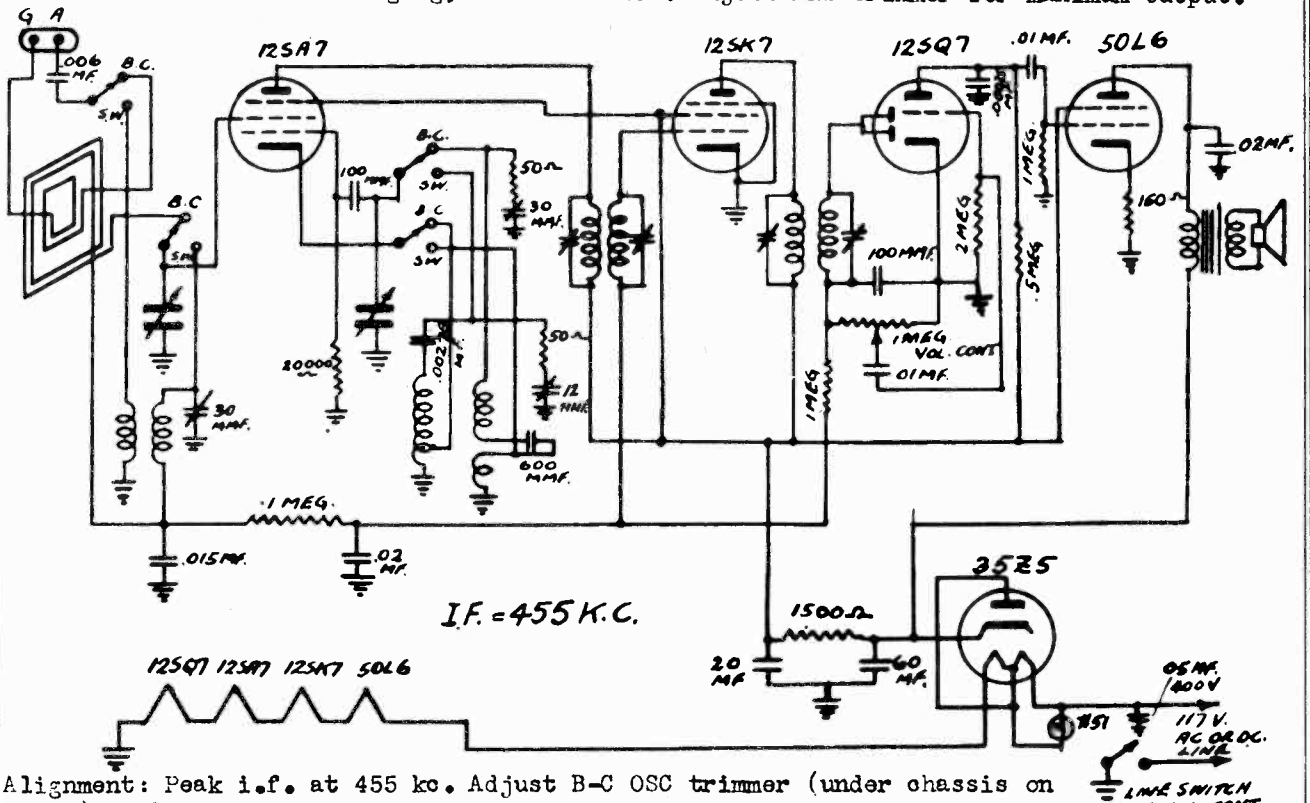
MODELS 225A, 225B, 245, 255, 265, 275, 285

GAROD RADIO CORP.

MODELS 51, 105, 125, 135

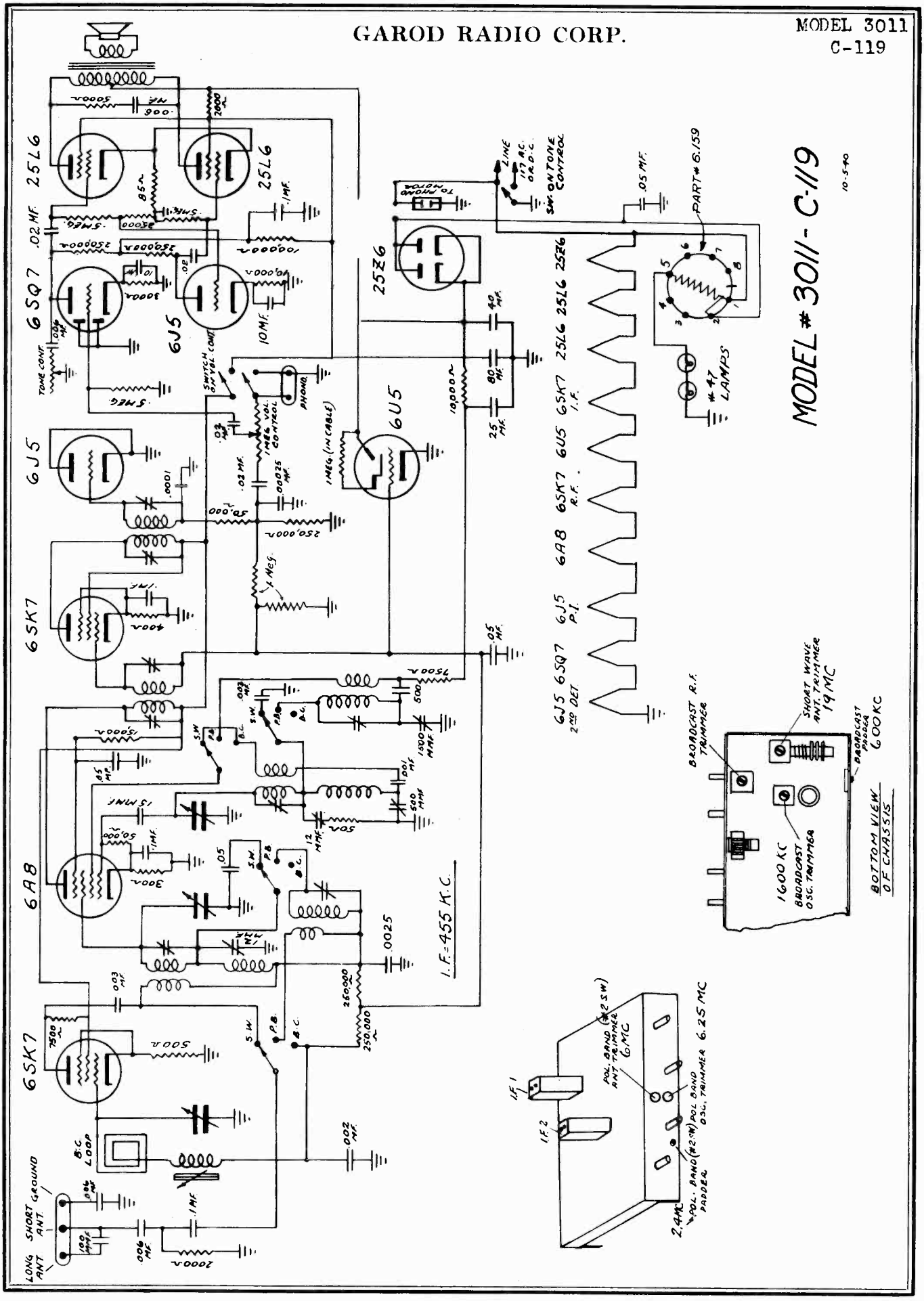


Alignment: Peak i-f transformers at 455 kc. Set generator to 1500 kc and tune in with OSC trimmer on gang, front section. Adjust ANT trimmer for maximum output.



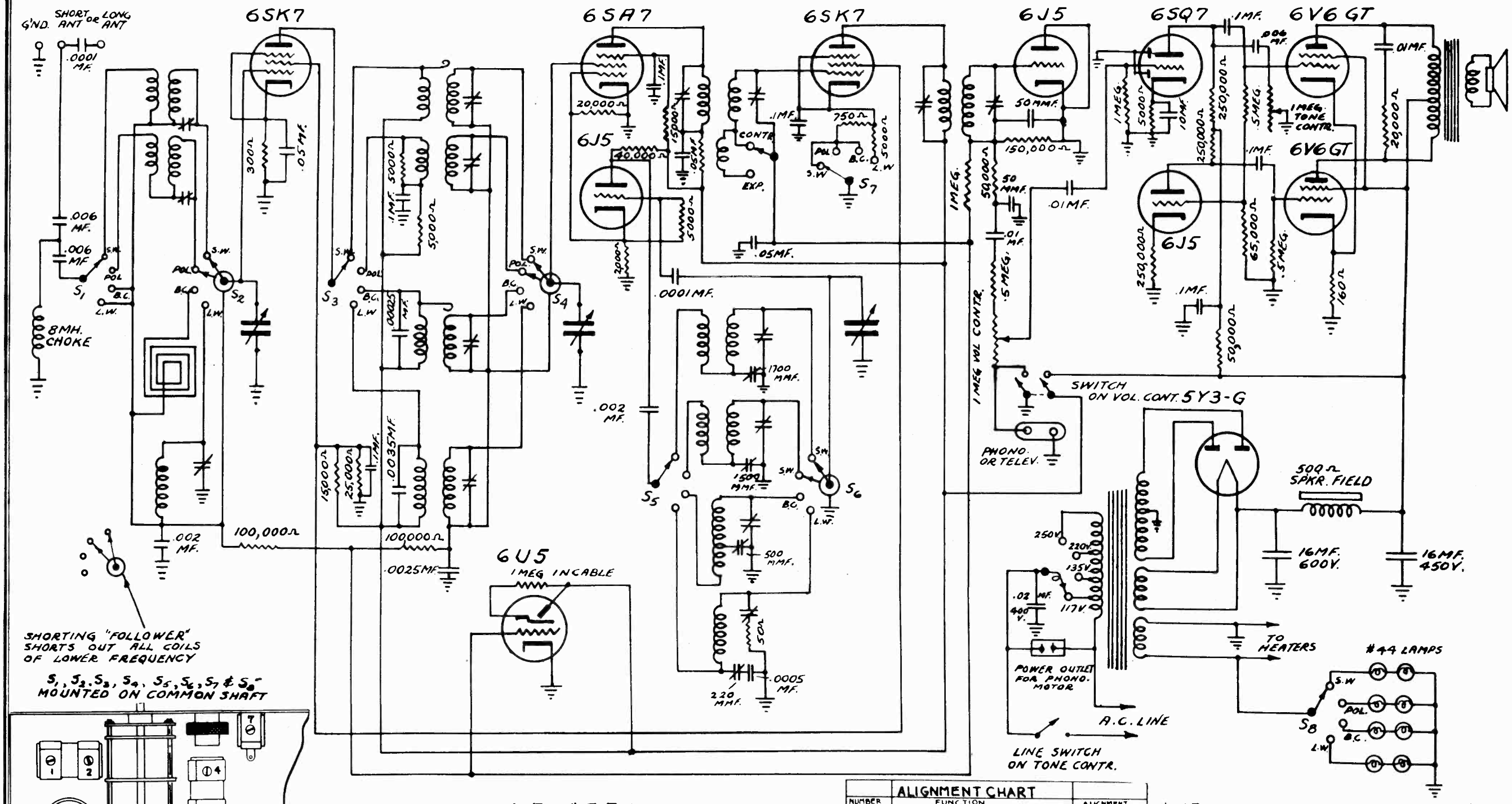
Alignment: Peak i.f. at 455 kc. Adjust B-C OSC trimmer (under chassis on apron) to 1500 kc. Adjust B-C padder (rear apron) to 600 kc. Set generator to 15 mc. Tune in. Set s-w OSC trimmer so that dial points to this frequency. Align s-w ANT trimmer (top of chassis on s-w ANT coil to right of gang condenser.)

SCHEMATIC WIRING DIAGRAM
MODELS 225A, 225B
245, 255, 265, 275, 285



GAROD RADIO CORP.

MODEL C120, 4011



BOTTOM VIEW OF CHASSIS SHOWING LOCATION OF TRIMMERS & PADDERS

I.F. 455 K.C.

BAND	RANGE	
	FREQUENCY	WAVE LENGTH
SHORT WAVE	22.5 - 7.2 MC.	13 - 41.75 METERS
POLICE	7.4 - 23 MC.	40.5 - 128 METERS
BROADCAST	545 - 1620 KILOCYCLES	550 - 185 METERS
LONG WAVE	140 - 370 KILOCYCLES	2140 - 813 METERS

NUMBER (SEE DIAGRAM)	ALIGNMENT CHART FUNCTION	ALIGNMENT FREQUENCY
1	2ND. S.W. ANT. TRIMMER	19 M.C.
2	1ST. S.W. ANT.	7 M.C.
3	2ND. S.W. INTER. (1ST. DET.)	19 M.C.
4	1ST. S.W. " "	7M.C.
5	2ND. S.W. OSC	22.5M.C.
6	1ST. S.W. "	7.6M.C.
7	L.W. ANT.	300K.C.
8	L.W. INTER (1ST. DET)	300K.C.
9	L.W. OSC.	300 K.C.
10	B.C. INTER. (1ST. DET.)	1400 K.C.
11	B.C. OSC	1620K.C.
12	B.C. LOOP PADDER	600K.C.
13	2ND. S.W. "	8 M.C.
14	1ST. S.W. "	2.5M.C.
15	B.C. "	600K.C.
16	L.W. "	150K.C.
	I.F. FREQUENCY	455K.C.

11 TUBE A.C. RECEIVER MODEL #4011

9-25-40

MODEL 4123

GAROD RADIO CORP.

SHORT ANT
LONG ANT
GND
RED
BLUE
BLK
C-1 .006μf
C-2 100μμf
C-3 .006μf
C-4 .006μf
2.5 M.A.
IF PEAK 455 KC
6SK7
6K8
6B8
6Z7
T-1 #1163
T-2 #1164
R-6 75000Ω
R-3 300Ω
C-6 .05μf
R-8 50,000Ω
R-7 150Ω
C-12 .05μf
C-26 30μμf
C-28 100μμf
R-31 50,000Ω
C-29 .01μf
C-30 .02μf
C-32 .1μf
R-22 .25 meg
R-23 15000Ω
R-24 .25 meg
R-25 .25 meg
R-26 .25 meg
R-27 .5 meg
R-28 .1 meg
R-30 .5 meg
R-34 15000Ω
R-29 1 meg VOL. CONTROL #B.145
C-33 .1μf
C-34 .006μf
C-35 .015μf
R-35 1 meg TONE CONTROL #B.144
R-32 1 meg
R-33 1 meg
PHONO-TELEVISION JACK -- SW. CLOSED FOR RADIO OPERATION - ON VOL. CONTROL
R-21 3000Ω
C-31 10μf
C-27 .02μf
L1 L2 L3 L4 L5 L6 L7 L8 L9 L10
S1 S2 S3 S4 S5 S6
C-7 C-36 .02μf
C-8
C-9
C-10 .0025 μf
C-11 250μμf
R-4 5000Ω
R-5 1500Ω
C-15 .1μf
C-16 1700μμf
C-17 1000μμf
C-18 500μμf
C-13 .002μf
C-14 100μμf
R-9 1 meg. IN SOCKET
6U5
25L6
25L6
25L6
25L6
R-19 500Ω
R-20 500Ω
C-37 .01μf
C-38 .01μf
T3
R-1 .1 meg
R-2 .1 meg
C-5 .002μf
MAN.
SWITCH ON PUSH-BUTTON #1
RB
C-19 100μμf
R-13 50,000Ω
6A8
R-10 15000Ω
C-20 .05μf
R-11 7500Ω
C-21 250μμf
R-12 3000Ω
C-22 .05μf
S7
PUSH-BUTTONS 2-7 (INCL.) PILOT LIGHTS BLUE BEAD BAYONET BASE #44
FILAMENT WIRING
6K8 6A8 6SK7 6B8 6Z7 6U5 25L6 25L6 25L6 25Z5 25Z5
R-14 #6.150 30Ω
R-16 150Ω
R-15 400Ω
#8123 CHOKE
RED BLUE BLACK
1800Ω SPKR FLD
C-23 16μf #S.340
C-24 RED-40μf BLUE-25μf #S.339
C-25 80μf #S.341
R-17 50Ω
R-18 30Ω
TO-117 V. AC or DC LINE
LINE SW ON PUSH BUTTON #8
25Z5
25Z5
GU5
6SK7
6A8
6K8
25L6
25L6
6Z7
6B8
25L6
25L6

RANGE	
FREQUENCY	METERS
22.5-7.2 mc	13.35 - 41.75
7.6-2.35 mc	39.4 - 127.5
1700 -540 kc	176.4 - 555

SHORTING BAR ON BAND SWITCH - SHORTS COILS OF LOWER FREQUENCY THAN ONE IN USE

S1 - S2 - S3 - S4 - S5 - S6 & S7 ARE GANGED ON BAND SWITCH

I.F. 455
12 TUBE - 3 BAND
AC-DC RECEIVER
4123 -- CC47

CH. BY [illegible] 11-7-39 "/14/39

GAROD RADIO CORP.

MODEL 4124

BAND	RANGE	
	FREQUENCY	METERS
1	22.5-7.2 mc	13.35-41.75
2	7.6-2.35 mc	39.4 -127.5
3	1700-540 kc	176.5 -555
4	370-140 kc	810 -2140

12 TUBE - 4 BAND AC-DC--RECEIVER

USED ON-	SCALE-
4124	--CC-48

PART #

DR BY BY	CH BY-BC	10/25/39

LONG ANT SHORT ANT GND

BLUE RED BLK C-42 .006MF

C-1 100 MMF

C-2 .006MF

C-3 .006MF

L-1 8 MH.

6SK7 R-2 300Ω C-8 .05MF

L-2 L-3 L-4 L-5 L-6 BDCST LOOP

S1 S2 S3 S4

C-9 .02MF C-10 .1MF R-3 5000Ω

C-5 C-6 C-7

L-7 C-4 .002MF

L-8 L-9 L-10 L-11 L-12 L-13 L-14 L-15

C-40 250MMF C-41 .0025MF C-11 .0025MF R-4 .1MEG

R-1 .1MEG C-25 .05MF

6K8 R-6 50,000Ω R-5 150-300Ω C-12 .05MF C-13 100MMF

L-16 L-17 L-18 L-19 L-20 L-21 L-22

S5 S6 C-14 1700MMF C-15 1000MMF C-19 .002MF C-16 500MMF C-17 220MMF R-7 50Ω C-18 500MMF

T-1 1ST I.F

6SK7 R-8 400Ω C-20 .1MF

T-2 2ND I.F C-32 100MMF

IF PEAK 455 KC

6SQ7 C-22 .1MF R-14 .1MEG R-16 .1MEG R-9 2500Ω C-21 10MF R-15 .1MEG R-17 5000Ω R-18 .1MEG C-23 .1MF

C-34 - .01MF
C-35 - 250MMF
R-27 .5MEG
C-36 - .006MF
R-28 - TONE BASS CONTROL
C-37 - .015MF

R-29 15,000Ω

R-10 .1MEG R-11 .5MEG C-38 100MMF C-24 .01MF R-12 1MEG R-30 .1MEG

6SQ7 VOL. CONTROL 1MEG R-13 PHONO-TELEVISION JACK

DPST SW - CLOSED FOR RADIO OPERATION -- ON VOL CONTROL

25L6 25L6 25L6 25L6 R-26 500Ω R-25 500Ω

R-23 400Ω C-26 16 MF C-27 40 MF C-28 25 MF C-29 80 MF

R-20 1MEG R-21 1MEG. IN SOCKET

SPKR FLD 1800Ω L-23 9-123

25Z5 25Z5 R-22 30Ω

6U5 R-19 50Ω C-33 .1MF C-30 .01MF

T-3 C-39 .01MF

C-31 .05MF

TO AC-DC LINE 117 V.

LINE SW. ON TONE CONTROL

S1-S2-S3-S4-S5-S6-S7 ARE GANGED ON BAND SWITCH

BAND SWITCH SHORT CIRCUITS COILS OF LOWER FREQUENCY THAN THE ONE IN USE

4124

25Z5 25Z5 6U5 6SK7 25L6 25L6 6SQ7 6K8 25L6 25L6 6SQ7 6SK7

R-32 150Ω 25Z5 25Z5 R-31 100Ω 6SK7 6K8 6SQ7

S7

25L6 25L6 25L6 25L6 6U5 6SK7 6SQ7

BLUE BEAD-BAYONET BASE #44 PILOT LIGHT

MODEL 4410

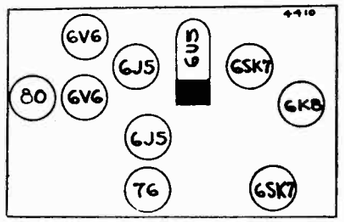
GAROD RADIO CORP.

BAND	RANGE	
	FREQUENCY	METERS
1	22.5 - 7.2 mc	13.35 - 41.75
2	7.6 - 2.35 mc	39.4 - 127.5
3	1700 - 540 kc	176.5 - 555
4	370 - 140 kc	810 - 2140

BOTTOM VIEW OF SOCKETS SHOWN

NOTE - BAND SWITCH SHORT-CIRCUITS COILS OF LOWER FREQUENCY THAN ONE IN USE..

$S_1 - S_2 - S_3 - S_4 - S_5 - S_6 - S_7$ ARE GANGED ON BAND SWITCH.



6SK7 6K8 I.F. 455 KC 6SK7 76

LONG ANT. SHORT ANT. .0001μf C-11 .006μf C-12 .006μf C-13 8 MH. L-1 GND

L-2 L-3 L-4 L-5 L-6 L-7 S_1 S_2 C-1

R-3 300Ω .05μf C-5 S_3 .02μf C-10 L-8 L-9 L-10 L-11 R-4 5000Ω R-5 1500Ω .1μf C-6 C-7 250MMF L-12 L-13 L-14 L-15 C-8 .0035μf C-2

R-1 .1meg. R-2 .1meg. .002μf C-4 .0025μf C-9

CAP .05μf C-41 1ST I.F. T-1 2ND I.F. T-2 R-31 2000Ω C-15 100MMF R-7 50,000Ω C-14 .05μf 300Ω R-6 .002μf C-28 7500Ω R-8 S_5 S_6 C-3 L-16 L-17 1700MMF C-16 L-18 L-19 1000MMF C-17 L-20 500MMF C18 L-21 C-19 220MMF 50Ω R-9 C-20 .05μf C-21

200Ω R-10 .1μf C23 100 μμf C 24 R-12 50,000Ω .5meg. R-11 1meg. R-13 100MMF C-29 .01μf C 30 R-17 1 meg. VOL. .0001μf C25 PHONO TELEVISION JACK

R-14 25000Ω R-15 25000Ω .1μf C-22 R-16 1meg. 6U5 .03μf C-21

R-18 1meg. TONE .01μf C 26 100MMF C 27

O.P.S.T. SW ON VOL. CONTROL CLOSED IN RADIO POSITION

LINE SW. ON TONE CONTROL TO A.C. LINE VOLTAGE TAPS 117 135 220 250 T-4 .02μf C 39 5.0V 6.3V 80 1000Ω SPKR. FLD 5.3V3 16μf 600V C-37 5.338 16μf C 38 S_7 #44 PILOT LIGHT BLUE BEAD - BAYONET BASE

6V6 C 34 .02μf R-30 15000Ω .01μf C-36 R-29 165Ω .5meg. R-27 .5meg. R-28 .02μf C 35 6V6 T-3

6J5 C 33 .02μf R-26 .25meg. 5000Ω R-25 .2meg R-24 .5meg. R-23

6J5 .01μf C 31 R-22 .25meg. C-40 .1μf .1meg. R-21 R-20 5000Ω 10μf C-32 2meg R-19

10 TUBE AC. RECEIVER 4 BAND 4410

BY 10/17/39

GAROD RADIO CORP.

MODELS 399, 4990; 1039, 1049; 1540; 3109; 4123; 4124; 4410

GAROD MODELS 399,4990; 1039,1049; 1540; 3109; 4123; 4124; 4410
ALIGNMENT

It is important to remember that in receivers of this kind which are equipped with automatic volume control it is necessary to use the minimum possible signal from the signal generator; otherwise the A.V.C. action will tend to nullify the variations in output as the trimmers are adjusted.

I.F. Adjustment: The signal generator is set at ① 455 kc and is connected through a .5 mmfd condenser to the grid of the first detector (6K8). With the band switch set on "Broadcast", the pointer set at 550 kc and the receiver volume control at its maximum position, the I.F. trimmers are adjusted for maximum output. These trimmers may be found on tops of the I.F. transformer shield cans.

Band #1 Adjustment: Turn the dial control knob so that the condenser plates are entirely out of mesh. Set the band switch to band #1. The signal generator should be connected to the short-antenna binding post through the dummy antenna consisting of a 250 mmfd mica condenser and a 400 ohm non-inductive resistor. The oscillator trimmer condenser should be opened to minimum capacity and the signal generator then set to 2.4 ② megacycles. The oscillator trimmer is then increased in capacity until maximum response is obtained. Two responses are possible and it is important that the high frequency response (oscillator trimmer low capacity) be used. The signal generator is then set to 1.9 ③ MC and the variable condenser turned until a response is obtained. The pointer should coincide with the 1.9 ③ MC mark on the dial. The antenna preselector and first detector trimmers are then adjusted in the order named, for maximum output. The variable condenser should be rocked slightly during this last adjustment. The signal generator is now set at 7.8 ④ mc and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum reading of the output meter while the generator runing condenser is rocked slightly to right and left. The high frequency adjustment should then be rechecked.

Band #2: The band selector switch is set in position for operation on short wave band #2. The variable condenser is opened so that the plates are completely unmeshed and the oscillator trimmer is opened to minimum capacity. The signal generator is set to 7.8 ⑤ mc and the oscillator trimmer condenser is increased in capacity until a response is heard. Two responses are possible and it is important that the higher frequency response (oscillator trimmer low capacity) be used. Set the signal generator at 7 mc and turn the tuning control until a response is indicated on the output meter. The pointer should now coincide with the 7 mc marker on the dial. The antenna preselector and first detector trimmers are then adjusted in the order named for maximum output. After high frequency adjustments have been made set the signal generator at 2.5 mc and turn the variable gang condenser until a response is observed. Adjust the padding condenser for this band for maximum gain while rocking the tuning condenser slightly to the right and the left. The higher frequency adjustment should then be rechecked.

Broadcast Band: The dummy antenna for this band should consist of a 250 mmfd condenser only. The signal generator is set at 1620 ⑥ kc, the band switch set at broadcast position. The variable condenser should be opened so that the plates are entirely out of mesh. The oscillator trimmer is then adjusted for maximum response on that frequency (1620kc) ⑥. Set the signal generator at 1500 kc and tune the receiver until a response is indicated. The dial pointer should coincide with the 1500 kc mark on the dial. ⑦
The signal generator is then set at 600 kc and the receiver tuned until a response is indicated. The padder condenser is then adjusted for maximum gain while the tuning gang condenser is rocked slightly to the left and right. The 1500 kc adjustment should then be rechecked.

MODELS 1049, 1540, 4124, 4410 and 4990. (ONLY)

Long Wave Band: The band selector switch is set in position for operation on the long wave band. The receiver and generator are both tuned to 300 kc and the oscillator trimmer is adjusted for maximum response. The antenna and first detector trimmers are adjusted in the order named for maximum output.

The signal generator is then set at 150 kc and the signal is tuned in. The long wave padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the left and right. The 300 kc adjustment should then be rechecked.

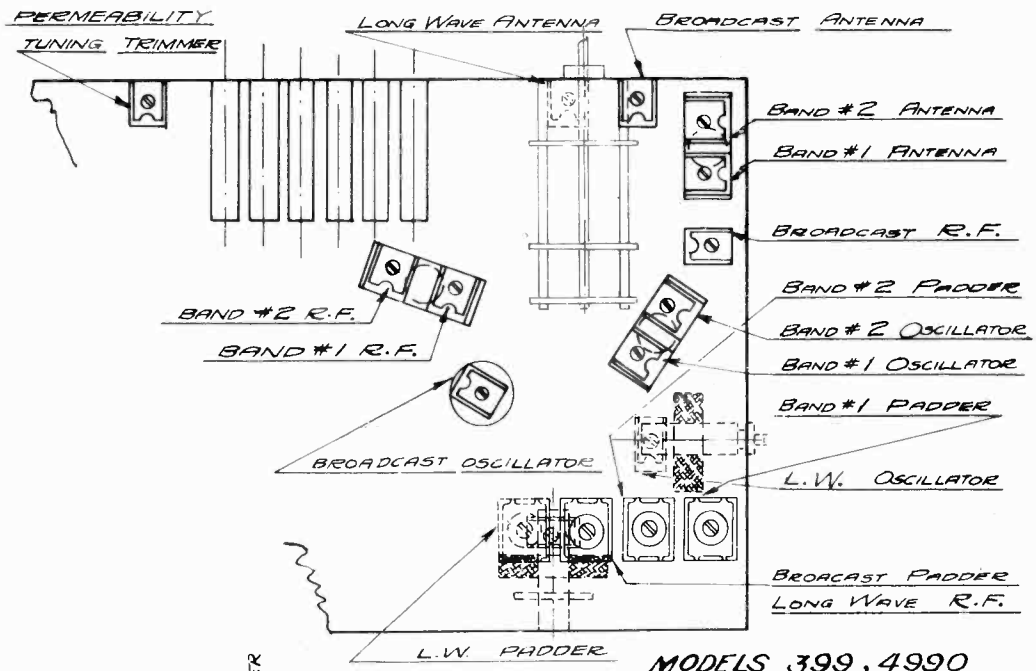
THIS NOTE REFERS TO MODELS 399,4990; 1039,1049; 1540; and 3109.

① 456KC ② 23MC ③ 21 MC ④ 7.2 MC ⑤ 7.4 MC ⑥ 1720 KC

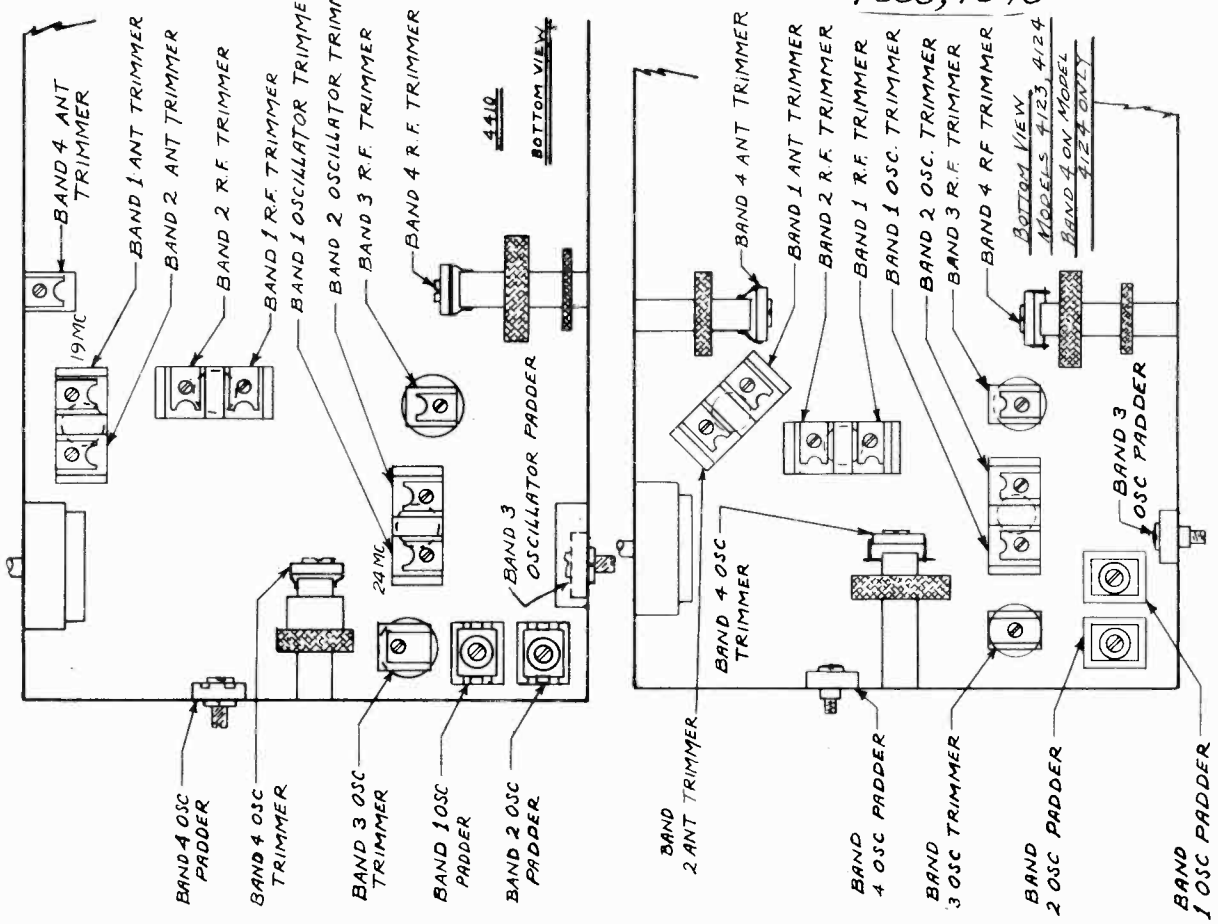
⑦ REFERS TO MODELS 1039,1049; 1540; 3109:-
Then adjust the antenna and detector trimmers in the order indicated for maximum output.

MODELS 399, 1039, 1049, 4990; 4123, 4124; 4410

GAROD RADIO CORP.



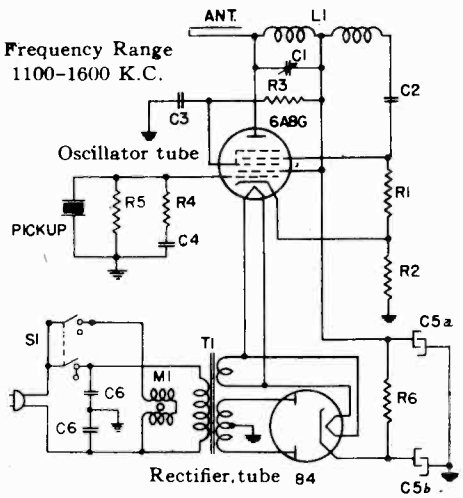
MODELS 399, 4990
1039, 1049



GENERAL ELECTRIC CO.

MODEL JM-23

MODELS HE-100, HE-100-H, HE-100L, HE-100LH, HE-105, HE-105L



C-1	300–850 mmf. tuning trimmer	M-1	Motor
C-2	100 mmf. mica capacitor	R-1	120,000 ohms carbon resistor
C-3	0.1 mfd. paper capacitor	R-2	1200 ohms carbon resistor
C-4	.005 mfd. paper capacitor	R-3	47,000 ohms carbon resistor
C-5a	10 mfd. dry electrolytic	R-4	47,000 ohms carbon resistor
C-5b	10 mfd. dry electrolytic	R-5	1.0 megohm carbon resistor
C-6	.01-.01 mfd. line capacitor	R-6	6800 ohms carbon resistor
L-1	Oscillator coil	S-1	Power switch
		T-1	Power transformer

SPECIFICATIONS

Overall Dimensions

Model JM-23
Height ..... $6\frac{1}{16}$ inches
Width ..... $14\frac{5}{8}$ inches
Depth ..... $11\frac{1}{16}$ inches

Electrical Specifications

Rating	Power Supply (Volts)	Frequency (Cycles per Second)	Power Consumption (Watts)
A6	115–125	60	30
A5	115–125	50	30

Phonograph Mechanism

Motor ..... Constant-speed, self-starting
Pickup ..... Crystal
Turntable Speed ..... 78 R.P.M.

GENERAL INFORMATION

The Model JM-23 Wireless Record Player is a two-tube transmitter using a type 84 tube as a rectifier and a type 6A8G as an oscillator. Audio modulation is applied to the control grid of the 6A8G from a properly loaded crystal pickup circuit. The oscillator operates over a range of 1100–1600 kilocycles and the frequency is adjusted by the tuning trimmer (C-1). This trimmer is set to operate at approximately 1500 K.C. at the factory.

The turntable is driven at 78 revolutions per minute by a constant-speed, self-starting induction motor. The motor is properly lubricated at the factory for long operation and should not require attention under normal weather conditions.

The power control is a three-position switch. When this control is turned to the extreme counterclockwise position, all power is removed from the record player. When switched to the center position, power is applied to both the motor and the transmitter. When turned to the extreme clockwise position, power is still supplied to the transmitter but is removed from the motor. This last position provides a means of stopping turntable rotation without letting the tubes cool down from operating temperature.

FREQUENCY ADJUSTMENT

To adjust the frequency of the oscillator turn the tuning trimmer which is accessible through a hole in the bottom cover near the power control knob. This is a screwdriver control. Clockwise rotation of the trimmer raises the frequency while counterclockwise rotation lowers the frequency. Since the electrical capacity of the hand may detune the transmitter somewhat if rested on the record player during adjustment, it is best to rest the record player on the edge of a table or bench with the tuning trimmer side of the record player just far enough out from the edge to allow screwdriver adjustment of the tuning trimmer.

REPLACEMENT PARTS LIST

MODEL JM-23

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
RB-941	BOTTOM COVER—Cabinet bottom cover	$0.30
*RC-023	CAPACITOR—.005 mfd. 600 V. paper (C-4)	.25
*RC-059	CAPACITOR—.01-.01 mfd. line capacitor (C-6)	.55
*RC-096	CAPACITOR—0.1 mfd. 200 V. paper (C-3)	.30
*RC-319	CAPACITOR—100 mmf. mica (C-2)	.25
*RC-2002	CLAMP—Crystal clamp	.10
RC-2016	CLIP—Oscillator coil mounting clip (Pkg. 5)	.10
RC-2017	CATCH—Tone arm catch for securing to rest	.10
*RC-5150	CAPACITOR—10 mfd., 10 mfd. 200 V. dry electrolytic (C-5)	.70
*RC-6529	CAPACITOR—Trimmer capacitor (C-1)	.40
RC-8174	CORD—Power cord	.40
*RF-016	FOOT—Rubber foot for cabinet (Pkg. 3)	.05
*RG-016	GRID CAP—6A8G control grid cap (Pkg. 5)	$0.10
*RH-114	HAIRPIN COTTER—Swivel retaining cotter	.10
*RK-073	KNOB—Power switch control knob	.10
*RL-2019	COIL—Oscillator coil (L-1)	.40
RN-007	NUT—Speed nut for mounting motor assembly (Pkg. 3)	.10
RN-008	NUT—Power switch clamping nut (Pkg. 5)	.10
*RN-102	NEEDLE CUP—Rubber needle cup	.10
*RP-506	PICK-UP—Crystal pick-up	4.75
*RP-801	POST—Tone arm swivel post	.15
*RQ-1261	RESISTOR—1200 ohms ½ W. carbon (R-2) (Pkg. 5)	.70
*RQ-1279	RESISTOR—6800 ohms ½ W. carbon (R-6) (Pkg. 5)	.70
*RQ-1299	RESISTOR—47,000 ohms ½ W. carbon (R-3, 4) (Pkg. 5)	.70
*RQ-1309	RESISTOR—120,000 ohms ½ W. carbon (R-1) (Pkg. 5)	.70
*RQ-1331	RESISTOR—1.0 megohm ½ W. carbon (R-5) (Pkg. 5)	$0.70
*RR-940	REST—Tone arm rest	.15
*RS-200	SOCKET—6A8G tube socket (Pkg. 5)	.75
*RS-224	SOCKET—Type 84 tube socket (Pkg. 5)	.50
*RS-888	SCREW—Needle clamping screw	.10
RS-896	SCREW—Crystal clamp and catch screw (Pkg. 5)	.05
*RS-938	SWIVEL—Tone arm swivel assembly	.15
*RS-3058	SWITCH—Power control switch	.50
*RT-020	TRANSFORMER—Power transformer, 60 cycles (T-1)	2.20
RT-021	TRANSFORMER—Power transformer, 50 cycles	2.85
*RT-912	TONE ARM—Crystal tone arm	.65
*RW-114	WEIGHT—Tone arm weight	.05

Voltage Chart

Tubes	Plate to Gnd. Volts	Sreen to Gnd. Volts	Cathode to Gnd. Volts	Filament Volts
6SK7 (R.F.)	215	98	4.7	6.3
6K8	Conv—230 Osc—105	98	4.7	6.3
6SK7 (I.F.)	215	98	3	6.3
6H6				6.3
6SF5	110		1	6.3
6J5G	100		4	6.3
6V6G	290	230	11.8	6.3
5U4G	277 a-c		300	5.1
6U5	170			6.3

MODEL HE-64L

GENERAL ELECTRIC CO.

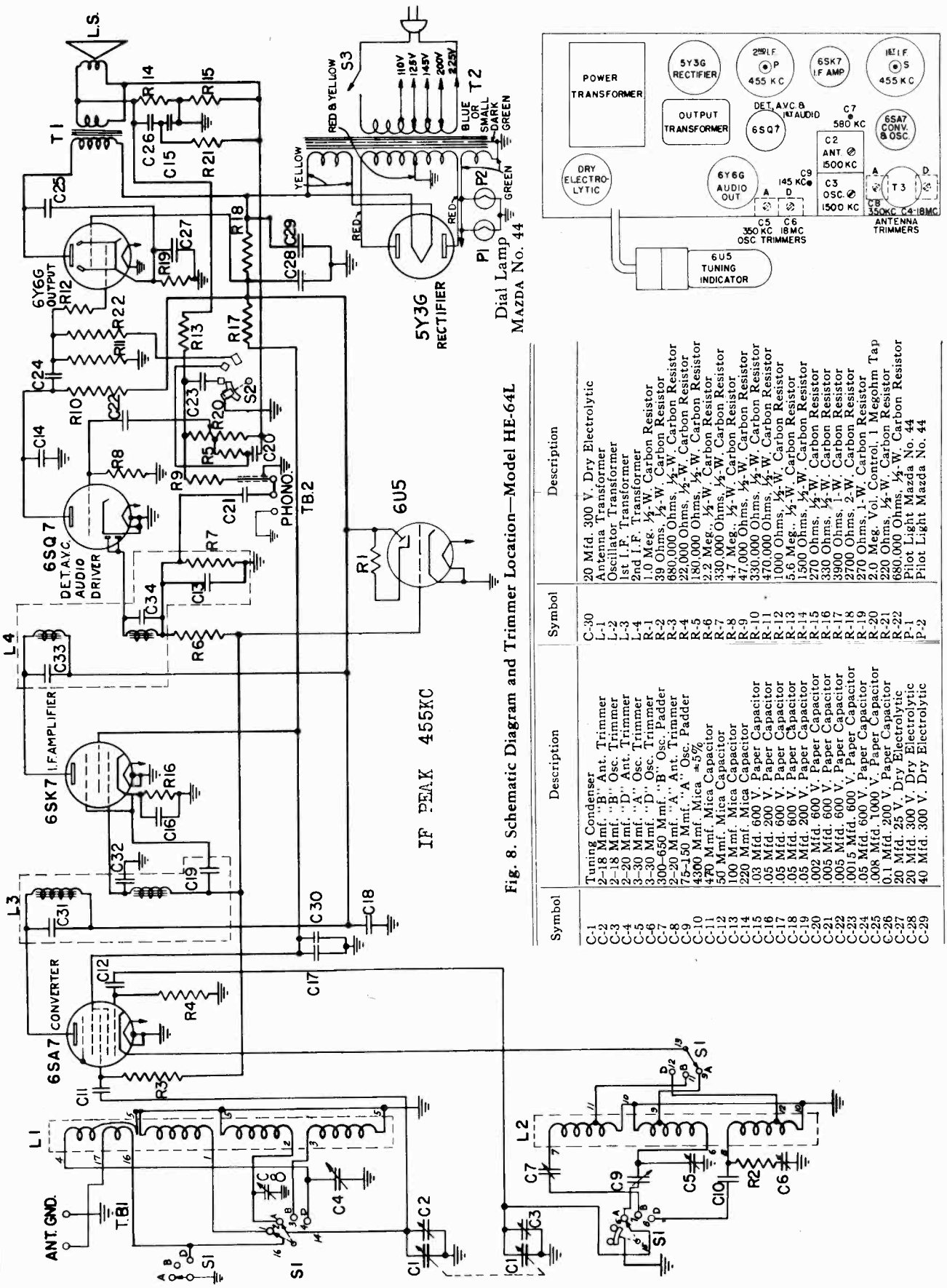
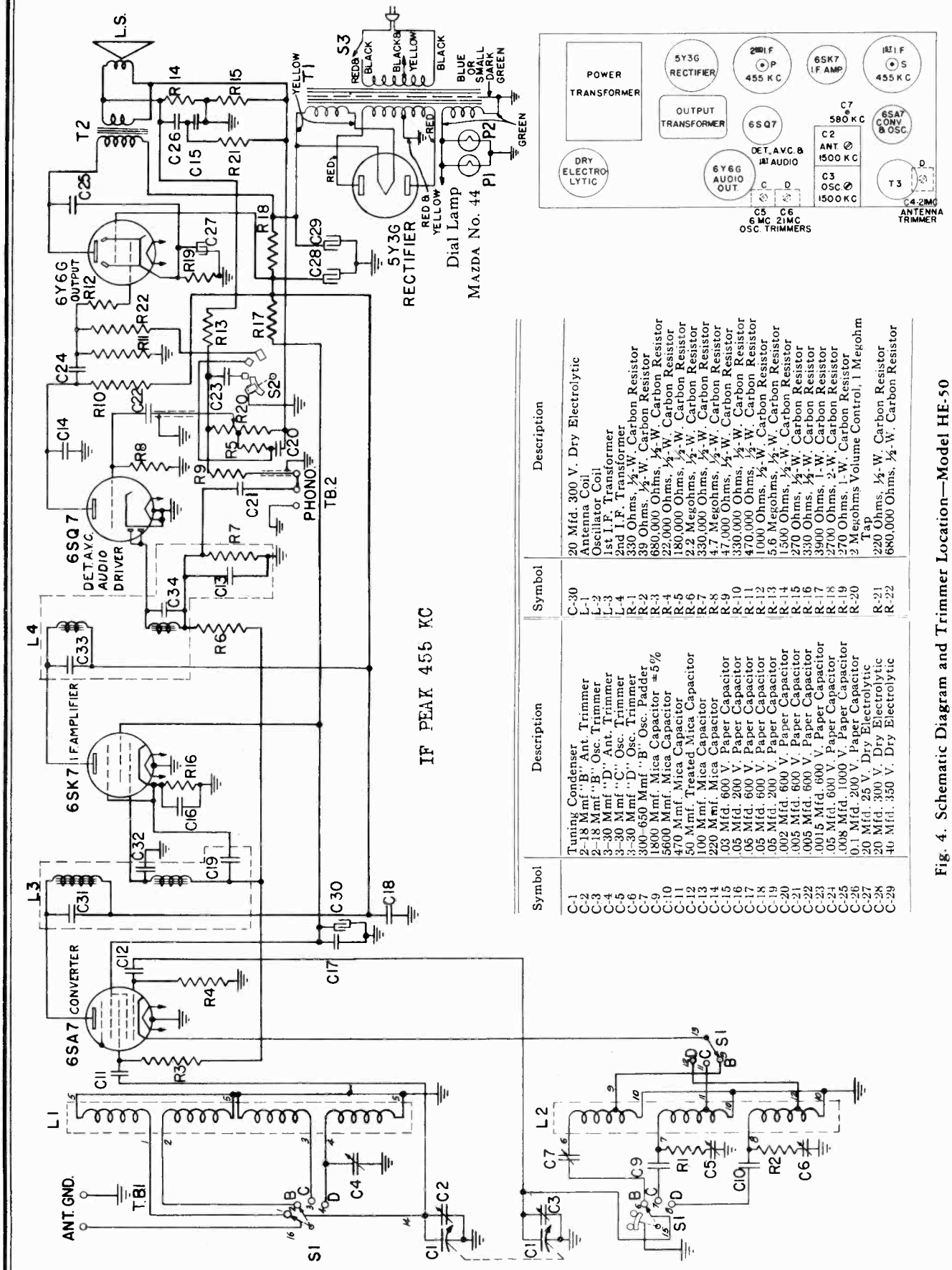


Fig. 8. Schematic Diagram and Trimmer Location—Model HE-64L

Symbol	Description
C-1	Tuning Condenser
C-2	2–18 Mmf. "B" Ant. Trimmer
C-3	2–18 Mmf. "B" Osc. Trimmer
C-4	2–20 Mmf. "D" Ant. Trimmer
C-5	3–30 Mmf. "A" Osc. Trimmer
C-6	3–30 Mmf. "D" Osc. Trimmer
C-7	300–650 Mmf. "B" Osc. Padder
C-8	2–20 Mmf. "A" Ant. Trimmer
C-9	75–150 Mmf. "A" Osc. Padder
C-10	4300 Mmf. Mica ±5%
C-11	470 Mmf. Mica Capacitor
C-12	50 Mmf. Mica Capacitor
C-13	100 Mmf. Mica Capacitor
C-14	220 Mmf. Mica Capacitor
C-15	.03 Mfd. 600 V. Paper Capacitor
C-16	.05 Mfd. 200 V. Paper Capacitor
C-17	.05 Mfd. 600 V. Paper Capacitor
C-18	.05 Mfd. 600 V. Paper Capacitor
C-19	.05 Mfd. 200 V. Paper Capacitor
C-20	.002 Mfd. 600 V. Paper Capacitor
C-21	.005 Mfd. 600 V. Paper Capacitor
C-22	.005 Mfd. 600 V. Paper Capacitor
C-23	.0015 Mfd. 600 V. Paper Capacitor
C-24	.05 Mfd. 600 V. Paper Capacitor
C-25	.008 Mfd. 1000 V. Paper Capacitor
C-26	0.1 Mfd. 200 V. Paper Capacitor
C-27	20 Mfd. 25 V. Dry Electrolytic
C-28	20 Mfd. 300 V. Dry Electrolytic
C-29	40 Mfd. 300 V. Dry Electrolytic
C-30	20 Mfd. 300 V. Dry Electrolytic
L-1	Antenna Transformer
L-2	Oscillator Transformer
L-3	1st I.F. Transformer
L-4	2nd I.F. Transformer
R-1	1.0 Meg. ½-W. Carbon Resistor
R-2	39 Ohms, ½-W. Carbon Resistor
R-3	680,000 Ohms, ½-W. Carbon Resistor
R-4	22,000 Ohms, ½-W. Carbon Resistor
R-5	180,000 Ohms, ½-W. Carbon Resistor
R-6	2.2 Meg., ½-W. Carbon Resistor
R-7	330,000 Ohms, ½-W. Carbon Resistor
R-8	4.7 Meg., ½-W. Carbon Resistor
R-9	47,000 Ohms, ½-W. Carbon Resistor
R-10	330,000 Ohms, ½-W. Carbon Resistor
R-11	470,000 Ohms, ½-W. Carbon Resistor
R-12	1000 Ohms, ½-W. Carbon Resistor
R-13	5.6 Meg., ½-W. Carbon Resistor
R-14	1500 Ohms, ½-W. Carbon Resistor
R-15	270 Ohms, ½-W. Carbon Resistor
R-16	330 Ohms, ½-W. Carbon Resistor
R-17	3900 Ohms, 1-W. Carbon Resistor
R-18	2700 Ohms, 2-W. Carbon Resistor
R-19	270 Ohms, 1-W. Carbon Resistor
R-20	2.0 Meg. Vol. Control, 1 Megohm Tap
R-21	220 Ohms, ½-W. Carbon Resistor
R-22	680,000 Ohms, ½-W. Carbon Resistor
P-1	Pilot Light Mazda No. 44
P-2	Pilot Light Mazda No. 44

MODEL HE-50

GENERAL ELECTRIC CO.



Symbol	Description
C-1	Tuning Condenser
C-2	2-18 Mmf "B" Ant Trimmer
C-3	2-18 Mmf "B" Osc. Trimmer
C-4	3-30 Mmf "D" Ant. Trimmer
C-5	3-30 Mmf "C" Osc. Trimmer
C-6	3-30 Mmf "D" Osc. Trimmer
C-7	300-650 Mmf "B" Osc. Padder
C-9	1800 Mmf. Mica Capacitor ±5%
C-10	5600 Mmf. Mica Capacitor
C-11	470 Mmf. Mica Capacitor
C-12	50 Mmf. Treated Mica Capacitor
C-13	100 Mmf. Mica Capacitor
C-14	220 Mmf. Mica Capacitor
C-15	.03 Mfd. 600 V. Paper Capacitor
C-16	.05 Mfd. 200 V. Paper Capacitor
C-17	.05 Mfd. 600 V. Paper Capacitor
C-18	.05 Mfd. 600 V. Paper Capacitor
C-19	.05 Mfd. 200 V. Paper Capacitor
C-20	.002 Mfd. 600 V. Paper Capacitor
C-21	.005 Mfd. 600 V. Paper Capacitor
C-22	.005 Mfd. 600 V. Paper Capacitor
C-23	.0015 Mfd. 600 V. Paper Capacitor
C-24	.05 Mfd. 600 V. Paper Capacitor
C-25	.008 Mfd. 1000 V. Paper Capacitor
C-26	0.1 Mfd. 200 V. Paper Capacitor
C-27	20 Mfd. 25 V. Dry Electrolytic
C-28	20 Mfd. 300 V. Dry Electrolytic
C-29	40 Mfd. 350 V. Dry Electrolytic

Symbol	Description
C-30	20 Mfd. 300 V. Dry Electrolytic
L-1	Antenna Coil
L-2	Oscillator Coil
L-3	1st I.F. Transformer
L-4	2nd I.F. Transformer
R-1	330 Ohms, ½-W. Carbon Resistor
R-2	39 Ohms. ½-W. Carbon Resistor
R-3	680,000 Ohms, ½-W. Carbon Resistor
R-4	22,000 Ohms, ½-W. Carbon Resistor
R-5	180,000 Ohms, ½-W. Carbon Resistor
R-6	2.2 Megohms, ½-W. Carbon Resistor
R-7	330,000 Ohms, ½-W. Carbon Resistor
R-8	4.7 Megohms, ½-W. Carbon Resistor
R-9	47,000 Ohms, ½-W. Carbon Resistor
R-10	330,000 Ohms, ½-W. Carbon Resistor
R-11	470,000 Ohms, ½-W. Carbon Resistor
R-12	1000 Ohms, ½-W. Carbon Resistor
R-13	5.6 Megohms, ½-W. Carbon Resistor
R-14	1500 Ohms, ½-W. Carbon Resistor
R-15	270 Ohms, ½-W. Carbon Resistor
R-16	330 Ohms, ½-W. Carbon Resistor
R-17	3900 Ohms, 1-W. Carbon Resistor
R-18	2700 Ohms, 2-W. Carbon Resistor
R-19	270 Ohms, 1-W. Carbon Resistor
R-20	2 Megohms Volume Control, 1 Megohm Tap
R-21	220 Ohms, ½-W. Carbon Resistor
R-22	680,000 Ohms, ½-W. Carbon Resistor

Fig. 4. Schematic Diagram and Trimmer Location—Model HE-50

MODELS HE-50,
HE-64L, HE-540,
HE-640L

GENERAL ELECTRIC CO.

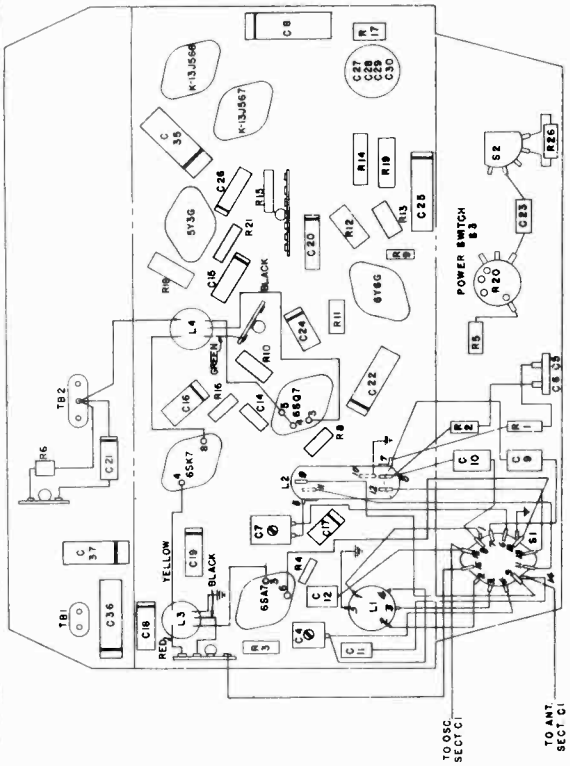


Fig. 7. Chassis Parts Layout—Model HE-540

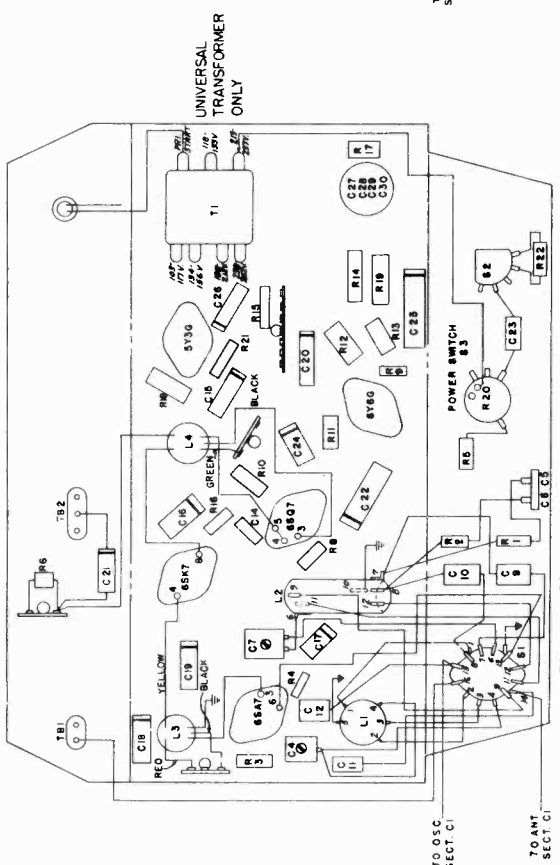


Fig. 6. Chassis Parts Layout—Model HE-50

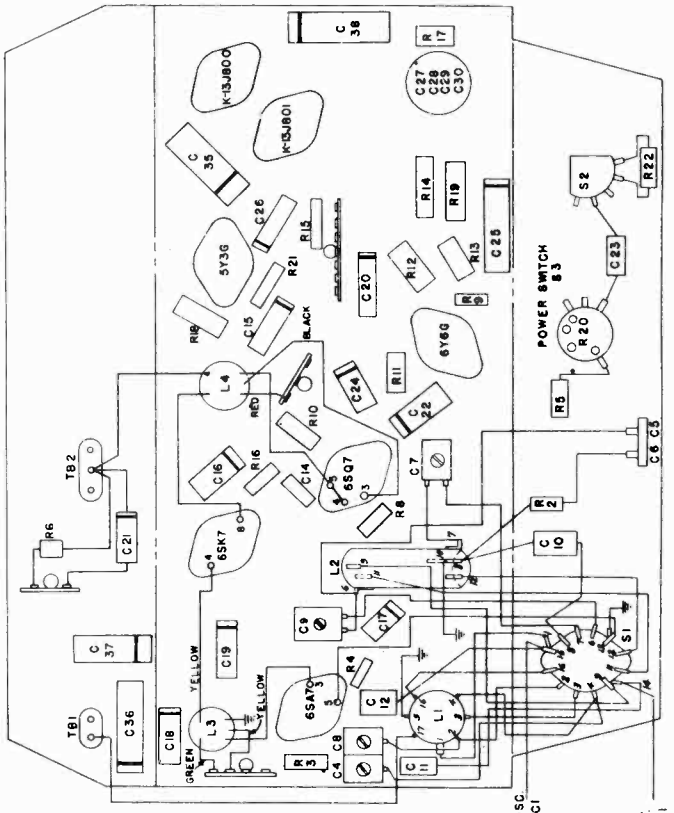


Fig. 11. Chassis Parts Layout—Model HE-640L

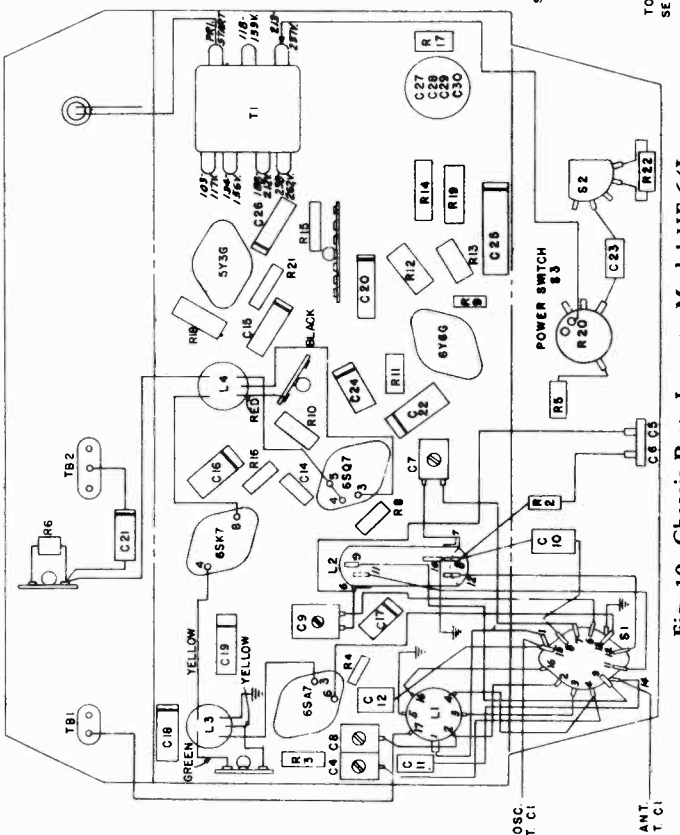


Fig. 10. Chassis Parts Layout—Model HE-64L

HE-640L

GENERAL ELECTRIC CO.

MODELS HE-50, HE-540, HE-64L,

GENERAL INFORMATION

Models HE-50 and HE-540 are three-band receivers employing five General Electric Pre-tested Tubes in a superheterodyne circuit. Features of design include "Alnico" magnet dynamic speaker, beampower output, iron core I.F. transformers, single-ended tubes, and degenerative feedback. Model HE-50 is an A-C receiver available in three classes of voltage and frequency rating. Model HE-540 is an AC-DC receiver using an improved rectifier circuit.

Models HE-64L and HE-640L are similar to the above models except for tuning frequency coverage and incorporation of a tuning indicator. Model HE-64L is an A-C receiver while Model HE-640L is an AC-DC receiver.

Coil Data

All antenna and oscillator transformer switch terminals are numbered in Figs. 6, 7, 10, and 11 to facilitate in locating these common points on the schematic diagrams Figs. 4, 5, 8 and 9.

The following tables show the coils in use for the various positions of the band-change switch.

Models HE-50 and HE-540

Band Switch Position	Antenna Primary	Antenna Secondary	Oscillator Grid	Oscillator Cathode
Band "B"	Section 1 to 5 of L1	Section 2 to 5 of L1	Section 6 to 10 of L2	Section 9 to 10 of L2
Band "C"	Section 2 to 5 of L1	Section 3 to 5 of L1	Section 7 to 10 of L2	Section 11 to 10 of L2
Band "D"	Section 3 to 5 of L1	Section 4 to 5 of L1	Section 8 to 10 of L2	Section 12 to 10 of L2

Models HE-64L and HE-640L

Band Switch Position	Antenna Primary	Antenna Secondary	Oscillator Grid	Oscillator Cathode
Band "A"	Sections 16 to 17 and 1 to 5 of L1	Section 2 to 5 of L1	Section 6 to 10 of L2	Section 9 to 10 of L2
Band "B"	Sections 16 to 17 and 2 to 5 of L1	Section 3 to 5 of L1	Section 7 to 10 of L2	Section 11 to 10 of L2
Band "D"	Section 16 to 17 of L1	Section 4 to 5 of L1	Section 8 to 10 of L2	Section 12 to 10 of L2

Loud-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly.

NOTE:—In no case should the magnet be removed from the assembly position as it will lose magnetism.

Phonograph Connections

Figs. 1a and 1b show simple methods for connecting a crystal or high impedance magnetic pickup into the receiver circuit for the reproduction of phonograph recordings. S-1 is a triple-pole, double-throw switch. A suitable loading circuit composed of a resistor or resistor and capacitor network should be used across the pickup leads when using a crystal type unit. It is very important that the pickup leads have a shield such as copper braid to prevent hum interference. This shield should be connected to the chassis ground.

Remove the jumper between phono-terminals 1 and 2 and make connections as shown in Fig. 1a and 1b.

When the pickup is connected as shown, the regular radio volume and tone controls work for both radio and phonograph reproduction. The following are suggested parts:

COIL RESISTANCE DATA

Coil	Model	Section	Resistance Measured Between Points	Resistance (Ohms)
Antenna	HE-50, 540	B Primary	1 and 5	22
		B Secondary	2 and 5	5
		C Secondary	3 and 5	.9
		D Secondary	4 and 5	.02
Antenna	HE-64L, 640L	A Primary	1 and 5	110
		A Secondary	2 and 5	26
		B Secondary	3 and 5	5
		D Secondary	4 and 5	.03
		D Primary	16 and 17	.2
Oscillator	HE-50, 540	B Band Coil	6 and 10	3
		C Band Coil	7 and 10	.8
		D Band Coil	8 and 10	.02
Oscillator	HE-64L, 640L	A Band Coil	6 and 10	10
		B Band Coil	7 and 10	3
		D Band Coil	8 and 10	.03
1st I.F. Transformer	All Models	Primary		9 to 12
		Secondary		15 to 19
2nd I.F. Transformer	All Models	Primary		14 to 18
		Secondary		7 to 9
Output Transformer	All Models	Primary		265
		Secondary		.4
Power Transformer	HE-50, 64L	Primary		
		110 V. Tap		7
		125 V. Tap		8
		200 V. Tap		9
		225 V. Tap		20
		250 V. Tap		24
		Secondary		
		Red to Red		250
		Green to Green		.5
		Yellow to Yellow		.5

Symbol	Description	Stock No.
S-1	Triple-pole, double-throw switch	RS-366
R-1	330,000 ohm resistor	RQ-1319

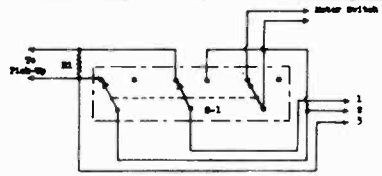


Fig. 1a. Pickup Connections for Models HE-50 and HE-64L

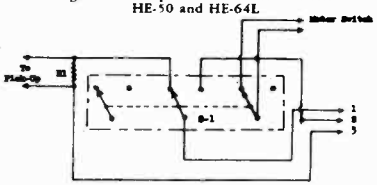


Fig. 1b. Pickup Connections for Models HE-540 and HE-640L

10-39

Alignment Procedure

The alignment is given in table form on this page. Use a standard I.R.E dummy antenna in making all **R.F.** alignments (see Fig. 2).

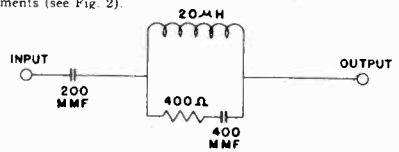


Fig. 2. Standard I.R.E. Dummy Antenna

I.F. transformers are double, permeability tuned with adjusting shafts at top and bottom of shield cans.

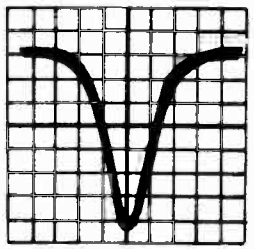


Fig. 3. Over-all I.F. Curve Taken on G-E Oscilloscope OFM-1

ALIGNMENT PROCEDURE OSCILLOSCOPE I. F. ALIGNMENT

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (Bottom of Shield Can) 2nd I.F. Pri. (Top of Shield Can)	Gang condenser plates closed—connect audio input of oscilloscope to ground and to phono terminal No. 2. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 3. It may be necessary to retrim 2nd I.F. transformers for final adjustment
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (Top of Shield Can) 1st I.F. Pri. (Bottom of Shield Can)	
I. F. ALIGNMENT WITH OUTPUT METER					
1. Band "B"	455 K.C. with Modulation	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (Bottom of Shield Can) 2nd I.F. Pri. (Top of Shield Can)	Gang condenser plates closed—connect output meter across voice coil—keep signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
2. Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (Top of Shield Can) 1st I.F. Pri. (Bottom of Shield Can)	
R. F. ALIGNMENT—MODELS HE-50 AND HE-540					
1. Band "B"					Close gang condenser plates. Adjust pointer to first line at left end of tuning scale. Connect meter output across voice coil.
2. Band "B"	1500 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-3) Ant. (C-2)	Peak trimmer for maximum output with a low input signal.
3. Band "B"	580 K.C. with Modulation	Antenna Post	I.R.E.	Osc. padder (C-7)	Adjust padder for maximum output in the vicinity of 580 K.C. while rocking the gang condenser.
4. Band "B"	Repeat Operation 2				
5. Band "C"	6. M.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-5)	Peak trimmer for maximum output while rocking the gang condenser. Image—910 K.C. below signal.

Continued

ALIGNMENT PROCEDURE (Continued)

R. F. ALIGNMENT—MODELS HE-50 AND HE-540

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
6. Band "D"	21 M.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-4)	The image of "D" band signal should be heard 910 K.C. below the input signal when (C-6) is on proper peak. Example: 21 M.C. image is at 20.09 M.C. Peak (C-4) while rocking the gang condenser.
R. F. ALIGNMENT—MODELS HE-64L AND HE-640L					
1. Band "B"					Close gang condenser plates. Adjust pointer to first line at left end of tuning scale. Connect output meter across voice coil.
2. Band "B"	1500 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-3) Ant. (C-2)	Peak trimmers for maximum output with a low input signal.
3. Band "B"	580 K.C. with Modulation	Antenna Post	I.R.E.	Osc. padder (C-7)	Adjust padder for maximum output in the vicinity of 580 K.C. while rocking the gang condenser.
4. Band "B"	1500 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-3) Ant. (C-2)	Peak trimmers for maximum output with a low input signal.
5. Band "A"	350 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-5) Ant. (C-8)	Peak trimmers for maximum output with a low input signal.
6. Band "A"	145 K.C. with Modulation	Antenna Post	I.R.E.	Osc. padder (C-9)	Adjust padder for maximum output in the vicinity of 145 K.C. while rocking the gang condenser.
7. Band "A"	Repeat Operation 5				
8. Band "D"	18 M.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-4)	The image of "D" band signal should be heard 910 K.C. below the input signal when (C-6) is on proper peak. Example: 18 M.C. image is at 17.09. M.C. Peak (C-4) while rocking the gang condenser.

Voltage Chart (Models HE-50 and HE-64L)

Tubes	Plate to Gnd Volts	Screen to Gnd Volts	Cathode to Gnd Volts	Filament Volts
6SA7	132	96	0	6.4
6SK7	132	96	3.3	6.4
6SQ7	66*		0	6.4
6Y6G	171	132	13	6.4
5Y3G	198 (AC)		183 (DC)	5.0
6U5**	132			6.4

5Y3G Cathode Current—67 ma.
Above voltages measured at 110 volts line on 103–117 volt tap.
*Use a high resistance voltmeter.
**Used only on HE-64L.

Voltage Chart (Models HE-540 and HE-640L)

Tubes	Plate to Gnd Volts	Screen to Gnd Volts	Cathode to Gnd Volts	Filament Volts
6SA7	144	100	0	6.5
6SK7	144	100	3	6.5
6SQ7	62*		0	6.5
25C6G	204	144	13. 8	25
25Z6G	216 (AC)		218 (DC)	25
6U5**	144			6.5

25Z6G Cathode Current—71.4 ma.
240 volts line A.C.
*Use a high resistance voltmeter.
**Used only on HE-640L.

Physical Specifications:

Models	HE-50, HE-540	HE-64L, HE-640L
Height	10¾ inches	11½ inches
Width	17⅛ inches	19 inches
Depth	8 inches	8 inches

Tuning Frequency Range

Models HE-50 and HE-540
- Band "B" ..... 540–1700 K.C.
- Band "C" ..... 2200–7000 K.C.
- Band "D" ..... 7000–22000 K.C.

Models HE-64L and HE-640L
- Band "A" ..... 140–400 K.C.
- Band "B" ..... 540–1700 K.C.
- Band "D" ..... 5800–18000 K. C.

Intermediate Frequency ..... 455 K.C.

Electrical Power Output HE-50, HE-64L HE-540, HE-640L

Undistorted	2.7 watts	3.5 watts
Maximum	5.0 watts	7.0 watts

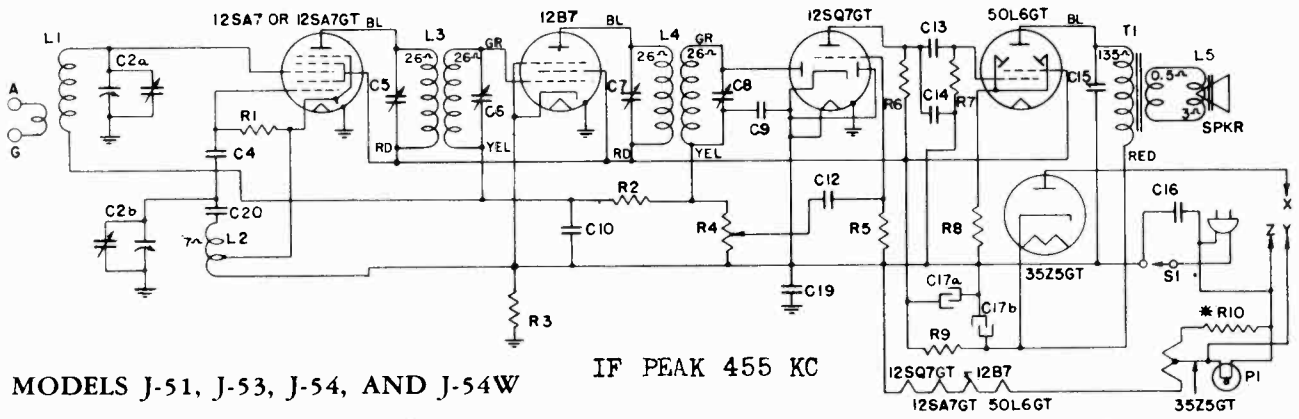
Loud-speaker—"Alnico" Magnet Dynamic
- Cone Diameter ..... 6½ inches
- Voice Coil Impedance (400 cycles) ... 3.5 ohms

Electrical Specifications

Model	Rating	Power Supply (Volts)	Frequency (Cycles on A.C.)	Power Consumption (Watts)
HE-50	A	103–117 118–133	50–60	65
	C	103–117 118–133	25–60	65
	V	103–117 118–133 134–156 188–212 213–237 238–262	50–60	65
HE-540 HE-640L		200–240 A-C or D-C	25–100	100
HE-64L	V	103–117 118–133 134–155 188–212 213–237 238–262	50–60	65

GENERAL ELECTRIC CO.

MODELS J-51, J-53, J-54, J-54W



MODELS J-51, J-53, J-54, AND J-54W

IF PEAK 455 KC

*"A" rated receivers have "X" connected to "Y" and R-10 is shorted. "C" rated receivers have "X" connected to "Z."

PARTS DESCRIPTION LIST

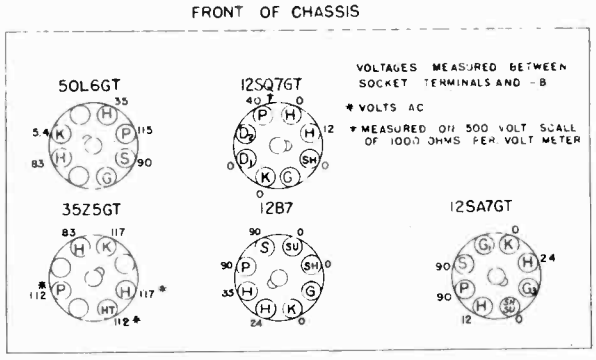
Symbol	Description	Symbol	Description	Symbol	Description
C2a	Antenna section of tuning condenser	C17b	40 mfd. 150 V. dry electrolytic	R4	0.5 megohms volume control
C2b	Oscillator section of tuning condenser	C19	0.2 mfd. paper capacitor	R5	4.7 megohms carbon resistor
C4	47 mmf. mica capacitor	C20	.01 mfd. paper capacitor	R6	470,000 ohms carbon resistor
C9	470 mmf. mica capacitor	L1	Beam-a-Scope	R7	470,000 ohms carbon resistor
C10	.05 mfd. paper capacitor	L2	Oscillator Coil	R8	150 ohms carbon resistor
C12	.005 mfd. paper capacitor	L3	1st. I.F. transformer	R9	1200 ohms 1 W. carbon resistor
C13	.005 mfd. paper capacitor	L4	2nd I.F. transformer	R10	13 ohms carbon resistor
C14	330 mmf. mica capacitor	P1	Dial lamp, MAZDA No. 47	S1	Power switch
C15	.01 mfd. paper capacitor	R1	33,000 ohms carbon resistor	T1	Output transformer
C16	.05 mfd. paper capacitor	R2	2.2 megohms carbon resistor		
C17a	30 mfd. 150 V. dry electrolytic	R3	470,000 ohms carbon resistor		

REPLACEMENT PARTS LIST

Stock No.	Description	List Price
*RB-008	BOARD—Terminal board (2 lug)	$0.10
*RB-626	BUSHING—Tuning shaft bushing	.10
RB-945	BACK COVER—Cabinet back cover for Model J-51	.15
RB-946	BACK COVER—Cabinet back cover for Model J-53	.15
RB-947	BACK COVER—Cabinet back cover for Models J-54 and J-54W	.15
*RB-1015	BOARD—Terminal board (1 lug)	.10
*RB-1102	BRACKET—Tuning condenser bracket	.10
RB-1112	BRACKET—Beam-a-Scope bracket	.10
*RC-023	CAPACITOR—.005 mfd. 600 V. paper (C-12, 13)	.25
*RC-039	CAPACITOR—.01 mfd. 600 V. paper (C-15, 20)	.25
*RC-072	CAPACITOR—.05 mfd. 200 V. paper (C-10)	.25
*RC-092	CAPACITOR—.05 mfd. 600 V. paper (C-16)	.30
RC-130	CAPACITOR—0.2 mfd. 400 V. paper (C-19)	.30
*RC-216	CAPACITOR—47 mmf. mica (C-4)	.25
*RC-274	CAPACITOR—330 mmf. mica (C-14)	.30
*RC-293	CAPACITOR—470 mmf. mica (C-9)	.30
*RC-863	CORD—Power cord	.65
RC-2019	CUSHION—Pointer guide plate spacer cushions (Pkg. 5)	.10
RC-2020	CUSHION—Mounting cushion for dial scale (Pkg. 5)	.10
RC-5163	CAPACITOR—30 mfd. 150 V., 40 mfd. 150 V., dry electrolytic (C-17a, 17b)	.65
RC-7031	CONDENSER—Tuning condenser and drum assembly (Drum pressed on to condenser shaft) (C-2a, 2b)	1.95
RC-7032	CONDENSER—Tuning condenser for use on Models with detachable drum (C-2a, -2b)	1.80
RC-8177	CORD—Tuning drive cord	.20
*RC-9011	CONE ASSEMBLY—Speaker cone assembly	.90
RD-158	DIAL—Dial scale for Models J-51 and J-53	.60
RD-159	DIAL—Dial scale for Models J-54 and J-54W	.40
RD-421	DRUM—Drum, hub and setscrew assembly	.30
RE-086	ESCUTCHEON—Dial escutcheon	.40
*RF-205	FASTENER—Fastener for mounting cabinet back on Models J-54 and J-54W (Pkg. 10)	.10
RF-206	FASTENER—Beam-a-Scope—bracket fastener (Pkg. 5)	.10
RF-207	FASTENER—Cabinet back fastener for Models J-51 and J-53 (Pkg. 5)	.10
*RH-111	HAIRPIN COTTER—Tuning shaft retaining cotter (Pkg. 10)	.05
RK-090	KNOB—Control knob and spring (Model J-54)	.10
RK-091	KNOB—Control knob and spring (Models J-51, J-53)	.10
RK-094	KNOB—Control knob and spring (Model J-54W)	.20
RL-530	BEAM-A-SCOPE—Beam-a-Scope assembly (L-1)	.80
*RL-2025	COIL—Oscillator coil (L-2)	.30
RM-511	MASK—Dial back plate reflector mask	.05
RN-009	NUT—Speed nut for mounting dial scale on Models J-54 and J-54W (Pkg. 5)	.10
RN-010	NUT—Speed nut for mounting dial scale on Models J-51 and J-53 (Pkg. 5)	.10
*RTN-001	NUT—Bushing retaining nut (Pkg. 5)	.10
RP-188	PLATE—Pointer guide plate assembly	.70
RP-189	POINTER—Dial scale pointer	.15
RP-322	PULLEY—Pointer cord pulley and stud (Pkg. 5)	.10
RQ-1214	RESISTOR—13 ohms ¼ W. carbon (R-10) (Pkg. 5)	$0.70
*RQ-1239	RESISTOR—150 ohms ½ W. carbon (R-8) (Pkg. 5)	.70
*RQ-1295	RESISTOR—33,000 ohms ½ W. carbon (R-1) (Pkg. 5)	.70
*RQ-1323	RESISTOR—470,000 ohms ½ W. carbon (R-3, 6, 7) (Pkg. 5)	.70
*RQ-1339	RESISTOR—2.2 megohms ½ W. carbon (R-2) (Pkg. 5)	.70
*RQ-1347	RESISTOR—4.7 megohms ½ W. carbon (R-5) (Pkg. 5)	.70
*RQ-1460	RESISTOR—1200 ohms 1 W. carbon (R-9)	.20
*RS-238	SOCKET—Octal tube socket	.15
*RS-263	SOCKET—12B7 tube socket	.15
RS-284	SOCKET—Dial light socket assembly	.20
*RS-432	SPRING—Drive cord tension spring (Pkg. 5)	.20
*RS-444	SPRING—Control knob tension spring (Pkg. 10)	.10
RS-1035	SPEAKER—5-inch dynapower speaker and output transformer assembly	2.50
RS-9006	SHAFT—Tuning shaft	.05
*RT-353	TRANSFORMER—2nd I.F. transformer (L-4)	.70
RT-359	TRANSFORMER—1st I.F. transformer (L-3)	.70
*RT-482	TRANSFORMER—Output transformer (T-1)	.90
*RT-955	TERMINAL—Antenna or ground terminal (Pkg. 5)	.10
RV-097	VOLUME CONTROL—0.5-megohm volume control (R-4)	1.45
RZ-174	CABINET—Cabinet for Model J-54	18.00
RZ-175	CABINET—Cabinet for Model J-54W	33.00

* Used on previous receivers. (Prices Subject to Change without Notice)

Socket Voltages



MODELS J-51, J-53, J-54, J-54W

GENERAL ELECTRIC CO.

MODELS J-51, J-53, J-54, and J-54W

SERVICE DATA

Over-all Dimensions

Model	J-51	J-53	J-54, J-54W
Height	$8\frac{5}{16}$ inches	$8\frac{5}{16}$ inches	$7\frac{1}{2}$ inches
Width	$12\frac{1}{2}$ inches	$14\frac{1}{2}$ inches	$10\frac{5}{8}$ inches
Depth	$6\frac{1}{2}$ inches	$6\frac{3}{4}$ inches	$6\frac{3}{16}$ inches

Electrical Rating

Rating	Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
A	115 AC or DC	40–60	30
C	115 AC or DC	25	30

Tuning Control Drive Ratio 14:1

Tuning Frequency Range ..... 540–1600 KC

Intermediate Frequency ..... 455 KC

Electrical Power Output (117 line volts)
- Undistorted ..... 1.5 watts
- Maximum ..... 2.5 watts

Loud-speaker—"Alnico" Magnet Dynamic
- Outside Cone Diameter ..... 5 inches
- Voice Coil Impedance (400 cycles) ..... 3.5 ohms

Tubes
- Converter and Oscillator GE-12SA7GT
- I.F. Amplifier GE-12B7
- Det., Aud., A.V.C. GE-12SQ7GT
- Audio Output GE-50L6GT
- Rectifier GE-35Z5GT
- Dial Lamp ..... MAZDA No. 47

GENERAL INFORMATION

Models J-51, J-53, J-54 and J-54W are compact, five-tube superheterodyne receivers which can be operated from either an AC or DC source of power. Model J-51 and J-53 cabinets are in matched walnut veneers. Model J-54 and J-54W cabinets are plastic in oak and gray-white respectively. All models incorporate the following design features: Built-in Beam-a-Scope, 5-inch dynapower speaker, increased dial length, automatic volume control, and beam power output.

The glass tubes used in the converter and detector stages are interchangeable with metal tubes if the receiver is realigned following the change.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F. ..... 455 KC
R.F. ..... 1650 and 1500 KC

The location of all trimmers is shown in Fig. 1.

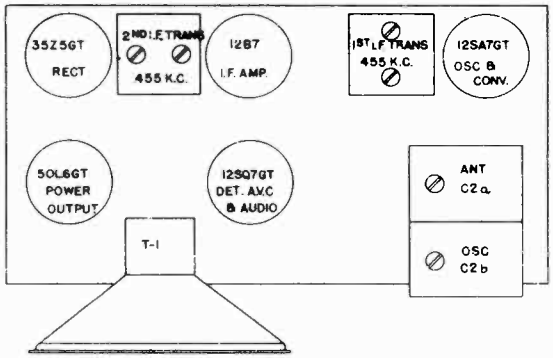


Fig. 1. Trimmer Location

I.F. Alignment

Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the converter grid through a .05 mfd. capacitor and align progressively the trimmers in the 2nd and 1st I.F. transformer cans.

R.F. Alignment

To insert the R.F. signal use either a standard I.R.E. dummy antenna between the signal generator and the receiver antenna post, or loop-couple the generator signal to the receiver Beam-a-Scope. A distance of two feet between generator loop and receiver Beam-a-Scope will insure freedom from over-coupling. When using an I.R.E. dummy antenna for R.F. alignment, do not connect the signal generator ground to the receiver chassis.

With the gang condenser wide open, align oscillator trimmer (C-2b) to 1650 KC. Change generator signal to 1500 KC, tune receiver to the signal and peak antenna trimmer (C-2a) for maximum output.

Precaution

If the signal generator is AC operated use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC current through the capacitor will introduce hum modulation and/or create the possibility of a burned-out signal generator attenuator.

Special Service Information

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains — Gain*
- Antenna Post to Converter Grid ..... 4.0 at 1000 KC
- R.F. on Converter Grid to I.F. on I.F. Amplifier Grid ..... 40 at 1000 KC
- I.F. on Converter Grid to I.F. on I.F. Amplifier Grid ..... 50 at 455 KC
- I.F. Amplifier Grid to Detector Plate ..... 50 at 455 KC

(2) 0.15-volt, 400-cycle signal across the volume control will give ½-watt speaker output.* (Volume control turned to maximum.)

(3) Average DC voltage developed across oscillator grid resistor (R-1) ..... 15 volts

* Variations of ± 20% permissible. All readings obtained with enough signal input to give ½-watt speaker output.

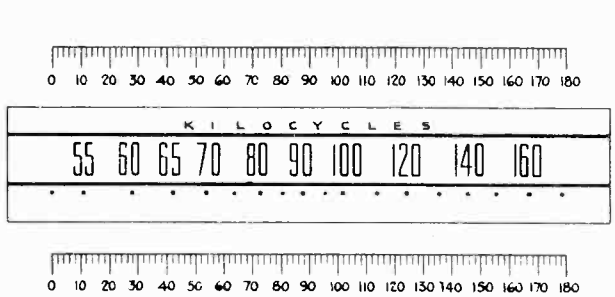


Fig. 2. Frequency-degree Reference Chart

Symbol	Description
C-1	Tuning Condenser
C-2	2-18 Mmf. B Antenna Trimmer
C-3	2-18 Mmf. B Oscillator Trimmer
C-4	3-30 Mmf. D Antenna Trimmer
C-5	3-30 Mmf. C Oscillator Trimmer
C-6	3-30 Mmf. D Oscillator Trimmer
C-7	300-675 Mmf. B Oscillator Padder
C-8	.02 Mfd. 600 V. Paper Capacitor
C-9	1800 Mmf. ±5% Mica Capacitor
C-10	5600 Mmf. ±5% Mica Capacitor
C-11	470 Mmf. Mica Capacitor
C-12	47 Mmf. Mica Capacitor
C-13	100 Mmf. Mica Capacitor
C-14	220 Mmf. Mica Capacitor
C-15	.03 Mfd. 600 V. Paper Capacitor
C-16	.05 Mfd. 200 V. Paper Capacitor
C-17	.05 Mfd. 600 V. Paper Capacitor
C-18	.05 Mfd. 600 V. Paper Capacitor
C-19	.05 Mfd. 200 V. Paper Capacitor
C-20	.002 Mfd. 600 V. Paper Capacitor
C-21	.005 Mfd. 600 V. Paper Capacitor
C-22	.02 Mfd. 600 V. Paper Capacitor
C-23	.0015 Mfd. 600 V. Paper Capacitor
C-24	.05 Mfd. 600 V. Paper Capacitor
C-25	.008 Mfd. 1000 V. Paper Capacitor
C-26	.1 Mfd. 200 V. Paper Capacitor
C-27	20 Mfd. 25 V. Dry Electrolytic
C-28	50 Mfd. 250 V. Dry Electrolytic
C-29	40 Mfd. 300 V. Dry Electrolytic
C-30	20 Mfd. 250 V. Dry Electrolytic
C-35	.25 Mfd. 400 V. Paper Capacitor
C-36	.01 Mfd. 600 V. Paper Capacitor
C-37	.01 Mfd. 600 V. Paper Ccpacitor
L-1	Antenna Coil
L-2	Oscillator Coil
L-3	1st I.F. Transformer
L-4	2nd I.F. Transformer
P-1	Dial Light MAZDA No. 44
P-2	Dial Light MAZDA No. 44
R-1	330 Ohms ½ W. Carbon Resistor
R-2	39 Ohms ½ W. Carbon Resistor
R-3	680,000 Ohms ½ W. Carbon Resistor
R-4	22,000 Ohms ½ W. Carbon Resistor
R-5	180,000 Ohms ½ W. Carbon Resistor (JE-51, -510 Only)
R-5	330,000 Ohms ½ W. Carbon Resistor (JE-61 Only)
R-6	2.2 Megohms ½ W. Carbon Resistor
R-7	330,000 Ohms ½ W. Carbon Resistor
R-8	4.7 Megohms ½ W. Carbon Resistor
R-9	47,000 Ohms ½ W. Carbon Resistor
R-10	330,000 Ohms ½ W. Carbon Resistor
R-11	470,000 Ohms ½ W. Carbon Resistor
R-12	1000 Ohms ½ W. Carbon Resistor
R-13	5.6 Megohms ½ W. Carbon Resistor
R-14	1500 Ohms ½ W. Carbon Resistor
R-15	270 Ohms ½ W. Carbon Resistor
R-16	330 Ohms ½ W. Carbon Resistor
R-17	3900 Ohms 1 W. Carbon Resistor
R-18	3300 Ohms 2 W. Carbon Resistor
R-19	270 Ohms 1 W. Carbon Resistor
R-20	2 Megohms, 1 Megohm Tap, Volume Control
R-21	220 Ohms ½ W. Carbon Resistor
R-22	330 Ohms 2 W. Carbon Resistor
R-23	1 Megohm ½ W. Carbon Resistor
R-24	160 Ohms 15 W. Ballast Resistor
R-25	463 Ohms 55 W. Ballast Resistor
R-26	680,000 Ohms ½ W. Carbon Resistor

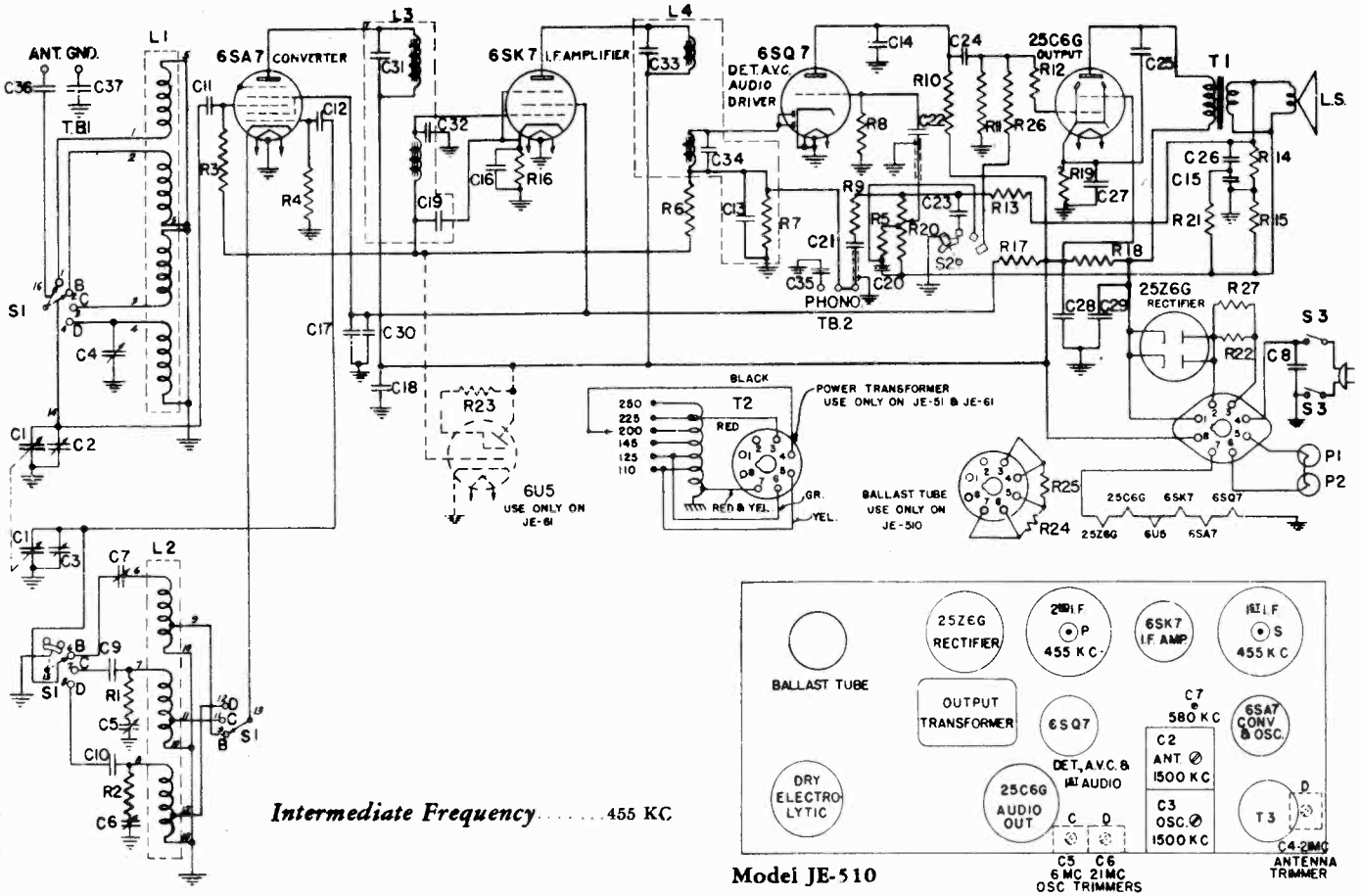
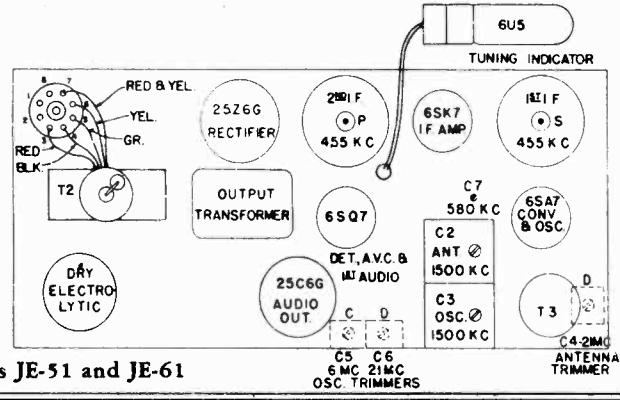


Fig. 4. Schematic Diagram and Trimmer Location Models JE-51, JE-510 and JE-61

Model JE-510



Models JE-51 and JE-61

Intermediate Frequency..... 455 KC

Tuning Frequency Range

Models JE-51, JE-510 and JE-61

Band "B"	540-1600 K.C.
Band "C"	2200-7000 K.C.
Band "D"	7000-22000 K.C.

Symbol	Description
R-27	330 Ohms 2 W. Carbon Resistor
S-1	Band Change Switch
S-2	Tone Control Switch
S-3	Power Switch
T-1	Output Transformer
T-2	Power Transformer

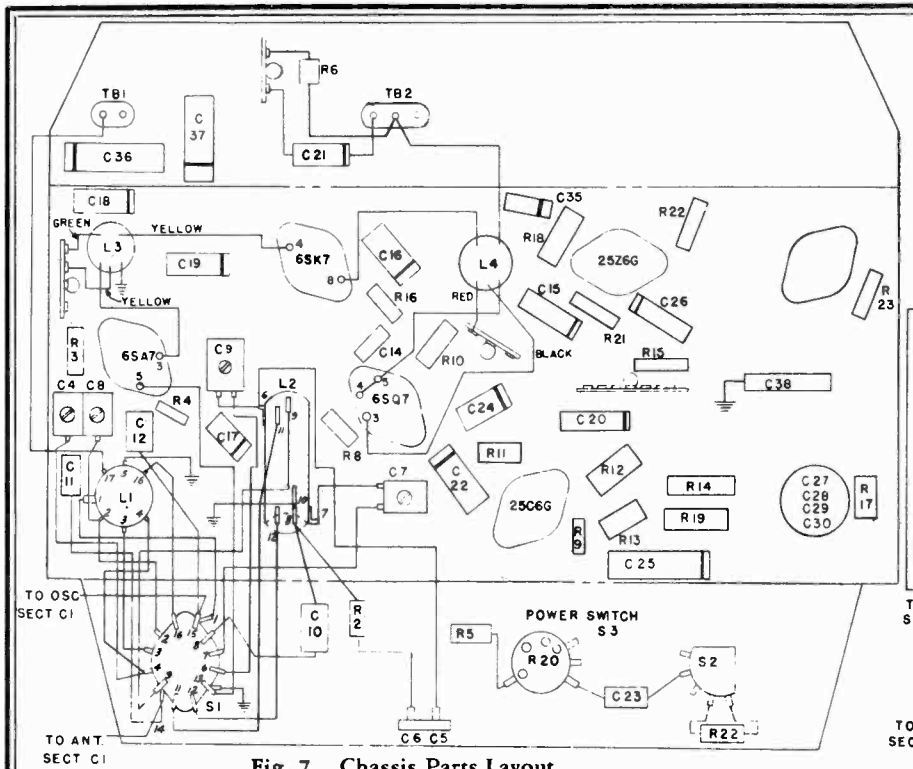


Fig. 7. Chassis Parts Layout
Model JE-61L

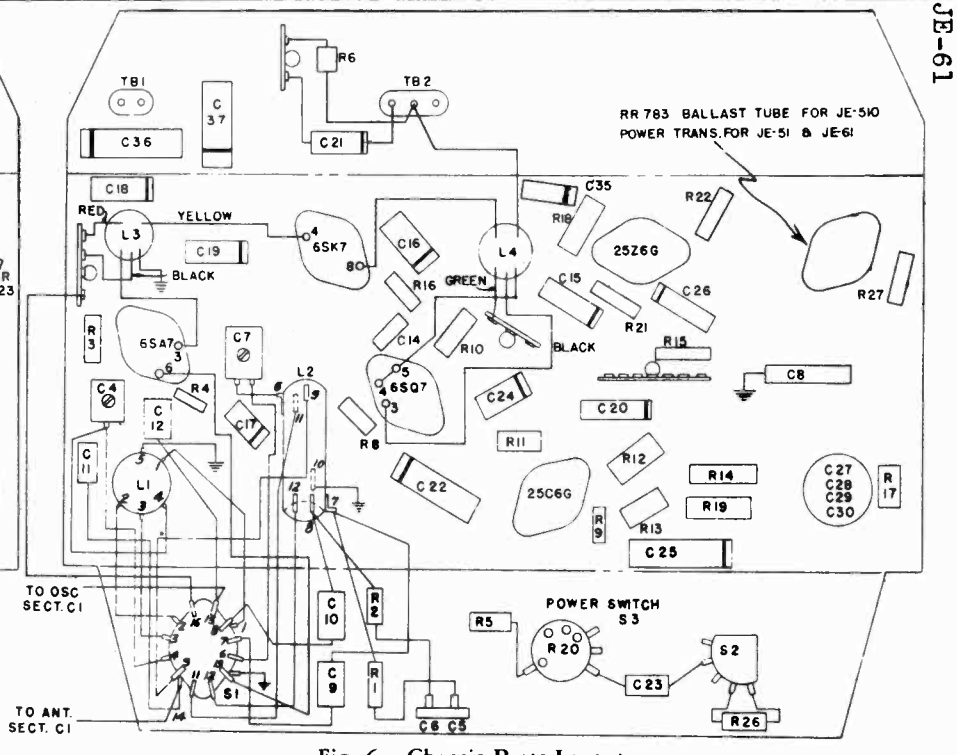


Fig. 6. Chassis Parts Layout
Models JE-51, JE-510 and JE-61

Electrical Specifications

Model	Rating	Power Supply (Voltage Tap)	Power Supply (Voltage Range)	Frequency (Cycles on A.C.)	Power Consumption (Watts)
JE-51 JE-61L	V	110	103–117	50–60*	65
		125	118–133		
		145	134–156		
		200	188–212		
		225	213–237		
		250	238–262		
JE-510			200–240 A.C. or D.C.	25–100	100
JE-61	V	110	103–117	50–60*	65
		125	118–133		
		145	134–155		
		200	188–212		
		225	213–237		
		250	238–262		
	C	110	103–117	25–60	65
		125	118–133		

PHYSICAL SPECIFICATIONS

	JE-51, JE-510	JE-61, JE-61L
Models		
Height	$10\frac{5}{16}$ inches	$11\frac{5}{8}$ inches
Width	$19\frac{3}{8}$ inches	$22\frac{1}{4}$ inches
Depth	$8\frac{7}{8}$ inches	9 inches

Drive Ratio 22:1

Electrical Power Output JE-51, JE-510 ... JE-61, JE-61L

Undistorted	2.7 watts	3.0 watts
Maximum	5.0 watts	6.0 watts

Tone Control 3-position

Loud-speaker—"Alnico" Magnet Dynamic

Cone Diameter ..... JE-51, JE-510—$6\frac{1}{2}$ inches
JE-61, JE-61L—8 inches

Voice Coil Impedance (400 cycles) ..... 3.5 ohms

*"V" rated receivers may be operated on 40 cycles provided the power supply voltage is reduced so as not to exceed the following equivalents: 110 volts on the 125-volt tap or 200 volts on the 225-volt tap.

Tubes

Models JE-51, JE-510

Converter and Oscillator	GE-6SA7
I.F. Amplifier	GE-6SK7
Det., Aud. AVC	GE-6SQ7
Power Output	GE-25C6G
Rectifier	GE-25Z6G
Dial Lamp	(2) MAZDA No. 44

Models JE-61, JE-61L

Converter and Oscillator	GE-6SA7
I.F. Amplifier	GE-6SK7
Det., Aud. AVC	GE-6SQ7
Power Output	GE-25C6G
Rectifier	GE-25Z6G
Tuning Indicator	GE-6U5
Dial Lamp	(2) MAZDA No. 44

GENERAL ELECTRIC CO.

MODELS JE-51, JE-510, JE-61, JE-61L

VOLTAGE CHART

Tubes	Plate to Gnd Volts	Screen to Gnd Volts	Cathode to Gnd Volts	Filament Volts
6SA7	153	106	0	6.3
6SK7	153	106	3	6.3
6SQ7	62*		0	6.3
25C6G	221	153	14	25
25Z6G	220 (A.C.)		236 (D.C.)	25
6U5**	153			6.3

25Z6G Cathode Current—80 ma.
240 volts line A.C. (225-volt tap on JE-51, JE-61 and JE-61L).

* Use a high resistance voltmeter.

** Used only on Models JE-61 and JE-61L.

SPECIAL SERVICE INFORMATION

The following information will be found very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains*

(a) Antenna Post to Converter Grid at

250 K.C.	6.0
1000 K.C.	4.0
4000 K.C.	3.2
18000 K.C.	2.4

(b) R.F. on Converter Grid to I.F. on 6SK7 Grid at

250 K.C.	25
1000 K.C.	36
4000 K.C.	30
18000 K.C.	28

(c) I.F. on Converter Grid to I.F. on 6SK7 Grid at

455 K.C.	55

(2) Voltage across the diode load to give ½ watt speaker output at

400 Cycles	.066*

(3) DC voltage developed across oscillator grid resistor (R4) at

250 K.C.	9.8*
1000 K.C.	8.6*
4000 K.C.	9.7*
18000 K.C.	7.7*

* Variations of +10%, −20% are permissible.

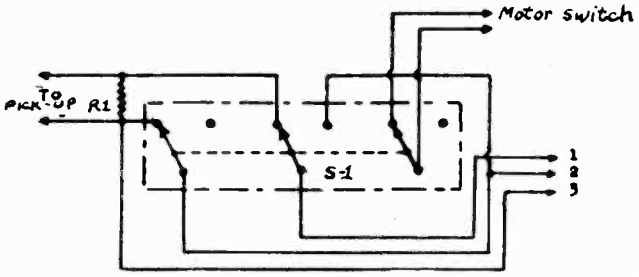


Fig. 1. Pick-up Connections

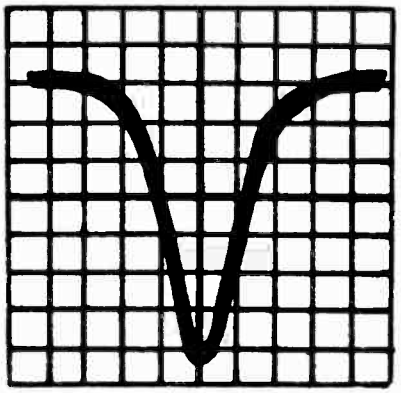


Fig. 3. Over-all I.F. Curve Taken on G-E Oscilloscope OFM-1

COIL RESISTANCE DATA

Coil	Model	Section	Resistance Measured Between Points	Resistance (Ohms)
Antenna	JE-51, 510, 61	B Primary	1 and 5	22
		B Secondary	2 and 5	5
		C Secondary	3 and 5	.9
		D Secondary	4 and 5	.02
Antenna	JE-61L	A Primary	1 and 5	110
		A Secondary	2 and 5	26
		B Secondary	3 and 5	5
		D Secondary	4 and 5	.03
		D Primary	16 and 17	.2
Oscillator	JE-51, 510, 61	B Band Coil	6 and 10	3
		C Band Coil	7 and 10	.8
		D Band Coil	8 and 10	.02
Oscillator	JE-61L	A Band Coil	6 and 10	10
		B Band Coil	7 and 10	3
		D Band Coil	8 and 10	.03
1st I.F. Transformer	All Models	Primary		9 to 12
		Secondary		15 to 19
2nd I.F. Transformer	All Models	Primary		14 to 18
		Secondary		7 to 9
Output Transformer	All Models	Primary		265
		Secondary		.4
Power Transformer	JE-51, 61, 61L	Primary		
		110 V. Tap		7
		125 V. Tap		8
		200 V. Tap		9
		225 V. Tap		20
		250 V. Tap		24
		Secondary		
		Red to Red		250
		Green to Green		.5
		Yellow to Yellow		.5

GENERAL INFORMATION

Models JE-51 and JE-510 are three-band receivers employing five General Electric Pre-tested Tubes in a superheterodyne circuit. These receivers are equipped with the new inclined "Visualux Dial" and luminescent pointer which assures ease in tuning. Additional design features include phonograph and television sound terminals. Tone Monitor circuit, low volume audio compensation, automatic volume control, iron-core I.F. transformers, anti-drift design, and the new Dynapower speaker.

Models JE-61 and JE-61L are similar to the above models in design except for inclusion of a cathode ray tuning indicator, different audio bass compensation and substitution of an eight-inch Dynapower speaker in place of the six and a half inch speaker. Model JE-61L also is provided with a long-wave band (140 to 400 K.C.) in place of the "C" band on Model JE-61.

CHASSIS REMOVAL

NOTE: Before attempting to slide the chassis out of the cabinet on these models free the drive cord from the dial pointer. A drop or two of cement may have been used to hold the pointer securely to the cord. This can be loosened with the fingernail or a pointed tool. Then press down on the cord until it can be moved to the rear underneath the hook in the pointer.

POWER SUPPLY

The receivers are equipped with the new plug-in type power supply which permits practically instantaneous conversion to DC operation. Simply remove the power transformer and replace with a plug-in type ballast resistor. Refer to the data given under "Conversion for Special Line Voltages."

The new power transformer is provided with 6 voltage taps. Instant tap switching is made by a simple pin plug and jack device. For correct operation measure the power supply voltage. Note which voltage range covers this voltage (see Electrical Specifications) and using the corresponding tap insert the plug in the jack.

PRECAUTION—When using a power transformer with any one of these models be sure a clean solid connection is maintained between transformer frame and chassis. Use of lock-washers between transformer and chassis will assure a clean contact. A poor connection may result in overvoltage on the tube filaments.

CONVERSION FOR SPECIAL LINE VOLTAGES

The JE-51, -510, -61 and -61L can be converted for operation on the following line voltages. In all cases where the power transformer is replaced with a ballast resistor, the power transformer must be removed from the chassis as the radiant heat from the ballast resistor is likely to injure the transformer insulation. When operated with these special resistors, the audio output on lower power-supply voltages will be reduced.

220 Volts Ac/Dc—(range 200-240)

Remove transformer from chassis of JE-51-, -61 and -61L and substitute ballast resistor RR-783 in socket previously occupied by transformer plug. Relabel sets with correct cabinet label supplied with resistor RR-783, as follows:

JE-51 relabel JE-510
JE-61 relabel JE-61-W
JE-61L relabel JE-61L-W.

115 Volts Dc—(range 105-129)

Remove transformer from chassis of JE-51, -61 and -61L or ballast RR-783 from JE-510; insert following respective ballast tubes and relabel sets with correct cabinet label supplied with new ballast resistor.

Model	Remove	Insert Ballast	Relabel
JE-51	Transformer	RR-785	JE-510-Z
JE-510	Ballast RR-783	RR-785	JE-510-Z
JE-61	Transformer	RR-786	JE-61-Z
JE-61L	Transformer	RR-786	JE-61L-Z

180 Volts Dc—(Voltage regulation for fluctuating line volts 145-215)

Remove transformer from chassis of JE-51, -61 and -61L or ballast RR-783 from JE-510; insert following ballast tubes and relabel sets with correct cabinet label supplied with new ballast resistor.

Model	Remove	Insert Ballast	Relabel
JE-51	Transformer	RR-784	JE-510-Y
JE-510	Ballast RR-783	RR-784	JE-510-Y
JE-61	Transformer	RR-787	JE-61-Y
JE-61L	Transformer	RR-787	JE-61L-Y

Coil Data

All antenna and oscillator transformer switch terminals are numbered in Figs. 6 and 7 to facilitate in locating these common points on the schematic diagrams Figs. 4 and 5.

The following tables show the coils in use for the various positions of the band-change switch.

Models JE-51, JE-510 and JE-61

Band Switch Position	Antenna Primary	Antenna Secondary	Oscillator Grid	Oscillator Cathode
Band "B"	Section 1 to 5 of L1	Section 2 to 5 of L1	Section 6 to 10 of L2	Section 9 to 10 of L2
Band "C"	Section 2 to 5 of L1	Section 3 to 5 of L1	Section 7 to 10 of L2	Section 11 to 10 of L2
Band "D"	Section 3 to 5 of L1	Section 4 to 5 of L1	Section 8 to 10 of L2	Section 12 to 10 of L2

Model JE-61L

Band Switch Position	Antenna Primary	Antenna Secondary	Oscillator Grid	Oscillator Cathode
Band "A"	Sections 16 to 17 and 1 to 5 of L1	Section 2 to 5 of L1	Section 6 to 10 of L2	Section 9 to 10 of L2
Band "B"	Sections 16 to 17 and 2 to 5 of L1	Section 3 to 5 of L1	Section 7 to 10 of L2	Section 11 to 10 of L2
Band "D"	Section 16 to 17 of L1	Section 4 to 5 of L1	Section 8 to 10 of L2	Section 12 to 10 of L2

Phonograph or Television Sound Connections

Fig. 1 shows a simple method for connecting a crystal or high impedance magnetic pick-up into the receiver circuit for the reproduction of phonograph recordings. S-1 is a triple-pole, double-throw switch. A suitable loading circuit composed of a resistor, or resistor and capacitor network should be used across the pick-up leads when using a crystal type unit. It is very important that the pick-up leads have a shield such as copper braid to prevent hum interference. This shield should be connected to the chassis ground.

Remove the jumper between phono-terminals 1 and 2 and make connections as shown in Fig. 1.

A television sound channel may be connected in place of the crystal pick-up. No loading resistor is required.

When the pick-up or television sound channel is connected as shown, the regular radio volume and tone controls work for both radio and phonograph-television sound reproduction. The following are suggested parts:

Loud-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly. Assembly instructions accompany each replacement cone.

NOTE: In no case should the magnet be removed from the assembly position as it will lose magnetism.

Symbol	Description	Stock No.
S-1	Triple-pole, double-throw switch	RS-366
R-1	330,000 ohm resistor	RQ-1319

Alignment Procedure

Use a standard I.R.E. dummy antenna in making all R.F. alignments (see Fig. 2).

I.F. transformers are double, permeability-tuned with adjusting shafts at top and bottom of shield cans.

Fig. 2. Standard I.R.E. Dummy Antenna

I.F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch	Input. Freq.	Point of Input	Dummy Antenna	Inductor or Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Pri. and Sec.	Gang condenser plates closed—connect audio input of oscilloscope to ground and to phono terminal No. 2. Adjust iron-core inductors simultaneously, using two insulated handle screwdrivers, for a single symmetrical curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 3. It may be necessary to retrim 2nd I.F. transformers for final adjustment.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Pri. and Sec.	

I.F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	455 K.C. with Modulation	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Pri. and Sec.	Gang condenser plates closed—connect output meter across voice coil—keep signal low and volume control on as far as possible. Adjust iron-core inductors for maximum output.
2. Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Pri. and Sec.	

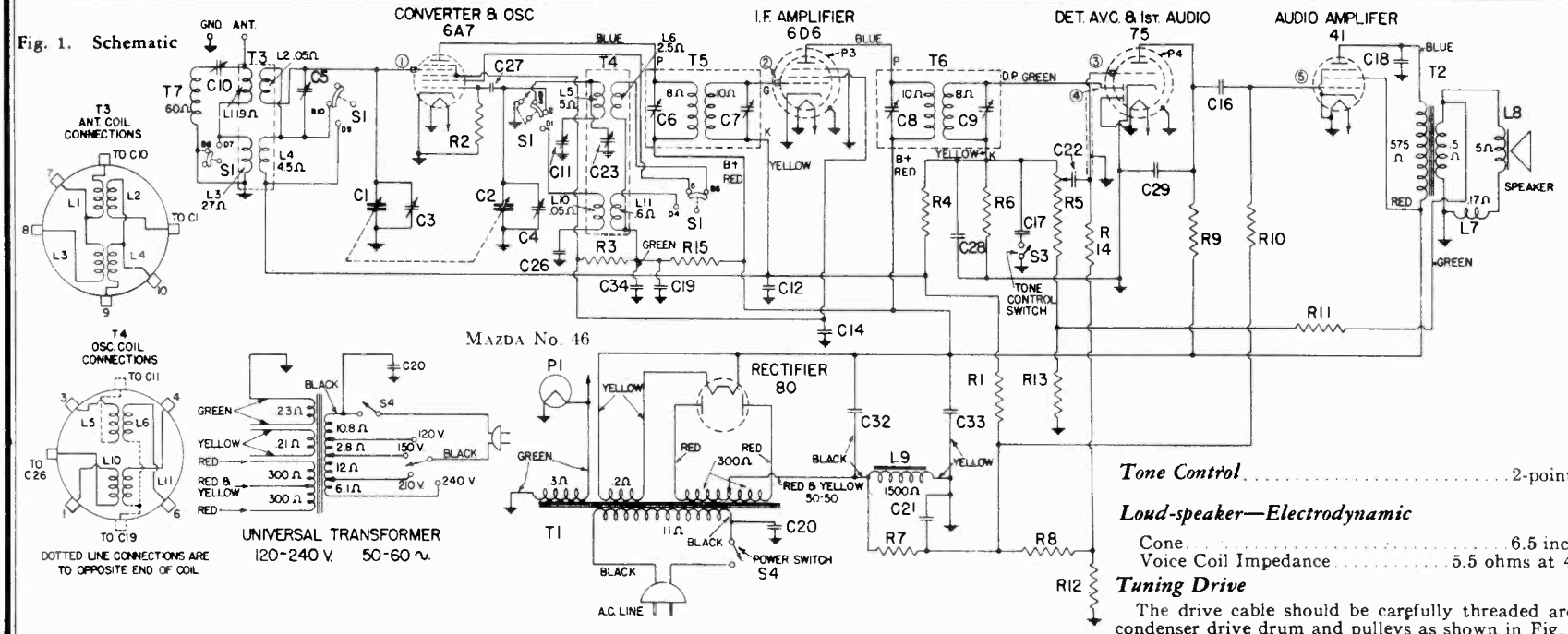
R.F. ALIGNMENT—MODELS JE-51, JE-510, AND JE-61

1. Band "B"					Close gang condenser plates. A special alignment scale is glued to the back side of pulley frame adjacent to pointer cord. With paper clip or drop of paint mark point on cord which is in line with last thin line on right side of scale (viewed from rear of chassis). The selected edge of the paper clip or the drop of paint will serve as a pointer for performing the following R.F. alignment. Connect meter across voice coil.
2. Band "B"	1500 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-3) Ant. (C-2)	Peak trimmer for maximum output with a low input signal.
3. Band "B"	580 K.C. with Modulation	Antenna Post	I.R.E.	Osc. padder (C-7)	Adjust padder for maximum output in the vicinity of 580 K.C. while rocking the gang condenser.
4. Band "B"	Repeat Operation 2				
5. Band "C"	6 M.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-5)	Peak trimmer for maximum output while rocking the gang condenser. Image—910 K.C. below signal.
6. Band "D"	21 M.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-4)	The image of "D" band signal should be heard 910 K.C. below the input signal when (C-6) is on proper peak. Example: 21 M.C. image at is 20.09 M.C. Peak (C-4) while rocking the gang condenser.

R.F. ALIGNMENT—MODEL JE-61L

1. Band "B"					Close gang condenser plates. A special alignment scale is glued to the back side of pulley frame adjacent to pointer cord. With paper clip or drop of paint mark point on cord which is in line with last thin line on right side of scale (viewed from rear of chassis). The selected edge of the paper clip or the drop of paint will serve as a pointer for performing the following R.F. alignment. Connect meter across voice coil.
2. Band "B"	1500 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-3) Ant. (C-2)	Peak trimmers for maximum output with a low input signal.
3. Band "B"	580 K.C. with Modulation	Antenna Post	I.R.E.	Osc. padder (C-7)	Adjust padder for maximum output in the vicinity of 580 K.C. while rocking the gang condenser.
4. Band "B"	1500 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-3) Ant. (C-2)	Peak trimmers for maximum output with a low input signal.
5. Band "A"	350 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-5) Ant. (C-8)	Peak trimmers for maximum output with a low input signal.
6. Band "A"	145 K.C. with Modulation	Antenna Post	I.R.E.	Osc. padder (C-9)	Adjust padder for maximum output in the vicinity of 145 K.C. while rocking the gang condenser.
7. Band "A"	Repeat Operation 5				
8. Band "D"	18 M.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-4)	The image of "D" band signal should be heard 910 K.C. below the input signal when (C-6) is on the proper peak. Example: 18 M.C. image is at 17.09 M.C. Peak (C-4) while rocking the gang condenser.

Fig. 1. Schematic



SYMBOL	DESCRIPTION	
C32	DRY ELEC CAPACITOR	12 MFD.
C33	DRY ELEC CAPACITOR	8 MFD.
C34	DRY ELEC CAPACITOR	4 MFD.
R1	CARBON RESISTOR	10 MEG. Ω
R2		47000 Ω
R3		15000 Ω
R4	CARBON RESISTOR	2.2 MEG. Ω
R5	VOLUME CONTROL	2.0 MEG. Ω
R6	CARBON RESISTOR	470000 Ω
R7		1.0 MEG. Ω
R8		220000 Ω
R9		330000 Ω
R10		680000 Ω
R11		22 Ω
R12		15000 Ω
R13		68 Ω
R14		1.5 MEG. Ω
R15	CARBON RESISTOR	4700 Ω

SYMBOL	DESCRIPTION		
C1	TUNING CAPACITOR	R.F.	SECTION
C2	TUNING	OSC.	
C3	TRIMMER	R.F.	
C4		OSC.	
C5		5-40	MMF
C6		100-230	MMF
C7		50-135	MMF
C8		50-135	MMF
C9		100-230	MMF
C10	TRIMMER	30-70	MMF
C11	PADDER	350-550	MMF
C12	PAPER	.05	MFD.
C14		.05	MFD.
C16		.005	MFD.
C17		.002	MFD.
C18		.008	MFD.
C19		.05	MFD.
C20		.01	MFD.
C21		.5	MFD.
C22	PAPER	.005	MFD.
C23	TRIMMER	5-40	MMF
C26	MICA	2850	MMF
C27		50	MMF
C28		500	MMF
C29	MICA CAPACITOR	250	MMF

CONDITIONS OF TEST
POWER SWITCH OFF
APPROX. RESISTANCE MEASUREMENTS

RESIS. TO GROUND	TUBE	SOCKET PRONG
① 2.6 MEG. Ω	6A7	GRID CAP
② 2.6 MEG. Ω	6D6	GRID CAP
③ 1.5 MEG. Ω	75	GRID CAP
④ 470000 Ω	75	4
⑤ 870000 Ω	41	4

PRONG NUMBERS BOTTOM VIEWS

Electrical Output

Undistorted . . . . . 2.3 watts
Maximum . . . . . 3.5 watts

Tone Control 2-point

Loud-speaker—Electrodynamic

Cone . . . . . 6.5 inches
Voice Coil Impedance . . . . . 5.5 ohms at 400 cycles

Tuning Drive

The drive cable should be carefully threaded around the condenser drive drum and pulleys as shown in Fig. 3.

Tuning Frequency Range

Band "B" . . . . . 540–1720 kc.
Band "C" . . . . . 5,800–18,000 kc.

Intermediate Frequency . . . . 455 kc.

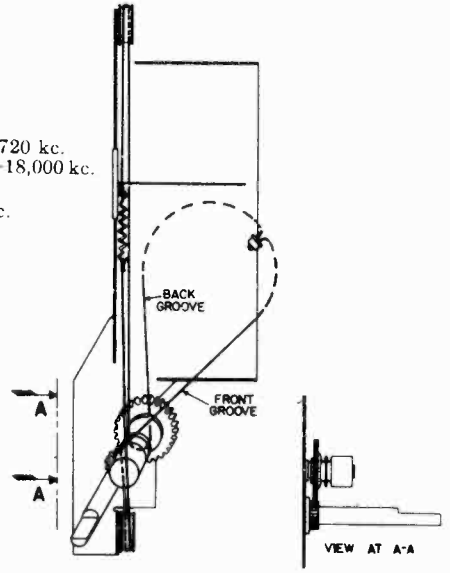


Fig. 3. Dial Mechanism

SOCKET VOLTAGES

Tube No.	Plate to Ground Volts—D.C.	Screen Grid to Ground Volts—D.C.	Cathode to Ground Volts—D.C.	Cathode Current M.A.	Heater Volts A.C.
6A7 Oscillator	176	105	0	14.8	6.3
6A7 Converter	230				
6D6 1st I.F. Amp.	230	105	0	10	6.3
75 Det A.V.C. 1st audio	100 *		0	.16	6.3
41 Output	215	230	0	29	6.3
80 Rectifier	300/600 RMS		315 to B-	54	

A-C line voltage 120. No signal input. 1000 ohms per-volt meter. Dial pointer at 530 K.C. *Measured on 500-volt scale.

MODEL GE-52

GENERAL ELECTRIC CO.

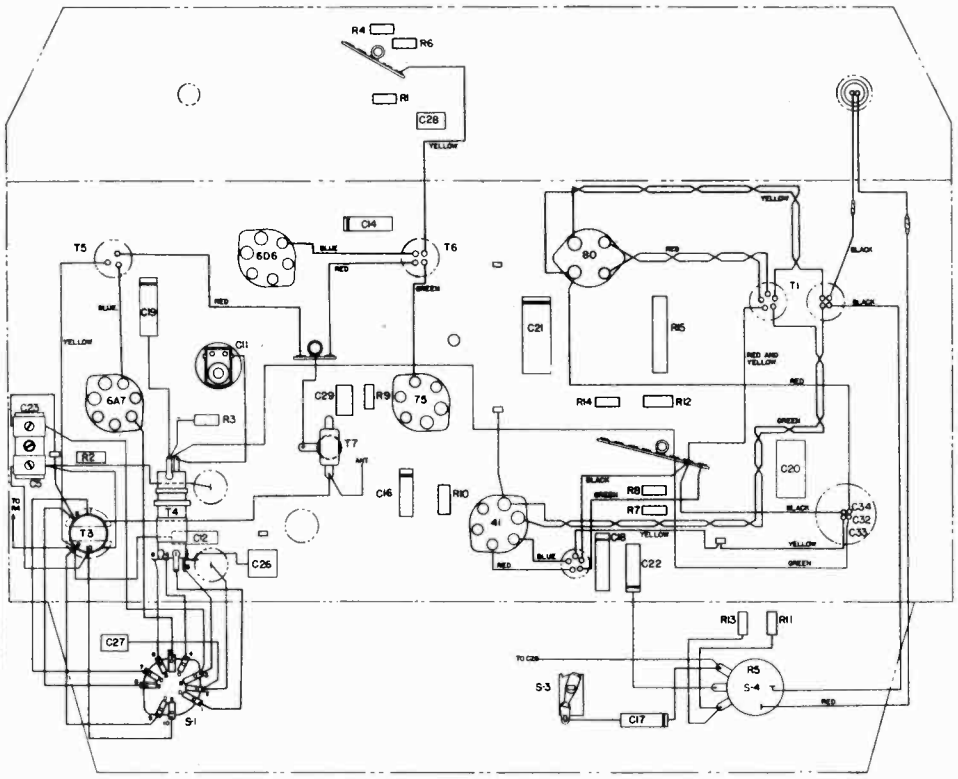


Fig. 4. Chassis Parts Layout

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115–125	50–60	60
V	115–125 140–155 190–220 220–250	40–60	65

NOTE: Rating "V" receivers may be used on 40-cycle circuits provided the voltage does not exceed 110 on the 115-125-volt tap or 200 volts on the 190-220-volt tap.

GENERAL INFORMATION

This two-band receiver employs five General Electric Pre-tested tubes in a superheterodyne circuit. The circuit incorporates a wave trap and a two-point tone control.

A signal from the antenna is coupled by the antenna transformer to the control grid of the 6A7 oscillator and converter tube. After conversion to 455 kc. the signal is amplified at this frequency by the intermediate frequency amplifier which employs two double tuned I.F. transformers.

The diode part of the 75 tube is used as a detector and provides the avc voltage. The 75 tube is resistance-coupled to the 41 pentode amplifier output tube.

Minimum bias is supplied for all tubes except the 75 by the voltage drop over the resistance R-8 and R-12. Bias for the 75 tube is supplied by the voltage drop over R-12.

Negative feed back is used to improve the tone of reproduction. In this circuit, voltage is fed back from the voice coil circuit to a tap on the volume control. This feed-back voltage is out of phase with the input voltage to the audio amplifier. Engineers have shown that the resulting degeneration reduces distortion arising in the audio amplifier and extends the tone range.

ALIGNMENT PROCEDURE

I.F. Alignment

Connect an output meter across the voice coil. Set the volume control for maximum.

Set the test oscillator to 455 kc. and connect one output lead to the receiver chassis and the other through a .05 Mfd. condenser to the control grid of the 6A7. Do not remove the grid lead from the 6A7 as this would remove the minimum bias from this tube. Keep the test oscillator output as low as possible to give a readable output. The four I.F. trimmers (see Fig. 2.) should be adjusted in the following sequence for maximum output.

1. Secondary trimmer (C-9) } on second I.F. transformer
2. Primary trimmer (C-8) }
3. Secondary trimmer (C-7) } on first I.F. transformer
4. Primary trimmer (C-6) }

Wave Trap Alignment

Leave the test oscillator set to 455 kc and connect one output lead to the receiver chassis and the other through a 250 Mmf. condenser in series with 400 ohms to the receiver antenna lead. Adjust C-10 for minimum output.

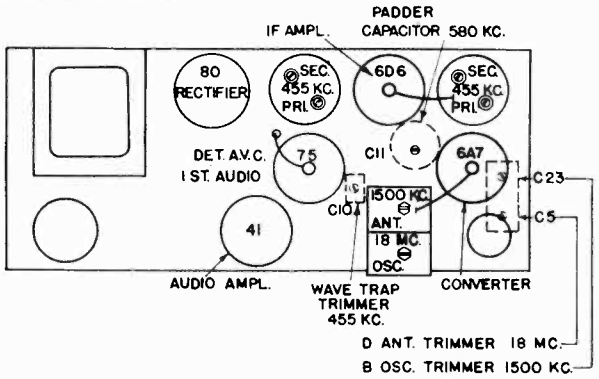


Fig. 2. Trimmer Location

R.F. Alignment

A careful examination of the diagram, Fig. 1, will disclose that the "D" band, oscillator trimmer C-4 must first be set before any adjustment of the broadcast oscillator trimmer C-23 can be made. The image of any signal on "D" band should be tuned in 910 kc. below the input signal when C-4 is on the correct peak. Example: 18 mc. image is at 17.09 mc.

Use the same dummy antenna (250 Mmf. and 400 ohms) as used for the wave-trap alignment.

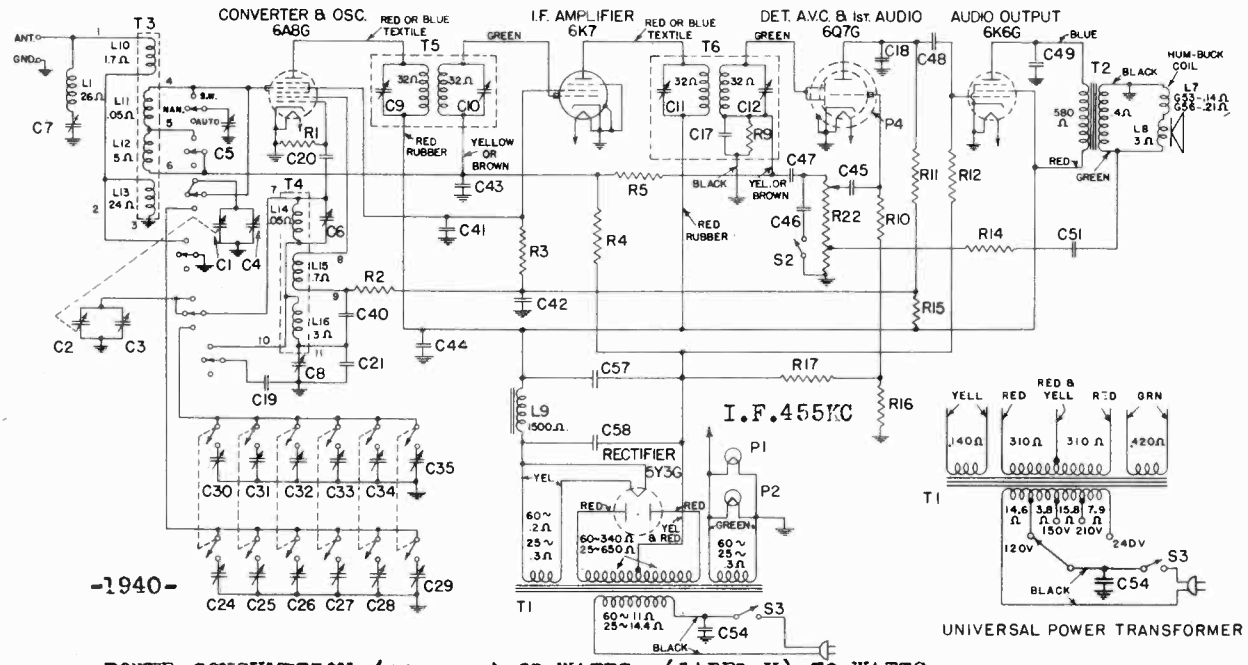
Rock the gang condenser when peaking the trimmers (C-11 or C-5).

	Band Switch	Signal Frequency	Adjust Trimmer
1.	"D"	18 mc.	C-4 (only)
2.	"B"	1500 kc.	C-23 and C-3
3.	"B"	580 kc.	C-11
4.	"B"	1500 kc.	C-23 and C-3
5.	"D"	18 mc.	C-5

NOTE: Be sure that the setting of C-4 made in No. 1 is not disturbed during any other part of the alignment. If it is changed the whole R.F. alignment procedure should be repeated.

GENERAL ELECTRIC CO.

MODEL GE-53



POWER CONSUMPTION (LABEL A) 65 WATTS, (LABEL V) 70 WATTS

Symbol	Description	Symbol	Description	Symbol	Description
C5	R. F. Trimmer Capacitor, "D" Band	C40	Paper Capacitor, 0.001 Mfd.	R10	Carbon Resistor, 2.2 Megohms
C6	Osc. Trimmer Capacitor, "D" Band	C41	Paper Capacitor, 0.05 Mfd.	R11	Carbon Resistor, 330,000 Ohms
C8	Osc. Padder Condenser, "B" Band	C42	Electrolytic Capacitor, 4.0 mfd.	R12	Carbon Resistor, 330,000 Ohms
C17	Mica Capacitor, 470 Mmf.	C43	Paper Capacitor, 0.05 Mfd.	R14	Carbon Resistor, 22,000 Ohms
C18	Mica Capacitor, 330 Mmf.	C44	Paper Capacitor, 0.05 Mfd.	R15	Carbon Resistor, 3900 Ohms
C19	Mica Capacitor, 3900 Mmf.	C45	Paper Capacitor, 0.01 Mfd.	R16	Carbon Resistor, 22 Ohms
C20	Mica Capacitor, 47 Mmf.	C46	Paper Capacitor, 0.001 Mfd.	R17	Carbon Resistor, 330 Ohms
C21	Mica Capacitor, 370 Mmf.	C47	Paper Capacitor, 0.005 Mfd.	R22	Volume Control, 2 Megohms, tap at 15,000 Ohms
C24	Mica Trimmer, 165-450 Mmf.	C48	Paper Capacitor, 0.005 Mfd.		
C25	Mica Trimmer, 95-345 Mmf.	C49	Paper Capacitor, 0.012 Mfd.	T1	Power Transformers
C26	Mica Trimmer, 80-235 Mmf.	C51	Paper Capacitor, 0.1 Mfd.	T2	Output Transformer
C27	Mica Trimmer, 35-175 Mmf.	C54	Molded Paper Capacitor, 0.01 Mfd.	L8	Speaker, 6½ Inches (G-53)
C28	Mica Trimmer, 30-115 Mmf.	C57	Dry Electrolytic Capacitor, 8 Mfd.		Speaker, 12 Inches (G-56)
C29	Mica Trimmer, 11-60 Mmf.	C58	Dry Electrolytic Capacitor, 8 Mfd.	S1	Band Switch
C30	Mica Trimmer, 165-450 Mmf.	R1	Carbon Resistor, 47,000 Ohms	S2	Tone Control Switch
C31	Mica Trimmer, 95-345 Mmf.	R2	Carbon Resistor, 4700 Ohms	S3	Power Switch (Part of Volume Control)
C32	Mica Trimmer, 80-235 Mmf.	R3	Carbon Resistor, 18,000 Ohms		
C33	Mica Trimmer, 35-175 Mmf.	R4	Carbon Resistor, 10 Megohms	S4	Push-button Switches
C34	Mica Trimmer, 30-115 Mmf.	R5	Carbon Resistor, 1.5 Megohms		
C35	Mica Trimmer, 11-60 Mmf.	R9	Carbon Resistor, 470,000 Ohms		

SOCKET VOLTAGES

Tube No.		Plate to Ground Volts D.C.	Screen Grid to Ground Volts D.C.	Cathode to Ground Volts D.C.	Cathode Current M.A. D.C.	Heater Volts A.C.
6A8G	Converter	236	95	0	12.2	6.5
	Oscillator	186	....			
6K7		236	95	0	8.7	6.5
6Q7G		84 *	....	0	0.4	6.5
6K6G		220	236	0	30.1	6.5
5Y3G		....	.....	320	51.4	5.3

A-C line voltage—120. No signal input. 1000 ohms per volt meter. Dial pointer at 530 kc. on "B" band.
* Measured on 500-volt scale.

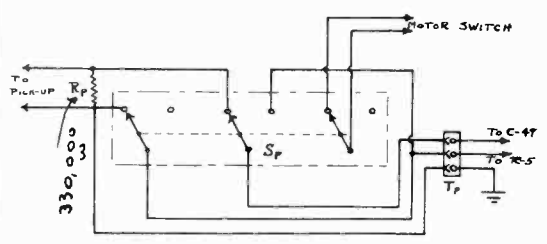
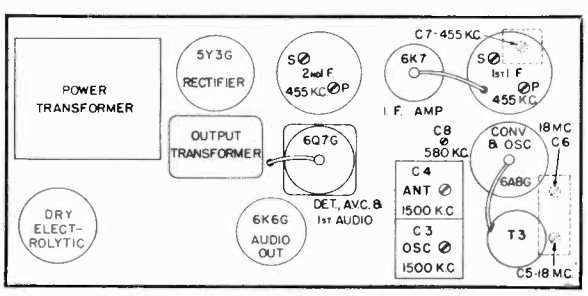


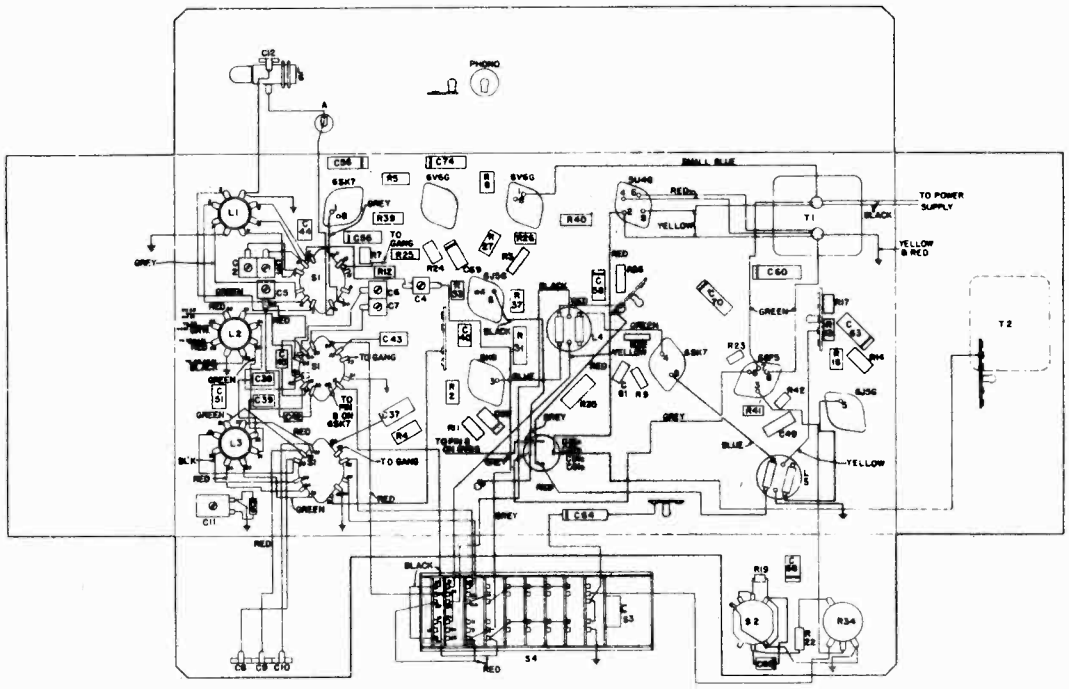
Fig. 1. Pick-up Connections

FOR OTHER DATA SEE INDEX

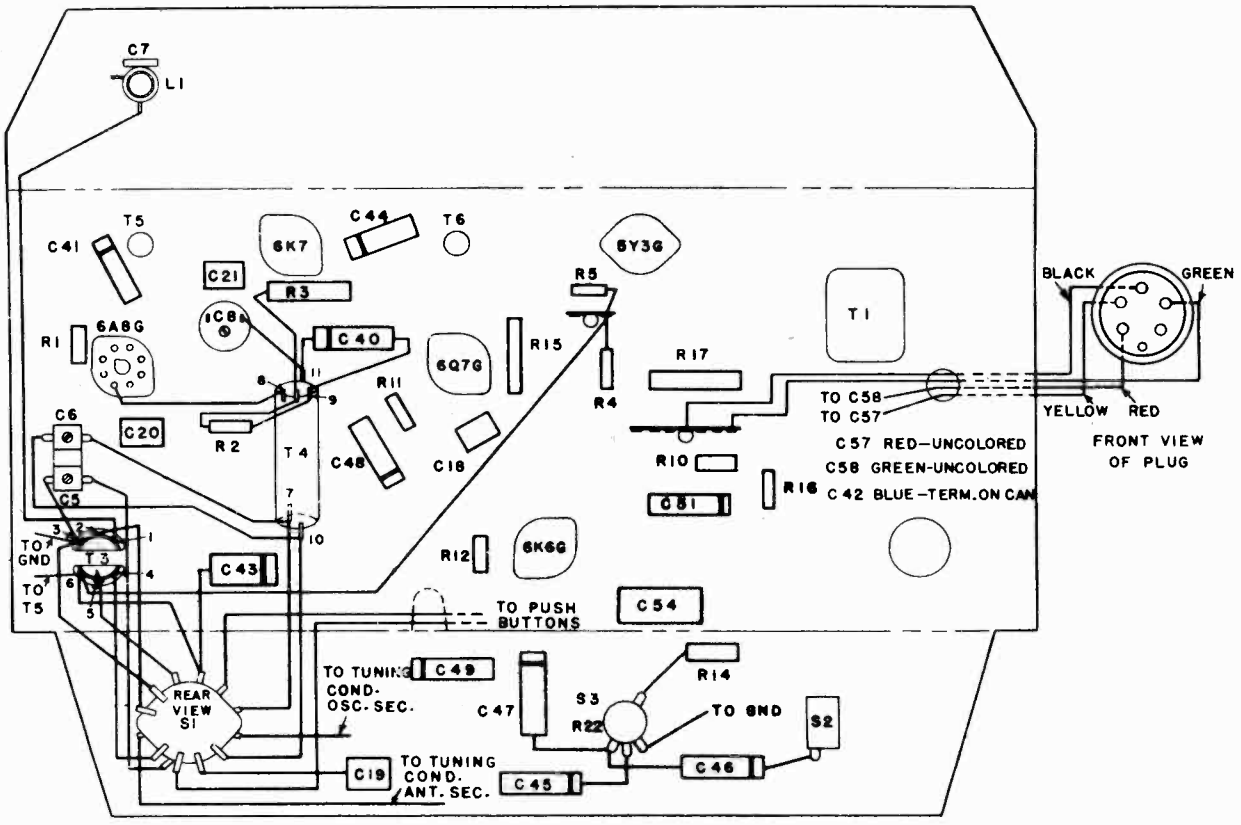


MODELS GE-53,
JE-101, JE-107

GENERAL ELECTRIC CO.



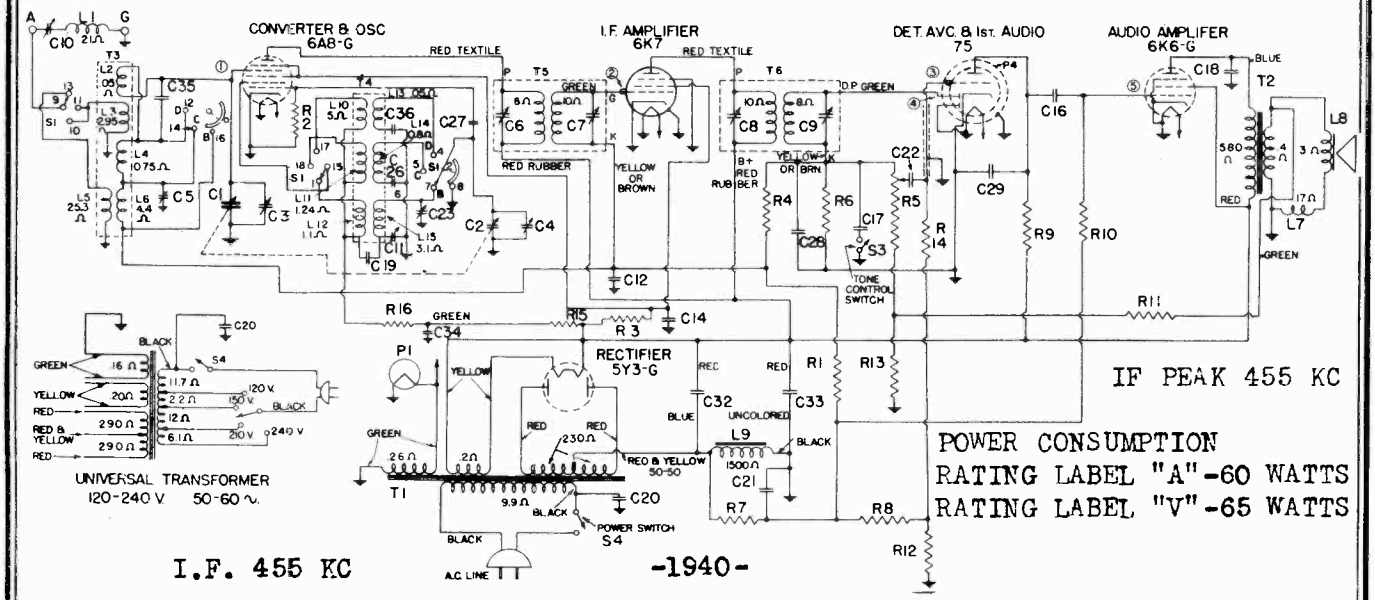
Chassis Parts Layout
Models JE-101 and 107



Chassis Parts Layout
MODEL GE-53

MODEL GE-54

GENERAL ELECTRIC CO.

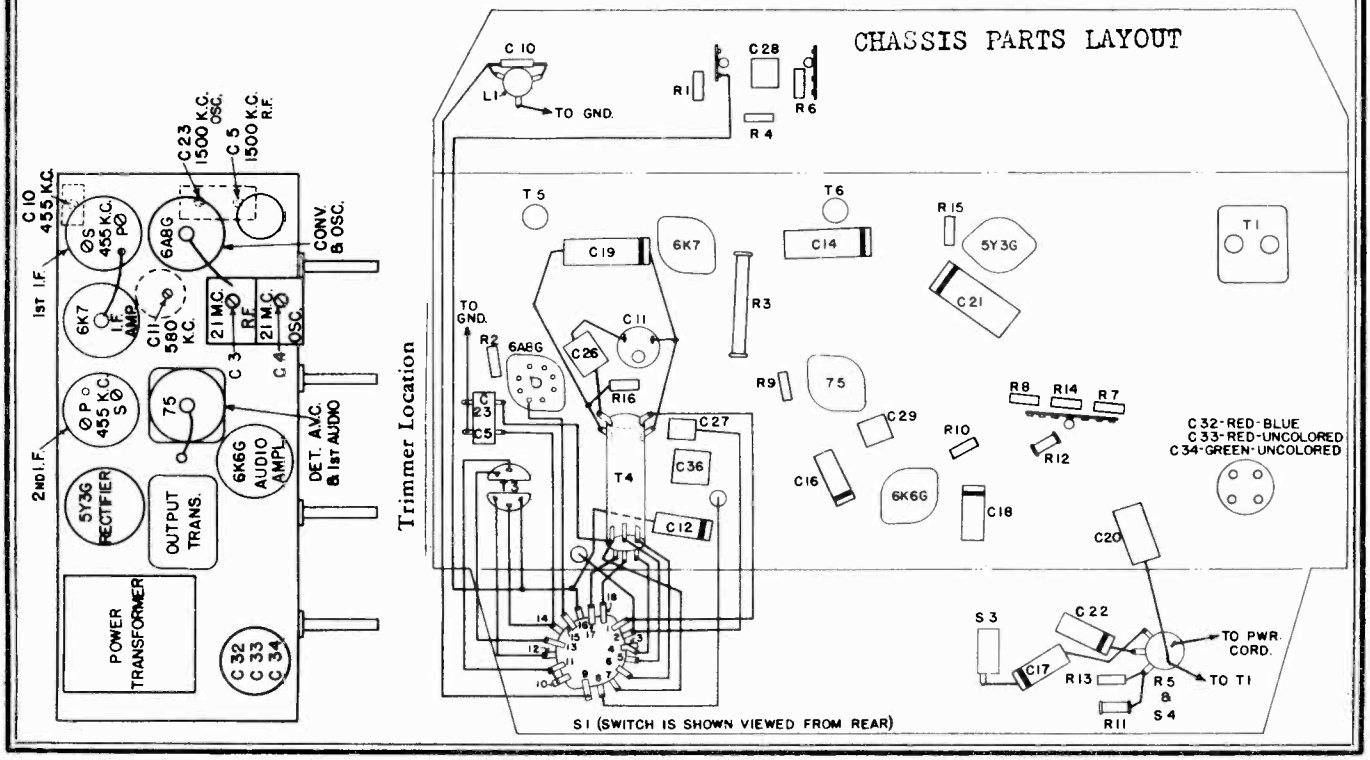


SYMBOL	DESCRIPTION
C-1	Tuning Capacitor R.F. Section
C-2	Tuning Capacitor Osc. Section
C-3	Trimmer Capacitor R.F. Section
C-4	Trimmer Capacitor Osc. Section
C-5	Trimmer Capacitor 5-40 MMF.
C-6	Trimmer Capacitor 80-225 MMF.
C-7	Trimmer Capacitor 45-125 MMF.
C-8	Trimmer Capacitor 45-125 MMF.
C-9	Trimmer Capacitor 80-225 MMF.
C-10	Trimmer Capacitor 45-100 MMF.
C-11	Padder Capacitor 350-550 MMF.
C-12	Paper Capacitor .05 MFD.
C-14	Paper Capacitor .05 MFD.
C-16	Paper Capacitor .005 MFD.
C-17	Paper Capacitor .002 MFD.
C-18	Paper Capacitor .008 MFD.
C-19	Paper Capacitor .01 MFD.
C-20	Paper Capacitor .01 MFD.
C-21	Paper Capacitor .5 MFD.
C-22	Paper Capacitor .005 MFD.
C-23	Trimmer Capacitor 5-40 MMF.
C-26	Mica Capacitor 1800 MMF.
C-27	Mica Capacitor 50 MMF.
C-28	Mica Capacitor 470 MMF.
C-29	Mica Capacitor 220 MMF.
C-32	Dry Elec. Capacitor 12 MFD.
C-33	Dry Elec. Capacitor 8 MFD.
C-34	Dry Elec. Capacitor 4 MFD.
C-35	Mica Capacitor 20 MMF.
C-36	Mica Capacitor 3400 MMF.
R-1	Carbon Resistor 10 Megohms
R-2	Carbon Resistor 47000 Ohms
R-3	Carbon Resistor 33000 Ohms
R-4	Carbon Resistor 2.2 Megohms
R-5	Volume Control 2.0 Megohms
R-6	Carbon Resistor 470000 Ohms
R-7	Carbon Resistor 1.0 Megohms
R-8	Carbon Resistor 220000 Ohms
R-9	Carbon Resistor 330000 Ohms
R-10	Carbon Resistor 680000 Ohms
R-11	Carbon Resistor 220 Ohms
R-12	Carbon Resistor 15000 Ohms
R-13	Carbon Resistor 68 Ohms
R-14	Carbon Resistor 1.5 Megohms
R-15	Carbon Resistor 10000 Ohms
R-16	Carbon Resistor 4700 Ohms
S-1	Band Change Switch
S-3	Tone Control Switch
S-4	Power Switch
L-1	Wave Trap Coil
L-3	Ant. Coil "B-C-D"
T-4	Osc. Coil "B-C-D"
T-5	1st I.F. Transformer
T-6	2nd I.F. Transformer
L-7	Speaker Hum Coil
L-8	Speaker Voice Coil 3 Ohms
L-9	Speaker Field Coil 1500 Ohms Cold
	Loud-speaker 6½ in.
T-1	Power Transformer (60 cycles / Universal)
T-2	Output Transformer
P-1	No. 46 MAZDA Pilot Lamp
P-4	Tube Shield

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII

FOR OTHER DATA
SEE INDEX

CHASSIS PARTS LAYOUT



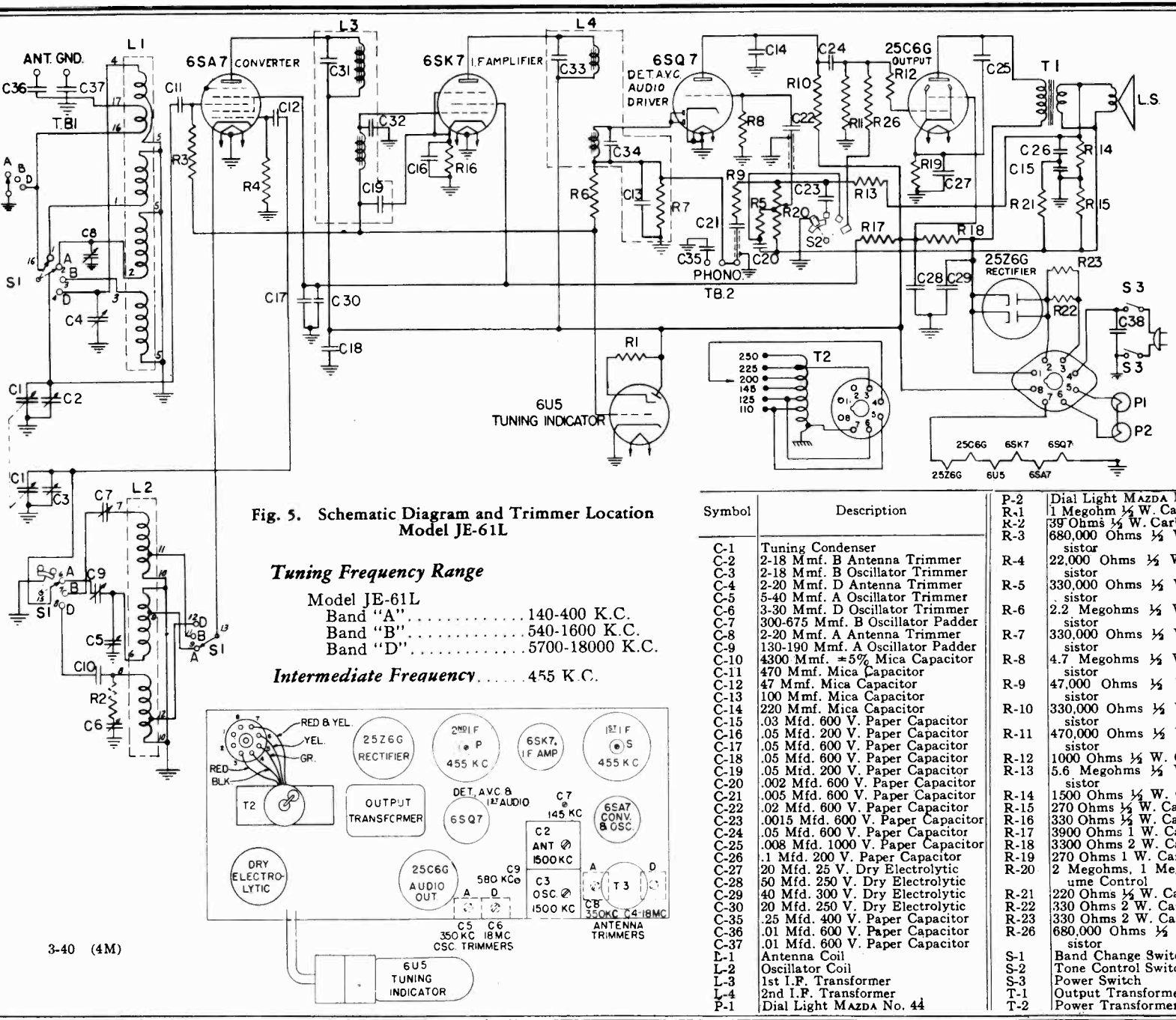


Fig. 5. Schematic Diagram and Trimmer Location Model JE-61L

Tuning Frequency Range

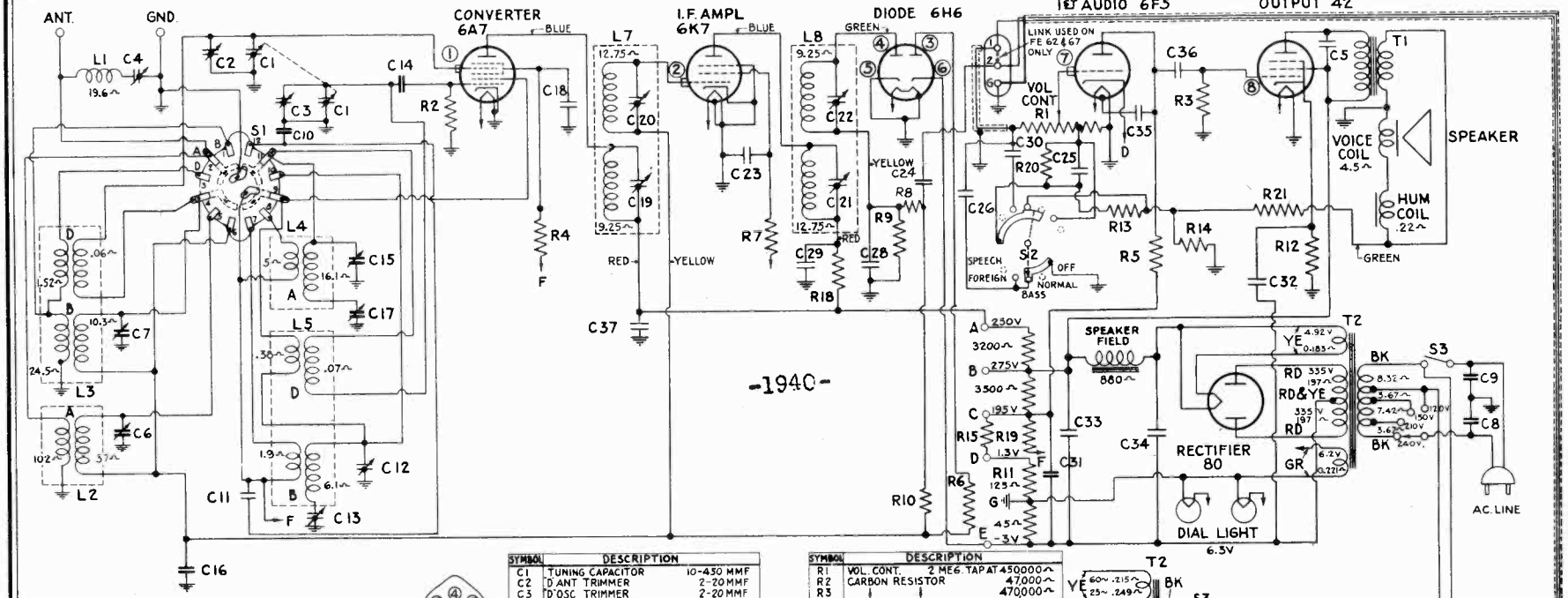
Model JE-61L
Band "A" ..... 140-400 K.C.
Band "B" ..... 540-1600 K.C.
Band "D" ..... 5700-18000 K.C.

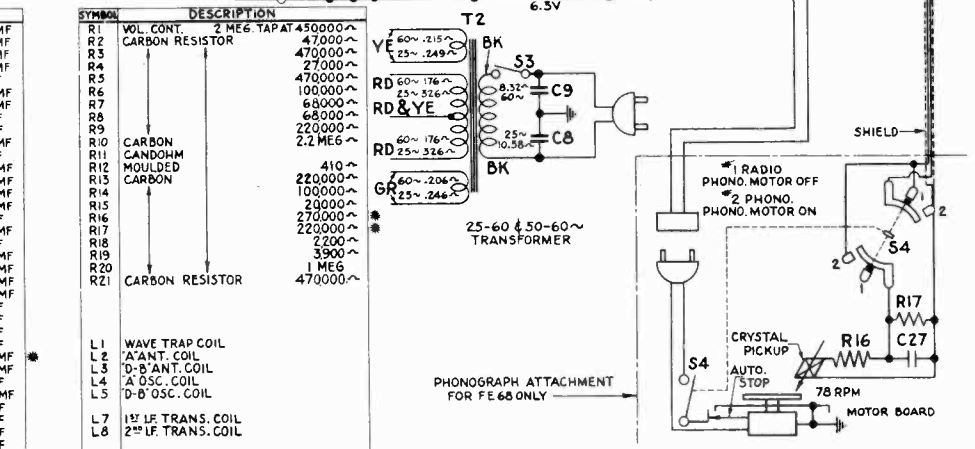
Intermediate Frequency ..... 455 K.C.

Symbol	Description
C-1	Tuning Condenser
C-2	2-18 Mmf. B Antenna Trimmer
C-3	2-18 Mmf. B Oscillator Trimmer
C-4	2-20 Mmf. D Antenna Trimmer
C-5	5-40 Mmf. A Oscillator Trimmer
C-6	3-30 Mmf. D Oscillator Trimmer
C-7	300-675 Mmf. B Oscillator Padder
C-8	2-20 Mmf. A Antenna Trimmer
C-9	130-190 Mmf. A Oscillator Padder
C-10	4300 Mmf. ±5% Mica Capacitor
C-11	470 Mmf. Mica Capacitor
C-12	47 Mmf. Mica Capacitor
C-13	100 Mmf. Mica Capacitor
C-14	220 Mmf. Mica Capacitor
C-15	.03 Mfd. 600 V. Paper Capacitor
C-16	.05 Mfd. 200 V. Paper Capacitor
C-17	.05 Mfd. 600 V. Paper Capacitor
C-18	.05 Mfd. 600 V. Paper Capacitor
C-19	.05 Mfd. 200 V. Paper Capacitor
C-20	.002 Mfd. 600 V. Paper Capacitor
C-21	.005 Mfd. 600 V. Paper Capacitor
C-22	.02 Mfd. 600 V. Paper Capacitor
C-23	.0015 Mfd. 600 V. Paper Capacitor
C-24	.05 Mfd. 600 V. Paper Capacitor
C-25	.008 Mfd. 1000 V. Paper Capacitor
C-26	.1 Mfd. 200 V. Paper Capacitor
C-27	20 Mfd. 25 V. Dry Electrolytic
C-28	50 Mfd. 250 V. Dry Electrolytic
C-29	40 Mfd. 300 V. Dry Electrolytic
C-30	20 Mfd. 250 V. Dry Electrolytic
C-35	.25 Mfd. 400 V. Paper Capacitor
C-36	.01 Mfd. 600 V. Paper Capacitor
C-37	.01 Mfd. 600 V. Paper Capacitor
L-1	Antenna Coil
L-2	Oscillator Coil
L-3	1st I.F. Transformer
L-4	2nd I.F. Transformer
P-1	Dial Light MAZDA No. 44
P-2	Dial Light MAZDA No. 44
R-1	1 Megohm ½ W. Carbon Resistor
R-2	39 Ohms ½ W. Carbon Resistor
R-3	680,000 Ohms ½ W. Carbon Resistor
R-4	22,000 Ohms ½ W. Carbon Resistor
R-5	330,000 Ohms ½ W. Carbon Resistor
R-6	2.2 Megohms ½ W. Carbon Resistor
R-7	330,000 Ohms ½ W. Carbon Resistor
R-8	4.7 Megohms ½ W. Carbon Resistor
R-9	47,000 Ohms ½ W. Carbon Resistor
R-10	330,000 Ohms ½ W. Carbon Resistor
R-11	470,000 Ohms ½ W. Carbon Resistor
R-12	1000 Ohms ½ W. Carbon Resistor
R-13	5.6 Megohms ½ W. Carbon Resistor
R-14	1500 Ohms ½ W. Carbon Resistor
R-15	270 Ohms ½ W. Carbon Resistor
R-16	330 Ohms ½ W. Carbon Resistor
R-17	3900 Ohms 1 W. Carbon Resistor
R-18	3300 Ohms 2 W. Carbon Resistor
R-19	270 Ohms 1 W. Carbon Resistor
R-20	2 Megohms, 1 Megohm Tap, Volume Control
R-21	220 Ohms ½ W. Carbon Resistor
R-22	330 Ohms 2 W. Carbon Resistor
R-23	330 Ohms 2 W. Carbon Resistor
R-26	680,000 Ohms ½ W. Carbon Resistor
S-1	Band Change Switch
S-2	Tone Control Switch
S-3	Power Switch
T-1	Output Transformer
T-2	Power Transformer

GENERAL ELECTRIC CO.

MODELS FE62, FE67, FE68





CONDITIONS OF TEST

WAVE SWITCH ON A BAND
POWER SWITCH OFF

APPROXIMATE RESISTANCE MEASUREMENTS

	RESISTANCE TO GND.	TUBE	SOCKET PRONG
1	2.4 MEG.~	CONV. GRID	CAP
2	2.4 MEG.~	1ST I.F GRID	CAP
3	2.5 MEG.~	DIODE PLATE	PRONG-3
4	220,000 ~	DIODE PLATE	PRONG-5
5	GROUNDED	DIODE CATH.	PRONG-8
6	45 ~	DIODE CATH.	PRONG-4
7	0-2 MEG.~ VOL. CONT	1ST AUDIO GRID	CAP
8	470,000 ~	OUTPUT GRID	PRONG-4

PRONG NUMBERS BOTTOM VIEW FOR 1

PRONG NUMBERS BOTTOM VIEW 2 TO 7 INCL

PRONG NUMBERS BOTTOM VIEW FOR 8

ALL VOLTAGES TO GROUND UNLESS OTHERWISE SPECIFIED
ALL VOLTAGES MEASURED WITH ANT. & GND TERMINALS SHORTED AND 120V ON PRI.

SYMBOL	DESCRIPTION	
C1	TUNING CAPACITOR	10-430 MMF
C2	'D' ANT TRIMMER	2-20 MMF
C3	'D' OSC. TRIMMER	2-20 MMF
C4	WAVE TRAP TRIMMER	75 MMF
C5	PAPER CAPACITOR	.01 MF
C6	'A' ANT. TRIMMER	4-30 MMF
C7	'B' ANT. TRIMMER	4-30 MMF
C8	PAPER CAPACITOR	.01 MF
C9	PAPER	.01 MF
C10	MICA	3600 MMF
C11	PAPER CAPACITOR	.001 MF
C12	'B' OSC. TRIMMER	4-30 MMF
C13	'B' PADDER TRIMMER	350-550 MMF
C14	MICA CAPACITOR	.50 MMF
C15	'A' OSC. TRIMMER	5-45 MMF
C16	PAPER CAPACITOR	.1 MF
C17	'A' PADDER TRIMMER	100-175 MMF
C18	PAPER CAPACITOR	.01 MF
C19	1ST I.F. PRI. TRIMMER	100-230 MMF
C20	1ST I.F. SEC.	50-135 MMF
C21	2ND I.F. PRI.	50-135 MMF
C22	2ND I.F. SEC. TRIMMER	100-230 MMF
C23	PAPER CAPACITOR	.01 MF
C24	PAPER	.004 MF
C25	PAPER	.002 MF
C26	PAPER	.001 MF
C27	MICA	500 MMF *
C28	MICA	250 MMF
C29	PAPER	.05 MF
C30	MICA	200 MMF
C31	DRY ELECT.	8 MF
C32	DRY ELECT.	10 MF
C33	DRY ELECT.	8 MF
C34	DRY ELECT.	12 MF
C35	MICA	250 MMF
C36	PAPER	.001 MF
C37	PAPER CAPACITOR	.05 MF

SYMBOL	DESCRIPTION	
R1	VOL. CONT. 2 MEG. TAP AT 450000 ~	
R2	CARBON RESISTOR	47,000 ~
R3		470000 ~
R4		27,000 ~
R5		470000 ~
R6		100000 ~
R7		68000 ~
R8		68000 ~
R9		220,000 ~
R10	CARBON	2.2 MEG ~
R11	CANDOHM	
R12	MOULDED	410 ~
R13	CARBON	220000 ~
R14		100000 ~
R15		20000 ~
R16		270000 ~
R17		220000 ~
R18		2200 ~
R19		3900 ~
R20		1 MEG
RZ1	CARBON RESISTOR	470000 ~
L1	WAVE TRAP COIL	
L2	'A' ANT. COIL	
L3	'D-B' ANT. COIL	
L4	'A' OSC. COIL	
L5	'D-B' OSC. COIL	
L7	1ST I.F. TRANS. COIL	
L8	2ND I.F. TRANS. COIL	
S1	BAND CHANGE SWITCH	
S2	TONE CONTROL SWITCH	
S3	POWER SWITCH	
S4	PHONO.-RADIO SWITCH	
T1	OUTPUT TRANS.	
T2	POWER TRANS.	

* USED ON MODEL FE 68 ONLY

Model FE-68

Rating Label	Power Consumption (Watts)
V6	105
V5	105

Models FE-62 and FE-67

Rating Label	Power Consumption (Watts)
A	75
C	80
V	80

Tuning Frequency Range

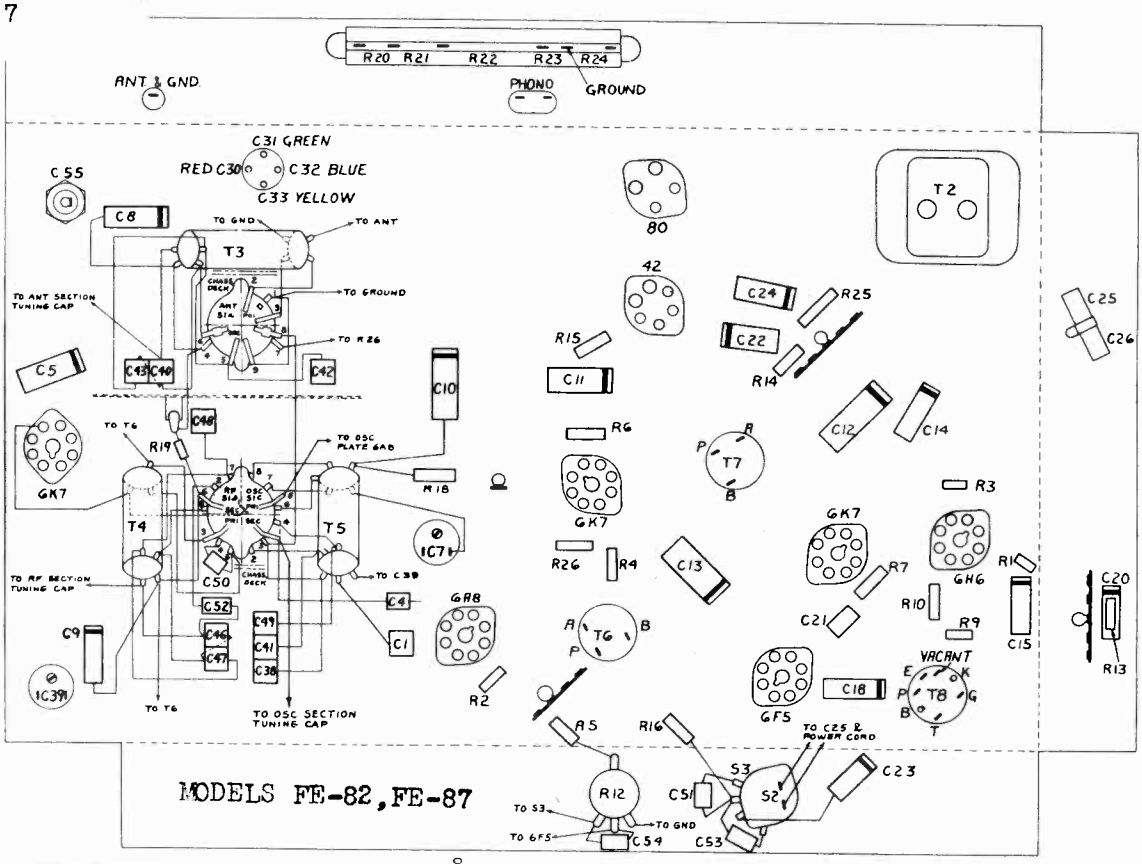
Band "A"	140–370 kc
Band "B"	540–1600 kc
Band "D"	5800–22,000 kc

Intermediate Frequency ..... 455 kc

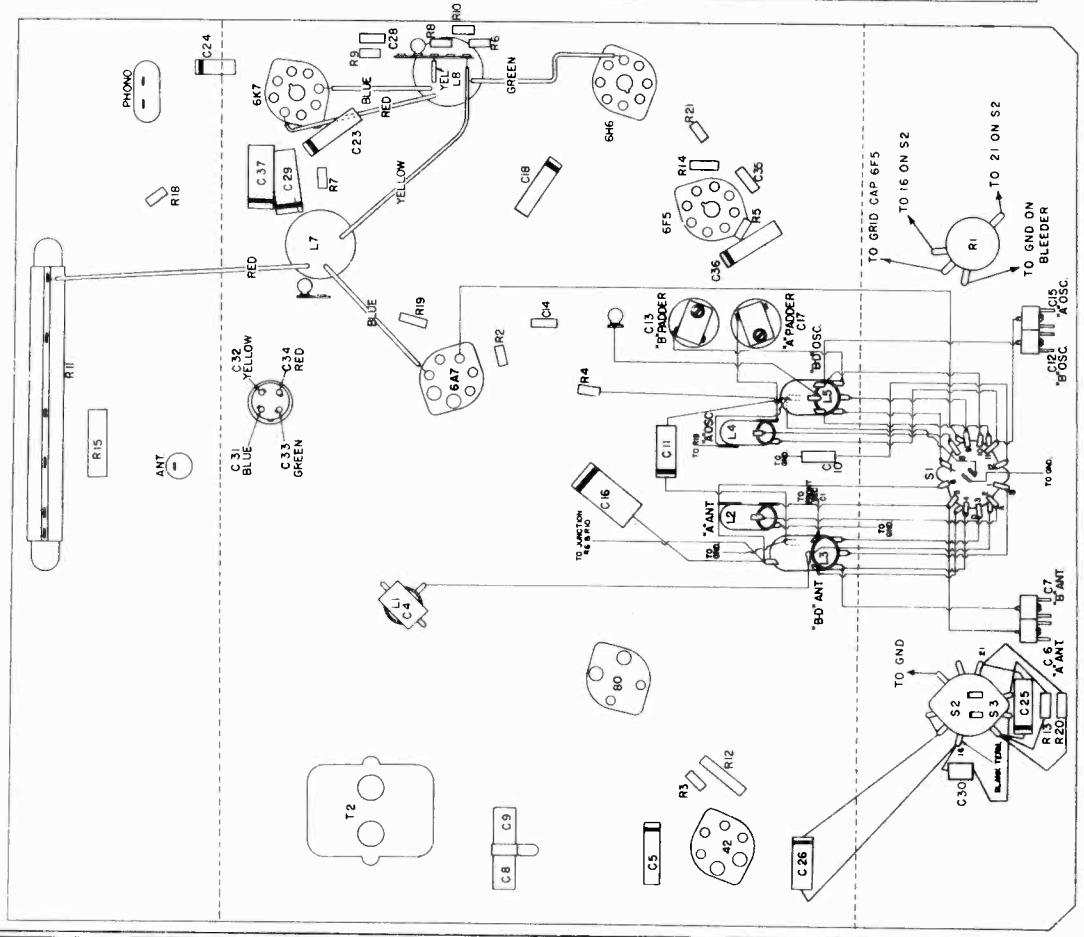
FOR OTHER DATA SEE INDEX

MODELS FE-62,
FE-67, FE-68
MODELS FE-82,
FE-87

GENERAL ELECTRIC CO.



MODELS FE-82, FE-87



Chassis Parts Layout

MODELS FE-62, FE-67, FE-68

Symbol	Description
C1	Tuning condenser
C2A	"B" band antenna trimmer
C2B	"B" band oscillator trimmer
C2C	"D" band antenna trimmer
C2D	"D" band oscillator trimmer
C3	"B" oscillator padder
C8	6 mmf. mica capacitor
C9	100 mmf. mica capacitor
C10	47 mmf. mica capacitor
C11	3600 mmf. ±5% mica capacitor
C12	220 mmf. mica capacitor
C13	220 mmf. mica capacitor
C14	0.1 mfd. paper capacitor
C15	.05 mfd. paper capacitor
C16	.015 mfd. paper capacitor
C17	.005 mfd. paper capacitor
C18	.005 mfd. paper capacitor
C19	.05 mfd. paper capacitor
C20	.01 mfd. paper capacitor
C21	.05 mfd. paper capacitor
C22	0.1 mfd. paper capacitor
C23	.01 mfd. paper capacitor
C24	0.1 mfd. paper capacitor
C25	.01 mfd. paper capacitor
C26	30 mfd. 250 V. dry electrolytic
C27A	40 mfd. 250 V. dry electrolytic
C27B	20 mfd. 250 V. dry electrolytic
L1	"B" band Beam-a-Scope
L2	"D" band Beam-a-Scope
L3	Oscillator coil
P1	Dial lamp, MAZDA No. 11
P2	Dial lamp, MAZDA No. 44
R1	0.5 megohm volume control
R2	1000 ohms carbon resistor
R3	1.0 megohm carbon resistor
R4	33,000 ohms carbon resistor
R5	27 ohms carbon resistor
R6	470,000 ohms carbon resistor
R7	2.2 megohms carbon resistor
R8	22,000 ohms carbon resistor
R9	4.7 megohms carbon resistor
R10	100,000 ohms carbon resistor
R11	1.0 megohm carbon resistor
R12	3300 ohms carbon resistor
R13	39,000 ohms carbon resistor
R14	470,000 ohms carbon resistor
R15	220 ohms carbon resistor
R16	3900 ohms 5 W. wire wound resistor
R17	30 ohms 2 W. wire wound resistor
R18	BL42D ballast resistor
S1	Band switch
S2	Power switch
T1	1st I.F. transformer
T2	2nd I.F. transformer
T3	Output transformer

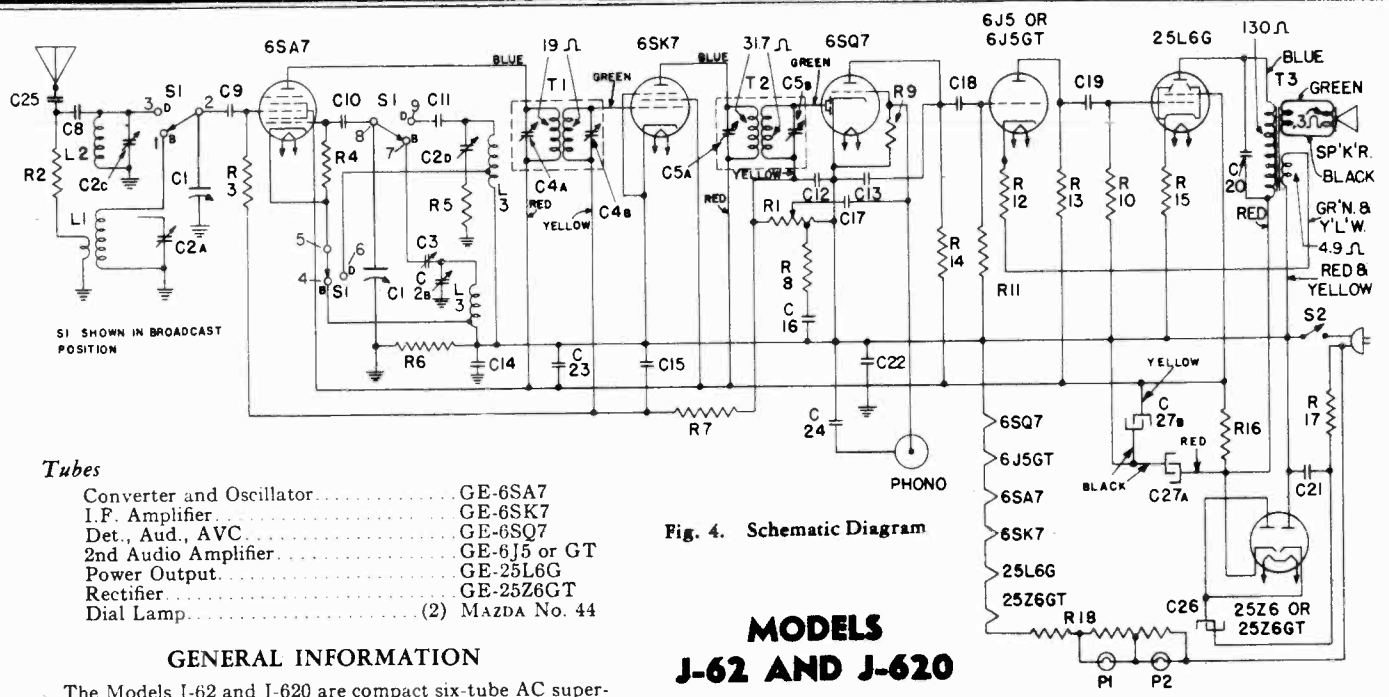


Fig. 4. Schematic Diagram

MODELS J-62 AND J-620

Tubes

Converter and Oscillator	GE-6SA7
I.F. Amplifier	GE-6SK7
Det., Aud., AVC	GE-6SQ7
2nd Audio Amplifier	GE-6J5 or GT
Power Output	GE-25L6G
Rectifier	GE-25Z6GT
Dial Lamp	(2) MAZDA No. 44

GENERAL INFORMATION

The Models J-62 and J-620 are compact six-tube AC superheterodyne receivers employing General Electric Pre-tested Tubes. Features of design include dual built-in Beam-a-Scopes, visualux dial, voltage-doubling rectifier system, broadcast and short-wave coverage, and automatic volume control.

Both models are Underwriters' approved and use the same chassis. Model J-62 has a mahogany cabinet. Model J-620 uses a bleached mahogany cabinet.

If an excessive amount of hum is noticed while the receiver is operating, reverse the power plug in the receptacle.

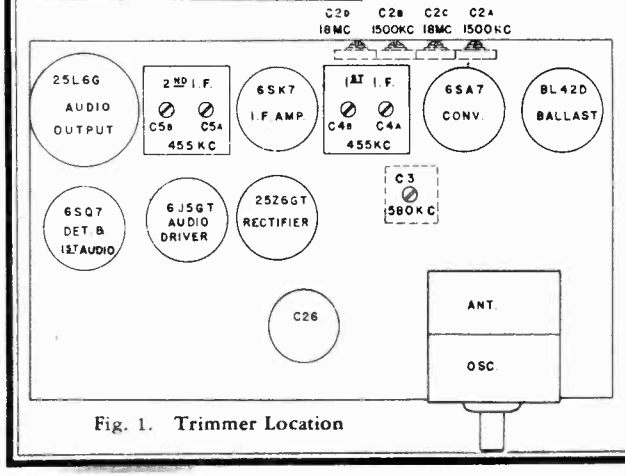


Fig. 1. Trimmer Location

SPECIFICATIONS

Electrical Rating

Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
115 AC	25-60	55

Tuning Frequency Range

Band "B"	540–1600 KC
Band "D"	5800–18,000 KC

Intermediate Frequency ..... 455 KC

Electrical Power Output (117 Line Volts)

Undistorted	3 watts
Maximum	4.5 watts

Loud-speaker—"Alnico" Magnet Dynamic

Outside Cone Diameter	5 inches
Voice Coil Impedance (400 cycles)	3.5 ohms

SPECIAL SERVICE INFORMATION

The following data will be very useful to servicemen equipped with vacuum-tube voltmeters or similar voltage-measuring instruments.

(1) Stage Gains*

Antenna Post to Converter Grid at 1000 KC	4.3
Converter Grid to 6SK7 Grid at 1000 KC	35
Converter Grid to 6SK7 Grid at 455 KC	42
6SK7 Grid to 6SQ7 Diode Plate at 455 KC	100

(2) Audio Gain

A 400-cycle signal of .06 volts across the volume control will give approximately ½-watt speaker output. (Volume control turned to maximum.)

(3) DC voltage developed across oscillator grid resistor (R-4) averages at

1000 KC	10.5
10,000 KC	8.0

* Variations of +10%, −20% permissible. All readings obtained with enough input signal to give ½-watt speaker output.

CHASSIS REMOVAL

NOTE: Care must be exercised in removing either the cabinet back or the chassis to avoid changing the shape of either the short-wave or broadcast loops. These loops are factory formed to give a certain inductance and any alterations in the loops in the field will throw the chassis out of alignment.

To remove the chassis proceed as follows: Pry loose the four fasteners which hold the cabinet back in position. Disconnect the speaker leads from the speaker terminals. Unscrew the woodscrew which secures the short-wave loop to the cabinet. Remove the three chassis bolts and knobs. The chassis is now free from the cabinet.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.	455 KC
Band "B"	1500 and 580 KC
Band "D"	18,000 and 6000 KC

The location of trimmers for the above models is shown in Fig. 1. All R.F. trimmers are accessible through holes in the back cover or through the bottom of the cabinet.

I.F. Alignment

Connect an output meter across the voice coil. Rotate the volume control to maximum. Completely close the gang condenser plates and set the dial pointer to the first dial mark at the low end of the scale. Turn the band switch to "B" band (counterclockwise).

Set test oscillator to 455 KC and apply signal to the control grid of the 6SA7 tube through a .05 mfd. capacitor. Keep the test oscillator output as low as a readable meter reading will permit. Adjust all I.F. trimmers for maximum meter reading.

R.F. Alignment

The use of a standard I.R.E. dummy antenna in making all R.F. alignments is recommended. R.F. alignment can be performed by loop coupling the generator signal to the receiver Beam-a-Scopes if care is exercised not to overcouple the two circuits. Keeping a distance of two feet or more between the generator loop and the receiver Beam-a-Scope will generally insure freedom from overcoupling. The relative position of the Beam-a-Scopes with respect to the chassis materially affects R.F. alignment; therefore, all R.F. alignments should be made with the chassis and Beam-a-Scopes mounted in the cabinet. In keeping with this recommendation all R.F. alignment trimmers are available through holes in the bottom deck and back of the cabinet. Metal objects such as meters, tools, etc., should not be placed near the receiver cabinet. Also the receiver should be kept away from large metal objects such as radiators, metal-top tables, etc.

Set the signal generator to 1500 KC. Align (C-2B) to the signal while the dial pointer is on the 1500 KC mark. Peak (C-2A) for maximum output. Change signal to 580 KC and tune receiver to signal. Peak (C-3) on the 580 KC signal by rocking the gang condenser. Retrim at 1500 KC.

Turn the band switch to "D" band. Align (C-2D) at 18 MC. Peak (C-2C) while rocking the gang condenser. The image of the 18 MC signal should be heard at 17.09 MC when (C-2D) is on the proper peak. Change signal to 6 MC and retune the receiver. Check the receiver for increased output at the 6 MC point by pinching or separating slightly the turns of wire in the short-wave Beam-a-Scope mounted on the side of the chassis. Retrim at 18 MC.

If the chassis is to be aligned outside of the cabinet it will no longer be possible to use the dial scale as a tuning reference since the dial scale is fastened to the cabinet. Use must be made, therefore, of a 0–180° calibrated scale which is cemented to the back of the dial reflector plate. From the reference chart Fig. 3 the degree readings for corresponding frequency settings may be obtained by laying a straight edge across the chart perpendicular to the line of figures and sliding the straight edge along to the various frequency settings desired. The degree readings will be found on either of the degree scales. To use these degree readings, first completely close the gang condenser plates and then slide pointer along the cord until the inside edge of the right-hand pointer-guide clip is in line with the 0° mark. (See Fig. 2.) By using this edge of the clip as the degree-scale pointer the receiver may be tuned to any frequency. Example: By rotating the tuning control until this edge of the clip is in line with 160° the receiver will be tuned to 1500 KC on the broadcast band. The alignment may now proceed as previously described.

NOTE: After moving the pointer along the cord to use one of the guide clips as a reference pointer for the degree scale, it will be necessary after reassembly in the cabinet for the gang condenser plates to be closed and the pointer to be moved back along the cord so that it lines up with the first dial markings on the left.

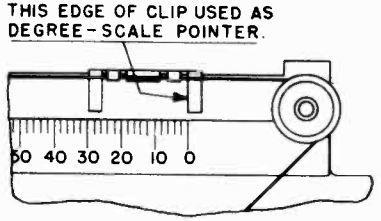


Fig. 2. Pointer-guide-clip Setting with Gang Condenser Closed

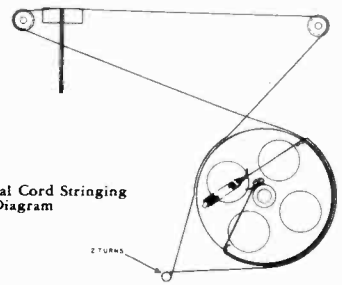


Fig. 7. Dial Cord Stringing Diagram

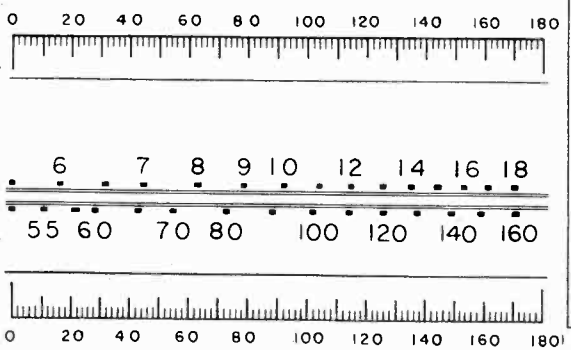


Fig. 3. Frequency-degree Reference Chart

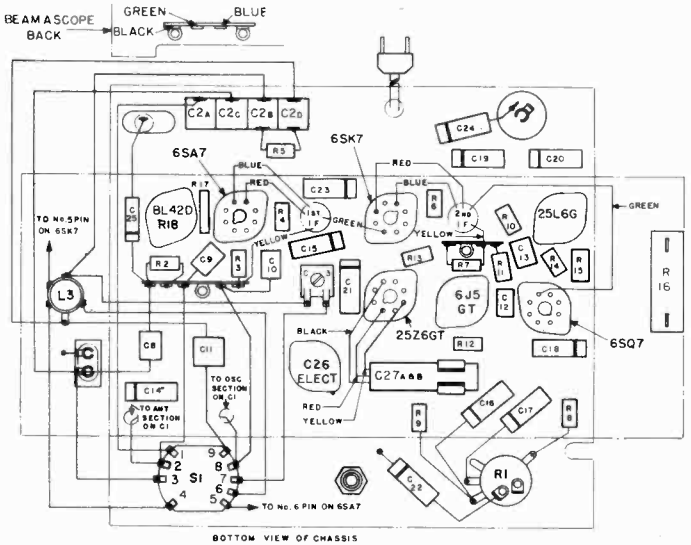


Fig. 5. Chassis Parts Layout

NOTE: The oscillator coil and band-switch terminals are numbered in the Chassis Parts Layout, Fig. 5, to assist in locating the corresponding numbered joints on the Schematic Diagram, Fig. 4. This numbering will also assist in rewiring if the coil or switch is replaced.

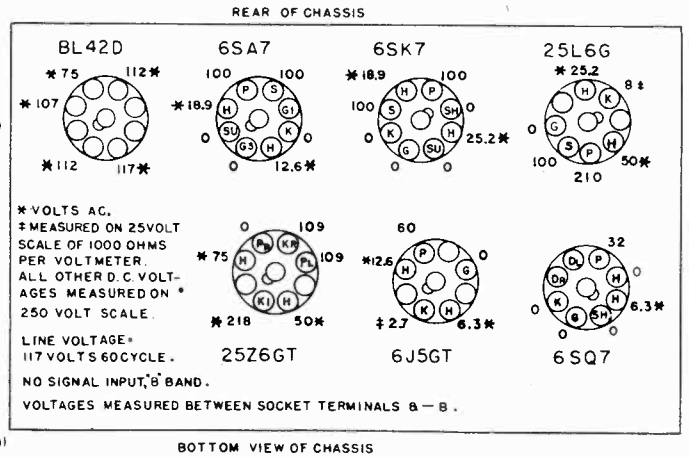


Fig. 6. Socket Voltages

SOCKET VOLTAGES

MODELS FE-82, FE-87

Tube No.	Plate to Ground Volts D-c	Screen Grid to Ground Volts D-c	Cathode to Ground Volts D-c	Cathode Current M.A.	Heater Volts A-c
6K7 R.F. Amplifier	232	97	0	7.5	6.3
6A8 Oscillator	180	....	0	10.6	6.3
6A8 Converter	232	97	0		
6K7 1st I.F. Amp.	232	95	"A" & "B" band 6 "D" band 3	"A" & "B" band 1.5 "D" band 3.4	6.3
6K7 2nd I.F. Amp.	245	95	3.52	5.7	6.3
6F5 Audio Amplifier	110*	....	1.3	.24	6.3
42 Output	236	252	16	39.0	6.3
80 Power Rectifier	342/684 Rms.	....	345	75	5.0

A-C line voltage 115 on primary 115-volt tap. No signal input. 1000 ohms per voltmeter. Dial pointer at 530 kc.
* Measured on 500-volt scale.

VOLTAGE CHART
Model JE-81

Tubes	Plate to Gnd. Volts	Screen to Gnd. Volts	Cathode to Gnd. Volts	Filament Volts
6SK7 (R.F.)	135	95	2.6	6.4
6K8	Conv.—135 Osc.—75	95	2.6	6.4
6SK7 (I.F.)	135	95	3	6.4
6J5G/6J5GT	0		0	6.4
6SQ7	80		1	6.4
6Y6G	210	135	13	6.4
5Y3G	460 V.A.C. Plate to Plate		220	5.1
6U5	135		0	6.4

Line Volts—110 AC on 110-volt tap—Pointer set at 560 KC on "B" band. No signal input.

5Y3G Cathode Current—80 ma.

VOLTAGE CHART
Model JE-810

Tubes	Plate to Gnd. Volts	Screen to Gnd. Volts	Cathode to Gnd. Volts	Filament Volts
6SK7 (R.F.)	135	95	2.5	6.4
6K8	Conv.—135 Osc.—75	95	2.5	6.4
6SK7 (I.F.)	135	95	3.2	6.4
6J5G/6J5GT	0		0	6.4
6SQ7	40		1	6.4
25C6G	200	135	13	25.5
25Z6G			210	25.5
6U5	135		0	6.4

Line Volts—240 AC or DC—Pointer set at 560 KC on "B" band.
No signal input.
25Z6G Cathode Current—85 ma.
Filament voltages on Model JE-810 will seldom be equal for same heater ratings, as tubes are in series and heater resistance varies from tube to tube.

SOCKET VOLTAGES

MODELS FE-112, FE-116, FE-119

Tube No.	Plate to Ground Volts DC	Screen Grid to Ground Volts DC	Cathode to Ground Volts DC	Cathode Current M.A.	Heater Volts AC
6K7 R.F. Amplifier	230	95	0	7.1	6.5
6J5-G Oscillator	195	....	0	11.0	6.5
6L7 Converter	235	90	0	7.7	6.5
6K7 1st I.F. Amp.	230	95	0	6.7	6.5
6K7 2nd I.F. Amp.	205	95	3.3	8.6	6.5
6F5 Audio Amp.	170	....	1.5	0.5	6.5
6L6-G Output	300	240	14.0	59.0	6.5
6U5 Tuning Indicator	....	195 (Target)	0	4.0	6.5
5Z3 Power Rectifier	345 A.C.	....	368	110	5.1

A-C line voltage 125 volts on primary 125-volt tap.
1000 ohms per-voltmeter. Dial pointer 5500 kc. on "D-1" band. No signal.

SOCKET VOLTAGES

MODELS FE-62, FE-67, FE-68

Tube No.	Plate to Ground Volts D-C	Screen Grid to Ground Volts D-C	Cathode to Ground Volts D-C	Cathode Current M.A.	Heater Volts A-C
6A7 Oscillator	175	....	0	10.4	6.5
6A7 Converter	236	95	0		
6K7 I.F. Amplifier	220	105	0	10.6	6.5
6H6 Det. and AVC Bias Section	....	....	−3.4	....	6.5
6H6 Det. and AVC Signal Section	....	....	....		
6F5 Audio Amplifier	98 *	....	1.3	0.2	6.5
42 Output	253	272	16.7	39.8	6.5
80 Power Rectifier	680/340 R.M.S.	....	340 D-C	68.3	5.0

A-C line voltage 120—No signal input—1000 ohms per volt meter—dial pointer at 540 K.C.
* Measured on 500-volt scale.

VOLTAGE CHART (Model HE-74 and HE-74L)

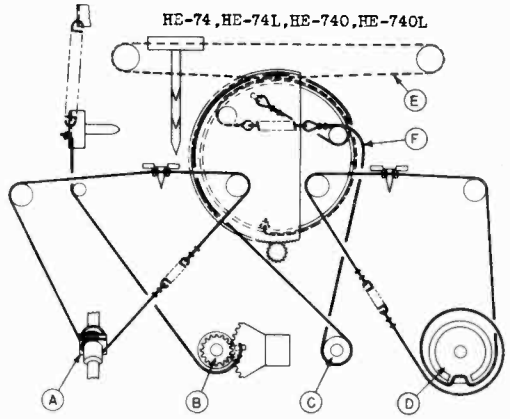
Tubes	Plate to Gnd. Volts	Screen to Gnd. Volts	Cathode to Gnd. Volts	Filament Volts
6SK7	135	90	4	6.5
6K8	Conv.—135 Osc.—95	90	3	6.5
6SK7	125	90	3	6.5
6SQ7	70		1	6.5
6Y6G	190	135	13.5	6.5
5Y3G	460 V. AC Plate to Plate		210	5.1
6U5	135		0	6.5

Line Volts—110 AC on 110-volt tap—Pointer set at 560 K.C. on "B" band—No signal input.
5Y36 Cathode Current—98 mils.

VOLTAGE CHART (Models HE-740 and HE-740L)

Tubes	Plate to Gnd. Volts	Screen to Gnd. Volts	Cathode to Gnd. Volts	Filament Volts
6SK7	145	95	4.3	6.1
6K8	Conv.—145 Osc.—136	95	2.9	6.1
6SK7	135	95	3.2	6.6
6SQ7	78		1.0	6.6
25C6G	210	145	13	26.5
25Z6G			220	26.5
6U5	145		1.0	6.5

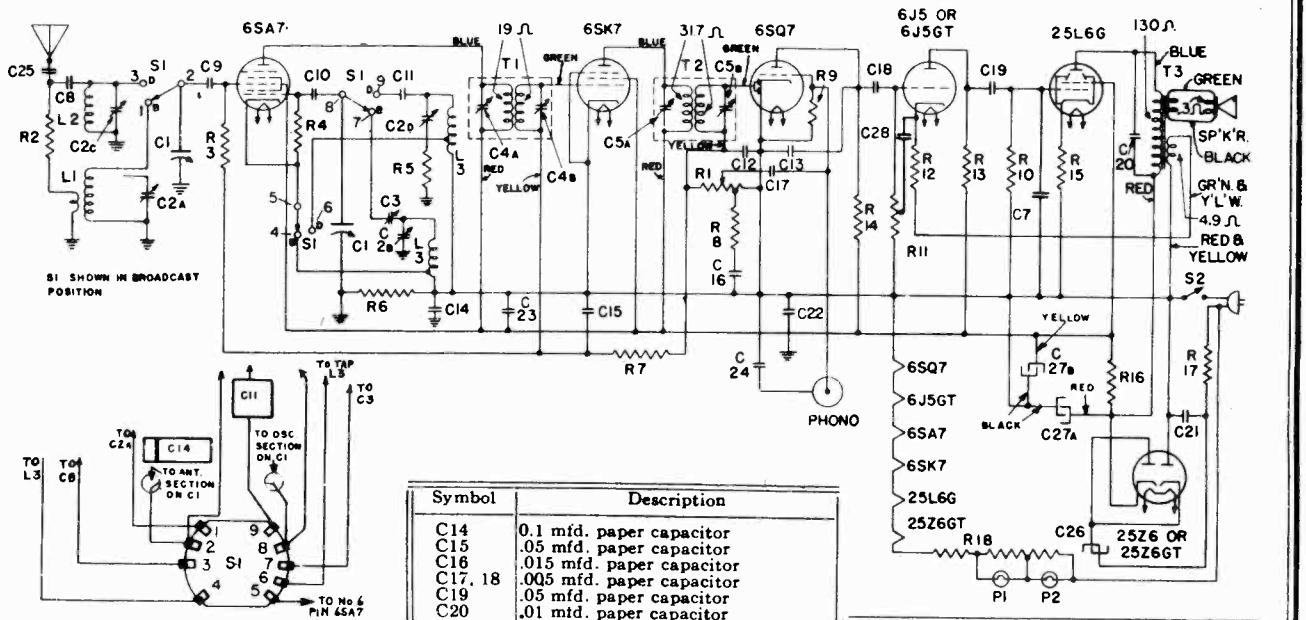
Line Volts—240 AC or DC—Pointer set at 560 K.C. on "B" band—No signal input.
25Z6G Cathode Current—100 mils.



Dial Drive Mechanism

MODEL J63

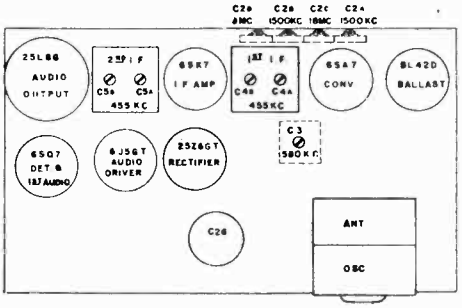
GENERAL ELECTRIC CO.

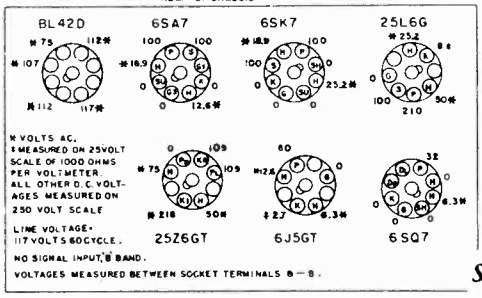


Symbol	Description
C1	Tuning condenser
C2A	"B" band antenna trimmer
C2B	"B" band oscillator trimmer
C2C	"D" band antenna trimmer
C2D	"D" band oscillator trimmer
C3	"B" oscillator padder
C7	220 mmf. mica capacitor
C8	6 mmf. mica capacitor
C9	100 mmf. mica capacitor
C10	47 mmf. mica capacitor
C11	3600 mmf. ±5% mica capacitor
C12, 13	220 mmf. mica capacitor

Symbol	Description
C14	0.1 mfd. paper capacitor
C15	.05 mfd. paper capacitor
C16	.015 mfd. paper capacitor
C17, 18	.005 mfd. paper capacitor
C19	.05 mfd. paper capacitor
C20	.01 mfd. paper capacitor
C21	.05 mfd. paper capacitor
C22	0.1 mfd. paper capacitor
C23	.01 mfd. paper capacitor
C24	0.1 mfd. paper capacitor
C25	.01 mfd. paper capacitor
C26	30 mfd. 250 V. dry electrolytic
C27A	40 mfd. 250 V. dry electrolytic
C27B	20 mfd. 250 V. dry electrolytic
C28	.01 mfd. paper capacitor
L1	"B" band Beam-a-Scope
L2	"D" band Beam-a-Scope
L3	Oscillator coil
R1	0.5 megohm volume control
R2	1000 ohms carbon resistor
R3	1.0 megohm carbon resistor
R4	33,000 ohms carbon resistor
R5	27 ohms carbon resistor

Symbol	Description
R6	470,000 ohms carbon resistor
R7	2.2 megohms carbon resistor
R8	22,000 ohms carbon resistor
R9	4.7 megohms carbon resistor
R10	100,000 ohms carbon resistor
R11	1.0 megohm tone control
R12	3300 ohms carbon resistor
R13	39,000 ohms carbon resistor
R14	470,000 ohms carbon resistor
R15	220 ohms carbon resistor
R16	3900 ohms 5 W. wire wound resistor
R17	30 ohms 2 W. wire wound resistor
R18	BL42D ballast resistor
S1	Band switch
S2	Power switch
T1	1st I.F. transformer
T2	2nd I.F. transformer
T3	Output transformer





Step	Connect Test-Osc. to	Test-Osc. Setting	Pointer Setting	Adjust Trimmers for Max. Output
1	6SK7 IF Grid in series with .05 mfd.	455 KC	"BC" Band 550 KC	C5A & C5B
2	6SA7 Conv. grid in series with .05 mfd.	455 KC	"BC" Band 550 KC	C4a & C4b
3	Capacity Coupled	580 KC	"BC" Band 580 KC	C3**
4	Capacity Coupled	1500 KC	"BC" Band 1500 KC	C2b (Osc.)
5	Capacity Coupled	1500 KC	"BC" Band 1500 KC	C2a (Ant.)
6	REPEAT STEP 3			
7	Capacity Coupled	18 MC	"SW" Band 18 MC	C2d * (Osc.)
8	Capacity Coupled	18 MC	"SW" Band 18 MC	C2c** (Ant.)

* Use minimum capacity peak.
** Rock gang condenser when making alignment.

Electrical Rating

115 Volts, 25-60 cycles AC; or 115 volts DC.....55 watts

Tuning Frequency Range

Broadcast Band.....540-1600 KC
Short-wave Band.....5800-18,000 KC

Intermediate Frequency.....455 KC.

Electrical Power Output (117 line volts)

Undistorted.....3 watts
Maximum.....4.5 watts

Loud-speaker—Alnico Magnet Dynamic

Outside Cone Diameter.....5 inches
Voice Coil Impedance (400 cycles).....3.5 ohms

Special Service Information

The following data will be very useful to servicemen equipped with vacuum-tube voltmeters or similar voltage-measuring instruments.

(1) Stage gains
Antenna Post to Converter Grid—4.3 at 1000 KC
Converter Grid to 6SK7 Grid—42 at 455 KC
6SK7 Grid to 6SQ7 Diode Plate—100 at 455 KC

(2) Audio gain
.06 volts, 400 cycles signal across volume control with control set to maximum will give approximately ½-watt speaker output.

(3) DC voltage developed across oscillator grid resistor (R4) averages 10.5 volts at 1000 KC or 8.0 volts at 10,000 KC.

* Variations of +10 or −20% permissible.

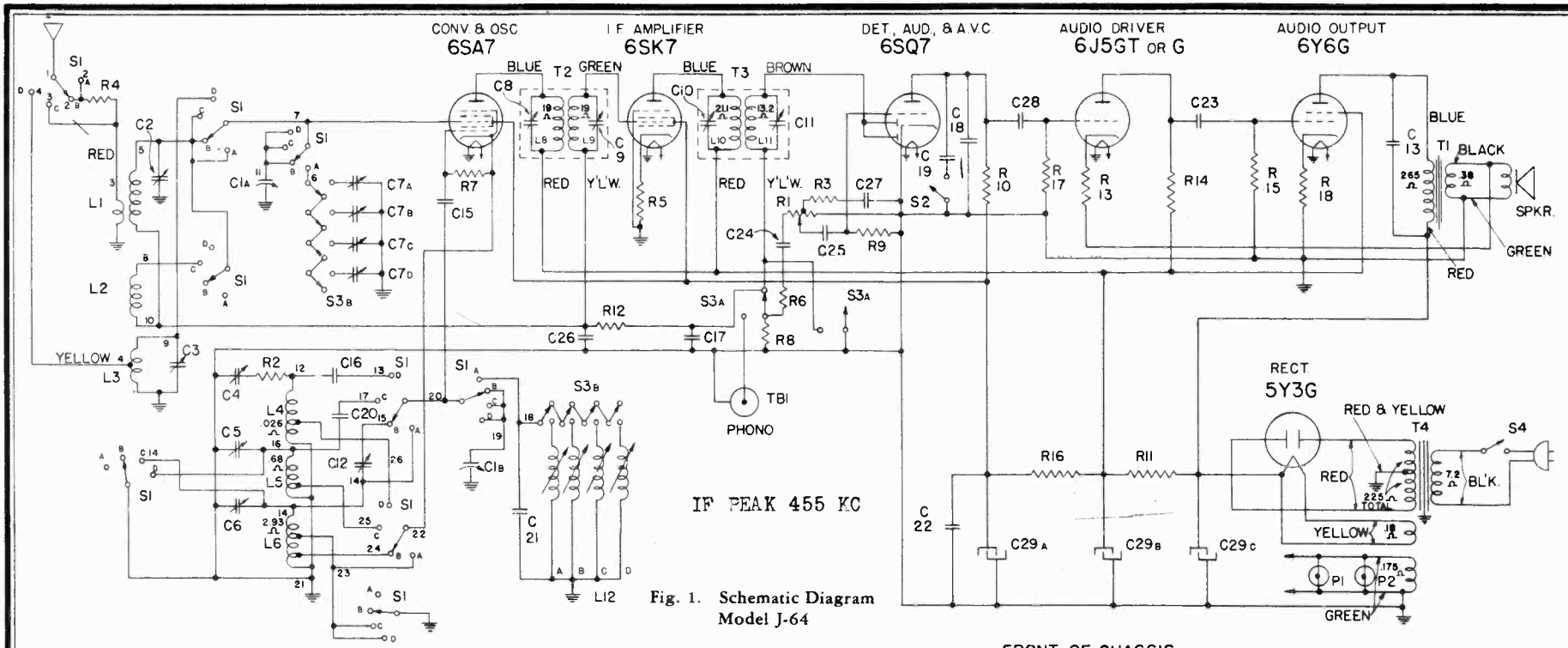
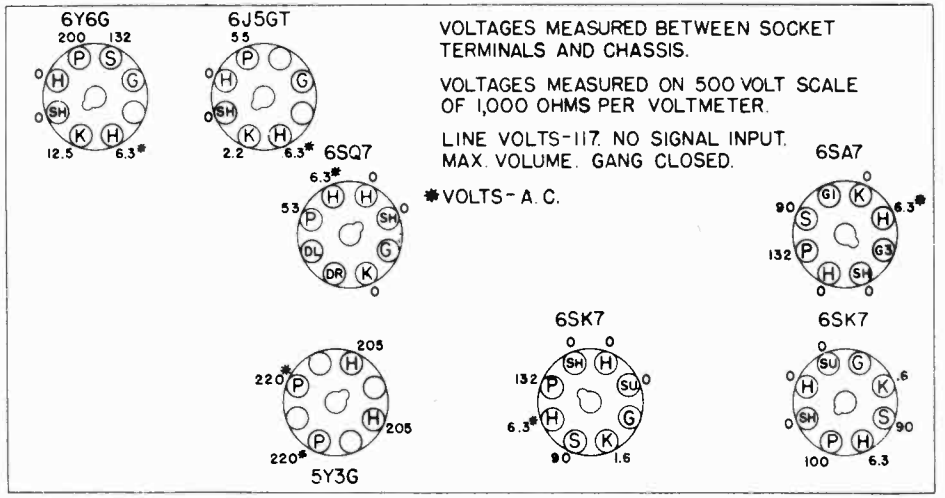


Fig. 1. Schematic Diagram
Model J-64

Symbol	Description	Symbol	Description
C1A	Antenna section of tuning condenser	L6	"BC" band oscillator coil
C1B	Oscillator section of tuning condenser	L12	Station selector coil strip
C2	"BC" band antenna trimmer	P1	Dial lamp, MAZDA No. 44
C3	"SW2" band antenna trimmer	P2	Dial lamp, MAZDA No. 44
C4	"SW2" band oscillator trimmer	R1	2 megohm volume control
C5	"SW1" band oscillator trimmer	R2	18 ohms carbon resistor
C6	"BC" band oscillator trimmer	R3	100,000 ohms carbon resistor
C7	Station selector antenna trimmers	R4	1000 ohms carbon resistor
C12	"BC" band padding trimmer	R5	150 ohms carbon resistor
C13	.01 mfd. paper capacitor	R6	47,000 ohms carbon resistor
C15	47 mmf. mica capacitor	R7	39,000 ohms carbon resistor
C16	.008 mfd. polystyrene capacitor	R8	470,000 ohms carbon resistor
C17	220 mmf. mica capacitor	R9	4.7 megohms carbon resistor
C18	150 mmf. mica capacitor	R10	330,000 ohms, carbon resistor
C19	.002 mfd. paper capacitor	R11	2700 ohms 2 W carbon resistor
C20	2400 mmf. ±5% mica capacitor	R12	2.2 megohms carbon resistor
C21	750 mmf. ±5% silvered mica capacitor	R13	3300 ohms carbon resistor
C22	.01 mfd. paper capacitor	R14	100,000 ohms carbon resistor
C23	.01 mfd. paper capacitor	R15	330,000 ohms carbon resistor
C24	.005 mfd. paper capacitor	R16	3300 ohms 1 W carbon resistor
C25	.02 mfd. paper capacitor	R17	470,000 ohms carbon resistor
C26	.05 mfd. paper capacitor	R18	270 ohms 1 W carbon resistor
C27	.005 mfd. paper capacitor	S1	Band switch
C28	.005 mfd. paper capacitor	S2	Tone control
C29A	10 mfd. 250 V. dry electrolytic	S3A	Phono-FM-Tel switch
C29B	15 mfd. 250 V. dry electrolytic	S3B	Touch tuning switches
C29C	30 mfd. 250 V. dry electrolytic	S4	Power switch on tone control
L1	"BC" and "SW1" band Beam-a-Scope	T1	Output transformer
L2	"SW1" band antenna coil	T2	1st I.F. transformer
L3	"SW2" band Beam-a-Scope	T3	2nd I.F. transformer
L4	"SW2" band oscillator coil	T4 or T4	50–60-cycle power transformer 25-cycle power transformer
L5	"SW1" band oscillator coil		



BOTTOM VIEW OF CHASSIS

Fig. 5. Socket Voltages

SPECIFICATIONS

Electrical Rating

Rating	Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
A	110–125	50–60	75
C	110–125	25	85

Tuning Frequency Range

Broadcast Band.....540–1600 KC
Short-wave Band No. 1.....2300–7000 KC
Short-wave Band No. 2.....7000–22,000 KC

Intermediate Frequency.....455 KC

Electrical Power Output

Undistorted.....2.85 watts
Maximum.....4.5 watts

Tone Control.....3-position

Loud-speaker—"Alnico" Magnet Dynamic

Outside Cone Diameter.....6½ inches
Voice Coil Impedance.....3.5 ohms

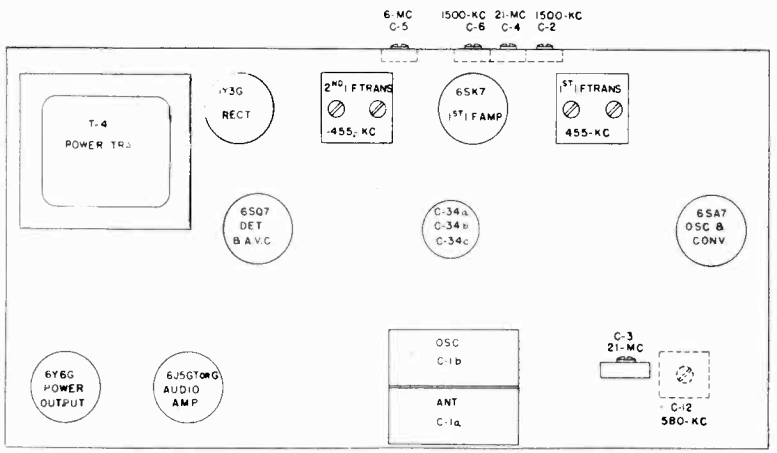


Fig. 4. Tube and Trimmer Location

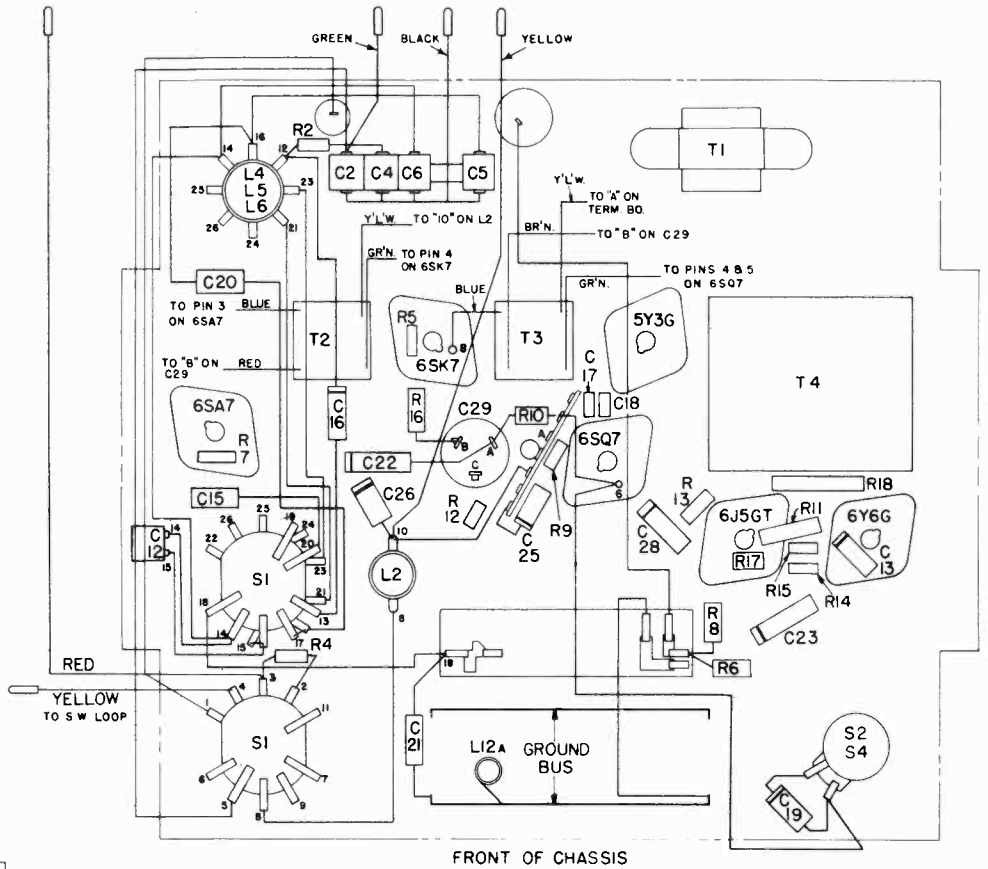


Fig. 6. Chassis Parts Layout

Tubes

Converter and Oscillator.....GE-6SA7
I.F. Amplifier.....GE-6SK7
Det., Aud., AVC.....GE-6SQ7
Audio Driver.....GE-6J5GT
Audio Output.....GE-6Y6G
Rectifier.....GE-5Y3G
Dial Lamp.....(2) MAZDA No. 44

NOTE: The oscillator coil and band-switch terminals are numbered in the Chassis Parts Layout, Fig. 6, to assist in locating the corresponding numbered points on the Schematic Diagram, Fig. 1. This numbering will also assist in rewiring if the coil or switch is replaced. I.F. transformer connections are shown as an aid in replacement.

GENERAL INFORMATION

Model J-64 is a six-tube, superheterodyne receiver designed to operate from an alternating-current power supply. The receiver incorporates the latest developments in radio of which the General Electric Dual Beam-a-Scopes are notable. Broadcast and short-wave No. 1 signals are selected by the Beam-a-Scope which is mounted on the cabinet back. Short-wave No. 2 signals are selected by the Beam-a-Scope which is mounted on the cabinet above the chassis. Additional features include single-ended tubes, iron-core oscillator station-selector coils, four feathertouch tuning station keys, one Phono-Frequency Modulation-Television key, tone monitor circuit and automatic volume control.

Phono-FM-Tel

This receiver is equipped with a pin jack on the rear apron of the chassis and a Phono-FM-Tel key for adapting it to use with record players, frequency modulation converters and television picture receivers with sound converters. General Electric plug, Stock No. RP-145, fits the pin jack.

Setting Up the Receiver

The following remarks will assist the serviceman in correctly setting up this receiver for use:

(1) In order to press the volume or tuning knobs all the way on their respective shafts, the dial reflector plate should be held in place by pressure from the rear.
(2) The black speaker lead should be connected to the speaker terminal which is grounded to the speaker frame.
(3) A method of setting up station keys which will assure driftproof adjustments is to screw the iron core all the way out and then turn slowly inward until the desired station is tuned in.

Chassis or Beam-a-Scope Removal

NOTE: Care must be exercised in removing either the cabinet back or the chassis to avoid changing the shape of either the short-wave or broadcast loop. These loops are factory formed to give a certain inductance and any alterations in the loops in the field will throw the chassis out of alignment.

When disconnecting the short-wave loop leads from the loop, be sure to support the loop while pulling off the connections. Failure to support the loop may cause the staples to loosen and result in the loop rattling in the cabinet.

Loud-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly.

NOTE—In no case should the magnet be removed from the assembled position.

Special Service Information

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains *
  (a) Antenna Post to Converter Grid at
    1000 KC 3.7
    4000 KC 2.8
    18,000 KC 2.0
  (b) R.F. on Converter Grid to I.F. on 1st I.F. Grid at
    1000 KC 35
    4000 KC 35
    18,000 KC 50
  (c) I.F. on Converter Grid to I.F. on 1st I.F. Grid at
    455 KC 45
  (d) I.F. Amplifier Grid to Detector Plate at
    455 KC 65
(2) Voltage across Volume Control to give ½-watt Speaker Output at
    400 cycles ..... .04 volts
(3) DC Voltage Developed across Oscillator Grid Resistor (R-7) at
    1000 KC 13
    4000 KC 11
    18,000 KC 9

* Variations of ± 20 per cent permissible. All readings obtained with enough input signal to give ½-watt speaker output.

ALIGNMENT PROCEDURE

The alignment procedure is given in table form below. The use of a standard I.R.E. dummy antenna in making all R.F. alignments is recommended. R.F. alignment can be performed by loop coupling the generator signal to the receiver Beam-a-Scopes if care is exercised not to overcouple the two circuits. Keeping a distance of two feet or more between the generator loop and the receiver Beam-a-Scope will generally insure freedom from overcoupling. The relative position of the Beam-a-Scopes with respect to the chassis materially affects R.F. alignment; therefore, all R.F. alignments should be made with the chassis and Beam-a-Scopes mounted in the cabinet. In keeping with this recommendation all R.F. alignment trimmers are available through holes in the bottom deck and back of the cabinet as shown in Fig. 3. Metal objects such as meters, tools, etc., should not be placed on top of the receiver cabinet. Also the receiver should be kept away from large metal objects such as radiators, metal-top tables, etc.

R.F. Alignment With Chassis Outside of Cabinet

R.F. alignment can be performed only on the "BC" and "SW1" bands with the chassis outside of the cabinet. Any alignment attempted on "SW2" band will not be satisfactory. The same relative position between the chassis and "BC" Beam-a-Scope should be maintained when aligning outside the cabinet as these components occupy in the cabinet. Since the glass dial scale is fastened to the cabinet it cannot be used for reference during alignment of the chassis outside of the cabinet. Use must be made, therefore, of a 0–180° calibrated scale which is cemented to the back of the dial reflector plate. From the reference chart Fig. 7 the degree readings for corresponding frequency settings may be obtained by laying a straight edge across the chart perpendicular to the line of figures and sliding the straight edge along to the various frequency settings desired. The degree readings will be found on either of the degree scales. To use these degree readings, first completely close the gang condenser plates and then slide the pointer along the cord until the left-hand edge of the pointer-guide slide lines up with the 0° mark. By using this left-hand edge (as viewed from the rear) of the slide as the degree-scale pointer the receiver may be tuned to any frequency. Example: By setting the left-hand edge of the slide to 158° the receiver will be tuned to 1500 KC on the "BC" band.

The "BC" and "SW1" band alignment procedure is the same as outlined in steps 2 to 6 inclusive of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

After the alignment has been performed on the "BC" and "SW1" bands the chassis should be mounted in the cabinet and "SW2" band alignment checked as described in steps 7 to 9 of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

ALIGNMENT CHART

I.F. Alignment with Oscilloscope

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. "BC" Band	455 KC Sweep	I.F. Grid	.05 mfd. or larger	2nd I.F. Trimmers C-10, 11	Gang condenser plates closed. Depress any station key other than Phono-FM-Tel key. Connect audio input of oscilloscope to chassis ground and junction of R6 and R8. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. Finish by retrimming 2nd I.F. trimmers.
2. "BC" Band	455 KC Sweep	Green lead on cabinet back terminal board and chassis gnd.	.05 mfd. or larger	1st I.F. Trimmers C-8, 9	

I.F. Alignment with Output Meter

1. "BC" Band	455 KC with Modulation	Green lead on cabinet back terminal board and chassis gnd.	.05 mfd. or larger	2nd I.F. Trimmers C-10, 11 1st I.F. Trimmers C-8, 9	Gang condenser plates closed. Depress any key other than Phono-FM-Tel key. Connect output meter across voice coil. Keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.

R.F. Alignment With Chassis Mounted in Cabinet

1. "BC" Band					Close gang plates, adjust pointer to first line at left end of tuning scale. Connect output meter across voice coil. Tone control set to "Normal" position.
2. "BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-2)	Set pointer to 1500 KC and tune in signal with (C-6). Peak output with (C-2).
3. "BC" Band	580 KC with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-12)	Set pointer to 580 KC and peak signal while rocking gang condenser.
4. "BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-2)	Retrim for maximum output.
5. Repeat operation 3 if "BC" band trimmers are badly out of alignment.					
6. "SW 1" Band	6 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-5)	Set pointer to 6 MC and peak signal while rocking gang condenser.
7. "SW 2" Band	21 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-4) Ant. (C-3)	Set pointer to 21 MC and tune in signal with (C-4). Peak output with (C-3) while rocking gang condenser. When (C-4) is on proper peak, image of 21 MC signal should be heard 910 KC below or on 20.09 MC.
8. "SW 2" Band	8 MC with Modulation	Antenna Post	I.R.E.		This operation may or may not be necessary depending on how much the short-wave Beam-a-Scope leads have been moved from their correctly dressed positions. Repositioning will be indicated if an increased output meter reading can be obtained by moving the short-wave Beam-a-Scope phosphor-bronze strap connector closer or farther away from the ground lead. The moving should be done with an insulated rod or stick.
9. Repeat operation 7 if the Beam-a-Scope leads are moved in operation 8.					

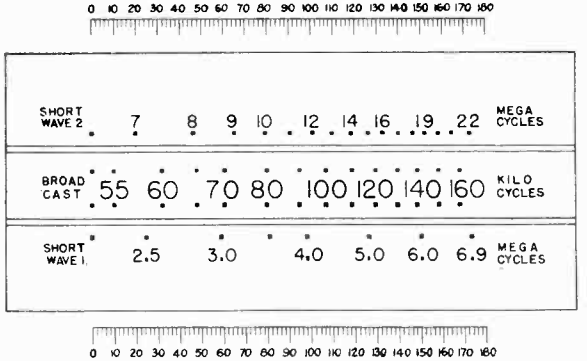


Fig. 7. Frequency-degree Reference Chart

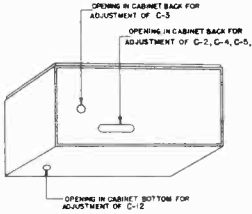


Fig. 3. Cabinet Holes for Trimmer Adjustment

NOTE: After moving the pointer along the cord to use the left-hand edge as a reference pointer for the degree scale, it will be necessary after reassembly in the cabinet for the gang condenser plates to be closed and the pointer to be moved back along the cord so that it lines up with the first dial markings on the left.

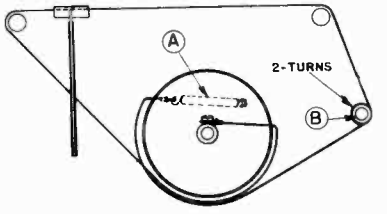
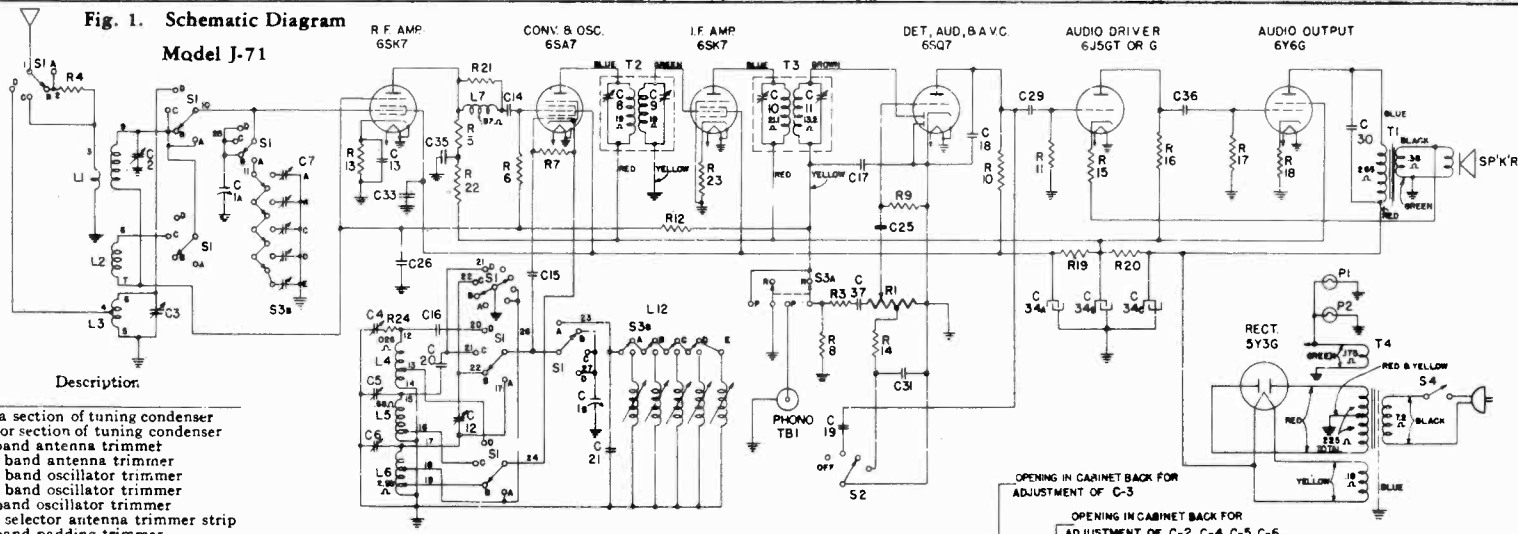


Fig. 2. Dial Drive Stringing Diagram

Fig. 1. Schematic Diagram

Model J-71



Symbol	Description
C1A	Antenna section of tuning condenser
C1B	Oscillator section of tuning condenser
C2	"BC" band antenna trimmer
C3	"SW2" band antenna trimmer
C4	"SW2" band oscillator trimmer
C5	"SW1" band oscillator trimmer
C6	"BC" band oscillator trimmer
C7	Station selector antenna trimmer strip
C12	"BC" band padding trimmer
C13	.01 mfd. paper capacitor
C14	100 mmf. mica capacitor
C15	47 mmf. mica capacitor
C16	.008 mfd. paper capacitor
C17	220 mmf. mica capacitor
C18	150 mmf. mica capacitor
C19	.002 mfd. paper capacitor
C20	2400 mmf. ±5% mica capacitor
C21	750 mmf. silvered mica capacitor
C25	.02 mfd. paper capacitor
C26	.05 mfd. paper capacitor
C29	.005 mfd. paper capacitor
C30	.01 mfd. paper capacitor
C31	.005 mfd. paper capacitor
C33	.01 mfd. paper capacitor
C34A	10 mfd. 250 V. dry electrolytic
C34B	15 mfd. 250 V. dry electrolytic
C34C	30 mfd. 250 V. dry electrolytic
C35	.01 mfd. paper capacitor
C36	.01 mfd. paper capacitor
C37	.005 mfd. paper capacitor
L1	"BC" Band Beam-a-Scope
L2	"SW1" band antenna coil
L3	"SW2" band Beam-a-Scope
L4	"SW2" band oscillator coil
L5	"SW1" band oscillator coil
L6	"BC" band oscillator coil
L7	R.F. interstage coil
L12	Station selector oscillator coils
P1	Dial lamp. Mazda No. 44
P2	Dial lamp. Mazda No. 44
R1	2 megohm volume control
R3	47,000 ohms carbon resistor
R4	1000 ohms carbon resistor
R5	3300 ohms carbon resistor
R6	47,000 ohms carbon resistor
R7	22,000 ohms carbon resistor
R8	470,000 ohms carbon resistor
R9	4.7 megohms carbon resistor
R10	330,000 ohms carbon resistor
R11	470,000 ohms carbon resistor
R12	2.2 megohms carbon resistor
R13	47 ohms carbon resistor
R14	100,000 ohms carbon resistor
R15	3300 ohms carbon resistor
R16	100,000 ohms carbon resistor
R17	330,000 ohms carbon resistor
R18	270 ohms 1 W. carbon resistor
R19	3300 ohms 1 W. carbon resistor
R20	1800 ohms 2 W. carbon resistor
R21	10,000 ohms carbon resistor
R22	1000 ohms carbon resistor
R23	150 ohms carbon resistor
R24	27 ohms carbon resistor

Model J-71 is a seven-tube, superheterodyne receiver designed to operate from an alternating current power supply. The receiver incorporates the latest developments in radio, among which are the General Electric Dual Beam-a-Scopes. Broadcast and short-wave No. 1 signals are selected by the Beam-a-Scope which is mounted at one end of the cabinet. Short-wave No. 2 signals are selected by the Beam-a-Scope which is mounted on the cabinet above the chassis. Additional features include single-ended tubes, iron-core oscillator station selector coils, five feathertouch tuning station keys, one Phono-Frequency Modulation-Television key, tone monitor circuit and automatic volume control.

Phono-FM-Tel

This receiver is equipped with a pin jack on the rear apron of the chassis and a Phono-FM-Tel key for adapting it to use with record players, frequency modulation converters, and television picture receivers with sound converters. General Electric plug, Stock No. RP-145, fits the pin jack.

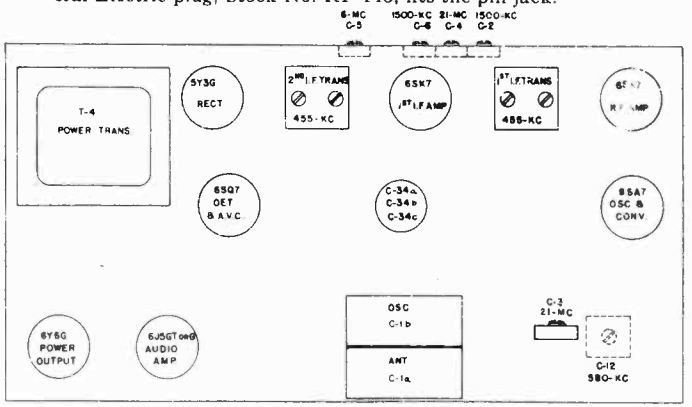


Fig. 4. Tube and Trimmer Location

S1	Band switch
S2	Tone control switch
S3A	Phono switch
S3B	Station selector switch
S4	Power switch
T1	Output transformer
T2	1st I.F. transformer
T3	2nd I.F. transformer
T4	Power transformer

Fig. 3. Cabinet Holes for Trimmer Adjustment

Electrical Rating

Rating	Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
A	110–125	50–60	75
C	110–125	25	85

Tuning Frequency Range

Broadcast Band	540–1600 KC
Short-wave Band No. 1	2300–6900 KC
Short-wave Band No. 2	6900–22,000 KC

Intermediate Frequency ..... 455 KC

Electrical Power Output

Undistorted	2.85 watts
Maximum	4.5 watts

Tone Control 3-position

Loud-speaker—"Alnico" Magnet Dynamic

Outside Cone Diameter	6½ inches
Voice Coil Impedance	3.5 ohms

ALIGNMENT PROCEDURE

The alignment procedure is given in table form below. The use of a standard I.R.E. dummy antenna in making all R.F. alignments is recommended. R.F. alignment can be performed by loop coupling the generator signal to the receiver Beam-a-Scopes if care is exercised not to overcouple the two circuits. Keeping a distance of two feet or more between the generator loop and the receiver Beam-a-Scope will generally insure freedom from overcoupling. The relative position of the Beam-a-Scopes with respect to the chassis materially affects R.F. alignment; therefore, all R.F. alignments should be made with the chassis and Beam-a-Scopes mounted in the cabinet. In keeping with this recommendation all R.F. alignment trimmers are available through holes in the bottom deck and back of the cabinet as shown in Fig. 3. Metal objects such as meters, tools, etc., should not be placed on top of the receiver cabinet. Also the receiver should be kept away from large metal objects such as radiators, metal-top tables, etc.

R.F. Alignment
With Chassis Outside of Cabinet

R.F. alignment can be performed only on the "BC" and "SW1" bands with the chassis outside of the cabinet. Any alignment attempted on "SW2" band will not be satisfactory. The same relative position between the chassis and broadcast loop should be maintained when aligning outside the cabinet as these components occupy in the cabinet. Since the glass dial scale is fastened to the cabinet it cannot be used for reference during alignment of the chassis outside of the cabinet. Use must be made, therefore, of a 0-180° calibrated scale which is cemented to the back of the dial reflector plate. From the reference chart Fig. 7 the degree readings for corresponding frequency settings may be obtained by laying a straight edge across the chart perpendicular to the line of figures and sliding the straight edge along to the various frequency settings desired. The degree readings will be found on either of the degree scales. To use these degree readings, first completely close the gang condenser plates and then slide the pointer along the cord until the left-hand edge of the pointer-guide slide lines up with the 0° mark. By using this left-hand edge (as viewed from the rear) of the slide as the degree-scale pointer the receiver may be tuned to any frequency. Example: By rotating the tuning control until the left-hand edge of the slide is in line with 158°, the receiver will be tuned to 1500 KC on the "BC" band.

The "BC" and "SW1" band alignment procedure is the same as outlined in steps 2 to 6 inclusive of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

After the alignment has been performed on the "BC" and "SW1" bands the chassis should be mounted in the cabinet and "SW2" band alignment checked as described in steps 7 to 9 of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

Note: After moving the pointer along the cord to use the left-hand edge as a reference pointer for the degree scale, it will be necessary after reassembly in the cabinet for the gang condenser plates to be closed and the pointer to be moved back along the cord so that it lines up with the first dial markings on the left.

Chassis or Beam-a-Scope Removal

Note: Care must be exercised in removing the chassis to avoid changing the shape of either the short-wave or broadcast loops. These loops are factory formed to give a certain inductance and any alterations in the loops in the field will throw the chassis out of alignment.

When disconnecting the short-wave loop leads from the loop, be sure to support the loop while pulling off the connections. Failure to support the loop may cause the staples to loosen and result in the loop rattling in the cabinet.

Loud-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly.

Note—In no case should the magnet be removed from the assembled position.

Special Service Information

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains*

(a) Antenna Post to R.F. Grid at	
1000 KC	5.5
4000 KC	2.5
18,000 KC	2.5
(b) R.F. Grid to Converter Grid at	
1000 KC	5.5
4000 KC	3.0
18,000 KC	2.0
(c) R.F. on Converter Grid to I.F. on 1st I.F. Grid at	
1000 KC	50
4000 KC	50
18,000 KC	45
(d) I.F. on Converter Grid to I.F. on 1st I.F. Grid at 455 KC	60
(e) I.F. Amplifier Grid to Detector Plate at 455 KC	55

(2) Voltage across Volume Control to Give ½-watt Speaker Output at 400 cycles .04 volts

(3) DC Voltage Developed across Oscillator Grid Resistor (R-7) at

1000 KC	8.3
4000 KC	7.8
18,000 KC	4.6

* Variations of ± 20% permissible. All readings obtained with enough input signal to give ½-watt speaker output.

I.F. Alignment with Oscilloscope

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. "BC" Band	455 KC Sweep	I.F. Grid	.05 mfd. or larger	2nd I.F. Trimmers C-10, 11	Gang condenser plates closed. Depress any station key other than Phono-FM-Tel key. Connect audio input of oscilloscope to chassis ground and junction of R3 and R8. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. Finish by retrimming 2nd I.F. trimmers.
2. "BC" Band	455 KC Sweep	Green lead on "BC" Beam-a-Scope terminal board and chassis ground.	.05 mfd. or larger	1st I.F. Trimmers C-8, 9	

I.F. Alignment with Output Meter

1. "BC" Band	455 KC with Modulation	Green lead on "BC" Beam-a-Scope terminal board and chassis ground.	.05 mfd. or larger	2nd I.F. Trimmers C-10, 11, 1st I.F. Trimmers C-8, 9	Gang condenser plates closed. Depress any key other than Phono-FM-Tel key. Connect output meter across voice coil. Keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.

R.F. Alignment
With Chassis Mounted in Cabinet

1. "BC" Band					Close gang plates, adjust pointer to first line at left end of tuning scale. Connect output meter across voice coil. Tone control set to "Normal" position.
2. "BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-2)	Set pointer to 1500 KC and tune in signal with (C-6). Peak output with (C-2).
3. "BC" Band	580 KC with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-12)	Set pointer to 580 KC and peak signal while rocking gang condenser.
4. "BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-2)	Retrim for maximum output.
5. Repeat operation 3 if "BC" band trimmers are badly out of alignment.					
6. "SW 1" Band	6 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-5)	Set pointer to 6 MC and peak signal while rocking gang condenser.
7. "SW 2" Band	21 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-4) Ant. (C-3)	Set pointer to 21 MC and tune in signal with (C-4). Peak output with (C-3) while rocking gang condenser. When (C-4) is on proper peak, image of 21 MC signal should be heard 910 KC below or on 20.09 MC.
8. "SW 2" Band	8 MC with Modulation	Antenna Post	I.R.E.		This operation may or may not be necessary depending on how much the short-wave Beam-a-Scope leads have been moved from their correctly dressed positions. Repositioning will be indicated if an increased output meter reading can be obtained by moving the short-wave Beam-a-Scope phosphor-bronze lead closer or farther away from the black lead. The moving should be done with an insulated rod or stick.
9. Repeat operation 7 if the Beam-a-Scope leads are moved in operation 8.					

FRONT OF CHASSIS

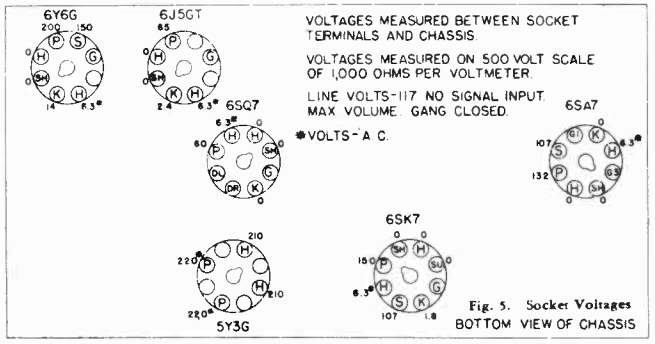
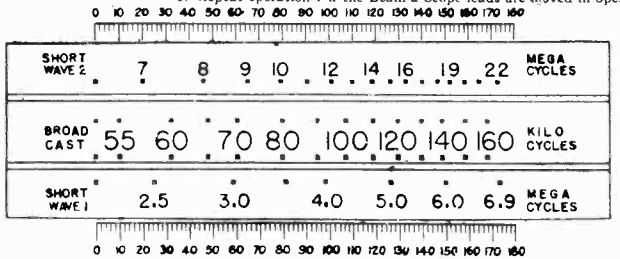


Fig. 5. Socket Voltages

Fig. 7.
Frequency-degree Reference Chart



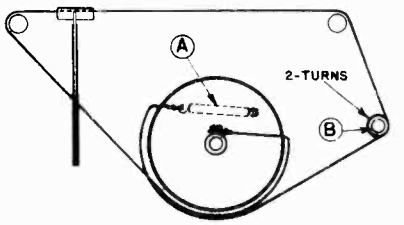


Fig. 2. Dial Drive Stringing Diagram

MODELS J-71, JB-508, JB-513, JB514

GENERAL ELECTRIC CO.

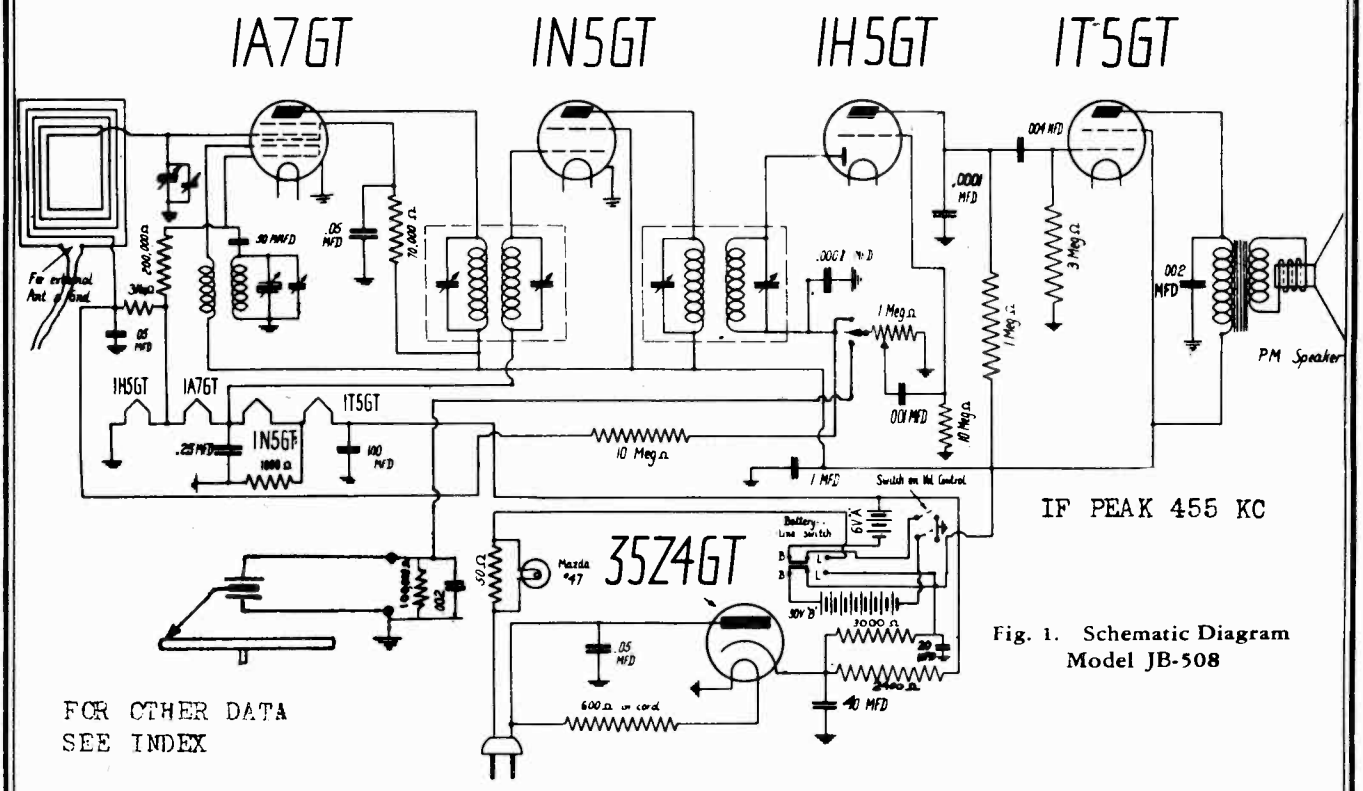


Fig. 1. Schematic Diagram Model JB-508

MODEL J-71

Tubes

R.F. Amplifier	GE-6SK7
Converter and Oscillator	GE-6SA7
I.F. Amplifier	GE-6SK7
Det., Aud., AVC	GE-6SQ7
Audio Driver	GE-6J5GT
Audio Output	GE-6Y6G
Rectifier	GE-5Y3G
Dial Lamp	(2) Mazda No. 44

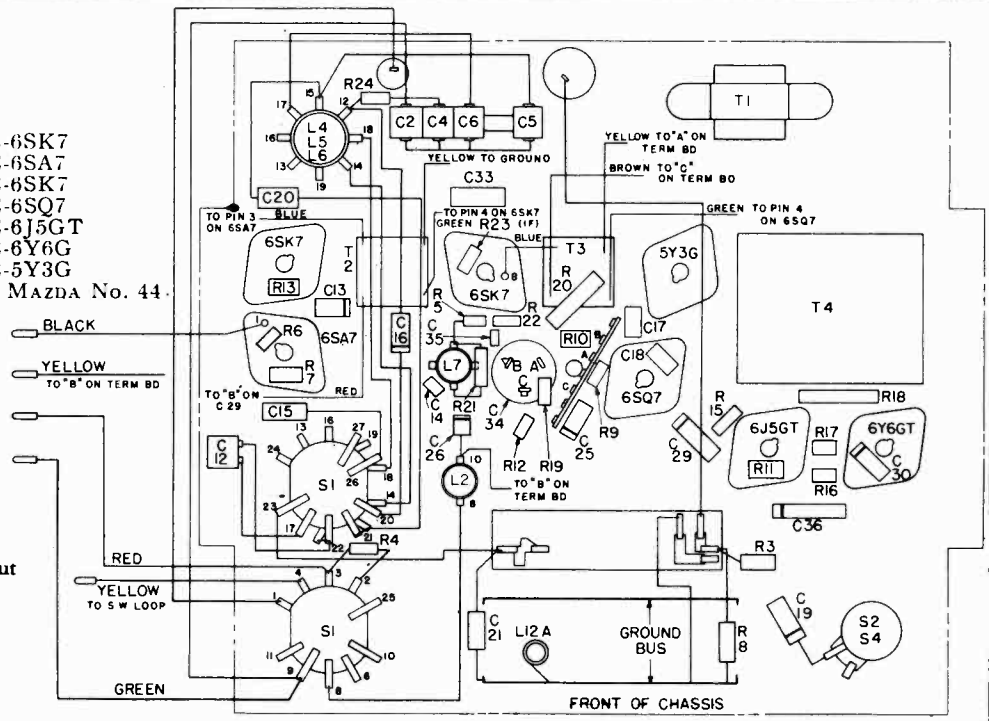


Fig. 6. Chassis Parts Layout

Note: The oscillator coil and band-switch terminals are numbered in the Chassis Parts Layout, Fig. 6, to assist in locating the corresponding numbered points on the Schematic Diagram, Fig. 1. This numbering will also assist in rewiring if the coil or switch is replaced. I.F. transformer connections are shown as an aid in replacement.

SETTING UP THE RECEIVER

The following remarks will assist the serviceman in correctly setting up this receiver for use:

(1) In order to press the volume or tuning knobs all the way on their respective shafts, the dial reflector plate should be held in place by pressure from the rear.

(2) The black speaker lead should be connected to the speaker terminal which is grounded to the speaker frame.

(3) A method of setting up station keys which will assure driftproof adjustments is to screw the iron core all the way out and then turn slowly inward until the desired station is tuned in.

GENERAL ELECTRIC CO.

MODELS JB508, JB-513, JB514

SERVICE DATA

Over-all Dimensions

Model	JB-508	JB-513, JB-514
Height	9½ inches	11 inches
Width	14 inches	14½ inches
Depth	15 inches	5 inches
Wt. with batteries	19½ lbs.	13¾ lbs.

Tuning Control Drive Ratio 6:1

Electrical Specifications

1. AC or DC Power Supply—105–125 Volts—40–60 cycles on AC
2. Battery Power Supply
   6 Volt "A" Supply, 90 Volt "B" supply
   Recommended batteries for 275-hour life (Maximum daily operation—4 hours)
   (a) "A" Battery—one Eveready No. 747 or equivalent
   (b) "B" Batteries—two Eveready No. 482 or equivalent

Tuning Frequency Range ..... 540—1700 KC

Intermediate Frequency ..... 455 KC

Maximum Power Output ..... 200 Milliwatts

Loudspeaker—Alnico Magnet Dynamic

Outside Cone Diameter ..... 5 inches
Voice Coil Impedance (400 cycles) ..... 3.5 ohms

Tubes

Converter and Oscillator GE-1A7GT
I.F. Amplifier GE-1N5GT
Det:, Aud., AVC GE-1H5GT
Power Output GE-1T5GT

Rectifier

Models JB-508, JB-513 ..... GE-35Z4GT
Model JB-514 ..... GE-117Z6GT

BATTERY AND TUBE INSTALLATION

Models JB-513 and JB-514

The batteries may be installed or replaced without removing the Beam-a-Scope antenna from the chassis. Place the two "B" batteries on the bottom of the cabinet with the terminal sockets facing each other. Place the "A" battery on top of the "B" batteries with its terminal socket toward the left.

To replace tubes it is necessary to detach the Beam-a-Scope from the supporting blocks. Do not strain the two leads connected to the Beam-a-Scope.

Model JB-508

To install or replace batteries remove the five wood screws which hold the motorboard in place, and raise the panel. (NOTE—The motor crank must be removed from the crank socket before the panel can be raised.) The panel can be freed if the two plug connectors are pulled out of the socket terminals in the chassis apron.

Access to the battery compartment having been made, loosen the battery block held by the wing nuts. Place the two "B" batteries in the bottom sections, terminals inward, and insert the two 3-prong plug connectors. The "A" battery is placed on top of the "B" batteries with terminal toward the removable block and the 2-prong plug connector attached. Replace the battery block and tighten the wing nuts.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F. ..... 455 KC Broadcast—1700 and 1500 KC

General Alignment Notes

This receiver must be removed from the carrying case in order to perform the alignment. Special care must be exercised to place the batteries, Beam-a-Scope and chassis in the same relative positions with respect to one another as these components occupied in the case; otherwise, alignment will not be satisfactory. When aligning Model JB-508 the radio-phono switch must be on "radio."

GENERAL INFORMATION

The Models JB-513 and JB-514 are portable, five-tube, superheterodyne receivers which are designed to operate on any one of three types of power supplies as listed under electrical specifications. Features of design include power selector switch, built-in Beam-a-Scope, 5-inch dynapower speaker and automatic volume control. Model JB-508 and JB-513 have a dial light which operates when the receiver is connected to an AC or DC power supply.

The Model JB-508 is a portable radio-phonograph combination employing a radio chassis similar to JB-513. The phonograph consists of a spring-wound Swiss motor and crystal pick-up. The Swiss motor will play two 10-inch records with one winding. A speed regulator controls the speed above and below 78 R.P.M.

Model JB-514 has full Underwriters' approval.

To switch these models from battery to external power supply operation, open the small door in the side of the cabinet, slide the button switch to "Line," which is to the right, and insert the cord plug in a power supply of the proper voltage and frequency. The button switch selects the battery or line power supply.

When these models are working on batteries, they will perform as soon as turned "on." However, when operating on an external power supply, sufficient time must be allowed for the tubes to become heated. When operating from a DC source of power, it is necessary to insert the power plug with the proper polarity; otherwise, the receiver will fail to function. If any hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

Outside antenna connections may be made to two black leads available in the chassis compartment.

I.F. Alignment

With batteries, Beam-a-Scope and chassis in position for alignment as mentioned above, connect an output meter across the voice coil. Rotate the volume control to maximum. Set test oscillator to 455 KC. Attach the test oscillator output leads to the two flexible leads of the Beam-a-Scope antenna. Keep the test oscillator output as low as a readable meter reading will permit. Adjust all I.F. trimmers for maximum output.

R.F. Alignment

Connect the signal generator output leads to the two flexible leads on the receiver Beam-a-Scope. Adjust the signal generator to 1700 KC and set the tuning condenser to minimum capacity. Turn the trimmer screw of the cut section of the tuning condenser (oscillator) until the signal is tuned in on the receiver. Change the signal to 1500 KC, retune the tuning condenser to this frequency and adjust the trimmer screw of the antenna section for maximum output.

VOLTAGE CHART

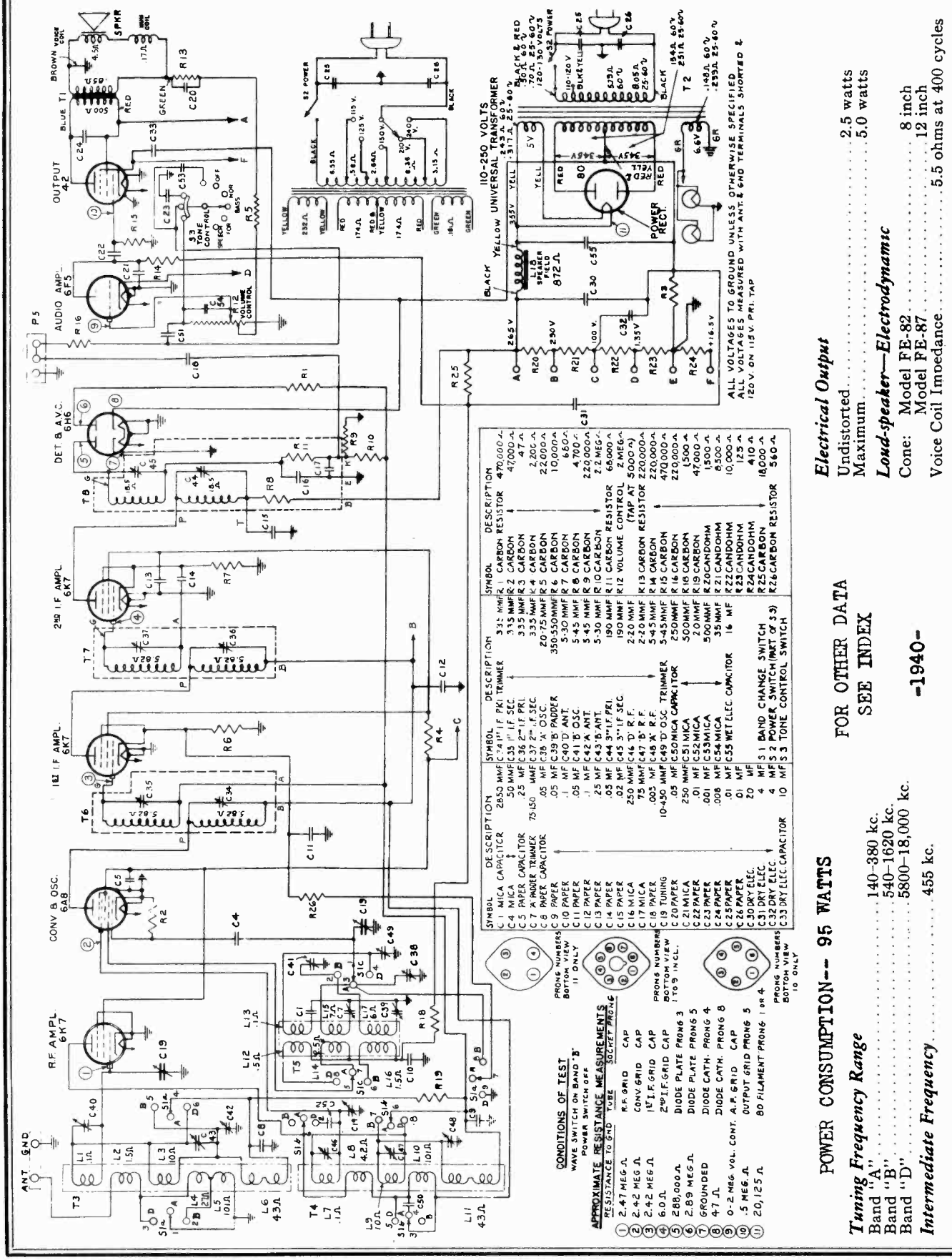
(Receiver connected to 120 Volt AC line)

Tubes	Plate to Gnd. Volts	Screen to Gnd. Volts	Filament to Gnd. Volts	Filament Volts
1A7GT	92	38	3.2	1.6
1N5GT	92	92	4.8	1.6
1H5GT	10		1.6	1.6
1T5GT	88	92	6.4	1.6
35Z4GT*	120 AC		125 Cathode to Gnd.	30
117Z6GT**	120 AC		125 Cathode to Gnd.	120 AC

* Used only in Models JB-513 and JB-508.
**Used only in Model JB-514.
Line—120 Volts AC.
Maximum Volume—Gang Closed—No signal input.
All voltages measured to chassis ground in Models JB-508 and JB-513.
Voltages measured to B minus in Model JB-514.

MODELS FE-82
FE-87

GENERAL ELECTRIC CO.



SYMBOL	DESCRIPTION
C1	MICA CAPACITOR
C4	MICA CAPACITOR
C5	PAPER CAPACITOR
C7	"A" PADDER TRIMMER
C8	PAPER CAPACITOR
C9	PAPER
C10	PAPER
C11	PAPER
C12	PAPER
C13	PAPER
C14	PAPER
C15	PAPER
C16	MICA
C17	MICA
C18	PAPER
C19	TUNING
C20	PAPER
C21	MICA
C22	PAPER
C23	PAPER
C24	PAPER
C25	PAPER
C26	PAPER
C30	DRY ELEC.
C31	DRY ELEC.
C32	DRY ELEC.
C33	DRY ELEC. CAPACITOR

SYMBOL	DESCRIPTION
C34	1ST I.F. PRI TRIMMER
C35	1ST I.F. SEC.
C36	2ND I.F. PRI.
C37	2ND I.F. SEC.
C38	"A" OSC.
C39	"B" PADDER
C40	"D" ANT.
C41	"B" OSC.
C42	"A" ANT.
C43	"B" ANT.
C44	3RD I.F. PRI.
C45	3RD I.F. SEC.
C46	"D" R.F.
C47	"B" R.F.
C48	"A" R.F.
C49	"D" OSC. TRIMMER
C50	MICA CAPACITOR
C51	MICA
C52	MICA
C53	MICA
C54	MICA
C55	WET ELEC. CAPACITOR
S1	BAND CHANGE SWITCH
S2	POWER SWITCH (PART OF S3)
S3	TONE CONTROL SWITCH

SYMBOL	DESCRIPTION	RESISTANCE
R1	CARBON RESISTOR	470,000Ω
R2	CARBON	47,000Ω
R3	CARBON	47Ω
R4	CARBON	2,200Ω
R5	CARBON	22,000Ω
R6	CARBON	10,000Ω
R7	CARBON	660Ω
R8	CARBON	4,700Ω
R9	CARBON	220,000Ω
R10	CARBON	2.2 MEGΩ
R11	CARBON RESISTOR	68,000Ω
R12	VOLUME CONTROL	2 MEGΩ
	(TAP AT 500,000Ω)	
R13	CARBON RESISTOR	220,000Ω
R14	CARBON	220,000Ω
R15	CARBON	470,000Ω
R16	CARBON	220,000Ω
R18	CARBON	1,500Ω
R19	CARBON	47,000Ω
R20	CANDOHM	1,500Ω
R21	CANDOHM	8,500Ω
R22	CANDOHM	10,000Ω
R23	CANDOHM	125Ω
R24	CANDOHM	410Ω
R25	CARBON	18,000Ω
R26	CARBON RESISTOR	560Ω

①	2.47 MEG Ω	R.F. GRID	CAP	⑤	288,000Ω	DIODE PLATE	PRONG 3	⑨	0-2 MEG VOL. CONT.	A.F. GRID	CAP
②	2.42 MEG Ω	CONV. GRID	CAP	⑥	2.89 MEG Ω	DIODE PLATE	PRONG 5	⑩	.5 MEG Ω	OUTPUT GRID	PRONG 5
③	2.42 MEG Ω	1ST I.F. GRID	CAP	⑦	GROUNDED	DIODE CATH.	PRONG 4	⑪	20,125 Ω	80 FILAMENT	PRONG 1 OR 4
④	6.0 Ω	2ND I.F. GRID	CAP	⑧	47 Ω	DIODE CATH.	PRONG 8				

POWER CONSUMPTION-- 95 WATTS

FOR OTHER DATA
SEE INDEX

-1940-

Tuning Frequency Range

Band "A" ..... 140–380 kc.
Band "B" ..... 540–1620 kc.
Band "D" ..... 5800–18,000 kc.

Intermediate Frequency ..... 455 kc.

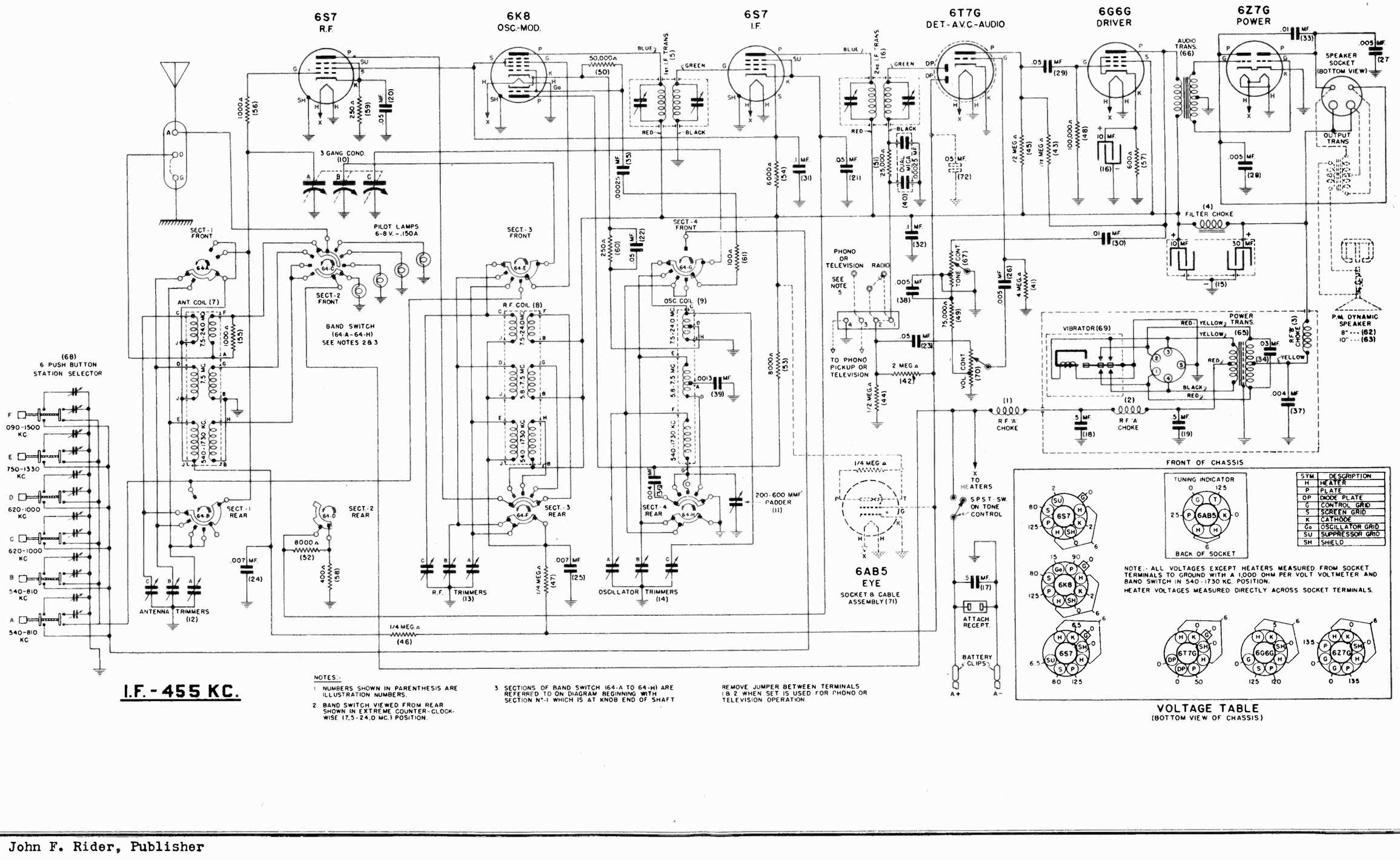
Electrical Output

Undistorted ..... 2.5 watts
Maximum ..... 5.0 watts

Loud-speaker—Electrodynamic

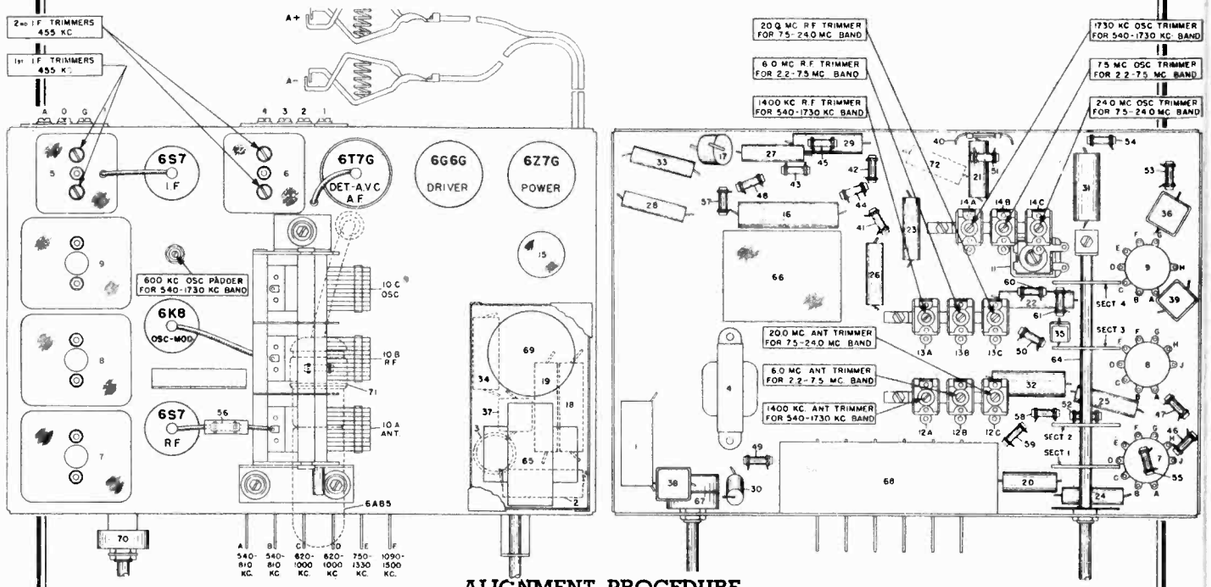
Cone: Model FE-82 ..... 8 inch
Model FE-87 ..... 12 inch
Voice Coil Impedance ..... 5.5 ohms at 400 cycles

GENERAL ELECTRIC CO.



GENERAL ELECTRIC CO.

MODEL JB-72



ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

(a) Check tuning dial adjustment by turning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move needle to correct position.
(b) Use an accurately calibrated test oscillator with some type of output measuring device.
(c) Have ground lead of test oscillator attached to chassis.

Place band switch for operation on:	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator: consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
I.F. ALIGNMENT use any band position	Any point where no interfering signal is received.	Exactly 455 K.C.	.02 Mfd. condenser	High side to grid cap of 6K8 tube. Do not remove cap	Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. transformer trimmers for maximum output.
1730 TO 540 K.C. BAND	1 Exactly 1730 K.C.	Exactly 1730 K.C.	.00025 Mfd. condenser	Receiver antenna "A" post	Adjust 1730 K.C. oscillator trimmer for maximum output.
	2 Approx. 1400 K.C.	Exactly 1400 K.C.	.00025 Mfd. condenser	Receiver antenna "A" post	While rocking gang condenser adjust 1400 K.C. antenna and R.F. trimmers for maximum output
	3 Approx. 600 K.C.	Approx. 600 K.C.	.00025 Mfd. condenser	Receiver antenna "A" post	While rocking gang condenser adjust 600 K.C. oscillator padder for maximum output.
2.2 TO 7.5 M.C. BAND	1 Exactly 7.5 M.C.	Exactly 7.5 M.C.	400 Ohm carbon resistor	Receiver antenna "A" post	Adjust 7.5 M.C. oscillator trimmer for maximum output.
	2 Approx. 6. M.C.	Exactly 6. M.C.	400 Ohm carbon resistor	Receiver antenna "A" post	While rocking gang condenser adjust 6 M.C. antenna and R.F. trimmers for maximum output
7.5 TO 24 M.C. BAND	1 Exactly 24 M.C.	Exactly 24 M.C.	400 Ohm carbon resistor	Receiver antenna "A" post	Adjust 24 M.C. oscillator trimmer for maximum output—be sure to use proper peak. The image of the 24 M. C. Signal should be heard at 24.91 M. C. when the correct peak is used.
	2 Approx. 20 M.C.	Approx. 20 M.C.	400 Ohm carbon resistor	Receiver antenna "A" post	While rocking gang condenser adjust 20 M.C. antenna and R.F. trimmers for maximum output

THE FOLLOWING DATA WILL BE USEFUL TO SERVICE MEN EQUIPPED WITH VACUUM-TUBE VOLTMETERS OR SIMILAR VOLTAGE MEASURING INSTRUMENTS:

	Gain †
(1) Stage Gains	
Antenna Post to 6S7 R. F. Grid	8 at 1000 KC
6S7 R. F. Grid to 6K8 Converter Grid	12 at 1000 KC
6K8 Converter Grid to 6S7 I. F. Grid	28 at 455 KC
6S7 I. F. Grid to 6T7G Diode Plate	50 at 455 KC

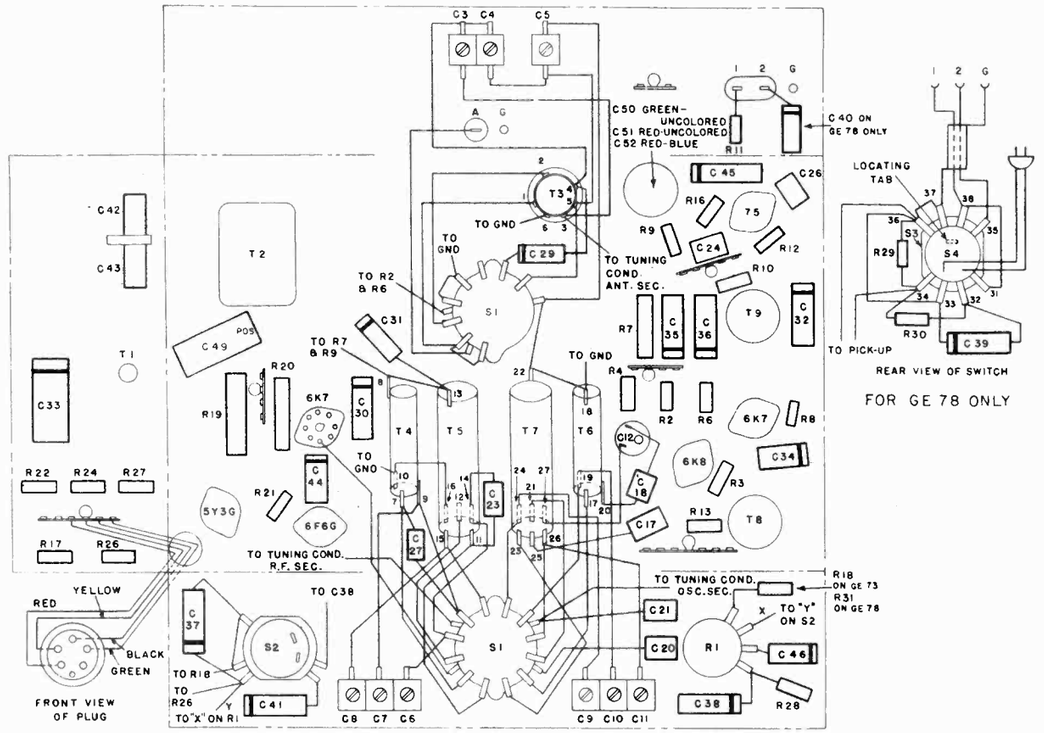
(2) Audio Gain
A 400 cycle signal of .05 volts across volume control will give approximately ½ watt speaker output. Volume control turned to maximum.)

(3) DC voltage developed across oscillator grid resistor (50) averages 15 volts at 1000 KC.

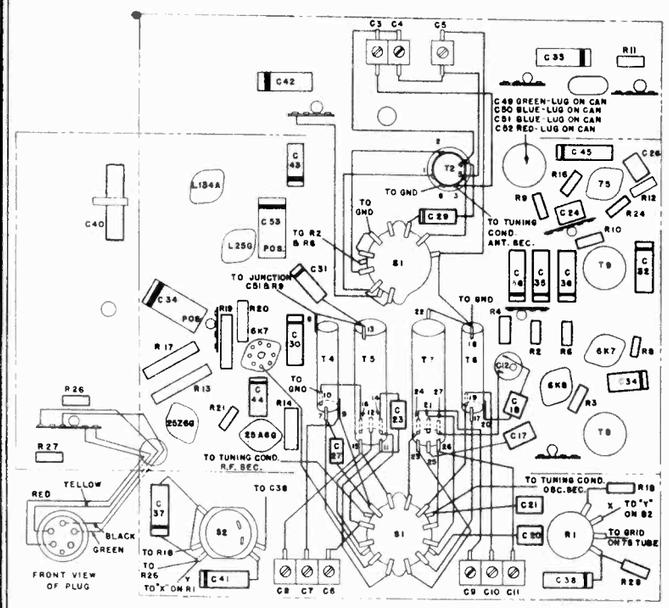
† Variations of +10% —20% permissible.

MODELS GE-73, GE-78
MODEL GDE-73

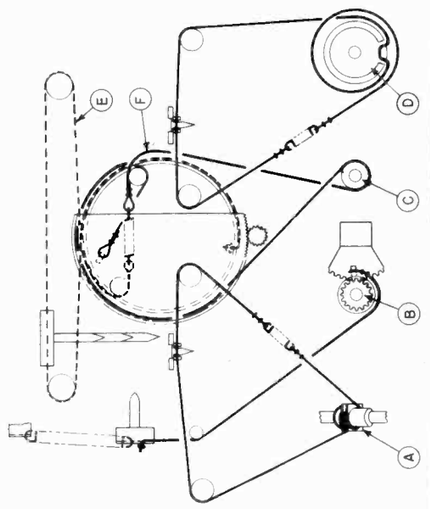
GENERAL ELECTRIC CO.



Chassis Parts Layout (GE-73 and GE-78)



Chassis Parts Layout (GDE-73)

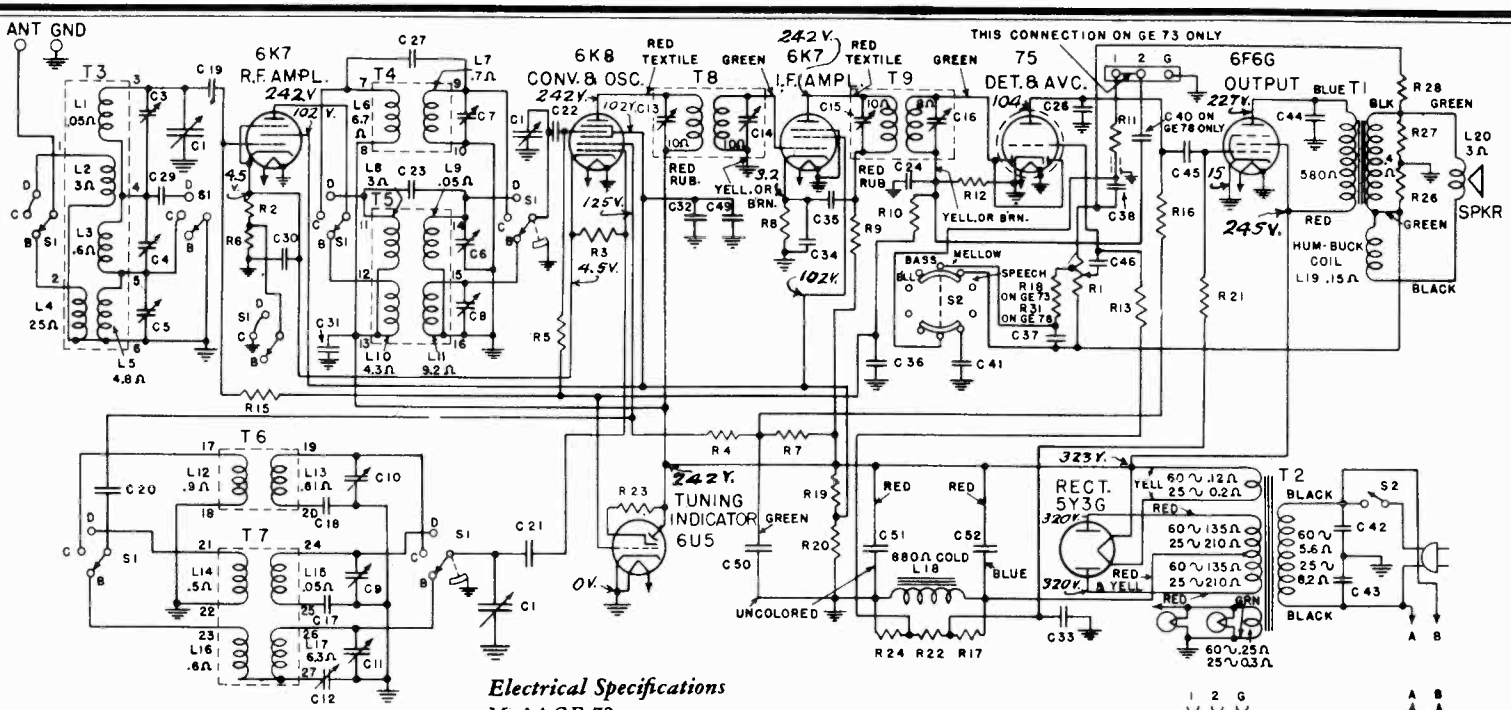


DIAL DRIVE

Models GE-73, GE-78, and GDE-73

GENERAL ELECTRIC CO.

MODELS GE-73 GE-78



UNIVERSAL POWER TRANSFORMER

Electrical Specifications

Model GE-73
- Rating "A," 115–125 volts, 50–60 cycles, 80 watts
- Rating "V," 115–250 volts, 50–60 cycles, 85 watts

Model GE-78
- Rating "V-6," 115–250 volts, 60 cycles, 115 watts
- Rating "V-5," 115–250 volts, 50 cycles, 115 watts
- Rating "C-4," 115–125 volts, 40 cycles, 115 watts

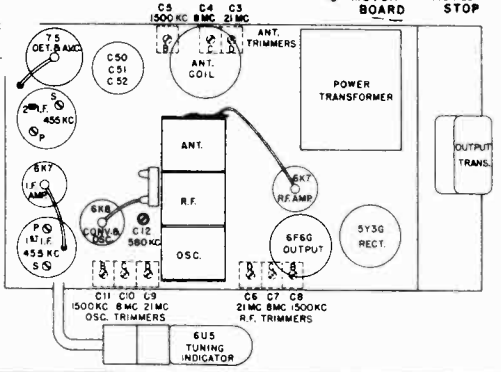
COMPONENTS MARKED WITH (*) ON LIST BELOW ARE USED IN MODEL GE-78 ONLY.

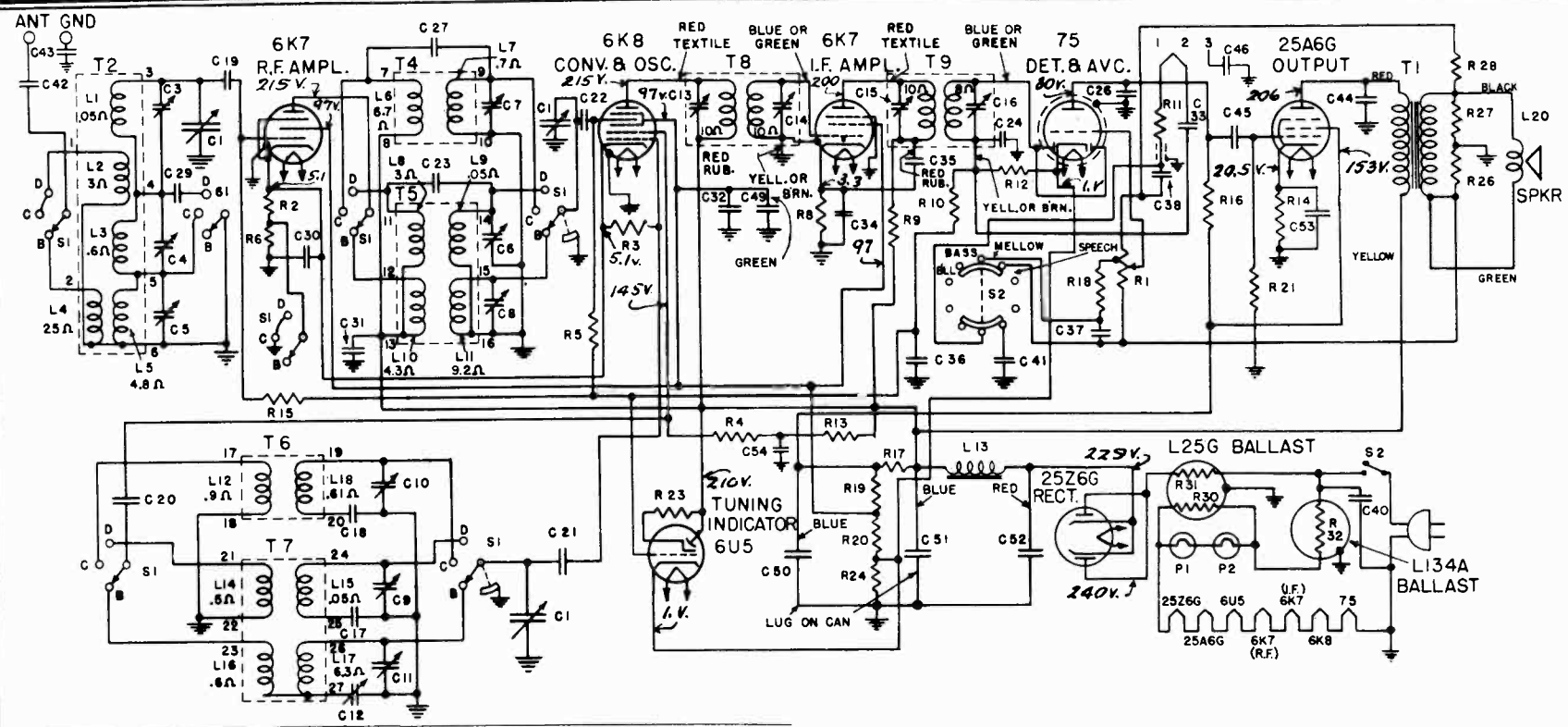
-1940-

I.F. 455 KC

FOR OTHER DATA SEE INDEX

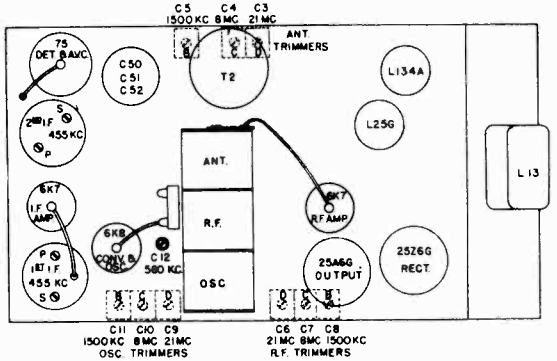
Symbol	Description
C1	450 Mmf. Tuning Condenser
C3, C4, C5	Antenna Trimmer Capacitor
C6, C7, C8	R.F. Trimmer Capacitor
C9, C10, C11	Oscillator Trimmer Capacitor
C12	400-650 Mmf. Padder Capacitor
C17	2400 Mmf. Mica Capacitor
C18	1600 Mmf. Mica Capacitor
C19 C20	390 Mmf. Mica Capacitor
C21	50 Mmf. Mica Capacitor
C22	390 Mmf. Mica Capacitor
C23	15 Mmf. Mica Capacitor
C24	100 Mmf. Mica Capacitor
C26	220 Mmf. Mica Capacitor
C27	15 Mmf. Mica Capacitor
C29	.0045 Mfd. Paper Capacitor
C30, C31, C32	.05 Mfd. Paper Capacitor
C33	.25 Mfd. Paper Capacitor
C34, C35, C36	.05 Mfd. Paper Capacitor
C37	.003 Mfd. Paper Capacitor
C38	.005 Mfd. Paper Capacitor
*C39	.001 Mfd. Paper Capacitor
*C40	.5 Mfd. Paper Capacitor
C41	.0015 Mfd. Paper Capacitor
C42, C43	.01 Mfd. Paper Capacitor
C44	.008 Mfd. Paper Capacitor
C45, C46	.05 Mfd. Paper Capacitor
C49	8 Mfd. Dry Electrolytic Capacitor
C50, C51, C52	Filter Dry Electrolytic Capacitor
T1	Output Transformer
T2	Power Transformer
S1	Band Change Switch
S2	Tone and Power Switch
*S3	Phono-Radio Switch
R1	2.0 Megohm Volume Control
R2	120 Ohm Carbon Resistor
R3	47,000 Ohm Carbon Resistor
R4	2,200 Ohm Carbon Resistor
R5	560,000 Ohm Carbon Resistor
R6	180 Ohm Carbon Resistor
R7	15,000 Ohm Carbon Resistor
R8	330 Ohm Carbon Resistor
R9	2200 Ohm Carbon Resistor
R10	2.2 Megohm Carbon Resistor
R11	47,000 Ohm Carbon Resistor
R12	330,000 Ohm Carbon Resistor
R13	2.2 Megohm Carbon Resistor
R15	560,000 Ohm Carbon Resistor
R16	330,000 Ohm Carbon Resistor
R17	390,000 Ohm Carbon Resistor
R18	100,000 Ohm Carbon Resistor
R19	8,200 Ohm Carbon Resistor
R20	15,000 Ohm Carbon Resistor
R21	470,000 Ohm Carbon Resistor
R22	82,000 Ohm Carbon Resistor
R23	1.0 Megohm Carbon Resistor
R24	8,200 Ohm Carbon Resistor
R26	22 Ohm, Carbon Resistor
R27	100 Ohm Carbon Resistor
R28	3.3 Megohm Carbon Resistor
*R29	100,000 Ohm Carbon Resistor
*R30	47,000 Ohm Carbon Resistor
*R31	220,000 Ohm Carbon Resistor





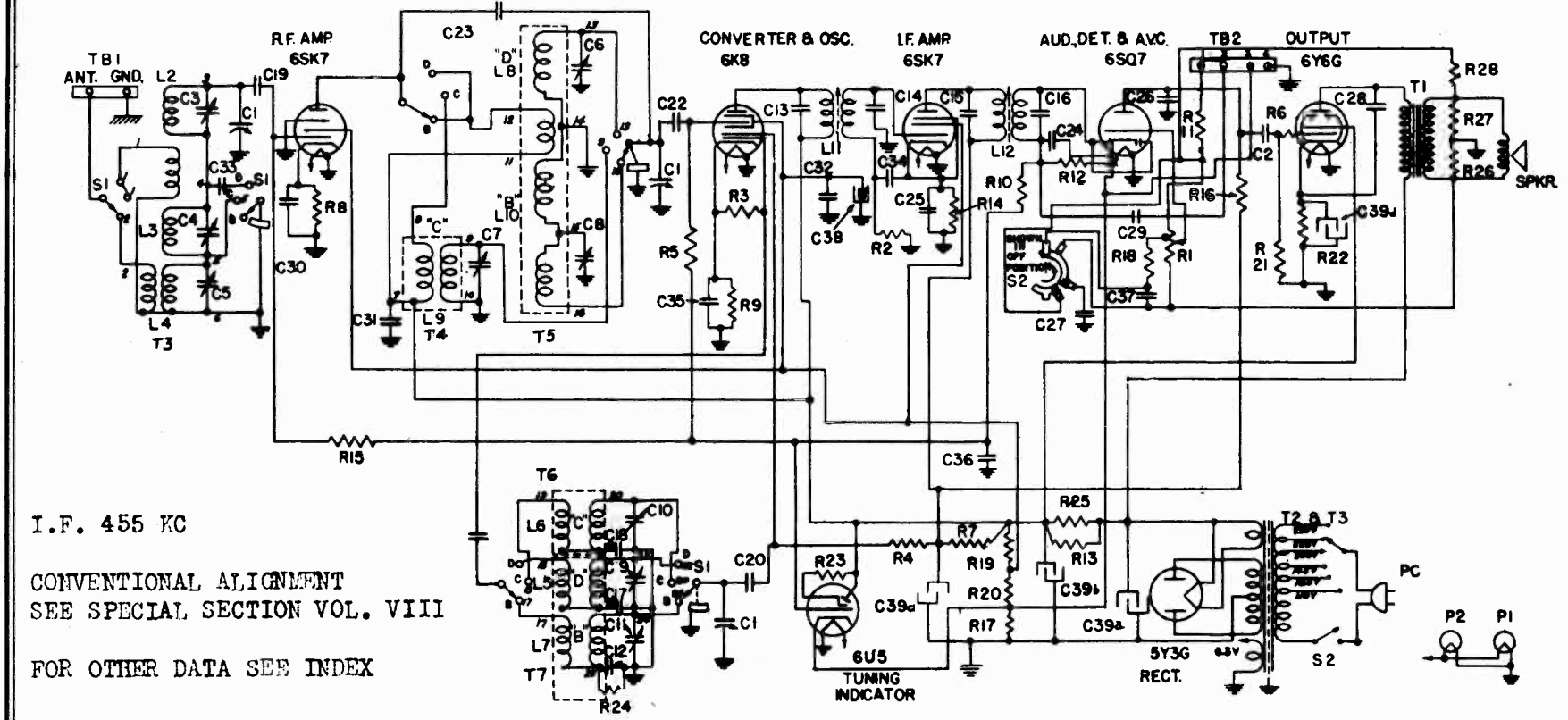
Symbol	Description	Symbol	Description
C1	450 Mmf. Tuning Condenser	S1	Band Change Switch
C3, C4, C5	Antenna Trimmer Capacitor	S2	Tone and Power Switch
C6, C7, C8	R.F. Trimmer Capacitor	R1	2.0 Megohm Volume Control
C9, C10, C11	Oscillator Trimmer Capacitor	R2	120 Ohm Carbon Resistor
C12	400–650 Mmf. Padder Capacitor	R3	47,000 Ohm Carbon Resistor
C17	2400 Mmf. Mica Capacitor	R4	2,200 Ohm Carbon Resistor
C18	1600 Mmf. Mica Capacitor	R5	560,000 Ohm Carbon Resistor
C19, C20	390 Mmf. Mica Capacitor	R6	180 Ohm Carbon Resistor
C21	50 Mmf. Mica Capacitor	R8	470 Ohm Carbon Resistor
C22	390 Mmf. Mica Capacitor	R9	2200 Ohm Carbon Resistor
C23	15 Mmf. Mica Capacitor	R10	2.2 Megohm Carbon Resistor
C24	100 Mmf. Mica Capacitor	R11	47,000 Ohm Carbon Resistor
C26	220 Mmf. Mica Capacitor	R12	330,000 Ohm Carbon Resistor
C27	15 Mmf. Mica Capacitor	R13	10,000 Ohm Carbon Resistor
C29	.0045 Mfd. Paper Capacitor	R14	470 Ohm Carbon Resistor
C30, C31, C32	.05 Mfd. Paper Capacitor	R15	560,000 Ohm Carbon Resistor
C33	.01 Mfd. Paper Capacitor	R16	330,000 Ohm Carbon Resistor
C34, C35, C36	.05 Mfd. Paper Capacitor	R17	2,200 Ohm Carbon Resistor
C37	.004 Mfd. Paper Capacitor	R18	100,000 Ohm Carbon Resistor
C38	.005 Mfd. Paper Capacitor	R19	3,300 Ohm Carbon Resistor
C40	.05 Mfd. Paper Capacitor	R20	10,000 Ohm Carbon Resistor
C41	.0015 Mfd. Paper Capacitor	R21	470,000 Ohm Carbon Resistor
C42, C43	.01 Mfd. Paper Capacitor	R23	1.0 Megohm Carbon Resistor
C44	.008 Mfd. Paper Capacitor	R24	82 Ohm Carbon Resistor
C45	.05 Mfd. Paper Capacitor	R26, R27	100 Ohm Carbon Resistor
C46	.25 Mfd. Paper Capacitor	R28	1.2 Megohm Carbon Resistor
C49–C52	Dry Electrolytic Filter Capacitor	R30, R31	Ballast resistance, L25G
C53	10 Mfd. Dry Electrolytic Capacitor	R32	455 Ohm 50 W. W.W. Resistor
C54	8 Mfd. Dry Electrolytic Capacitor		
T1	Output Transformer		

Model GDE-73
220–240 volts A.C., 40–100 cycles, 105 watts
220–240 volts D.C., 105 watts



-1940-
I.F. 455 KC

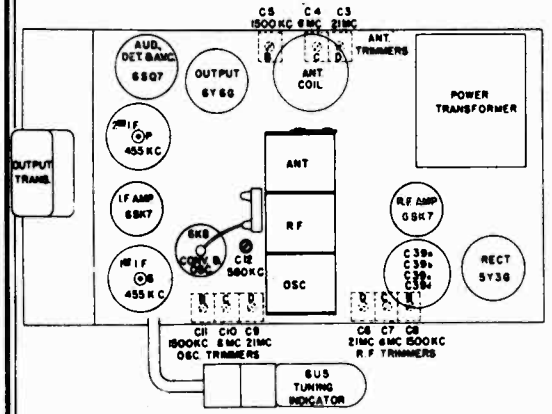
FOR OTHER DATA
SEE INDEX



I.F. 455 KC

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII

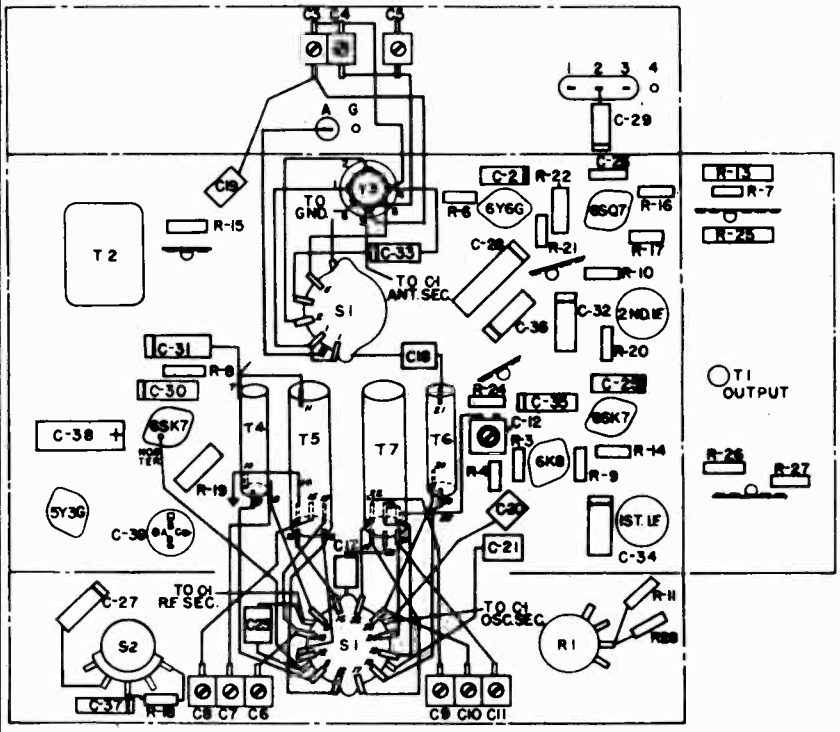
FOR OTHER DATA SEE INDEX



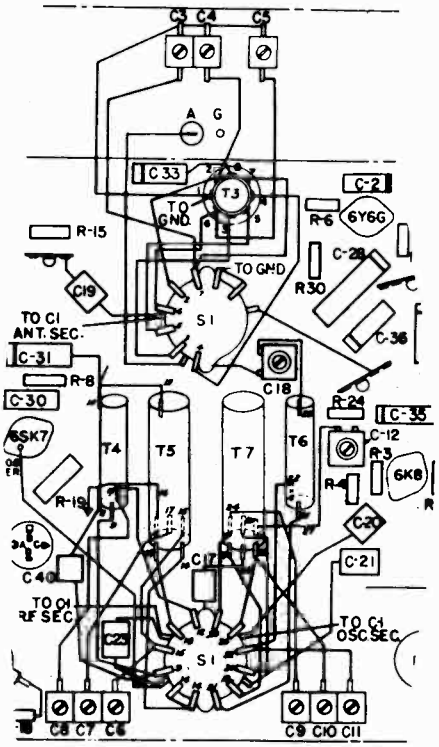
Symbol	Description	Symbol	Description	Symbol	Description
C1	450 Mmf. Tuning Condenser	C28	.03 Mfd. 1500 V. Paper	R7	1,000 Ohms, ½-w. Carbon
C2	.05 Mfd. 600 V. Paper	C29	.002 Mfd. 600 V. Paper	R8	560 Ohms, ½-w. Carbon
C3	5-40 Mmf. "D" Ant. Trimmer	C30	.05 Mfd. 200 V. Paper	R9	220 Ohms, ½-w. Carbon
C4	3-30 Mmf. "C" Ant. Trimmer	C31	.05 Mfd. 600 V. Paper	R10	2.2 Megohms, ½-w. Carbon
C5	2-20 Mmf. "B" Ant. Trimmer	C32	.05 Mfd. 600 V. Paper	R11	47,000 Ohms, ½-w. Carbon
C6	3-30 Mmf. "D" R.F. Trimmer	C33	.006 Mfd. 600 V. Paper ±5%	R12	330,000 Ohms, ½-w. Carbon
C7	3-30 Mmf. "C" R.F. Trimmer	C34	.05 Mfd. 200 V. Paper	R13	3,900 Ohms, 2-w. Carbon
C8	3-20 Mmf. "B" R.F. Trimmer	C35	.05 Mfd. 200 V. Paper	R14	330 Ohms, ½-w. Carbon
C9	3-30 Mmf. "D" Osc. Trimmer	C36	.05 Mfd. 200 V. Paper	R15	560,000 Ohms, ½-w. Carbon
C10	3-30 Mmf. "C" Osc. Trimmer	C37	.003 Mfd. 600 V. Paper	R16	330,000 Ohms, ½-w. Carbon
C11	5-45 Mmf. "B" Osc. Trimmer	C38	8 Mfd. 250 V. Dry Elec.	R17	150 Ohms, ½-w. Carbon
C12	300-650 Mmf. "B" Osc. Padder	C39a	40 Mfd. 350 V. Dry Elec.	R18	220,000 Ohms, ½-w. Carbon
C17	2800 Mmf. Mica ±5%	C39b	20 Mfd. 300 V. Dry Elec.	R19	2,700 Ohms, 2-w. Carbon
C18	1600 Mmf. Mica ±5%	C39c	20 Mfd. 300 V. Dry Elec.	R20	15,000 Ohms, 1-w. Carbon
C19	470 Mmf. Mica	C39d	20 Mfd. 25 V. Dry Elec.	R21	470,000 Ohms, ½-w. Carbon
C20	470 Mmf. Mica	P1	Pilot Light, MAZDA No. 44	R22	220 Ohms, 2-w. Carbon ±5%
C21	50 Mmf. Mica	P2	Pilot Light, MAZDA No. 44	R23	1.0 Megohms, ½-w. Carbon
C22	470 Mmf. Mica	R1	2.0 Megohms Volume Control	R24	5,600 Ohms, ½-w. Carbon
C23	10 Mmf. Mica	R2	330,000 Ohms, ½-W. Carbon	R25	3,900 Ohms, 2-w. Carbon
C24	100 Mmf. Mica	R3	33,000 Ohms, ½-W. Carbon	R26	22 Ohms, ½-w. Carbon
C25	.04 Mfd. 600 V. Paper	R4	15,000 Ohms, ½-W. Carbon	R27	100 Ohms, ½-w. Carbon
C26	220 Mmf. Mica	R5	560,000 Ohms, ½-W. Carbon	R28	5.6 Megohms, ½-w. Carbon
C27	.00075 Mfd. 600 V. Paper	R6	1,000 Ohms, ½-W. Carbon		

MODEL HE-74
MODEL HE-74L
MODEL HE-740
MODEL HE-740L

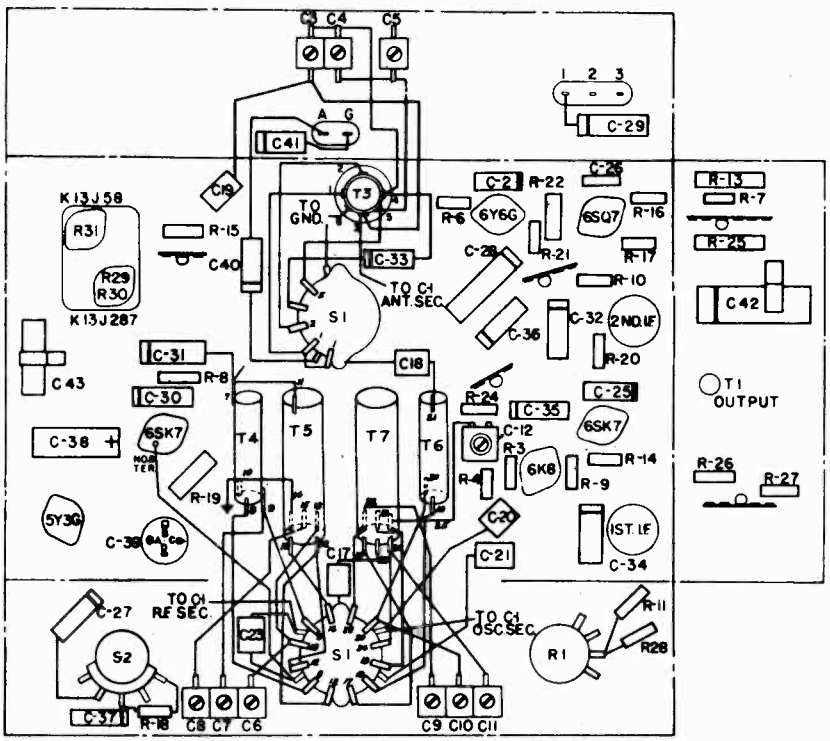
GENERAL ELECTRIC CO.



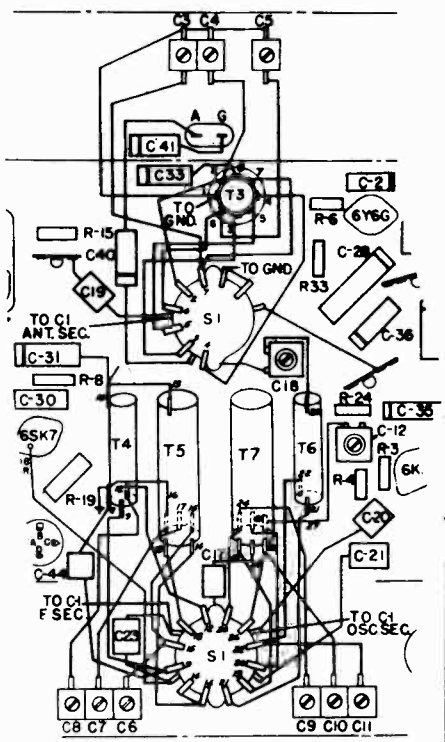
CHASSIS PARTS LAYOUT
MODEL HE-74



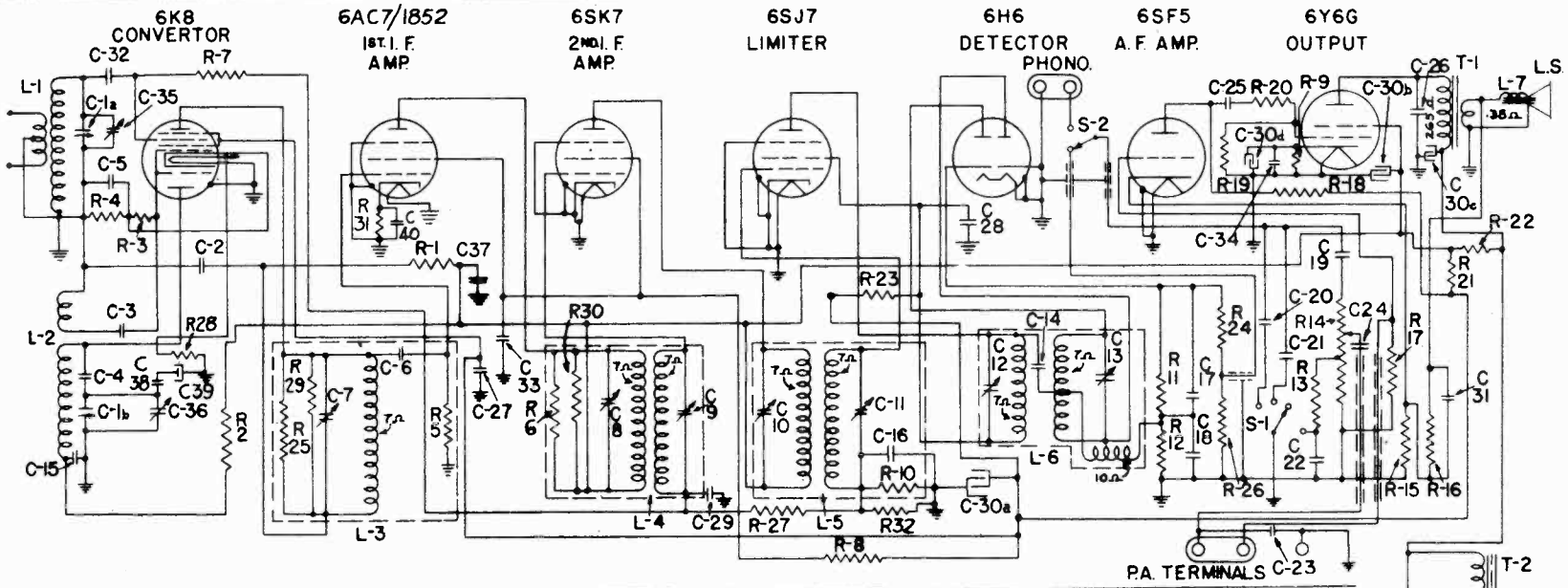
CHASSIS PARTS LAYOUT
(PARTIAL)
MODEL HE-74L
BALANCE SAME AS HE-74



CHASSIS PARTS LAYOUT
MODEL HE-740



CHASSIS PARTS LAYOUT
MODEL HE-740L
(PARTIAL)
BALANCE SAME AS HE740



Models HM-80A and HM-85A

General Electric Frequency Modulation Receivers, Models HM-80A and HM-85A are designed for the reception of ultra-short-wave broadcasting as developed by Major Edward H. Armstrong. These receivers of the superheterodyne type using eight General Electric Pre-tested Tubes are similar to Models HM-80 and HM-85 respectively. Certain circuit changes have been incorporated in the Models HM-80A and HM-85A to increase sensitivity, improve limiter action, and assure greater stability. A revised schematic diagram and additional replacement parts list are incorporated in this sheet.

For specifications, general information and alignment procedure, refer to HM -80 Service Notes. The tube complement is altered by the substitution of a 6AC7/1852 in place of the 6SK7 1st I.F. amplifier tube.

OSCILLATOR DRIFT CORRECTION NETWORK

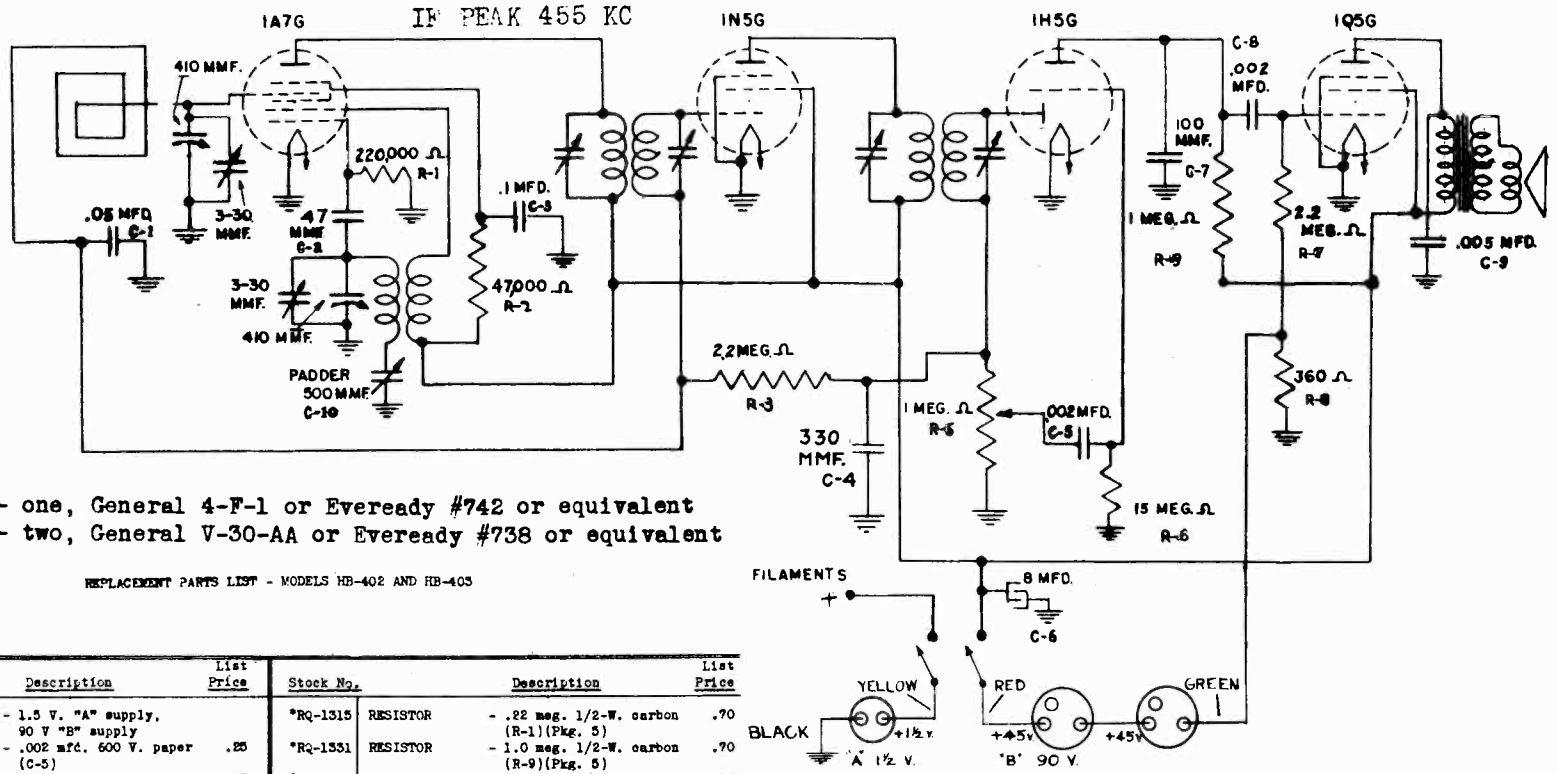
The placement of the parts comprising this network materially affects the amount of oscillator drift correction. For maximum performance the positions of the 47-ohm, 1-watt resistor (R-28) and the 5-mmf. compensating capacitor (C-39) should be adjusted until they are parallel and separated by exactly $\frac{1}{16}$ inch.

Symbol	Description
C-1	20 mmf. tuning condenser
C-2	.02 mfd. paper capacitor
C-3	47 mmf. mica capacitor
C-4	1200 mmf. mica capacitor ±5%
C-5	.05 mfd. paper capacitor
C-6	500 mmf. trimmer
C-14	47 mmf. mica capacitor
C-15	470 mmf. mica capacitor
C-16	22 mmf. mica capacitor
C-17	100 mmf. mica capacitor
C-18	100 mmf. mica capacitor
C-19	.005 mfd. paper capacitor
C-20	.002 mfd. paper capacitor
C-21	470 mmf. mica capacitor
C-22	.002 mfd. paper capacitor
C-23	220 mmf. mica capacitor
C-24	.005 mfd. paper capacitor
C-25	.05 mfd. paper capacitor
C-26	.005 mfd. paper capacitor
C-27	.005 mfd. paper capacitor
C-28	.05 mfd. paper capacitor
C-29	.05 mfd. paper capacitor
C-30a	20 mfd. 250 V. dry electrolytic
C-30b	20 mfd. 250 V. dry electrolytic
C-30c	40 mfd. 250 V. dry electrolytic
C-30d	20 mfd. 25 V. dry electrolytic
C-31	0.1 mfd. paper capacitor
C-32	470 mmf. mica capacitor
C-33	0.1 mfd. paper capacitor
C-34	.05 mfd. paper capacitor
C-35	2-15 mmf. antenna trimmer
C-36	7-23 mmf. air trimmer
C-37	.05 mfd. paper capacitor
C-38	20 mmf. mica capacitor
C-39	5 mmf. compensating capacitor
C-40	.01 mfd. paper capacitor
R-1	2200 ohms carbon resistor
R-2	6800 ohms carbon resistor
R-3	47,000 ohms carbon resistor
R-4	330 ohms carbon resistor

Symbol	Description
R-5	470,000 ohms carbon resistor
R-6	47,000 ohms carbon resistor
R-7	470,000 ohms carbon resistor
R-8	4700 ohms carbon resistor
R-9	220 ohms 2 W. carbon resistor
R-10	330,000 ohms carbon resistor
R-11	100,000 ohms carbon resistor
R-12	100,000 ohms carbon resistor
R-13	120,000 ohms carbon resistor
R-14	2 megohm volume control
R-15	82 ohms carbon resistor
R-16	220 ohms carbon resistor
R-17	15 megohms carbon resistor
R-18	220,000 ohms carbon resistor
R-19	470,000 ohms carbon resistor
R-20	1500 ohms carbon resistor
R-21	2200 ohms 1 W. carbon resistor
R-22	1600 ohms 3½ W. wire wound resistor
R-23	2200 ohms carbon resistor
R-24	100,000 ohms carbon resistor
R-25	33,000 ohms carbon resistor
R-26	220,000 ohms carbon resistor
R-27	2.2 megohms carbon resistor
R-28	47 ohms 1 W. carbon resistor
R-29	33,000 ohms carbon resistor
R-30	47,000 ohms carbon resistor
R-31	150 ohms carbon resistor
R-32	100,000 ohms carbon resistor
S-1	Tone switch
S-2	Phono switch
S-3	Power switch—on S-2
L-1	Antenna transformer
L-2	Oscillator transformer
L-3	1st I.F. transformer
L-4	2nd I.F. transformer
L-5	I.F. limiter
L-6	Discrim. transformer
P-1	Dial lamp, MAZDA No. 44
P-2	Dial lamp, MAZDA No. 44

FOR MODEL HM-80
SEE INDEX

FOR OTHER DATA
SEE INDEX



"A" supply - one, General 4-F-1 or Eveready #742 or equivalent
"B" supply - two, General V-30-AA or Eveready #738 or equivalent

REPLACEMENT PARTS LIST - MODELS HB-402 AND HB-403

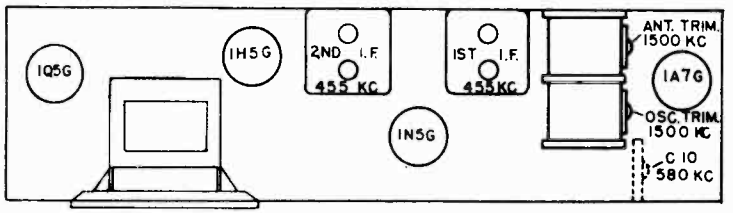
Stock No.		Description	List Price
RB-325	BATTERY	- 1.5 V. "A" supply, 90 V "B" supply	
*RC-011	CAPACITOR	- .002 mfd. 600 V. paper (C-5)	.25
*RC-023	CAPACITOR	- .005 mfd. 600 V. paper (C-9)	.25
*RC-072	CAPACITOR	- .05 mfd. 200 V. paper (C-1)	.25
*RC-102	CAPACITOR	- 0.1 mfd. 100 V. paper (C-3)	.30
RC-232	CAPACITOR	- 47 mmf. mica (C-2)	.25
*RC-236	CAPACITOR	- 100 mmf. mica (C-7)	.25
*RC-274	CAPACITOR	- 330 mmf. mica (C-4)	.30
RC-743	CONDENSER	- Tuning Condenser	2.15
RC-5131	CAPACITOR	- 8 mfd. 150 V. dry electrolytic (C-6)	.55
RC-6508	CAPACITOR	- Oscillator padding capacitor (C-10)	.30
RC-6119	CABLE	- Tuning drive cord and spring	.15
RD-107	DIAL	- Dial scale	.30
RL-286	COIL	- Oscillator coil	.40
RL-503	LOOP	- Antenna loop	1.20
RP-126	POINTER	- Dial pointer	.15
RQ-1248	RESISTOR	- 360 ohms, 1/2-W. carbon (R-8)(Pkg. 5)	.70
*RQ-1299	RESISTOR	- 47,000 ohms, 1/2-W. carbon (R-2)(Pkg. 5)	.70

Stock No.		Description	List Price
*RQ-1315	RESISTOR	- .22 meg. 1/2-W. carbon (R-1)(Pkg. 5)	.70
*RQ-1331	RESISTOR	- 1.0 meg. 1/2-W. carbon (R-9)(Pkg. 5)	.70
*RQ-1339	RESISTOR	- 2.2 meg. 1/2-W. carbon (R-5)(Pkg. 5)	.70
*RQ-1365	RESISTOR	- 15 meg. 1/4 W. carbon (R-6)(Pkg. 5)	.70
*RS-238	SOCKET	- Octal tube socket	.15
RS-874	SCREW	- Ornamental wood screw for cabinet back (Pkg.10)	.15
RS-923	SHAFT	- Tuning drive shaft	.10
RS-1010	SPEAKER	- 4-inch permanent magnet speaker	3.25

Stock No.		Description	List Price
RT-311	TRANSFORMER	- 1st IF transformer	1.80
RT-312	TRANSFORMER	- 2nd IF transformer	1.30
RV-066	VOLUME CONTROL	- 1 meg. volume control (R-5)	.80
RW-036	WINDOW	- Dial scale window	.20

*Used on previous receivers.

(Prices subject to change without notice.)



TRIMMER LOCATION FIG. 1

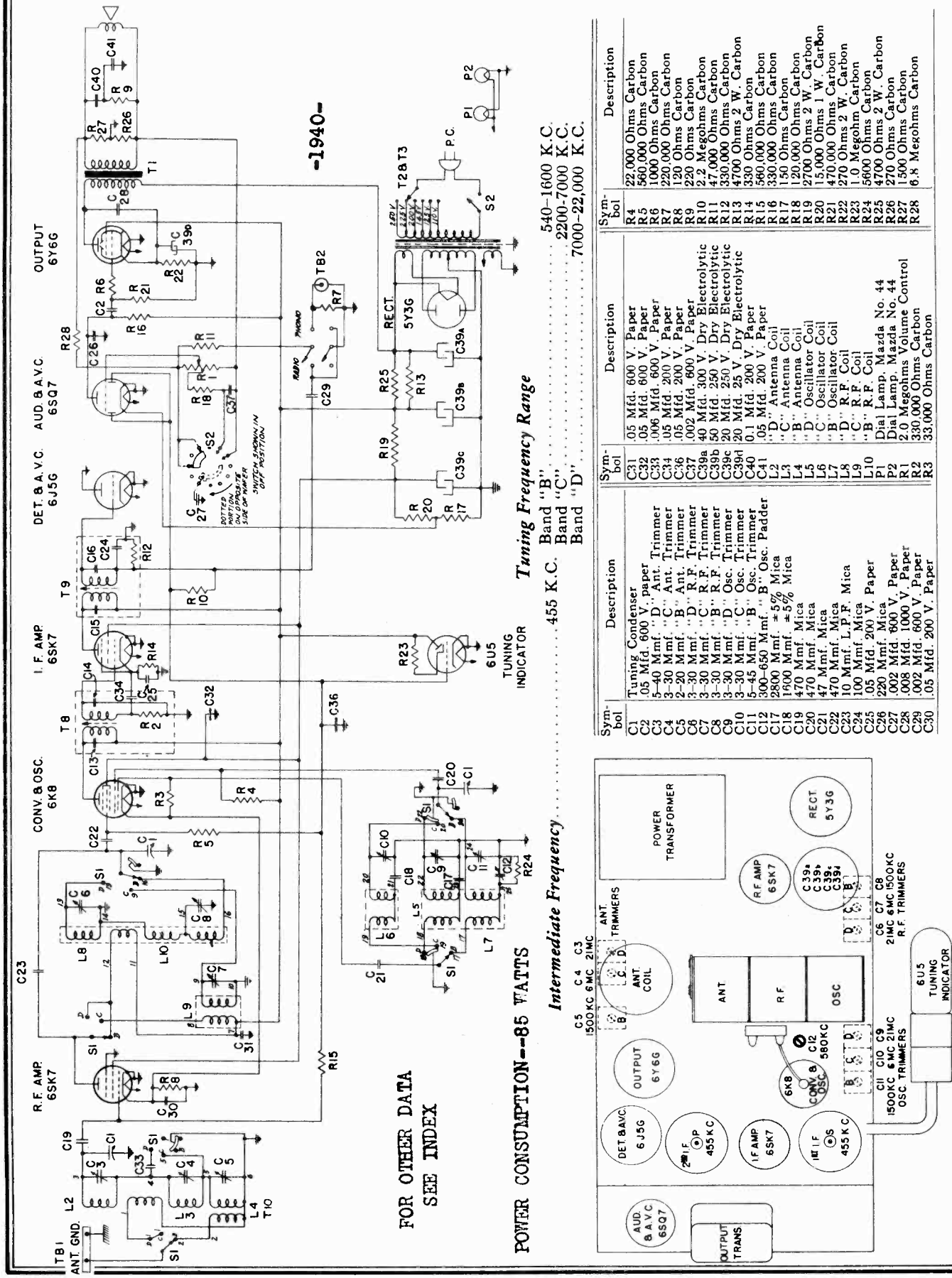
ALIGNMENT FREQUENCIES ..... IF - 455 KC Broadcast - 1500 KC and 580 KC

NOTE:- The chassis must be removed from the carrying case when aligning. Since the location of the back cover, loop, chassis and battery affect alignment considerably, the position of these components when aligning should duplicate that found in the carrying case. A non-metallic object should be used to hold the back cover-loop assembly in position during alignment.

GENERAL ELECTRIC CO.

MODELS JE-81
JE-810

-1940-



Symbol	Description
C1	Tuning Condenser
C2	.05 Mfd. 600 V. paper
C3	5-40 Mmf. "D" Ant. Trimmer
C4	3-30 Mmf. "C" Ant. Trimmer
C5	2-20 Mmf. "B" Ant. Trimmer
C6	3-30 Mmf. "D" R.F. Trimmer
C7	3-30 Mmf. "C" R.F. Trimmer
C8	3-30 Mmf. "B" R.F. Trimmer
C9	3-30 Mmf. "D" Osc. Trimmer
C10	3-30 Mmf. "C" Osc. Trimmer
C11	5-45 Mmf. "B" Osc. Trimmer
C12	300-650 Mmf. "B" Osc. Padder
C17	2800 Mmf. ±5% Mica
C18	1600 Mmf. ±5% Mica
C19	470 Mmf. Mica
C20	470 Mmf. Mica
C21	47 Mmf. Mica
C22	470 Mmf. Mica
C23	10 Mmf. L.P.F. Mica
C24	100 Mmf. Mica
C25	.05 Mfd. 200 V. Paper
C26	220 Mmf. Mica
C27	.002 Mfd. 600 V. Paper
C28	.008 Mfd. 1000 V. Paper
C29	.002 Mfd. 600 V. Paper
C30	.05 Mfd. 200 V. Paper

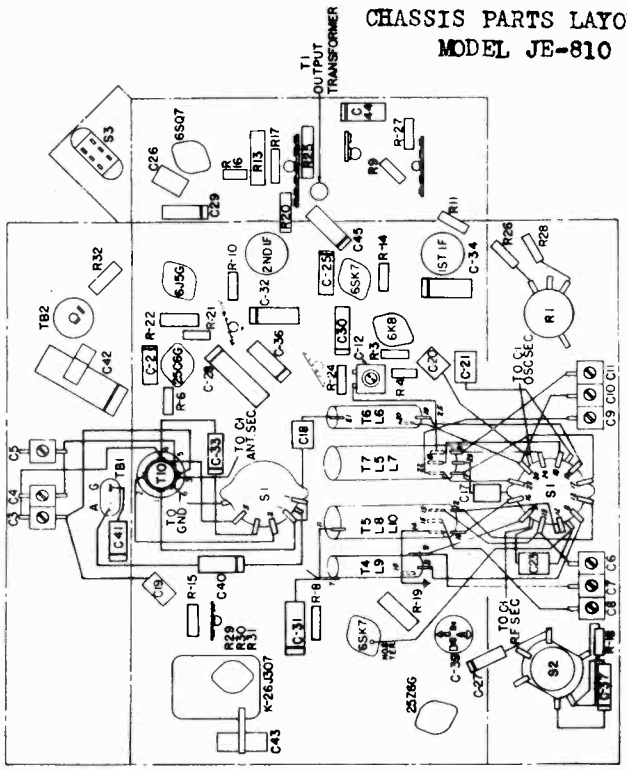
Symbol	Description
C31	.05 Mfd. 600 V. Paper
C32	.05 Mfd. 600 V. Paper
C33	.006 Mfd. 600 V. Paper
C34	.05 Mfd. 200 V. Paper
C36	.05 Mfd. 200 V. Paper
C37	.002 Mfd. 600 V. Paper
C39a	40 Mfd. 300 V. Dry Electrolytic
C39b	50 Mfd. 250 V. Dry Electrolytic
C39c	20 Mfd. 250 V. Dry Electrolytic
C39d	20 Mfd. 25 V. Dry Electrolytic
C40	0.1 Mfd. 200 V. Paper
C41	.05 Mfd. 200 V. Paper
L2	"D" Antenna Coil
L3	"C" Antenna Coil
L4	"B" Antenna Coil
L5	"D" Oscillator Coil
L6	"C" Oscillator Coil
L7	"B" Oscillator Coil
L8	"D" R.F. Coil
L9	"C" R.F. Coil
L10	"B" R.F. Coil
P1	Dial Lamp, Mazda No. 44
P2	Dial Lamp, Mazda No. 44
R1	2.0 Megohms Volume Control
R2	330,000 Ohms Carbon
R3	33,000 Ohms Carbon

Symbol	Description
R4	22,000 Ohms Carbon
R5	560,000 Ohms Carbon
R6	1000 Ohms Carbon
R7	220,000 Ohms Carbon
R8	120 Ohms Carbon
R9	220 Ohms Carbon
R10	2.2 Megohms Carbon
R11	47,000 Ohms Carbon
R12	330,000 Ohms Carbon
R13	4700 Ohms 2 W. Carbon
R14	330 Ohms Carbon
R15	560,000 Ohms Carbon
R16	330,000 Ohms Carbon
R17	150 Ohms Carbon
R18	120,000 Ohms Carbon
R19	2700 Ohms 2 W. Carbon
R20	15,000 Ohms 1 W. Carbon
R21	470,000 Ohms Carbon
R22	270 Ohms 2 W. Carbon
R23	1.0 Megohm Carbon
R24	5600 Ohms Carbon
R25	4700 Ohms 2 W. Carbon
R26	270 Ohms Carbon
R27	1500 Ohms Carbon
R28	6.8 Megohms Carbon

MODELS JE-81
JE-810

GENERAL ELECTRIC CO.

CHASSIS PARTS LAYOUT
MODEL JE-810



SPECIAL SERVICE INFORMATION

The following information will be found very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains*

(a) Antenna Post to R.F. Amplifier Grid at

1000 KC	4.4
4000 KC	2.6
18,000 KC	2.2

(b) R.F. Amplifier Grid to Converter Grid at

1000 KC	6.0
4000 KC	12.0
18,000 KC	8.2**

(c) R.F. on Converter Grid to I.F. on 1st I.F. Grid at

1000 KC ("B" Manual)	40.0
4000 KC	35.0
18,000 KC	35.0

(d) I.F. on Converter Grid to I.F. on 1st I.F. Grid at

455 KC ("B" Manual—Gang Closed)	42.0

(e) I.F. Amplifier Grid to Detector Grid at

455 KC	117.0

(2) Voltage Across Volume Control to Give ½-watt Speaker Output at

400 Cycles	0.075*

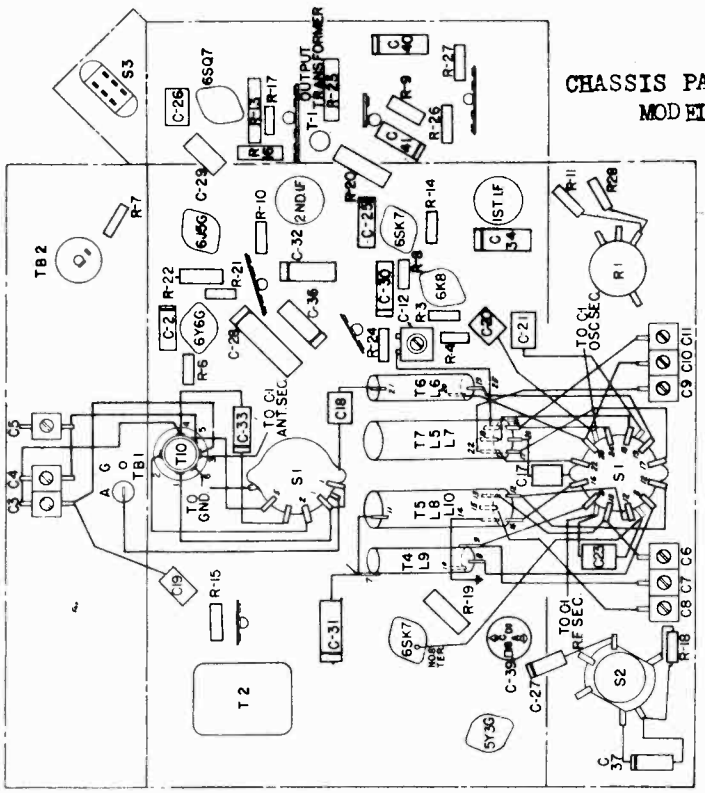
(3) DC voltage developed across oscillator grid resistor (R-3) with the gang closed.

"B" Band	7.6*
"C" Band	6.2*
"D" Band	5.1*

* Variations of +10%, −20% are permissible.

** On "D" band, stray oscillator voltage may upset reading.

CHASSIS PARTS LAYOUT
MODEL JE-81



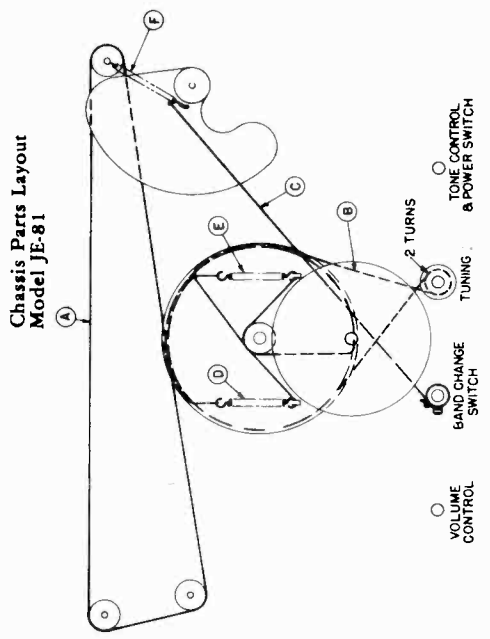
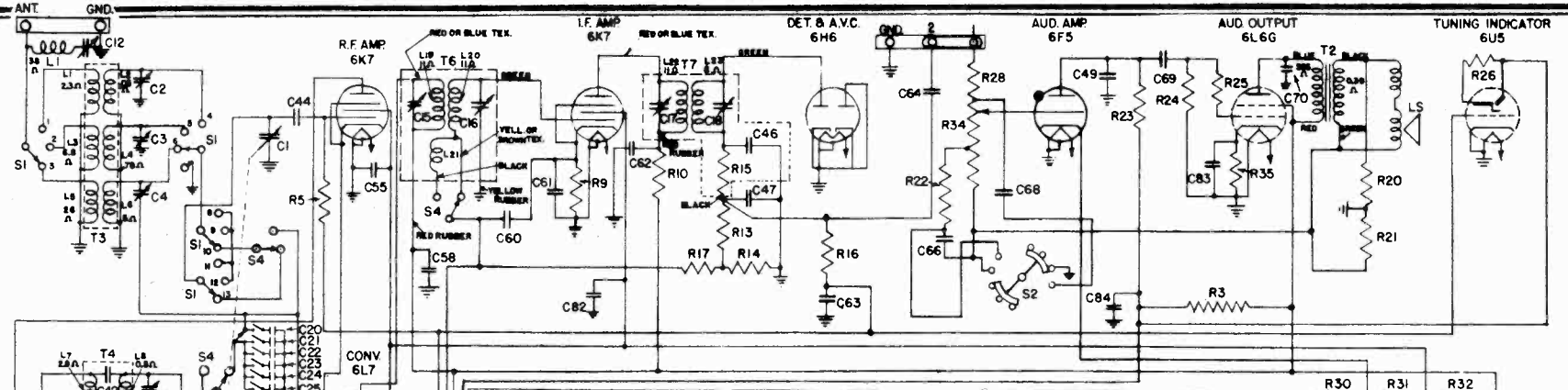
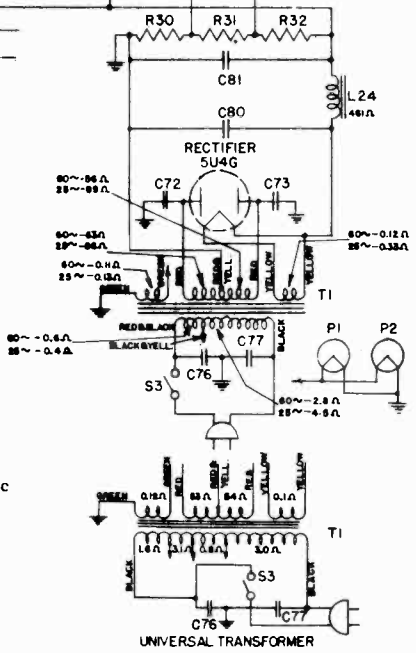


Fig. 7. Dial Cord Stringing Diagram

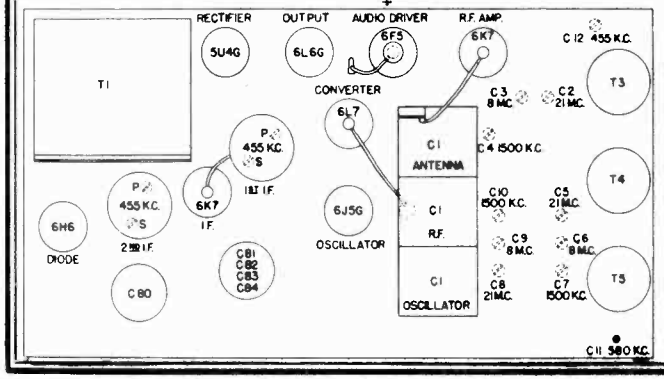
GENERAL ELECTRIC CO.

MODELS GE-93
GE-96





Symbol	Description	Symbol	Description
R1	2200 Ohm Carbon Resistor	C20–C25	Antenna Trimmer Strip
R2	47000 Ohm Carbon Resistor	C29–C34	Oscillator Trimmer Strip
R3	3900 Ohm Carbon Resistor	C38	3200 Mmf. Mica Capacitor
R4, 5	560,000 Ohm Carbon Resistor	C39	1800 Mmf. Mica Capacitor
R6, 7	220 Ohm Carbon Resistor	C40	50 Mmf. Mica Capacitor
R9	390 Ohm Carbon Resistor	C42	15 Mmf. Mica Capacitor
R10	2200 Ohm Carbon Resistor	C43, C44	390 Mmf. Mica Capacitor
R11	1000 Ohm Carbon Resistor	C45	4 Mmf. Mica Capacitor
R12	470 Ohm Carbon Resistor	C46	220 Mmf. Mica Capacitor
R13, 14	120,000 Ohm Carbon Resistor	C47	150 Mmf. Mica Capacitor
R15	47,000 Ohm Carbon Resistor	C49	330 Mmf. Mica Capacitor
R16	2.2 Megohm Carbon Resistor	C51	10 Mmf. Mica Capacitor
R17	1.5 Megohm Carbon Resistor	C54	.05 Mfd. Paper Capacitor
R20	220 Ohm Carbon Resistor	C55, 56	.05 Mfd. Paper Capacitor
R21	15 Ohm Carbon Resistor	C58, 60, 61	.05 Mfd. Paper Capacitor
R22	150,000 Ohm Carbon Resistor	C62, 63	.05 Mfd. Paper Capacitor
R23, 24	100,000 Ohm Carbon Resistor	C64	.02 Mfd. Paper Capacitor
R25	1000 Ohm Carbon Resistor	C65	.05 Mfd. Paper Capacitor
R26	1 Megohm Carbon Resistor	C66	.004 Mfd. Paper Capacitor
R28	120,000 Ohm Carbon Resistor	C68	.001 Mfd. Paper Capacitor
R30	82 Ohm Carbon Resistor	C69	.05 Mfd. Paper Capacitor
R31	10,000 Ohm Carbon Resistor	C70	.02 Mfd. Paper Capacitor
R32	6800 Ohm Carbon Resistor	C72, 73	.01 Mfd. Paper Capacitor
R34	2 Megohm Volume Control	C76, 77	.01 Mfd. Paper Capacitor
R35	180 Ohm Carbon Resistor	C80	30 Mfd. Wet Electrolytic
C1	10–450 Mmf. Tuning Condenser	C81	20 Mfd. 400 V. Dry Electrolytic
C2, C3	5–40 Mmf. Trimmer Capacitor	C82	4 Mfd. 250 V. Dry Electrolytic
C4	2–20 Mmf. Trimmer Capacitor	C83	25 Mfd. 50 V. Dry Electrolytic
C5, C6, C7	3–30 Mmf. Trimmer Capacitor	C84	4 Mfd. 400 V. Dry Electrolytic
C8, C9, C10	3–30 Mmf. Trimmer Capacitor	T1	Power Transformer
C11	300–650 Mmf. Padder Capacitor	T2	Output Transformer
C12	20–50 Mmf. Wave Trap Trimmer	T3	Antenna Transformer
		T4	R.F. Transformer
		T5	Oscillator Transformer
		S1	Band Change Switch
		S2	Tone Control Switch
		S3	Power Switch



IF PEAK 455 KC

Rating Label	Power Consumption
A	105
C	110
V	110

-1940-

I.F. 455 KC

FOR OTHER DATA SEE INDEX

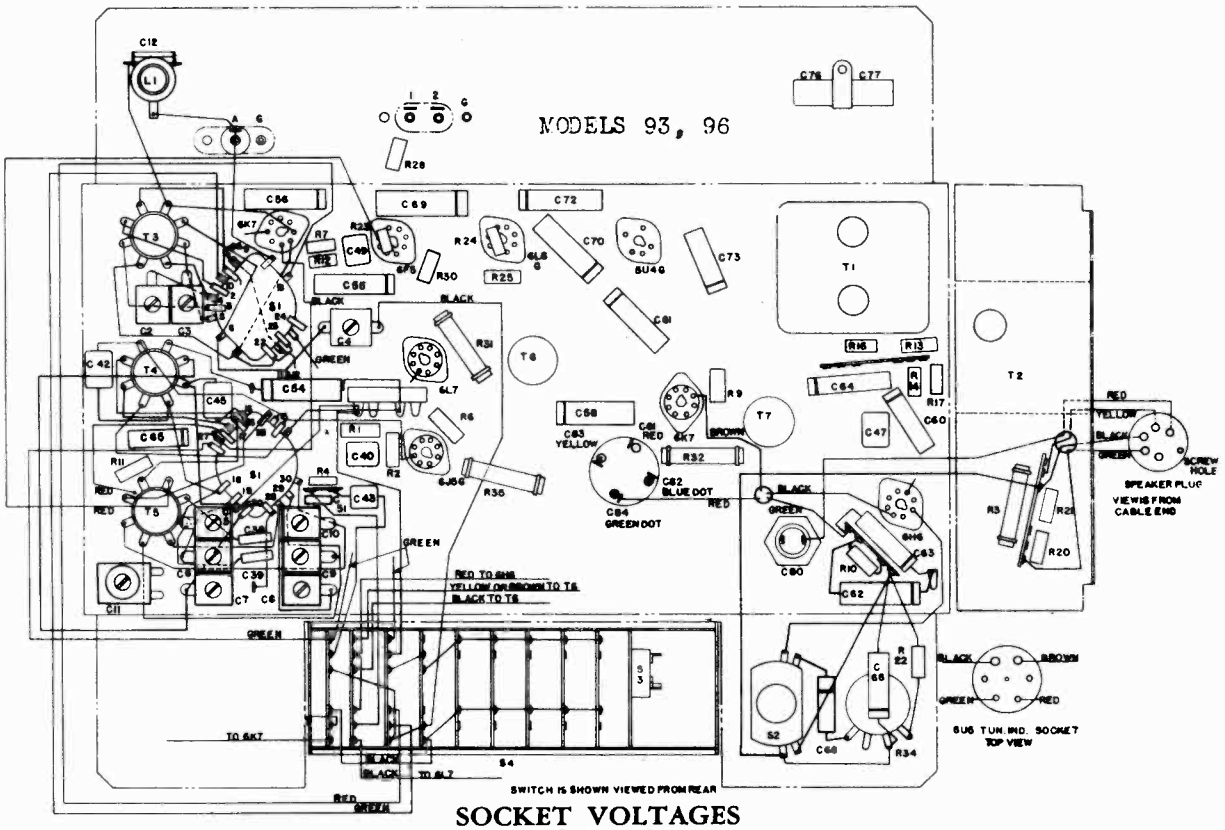
Loud-speaker—Electrodynamic

	GE-93	GE-96
Outside Cone Diameter	8 in.	12 in.
Voice Coil Impedance	3.5 ohms at 400 cycles	
Field Coil Resistance	460 ohms (cold)	

MODELS GE-93, GE-96
MODELS HE-100,
HE-100H, HE-105

GENERAL ELECTRIC CO.

MODELS HE-100L,
HE-100LH, HE-105L



SOCKET VOLTAGES

GE-93, GE-96

Tube No.	Plate to Ground Volts D.C.	Screen Grid to Ground Volts D.C.	Cathode to Ground Volts D.C.	Cathode Current M.A.	Heater Volts A.C.
6K7 R.F.	225	105	5.8	3.6	6.4
6L7	235	105	5.8	5.2	6.4
6J5G	190	...	0	10.5	6.4
6K7 I.F.	215	105	3.6	9.5	6.4
6F5	* 120	...	0.9	0.7	6.4
6L6G	220	235	12	70	6.4
6U5	Target 190	...	...	1.5	6.4
5U4G	280/280 A.C. RMS	...	298	110	5.1

A.C. line voltage—125. No signal input. 1000 ohms per volt meter. Dial pointer at 550 K.C. on "B" band.
*Measured on 500-volt scale.

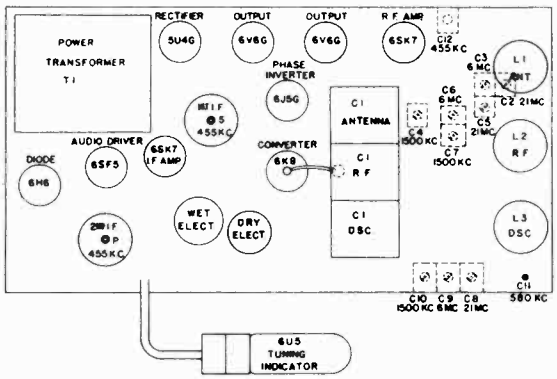


Fig. 4. Trimmer Location
Models HE-100, HE-100H, HE-105

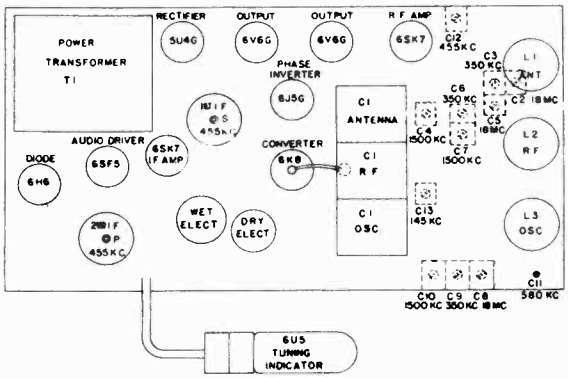
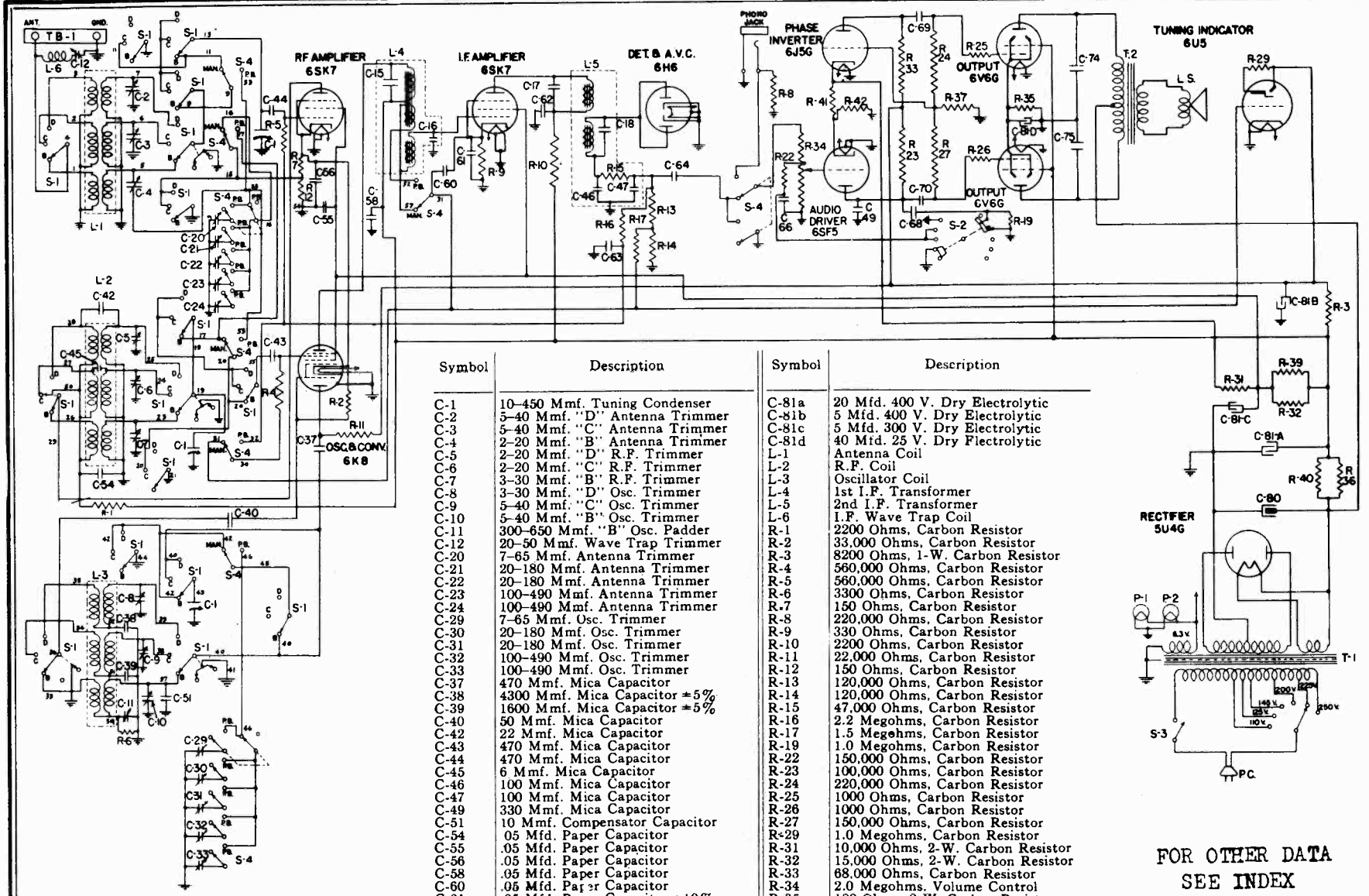


Fig. 5. Trimmer Location
Models HE-100L, HE-100LH, HE-105L

GENERAL ELECTRIC CO.

MODELS HE-100, HE-100H, HE-105



Symbol	Description
C-1	10–450 Mmf. Tuning Condenser
C-2	5–40 Mmf. "D" Antenna Trimmer
C-3	5–40 Mmf. "C" Antenna Trimmer
C-4	2–20 Mmf. "B" Antenna Trimmer
C-5	2–20 Mmf. "D" R.F. Trimmer
C-6	2–20 Mmf. "C" R.F. Trimmer
C-7	3–30 Mmf. "B" R.F. Trimmer
C-8	3–30 Mmf. "D" Osc. Trimmer
C-9	5–40 Mmf. "C" Osc. Trimmer
C-10	5–40 Mmf. "B" Osc. Trimmer
C-11	300–650 Mmf. "B" Osc. Padder
C-12	20–50 Mmf. Wave Trap Trimmer
C-20	7–65 Mmf. Antenna Trimmer
C-21	20–180 Mmf. Antenna Trimmer
C-22	20–180 Mmf. Antenna Trimmer
C-23	100–490 Mmf. Antenna Trimmer
C-24	100–490 Mmf. Antenna Trimmer
C-29	7–65 Mmf. Osc. Trimmer
C-30	20–180 Mmf. Osc. Trimmer
C-31	20–180 Mmf. Osc. Trimmer
C-32	100–490 Mmf. Osc. Trimmer
C-33	100–490 Mmf. Osc. Trimmer
C-37	470 Mmf. Mica Capacitor
C-38	4300 Mmf. Mica Capacitor ±5%
C-39	1600 Mmf. Mica Capacitor ±5%
C-40	50 Mmf. Mica Capacitor
C-42	22 Mmf. Mica Capacitor
C-43	470 Mmf. Mica Capacitor
C-44	470 Mmf. Mica Capacitor
C-45	6 Mmf. Mica Capacitor
C-46	100 Mmf. Mica Capacitor
C-47	100 Mmf. Mica Capacitor
C-49	330 Mmf. Mica Capacitor
C-51	10 Mmf. Compensator Capacitor
C-54	.05 Mfd. Paper Capacitor
C-55	.05 Mfd. Paper Capacitor
C-56	.05 Mfd. Paper Capacitor
C-58	.05 Mfd. Paper Capacitor
C-60	.05 Mfd. Paper Capacitor
C-61	.05 Mfd. Paper Capacitor ±10%
C-62	.05 Mfd. Paper Capacitor
C-63	.05 Mfd. Paper Capacitor
C-64	.02 Mfd. Paper Capacitor
C-66	.003 Mfd. Paper Capacitor
C-68	.005 Mfd. Paper Capacitor
C-69	.05 Mfd. Paper Capacitor
C-70	.05 Mfd. Paper Capacitor
C-74	.0105 Mfd. 1500 V. Paper Capacitor
C-75	.0105 Mfd. 1500 V. Paper Capacitor
C-80	40 Mfd. 400 V. Wet Electrolytic

Symbol	Description
C-81a	20 Mfd. 400 V. Dry Electrolytic
C-81b	5 Mfd. 400 V. Dry Electrolytic
C-81c	5 Mfd. 300 V. Dry Electrolytic
C-81d	40 Mfd. 25 V. Dry Electrolytic
L-1	Antenna Coil
L-2	R.F. Coil
L-3	Oscillator Coil
L-4	1st I.F. Transformer
L-5	2nd I.F. Transformer
L-6	I.F. Wave Trap Coil
R-1	2200 Ohms, Carbon Resistor
R-2	33,000 Ohms, Carbon Resistor
R-3	8200 Ohms, 1-W. Carbon Resistor
R-4	560,000 Ohms, Carbon Resistor
R-5	560,000 Ohms, Carbon Resistor
R-6	3300 Ohms, Carbon Resistor
R-7	150 Ohms, Carbon Resistor
R-8	220,000 Ohms, Carbon Resistor
R-9	330 Ohms, Carbon Resistor
R-10	2200 Ohms, Carbon Resistor
R-11	22,000 Ohms, Carbon Resistor
R-12	150 Ohms, Carbon Resistor
R-13	120,000 Ohms, Carbon Resistor
R-14	120,000 Ohms, Carbon Resistor
R-15	47,000 Ohms, Carbon Resistor
R-16	2.2 Megohms, Carbon Resistor
R-17	1.5 Megohms, Carbon Resistor
R-19	1.0 Megohms, Carbon Resistor
R-22	150,000 Ohms, Carbon Resistor
R-23	100,000 Ohms, Carbon Resistor
R-24	220,000 Ohms, Carbon Resistor
R-25	1000 Ohms, Carbon Resistor
R-26	1000 Ohms, Carbon Resistor
R-27	150,000 Ohms, Carbon Resistor
R-29	1.0 Megohms, Carbon Resistor
R-31	10,000 Ohms, 2-W. Carbon Resistor
R-32	15,000 Ohms, 2-W. Carbon Resistor
R-33	68,000 Ohms, Carbon Resistor
R-34	2.0 Megohms, Volume Control
R-35	180 Ohms, 2-W. Carbon Resistor
R-36	3300 Ohms, 2-W. Carbon Resistor
R-37	56,000 Ohms, Carbon Resistor
R-39	15,000 Ohms, 2-W. Carbon Resistor
R-40	3300 Ohms, 2-W. Carbon Resistor
R-41	330 Ohms, Carbon Resistor
R-42	82 Ohms, Carbon Resistor
S-1	Band Change Switch
S-2	Tone Control Switch
S-3	Power Switch on S4
S-4	Station Selector Switch

Tuning Frequency Range

Models HE-100, HE-100H, HE-105

Band "B".....

Band "C".....

Band "D".....

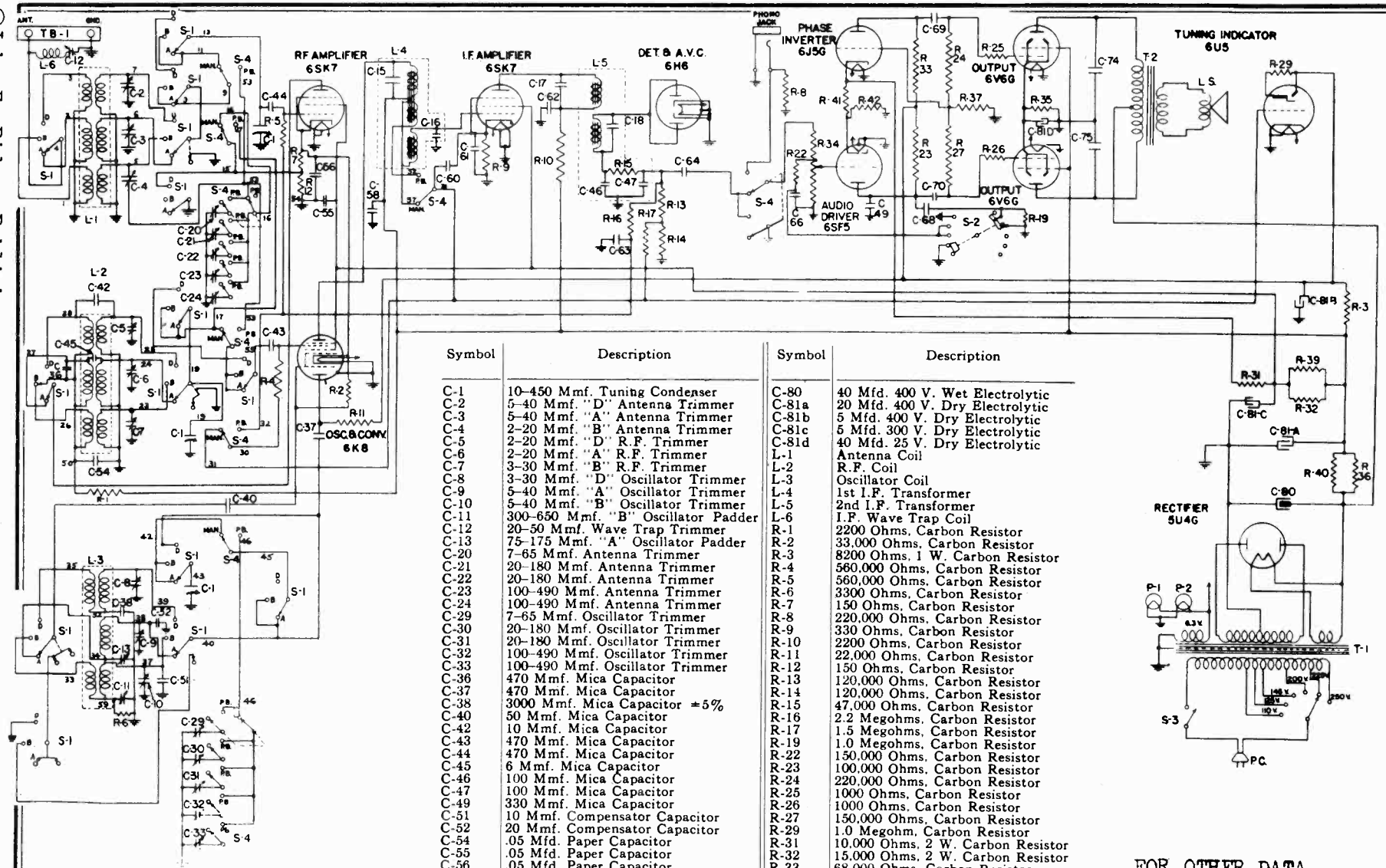
FOR OTHER DATA SEE INDEX

I.F. 455 KC

-1940-

MODELS HE-100L,
HE-100LH, HE-105L

GENERAL ELECTRIC CO.



Symbol	Description
C-1	10–450 Mmf. Tuning Condenser
C-2	5–40 Mmf. "D" Antenna Trimmer
C-3	5–40 Mmf. "A" Antenna Trimmer
C-4	2–20 Mmf. "B" Antenna Trimmer
C-5	2–20 Mmf. "D" R.F. Trimmer
C-6	2–20 Mmf. "A" R.F. Trimmer
C-7	3–30 Mmf. "B" R.F. Trimmer
C-8	3–30 Mmf. "D" Oscillator Trimmer
C-9	5–40 Mmf. "A" Oscillator Trimmer
C-10	5–40 Mmf. "B" Oscillator Trimmer
C-11	300–650 Mmf. "B" Oscillator Padder
C-12	20–50 Mmf. Wave Trap Trimmer
C-13	75–175 Mmf. "A" Oscillator Padder
C-20	7–65 Mmf. Antenna Trimmer
C-21	20–180 Mmf. Antenna Trimmer
C-22	20–180 Mmf. Antenna Trimmer
C-23	100–490 Mmf. Antenna Trimmer
C-24	100–490 Mmf. Antenna Trimmer
C-29	7–65 Mmf. Oscillator Trimmer
C-30	20–180 Mmf. Oscillator Trimmer
C-31	20–180 Mmf. Oscillator Trimmer
C-32	100–490 Mmf. Oscillator Trimmer
C-33	100–490 Mmf. Oscillator Trimmer
C-36	470 Mmf. Mica Capacitor
C-37	470 Mmf. Mica Capacitor
C-38	3000 Mmf. Mica Capacitor ±5%
C-40	50 Mmf. Mica Capacitor
C-42	10 Mmf. Mica Capacitor
C-43	470 Mmf. Mica Capacitor
C-44	470 Mmf. Mica Capacitor
C-45	6 Mmf. Mica Capacitor
C-46	100 Mmf. Mica Capacitor
C-47	100 Mmf. Mica Capacitor
C-49	330 Mmf. Mica Capacitor
C-51	10 Mmf. Compensator Capacitor
C-52	20 Mmf. Compensator Capacitor
C-54	.05 Mfd. Paper Capacitor
C-55	.05 Mfd. Paper Capacitor
C-56	.05 Mfd. Paper Capacitor
C-58	.05 Mfd. Paper Capacitor
C-60	.05 Mfd. Paper Capacitor
C-61	.05 Mfd. Paper Capacitor ±10%
C-62	.05 Mfd. Paper Capacitor
C-63	.05 Mfd. Paper Capacitor
C-64	.02 Mfd. Paper Capacitor
C-66	.003 Mfd. Paper Capacitor
C-68	.005 Mfd. Paper Capacitor
C-69	.05 Mfd. Paper Capacitor
C-70	.05 Mfd. Paper Capacitor
C-74	.0015 Mfd. 1500 V. Paper Capacitor
C-75	.0015 Mfd. 1500 V. Paper Capacitor

Symbol	Description
C-80	40 Mfd. 400 V. Wet Electrolytic
C-81a	20 Mfd. 400 V. Dry Electrolytic
C-81b	5 Mfd. 400 V. Dry Electrolytic
C-81c	5 Mfd. 300 V. Dry Electrolytic
C-81d	40 Mfd. 25 V. Dry Electrolytic
L-1	Antenna Coil
L-2	R.F. Coil
L-3	Oscillator Coil
L-4	1st I.F. Transformer
L-5	2nd I.F. Transformer
L-6	I.F. Wave Trap Coil
R-1	2200 Ohms, Carbon Resistor
R-2	33,000 Ohms, Carbon Resistor
R-3	8200 Ohms, 1 W. Carbon Resistor
R-4	560,000 Ohms, Carbon Resistor
R-5	560,000 Ohms, Carbon Resistor
R-6	3300 Ohms, Carbon Resistor
R-7	150 Ohms, Carbon Resistor
R-8	220,000 Ohms, Carbon Resistor
R-9	330 Ohms, Carbon Resistor
R-10	2200 Ohms, Carbon Resistor
R-11	22,000 Ohms, Carbon Resistor
R-12	150 Ohms, Carbon Resistor
R-13	120,000 Ohms, Carbon Resistor
R-14	120,000 Ohms, Carbon Resistor
R-15	47,000 Ohms, Carbon Resistor
R-16	2.2 Megohms, Carbon Resistor
R-17	1.5 Megohms, Carbon Resistor
R-19	1.0 Megohms, Carbon Resistor
R-22	150,000 Ohms, Carbon Resistor
R-23	100,000 Ohms, Carbon Resistor
R-24	220,000 Ohms, Carbon Resistor
R-25	1000 Ohms, Carbon Resistor
R-26	1000 Ohms, Carbon Resistor
R-27	150,000 Ohms, Carbon Resistor
R-29	1.0 Megohm, Carbon Resistor
R-31	10,000 Ohms, 2 W. Carbon Resistor
R-32	15,000 Ohms, 2 W. Carbon Resistor
R-33	68,000 Ohms, Carbon Resistor
R-34	2.0 Megohms, Volume Control
R-35	180 Ohms, 2 W. Carbon Resistor
R-36	3300 Ohms, 2 W. Carbon Resistor
R-37	56,000 Ohms, Carbon Resistor
R-39	15,000 Ohms, 2 W. Carbon Resistor
R-40	3300 Ohms, 2 W. Carbon Resistor
R-41	330 Ohms, Carbon Resistor
R-42	82 Ohms, Carbon Resistor
S-1	Band Change Switch
S-2	Tone Control Switch
S-3	Power Switch on S-4
S-4	Station Selector Switch

TUNING FREQUENCY RANGE

Models HE-100L, HE-100LH, HE-105L

Band "A"	140–400 K.C.
Band "B"	540–1600 K.C.
Band "D"	5700–18,000 K.C.

FOR OTHER DATA
SEE INDEX

I.F. 455 KC

-1940-

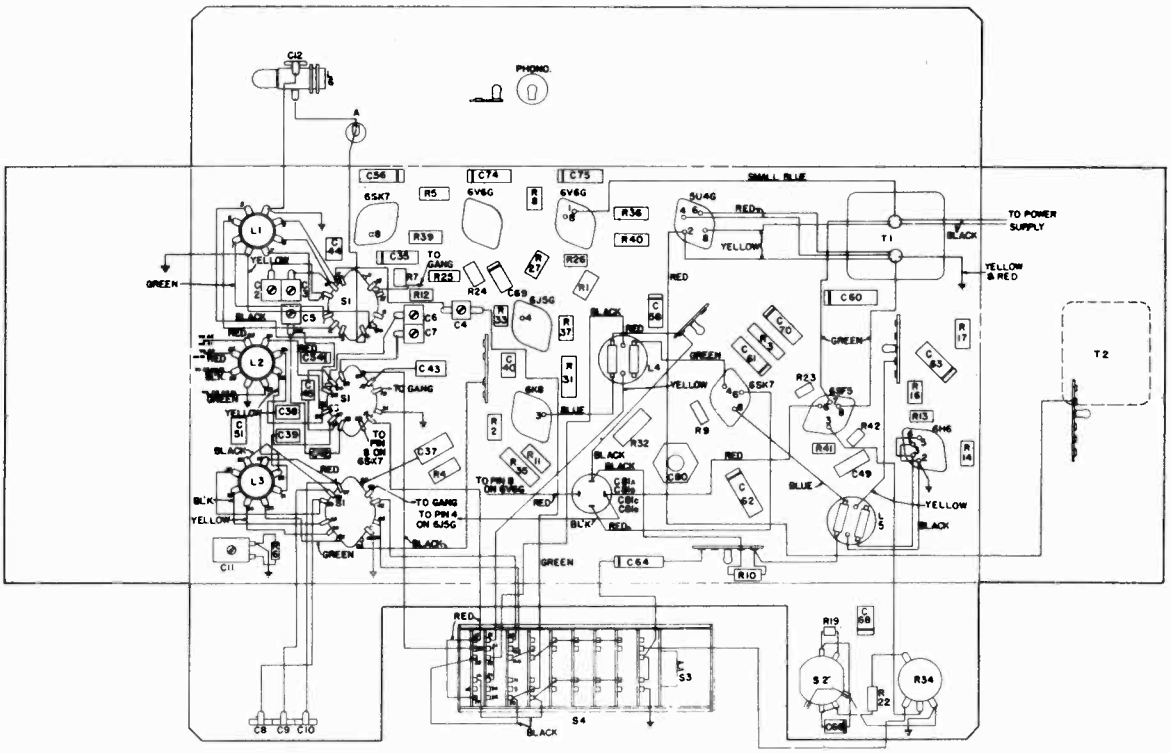


Fig. 8. Chassis Parts Layout
Models HE-100, HE-100H, HE-105

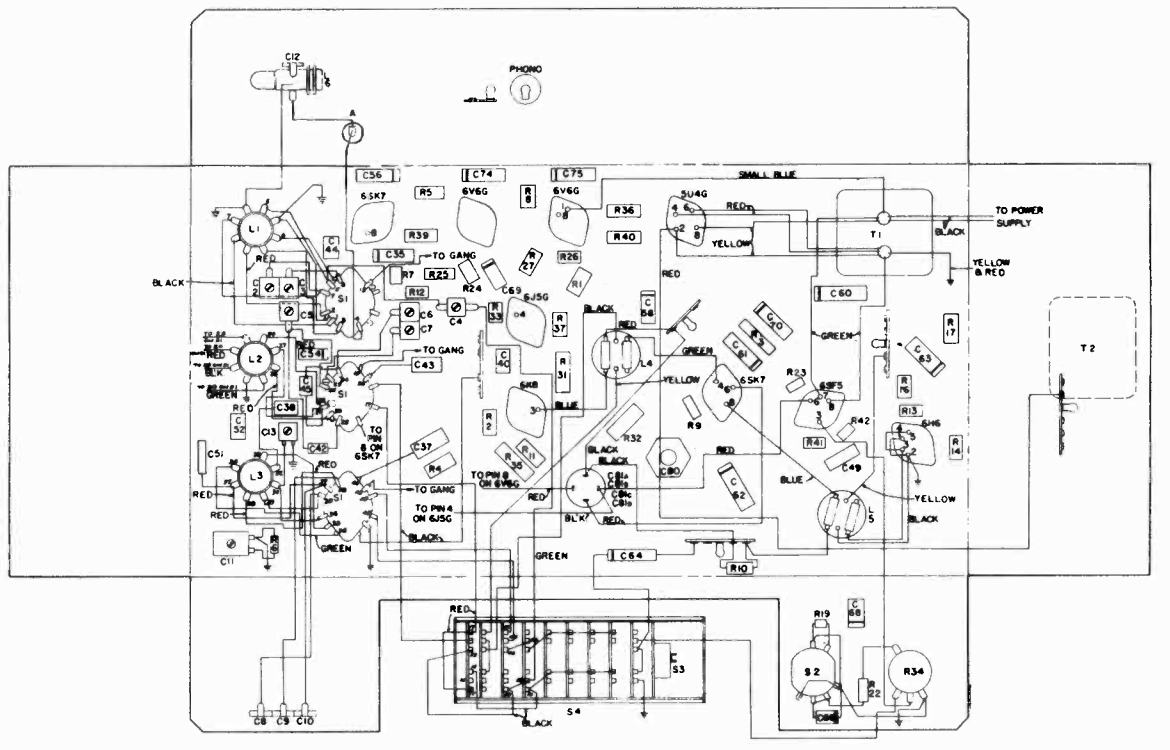
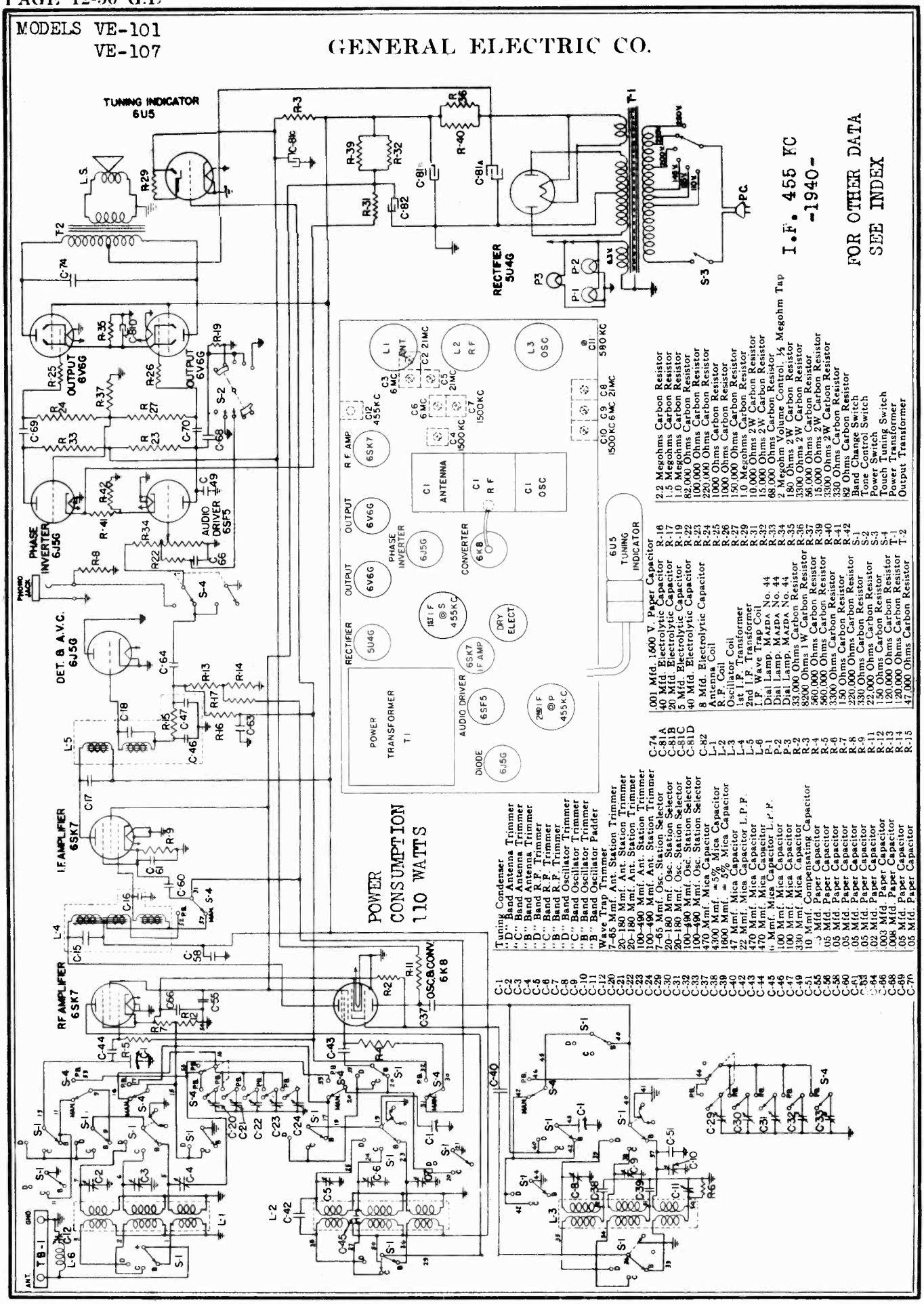


Fig. 9. Chassis Parts Layout
Models HE-100L, HE-100LH, HE-105L

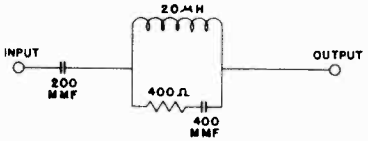
MODELS VE-101
VE-107

GENERAL ELECTRIC CO.



ALIGNMENT PROCEDURE

MODELS JE-101, JE-107, HE-100, HE-100H, HE-100L, HE-100LH, HE-105, HE-105L



Standard I.R.E. Dummy Antenna

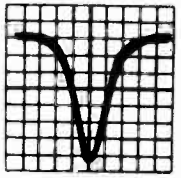


Fig. 2. Sharp Over-all I.F. Curve Taken on G-E Oscilloscope OFM-1

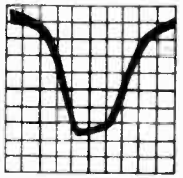


Fig. 3. Broad Over-all I.F. Curve Taken on G-E Oscilloscope OFM-1

I.F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Frequency	Point of Input	Dummy Antenna	Inductor or Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 mfd. or larger	2nd I.F. pri. and sec.	Gang condenser plates closed—manual key depressed—connect audio input of oscilloscope to ground and to junction of C-64, R-13 and R-16. Adjust two iron-core inductors of each I.F. transformer simultaneously using two insulated screw drivers. The resultant curve should be single and symmetrical as shown in Fig. 2.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 mfd. or larger	1st I.F. pri. and sec.	
3. Band "B"	455 K.C. Sweep	Converter Grid	.05 mfd. or larger		Check broad I.F. curve by pressing station key. If broad curve is not single and symmetrical (see Fig. 3) readjust I.F. trimmers slightly.
4. Band "B"	455 K.C. Sweep	Antenna Post	I.R.E.	C-12	Align wave trap for minimum amplitude.

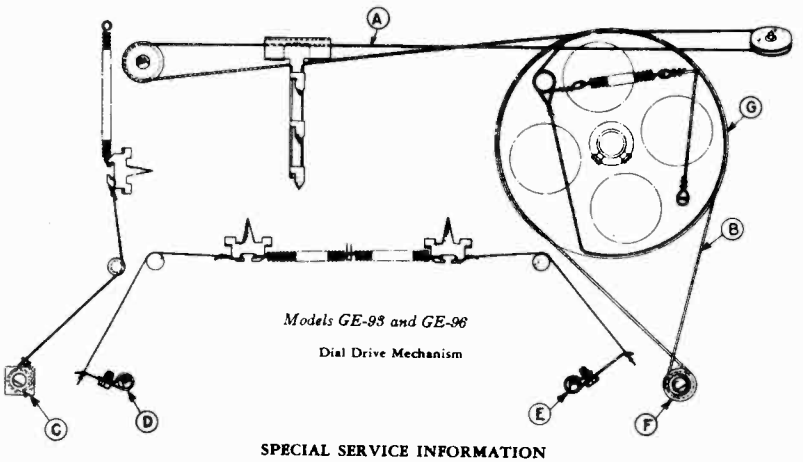
ALIGNMENT PROCEDURE

I.F. ALIGNMENT WITH OUTPUT METER

Band Switch Setting	Input Frequency	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	455 K.C. with Modulation	I.F. Grid	.05 mfd. or larger	2nd I.F. pri. and sec.	Gang condenser plates closed—manual key depressed—connect output meter across voice coil—keep signal low and volume control on as far as possible. Adjust all iron-core inductors for maximum output.
2. Band "B"	455 K.C. with Modulation	Converter Grid	.05 mfd. or larger	1st I.F. pri. and sec.	
3. Band "B"	455 K.C. with Modulation	Antenna Post	I.R.E.	C-12	Align wave trap for minimum output.

R. F. ALIGNMENT

1. Band "B"					Close gang condenser plates. Adjust pointer to first line at left end of tuning scale. Depress manual key.
2. Band "D"	21 M.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-8) R.F. (C-5) Ant. (C-2)	Connect output meter across voice coil—peak trimmers for maximum output. The image of any "D" band signal should be heard 910 K.C. below the input signal. EXAMPLE—21 M.C. image is at 20:09 M.C. Peak (C-5) while rocking the gang condenser.
3. Band "C"	6 M.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-9) R.F. (C-6) Ant. (C-3)	Peak trimmers for maximum output using a low input signal. Image—910 K.C. below signal.
4. Band "B"	1500 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-10) R.F. (C-7) Ant. (C-4)	Peak trimmers for maximum output with a low input signal.
5. Band "B"	580 K.C. with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-11)	Adjust padder for maximum output in the vicinity of 580 K.C. while rocking the gang condenser.
6. Band "B"		Repeat Operation 4			



Models GE-93 and GE-96

Dial Drive Mechanism

SPECIAL SERVICE INFORMATION

MODELS JE-101, JE-107

The following information will be found very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains*

(a) Antenna Post to R.F. Amplifier Grid at

1000 KC	5.0
4000 KC	3.7
18,000 KC	2.6

(b) R.F. Amplifier Grid to Converter Grid at

1000 KC	14.0
4000 KC	10.0
18,000 KC	10.0**

(c) R.F. on Converter Grid to IF. on 1st I.F. Grid at

1000 KC	("B" Manual)	16.0
4000 KC		30.0
18,000 KC		34.0

(d) I.F. on Converter Grid to I.F. on 1st I.F. Grid at 455 KC ("B" Manual—Gang Closed) 24.0

(e) I.F. Amplifier Grid to Detector Grid at 455 KC 112.0

(2) Voltage Across Volume Control to Give ½-watt Speaker Output at 400 Cycles 0.05*

(3) D.C. voltage developed across oscillator grid resistor (R-[illegible]) with the gang closed.

"B" Band	6.2*
"C" Band	7.8*
"D" Band	4.8*

* Variations of +10%, −20% are permissible.

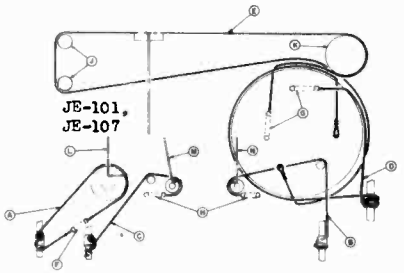
** On "D" band, stray oscillator voltage may upset reading.

MODELS JE-101, JE-107

VOLTAGE CHART*

Tubes	Plate to Gnd. Volts	Screen to Gnd. Volts	Cathode to Gnd. Volts	Filament Volts
6SK7 (R.F.)	235	95	4.7	6.3
6K8	Con.—235 Osc.—105	95	4.7	6.3
6SK7 (I.F.)	235	95	3	6.3
6J5G (Det.)	0		0	6.3
6SF5	120		1	6.3
6J5G (Inverter)	90		4	6.3
6V6G	290	230	12.5	6.3
5U4G	277a.c.		300	5.1
6U5	170			6.3

* Voltages measured at rated tap voltage (110 volts on 110 tap, etc.). Receiver tuned to low end of "B" band.

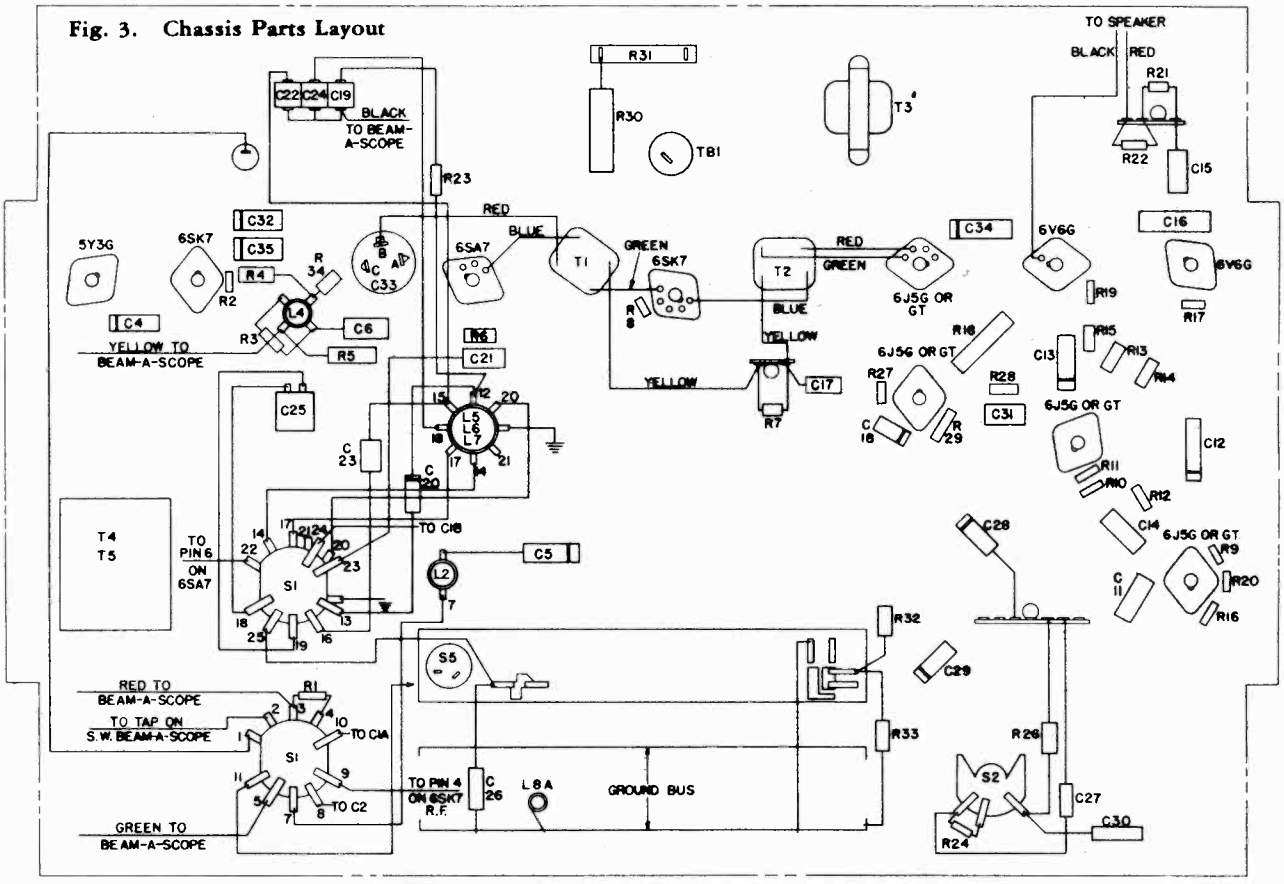


Cord Stringing Diagram

MODEL J-105
(Golden Tone)

GENERAL ELECTRIC CO.

Fig. 3. Chassis Parts Layout



FRONT OF CHASSIS

Note: The oscillator coil and band-switch terminals are numbered in the Chassis Parts Layout, Fig. 3, to assist in locating the corresponding numbered points on the Schematic Diagram, Fig. 2. This numbering will also assist in rewiring if the coil or switch is replaced. I.F. transformer connections are shown as an aid in replacement.

Rating	Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
A	110–125	50–60	115
C	110–125	25–60	120

Tubes

R.F. AMPLIFIER.....GE-6SK7
CONVERTER AND OSCILLATOR.....GE-6SA7
I.F. AMPLIFIER.....GE-6SK7
DET., AVC.....GE-6J5GT
1st AUDIO DRIVER.....GE-6J5GT
2nd AUDIO DRIVER.....GE-6J5GT
PHASE INVERTER.....GE-6J5GT
POWER OUTPUT.....(2) GE-6V6G
RECTIFIER.....GE-5Y3G
DIAL LAMP.....(2) Mazda No. 44

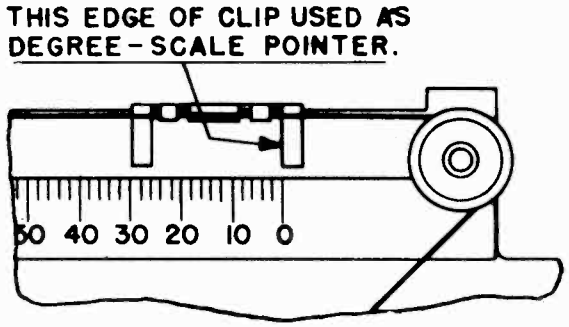


Fig. 6. Pointer-Guide Clip Setting with Gang Condenser Closed (See "R.F. Alignment with Chassis Outside of Cabinet")

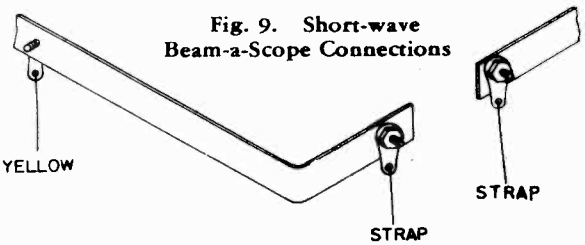


Fig. 9. Short-wave Beam-a-Scope Connections

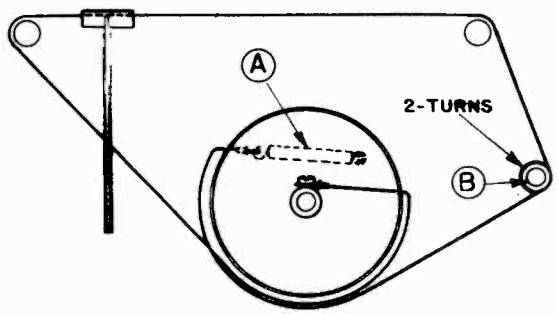


Fig. 7. Dial Cord Stringing Diagram

GENERAL ELECTRIC CO.

MODEL J-105 (Golden Tone)

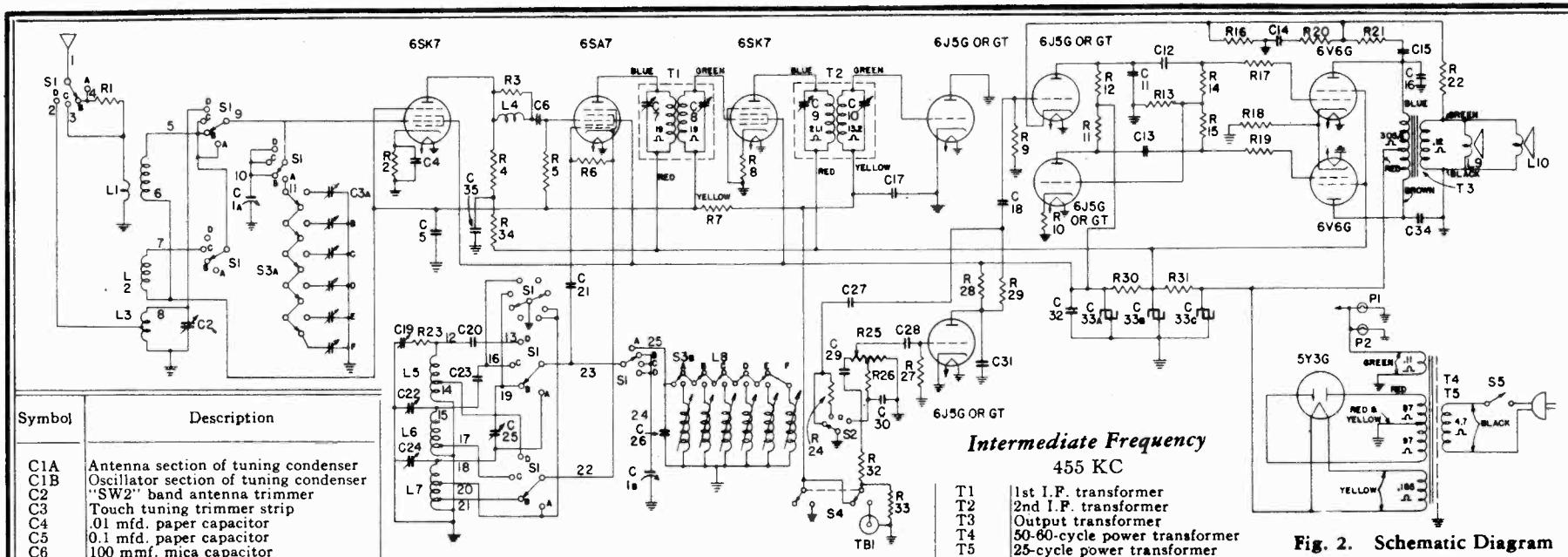


Fig. 2. Schematic Diagram MODEL J-105

Symbol	Description
C1A	Antenna section of tuning condenser
C1B	Oscillator section of tuning condenser
C2	"SW2" band antenna trimmer
C3	Touch tuning trimmer strip
C4	.01 mfd. paper capacitor
C5	0.1 mfd. paper capacitor
C6	100 mmf. mica capacitor
C11	.001 mfd. paper capacitor
C12	.03 mfd. paper capacitor
C13	.03 mfd. paper capacitor
C14	.02 mfd. paper capacitor
C15	100 mmf. 1000 V. mica capacitor
C16	.002 mfd. 1000 V. paper capacitor
C17	220 mmf. mica capacitor
C18	.01 mfd. paper capacitor
C19	"SW2" band oscillator trimmer
C20	.008 mfd. paper capacitor
C21	47 mmf. mica capacitor
C22	"SW1" band oscillator trimmer
C23	2400 mmf. ±5% mica capacitor
C24	"BC" band oscillator trimmer
C25	"BC" band oscillator padder
C26	750 mmf. silvered mica capacitor
C27	.005 mfd. paper capacitor
C28	.05 mfd. paper capacitor
C29	.005 mfd. paper capacitor
C30	.004 mfd. paper capacitor
C31	150 mmf. mica capacitor
C32	.01 mfd. paper capacitor
C33A	10 mfd. 350 V. dry electrolytic
C33B	15 mfd. 400 V. dry electrolytic
C33C	30 mfd. 400 V. dry electrolytic
C34	.002 mfd. 1000 V. paper capacitor
C35	.01 mfd. paper capacitor
L1	"BC" and "SW1" band Beam-a-Scope
L2	"SW1" band antenna coil
L3	"SW2" band Beam-a-Scope
L4	R.F. interstage coil
L5	"SW2" band oscillator coil
L6	"SW1" band oscillator coil
L7	"BC" band oscillator coil
L8	Touch tuning coil strip
P1	Dial lamp, Mazda No. 44
P2	Dial lamp; Mazda No. 44
R1	1000 ohms carbon resistor
R2	47 ohms carbon resistor
R3	10,000 ohms carbon resistor
R4	3300 ohms 1 W. carbon resistor
R5	47,000 ohms carbon resistor
R6	22,000 ohms carbon resistor
R7	2.2 megohms carbon resistor
R8	150 ohms carbon resistor
R9	470,000 ohms carbon resistor
R10	3300 ohms carbon resistor
R11	100,000 ohms carbon resistor
R12	220,000 ohms carbon resistor
R13	220,000 ohms carbon resistor
R14	150,000 ohms carbon resistor
R15	270,000 ohms carbon resistor
R16	4700 ohms carbon resistor
S1	Band switch
S2	Tone control switch
S3	Touch tuning switch
S4	Phono key
S5	Power key

Intermediate Frequency

455 KC

T1	1st I.F. transformer
T2	2nd I.F. transformer
T3	Output transformer
T4	50-60-cycle power transformer
T5	25-cycle power transformer

R17	1000 ohms carbon resistor
R18	180 ohms 2 W. carbon resistor
R19	1000 ohms carbon resistor
R20	1800 ohms carbon resistor
R21	47,000 ohms carbon resistor
R22	6800 ohms carbon resistor
R23	27 ohms carbon resistor
R24	47,000 ohms carbon resistor
R25	2 megohms volume control (½ megohm tap)

R26	56,000 ohms carbon resistor
R27	5.6 megohms carbon resistor
R28	220,000 ohms carbon resistor
R29	33,000 ohms carbon resistor
R30	10,000 ohms 3 W. carbon resistor
R31	1600 ohms 4 W. candohm resistor
R32	47,000 ohms carbon resistor
R33	470,000 ohms carbon resistor
R34	1000 ohms carbon resistor

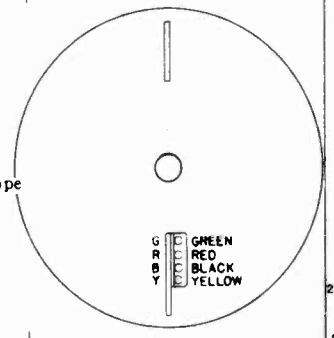
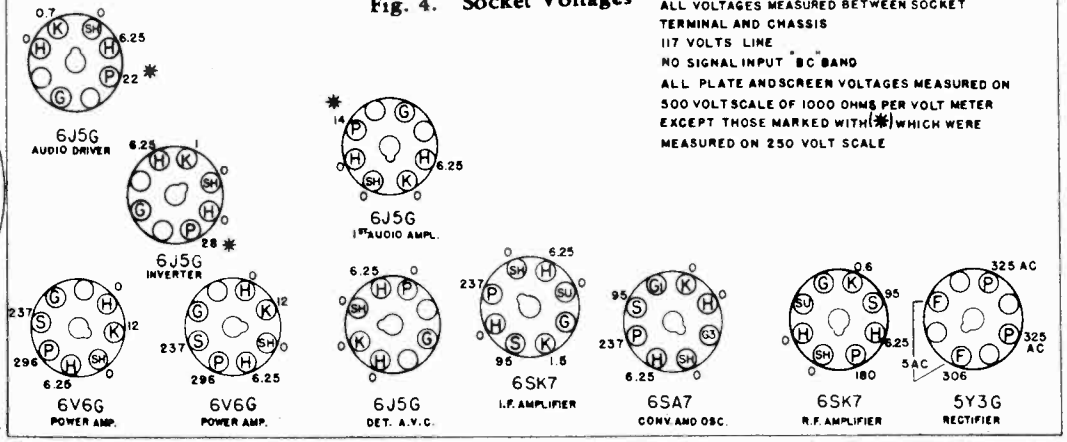


Fig. 8. Cylindrical Beam-a-Scope Connections

FRONT OF CHASSIS

Fig. 4. Socket Voltages

ALL VOLTAGES MEASURED BETWEEN SOCKET TERMINAL AND CHASSIS
117 VOLTS LINE
NO SIGNAL INPUT "BC" BAND
ALL PLATE AND SCREEN VOLTAGES MEASURED ON 500 VOLT SCALE OF 1000 OHMS PER VOLT METER EXCEPT THOSE MARKED WITH (*) WHICH WERE MEASURED ON 250 VOLT SCALE



BOTTOM VIEW OF CHASSIS

Tuning Frequency Range

Broadcast Band	540–1700 KC
Short-wave Band No. 1	2400–7000 KC
Short-wave Band No. 2	7000–22,000 KC

Electrical Power Output

Undistorted	10 Watts
Maximum	12 Watts

Tone Control ..... 4 positions

Loud-speakers—"Alnico" Magnet Dynamic

Speaker Diameters	14 inches and 6½ inches
Voice Coil Impedances	3.5 ohms 3.5 ohms

GENERAL INFORMATION

Model J-105 is a ten tube superheterodyne receiver designed to operate from an alternating current power supply. The receiver incorporates the latest developments in radio among which are the General Electric Dual Beam-a-Scopes. Broadcast and short-wave No. 1 signals are selected by the cylindrical Beam-a-Scope. Short-wave No. 2 signals are selected by the Beam-a-Scope which is mounted on the cabinet above the chassis. Additional features include single-ended tubes, iron-core oscillator station selector coils, six Feathertouch Tuning station keys, one Phono-Frequency Modulation-Television key, an "Off" key, a "Manual" key, Dual Dynapower speakers, tone monitor circuit and automatic volume control.

Phono-FM-Tel

This receiver is equipped with a pin jack on the rear apron of the chassis and a Phono–FM–Tel key for adapting it to use with record players, frequency modulation converters and television picture receivers with sound converters. General Electric plug, Stock No. RP-145, fits the pin jack.

SETTING UP THE RECEIVER

The following remarks will assist the serviceman in correctly setting up this receiver for use:

(1) In order to press the volume or tuning knobs all the way on their respective shafts, the dial reflector plate should be held in place by pressure from the rear.

(2) After releasing the shipping screws the position of the chassis should be checked to insure accurate tuning. Close the gang condenser plates and push the chassis one way or the other until the pointer lines up with the first markings on the left side of the dial.

(3) The black speaker leads should be connected to the speaker terminals which are grounded to the speaker frame.

(4) A method of setting up station keys which will assure driftproof adjustments is to screw the iron core all the way out and then turn slowly inward until the desired station is tuned in.

CHASSIS OR BEAM-A-SCOPE REMOVAL

Before either the chassis or Beam-a-Scope can be removed the leads between them must be disconnected. The cylindrical Beam-a-Scope leads are disconnected by pulling the pin plugs out of the Beam-a-Scope terminals. The short-wave Beam-a-Scope leads are disconnected by unscrewing the nuts which clamp the terminals on the two phosphor-bronze straps and the screw which clamps the terminal of the yellow lead.

Figs. 8 and 9 show the correct location of the Beam-a-Scope leads when reconnecting. The cylindrical Beam-a-Scope leads must be threaded down through the slot in the cabinet shelf which is immediately below the antenna-ground terminal board. The leads can then be brought out to the position of the cutout in the back of the cabinet shelf where they can be inserted in the Beam-a-Scope terminals.

To remove the cylindrical Beam-a-Scope the following procedure is recommended: Disconnect the four Beam-a-Scope leads. Unscrew the long self-tapping screw which prevents the Beam-a-Scope from rotating continuously in one direction. This screw is located in the cabinet shelf. Pry loose the cardboard strap which is stapled to the bottom of the cabinet and which holds the bottom of the Beam-a-Scope in place. The Beam-a-Scope can now be rotated from right to left until it comes loose. Note: The upper pivot bolt by which the Beam-a-Scope is supported should never be loosened or removed.

When replacing the cylindrical Beam-a-Scope it should be screwed on approximately five turns from the position where the bolt first takes hold. The self-tapping screw in the cabinet shelf should then be screwed down until it acts as a stop for the projection next to the terminals. The screw should not be run down so far that it contacts the projection on the opposite side from the terminals as this will limit rotation to only 180 degrees. The cardboard strap should be placed over the bottom Beam-a-Scope pivot and stapled to the cabinet in such a position that the Beam-a-Scope hangs vertically and is free to turn without rubbing on the strap.

Loud-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly.

Note—In no case should the magnet be removed from the assembled position.

Special Service Information

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains*

(a) Antenna Post to R.F. Grid at

1000 KC	6.5
4000 KC	3.0
18,000 KC	2.0

(b) R.F. Grid to Converter Grid at

1000 KC	5.0
4000 KC	3.0
18,000 KC	2.0

(c) R.F. on Converter Grid to I.F. on 1st I.F. Grid at

1000 KC	50
4000 KC	50
18,000 KC	40

(d) Converter Grid to 1st I.F. Grid at

455 KC	55

(e) I.F. Amplifier Grid to Detector Grid at

455 KC	75

(2) Voltage across Volume Control to Give ½-watt Speaker Output at

400 cycles	.04 volts

(3) DC Voltage Developed Across Oscillator Grid Resistor (R-6) at

1000 KC	8.5
4000 KC	8.5
18,000 KC	7.5

* Variations of ±20% permissible. All readings obtained with enough input signal to give ½-watt speaker output.

Alignment Procedure

The alignment procedure is given in table form. The use of a standard I.R.E. dummy antenna in making all R.F. alignments is recommended. R.F. alignment can be performed by loop coupling the generator signal to the receiver Beam-a-Scopes if care is exercised not to overcouple the two circuits. Keeping a distance of two feet or more between the generator loop and receiver Beam-a-Scope will generally insure freedom from overcoupling. The relative position of the Beam-a-Scopes with respect to the chassis materially affects R.F. alignment; therefore, all R.F. alignments should be made with the chassis and Beam-a-Scopes mounted in the cabinet. In keeping with this recommendation all R.F. alignment trimmers are accessible through holes in the back apron of the chassis or from the top of the chassis (refer to the Trimmer Location diagram, Fig. 1). Metal objects such as meters, tools, etc. should not be placed on top of the receiver cabinet. Also the receiver should be kept away from large metal objects such as radiators, metal-top tables, etc.

R.F. ALIGNMENT WITH CHASSIS OUTSIDE OF CABINET

R.F. alignment can be performed only on the "BC" and "SW-1" bands with the chassis outside the cabinet. Any alignment attempted on "SW-2" band will not be satisfactory. The same relative position between the chassis and cylindrical Beam-a-Scope should be maintained when aligning outside the cabinet as these components occupy in the cabinet. Since the glass dial scale is fastened to the cabinet it cannot be used for reference during alignment of the chassis outside of the cabinet. Use must be made, therefore, of a 0–180° calibrated scale which is cemented to the back of the dial reflector plate. From the reference chart the degree readings for corresponding frequency settings may be ob-

(CONTINUED)

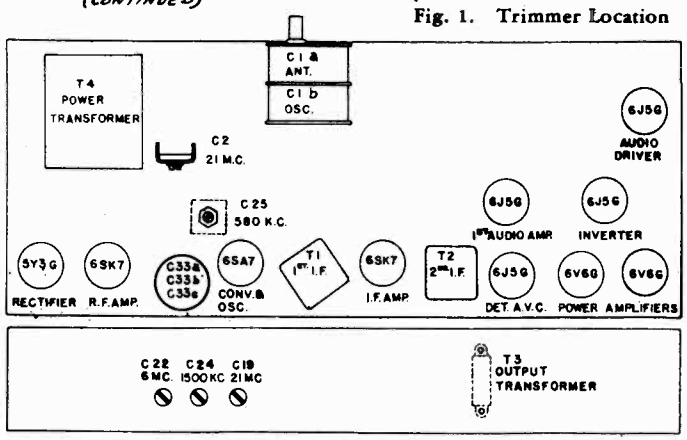


Fig. 1. Trimmer Location

(CONTINUED)

tained by laying a straight edge across the chart perpendicular to the line of figures and sliding the straight edge along to the various frequency settings desired. The degree readings will be found on either of the degree scales above or below the dial scale. To use these degree readings, first completely close the gang condenser plates and then slide the pointer along the cord until the inside edge of the right-hand pointer-guide clip is in line with the 0° mark. (See Fig. 6.) By using this edge of the clip as the degree-scale pointer the receiver may be tuned to any frequency. Example: By rotating the tuning control until this edge of the clip is in line with 154°, the receiver will be tuned to 1500 KC on the "BC" band.

The "BC" and "SW-1" band alignment procedure is the same as outlined in steps 2 to 5 inclusive of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

After the alignment has been performed on the "BC" and "SW-1" bands the chassis should be mounted in the cabinet and "SW-2" band alignment checked as described in steps 6 to 8 of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

Note: After moving the pointer along the cord to use one of the guide clips as a reference pointer for the degree scale, it will be necessary after reassembly in the cabinet for the gang condenser plates to be closed and the pointer to be moved back along the cord so that it lines up with the first dial markings on the left.

ALIGNMENT CHART

I.F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. "BC" Band	455 KC Sweep	I.F. Grid	.05 mfd. or larger	2nd I.F. trimmers, C-9, C-10	Gang condenser plates closed. Depress any station key other than Phono–FM–Tel key. Connect audio input of oscilloscope to chassis ground and junction of R-32 and R-33. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. Finish by retrimming 2nd I.F. trimmers.
2. "BC" Band	455 KC Sweep	Converter Grid	.05 mfd. or larger	1st I.F. trimmers, C-7, C-8	

I.F. Alignment with Output Meter

1. "BC" Band	455 KC with Modulation	Converter Grid	.05 mfd. or larger	2nd I.F. trimmers, C-9, C-10	Gang condenser plates closed. Depress any key other than Phono–FM–Tel key. Connect output meter across voice coil. Keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
				1st I.F. trimmers, C-7, C-8	

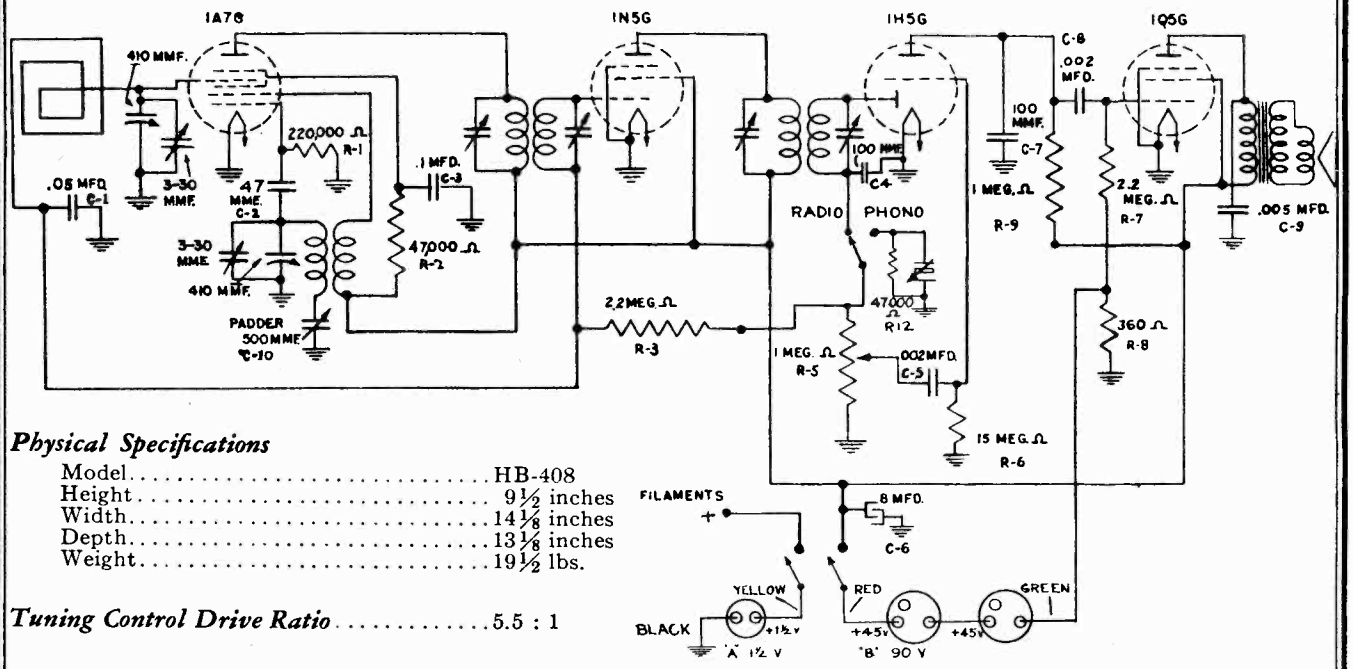
R.F. Alignment With Chassis Mounted in Cabinet

1. "BC" Band					Close gang plates, adjust pointer to first line at left end of tuning scale. Connect output meter across voice coil. Tone control set to "Normal."
2. "BC" Band	580 KC with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-25)	Set dial pointer to 580 KC and tune in signal with (C-25) while rocking gang condenser.
3. "BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-24)	Set dial pointer to 1500 KC and peak trimmer for maximum output while rocking the gang condenser.
4. "BC" Band	580 KC with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-25)	Realign for maximum output with a low input signal rocking the gang condenser.
5. "SW-1" Band	6 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-22)	Set pointer to 6 MC and peak signal while rocking gang condenser.
6. "SW-2" Band	21 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-19) Ant. (C-2)	Set pointer to 21 MC and tune in signal with (C-19). Peak output with (C-2) while rocking gang condenser. When (C-19) is on proper peak, image of 21 MC signal should be heard 910 KC below or on 20.09 MC.
7. "SW-2" Band	8 MC with Modulation	Antenna Post	I.R.E.		This operation may or may not be necessary depending on how much the short-wave Beam-a-Scope leads have been moved from their correctly dressed positions. Repositioning will be indicated if an increased output meter reading can be obtained by moving the short-wave Beam-a-Scope strap leads closer or farther apart. The moving should be done with an insulated rod or stick.

8. Repeat Operation 6 if the short-wave Beam-a-Scope leads are moved appreciably in Operation 7.

MODEL HB-408

GENERAL ELECTRIC CO.



Physical Specifications

Model	HB-408
Height	9½ inches
Width	14⅛ inches
Depth	13⅛ inches
Weight	19½ lbs.

Tuning Control Drive Ratio ..... 5.5 : 1

Battery Specifications

"A" BATTERY
1—General 8-F-1 or 1—Eveready No. 741
"B" BATTERY
2—General V-30-B or 2—Eveready No. 762

Battery Life

Using the above recommended batteries a battery life from 200 to 250 hours can be expected providing the daily operation does not exceed four hours. If the daily operation exceeds four hours the battery life will be reduced due to the fact that the batteries do not have sufficient time to revitalize themselves.

Tuning Frequency Range ..... 550-1600 K.C.

Intermediate Frequency ..... 455 K.C.

Loud-speaker—Permanent Magnet

Outside Cone Diameter	4 inches
Voice Coil Impedance (400 cycles)	3.5 ohms

Tubes

Converter and Oscillator	1A7G
I.F. Amplifier	1N5G
Detector-Amplifier	1H5G
Output	1Q5G

SERVICE INFORMATION

On later production models the 360-ohm output biasing resistor (R-8) was changed to 430 ohms. This change reduced battery drain while not appreciably affecting power output.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.—455 K.C. Broadcast—1500 K.C. and 580 K.C The location of all trimmers is shown in Fig. 1.

I.F. Alignment

In order to align this receiver for I.F. the four wood screws holding the motorboard to the cabinet will have to be removed. Raise the front edge of the motorboard being careful not to let the cabinet cover swing back and place a strain on the hinges. The phono-switch cable will limit the amount which the front edge of the motorboard can be opened. Prop the motorboard in the opened position and proceed with I.F. alignment. (NOTE—Do not let the phono-switch cable come near the 1N5G grid leads. Standard dressing is to force the cable down in the space between the 1H5G tube and the 2nd I.F. transformer.)

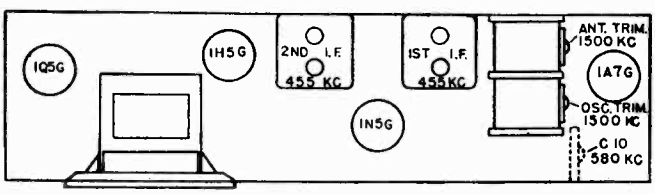


Fig. 1. Trimmer Location

Connect an output meter across the voice coil. Set the volume control for maximum. With the test oscillator set to 455 K.C. apply signal to the control grid of the 1A7G converter tube through a .05-mfd. capacitor. Do not remove the grid leads from the tubes. Keep the test oscillator output as low as possible to give a readable output. Adjust all four I.F. trimmers for maximum output.

R.F. Alignment

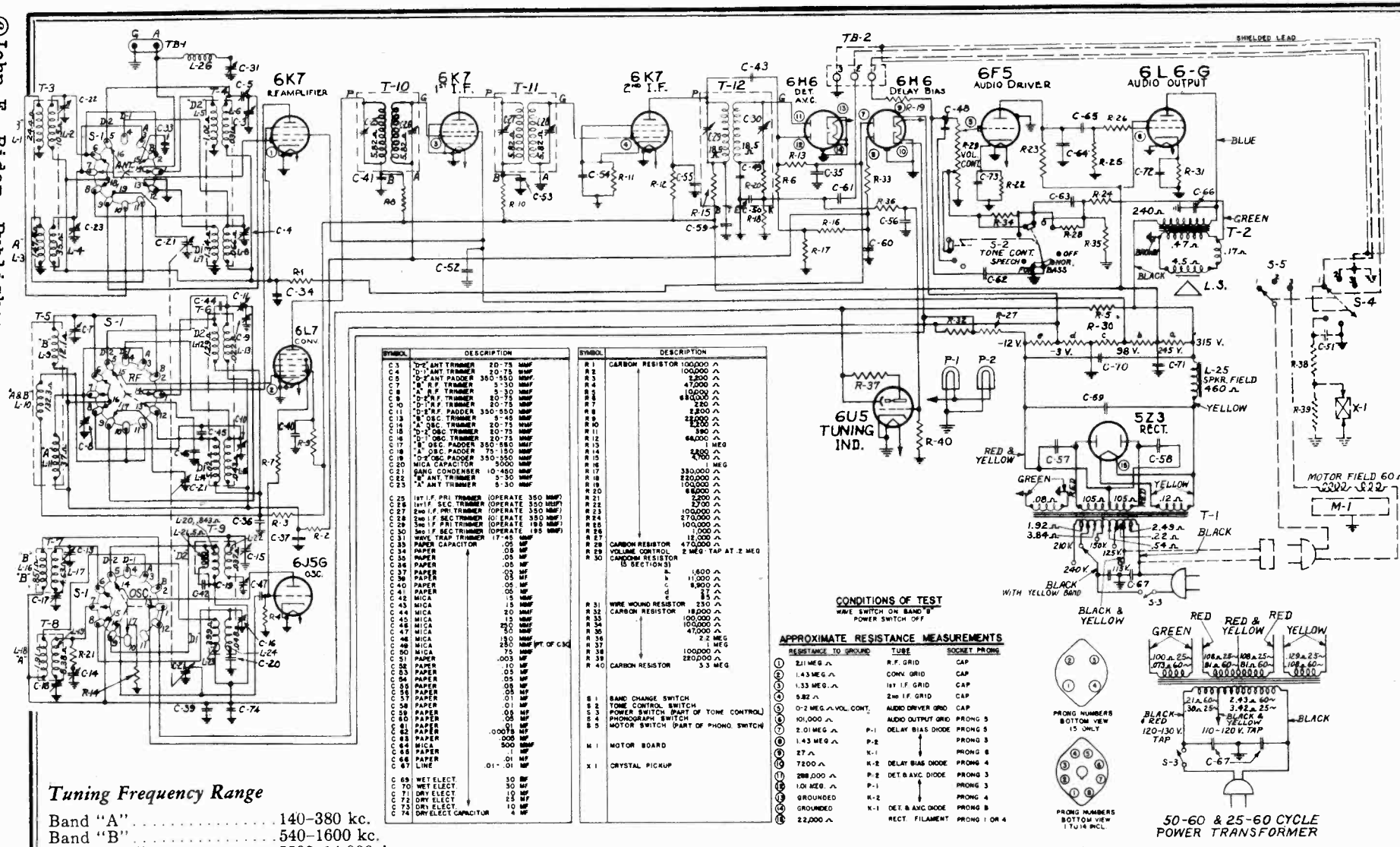
Return the motorboard to its normal cabinet position. (NOTE—Before R.F. alignment be sure that all parts are in their normal positions in the cabinet.) It is not necessary to screw the motorboard to the cabinet as it may be convenient to raise the motorboard slightly from time to time to locate the heads of the trimmer screws. It must be remembered however, that R.F. trimmer adjustments should only be made when the motorboard is down in position.

Access to the R.F. trimmers is made possible by removing the three snap fasteners on the right side of the cabinet. The upper left-hand trimmer is the 1500-K.C. oscillator trimmer. The upper right-hand trimmer is the 1500-K.C. antenna trimmer. The lower trimmer is the 580-K.C. padder.

The test signal may be applied by connecting across the test oscillator terminals a loop of ten turns of wire approximately one foot in diameter. Place the loop parallel to the plane of the back panel of the cabinet and not closer than one foot. With 1500 K.C. input adjust the oscillator and antenna trimmers for maximum output. Change input signal to 580 K.C. and peak the 580-K.C. (C-10) padder by rocking the gang condenser.

GENERAL ELECTRIC CO.

MODELS FE-112, FE-116, FE-119



SYMBOL	DESCRIPTION
C 1	"D-1" ANT TRIMMER 20-75 MMF
C 2	"D-1" ANT TRIMMER 20-75 MMF
C 3	"D-1" ANT PADDER 350-550 MMF
C 4	"A" R.F. TRIMMER 3-30 MMF
C 5	"A" R.F. TRIMMER 3-30 MMF
C 6	"D-1" R.F. TRIMMER 20-75 MMF
C 7	"D-2" R.F. TRIMMER 20-75 MMF
C 8	"D-1" R.F. PADDER 350-550 MMF
C 9	"B" OSC. TRIMMER 9-45 MMF
C 10	"A" OSC. TRIMMER 20-75 MMF
C 11	"D-1" OSC. TRIMMER 20-75 MMF
C 12	"D-2" OSC. TRIMMER 20-75 MMF
C 13	"B" OSC. PADDER 350-550 MMF
C 14	"A" OSC. PADDER 75-150 MMF
C 15	"D-2" OSC. PADDER 350-550 MMF
C 16	MICA CAPACITOR 5000 MMF
C 21	GANG CONDENSER 10-460 MMF
C 22	"B" ANT. TRIMMER 3-30 MMF
C 23	"A" ANT. TRIMMER 3-30 MMF
C 25	1st I.F. PRI. TRIMMER (OPERATE 350 MMF)
C 26	1st I.F. SEC. TRIMMER (OPERATE 350 MMF)
C 27	2nd I.F. PRI. TRIMMER (OPERATE 350 MMF)
C 28	2nd I.F. SEC. TRIMMER (OPERATE 350 MMF)
C 29	3rd I.F. PRI. TRIMMER (OPERATE 195 MMF)
C 30	3rd I.F. SEC. TRIMMER (OPERATE 195 MMF)
C 31	WAVE TRAP TRIMMER 17-45 MMF
C 33	PAPER CAPACITOR .05 MF
C 34	PAPER .05 MF
C 35	PAPER .05 MF
C 36	PAPER .05 MF
C 37	PAPER .02 MF
C 38	PAPER .05 MF
C 40	PAPER .05 MF
C 41	PAPER .05 MF
C 42	MICA .15 MMF
C 43	MICA .15 MMF
C 44	MICA .20 MMF
C 45	MICA .15 MMF
C 46	MICA 250 MMF
C 47	MICA .50 MMF
C 48	MICA .15 MMF
C 49	MICA 250 MMF
C 50	MICA .75 MMF
C 51	PAPER .0003 MF
C 58	PAPER .10 MF
C 59	PAPER .01 MF
C 60	PAPER .05 MF
C 61	PAPER .08 MF
C 62	PAPER .05 MF
C 63	PAPER .01 MF
C 64	PAPER .01 MF
C 65	PAPER .00075 MF
C 66	PAPER .005 MF
C 67	PAPER .500 MMF
C 68	PAPER .1 MF
C 69	PAPER .01 MF
C 70	LINE .01 - .01 MF
C 69	WET ELECT. 30 MF
C 70	WET ELECT. 30 MF
C 71	DRY ELECT. 10 MF
C 72	DRY ELECT. 25 MF
C 73	DRY ELECT. 10 MF
C 74	DRY ELECT. CAPACITOR 4 MF

SYMBOL	DESCRIPTION
R 1	CARBON RESISTOR 100,000 Ω
R 2	100,000 Ω
R 3	2,200 Ω
R 4	47,000 Ω
R 5	10,000 Ω
R 6	68,000 Ω
R 7	1 MEG
R 8	2,200 Ω
R 9	22,000 Ω
R 10	2,200 Ω
R 11	390 Ω
R 12	66,000 Ω
R 13	1 MEG
R 14	2,400 Ω
R 15	4,700 Ω
R 16	1 MEG
R 17	330,000 Ω
R 18	220,000 Ω
R 19	100,000 Ω
R 20	68,000 Ω
R 21	2,200 Ω
R 22	2,700 Ω
R 23	100,000 Ω
R 24	270,000 Ω
R 25	100,000 Ω
R 26	1,000 Ω
R 27	15,000 Ω
R 29	CARBON RESISTOR 470,000 Ω
R 30	VOLUME CONTROL 2 MEG - TAP AT .2 MEG
	CANDOHM RESISTOR (5 SECTION 31)
	a 1,600 Ω
	b 11,000 Ω
	c 9,900 Ω
	d 97 Ω
	e 85 Ω
R 31	WIRE WOUND RESISTOR 250 Ω
R 32	CARBON RESISTOR 18,000 Ω
R 33	100,000 Ω
R 34	100,000 Ω
R 35	47,000 Ω
R 36	2.2 MEG
R 37	1 MEG
R 38	100,000 Ω
R 39	220,000 Ω
R 40	3.3 MEG.
S 1	BAND CHANGE SWITCH
S 2	TONE CONTROL SWITCH
S 3	POWER SWITCH (PART OF TONE CONTROL)
S 4	PHONOGRAPH SWITCH
S 5	MOTOR SWITCH (PART OF PHONO. SWITCH)
M 1	MOTOR BOARD
X 1	CRYSTAL PICKUP

CONDITIONS OF TEST
WAVE SWITCH ON BAND "B"
POWER SWITCH OFF

APPROXIMATE RESISTANCE MEASUREMENTS

RESISTANCE TO GROUND		TUBE	SOCKET PRONG
2.1 MEG Ω		R.F. GRID	CAP
1.43 MEG Ω		CONV. GRID	CAP
1.33 MEG Ω		1st I.F. GRID	CAP
5.82 Ω		2nd I.F. GRID	CAP
0-2 MEG Ω VOL. CONT.		AUDIO DRIVER GRID	CAP
101,000 Ω		AUDIO OUTPUT GRID	PRONG 5
2.01 MEG Ω	P-1	DELAY BIAS DIODE	PRONG 5
1.43 MEG Ω	P-2		PRONG 3
27 Ω	K-1		PRONG 8
7200 Ω	K-2	DELAY BIAS DIODE	PRONG 4
288,000 Ω	P-2	DET. & A.V.C. DIODE	PRONG 3
1.01 MEG. Ω	P-1		PRONG 3
GROUNDED	K-2		PRONG 4
GROUNDED	K-1	DET. & A.V.C. DIODE	PRONG 8
22,000 Ω		RECT. FILAMENT	PRONG 1 OR 4

Tuning Frequency Range

Band "A" . . . . . 140–380 kc.
Band "B" . . . . . 540–1600 kc.
Band "D-1" . . . . . 5500–14,000 kc.
Band "D-2" . . . . . 13,000–23,000 kc.

Intermediate Frequency . . 455 kc.

Electrical Output

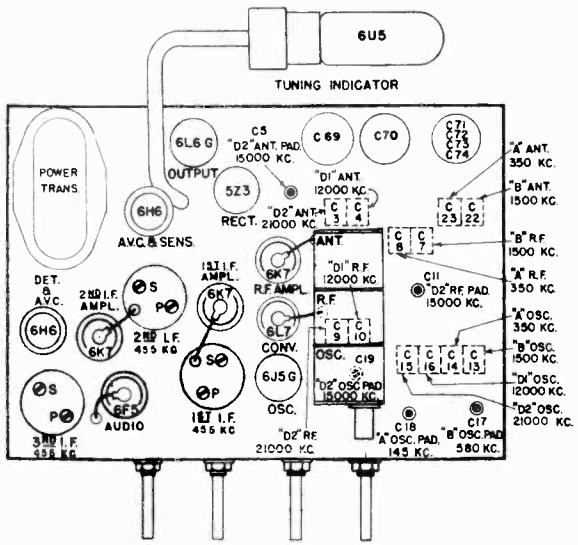
Undistorted . . . . . 6 watts
Maximum . . . . . 10 watts

MOTOR AND PICKUP CONNECTIONS SHOWN IN DOTTED LINES APPLY TO MODEL FE-119 ONLY.

TERMINALS 1 AND 2 ON TB-2 JOINED IN MODELS FE-112 AND FE-116.

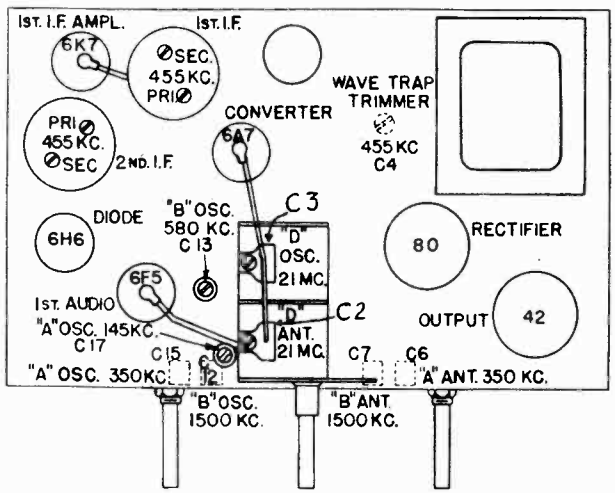
-1940-

FOR OTHER DATA SEE INDEX



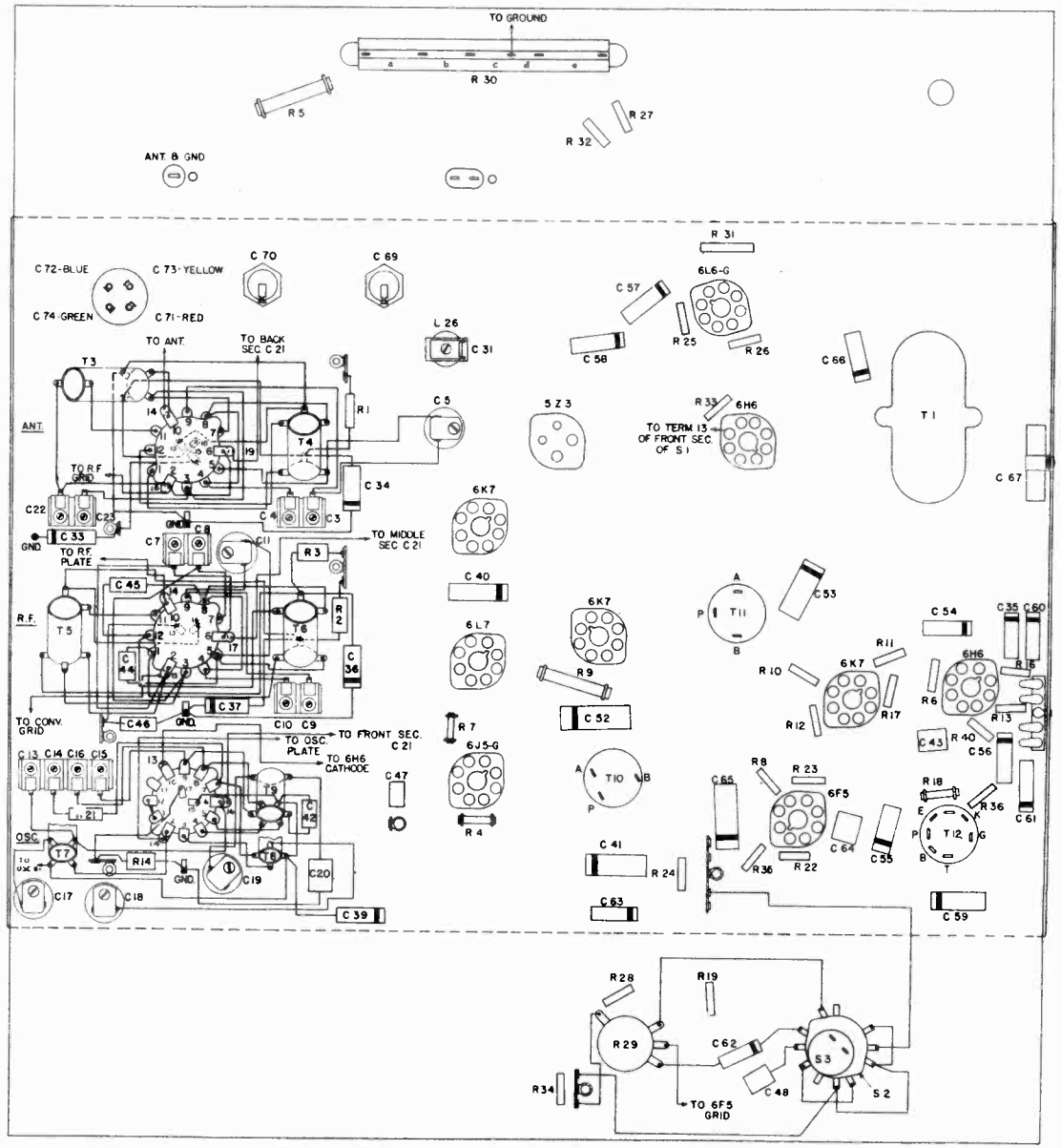
Chassis Layout and Trimmer Location

MODELS FE-112, FE-116, FE-119



Chassis Layout and Trimmer Location

MODELS FE-62, FE-67, FE-68

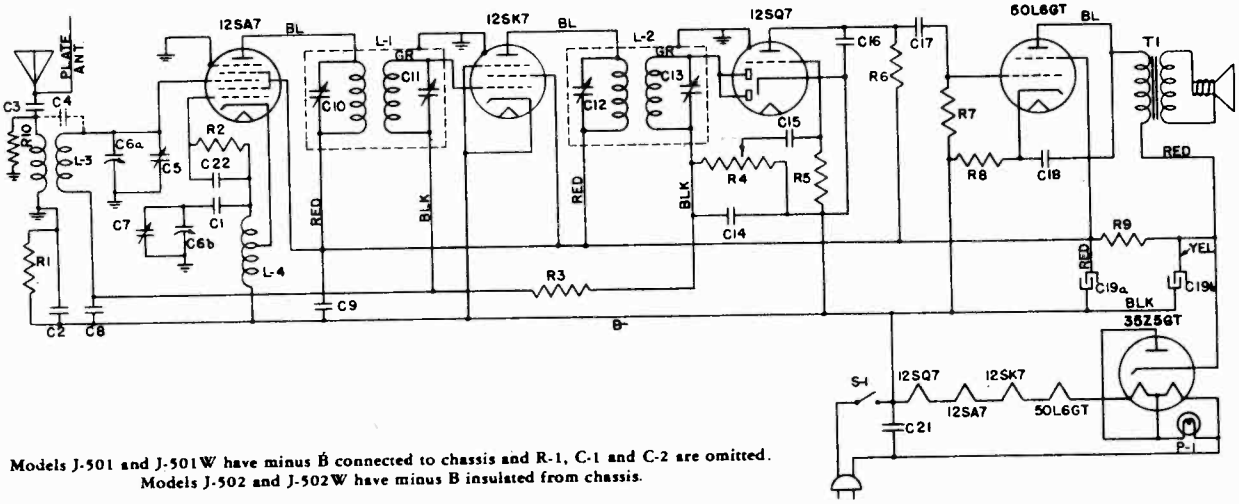


CHASSIS PARTS LAYOUT

MODELS FE-112, FE-116, FE-119

GENERAL ELECTRIC CO.

MODELS J-501, J-501W, J-502, J-502W



Models J-501 and J-501W have minus B connected to chassis and R-1, C-1 and C-2 are omitted.
Models J-502 and J-502W have minus B insulated from chassis.

Symbol	Description	Symbol	Description	Symbol	Description
C-1	.02 mfd. paper (Used only in J-502. 502W)	C-16	100 mmf. mica	R-2	20,000 ohms carbon
C-2	.2 mfd. paper (Used only in J-502. 502W)	C-17	.01 mfd. paper	R-3	2.2 megohms carbon
C-3	.01 mfd. paper	C-18	.02 mfd. paper	R-4	0.5 megohm volume control
C-5	Antenna trimmer	C-19A	16 mfd. dry electrolytic	R-5	5.1 megohms carbon
C-6A	Antenna section of tuning condenser	C-19B	24 mfd. dry electrolytic	R-6	250,000 ohms carbon
C-6B	Oscillator section of tuning condenser	C-21	.05 mfd. paper	R-7	750,000 ohms carbon
C-7	Oscillator trimmer	C-22	100 mmf. mica	R-8	150 ohms carbon
C-8	.05 mfd. paper	L-3	Antenna coil	R-9	2800 ohms 1 W. carbon
C-9	.05 mfd. paper	L-4	Oscillator coil	R-10	10,000 ohms carbon
C-14	250 mmf. mica	P-1	Dial lamp, MAZDA No. 47	S-1	Power switch
C-15	.01 mfd. paper	R-1	250,000 ohms carbon (Used only in J-502. 502W)		

GENERAL INFORMATION

Models J-501, J-501W, J-502 and J-502W are five-tube, AC-DC superheterodyne receivers. Models J-502 and J-502W are Underwriters' approved versions of the Models J-501 and J-501W. The Models J-501 and J-502 use rich brown plastic cabinets. Models J-501W and J-502W are identical to Models J-501 and J-502, respectively, except for white plastic cabinet.

These receivers incorporate the following features: Single-ended tubes, automatic volume control, plate antenna, dynapower speaker, beam power output and a dial lamp.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F. ..... 455 KC
R.F. ..... 1750 and 1500 KC

The location of all trimmers is shown in Fig. 1.

I.F. Alignment

Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the converter grid through a .05 mfd. capacitor and align progressively the trimmers in the 2nd and 1st I.F. transformer cans.

R.F. Alignment

Apply the R.F. alignment signals through a standard I.R.E. dummy antenna to the receiver antenna post. With the gang condenser wide open, align the oscillator trimmer (C-7) to 1750 KC. Change the generator signal to 1500 KC, tune the receiver to the signal and peak antenna trimmer (C-5) for maximum output.

Precaution

If the signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC current through the capacitor will introduce hum modulation and/or create the possibility of a burned-out signal generator attenuator.

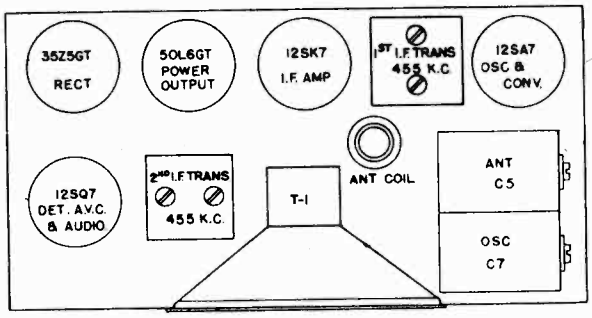


Fig. 1. Trimmer Location

Over-all Dimensions

Height ..... 6 inches
Width ..... 9¼ inches
Depth ..... 5½ inches

Tuning Control Drive Ratio 6:1

Electrical Specifications

Models	VOLTAGE RATING (AC or DC)	FREQUENCY (Cycles per Second)	POWER CONSUMPTION (Watts)
J-501, 501W	105–125	40–60	30
J-502, 502W	105–117	40–60	30

Tuning Frequency Range ..... 550–1750 KC

Intermediate Frequency ..... 455 KC

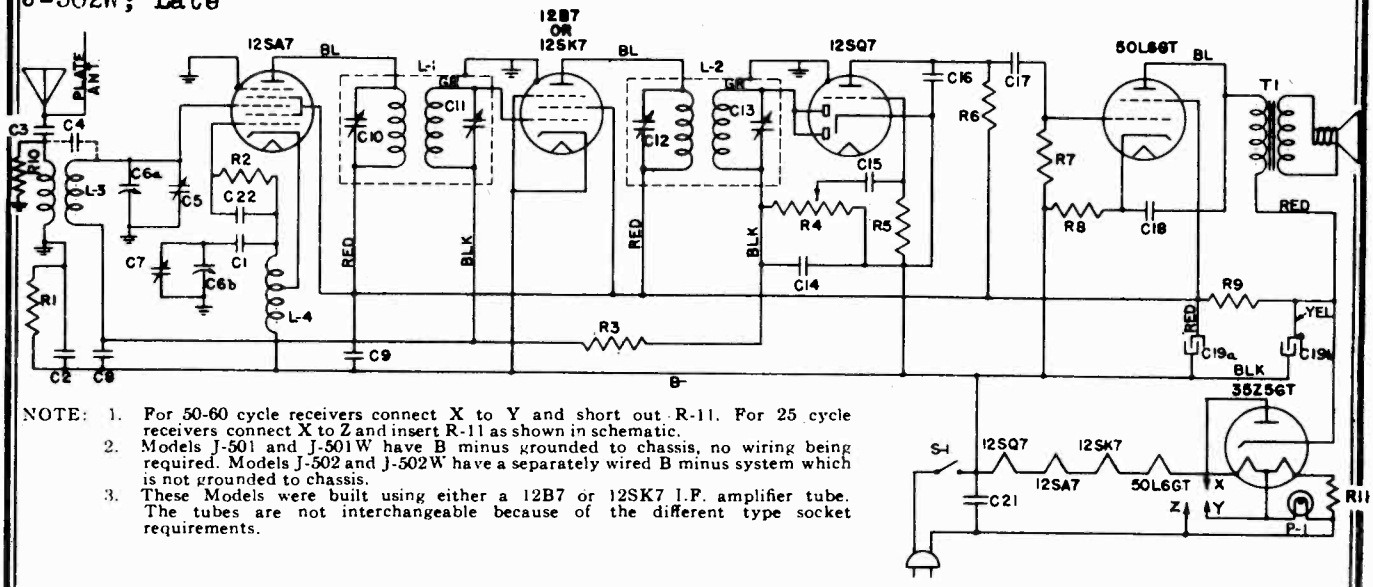
Maximum Power Output ..... 1.5 Watts

Loud-speaker—"Alnico" Magnet Dynamic

Outside cone diameter ..... 4 inches
Voice coil impedance (400 cycles) ..... 3.1 ohms

MODELS J-501, J-501W, J-502, J-502W; "Late"

GENERAL ELECTRIC CO.



NOTE:
1. For 50-60 cycle receivers connect X to Y and short out R-11. For 25 cycle receivers connect X to Z and insert R-11 as shown in schematic.
2. Models J-501 and J-501W have B minus grounded to chassis, no wiring being required. Models J-502 and J-502W have a separately wired B minus system which is not grounded to chassis.
3. These Models were built using either a 12B7 or 12SK7 I.F. amplifier tube. The tubes are not interchangeable because of the different type socket requirements.

Symbol	Description	Symbol	Description	Symbol	Description
C-1	.05 mfd. paper capacitor (Used only in J-502 and J-502W)	C-16	330 mmf. mica capacitor	R-2	22,000 ohms carbon resistor
C-2	0.2 mfd. paper capacitor (Used only in J-502 and J-502W)	C-17	.01 mfd. paper capacitor	R-3	2.2 megohms carbon resistor
C-3	.01 mfd. paper capacitor	C-18	.02 mfd. paper capacitor	R-4	0.5 megohm volume control
C-4	5 to 7 mmf. (part of L-3)	C-19a	20 mfd. 150 V. dry electrolytic	R-5	4.7 megohms carbon resistor
C-5	Antenna trimmer on gang	C-19b	30 mfd. 150 V. dry electrolytic	R-6	270,000 ohms carbon resistor
C-6a	Antenna section of tuning condenser	C-21	.05 mfd. paper capacitor	R-7	470,000 ohms carbon resistor
C-6b	Oscillator section of tuning condenser	C-22	100 mmf. mica capacitor	R-8	150 ohms carbon resistor
C-7	Oscillator trimmer on gang	L-1	1st I.F. transformer	R-9	2700 ohms 1 W. carbon resistor
C-8	.05 mfd. paper capacitor	L-2	2nd I.F. transformer	R-10	10,000 ohms carbon resistor
C-9	.05 mfd. paper capacitor	L-3	Antenna coil	R-11	13 ohms carbon resistor (Used on 25 cycle sets only)
C-14	330 mmf. mica capacitor	L-4	Oscillator coil	T-1	Output transformer
C-15	.005 mfd. paper capacitor	P-1	Dial lamp, MAZDA No. 47		
		R-1	330,000 ohms carbon resistor (Used only in J-502 and J-502W)		

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POWER CONSUMPTION-30 WATTS

Tuning Frequency Range ..... 550-1720 KC

Intermediate Frequency ..... 455 KC

Maximum Power Output ..... 1.5 Watts

Loud-speaker—"Alnico" Magnet Dynamic

Outside cone diameter ..... 4 inches
Voice coil impedance (400 cycles) ..... 3.1 ohms

Tubes

Converter and Oscillator GE-12SA7
I.F. Amplifier ..... GE-12SK7 or 12B7
Det., Aud., AVC GE-12SQ7
Power Output GE-50L6GT
Rectifier GE-35Z5GT
Dial Lamp ..... MAZDA No. 47

VOLTAGE CHART

Tubes	Plate to Gnd. Volts	Screen to Gnd. Volts	Cathode to Gnd. Volts	Filament Volts
12SA7	73	73	0	12
12SK7	73	73	0	12
12SQ7	40		0	12
50L6GT	120	73	12	50
35Z5GT	112 AC		122	31

Precaution

If the signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC current through the capacitor will introduce hum modulation and/or create the possibility of a burned-out signal generator attenuator.

I.F. ALIGNMENT CONVENTIONAL
SEE SPECIAL SECTION VOL. VIII

Alignment Frequencies

I.F. ..... 455 KC
R.F. ..... 1500 KC

The location of all trimmers is shown in Fig. 1.

R.F. Alignment

Close the gang condenser by rotating the tuning control. Slide the pointer along the cord until it lines up with the first dial marking on the left. Now rotate the tuning control until the pointer is over the 1500 KC dial mark. Apply a 1500 KC signal to the receiver antenna post through a standard I.R.E. dummy antenna. Align the oscillaton trimmer (C-7) to bring in the signal and peak the signal by adjusting the antenna trimmer (C-5). (See Fig. 1 for trimmer locations.)

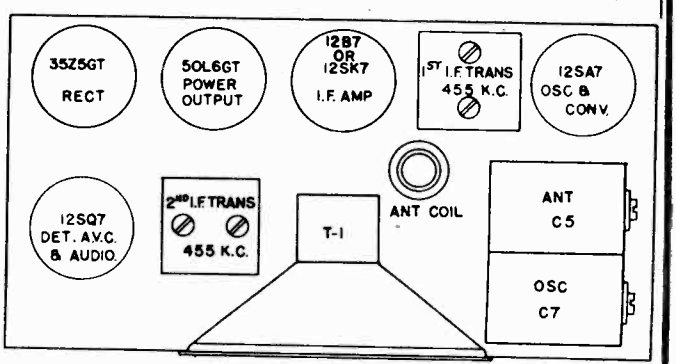
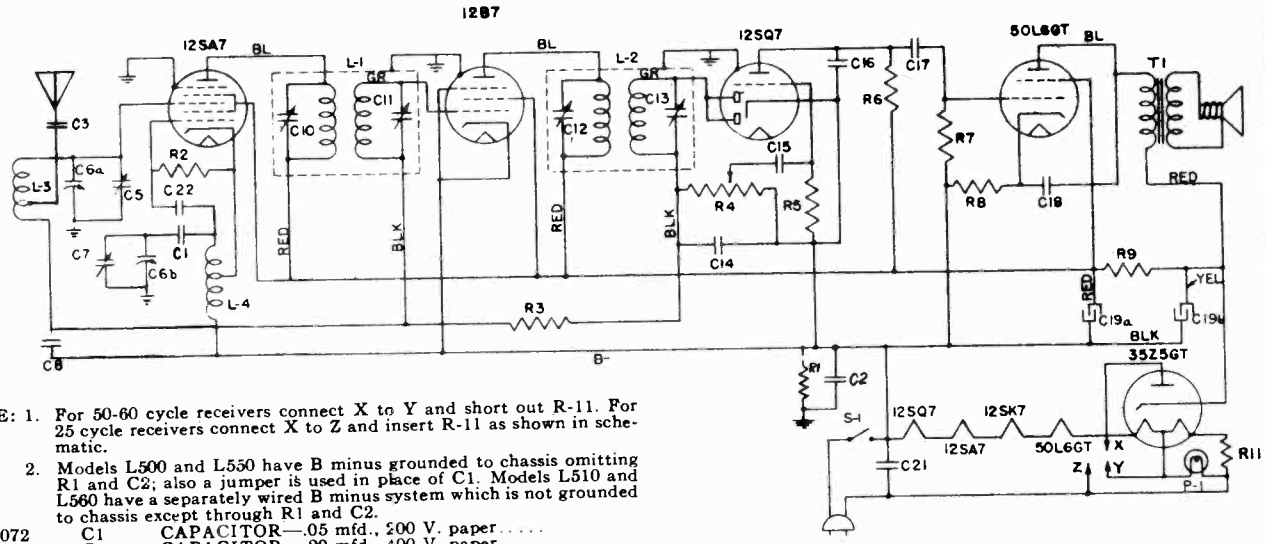


Fig. 1. Trimmer Location

GENERAL ELECTRIC CO.

MODELS L500, L510, L550, L560



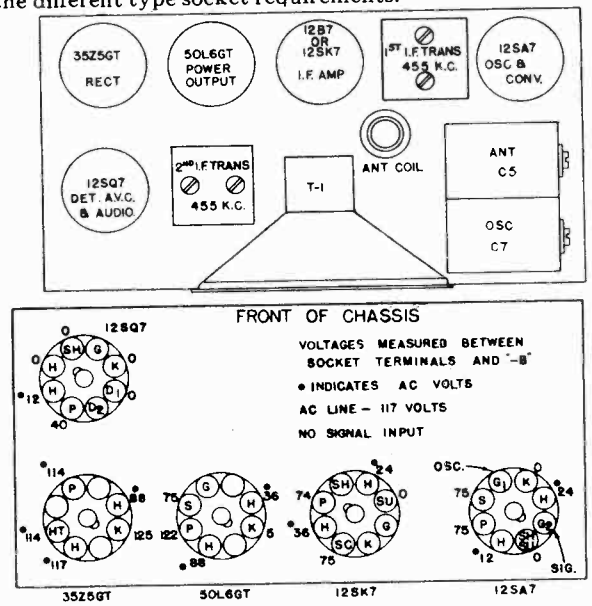
NOTE: 1. For 50-60 cycle receivers connect X to Y and short out R-11. For 25 cycle receivers connect X to Z and insert R-11 as shown in schematic.

2. Models L500 and L550 have B minus grounded to chassis omitting R1 and C2; also a jumper is used in place of C1. Models L510 and L560 have a separately wired B minus system which is not grounded to chassis except through R1 and C2.

*RC-072	C1	CAPACITOR—.05 mfd., 200 V. paper
*RC-130	C2	CAPACITOR—.20 mfd., 400 V. paper
*RC-293	C3	CAPACITOR—470 mmf., mica
*RC-7039	C6a, 6b	CONDENSER—Tuning condenser
*RC-072	C8	CAPACITOR—.05 mfd., 200 V. paper
*RC-274	C14	CAPACITOR—330 mmf., mica
*RC-023	C15	CAPACITOR—.005 mfd., 600 V. paper
*RC-274	C16	CAPACITOR—330 mmf., mica
*RC-039	C17	CAPACITOR—.01 mfd., 600 V. paper
*RC-048	C18	CAPACITOR—.02 mfd., 600 V. paper
*RC-5174	C19a	CAPACITOR—20 mfd., 150 V. electrolytic
*RC-5174	C19b	CAPACITOR—30 mfd., 150 V. electrolytic
*RC-092	C21	CAPACITOR—.05 mfd., 600 V. paper
*RC-235	C22	CAPACITOR—100 mmf., mica
*RQ-1319	R1	RESISTOR—330,000 ohms, ½ W. carbon
*RQ-1291	R2	RESISTOR—22,000 ohms, ½W. carbon
*RQ-1339	R3	RESISTOR—2.2 megohms, ½W. carbon
*RV-108	R4	VOL. CONTROL—0.5 megohm control
*RQ-1347	R5	RESISTOR—4.7 megohms, ½W. carbon
*RQ-1317	R6	RESISTOR—270,000 ohms, ½W. carbon
*RQ-1323	R7	RESISTOR—470,000 ohms, ½W. carbon
*RQ-1239	R8	RESISTOR—150 ohms, ½W. carbon
*RQ-1469	R9	RESISTOR—2,700 ohms, 1W. carbon
*RQ-1214	R11	RESISTOR—13 ohms, ½W. carbon
*RT-375	L1	TRANSFORMER—1st I.F. transformer
*RT-376	L2	TRANSFORMER—2nd I.F. transformer
RL-1011	L3	COIL—antenna coil
RL-2047	L4	COIL—oscillator coil
RT-4004	T1	TRANSFORMER—output transformer

Models L500, L510, L550 and L560 are five tube AC-DC superheterodyne receivers. Models L510 and L560 are Underwriters' approved versions of the Models L500 and L550. The models L500 and L510 use rich mahogany plastic cabinets. Models L550 and L560 are identical to Models L500 and L510, respectively, except for ivory plastic cabinets.

These models are built using either a 12B7 or 12SK7 I.F. amplifier tube. The tubes are not interchangeable because of the different type socket requirements.



Intermediate Frequency	455 KC
Maximum Power Output	1.5 watts
Loud-speaker—PM Dynamic	
Outside Cone Diameter	4 inches
Voice Coil Impedance (400 Cycles)	3.5 ohms

I.F Alignment

Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the converter grid through a .05 mfd. capacitor and align progressively the trimmers in the 2nd and 1st I.F. transformer cans.

R.F. Alignment

Close the gang condenser by rotating the tuning control. Slide the pointer along the cord until it lines up with the first dial marking on the left. Now rotate the tuning control until the pointer is over the 1500 KC dial mark. Apply a 1500 KC signal to the receiver antenna post through a standard I.R.E. dummy antenna. Align the oscillator trimmer (C-7) to bring in the signal and peak the signal by adjusting the antenna trimmer (C-5). (See Fig. 1 for trimmer locations.)

Precaution

If the signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC current through the capacitor will introduce hum modulation and/or create the possibility of a burned-out signal generator attenuator.

Special Service Information

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains*

Antenna Post to Converter Grid	4.0 at 1000 KC
I.F. on Converter Grid to I.F. on I.F. Amplifier Grid	50 at 455 KC
I.F. Amplifier Grid to Diode Plate	45 at 455 KC

(2) 0.20-volt, 400-cycle signal across the volume control will give ½-watt speaker output.* (Volume control turned to maximum.)

(3) Average DC voltage developed across oscillator grid leak ..... 6 volts

* Variations of ±20% permissible. All readings obtained with enough signal input to give ½-watt speaker output.

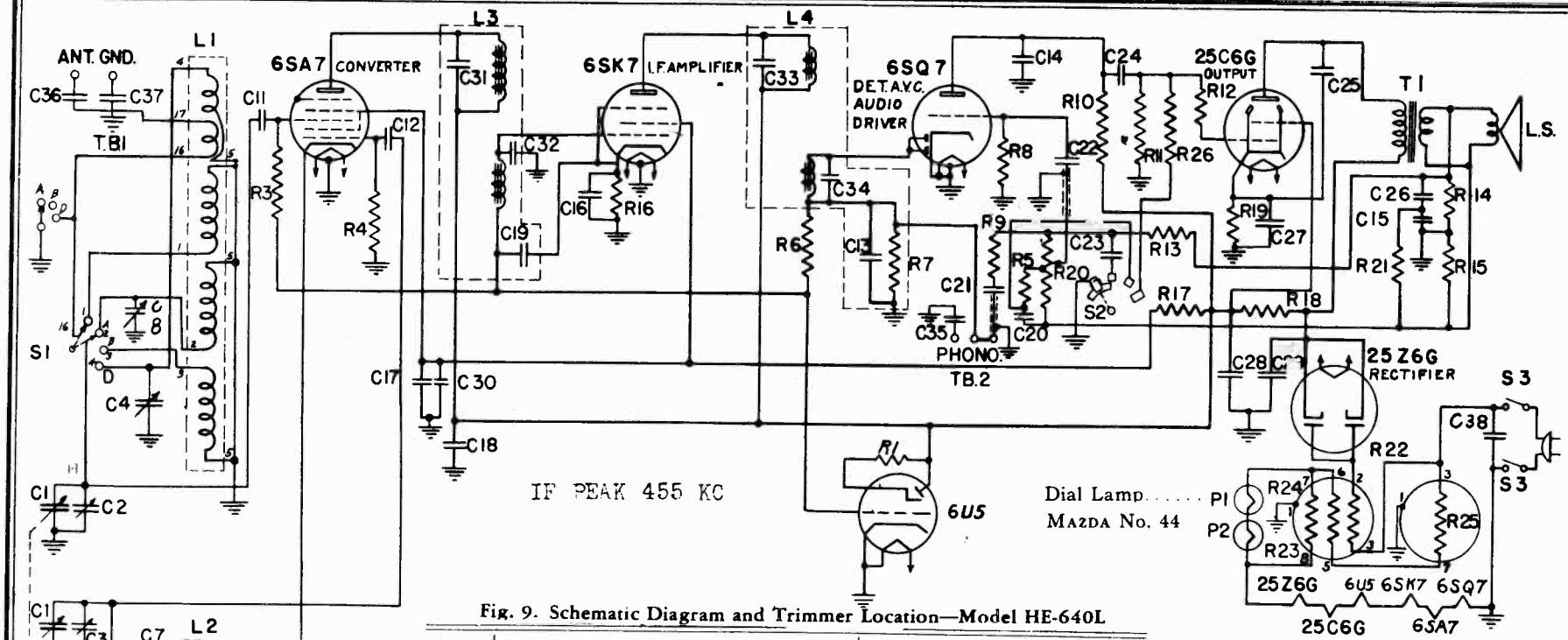
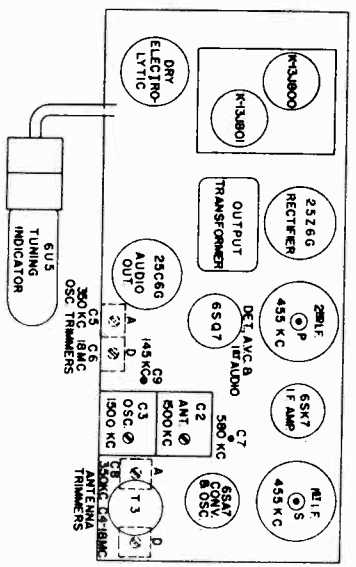


Fig. 9. Schematic Diagram and Trimmer Location—Model HE-640L

Symbol	Description	Symbol	Description
C-1	Tuning Condenser	C-38	.05 Mfd. 600 V. Paper Capacitor
C-2	2-18 Mmf. "B" Ant. Trimmer	L-1	Antenna Transformer
C-3	2-18 Mmf. "B" Osc. Trimmer	L-2	Oscillator Transformer
C-4	2-20 Mmf. "D" Ant. Trimmer	L-3	1st I.F. Transformer
C-5	3-30 Mmf. "A" Osc. Trimmer	L-4	2nd I.F. Transformer
C-6	3-30 Mmf. "D" Osc. Trimmer	P-1	Pilot Light Mazda No. 44
C-7	300-675 Mmf. "B" Osc. Padder	P-2	Pilot Light Mazda No. 44
C-8	2-20 Mmf. "A" Ant. Trimmer	R-1	1.0 Meg., ½-W. Carbon Resistor
C-9	75-150 Mmf. "A" Osc. Padder	R-2	39 Ohms, ½-W. Carbon Resistor
C-10	4300 Mmf. Mica ±5%	R-3	680,000 Ohms, ½-W. Carbon Resistor
C-11	470 Mmf. Mica Capacitor	R-4	22,000 Ohms, ½-W. Carbon Resistor
C-12	50 Mmf. Mica Capacitor	R-5	180,000 Ohms, ½-W. Carbon Resistor
C-13	100 Mmf. Mica Capacitor	R-6	2.2 Meg., ½-W. Carbon Resistor
C-14	220 Mmf. Mica Capacitor	R-7	330,000 Ohms, ½-W. Carbon Resistor
C-15	.03 Mfd. 600 V. Paper Capacitor	R-8	4.7 Meg., ½-W. Carbon Resistor
C-16	.05 Mfd. 200 V. Paper Capacitor	R-9	47,000 Ohms, ½-W. Carbon Resistor
C-17	.05 Mfd. 600 V. Paper Capacitor	R-10	330,000 Ohms, ½-W. Carbon Resistor
C-18	.05 Mfd. 600 V. Paper Capacitor	R-11	470,000 Ohms, ½-W. Carbon Resistor
C-19	.05 Mfd. 200 V. Paper Capacitor	R-12	1000 Ohms, ½-W. Carbon Resistor
C-20	.002 Mfd. 600 V. Paper Capacitor	R-13	5.6 Meg., ½-W. Carbon Resistor
C-21	.005 Mfd. 600 V. Paper Capacitor	R-14	1500 Ohms, ½-W. Carbon Resistor
C-22	.005 Mfd. 600 V. Paper Capacitor	R-15	270 Ohms, ½-W. Carbon Resistor
C-23	.0015 Mfd. 600 V. Paper Capacitor	R-16	330 Ohms, ½-W. Carbon Resistor
C-24	.05 Mfd. 600 V. Paper Capacitor	R-17	3900 Ohms, 1-W. Carbon Resistor
C-25	.008 Mfd. 1000 V. Paper Capacitor	R-18	3300 Ohms, 2-W. Carbon Resistor
C-26	0.1 Mfd. 200 V. Paper Capacitor	R-19	270 Ohms, 1-W. Carbon Resistor
C-27	20 Mfd. 25 V. Dry Electrolytic	R-20	2.0 Meg. Vol. Control, 1 Megohm Tap
C-28	50 Mfd. 250 V. Dry Electrolytic	R-21	220 Ohms, ½-W. Carbon Resistor
C-29	40 Mfd. 300 V. Dry Electrolytic	R-22	240 Ohms, 10-W. Ballast (K13J801)
C-30	20 Mfd. 250 V. Dry Electrolytic	R-23	110 Ohms, 20-W. Ballast (K13J801)
C-35	.25 Mfd. 400 V. Paper Capacitor	R-24	160 Ohms, 20-W. Ballast (K13J801)
C-36	.01 Mfd. 600 V. Paper Capacitor	R-25	370 Ohms, 50-W. Ballast (K13J800)
C-37	.01 Mfd. 600 V. Paper Capacitor	R-26	680,000 Ohms ½-W Carbon Resistor



GENERAL ELECTRIC CO.

MODEL JB-513
MODEL JB-514

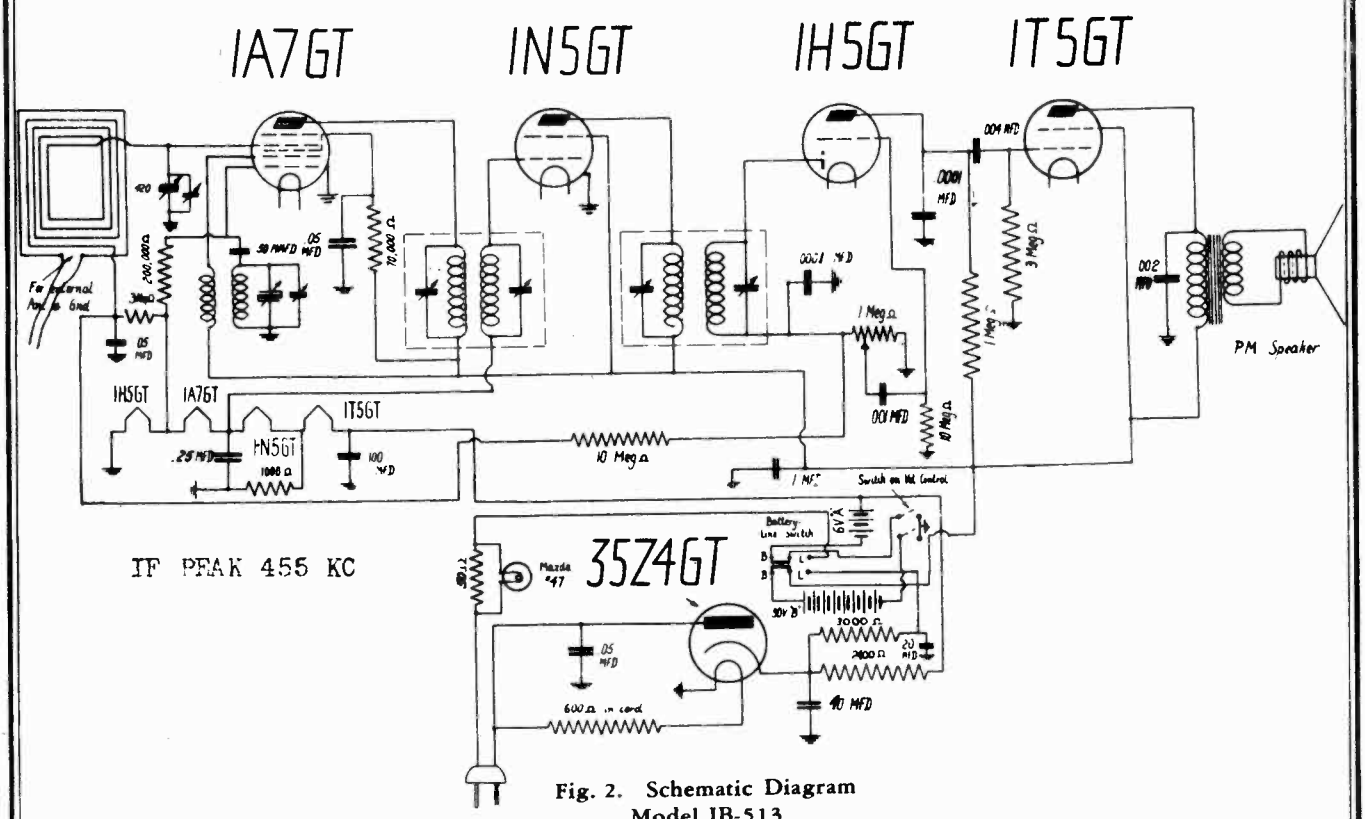


Fig. 2. Schematic Diagram
Model JB-513

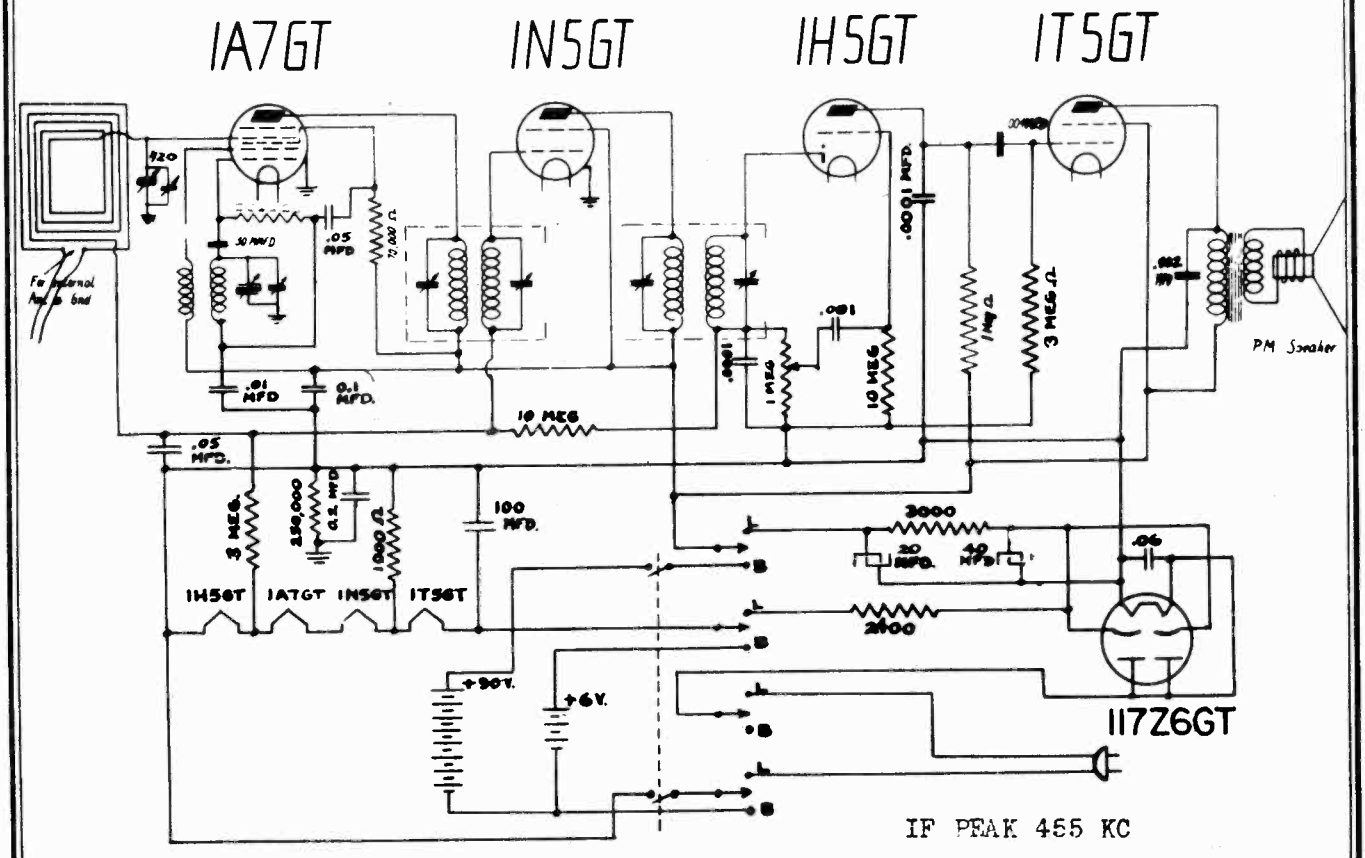


Fig. 3. Schematic Diagram
Model JB-514

MODEL JB-523
MODEL JB-524

GENERAL ELECTRIC CO.

MODELS JB-630
JB-631

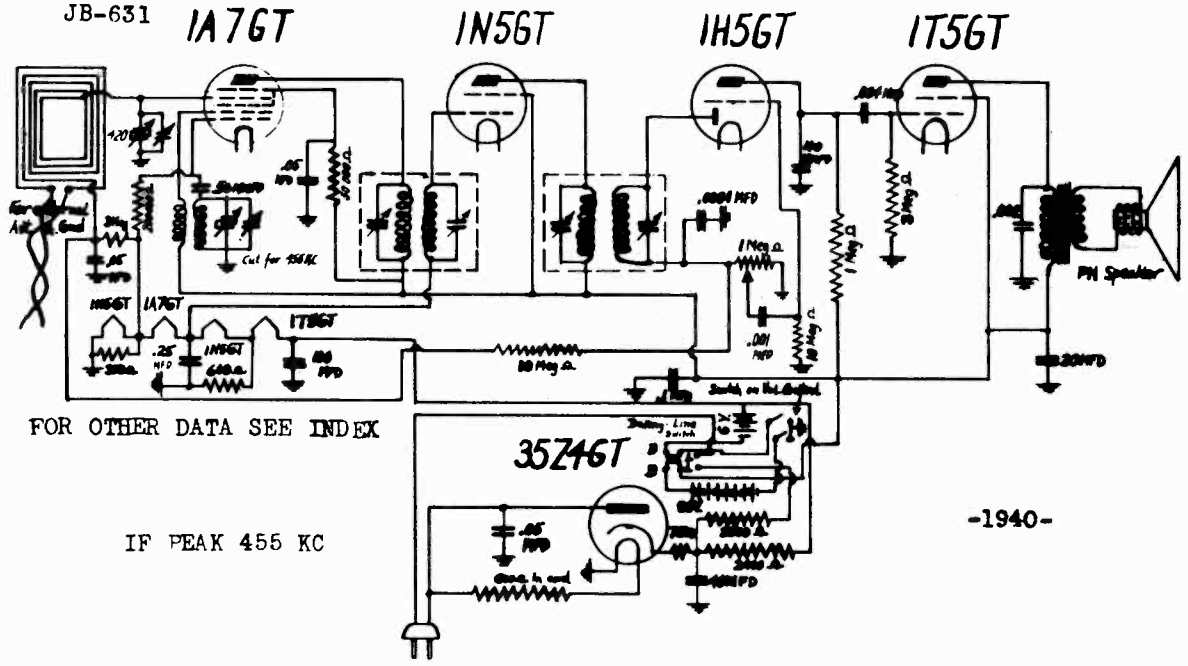


Fig. 1. Schematic Diagram—Model JB-523

ALIGNMENT AND VOLTAGES

MODELS JB-523, JB-524, JB-630, JB-631

I.F ALIGNMENT CONVENTIONAL
SEE SPECIAL SECTION VOL. VIII

VOLTAGE CHART
(117 line volts)

Tubes	Plate to Gnd. Volts	Screen to Gnd. Volts	Cathode to Gnd. Volts	Filament Volts
1A7GT	90 (conv.) 90 (osc.)	60 *		1.2 to 1.5
1N5GT	90	90		1.2 to 1.5
1H5GT	54 *			1.2 to 1.5
1T5GT	85	90		1.2 to 1.5
3Q5GT	85	90		2.5 to 3.3
35Z4GT	117 AC		122	35
117Z6GT	117 AC		122	117

* Voltages are operating voltages in circuits with high series resistance. The actual voltages will be lower depending on the voltmeter loading. Above voltages should be held within ±20% with 117 volts AC line.

R.F. Alignment

Connect high side of signal generator to one of Beam-a-Scope primary leads and ground side to other primary lead. Turn tuning condenser completely out of mesh (open). Set generator to 1700 KC. Adjust oscillator trimmer (cut section of tuning condenser) until generator signal is heard through speaker. Then reset generator to 1500 KC and tune receiver to signal. Peak antenna trimmer on tuning condenser for maximum output.

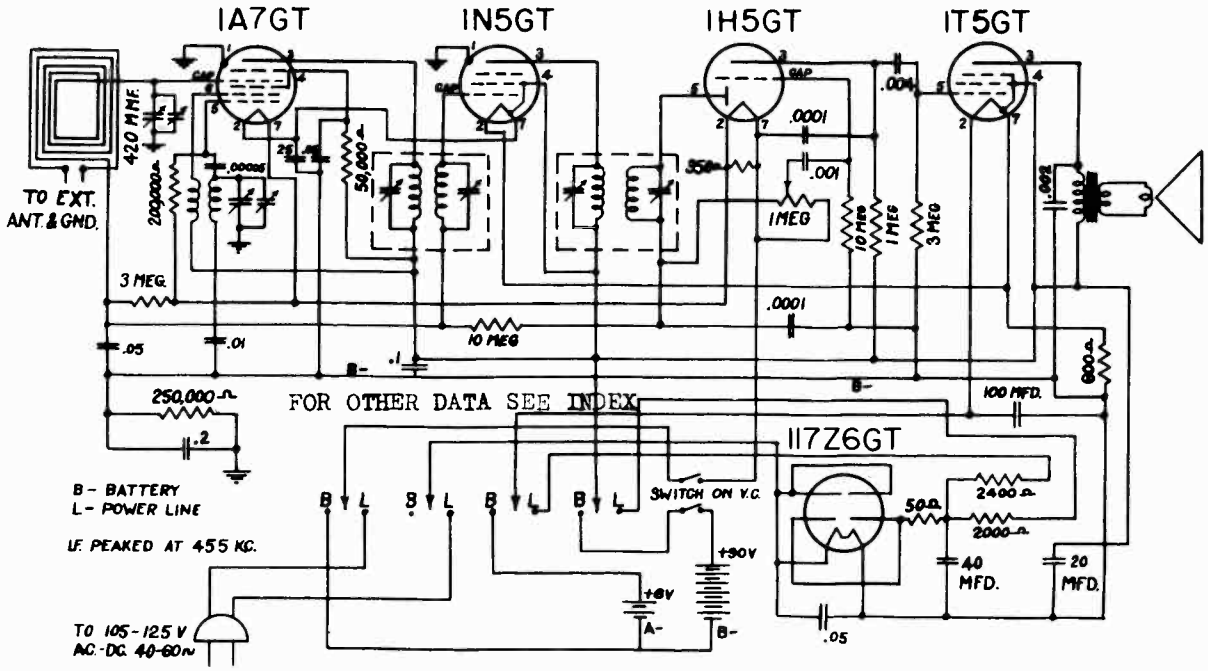


Fig. 2. Schematic Diagram—Model JB-524

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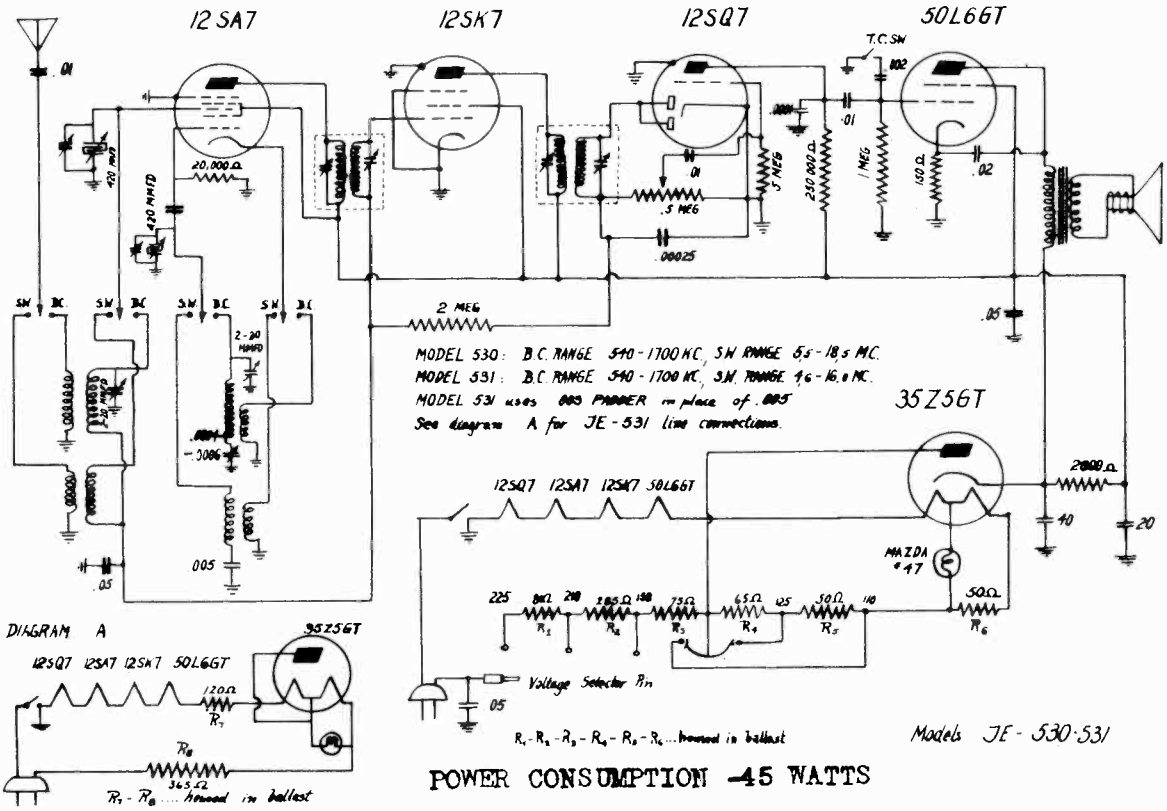
GENERAL ELECTRIC CO.

MODELS JE-530, JE-531, JE-531X



POWER CONSUMPTION -45 WATTS

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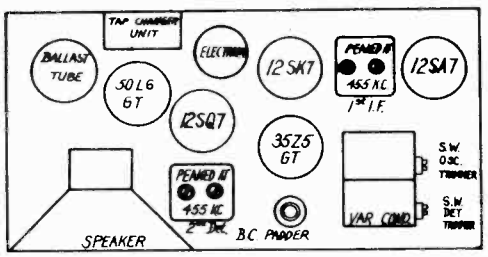
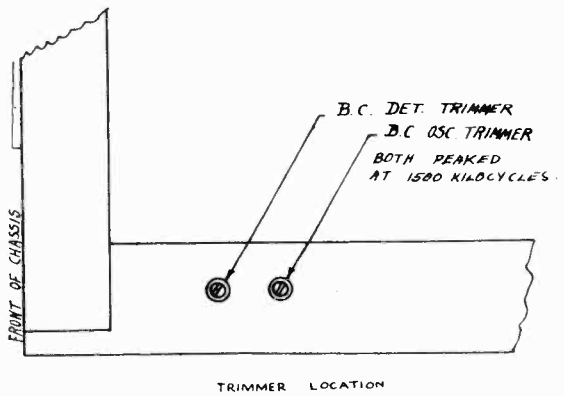


Electrical Power Output

Undistorted	1.2 watts
Maximum	2 watts

Loud-speaker—Permanent Magnet

Outside Cone Diameter	5 inches
Voice Coil Impedance (400 cycles)	3.5 ohms



TRIMMER LOCATION

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.	455 Kc.
Broadcast R.F.	1500 and 600 Kc.
Short Wave	
JE530	17,000 Kc.
JE531X	15,000 Kc.

I.F. Alignment

Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 Kc. and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the grid of the 12SK7 through a .05 mfd. capacitor and align the 2nd I.F. transformer. Repeat the procedure applying the 455 Kc. signal to the control grid of the 12SA7 and aligning the 1st I.F. transformer. Do not remove the grid leads from the tubes. Finish alignment by over-all adjustments.

R.F. Alignment

Refer Sketch **"Trimmer Location."** Apply R.F. signals through a standard IRE dummy to the antenna terminal.

"C" Band (Model JE530—5500–18,500 Kc.)

Rotate band switch to clockwise position and set dial pointer and signal generator to 17 megacycles. Align by rotating S.W. osc. trimmer located on rear section of variable condenser. Peak the S.W. detector trimmer located on front section of variable condenser for maximum signal while rocking the gang condenser. The image of 17 Mc. should be heard at 16.09 Mc.

"C" Band (Models JE531, JE531X—4600–16,000 Kc.)

Same procedure as above, but align osc. trimmer at 15 megacycles. Image will be heard at 14.09 Mc.

"B" Band (All models—540–1700 Kc.)

Rotate band switch to counterclockwise position and set dial pointer and signal generator to 1500 Kc. Align by turning the broadcast oscillator trimmer screw. Peak broadcast detector screw for maximum signal. Set screw for maximum signal. Set receiver dial and signal generator to 600 Kc. and adjust the broadcast padder for maximum signal while rocking the gang condenser. Retrim at 1500 Kc.

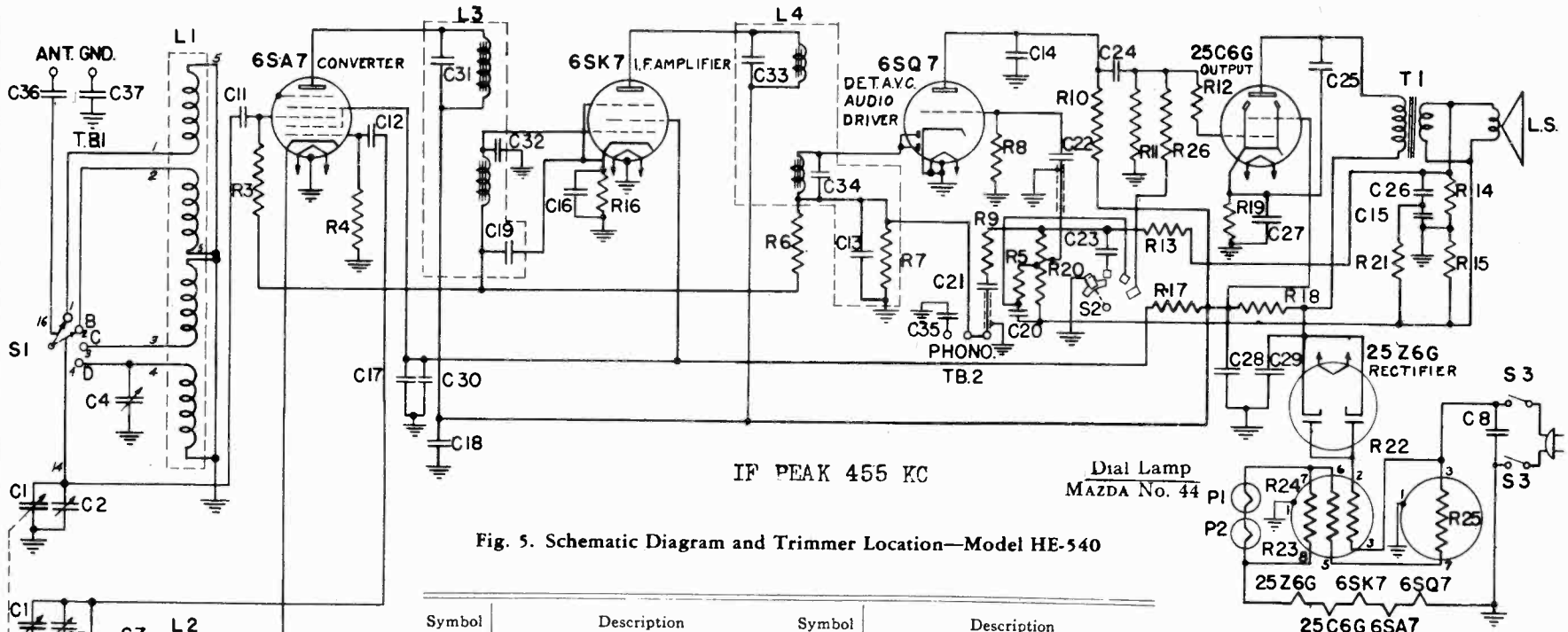
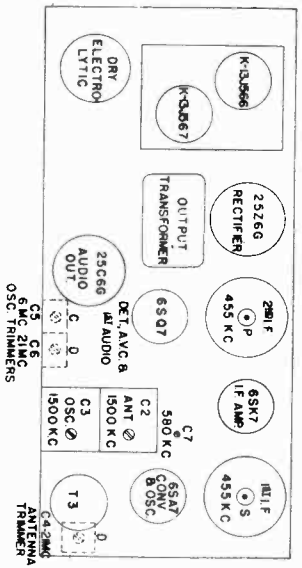


Fig. 5. Schematic Diagram and Trimmer Location—Model HE-540

Symbol	Description	Symbol	Description
C-1	Tuning Condenser	L-1	Antenna Transformer
C-2	2–18 Mmf. "B" Ant. Trimmer	L-2	Oscillator Transformer
C-3	2–18 Mmf. "B" Osc. Trimmer	L-3	1st I.F. Transformer
C-4	3–30 Mmf. "D" Ant. Trimmer	L-4	2nd I.F. Transformer
C-5	3–30 Mmf. "C" Osc. Trimmer	P-1	Pilot Light Mazda No. 44
C-6	3–30 Mmf. "D" Osc. Trimmer	P-2	Pilot Light Mazda No. 44
C-7	300–650 Mmf. "B" Osc. Padder	R-1	330 Ohms, ½-W. Carbon Resistor
C-8	.05 Mfd. 600 V. Paper	R-2	39 Ohms, ½-W. Carbon Resistor
C-9	1800 Mmf. Mica ±5%	R-3	680,000 Ohms, ½-W. Carbon Resistor
C-10	5600 Mmf. Mica ±5%	R-4	22,000 Ohms, ½-W. Carbon Resistor
C-11	470 Mmf. Mica Capacitor	R-5	180,000 Ohms, ½-W. Carbon Resistor
C-12	50 Mmf. Mica Capacitor	R-6	2.2 Meg., ½-W. Carbon Resistor
C-13	100 Mmf. Mica Capacitor	R-7	330,000 Ohms, ½-W. Carbon Resistor
C-14	220 Mmf. Mica Capacitor	R-8	4.7 Meg., ½-W. Carbon Resistor
C-15	.03 Mfd. 600 V. Paper Capacitor	R-9	47,000 Ohms, ½-W. Carbon Resistor
C-16	.05 Mfd. 200 V. Paper Capacitor	R-10	330,000 Ohms, ½-W. Carbon Resistor
C-17	.05 Mfd. 600 V. Paper Capacitor	R-11	470,000 Ohms, ½-W. Carbon Resistor
C-18	.05 Mfd. 600 V. Paper Capacitor	R-12	1000 Ohms, ½-W. Carbon Resistor
C-19	.05 Mfd. 200 V. Paper Capacitor	R-13	5.6 Meg., ½-W. Carbon Resistor
C-20	.002 Mfd. 600 V. Paper Capacitor	R-14	1500 Ohms, ½-W. Carbon Resistor
C-21	.005 Mfd. 600 V. Paper Capacitor	R-15	270 Ohms, ½-W. Carbon Resistor
C-22	.005 Mfd. 600 V. Paper Capacitor	R-16	330 Ohms, ½-W. Carbon Resistor
C-23	.0015 Mfd. 600 V. Paper Capacitor	R-17	3900 Ohms, 1-W. Carbon Resistor
C-24	.05 Mfd. 600 V. Paper Capacitor	R-18	3300 Ohms, 2-W. Carbon Resistor
C-25	.008 Mfd. 1000 V. Paper Capacitor	R-19	270 Ohms, 1-W. Carbon Resistor
C-26	0.1 Mfd. 200 V. Paper Capacitor	R-20	2 Meg. Volume Control, 1 Meg. Tap
C-27	20 Mfd. 25 V. Dry Electrolytic	R-21	220 Ohms, ½-W. Carbon Resistor
C-28	50 Mfd. 250 V. Dry Electrolytic	R-22	240 Ohms, 10-W. Ballast (K13J567)
C-29	40 Mfd. 300 V. Dry Electrolytic	R-23	110 Ohms, 20-W. Ballast (K13J567)
C-30	20 Mfd. 250 V. Dry Electrolytic	R-24	160 Ohms, 20-W. Ballast (K13J567)
C-35	.25 Mfd. 400 V. Paper Capacitor	R-25	390 Ohms, 50-W. Ballast (K13J566)
C-36	.01 Mfd. 600 V. Paper Capacitor	R-26	680,000 Ohms, ½-W. Carbon Resistor
C-37	.01 Mfd. 600 V. Paper Capacitor		



One side of the power line is connected directly to the chassis, therefore, caution should be exercised when servicing.

Power Supply (Volts)	Frequency (Cycles on A-C)	Power Consumption (Watts)
105–125 AC 105–125 DC	50–60	30

Electrical Power Output

Undistorted.....1.0 watt
Maximum.....1.7 watts

Loud-speaker—Permanent Magnet Type

Outside Cone Diameter.....5 inches
Voice Coil Impedance (400 cycles)...3.8 ohms
D.C. Coil Resistance.....3.4 ohms

ALIGNMENT PROCEDURE

The location of alignment trimmers is shown in Figs. 1 and 2.

I.F. Alignment*

Connect an output meter across the voice coil. Turn the volume control to maximum. Set signal generator to 455 K.C. and keep the generator output as low as a readable meter reading will permit.

Apply signal to the grid of the 12SA7GT through a .05 capacitor. Align all I.F. trimmers (C-14, 15 and 16) for a maximum meter reading.

R.F. Alignment*

Set the signal generator to 1730 K.C. and connect the output to the blue antenna lead through a 100 mmf. mica capacitor. Rotate the gang condenser to wide open and align the oscillator trimmer. Readjust signal generator output to 1400 K.C. and after tuning in signal by rotating the gang condenser, peak the antenna trimmer. The alignment is now complete unless the gang condenser plates have been bent out of shape. In case of bent plates, set the signal generator and receiver to 600 K.C. and bend the plates into position of maximum output.

*Precaution—If signal generator is A-C operated use an isolating transformer between the power supply and the radio receiver power output. The use of an isolating capacitor is not recommended as A-C current through the capacitor will introduce hum modulation and/or create the possibility of a burned-out signal generator attenuator.

SERVICE INFORMATION

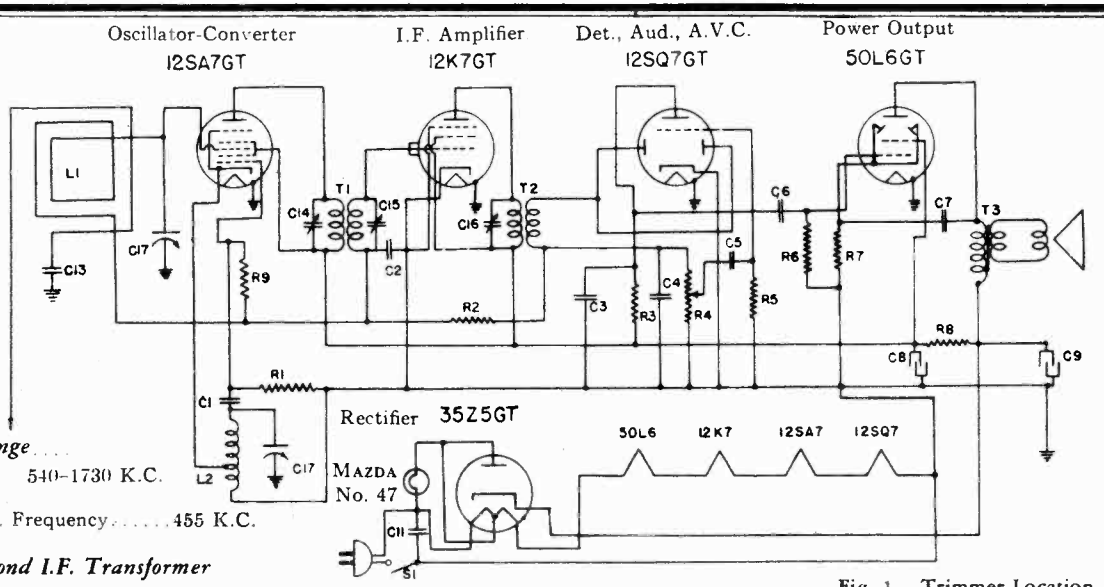
Oscillator Coil

Looking at connection end in clockwise direction starting at chassis the terminals are No. 1, end of winding; No. 2, start of winding; No. 3, tap.

No. 1 to No. 2.....4.8 ohms
No. 1 to No. 3.....4.2 ohms

First I.F. Transformer

Primary—Blue, plate; red, B+.....32.1 ohms
Secondary—White, grid; black, AVC.....33.2 ohms



Range.....
540–1730 K.C.

I.F. Frequency.....455 K.C.

Second I.F. Transformer

Primary—Blue, plate; red, B+.....24.2 ohms
Secondary—White, grid; black, AVC.....24.1 ohms

Electrolytic Condenser

Red, 30 mfd., 150 volts; green, 20 mfd., 150 volts; black, common terminal.

SOCKET VOLTAGES

Tube	Plate To Gnd (Volts)	Screen To Gnd (Volts)	Cathode To Gnd (Volts)	Filament Voltage
12SA7GT	80	82		11
12K7GT	80	82	0	11
12SQGT	40*		0	11
50L6GT	97	82	5.5	48
35Z5GT	115 AC		102	34

Line—115 Volts AC, Volume Control Maximum.
Antenna shorted to ground.
*Measured on 250 volt scale of 1000 ohms per volt voltmeter.

Symbol	Description	Symbol	Description
C-1	100 mmf. mica capacitor	C-13	.001 mfd. paper capacitor
C-2	.02 mfd. paper capacitor	R-1	20,000 ohms carbon resistor
C-3	500 mmf. mica capacitor	R-2	2.2 megohms carbon resistor
C-4	250 mmf. mica capacitor	R-3	250,000 ohms carbon resistor
C-5	.01 mfd. paper capacitor	R-4	500,000 ohms volume control
C-6	.002 mfd. paper capacitor	R-5	5.6 megohms carbon resistor
C-7	.01 mfd. paper capacitor	R-6	510,000 ohms carbon resistor
C-8	20 mfd. 150 V. dry electrolytic	R-7	150 ohms carbon resistor
C-9	30 mfd. 150 V. dry electrolytic	R-8	1000 ohms 1 W. carbon resistor
C-11	.05 mfd. paper capacitor	R-9	15 megohms carbon resistor

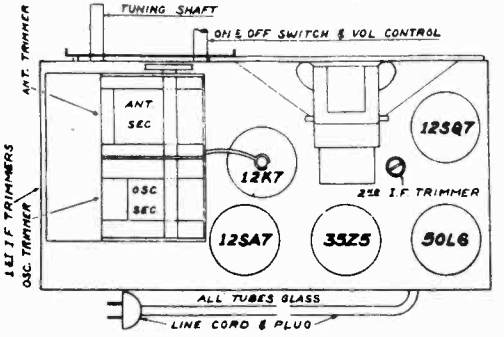


Fig. 1. Trimmer Location Models HP-558 and HP-561

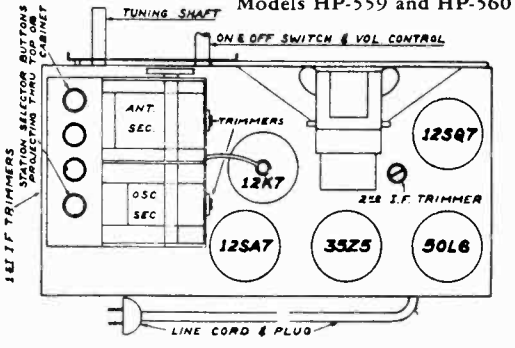
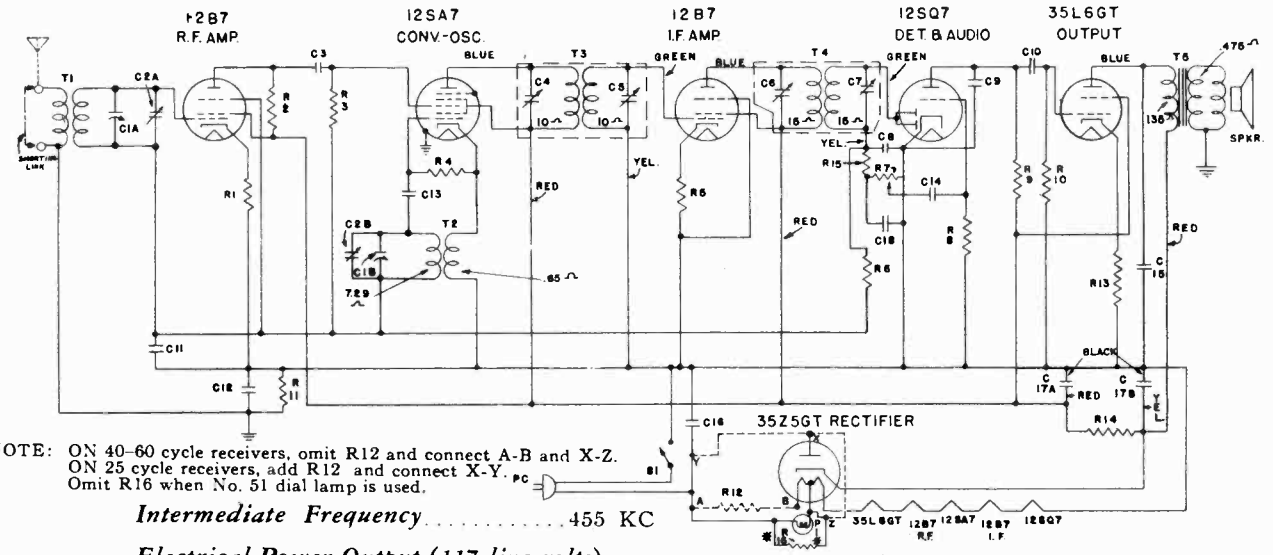


Fig. 2. Trimmer Location Models HP-559 and HP-560

MODELS J-602
J-603

GENERAL ELECTRIC CO.



NOTE: ON 40–60 cycle receivers, omit R12 and connect A-B and X-Z.
ON 25 cycle receivers, add R12 and connect X-Y.
Omit R16 when No. 51 dial lamp is used.

Intermediate Frequency ..... 455 KC

Electrical Power Output (117 line volts)

Undistorted ..... 1.0 watts
Maximum ..... 1.5 watts

Loudspeaker—PM Dynamic

Outside Cone Diameter ..... 5 inches
Voice Coil Impedance (400 cycles) . 3.5 ohms

IF Alignment

Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the 12SA7 converter grid through a .05 mfd. capacitor and align progressively the trimmers in the 2nd and 1st IF transformers.

RF Alignment

When making the following alignment the loop antenna must be bolted to the chassis by the screw and spacer mounting. The RF signal should be capacity coupled to the receiver loop by placing a two-foot piece of wire for an antenna on the test oscillator output post (high side). Keeping this antenna two feet or more from the receiver loop will generally insure freedom from too much coupling. Metal objects such as meters, tools, etc., should not be placed in close proximity to the loop when making this alignment.

With the gang condenser plates completely closed, the pointer should line up with the first mark on the left of the scale. Set the signal generator to 1500 KC. Align (C-1b) to the signal while the pointer is on the 1500 KC mark. Peak (C-1a) for maximum output.

Special Service Information

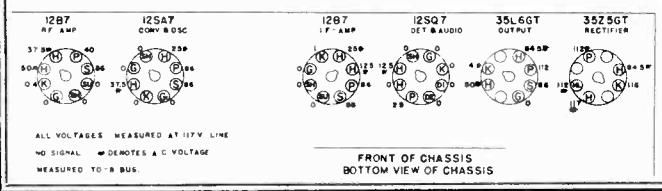
The following information will be very useful to servicemen equipped with vacuum tube voltmeters or similar voltage measuring instruments.

(1) Stage Gains
Antenna post to RF grid—3.8 at 1000 KC
RF grid to converter grid—6.0 at 1000 KC
Converter grid to IF grid—46 at 455 KC
IF grid to 12SQ7 diode plate—75 at 455 KC

(2) Audio Gain
.14 volts, 400 cycles signal across volume control with control set at maximum, will give approximately ½-watt speaker output.

(3) DC voltage developed across oscillator grid resistor (R4) averages 10.0 volts at 1000 KC.

Variations of ±20% permissible. All readings obtained with enough signal input to give ½-watt speaker output.



Stock No.	Symbol	Description
RC-7049	C-1a, 1b, 2a, 2b	CONDENSER—Tuning condenser
*RC-235	C-3	CAPACITOR—100 Mmf., mica
*RC-242	C-8	CAPACITOR—150 Mmf., mica
*RC-274	C-9	CAPACITOR—330 Mmf., mica
*RC-039	C-10	CAPACITOR—.01 Mfd., 600 V. paper
*RC-072	C-11	CAPACITOR—.05 Mfd., 200 V. paper
*RC-104	C-12	CAPACITOR—0.1 Mfd., 600 V. paper
*RC-216	C-13	CAPACITOR—47 Mmf., mica
*RC-023	C-14	CAPACITOR—.005 Mfd., 600 V. paper
*RC-039	C-15	CAPACITOR—.01 Mfd., 600 V. paper
*RC-092	C-16	CAPACITOR—.05 Mfd., 600 V. paper
RC-5183	C-17a, 17b	CAPACITOR—50 Mfd., 60 Mfd., electrolytic
*RC-235	C-18	CAPACITOR—100 Mmf., mica
*RQ-1227	R-1	RESISTOR—47 ohm, ½ W. carbon
*RQ-1275	R-2	RESISTOR—4700 ohm, ½ W. carbon
*RQ-1299	R-3	RESISTOR—47,000 ohm, ½ W. carbon
*RQ-1295	R-4	RESISTOR—33,000 ohm, ½ W. carbon
*RQ-1235	R-5	RESISTOR—100 ohm, ½ W. carbon
*RQ-1339	R-6	RESISTOR—2.2 megohm, ½ W. carbon
RV-120	R-7, S-1	VOLUME CONTROL—0.5 megohm, combined with power switch
*RQ-1349	R-8	RESISTOR—5.6 megohm, ½ W. carbon
*RQ-1323	R-9, 10, 11	RESISTOR—470,000 ohm, ½ W. carbon
*RQ-1213	R-12	RESISTOR—12 ohm, ½ W. carbon
*RQ-1239	R-13	RESISTOR—150 ohm, ½ W. carbon
RQ-651	R-14	RESISTOR—1000 ohm, 2 W. carbon
*RQ-1299	R-15	RESISTOR—47,000 ohm, ½ W. carbon
*RQ-1255	R-16	RESISTOR—680 ohm, ½ W. carbon

*Used in previous receivers.

Models J602 and J603 are six-tube AC-DC superheterodyne receivers with Underwriters' Approval listing. The Model J602 is housed in a mahogany plastic cabinet, while the Model J603 has an ivory plastic cabinet.

Both the MAZDA No. 47 and No. 51 dial lamps were used during production. When lamp No. 51 is used, the resistor R16 should be omitted.

Either the metal or glass type 12B7 tube may be used in the RF or IF stage. However when the glass tube is used in the IF stage, a tube shield must be used to prevent oscillation at the low frequency end of the broadcast band.

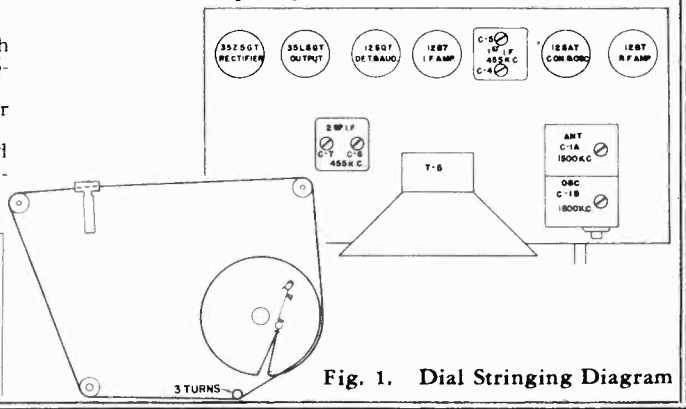
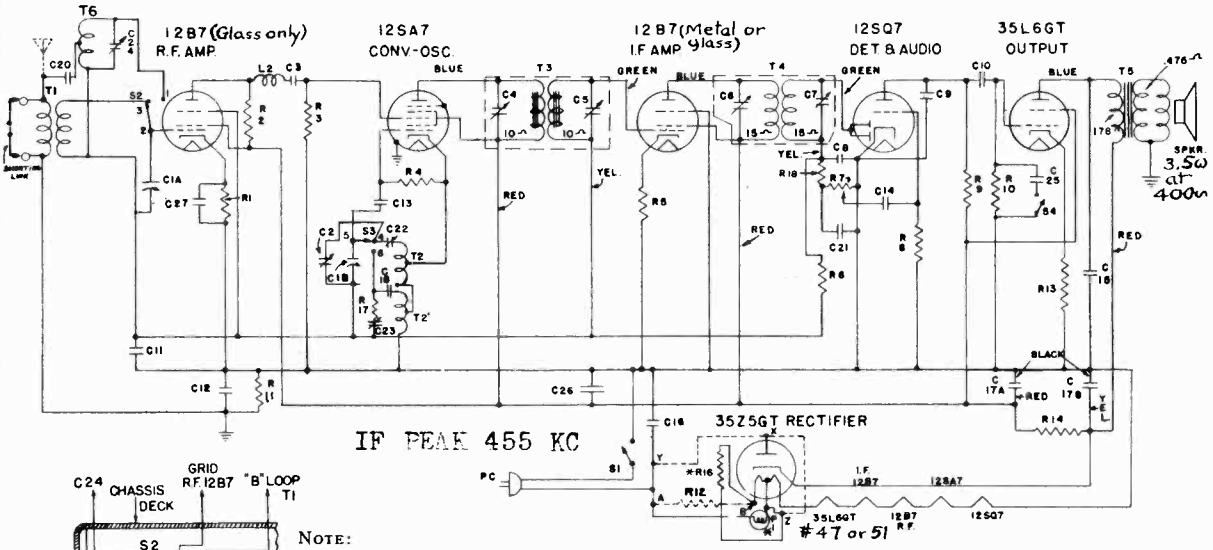
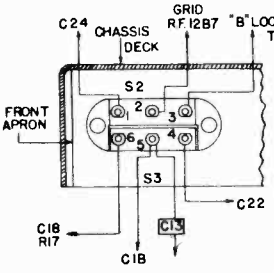


Fig. 1. Dial Stringing Diagram

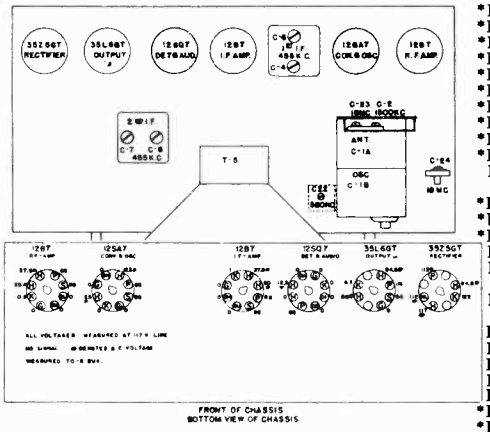
GENERAL ELECTRIC CO.

MODELS J-614
J-664





NOTE:
On 40-60 cycle receivers, omit R12 and connect A-B & X-Z.
On 25 cycle receivers, add R12 and connect X-Y.
* Omit R16 when No. 51 Mazda dial lamp is used



Band Switch Wiring

The alignment procedure is given in table form. All IF alignments may be made with the chassis removed from the cabinet. However the RF alignments are made with the chassis and loop antennas securely bolted in the cabinet, as the relative position of the loop antenna with respect to the chassis materially affects it. The RF signal should be capacity coupled by placing a two-foot wire for an antenna on the test-oscillator output post (high side). Keeping this antenna two feet or more from the receiver loop will generally insure freedom from too much coupling. Metal objects such as meters, tools, etc., should not be placed on top of the receiver cabinet.

ALIGNMENT CHART

Step	Connect Test-Osc. to	Test-Osc. Setting	Pointer Setting	Adjust Trimmers for Max. Output
1	12B7 IF Grid in series with .05 mfd.	455 KC	"BC" Band 550 KC	C6 & C7
2	6SA7 Conv. grid in series with .05 mfd.	455 KC	"BC" Band 550 KC	C4 & C5
3	Capacity Coupled	580 KC	"BC" Band 580 KC	C22**
4	Capacity Coupled	1500 KC	"BC" Band 1500 KC	C2 (Osc.)
5	REPEAT STEP 3			
6	Capacity Coupled	18 MC	"SW" Band 18 MC	C23* (Osc.)
7	Capacity Coupled	18 MC	"SW" Band 18 MC	C24** (Ant.)

* Use minimum capacity peak.
** Rock gang condenser when making alignment.

"A" rating—115 Volts AC or DC, 40-60 cycles, 35 watts
"C" rating—115 Volts AC or DC, 25 cycles, 35 watts

Tuning Frequency Range

Broadcast Band.....540-1720 kilocycles
Short-wave Band.....5600-18,300 kilocycles

	C-1a, 1b	CONDENSER—Tuning condenser
RC-6547	C-2, 23	CAPACITOR—"BC" and "SW" osc. trimmer assembly
*RC-235	C-3	CAPACITOR—100 Mmf., mica
*RC-274	C-8	CAPACITOR—330 Mmf., mica
*RC-242	C-9	CAPACITOR—150 Mmf., mica
*RC-039	C-10	CAPACITOR—.01 Mfd., 600 V. paper
*RC-072	C-11	CAPACITOR—.05 Mfd., 200 V. paper
*RC-104	C-12	CAPACITOR—0.1 Mfd., 600 V. paper
*RC-216	C-13	CAPACITOR—47 Mmf., mica
*RC-023	C-14	CAPACITOR—.005 Mfd., 600 V. paper
*RC-039	C-15	CAPACITOR—.01 Mfd., 600 V. paper
*RC-092	C-16	CAPACITOR—.05 Mfd., 600 V. paper
RC-5183	C-17a, 17b	CAPACITOR—50 Mfd., 60 Mfd., 150 V. electrolytic
*RC-391	C-18	CAPACITOR—4300 Mmf., mica
*RC-209	C-20	CAPACITOR—39 Mmf., mica
*RC-235	C-21	CAPACITOR—100 Mmf., mica
RC-6548	C-22	CAPACITOR—"B" padder
RC-6547	C-23, 2	CAPACITOR—"SW" and "BC" osc. trimmer assembly
RC-6546	C-24	CAPACITOR—"SW" band antenna trimmer
RC-053	C-25	CAPACITOR—.0032 Mfd., 600 V. paper
RC-039	C-26, 27	CAPACITOR—.01 Mfd., 600 V. paper
RQ-1227	R-1	RESISTOR—47 ohm, ½ W. carbon
RQ-1275	R-2	RESISTOR—4700 ohm, ½ W. carbon
RQ-1299	R-3	RESISTOR—47,000 ohm, ½ W. carbon
*RQ-1295	R-4	RESISTOR—33,000 ohm, ½ W. carbon
*RQ-1235	R-5	RESISTOR—100 ohm, ½ W. carbon
*RQ-1339	R-6	RESISTOR—2.2 megohm, ½ W. carbon
RV-120	R-7, S-1	VOLUME CONTROL — 0.5 megohm with power switch
*RQ-1349	R-8	RESISTOR—5.6 megohm, ½ W. carbon
*RQ-1315	R-9	RESISTOR—220,000 ohm, ½ W. carbon
RQ-1323	R10, 11	RESISTOR—470,000 ohm, ½ W. carbon
*RQ-1213	R-12	RESISTOR—12 ohm, ½ W. carbon
*RQ-1239	R-13	RESISTOR—150 ohm, ½ W. carbon
RQ-651	R-14	RESISTOR—1000 ohm, 2 W. carbon
*RQ-1255	R-16	RESISTOR—680 ohm, ½ W. carbon
*RQ-1231	R-17	RESISTOR—68 ohm, ½ W. carbon
*RQ-1299	R-18	RESISTOR—47,000 ohm, ½ W. carbon
RL-1012	L-2	COIL—R.F. choke coil

* Used in previous receivers.

Special Service Information

The following data will be very useful to servicemen equipped with vacuum-tube voltmeters or similar voltage-measuring instruments.

(1) Stage gains

Antenna post to RF grid—3.0 at 1000 KC
RF grid to converter grid—6.0 at 1000 KC
Converter grid to IF grid—50 at 455 KC
IF grid to 12SQ7 diode plate—75 at 455 KC

(2) Audio gains

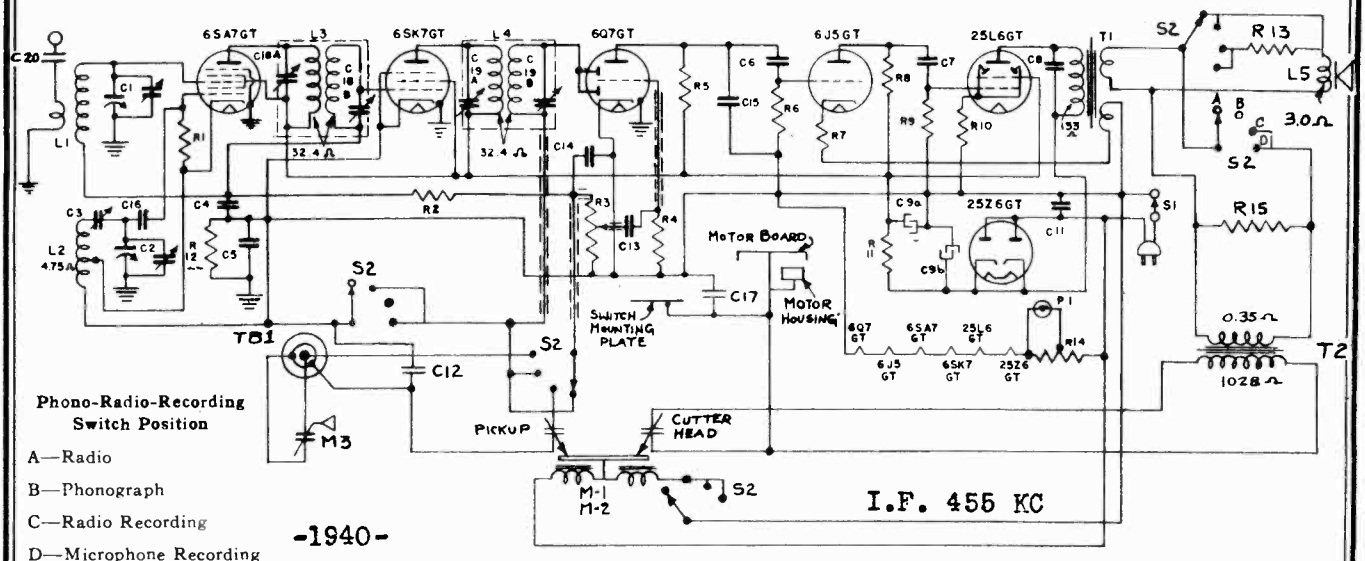
.14 volts, 400 cycles signal across volume control with control set to maximum will give approximately ½-watt speaker output.

(3) DC voltage developed across oscillator grid resistor (R4) averages 9.0 volts at 1000 KC or 8.0 volts at 10,000 KC.

* Variations of ±20% permissible. All readings obtained with enough signal input to give ½-watt speaker output.

MODEL J-629

GENERAL ELECTRIC CO.



	Description	Symbol	Description	Symbol	Description
	RADIO CHASSIS	C-14	470 mmf. mica capacitor	R-6	1.0 megohm carbon resistor
C-1	Antenna section of tuning condenser	C-15	220 mmf. mica capacitor	R-7	3300 ohms carbon resistor
C-2	Oscillator section of tuning condenser	C-16	47 mmf. mica capacitor	R-8	39,000 ohms carbon resistor
C-3	"B" band padder	C-17	.01 mfd. paper capacitor	R-9	470,000 ohms carbon resistor
C-4	.05 mfd. paper capacitor	C-20	.002 mfd. paper capacitor	R-10	150 ohms carbon resistor
C-5	.20 mfd. paper capacitor	L-1	Beam-a-Scope	R-11	1000 ohms 1 W. carbon resistor
C-6	.005 mfd. paper capacitor	L-2	Oscillator coil	R-12	470,000 ohms carbon resistor
C-7	.005 mfd. paper capacitor	L-3	1st I.F. transformer	R-13	3.9 ohm W. W. resistor
C-8	.01 mfd. paper capacitor	L-4	2nd I.F. transformer	R-14	BL-42-B ballast resistor
C-9a	30 mfd. 150 V. dry electrolytic	P-1	Pilot lamp MAZDA No. 44	R-15	7.0 ohm W. W. resistor
C-9b	50 mfd. 150 V. dry electrolytic	R-1	33,000 ohms carbon resistor	S-1	Power switch (comb. with R-3)
C-11	.05 mfd. paper capacitor	R-2	2.2 megohms carbon resistor	S-2	Radio-phono-record switch
C-12	.08 mfd. paper capacitor	R-3	0.5 megohm volume control	T-1	Output transformer
C-13	.03 mfd. paper capacitor	R-4	15 megohms carbon resistor	T-2	Cutter transformer
		R-5	470,000 ohms carbon resistor	TB-1	Microphone jack

Outside Cone Diameter ..... 6.5 inches
Voice Coil Impedance (400 cycles) ..... 3.5 ohms

ALIGNMENT CONVENTIONAL
SEE SPECIAL SECTION VOL. VIII
TRIM ANT, OSC, 1500 KC; PAD 580 KC
POWER CONSUMPTION-75 WATTS

Special Service Information

The following data will be very useful to servicemen equipped with vacuum-tube voltmeters or similar voltage-measuring instruments.

(1) Stage Gains
Antenna Post to Converter Grid—6 at 1000 KC‡
Converter Grid to 6SK7GT Grid—30 at 455 KC‡
6SK7GT Grid to 6Q7GT Det. Plate—100 at 455 KC‡

(2) Audio Gains
.06 volts, 400 cycles signal across volume control with control set to maximum will give approximately ½-watt speaker output.

(3) DC voltage developed across oscillator grid resistor (R-1) averages 12 volts.

‡ Variations of +10, −20% permissible.

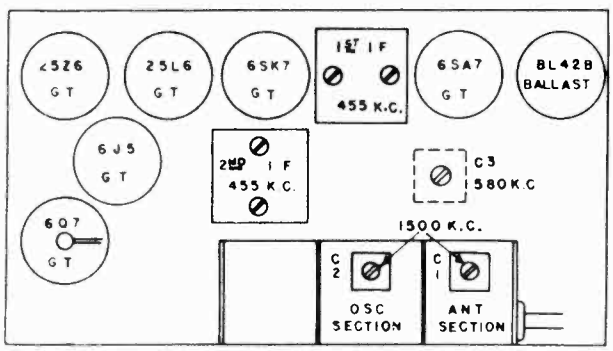


Fig. 1. Trimmer Location

RECORDING ADJUSTMENTS

Cutting Head Pressure

The pressure is controlled by means of the adjustment screw located midway back on top of the recording arm.

The pressure should be adjusted so that by inspection with a magnifying glass, the uncut portion of the record between the grooves is the same width as the groove. At no time should pressure be great enough to cut through the acetate surface enough to show the metal base of the record.

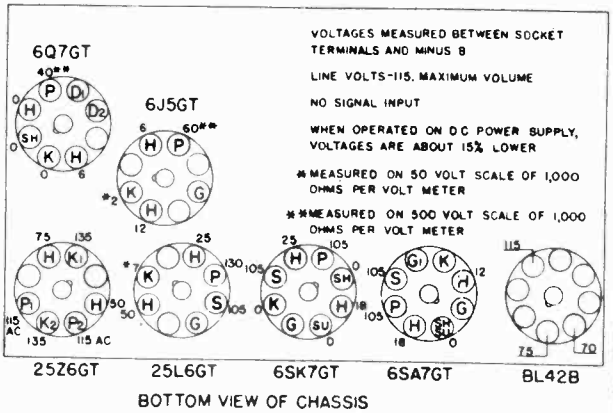
A clockwise rotation of the setscrew increases pressure.

Cutting Arm Adjustment

The adjustment at the rear and underneath the cutting arm, controls the height above the record blank at which the cutting arm rides. This should be adjusted so that when resting in the recording position on the record, the setscrew of the cutting head rides halfway down in the needle screw gap.

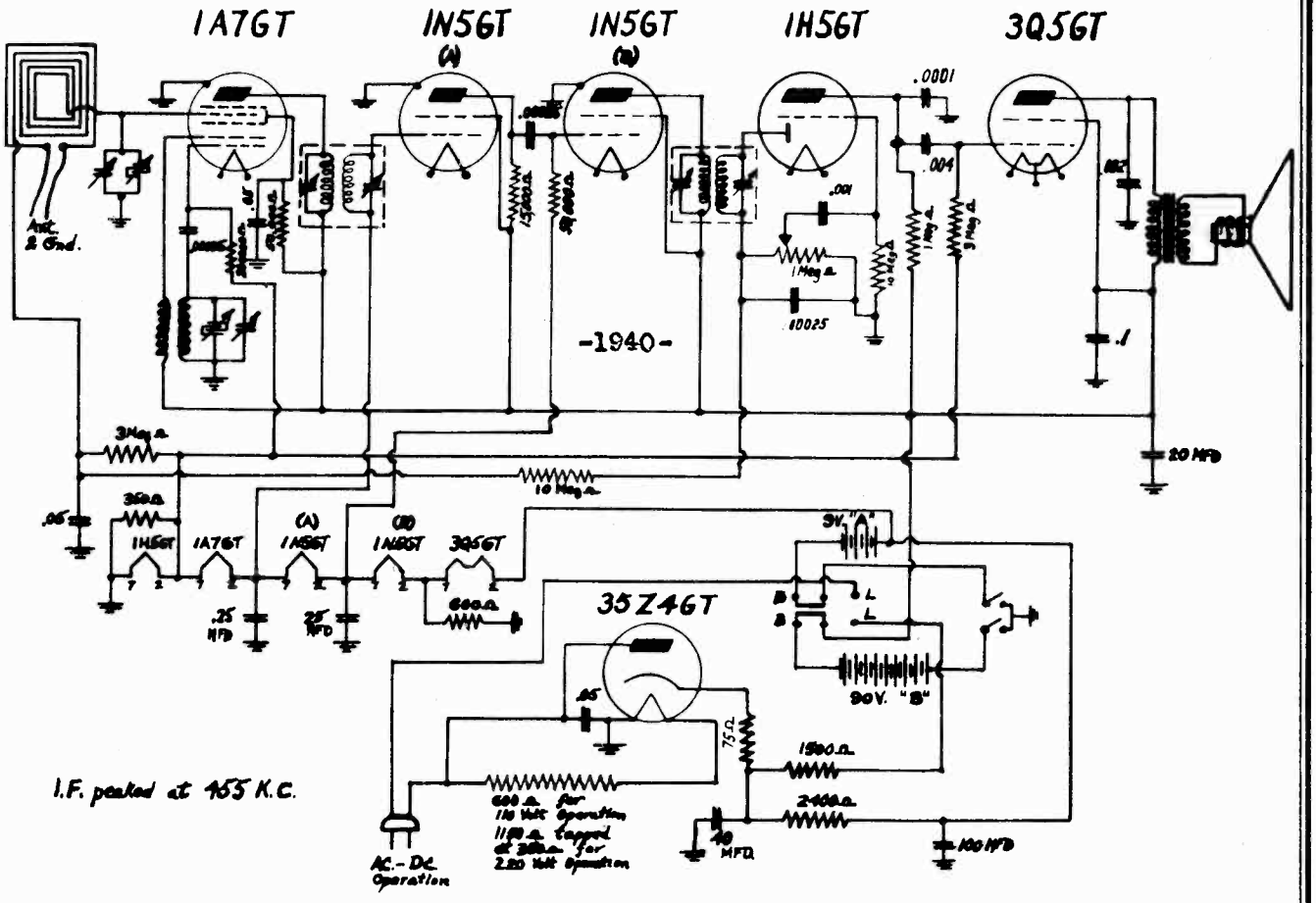
Lead Screw Follower Arm Pressure Adjustment

The pressure is varied by the phosphor bronze spring adjustment underneath the phono assembly on the follower arm. The pressure should be great enough so that when the recording head is in the recording position, this phosphor bronze spring should rest at the bottom of the lead screw groove. Too great pressure will cause binding, while too little pressure is liable to cause overlapping of the grooves.



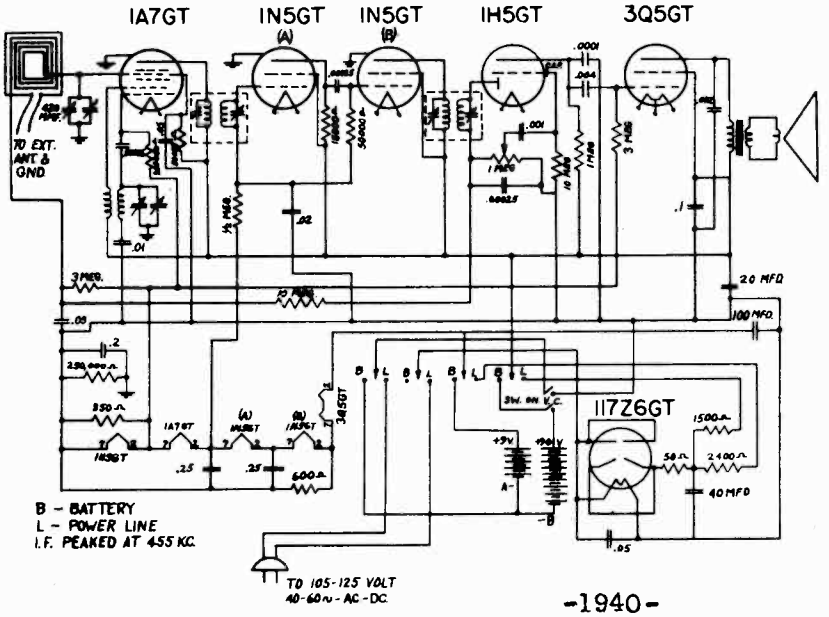
GENERAL ELECTRIC CO.

MODEL JB-630
MODEL JB-631



Schematic Diagram—Model JB-630

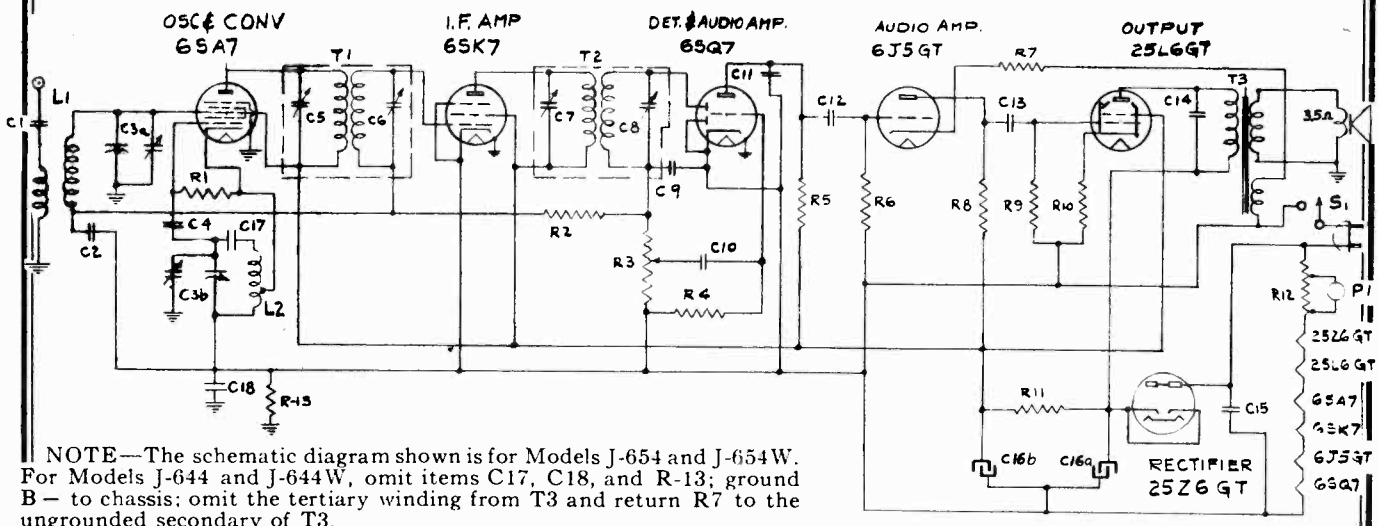
FOR ALIGNMENT, VOLTAGES, PARTS, SEE INDEX



Schematic Diagram—Model JB-631

MODELS J-644, J-644W, J-654, J-654W

GENERAL ELECTRIC CO.



NOTE—The schematic diagram shown is for Models J-654 and J-654W. For Models J-644 and J-644W, omit items C17, C18, and R-13; ground B— to chassis; omit the tertiary winding from T3 and return R7 to the ungrounded secondary of T3.

PARTS DESCRIPTION LIST I.F. 455 KC

Symbol	Description	Symbol	Description	Symbol	Description
C1	.01 mfd. paper capacitor	C16a, 16b	50 mfd., 30 mfd. electrolytic	R9	470,000 ohm carbon resistor
C2	.05 mfd. paper capacitor	C17	.05 mfd. paper capacitor	R10	150 ohm carbon resistor
C3a. 3b	Tuning condenser	C18	.20 mfd. paper capacitor	R11	1000 ohm carbon resistor
C4	47 mmf. mica capacitor	R1	33,000 ohm carbon resistor	R12	Ballast resistor tube
C5–C8	I.F. trimmers	R2	2.2 megohm carbon resistor	R13	470,000 ohm carbon resistor
C9	470 mmf. mica capacitor	R3	0.5 megohm volume control	L1	Beam-a-Scope
C10	.02 mfd. paper capacitor	R4	4.7 megohm carbon resistor	L2	Oscillator coil
C11	470 mmf. mica capacitor	R5	470,000 ohm carbon resistor	T1	1st I.F. transformer
C12, C13	.005 mfd. paper capacitor	R6	1.0 megohm carbon resistor	T2	2nd I.F. transformer
C14	.01 mfd. paper capacitor	R7	3300 ohm carbon resistor	T3	Output transformer
C15	.05 mfd. paper capacitor	R8	39,000 ohm carbon resistor		

-1940-

Special Service Information

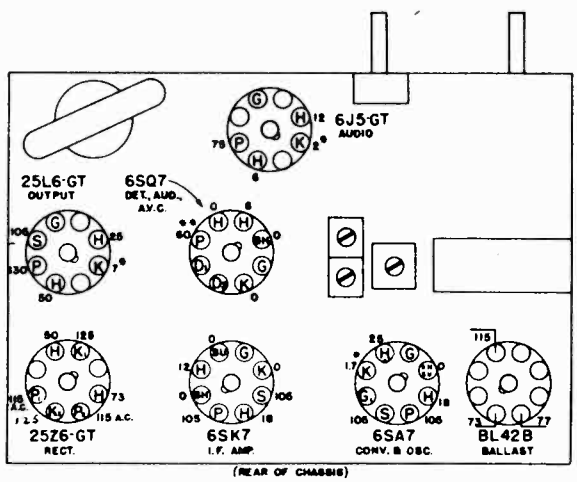
The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains — Gain*
Antenna Post to Converter Grid.....4.0 at 1000 KC
I.F. on Converter Grid to I.F. on I.F. Amplifier Grid.....35 at 455 KC
I.F. Amplifier Grid to Diode Plate...60 at 455 KC

(2) 0.05-volt, 400-cycle signal across the volume control will give ½-watt speaker output.* (Volume control turned to maximum.)

(3) Average RF voltage developed from oscillator cathode to B—.....1.5 volts

* Variations of ± 20% permissible. All readings obtained with enough signal input to give ½-watt speaker output.



Socket Voltages

I.F. ALIGNMENT CONVENTIONAL
SEE SPECIAL SECTION VOL. VIII
TRIM OSC 1650 KC; ANT 1500 KC

Intermediate Frequency.....455 KC

Electrical Power Output (117 line volts)
Undistorted.....1.5 watts
Maximum.....2.5 watts

Loud-speaker—Alnico Magnet Dynamic
Outside Cone Diameter.....5 inches
Voice Coil Impedance (400 cycles).....3.5 ohms

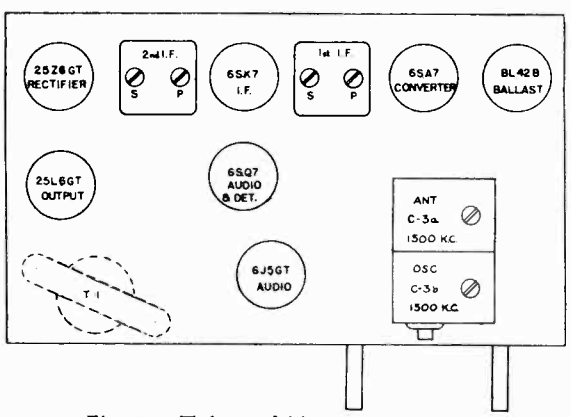
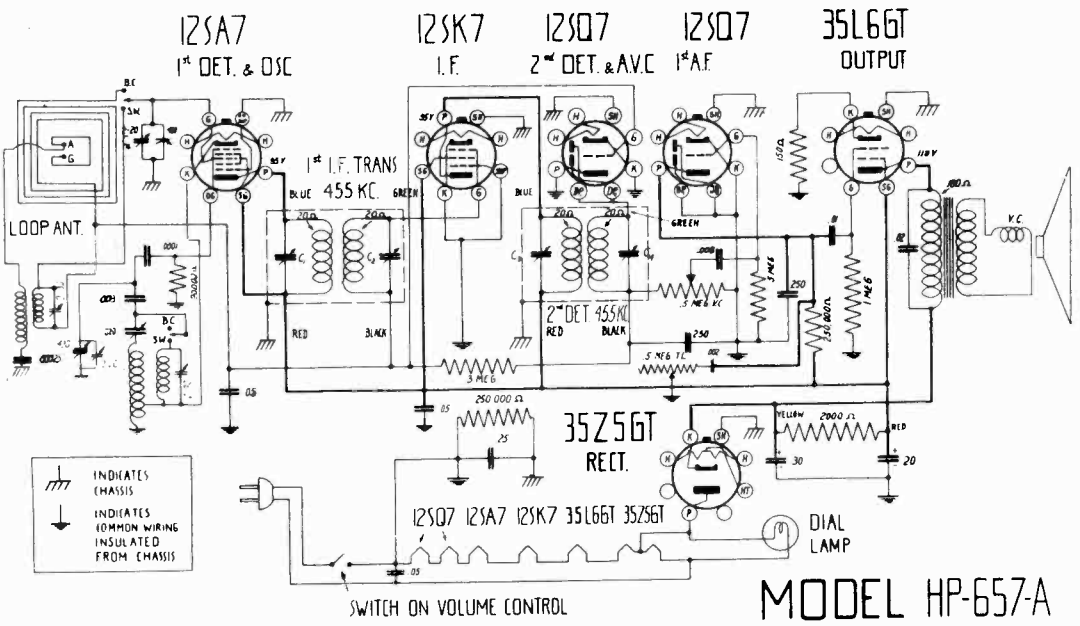


Fig. 1. Tube and Trimmer Location

GENERAL ELECTRIC CO.



Model HP-657-A

SERVICE DATA

Over-all Dimensions

Height	8 inches
Width	12⅞ inches
Depth	7¼ inches

Tuning Control Drive Ratio 5:1

Electrical Specifications

Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
105–125 AC or DC	40–60	30

Tuning Frequency Range

Broadcast Band	540–1650 KC
Police Band	2600–7500 KC

Electrical Power Output

Undistorted	0.8 watts
Maximum	1.6 watts

Loud-speaker—Permanent Magnet

Outside Cone Diameter	5 inches
Voice Coil Impedance (400 cycles)	3 ohms

Tubes

Converter-Oscillator	GE-12SA7
I.F. Amplifier	GE-12SK7
Detector—AVC	GE-12SQ7
1st Audio Amplifier	GE-12SQ7
Audio Output	GE-35L6GT
Rectifier	GE-35Z5GT
Dial Lamp	MAZDA No. 47

GENERAL INFORMATION

Model HP-657-A is a compact, six-tube, AC-DC, superheterodyne radio designed to receive programs on the broadcast and police-amateur-aircraft bands of frequency. Antenna and ground connections are not necessary as the built-in "Beam-a-Scope" provides adequate pick-up; however, terminals are provided on the cabinet back for connecting antenna and ground leads when signal strengths are low. The receiver is equipped with five mechanical "Feathertouch Tuning" keys adjustable by removing the keys and loosening the binding screws with a screwdriver. Additional design features include Underwriters' approval, full automatic volume control, continuously variable tone control, and single-ended tubes.

When operating from a DC source of power it is necessary to insert the power plug with the proper polarity. If the receiver fails to function with the power plug inserted one way, reverse the plug. If any hum is noticed when the receiver is used on AC, reverse the power plug as above.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.	455 KC
Broadcast R.F.	1650, 1500 and 600 KC
Police R.F.	7000 KC

I.F. Alignment

Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the grid of the 12SK7 through a .05 mfd. capacitor and align the 2nd I.F. transformer. Repeat the procedure applying the 455 KC signal to the control grid of the 12SA7 and aligning the 1st I.F. transformer. Do not remove the grid leads from the tubes. Finish alignment by over-all adjustments.

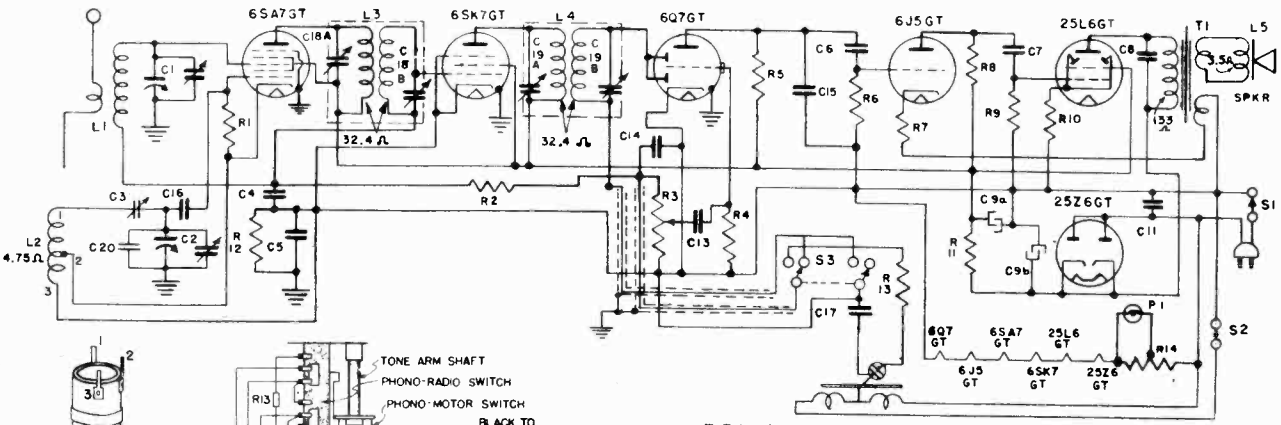
R.F. Alignment

Apply R.F. signals either through a standard I.R.E. dummy to the antenna terminal or through an additional loop connected to the signal generator output which can be magnetically coupled to the receiver Beam-a-Scope.

1. Rotate the gang condenser to maximum open and apply 1650 KC signal to Beam-a-Scope. Peak oscillator trimmer on right-hand section of gang condenser (as viewed from front) for maximum output.
2. Change generator signal to 1500 KC and set dial pointer to 1500 KC mark. Peak antenna trimmer on left-hand section of gang condenser.
3. Set pointer and generator signal to 600 KC. Peak broadcast padder while rocking the gang condenser. Broadcast padder is first from front on right side of chassis.
4. Rotate band switch to clockwise position and set dial pointer to the 7.0 MC mark. With 7.0 MC input signal align rear trimmer on right side of chassis and peak trimmer located on small antenna coil on top of chassis.

MODEL J-678

GENERAL ELECTRIC CO.



Alignment Frequencies

I.F. ..... 455 KC R.F. ..... 1500 and 580 KC
The location of all trimmers is shown in Fig. 1.

I.F. Alignment

Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the grid of the 6SK7GT through a .05-mfd. capacitor and align the 2nd IF transformer. Repeat the procedure, applying the 455-Kc signal to the control grid of the 6SA7GT and aligning the 1st I.F. transformer. Finish by over-all adjustments.

R.F. Alignment

With gang condenser plates completely closed, set dial pointer to the first mark at the left end of the scale. Apply a 1500-Kc signal either through a standard I.R.E. dummy to the antenna terminal or through an additional loop connected to the generator output which can be magnetically coupled to the receiver Beam-a-Scope. Align (C-2) at 1500 KC and peak (C-1) for maximum output. Peak (C-3) on 580 KC while rocking the gang condenser. Retrim at 1500 KC.

Precaution

If the signal generator is AC operated, use an isolating transformer between the power supply and the radio receiver power input. The use of an isolating capacitor is not recommended as AC current through the capacitor will introduce hum modulation and/or create the possibility of a burned out signal generator attenuator.

Special Service Information

The following data will be very useful to servicemen equipped with vacuum tube voltmeters or similar voltage measuring instruments.

(1) Stage Gains*
Antenna post to 6SA7GT grid ..... 4 at 1000 KC
6SA7GT grid to 6SK7GT grid ..... 30 at 455 KC
6SK7GT grid to 6Q7GT det. plate ..... 100 at 455 KC

(2) Audio Gains
.06 volts, 400 cycles signal across volume control with control set to maximum will give approximately ½ watt speaker output.

(3) DC voltage developed across oscillator grid resistor (R-1) averages 12 volts.

* Variations of +10%, −20% permissible.

Electrical Rating

A-6 Rating ..... 115 volts, 60 cycles AC, 75 watts
A-5 Rating ..... 115 volts, 50 cycles AC, 75 watts

Tuning Frequency Range ..... 550–1600 KC.

Intermediate Frequency ..... 455 KC.

Electrical Power Output

Undistorted ..... 2.0 watts
Maximum ..... 2.5 watts

Loud-speaker—PM Dynamic

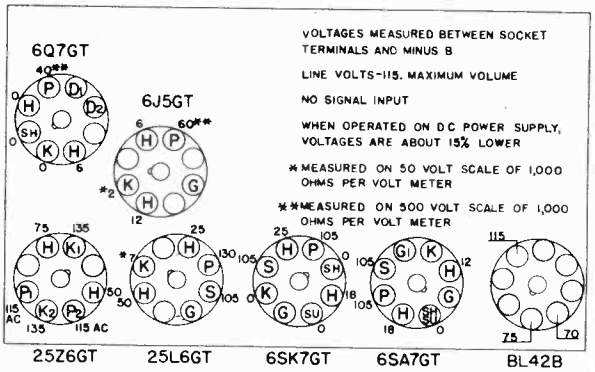
Outside cone diameter ..... 6.5 inches
Voice coil impedance (400 cycles) ..... 3.5 ohms

Phonograph Mechanism

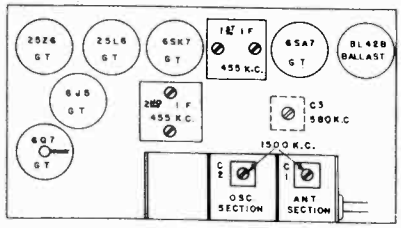
Type mechanism ..... Manual
Type pick-up ..... Crystal
Turntable speed ..... 78 R.P.M.

RC-7017	C-1, -2	CONDENSER—Tuning Condenser
RC-6515	C-3	CAPACITOR—Oscillator padder
RC-072	C-4	CAPACITOR—.05 Mfd., 200 V. paper
RC-130	C-5	CAPACITOR—0.2 Mfd., 400 V. paper
RC-023	C-6, 7	CAPACITOR—.005 Mfd., 600 V. paper
RC-039	C-8	CAPACITOR—.01 Mfd., 600 V. paper
RC-5145	C-9a	CAPACITOR—30 Mfd., 150 V.
RC-5145	C-9b	CAPACITOR—50 Mfd., 150 V.
RC-092	C-11	CAPACITOR—.05 Mfd., 600 V. paper
RC-060	C-13	CAPACITOR—.03 Mfd., 600 V. paper
RC-293	C-14	CAPACITOR—470 Mmf., mica
RC-250	C-15	CAPACITOR—220 Mmf., mica
RC-216	C-16	CAPACITOR—47 Mmf., mica
RC-104	C-17	CAPACITOR—0.1 Mfd., 400 V. paper
RC-226	C-20	CAPACITOR—10 Mmf., mica
RQ-1295	R-1	CAPACITOR—33,000 ohms, ½ W. carbon
RQ-1339	R-2	RESISTOR—2.2 megohm, ½ W. carbon
RV-119	R-3, S-1	VOLUME CONTROL—0.5 megohm potentiometer
RQ-1365	R-4	RESISTOR—15 megohm, ½ W. carbon
RQ-1323	R-5	RESISTOR—470,000 ohms, ½ W. carbon
RQ-1331	R-6	RESISTOR—1.0 megohm, ½ W. carbon
RQ-1271	R-7	RESISTOR—3,300 ohms, ½ W. carbon
RQ-1297	R-8	RESISTOR—39,000 ohms, ½ W. carbon
RQ-1323	R-9	RESISTOR—470,000 ohms, ½ W. carbon
RQ-1239	R-10	RESISTOR—150 ohms, ½ W. carbon
RQ-1459	R-11	RESISTOR—1,000 ohms, 1 W. carbon
RQ-1323	R-12	RESISTOR—470,000 ohms, ½ W. carbon
RQ-1307	R-13	RESISTOR—100,000 ohms, ½ W. carbon
RR-773	R-14	RESISTOR—BL42B Ballast resistor
RL-528	L-1	LOOP—Built-in antenna and back cover assembly
RL-2016	L-2	COIL—Oscillator coil
RT-341	L-3	TRANSFORMER—1st I.F. transformer
RT-342	L-4	TRANSFORMER—2nd I.F. transformer
RT-475	T-1	TRANSFORMER—Output transformer

FRONT OF CHASSIS



BOTTOM VIEW OF CHASSIS



TO SET-UP PUSH BUTTONS

1. Make a list of stations desired on push buttons and arrange in order, from low to highest frequency; insert tabs of the call letters of the stations in the keys in the order listed.
2. Allow the receiver to run five minutes before making the following adjustments. Manually tune in first station, lift key upward and loosen adjusting bolt. Hold the tuning control to the exact tune position and with a screwdriver push in the adjusting bolt as far as it will go, then tighten the adjusting bolt.
3. Adjust for each of the five remaining stations in a similar manner.

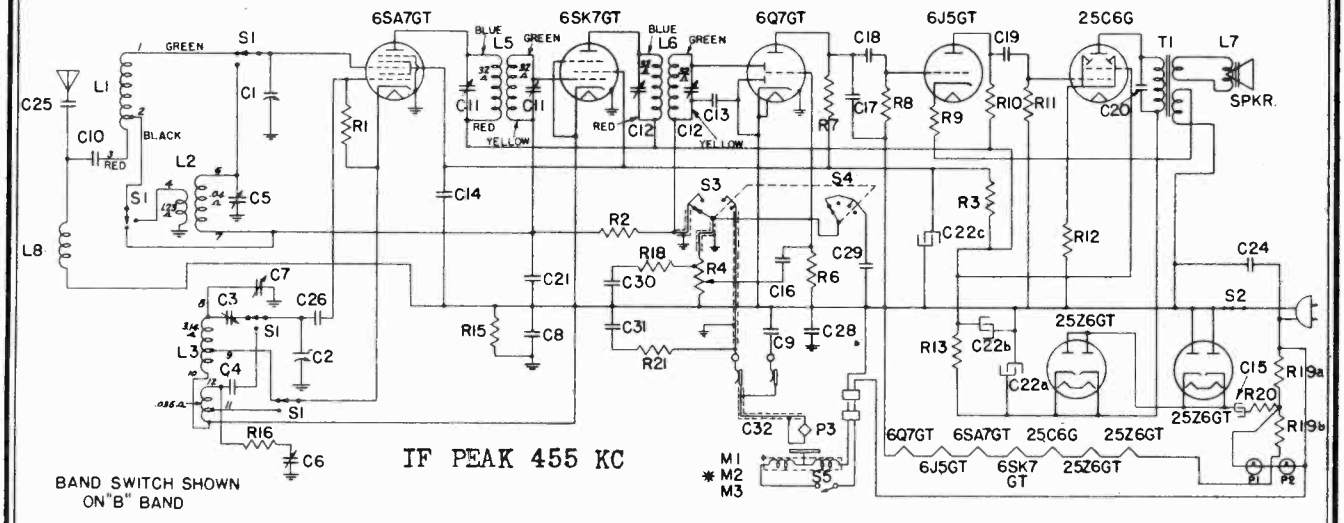


Fig. 3. Schematic Diagram

Symbol	Description
C-1	Antenna section tuning condenser
C-2	Oscillator section tuning condenser
C-3	"B" band padding capacitor
C-4	3900 mmf. mica condenser ±5%
C-5	3–30 mmf. "D" antenna trimmer
C-6	3–20 mmf. "D" oscillator trimmer
C-7	3–20 mmf. "B" oscillator trimmer
C-8	0.1 mfd. paper capacitor
C-9	0.1 mfd. paper capacitor
C-10	.01 mfd. paper capacitor
C-13	220 mmf. mica capacitor
C-14	.05 mfd. paper capacitor
C-15	30 mfd. 250 V. dry electrolytic
C-16	.02 mfd. paper capacitor
C-17	220 mmf. mica capacitor
C-18	.005 mfd. paper capacitor
C-19	.03 mfd. paper capacitor
C-20	.01 mfd. paper capacitor
C-21	0.1 mfd. paper capacitor
C-22a	40 mfd. 250 V. electrolytic
C-22b	20 mfd. 250 V. electrolytic
C-22c	20 mfd. 250 V. electrolytic
C-24	.05 mfd. paper capacitor
C-25	.01 mfd. paper capacitor
C-26	47 mmf. mica capacitor
C-28	0.1 mfd. paper capacitor
C-29	.002 mfd. paper capacitor
C-30	.01 mfd. paper capacitor
C-31	.0072 mfd. paper capacitor
L-1	Beam-a-Scope
L-2	"D" antenna coil
L-3	"B-D" oscillator coil
L-5	1st I.F. transformer
L-6	2nd I.F. transformer
L-8	1½ mh. antenna choke
M-1	60-cycle phono motor
M-2	50-cycle phono motor
M-3	25-cycle phono motor
P-1, -2	Dial lamps, MAZDA No. 44
P-3	Crystal pick-up
R-1	33,000 ohms carbon resistor
R-2	2.2 megohms carbon resistor
R-3	3900 ohms carbon resistor
R-4	0.5 megohm volume control
R-6	15 megohms carbon resistor
R-7	470,000 ohms carbon resistor
R-8	1.0 megohm carbon resistor
R-9	3300 ohms carbon resistor
R-10	39,000 ohms carbon resistor
R-11	470,000 ohms carbon resistor
R-12	220 ohms 1 W. carbon resistor
R-13	3300 ohms 2 W. carbon resistor
R-15	470,000 ohms carbon resistor
R-16	27 ohms carbon resistor
R-18	33,000 ohms carbon resistor
R-19a	33 ohms 3.5 W. wire wound
R-19b	20 ohms 2.5 W. wire wound
R-20	22 ohms 2 W. carbon resistor
R-21	100,000 ohms carbon resistor
S-1	Band switch
S-2	Power switch on volume control
S-3	Radio-phono switch
S-4	Tone control
S-5	Motor power switch
T-1	Output transformer

MODEL J-709

TECHNICAL AND SERVICE INFORMATION

Model J-709 combination uses the same chassis and record-changer mechanism as the Model H-708, data for which will be found in Vol. XI. The schematic Fig. 3 above and parts view of the automatic changer, Fig. 5 below, are corrected to care for the Model J-709.

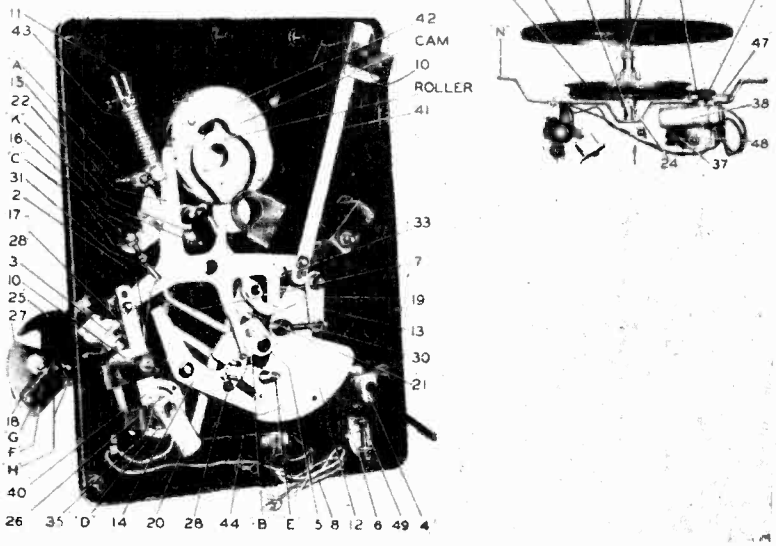


Fig. 5. Parts View of Automatic Record Changer

MODELS J-718
J-728

GENERAL ELECTRIC CO.

MODELS J-718 AND J-728

SPECIFICATIONS

Over-all Dimensions

Height	35 1/8 inches
Width	35 1/8 inches
Depth	16 inches

Electrical Rating

Rating	Power Supply (volts)	Frequency (cycles on AC)	Power Consumption (watts)
A6	110–125	60	95
A5	110–125	50	95
C2	110–125	25	105

Tuning Frequency Range

Broadcast Band	540–1600 KC
Short-wave Band No. 1	2300–6900 KC
Short-wave Band No. 2	6900–22,000 KC

Intermediate Frequency ..... 455 KC

Electrical Power Output

Undistorted	4 Watts
Maximum	5.5 Watts

Loud-speaker—"Alnico" Magnet Dynamic

Outside Speaker Diameter	14 inches
Voice Coil Impedance	3.5 ohms

Tubes

R.F. Amplifier	GE-6SK7
Converter and Oscillator	GE-6SA7
I.F. Amplifier	GE-6SK7
Det., Aud., AVC	GE-6SQ7
Audio Driver	GE-6J5G or GT
Audio Output	GE-6V6G
Rectifier	GE-5Y3G
Dial and Pilot Lamps	(4) MAZDA No. 44

Phonograph Mechanism

Type	Automatic Record Changer
Record Capacity	
10-inch records	8
12-inch records	7
Type Pick-up	Crystal
Turntable speed	78 Rpm

GENERAL INFORMATION

Models J-718 and J-728 are radio-automatic phonograph combinations each incorporating a seven-tube, three-band, A-C radio receiver. The only difference between these two models is in the cabinet.

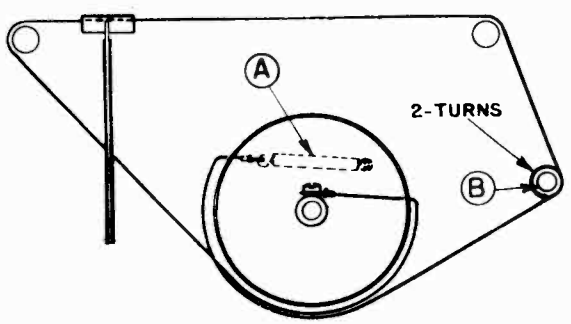


Fig. 4. Dial Cord Stringing Diagram

Setting Up the Receiver

The following remarks will assist the serviceman in correctly setting up these receivers for use:

(1) In order to press the volume or tuning knobs all the way on their respective shafts, the dial reflector plate should be held in place by pressure from the rear.

(2) The black speaker lead should be connected to the speaker terminal which is grounded to the speaker frame.

(3) A method of setting up station keys which will assure driftproof adjustments is to turn each iron core screw adjustment to its extreme counter-clockwise position, and then turn slowly in a clockwise direction until the desired station is tuned in.

Beam-a-Scope Removal

Before either the chassis or Beam-a-Scopes can be removed the leads between them must be disconnected. The cylindrical Beam-a-Scope leads are disconnected by pulling the pin-plug connections out of the Beam-a-Scope terminals. The short-wave Beam-a-Scope leads are disconnected by unscrewing the nuts which clamp the terminals on the phosphor-bronze strap and green leads, and the screw which clamps the terminal of the yellow lead.

Fig. 2 shows the location of the Beam-a-Scope leads when connected.

To remove the cylindrical Beam-a-Scope, the following procedure is recommended: Disconnect the four Beam-a-Scope leads. Pry loose the cardboard strap which is stapled to the bottom of the cabinet and which holds the bottom end of the Beam-a-Scope in place. The cylindrical Beam-a-Scope can now be tilted enough out of vertical to allow continuous rotation of it. Rotate the Beam-a-Scope from right to left until it comes loose. NOTE: The upper pivot bolt by which the Beam-a-Scope is supported should never be loosened or removed.

When replacing the cylindrical Beam-a-Scope it should be screwed up on the bolt approximately five turns or until the blocking bolt prevents more than 180° rotation when the Beam-a-Scope hangs vertically. The cardboard strap which holds the bottom pivot of the Beam-a-Scope in place should be restapled in such a position that the Beam-a-Scope hangs vertically and is free to turn without rubbing on the strap.

Loud-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly.

NOTE: In no case should the magnet be removed from the assembled position.

Special Service Information

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available:

(1) STAGE GAINS *

(a) Antenna Post to R.F. Grid at	
1,000 KC	5.5
4,000 KC	2.5
18,000 KC	2.5
(b) R.F. Grid to Converter Grid at	
1,000 KC	5.5
4,000 KC	3.0
18,000 KC	2.0
(c) R.F. on Converter Grid to I.F. on 1st I.F. Grid at	
1,000 KC	50
4,000 KC	50
18,000 KC	45
(d) I.F. on Converter Grid to I.F. on 1st I.F. Grid at	
455 KC	75
(e) I.F. Amplifier Grid to Detector Plate at	
455 KC	70

(2) Voltage across volume control to give ½-watt speaker output at 400 cycles ..... .03 volts

(3) DC voltage developed across oscillator grid resistor (R-7) at

1,000 KC	8.3
4,000 KC	7.8
18,000 KC	4.6

* Variations of ±20% permissible. All readings obtained with enough signal input to give ½-watt speaker output.

Frequency-degree Reference Chart

"BC" Band *

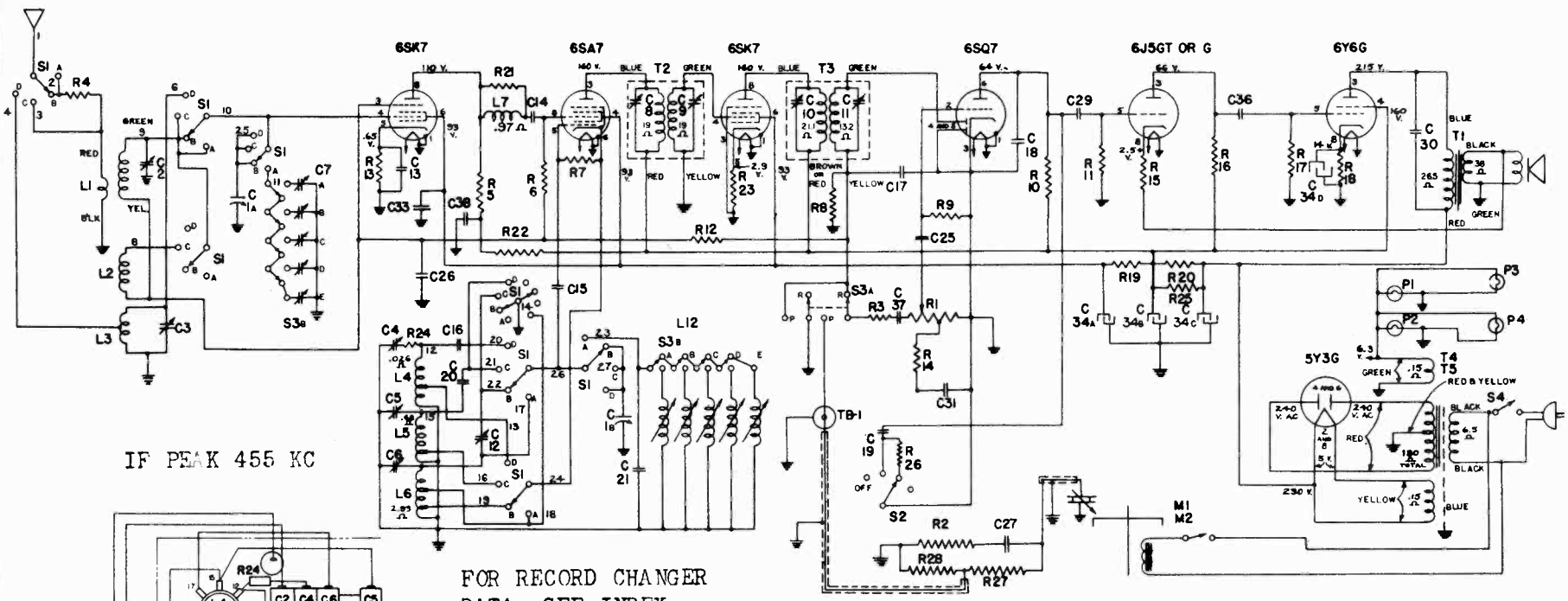
1600 KC	168°	1200 KC	129°	700 KC	60°
1500 KC	158°	1000 KC	106°	600 KC	32°
1400 KC	148°	800 KC	80°	580 KC	24°
				540 KC	0°

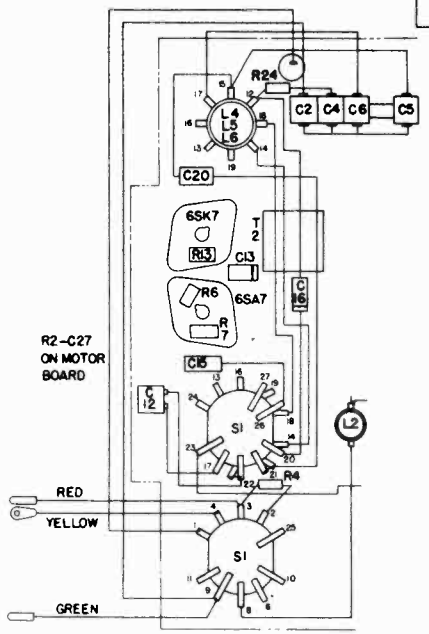
"SW1" Band

6.9 MC	173°	4.0 MC	98°
6.0 MC	150°	3.0 MC	59°
5.0 MC	126°	2.5 MC	24°

"SW2" Band

22 MC	172°	16 MC	134°	8 MC	46°
21 MC	164°	12 MC	101°	7 MC	20°
18 MC	146°	10 MC	79°		





Switch and Coil Section of Chassis Underview

Symbol	Description	Symbol	Description	Symbol	Description
C1A	Antenna Section of Tuning Condenser	C34A	20 mfd. dry electrolytic	R12	2.2 megohms carbon
C1B	Oscillator Section of Tuning Condenser	C34B	50 mfd. dry electrolytic	R13	47 ohms carbon
C2	"BC" Band Antenna Trimmer	C34C	40 mfd. dry electrolytic	R14	150,000 ohms carbon
C3	"SW2" Band Antenna Trimmer	C34D	20 mfd. dry electrolytic	R15	3300 ohms carbon
C4	"SW2" Band Oscillator Trimmer	C36	.05 mfd. paper	R16	100,000 ohms carbon
C5	"SW1" Band Oscillator Trimmer	C37	.005 mfd. paper	R17	330,000 ohms carbon
C6	"BC" Band Oscillator Trimmer	C38	.01 mfd. paper	R18	270 ohms 2 W. carbon
C7	Station Selector Antenna Trimmers	L1	"BC" band Beam-a-Scope	R19	3900 ohms 1 W. carbon
C12	"BC" Band Padder	L2	"SW1" band Antenna Coil	R20	3900 ohms 2 W. carbon
C13	.01 mfd. paper	L3	"SW2" band Beam-a-Scope	R21	10,000 ohms carbon
C14	100 mmf. mica	L4	"SW2" band oscillator coil	R22	1000 ohms carbon
C15	47 mmf. mica	L5	"SW1" band oscillator coil	R23	150 ohms carbon
C16	.008 mfd. polystyrene	L6	"BC" band oscillator coil	R24	27 ohms carbon
C17	220 mmf. mica	L7	R.F. interstage coil	R25	3900 ohms 2 W. carbon
C18	150 mmf. mica	L12	Station selector oscillator coils	R26	47,000 ohms carbon
C19	.005 mfd. paper	M1, 2	Automatic record changer	R27	680,000 ohms carbon
C20	2400 mmf. mica ±5%	P1 to 4	Pilot lamp, MAZDA No. 44	R28	270,000 ohms carbon
C21	750 mmf. silvered mica ±5%	R1	2 megohm volume control	S1	Band switch
C25	.02 mfd. paper	R2	100,000 ohms carbon	S2	Tone control switch
C26	0.1 mfd. paper	R3	47,000 ohms carbon	S3A	Phono switch
C27	.01 mfd. paper	R4	1000 ohms carbon	S3B	Feathertouch tuning switch
C29	.005 mfd. paper	R5	3300 ohms carbon	S4	Power switch
C30	.01 mfd. paper	R6	47,000 ohms carbon	T1	Output transformer
C31	.005 mfd. paper	R7	22,000 ohms carbon	T2	1st I.F. transformer
C33	.01 mfd. paper	R8	470,000 ohms carbon	T3	2nd I.F. transformer
		R9	4.7 megohms carbon	T4, 5	Power transformer
		R10	330,000 ohms carbon		
		R11	470,000 ohms carbon		

GENERAL ELECTRIC CO.

MODELS J-718
J-728

G.E. PAGE 12-77

MODELS J-718
J-728

GENERAL ELECTRIC CO.

ALIGNMENT PROCEDURE

The alignment procedure is given in table form below. The use of a standard I.R.E. dummy antenna in making all R.F. alignments is recommended. R.F. alignment can be performed by loop-coupling the generator signal to the receiver Beam-a-Scopes if care is exercised not to overcouple the two circuits. Keeping a distance of two feet or more between the generator loop and the receiver Beam-a-Scope will generally insure freedom from overcoupling. The relative position of the Beam-a-Scopes with respect to the chassis materially affects R.F. alignment; therefore, all R.F. alignments should be made with the chassis and Beam-a-Scopes mounted in the cabinet. In keeping with this recommendation all R.F. alignment trimmers are available either through holes in the back apron of the chassis or from the top of the chassis deck. See Fig. 1 for trimmer location. Metal objects such as meters, tools, etc., should not be placed on top of the receiver cabinet. Also the receiver should be kept away from large metal objects such as radiators, metal-top tables, etc.

ALIGNMENT CHART

Band Switch Setting	Input Frequency	Point of Input	Dummy Antenna	Trimmer	Comments
I.F. Alignment with Oscilloscope					
1. "BC" Band	455 KC Sweep	I.F. Grid and Chassis Ground	.05 Mfd. or larger	2nd I.F. Trimmers C-10, 11	Gang condenser plates open. Depress any station key other than Phono key. Connect audio input of oscilloscope to chassis ground and top of volume control. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. Finish by retrimming 2nd I.F. trimmers.
2. "BC" Band	455 KC Sweep	Green lead on "BC" Beam-a-Scope terminal board and chassis ground	.05 Mfd. or larger	1st I.F. Trimmers C-8, 9	
I.F. Alignment with Output Meter					
1. "BC" Band	455 KC with Modulation	Green lead on "BC" Beam-a-Scope terminal board and chassis ground	.05 Mfd. or larger	2nd I.F. Trimmers C-10, 11. 1st I.F. trimmers C-8, 9	Gang condenser plates open. Depress any key other than Phono key. Connect output meter across voice coil. Keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
R.F. Alignment with Chassis Mounted in Cabinet					
1. "BC" Band					Close gang plates, adjust pointer to first line at left end of tuning scale. Connect output meter across voice coil. Tone control set to "Normal" position.
2. "BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-2)	Set pointer to 1500 KC and tune in signal with (C-6). Peak output with (C-2).
3. "BC" Band	580 KC with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-12)	Set Pointer to 580 KC and peak signal while rocking gang condenser
4. "BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-2)	Retrim for maximum output.
5. Repeat operation 3 if "BC" band trimmers are badly out of alignment.					
6. "SW1" Band	6 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-5)	Set pointer to 6 MC and peak signal while rocking gang condenser.
7. "SW2" Band	21 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-4) Ant. (C-3)	Set pointer to 21 MC and tune in signal with (C-4). Peak output with (C-3) while rocking gang condenser. When (C-4) is on proper peak, image of 21 MC signal should be heard 910 KC below or on 20.09 MC.
8. "SW2" Band	8 MC with Modulation	Antenna Post	I.R.E.		This operation may or may not be necessary depending on how much the short-wave Beam-a-Scope leads have been moved from their correctly dressed positions. Repositioning will be indicated if an increased output meter reading can be obtained by moving the short-wave Beam-a-Scope phosphor-bronze lead closer or farther away from the green lead. The moving should be done with an insulated rod or stick.
9. Repeat operation 7 if the Beam-a-Scope leads are moved in operation 8.					

R.F. ALIGNMENT
With Chassis Outside of Cabinet

R.F. alignment can be performed only on the "BC" and "SW1" bands with the chassis outside of the cabinet. Any alignment attempted on "SW2" band will not be satisfactory. The same relative position between the chassis and broadcast loop should be maintained when aligning outside the cabinet as these components occupy in the cabinet. Since the glass dial scale is fastened to the cabinet it cannot be used for reference during alignment of the chassis outside of the cabinet. Use must be made, therefore, of 0–180° calibrated scale which is cemented to the back of the dial-reflector plate. From the "frequency-degree reference chart" the degree readings for corresponding frequency settings may be obtained. To use these degree readings, first completely close the gang condenser plates and then slide the pointer along the cord until the left-hand edge of the pointer-guide slide lines up with the 0° mark. By using this left-hand edge (as viewed from the rear) of the slide as the degree-scale pointer the receiver may be tuned to any frequency. Example: By rotating the tuning control until the left-hand edge of the slide is in line with 158°, the receiver will be tuned to 1500 KC on the "BC" band.

The "BC" and "SW1" band alignment procedure is the same as outlined in steps 2 to 6 inclusive of the chart—"R.F. Alignment with Chassis Mounted in Cabinet."

After the alignment has been performed on the "BC" and "SW1" bands, the chassis should be mounted in the cabinet and "SW2" band alignment checked as described in steps 7 to 9 of the chart—"R.F. Alignment with Chassis Mounted in Cabinet."

NOTE: After moving the pointer along the cord to use the left-hand edge as a reference pointer for the degree scale, it will be necessary after reassembly in the cabinet for the gang condenser plates to be closed and the pointer to be moved back along the cord so that it lines up with the first dial markings on the left.

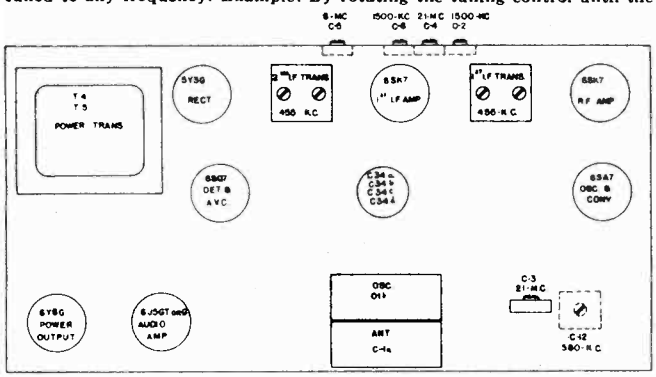


Fig. 1. Trimmer Location

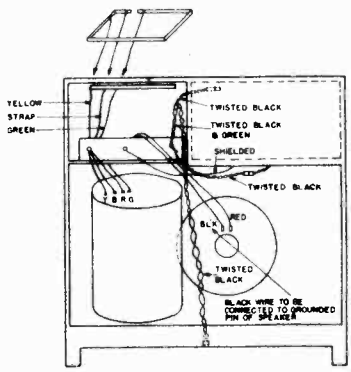


Fig. 2. Interconnection Diagram

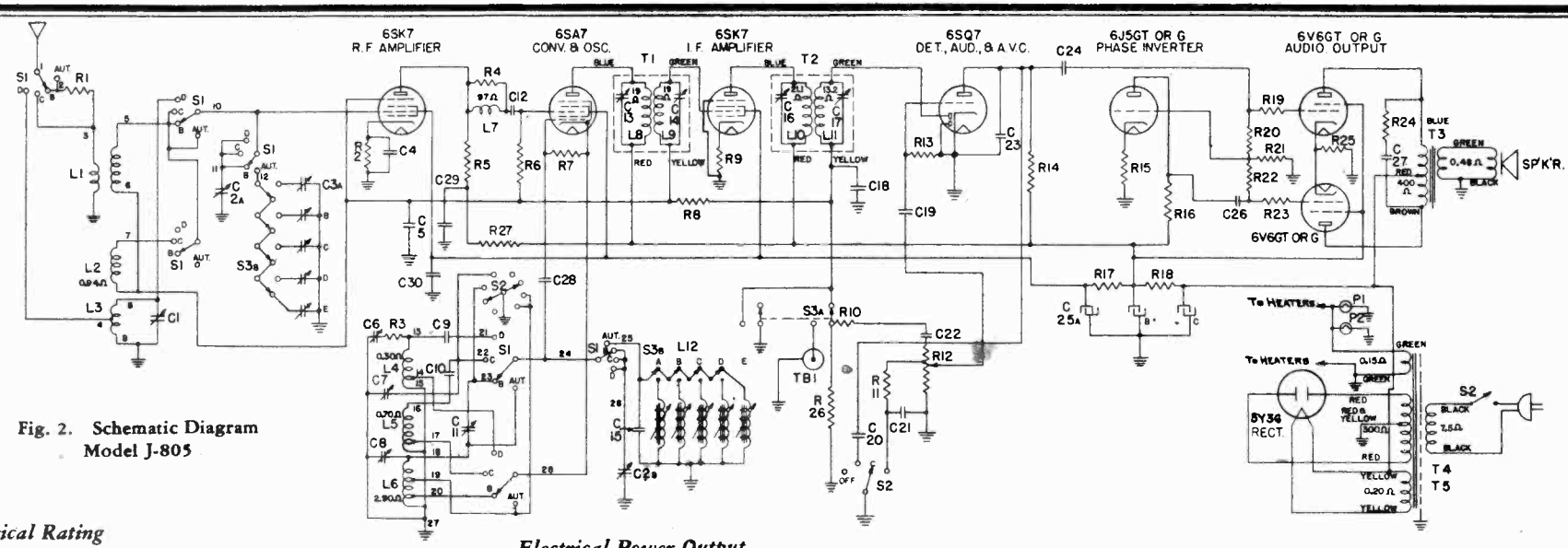


Fig. 2. Schematic Diagram
Model J-805

Electrical Rating

Rating	Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
A	110–125	50–60	85
C	110–125	25–60	85

Electrical Power Output

Undistorted.....6.0 watts
Maximum.....9.0 watts

Tone Control.....3-position

Loud-speaker—"Alnico" Magnet Dynamic

Outside Cone Diameter.....12 inches
Voice Coil Impedance.....3.5 ohms

Tuning Frequency Range

Broadcast Band.....540–1700 KC
Short-wave Band No. 1.....2400–7000 KC
Short-wave Band No. 2.....7000–22000 KC

Intermediate Frequency.....455 KC

PARTS DESCRIPTION LIST

Symbol	Description	Symbol	Description	Symbol	Description
C1	"D" band antenna trimmer	C28	47 mmf. mica capacitor	R13	4.7 megohms carbon resistor
C2A	Antenna section of tuning condenser	C29	.01 mfd. paper capacitor	R14	470,000 ohms carbon resistor
C2B	Oscillator section of tuning condenser	C30	.01 mfd. paper capacitor	R15	3300 ohms carbon resistor
C3	Antenna station selector trimmer strip	L1	"B" and "C" band Beam-a-Scope	R16	68,000 ohms carbon resistor
C4	.01 mfd. paper capacitor	L2	"C" band antenna coil	R17	8200 ohms 2 W. carbon resistor
C5	0.1 mfd. paper capacitor	L3	"D" band Beam-a-Scope	R18	1800 ohms 3 W. carbon resistor
C6	"D" band oscillator trimmer	L4	"D" band oscillator coil	R19	1000 ohms carbon resistor
C7	"C" band oscillator trimmer	L5	"C" band oscillator coil	R20	150,000 ohms carbon resistor
C8	"B" band oscillator trimmer	L6	"B" band oscillator coil	R21	56,000 ohms carbon resistor
C9	.008 mfd. paper capacitor	L7	R.F. interstage coil	R22	270,000 ohms carbon resistor
C10	2400 mmf. ±5% mica capacitor	L12	Oscillator station selector coil strip	R23	1000 ohms carbon resistor
C11	"B" band padding trimmer	P1	Dial lamp, MAZDA No. 44	R24	5600 ohms carbon resistor
C12	100 mmf. mica capacitor	P2	Dial lamp, MAZDA No. 44	R25	180 ohms 1 W. carbon resistor
C15	750 mmf. ±5% silvered mica	R1	1000 ohms carbon resistor	R26	470,000 ohms carbon resistor
C18	220 mmf. mica capacitor	R2	47 ohms carbon resistor	R27	1000 ohms carbon resistor
C19	.02 mfd. paper capacitor	R3	27 ohms carbon resistor	S1	Band switch
C20	.003 mfd. paper capacitor	R4	10,000 ohms carbon resistor	S2	Tone control switch
C21	.005 mfd. paper capacitor	R5	3300 ohms carbon resistor	S3A	Phono-FM-Tel switch
C22	.005 mfd. paper capacitor	R6	47,000 ohms carbon resistor	S3B	Station selector switch
C23	220 mmf. mica capacitor	R7	22,000 ohms carbon resistor	T1	1st I.F. transformer
C24	.03 mfd. paper capacitor	R8	2.2 megohms carbon resistor	T2	2nd I.F. transformer
C25A	10 mfd. 300 V. dry electrolytic	R9	150 ohms carbon resistor	T3	Output transformer
C25B	15 mfd. 300 V. dry electrolytic	R10	47,000 ohms carbon resistor	T4	50–60 cycle-power transformer
C25C	30 mfd. 350 V. dry electrolytic	R11	82,000 ohms carbon resistor	T5	25 cycle power transformer
C26	.03 mfd. paper capacitor	R12	2 megohms volume control (0.5-meg-ohm tap)		
C27	.002 mfd. paper capacitor				

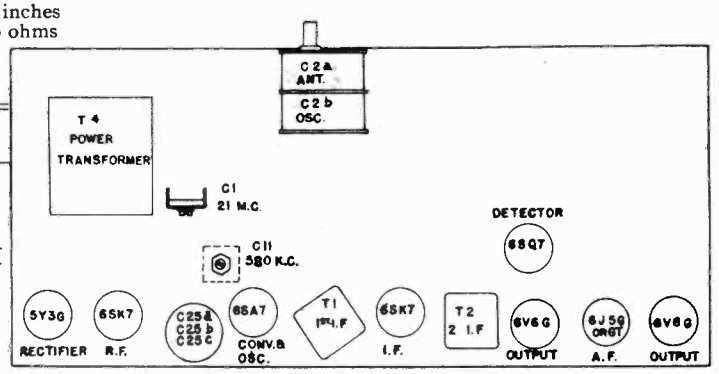


Fig. 1. Trimmer Location

NOTE: The oscillator coil and band switch terminals are numbered in the Chassis Parts Layout, Fig. 3, to assist in locating the corresponding numbered points on the Schematic Diagram, Fig. 2. This numbering will also assist in rewiring if the coil or switch are replaced. I.F. transformer connections are shown as an aid in replacement.

Tubes

R. F. Amplifier	GE-6SK7
Converter and Oscillator	GE-6SA7
I. F. Amplifier	GE-6SK7
Det., Aud., AVC	GE-6SQ7
Phase Inverter	GE-6J5G or GT
Audio Output	(2) GE-6V6G or GT
Rectifier	GE-5Y3G
Dial Lamp	(2) MAZDA No. 44

Special Service Information

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains*

(a) Antenna Post to R. F. Grid at

1000 KC	6.5
4000 KC	3.0
18000 KC	2.3

(b) R.F. Grid to Converter Grid at

1000 KC	5.0
4000 KC	3.0
18000 KC	2.0

(c) R.F. on Converter Grid to I.F. on 1st I.F. Grid at

1000 KC	47
4000 KC	47
18000 KC	39

(d) I.F. on Converter Grid to I.F. on 1st I.F. Grid at

455 KC	55

(e) I.F. Amplifier Grid to Detector Plate at

455 KC	77

(2) Voltage across Volume Control to Give ½-watt Speaker Output at

400 cycles	.05 volts

(3) DC Voltage Developed Across Oscillator Grid Resistor (R-7) at

1000 KC	6.0
4000 KC	5.5
18000 KC	3.9

*Variations of ± 20% are permissible. All readings obtained with enough input signal to give ½-watt speaker output.

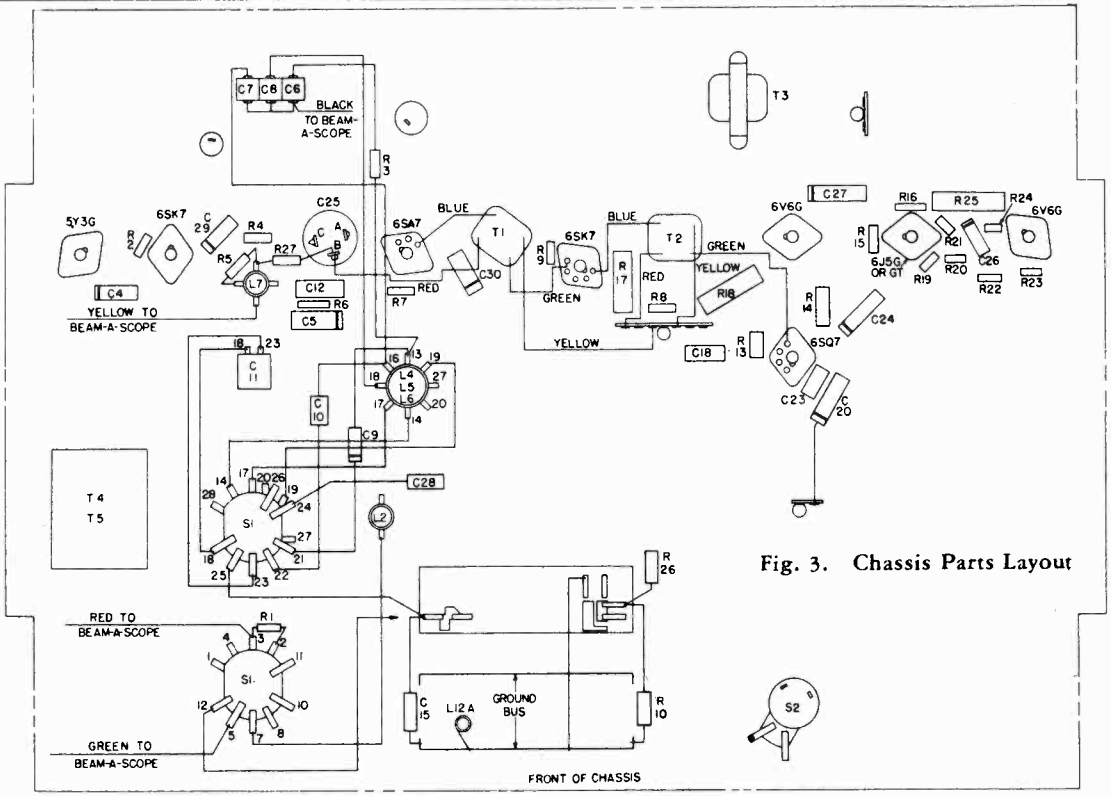


Fig. 3. Chassis Parts Layout

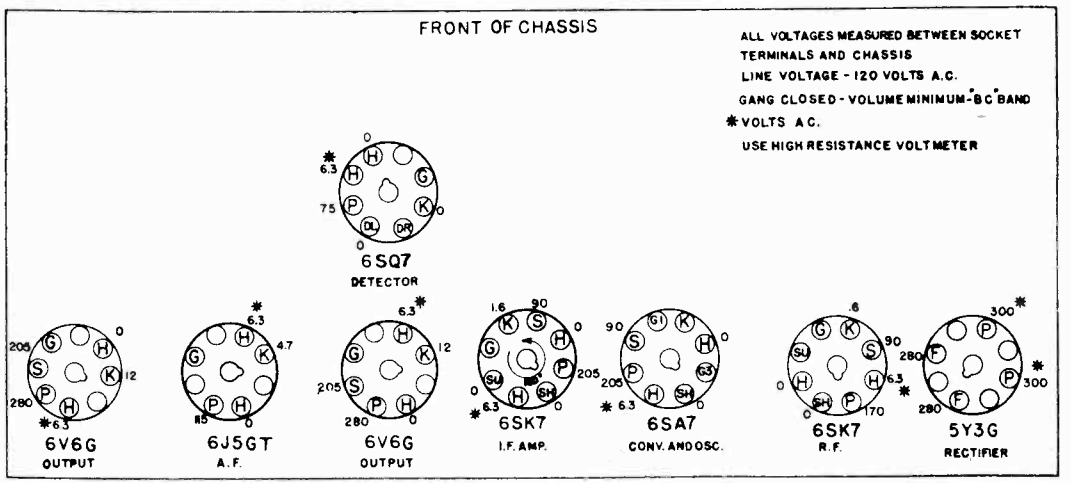


Fig. 4. Socket Voltages

GOLDEN TONE
MODEL J-805

GENERAL INFORMATION

Model J-805 is an eight-tube superheterodyne receiver designed to operate on an alternating-current power supply. The receiver incorporates the latest developments in radio of which the General Electric Dual Beam-a-Scopes are notable. Broadcast and short-wave No. 1 signals are selected by the cylindrical Beam-a-Scope which is in the speaker compartment. Short-wave No. 2 signals are selected by the Beam-a-Scope which is mounted on the cabinet above the chassis. Additional features include single-ended tubes, iron-core oscillator station selector coils, five feather-touch tuning station keys, one Phono-Frequency Modulation, Television key, tone monitor circuit, automatic volume control and push-pull power output.

Phono-FM-Tel

This receiver is equipped with a pin jack on the rear apron of the chassis and a Phono-FM-Tel key for adapting it to use with record players, frequency modulation converters and television picture receiver and sound converters. General Electric plug, Stock No. RP-145, fits the pin jack.

Setting Up the Receiver

The following remarks will assist the serviceman in correctly setting up this receiver for use:

(1) In order to press the volume or tuning knobs all the way on their respective shafts, the dial reflector plate should be held in place by pressure from the rear.
(2) After releasing the shipping screws the position of the chassis should be checked to insure accurate tuning. Close the gang condenser plates and push the chassis one way or the other until the pointer lines up with the first markings on the left side of the dial.
(3) The black speaker lead should be connected to the speaker terminal which is grounded to the speaker frame.
(4) A method of setting up station keys which will assure driftproof adjustments is to screw the iron core all the way out and then turn slowly inward until the desired station is tuned in.

Chassis or Beam-a-Scope Removal

Before either the chassis or Beam-a-Scope can be removed the leads between them must be disconnected. The cylindrical Beam-a-Scope leads are disconnected by pulling the pin plugs out of the Beam-a-Scope terminals. The short-wave Beam-a-Scope leads are disconnected by unscrewing the nuts which clamp the terminals on the two phosphor bronze straps and the screw which clamps the terminal of the yellow lead.

Figs. 8 and 9 show the correct location of the Beam-a-Scope leads when reconnecting. The cylindrical Beam-a-Scope leads must be threaded down through the slot in the cabinet shelf which is immediately below the antenna-ground terminal board. The leads can then be brought out to the position of the cutout in the back of the cabinet shelf where they can be inserted in the Beam-a-Scope terminals.

To remove the cylindrical Beam-a-Scope the following procedure is recommended: Disconnect the four Beam-a-Scope leads. Unscrew the long self-tapping screw which prevents the Beam-a-Scope from rotating continuously in one direction. This screw is located in the cabinet shelf. Pry loose the cardboard strap which is stapled to the bottom of the cabinet and which holds the bottom of the Beam-a-Scope in place. The Beam-a-Scope can now be rotated from right to left until it comes loose. Note: The upper pivot bolt by which the Beam-a-Scope is supported should never be loosened or removed.

When replacing the cylindrical Beam-a-Scope it should be screwed up on the bolt approximately five turns from the position where the bolt first takes hold. The self-tapping screw in the cabinet shelf should then be screwed down until it acts as a stop for the projection next to the terminals. The screw should not be run down so far that it contacts the projection on the opposite side from the terminals as this will limit rotation to only 180 degrees. The cardboard strap should be placed over the bottom Beam-a-Scope pivot and stapled to the cabinet in such a position that the Beam-a-Scope hangs vertically and is free to turn without rubbing on the strap.

Loud-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly.

Note—In no case should the magnet be removed from the assembled position.

Alignment Procedure

The alignment procedure is given in table form below. The use of a standard 1 9 0 ohm dummy antenna in making all R.F. alignments is recommended. R.F. alignment can be performed by loop-coupling the generator signal to the receiver Beam-a-Scopes if care is exercised not to over-couple the two circuits. Keeping a distance of two feet or more between the generator loop and the receiver Beam-a-Scope will generally insure freedom from overcoupling. The relative position of the Beam-a-Scopes with respect to the chassis materially affects R.F. alignment; therefore, all R.F. alignments should be made with the chassis and Beam-a-Scopes mounted in the cabinet. In keeping with this recommendation all R.F. alignment trimmers are accessible through holes in the back apron of the chassis or from the top of the chassis (refer to the Trimmer Location diagram, Fig. 1). Metal objects such as meters, tools, etc., should not be placed on top of the receiver cabinet. Also the receiver should be kept away from large metal objects such as radiators, metal-top tables, etc.

R.F. Alignment
With Chassis Outside of Cabinet

R.F. alignment can be performed only on the "BC" and "SW-1" bands with the chassis outside the cabinet. Any alignment attempted on "SW-2" band will not be satisfactory. The same relative position between the chassis and cylindrical Beam-a-Scope should be maintained when aligning outside the cabinet as these components occupy in the cabinet. Since the glass dial scale is fastened to the cabinet it cannot be used for reference during alignment of the chassis outside of the cabinet. Use must be made, therefore, of a 0–180 deg calibrated scale which is cemented to the back of the dial reflector plate. To use these readings, first completely close the gang condenser plates and then slide the pointer along the cord until the inside edge of the right-hand pointer guide clip is in line with the 0 deg mark. (See Fig. 6.) By using this edge of the clip as the degree-scale pointer the receiver may be tuned to any frequency.

Example: By setting the edge of the clip to 154 deg the receiver will be tuned to 1580 KC on the "BC" band.

The "BC" and "SW-1" band alignment procedure is the same as outlined in steps 2 to 5 inclusive of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

After the alignment has been performed on the "BC" and "SW-1" bands the chassis should be mounted in the cabinet and "SW-2" band alignment checked as described in steps 6 to 8 of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

Note: After moving the pointer along the cord to use one of the guide clips as a reference pointer for the degree scale, it will be necessary after reassembly in the cabinet for the gang condenser plates to be closed and the pointer to be moved back along the cord so that it lines up with the first dial markings on the left.

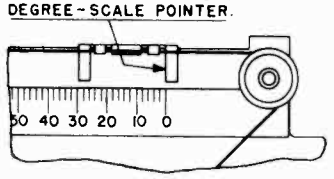


Fig. 6. Pointer-guide Clip Setting with Gang Condenser Closed

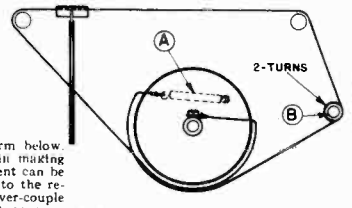


Fig. 7. Dial Cord Stringing Diagram

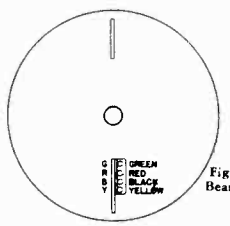


Fig. 8. Cylindrical Beam-a-Scope Connections

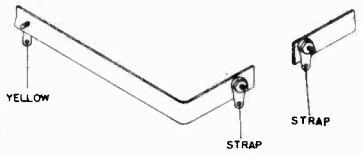


Fig. 9. Short-wave Beam-a-Scope Connections

ALIGNMENT CHART

I.F. Alignment with Oscilloscope

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. "BC" Band	455 KC Sweep	I.F. Grid	.05 mfd. or larger	2nd I.F. Trimmers, C-16, 17	Gang condenser plates open. Depress any station key other than Phono-FM-Tel key. Connect audio input of oscilloscope to chassis ground and junction of R-10 and R-26. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. Finish by retrimming 2nd I.F. trimmers.
2. "BC" Band	455 KC Sweep	Converter Grid	.05 mfd. or larger	1st I.F. Trimmers, C-13, 14	

I.F. Alignment with Output Meter

1. "BC" Band	455 KC with Modulation	Converter Grid	.05 mfd. or larger	2nd I.F. Trimmers C-16, 17	Gang condenser plates open. Depress any key other than Phono-FM-Tel key. Connect output meter across voice coil. Keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
				1st I.F. Trimmers, C-13, 14	

R.F. Alignment
With Chassis Mounted in Cabinet

1. "BC"					Close gang plates, adjust pointer to first line at left end of tuning scale. Connect output meter across voice coil. Tone control set to "Normal" position.
2. "BC" Band	580 KC with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-11)	Set dial pointer to 580 KC and tune in signal with (C-11) while rocking gang condenser.
3. "BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-8)	Set dial pointer to 1500 KC. Peak trimmer for maximum output while rocking the gang condenser.
4. "BC" Band	580 KC. with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-11)	Realign for maximum output with a low input signal, rocking the gang condenser.
5. "SW-1" Band	6 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-7)	Set pointer to 6 MC and peak signal while rocking gang condenser.
6. "SW-2" Band	21 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-1)	Set pointer to 21 MC and tune in signal with (C-6). Peak output with (C-1) while rocking gang condenser. When (C-6) is on proper peak, image of 21 MC signal should be heard 910 KC below or on 20.09 MC.
7. "SW-2" Band	8 MC with Modulation	Antenna Post	I.R.E.		This operation may or may not be necessary depending on how much the short-wave Beam-a-Scope leads have been moved from their correctly dressed positions. Repositioning will be indicated if an increased output meter reading can be obtained by moving the short-wave Beam-a-Scope phosphor-bronze strap leads closer or farther away from one another. The moving should be done with an insulated rod or stick.

8. Repeat Operation 6 if the short-wave Beam-a-Scope leads are moved appreciably in Operation 7.

MODELS J-808, J-818, J-828, J-809

GENERAL ELECTRIC CO.

SPECIFICATIONS

Over-all Dimensions

	J-808, -818, -828	J-809
Height	35 inches	37 7/8 inches
Width	36 1/2 inches	38 1/4 inches
Depth	17 1/2 inches	17 1/4 inches

Tuning Control Drive Ratio 25:1

Electrical Rating (All Models)

Rating	Power Supply (Volts)	Frequency (Cycles per Second)	Power Consumption (Watts)
A6	110–125	60	100
A5	110–125	50	100
C2	110–125	25	100

Tuning Frequency Range

Broadcast Band	540–1600 KC
Short-wave Band No. 1	2300–7000 KC
Short-wave Band No. 2	7000–22,000 KC

Intermediate Frequency ..... 455 KC

Electrical Power Output

Undistorted	10 watts
Maximum	12 watts

Tone Control

Models—J-808, -818, -828 (Individual Phonograph and Radio Controls) —3 positions each.
J-809 (Phonograph and Radio Controls Combined)—3 positions.

Loud-speakers—"Alnico" Magnet Dynamic

Outside Cone Diameters	6 1/2 and 14 inches
Voice Coil Impedances	3.5 ohms each

Phonograph Mechanism

Type	Automatic Record Changer
Record Capacity	
10-inch	8
12-inch	7
Type Pickup	Crystal
Turntable Speed	78 Rpm

Tubes

R.F. Amplifier	GE-6SK7
Converter and Oscillator	GE-6SA7
I.F. Amplifier	GE-6SK7
Det., Aud., AVC	GE-6SQ7
Phase Inverter	GE-6J5G or GT
Audio Output	(2) GE-6V6G or GT
Rectifier	GE-5Y3G
Dial Lamps	(3) MAZDA No. 44

GENERAL INFORMATION

These models each contain an eight tube, superheterodyne receiver which is designed to operate from an alternating current power supply. Dual Beam-a-Scopes insure satisfactory performance at all frequencies within the tuning ranges of the receiver. Broadcast and short-wave No. 1 signals are selected by the cylindrical Beam-a-Scope. Short-wave No. 2 signals are selected by the Beam-a-Scope which is mounted on the cabinet. Additional features include single-ended tubes, iron core oscillator station selector coils, five feathertouch tuning station keys, and automatic volume control.

Models J-808, J-818 and J-828 are provided with dual controls for volume and tone. One set of volume and tone controls permit adjustment of the radio output only while the remaining set of controls permit adjustment of the phonograph output. The phonograph volume and tone controls are mounted on a plate separate from the chassis. Fig. 2 shows the interconnections between chassis and phonograph controls, chassis and phono motor, chassis and speakers, and chassis and Beam-a-Scopes.

Phono-FM-Tel

All models are designed to allow the ready connection of separate record players, frequency modulation converters, and television picture receivers with sound converters. Models J-808, J-818 and J-828 are equipped with a pin jack immediately in back of the plug connection on the bottom apron of the chassis. Model J-809 is equipped with a pin jack on the back apron of the chassis into which a plug connection is made from the tone arm of the automatic record changer. If a separate record player, frequency modulation converter, or television picture receiver with sound converter is to be used with the Model J-809, the record changer plug connection can be removed and the auxiliary plug connection made. General Electric plug, Stock No. RP-145, fits the pin jack. The left-hand feathertouch tuning key, marked "Tel-FM" on Models J-808, J-818 and J-828, and "Phono" on Model J-809, when depressed switches the receiver from radio to operation with the auxiliary equipment.

Setting Up the Receiver

The following remarks will assist the serviceman in correctly setting up this receiver for use:

(1) In order to press the volume or tuning knobs all the way on their respective shafts, the dial reflector plate should be held in place by pressure from the rear.

(2) The black speaker lead should be connected to the 14-inch speaker terminal which is grounded to the speaker frame and to the 6 1/2 inch speaker terminal which is not grounded. This will assure proper phasing of the speakers.

(3) A method of setting up station keys which will assure drift-proof adjustments is to screw the iron core all the way out and then turn slowly inward until the desired station is tuned in.

Chassis or Beam-a-Scope Removal

MODELS J-808, 818 AND J-828

The chassis in anchored to the chassis board which in turn is held in place by three woodscrews located along the bottom edge. Removal of these three woodscrews will allow the chassis to be dropped down and taken out. Three felt pads are stapled to the upper edge of the chassis board to firmly cushion the board in the cabinet slot.

To remove the cylindrical Beam-a-Scope proceed as follows: Disconnect the four Beam-a-Scope leads and the Beam-a-Scope drive cord. Remove the two woodscrews in the bracket which holds the Beam-a-Scope drive shaft in place. This will allow the shaft to be swung clear of the wooden stopping block on the cylindrical Beam-a-Scope. Tilt or raise the cabinet off the floor enough to get a screwdriver under the bottom Beam-a-Scope support. Remove the two woodscrews which hold the support in place. The Beam-a-Scope can now be rotated from right to left until it is free.

MODEL J-809

The chassis is held in place on the cabinet shelf by four mounting bolts accessible from the under side. Removal of these bolts will free the chassis from the shelf.

To remove the cylindrical Beam-a-Scope proceed as follows: Disconnect the four Beam-a-Scope leads. Remove the Beam-a-Scope drive cord. With a screwdriver remove the two woodscrews which hold the bottom Beam-a-Scope support to the cabinet. These screws are accessible from the top side of the support next to the lower rear cross-member of the cabinet. The Beam-a-Scope can now be rotated from right to left until it comes loose from the upper pivot.

The Beam-a-Scope drive mechanism is held in place by two bolt-and-nut anchorages. The nuts are accessible from the bottom side of the plate. If in attempting to remove these nuts, the bolt is found to turn then it will be necessary to remove the chassis to get at the bolt heads. This mechanism will have to be removed to replace either the control drum or the drive cord. When replacing the drive cord, it will be best to take out the Beam-a-Scope and drive unit as one assembly allowing the cord to be completely restrung before remounting the assembly.

Loud-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly.

NOTE.—In no case should the magnet be removed from the assembled position.

Special Service Information

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains*

(a) Antenna Post to R.F. Grid at	
1000 KC	5.5
4000 KC	2.5
18000 KC	2.5
(b) R.F. Grid to Converter Grid at	
1000 KC	5.5
4000 KC	3.0
18000 KC	2.0
(c) R.F. on Converter Grid to I.F. on 1st I.F. Grid at	
1000 KC	50
4000 KC	50
18000 KC	45
(d) I.F. on Converter Grid to I.F. on 1st I.F. Grid at	
455 KC	60
(e) I.F. Amplifier Grid to Detector Plate at	
455 KC	55

(2) Voltage across volume control to give 1/2-watt speaker output at 400 cycles .068 volts

(3) DC voltage developed across oscillator grid resistor (R-7) at

1000 KC	8.3
4000 KC	7.8
18000 KC	4.6

* Variations of ±20% permissible. All readings obtained with enough signal input to give 1/2-watt speaker output.

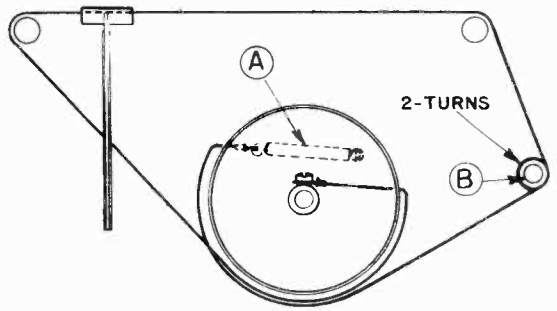


Fig. 8. Dial Cord Stringing Diagram

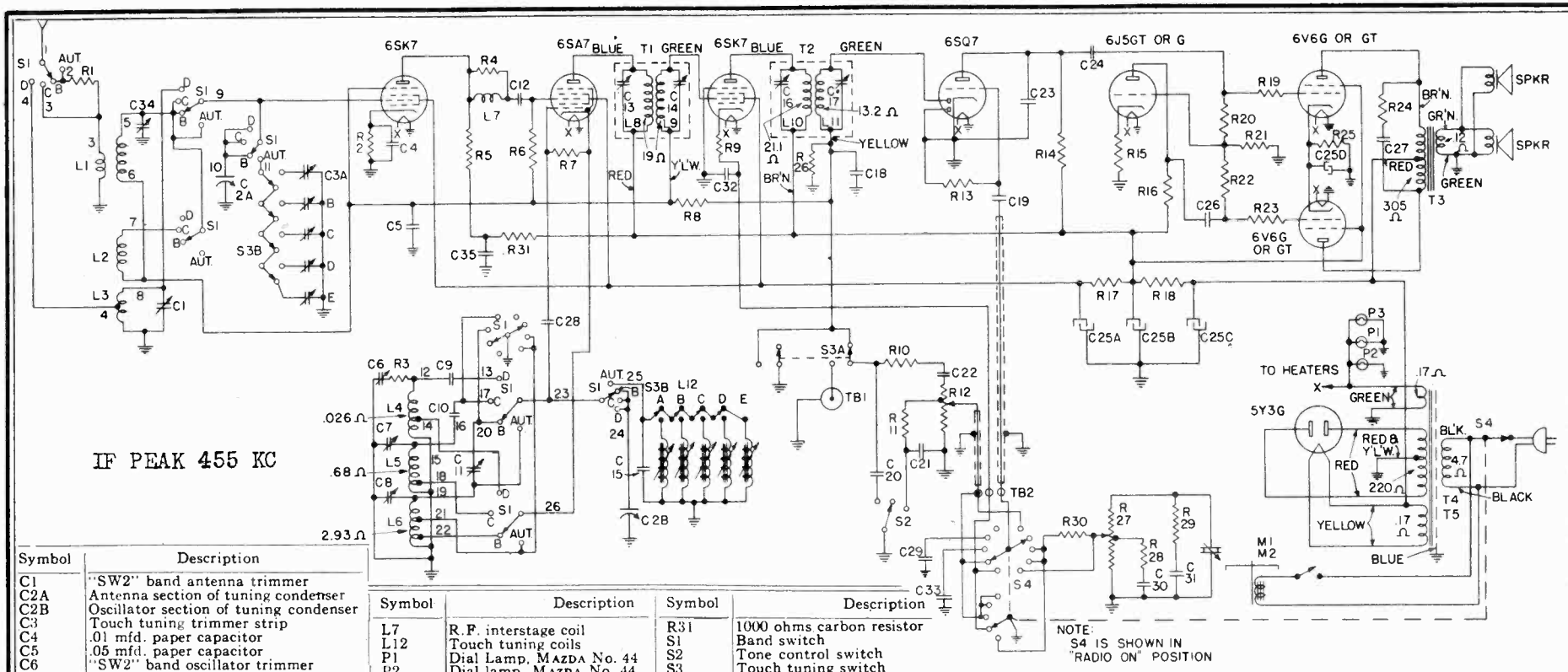


Fig. 3. Schematic Diagram—Models J-808, J-818, and J-828

Symbol	Description
C1	"SW2" band antenna trimmer
C2A	Antenna section of tuning condenser
C2B	Oscillator section of tuning condenser
C3	Touch tuning trimmer strip
C4	.01 mfd. paper capacitor
C5	.05 mfd. paper capacitor
C6	"SW2" band oscillator trimmer
C7	"SW1" band oscillator trimmer
C8	"BC" band oscillator trimmer
C9	.008 mfd. polystyrene capacitor
C10	2400 mmf. ±5% mica capacitor
C11	"BC" band padder
C12	100 mmf. mica capacitor
C15	750 mmf. silvered mica capacitor
C18	330 mmf. mica capacitor
C19	.02 mfd. paper capacitor
C20	.003 mfd. paper capacitor
C21	.003 mfd. paper capacitor
C22	.005 mfd. paper capacitor
C23	220 mmf. mica capacitor
C24	.03 mfd. paper capacitor
C25A	10 mfd. 350 V. dry electrolytic
C25B	20 mfd. 400 V. dry electrolytic
C25C	30 mfd. 400 V. dry electrolytic
C25D	20 mfd. 25 V. dry electrolytic
C26	.03 mfd. paper capacitor
C27	.002 mfd. paper capacitor
C28	47 mmf. mica capacitor
C29	.004 mfd. paper capacitor
C30	.003 mfd. paper capacitor
C31	.008 mfd. paper capacitor
C32	.05 mfd. paper capacitor
C33	220 mmf. mica capacitor
C34	"BC" band antenna trimmer
C35	.01 mfd. paper capacitor
L1	"BC" band Beam-a-Scope
L2	"SW1" band antenna coil
L3	"SW2" band Beam-a-Scope
L4	"SW2" band oscillator coil
L5	"SW1" band oscillator coil
L6	"BC" band oscillator coil

Symbol	Description
L7	R.F. interstage coil
L12	Touch tuning coils
P1	Dial Lamp, MAZDA No. 44
P2	Dial lamp, MAZDA No. 44
P3	Dial lamp, MAZDA No. 44
R1	1000 ohms carbon resistor
R2	47 ohms carbon resistor
R3	27 ohms carbon resistor
R4	10,000 ohms carbon resistor
R5	3300 ohms carbon resistor
R6	47,000 ohms carbon resistor
R7	22,000 ohms carbon resistor
R8	2.2 megohms carbon resistor
R9	150 ohms carbon resistor
R10	47,000 ohms carbon resistor
R11	82,000 ohms carbon resistor
R12	2 megohms volume control (.5 megohm tap)
R13	4.7 megohms carbon resistor
R14	470,000 ohms carbon resistor
R15	2200 ohms carbon resistor
R16	68,000 ohms carbon resistor
R17	11,200 ohms wire wound resistor
R18	1940 ohms wire wound resistor
R19	1000 ohms carbon resistor
R20	150,000 ohms carbon resistor
R21	56,000 ohms carbon resistor
R22	330,000 ohms carbon resistor
R23	1000 ohms carbon resistor
R24	5600 ohms carbon resistor
R25	180 ohms 1 W. carbon resistor
R26	470,000 ohms carbon resistor
R27	2 megohm volume control (.5 megohm tap)
R28	82,000 ohms carbon resistor
R29	100,000 ohms carbon resistor
R30	220,000 ohms carbon resistor
R31	1000 ohms carbon resistor
S1	Band switch
S2	Tone control switch
S3	Touch tuning switch
S4	Phono-Radio switch
T1	1st I.F. transformer
T2	2nd I.F. transformer
T3	Output transformer
T4	60-cycle power transformer
T5	25/50-cycle power transformer

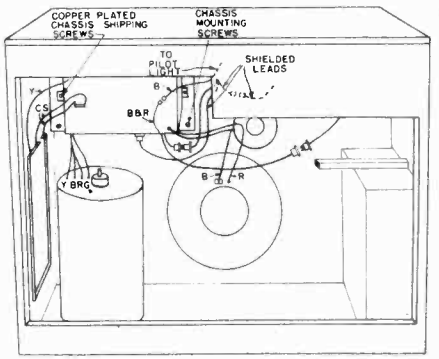


Fig. 2. Interconnection Diagram (Models J-808, J-818, J-828)

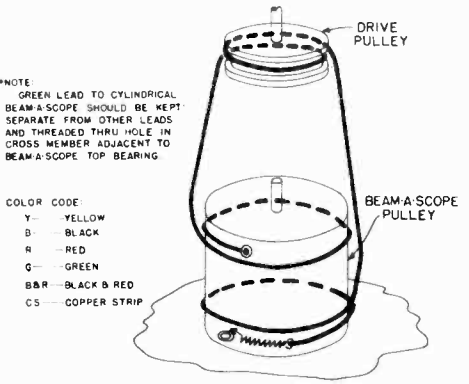


Fig. 10. Beam-a-Scope Drive Cord Stringing Diagram (Models J-808, J-818, J-828)

MODELS J-808, J-809, J-818, J-828

GENERAL ELECTRIC CO.

ALIGNMENT PROCEDURE

The alignment procedure is given in table form below. The use of a standard I.R.E. dummy antenna in making all R.F. alignments is recommended. R.F. alignment can be performed by loop coupling the generator signal to the receiver Beam-a-Scopes if care is exercised not to overcouple the two circuits. Keeping a distance of two feet or more between the generator loop and the receiver Beam-a-Scope will generally insure freedom from overcoupling. The relative position of the Beam-a-Scopes with respect to the chassis materially affects R.F. alignment; therefore, all R.F. alignments should be made with the chassis and Beam-a-Scopes mounted in the cabinet. In keeping with this recommendation all R.F. alignment trimmers are available either on top of the chassis or through holes in the back apron as shown in Fig. 1. Metal objects such as meters, tools, etc., should not be placed on top of the receiver cabinet. Also the receiver should be kept away from large metal objects such as radiators, metal-top tables, etc.

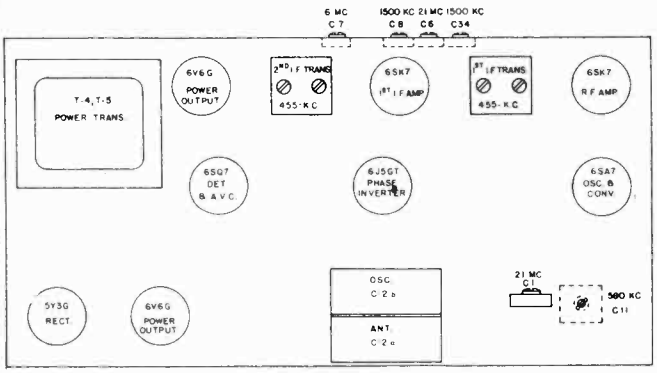


Fig. 1. Trimmer Location (All Models)

R.F. ALIGNMENT WITH CHASSIS OUTSIDE OF CABINET

R.F. alignment can be performed only on the "BC" and "SW1" bands with the chassis outside of the cabinet. Any alignment attempted on "SW2" band will not be satisfactory. The same relative position between the chassis and broadcast loops should be maintained when aligning outside the cabinet as these components occupy in the cabinet. Since the glass dial scale is fastened to the cabinet it cannot be used for reference during alignment of the chassis outside of the cabinet. Use must be made, therefore, of a 0–180° calibrated scale which is cemented to the back of the dial reflector plate. From the reference chart Fig. 7 the degree readings for corresponding frequency settings may be obtained by laying a straight edge across the chart perpendicular to the line of figures and sliding the straight edge along to the various frequency settings desired. The degree readings will be found on either of the degree scales. To use these degree readings, first completely close the gang condenser plates and then slide the pointer along the cord until the left-hand edge of the pointer-guide slide lines up with the 0° mark. By using the left-hand edge (as viewed from the rear) of the slide as the degree-scale pointer the receiver may be tuned to any frequency. Example: By rotating the tuning control until the left-hand edge of the slide is in line with 158°, the receiver will be tuned to 1500 KC on the "BC" band.

The "BC" and "SW1" band alignment procedure is the same as outlined in steps 2 to 6 inclusive of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

After the alignment has been performed on the "BC" and "SW1" bands the chassis should be mounted in the cabinet and "SW2" band alignment checked as described in steps 7 to 9 of the chart "R.F. Alignment with Chassis Mounted in Cabinet."

NOTE: After moving the pointer along the cord to use the left-hand edge as a reference pointer for the degree scale, it will be necessary after reassembly in the cabinet for the gang condenser plates to be closed and the pointer to be moved back along the cord so that it lines up with the first dial markings on the left.

ALIGNMENT CHART

I.F. ALIGNMENT WITH OSCILLOSCOPE

	Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1.	"BC" Band	455 KC Sweep	I.F. Grid	.05 mfd. or larger	2nd I.F. Trimmers C-16, 17	Gang condenser plates open. Depress any station key other than Phono-FM-Tel key. ("Radio On" position in Models J-808, 818, 828.) Connect audio input of oscilloscope to chassis ground and top of volume control, R12. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. Finish by retrimming 2nd I.F. trimmers.
2.	"BC" Band	455 KC Sweep	Green lead on cylindrical Beam-a-Scope	.05 mfd. or larger	1st I.F. Trimmers C-13, 14	

I.F. ALIGNMENT WITH OUTPUT METER

1.	"BC" Band	455 KC with Modulation	Green lead on cylindrical Beam-a-Scope	.05 mfd. or larger	2nd I.F. Trimmers C-16, 17. 1st I.F. Trimmers C-13, 14	Gang condenser plates open. Depress any key other than Phono-FM-Tel key. ("Radio On" position in Models J-808, 818, 828.) Connect output meter across voice coil. Keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.

R.F. ALIGNMENT WITH CHASSIS MOUNTED IN CABINET

1.	"BC" Band					Close gang plates, adjust pointer to first line at left end of tuning scale. Connect output meter across voice coil. Tone control set to "Normal" position.
2.	"BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-8) Ant. (C-34)	Set pointer to 1500 KC and tune in signal with (C-8). Peak output with (C-34).
3.	"BC" Band	580 KC with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-11)	Set pointer to 580 KC and peak signal while rocking gang condenser.
4.	"BC" Band	1500 KC with Modulation	Antenna Post	I.R.E.	Osc. (C-8) Ant. (C-34)	Retrim for maximum output.
5.	Repeat operation 3 if "BC" band trimmers are badly out of alignment.					
6.	"SW 1" Band	6 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-7)	Set pointer to 6 MC and peak signal while rocking gang condenser.
7.	"SW 2" Band	21 MC with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-1)	Set pointer to 21 MC and tune in signal with (C-6) Peak output with (C-1) while rocking gang condenser When (C-6) is on proper peak, image of 21 MC signal should be heard 910 KC below or on 20.09 MC.
8.	"SW 2" Band	8 MC with Modulation	Antenna Post	I.R.E.		This operation may or may not be necessary depending on how much the short-wave Beam-a-Scope leads have been moved from their correctly dressed positions. Repositioning will be indicated if an increased output meter reading can be obtained by moving the short-wave Beam-a-Scope strap leads closer or farther away from one another. The moving should be done with an insulated rod or stick.
9.	Repeat operation 7 if the Beam-a-Scope leads are moved in operation 8.					

GENERAL ELECTRIC CO.

MODELS J-808, J-809, J-818, J-828

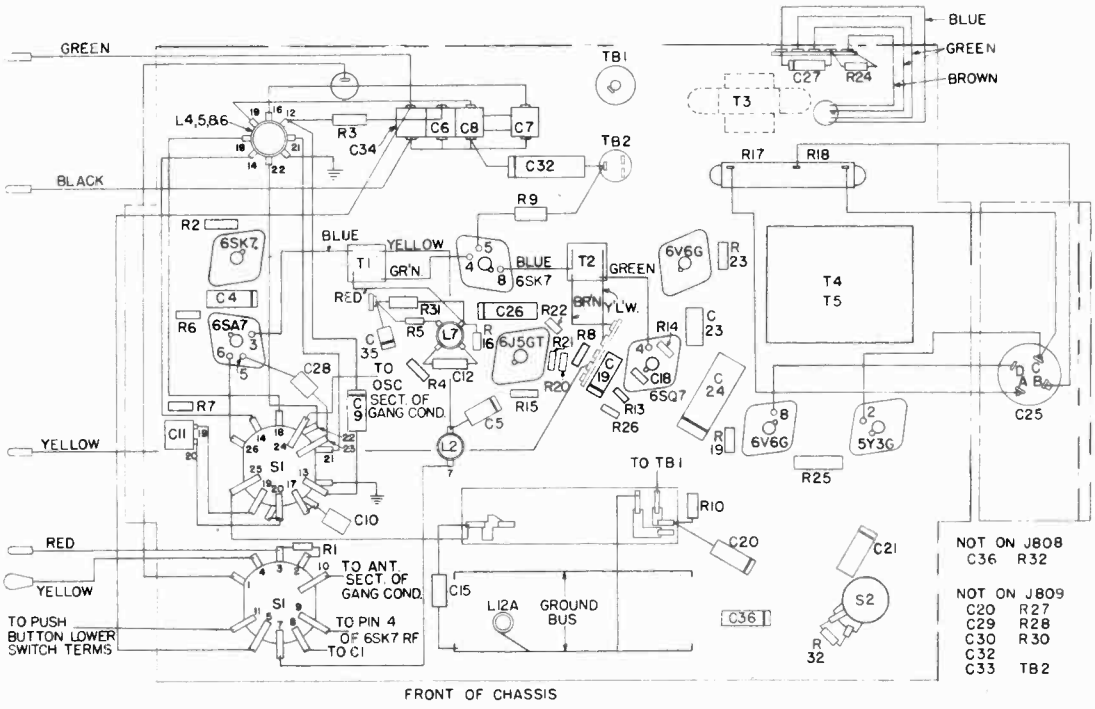


Fig. 5. Chassis Parts Layout (All Models)

FRONT OF CHASSIS

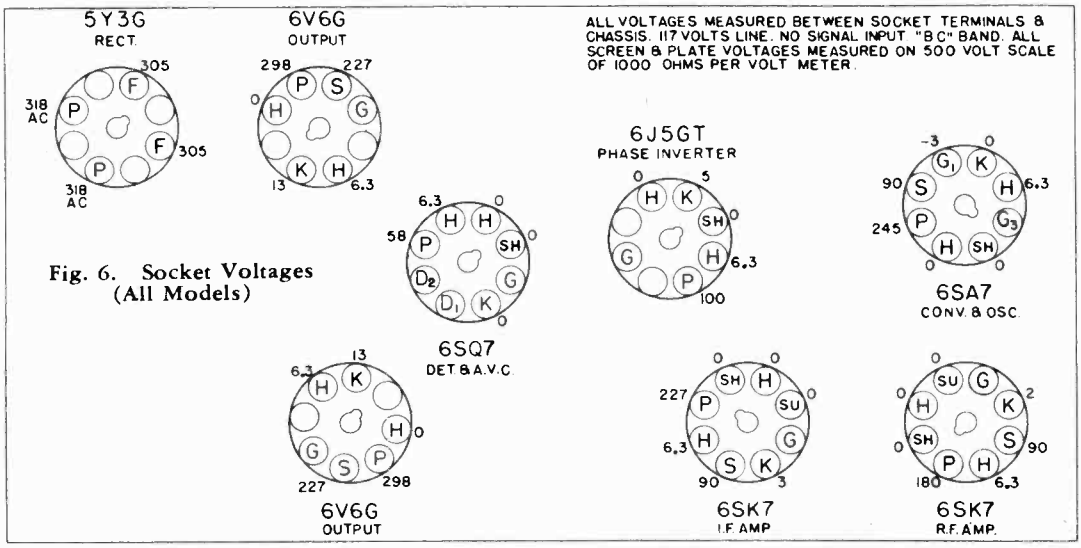


Fig. 6. Socket Voltages (All Models)

BOTTOM VIEW OF CHASSIS

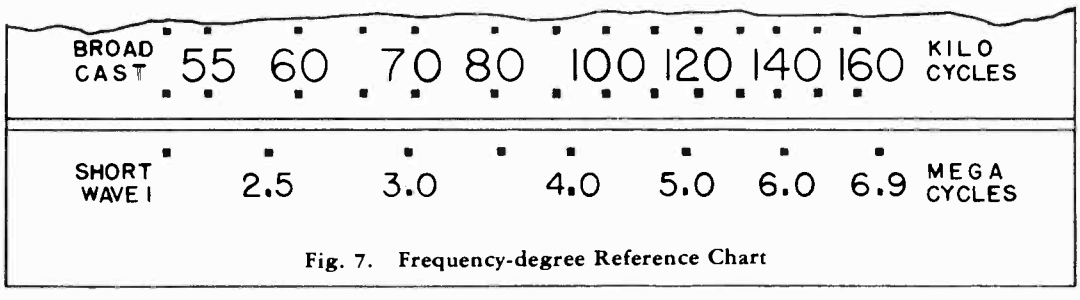
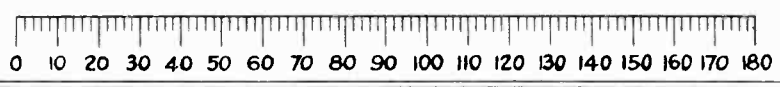


Fig. 7. Frequency-degree Reference Chart



NOTE: The oscillator coil and band-switch terminals are numbered in the Chassis Parts Layout, Fig. 5, to assist in locating the corresponding numbered points on the Schematic Diagrams, Figs. 3 and 4. This numbering will also assist in rewiring if the coil or switch is replaced. I.F. transformer connections are shown as an aid in replacement.

MODELS J-718, J-728, J-808, J-809, J-818, J-828

GENERAL ELECTRIC CO.

AUTOMATIC RECORD CHANGER

USED IN MODELS

J-718, J-728, J-808, J-809, J-818 AND J-828

This automatic Record Changer is a standard assembly in all of the above models. It is designed for operation on 110 volts, 60 cycles only and will automatically play a series of eight 10-inch or seven 12-inch records of the 78 revolutions per minute type. Manual operation is also provided. Records of the last few years with the standard eccentric or spiral stopping groove will operate the automatic mechanism and change your records.

OPERATING INSTRUCTIONS

Before operating the phonograph, either automatically or manually, be sure the pick-up is down and can be moved by hand; if not, a "cycle" must be completed to bring it down. To do this, throw the turntable switch to "ON." The turntable will start to revolve and the cycle of motion on the pick-up arm will be resumed. When the pick-up arm comes down, turn the turntable switch off.

CONTROLS AND MOVING MECHANISM

Index and Record-reject Lever

This lever is located near the right-front corner of the motorboard with its index plate marked for four positions—"Manual," "12," "10," and "Reject." When you desire to change record selections manually, this lever should be set in the "Manual" position. With the lever in the "12" position, the mechanism is set to play a series of 12-inch records automatically. To play a series of 10-inch records, the lever should be set at the "10" position.

To reject a record being played or to start the record-changing cycle in case the record just played does not have the standard eccentric or spiral stopping groove, simply push the lever to the "Reject" position and let go. The pick-up will raise up and swing outward and the next record will drop down. Upon releasing the lever, it will automatically return to the "10" position. If you are playing a series of 12-inch records the lever should be returned to the "12" position after rejecting a record. Keep the lever in its "Manual" position when not actually playing records automatically.

Turntable Switch

The toggle switch located just in front of the Index and Record-reject Lever controls the current to the turntable motor. To start the turntable throw the switch to the "On" position. To stop the turntable throw the switch to the "Off" position. This switch will not operate unless receiver power is turned on.

Pick-up and Top-loading Needle Socket

The pick-up is the new crystal type, with a hole in the top for insertion of needles. When not playing records or changing needles the pick-up arm should be moved out to the right beyond the turntable and placed at rest on the support with the left edge of the pick-up arm in the left-edge recess of the support as shown in Fig. 2a.

When changing needles rest the pick-up arm in the right recess of the support as shown in Fig. 2b. To insert a needle initially, loosen the needle screw on the front of the pick-up, place the needle in hole at top so that it drops down against the needle gauge plate and then tighten up the needle screw. As soon as the needle has been changed raise the pick-up arm and return to the position of rest as described in the preceding paragraph.

Needle Ejector

The extending tab on the needle gauge plate of the needle box operates the needle ejector. To change a needle, place pick-up arm in needle-changing rest position, loosen needle screw and press the extending tab on the needle gauge plate to drop the used needle into the box below. Release tab, allowing the needle gauge plate to swing back, and then insert a new needle in the pick-up as described above.

Record-holder Shelves

To place a record on the turntable or to remove records, raise the record-holder shelves, by grasping the knob posts with the fingers, and swing clear of outer edge of record. Also push back vertical lever adjacent to the rear record-holder post. You now have clear access to the turntable. Before loading the magazine for automatic operation swing the record-holder shelves back into position.

AUTOMATIC OPERATION

1. See that pick-up arm is in rest position (Fig. 2a) with needle properly in place. If mechanism will not allow pick-up arm to come to the rest position, complete a "cycle" as explained in the first paragraph under "Operation."
2. Place the series of records (up to eight 10-inch or seven 12-inch records) on the record-holder posts (as shown in Fig 1). The records should be arranged in the desired order with the desired selection face up and the last selection on top.
3. Throw turntable switch to "On."

(NOTE—The radio power should be turned on or phonograph will not operate.)

4. To start the automatic cycle, simply push the lever to the "Reject" position and then return it immediately to the numbered position corresponding to the size of records to be played. The pick-up will raise up and swing outward and the first record will drop down and the pick-up will come to rest on it.

The whole series of records will play without further attention, and the last record will repeat until the Turntable Switch is turned off. If the record-changing mechanism is in a change cycle wait until it is completed before stopping the turntable. Then lift the pick-up, swing the arm to the right beyond the edge of the record and lower it onto the pick-up rest (Fig. 2a). The record player is then ready for reloading, or for manual operation.

MANUAL OPERATION

To play records manually:

1. Proceed as in Step 1, under "Automatic Operation."
2. Swing record-holder shelves clear of turntable. Place record on turntable with desired selection upwards.
3. Set Index and Record-reject Lever to "Manual" position.
4. Proceed as in Step 3 under "Automatic Operation" and when turntable has attained speed, lift pick-up and lower gently onto the record so that the needle point enters the outside groove. When you have finished playing, be sure that the turntable has stopped and the pick-up is in the rest position over needle gauge plate. Never leave pick-up with needle resting on a record or on the turntable.

SERVICE DATA

General Information

The turntable is driven through a friction drive wheel mounted on the turntable spindle. It is important that the drive motor spindle and rubber tires on the main driving wheel and idler pulley be kept clean and free from oil, grease, dirt or any foreign matter. Any quick-drying naphtha is satisfactory for cleaning these parts. The drive motor bearing is lubricated from an oil well filled and sealed at the factory. It should not require lubrication in the field. The turntable is not removable from the spindle without removing the tapered pin "24" which fastens the rubber-tired driving wheel to the spindle. Once the pin is removed, the driving wheel can be slipped off the spindle and the turntable and spindle assembly lifted upward from the motor board. Caution should be exercised not to bend the spindle. The spindle bearing should be oiled and the cup and ball thrust bearing oiled and checked for proper position.

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc., are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and revolving the turntable by hand. Six turntable revolutions are required for one change cycle.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

The 10- and 12-inch records must be absolutely flat for smooth operation.

Adjustments

A. Main Lever.—This lever is basically important in that it interlinks the various individual mechanisms which control needle landing, tripping, record separation, etc. One adjustment is provided for the main lever. Rotate the turntable until the changer is out-of-cycle; and adjust rubber bumper bracket (A) so that the roller clears the nose of the cam plate by 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the record is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pick-up is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the trip finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.

C. Pick-up Lift Cable Screw.—During the record-change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pick-up lift cable. To adjust pick-up for proper elevation, stop the changer "in-cycle" at the point where pick-up is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknots "C" to obtain 1-inch spacing between needle point and turntable top surface.

D. and E. Needle Landing on Record.—The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10-inch record. Position of eccentric stud "E" governs the landing of the needle on a 12-inch record; this, however, is dependent on the proper 10-inch adjustment.

To adjust for needle landing, place 10-inch record on turntable; push index lever to reject position and return to the 10-inch position; see that pick-up locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on the record; then see that pin "V" on lever "14" is in contact with "Step T" on lever "17." The correct point of landing is 4⅝ inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17." Leave approximately 1/32-inch end play between hub of lever "20" and pick-up base bearing, and tighten the blunt-nose screw "D"; run mechanism through several cycles as a check, then tighten cone-pointed screw "D."

After adjusting for needle landing on a 10-inch record, place 12-inch record on turntable; push index lever to reject and return to 12-inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5⅝ inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be toward the rear of the motor board; otherwise incorrect landing may occur with 10-inch records.

F. and G. Record Separating Knife.—The upper plate (knife) "25" on each of the record post serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "27" be accurately maintained. The spacing for the 10-inch record is nominally .055 inch, and for the 12-inch record is .075 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "F" to give .052–.058 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F" adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072–.078 inch.

H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustments be such that the record is released from both shelves at the same instant. To adjust, place a 12-inch record on the turntable, rotate mechanism into cycle to the point where both separating knives have turned clockwise as far as the mechanism will turn them; lift record upward until it is in contact with both separating knives, then loosen screws "H" and shift record shelves so that the curved inner edges of the shelves are uniformly spaced at least 1/16 inch from record edge. Some backlash will be present in the rotation of these shelves. They should be adjusted so that backlash permits them to move away from record but not closer than the 1/16 inch specified above. Tighten the blunt-nose screw "H," run mechanism through cycle several times to check action, then tighten cone-pointed screw "H."

If record shelves or knives are bent, or not perfectly horizontal improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown).—When the changer is out-of-cycle, the front lower edge of the pick-up head should be 5/16 inch above surface of motor board. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication. Petrolatum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on under side of motor board.

The turntable bearing must be lubricated from the top of the motor board. Using an oil can with a long spout, reach in between the turntable and motor board and apply oil directly to the spindle.

Do not allow oil or grease to come in contact with rubber mounting of tone arm base, rubber bumper, or rubber spindle cap.

MISCELLANEOUS SERVICE HINTS

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual misadjustments will enable ready adjustment in most cases.

1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A."
2. Needle does not land properly on both 10- and 12-inch record—Make complete adjustments "D" and "E."
3. Needle does not land properly on 12-inch record but correctly on 10-inch—Effect adjustment "E."
4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B." Also, see that levers "7" and "12" are free to move without touching each other.
5. Pick-up strikes lower record of stack or drags across top record on turntable—Adjust lift cable per adjustment "C."
6. Needle does not track after landing—Friction clutch "5" adjustment "B" may be too tight; bind in tone arm vertical bearing; levers "7" and "12" fouled; or pick-up output cable twisted.
7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.
8. "Wow" in record reproduction—Record is defective; instrument is not being operated at normal room temperature (65° F); oil, grease or dirt on driving wheel or idler pulley rubber tire. The motor support bracket "N" should be moved in its mounting holes until motor spindle is parallel to the turntable spindle and exactly at right angles to the main driving wheel "29." The bracket mounting nuts should then be securely tightened.
9. Record knives strike edge of records—Record warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.
10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H."
11. When playing both types of records mixed and needle either lands in 10-inch position on 12-inch record or misses record entirely—Increase tension of mixed record discriminating lever spring "M."

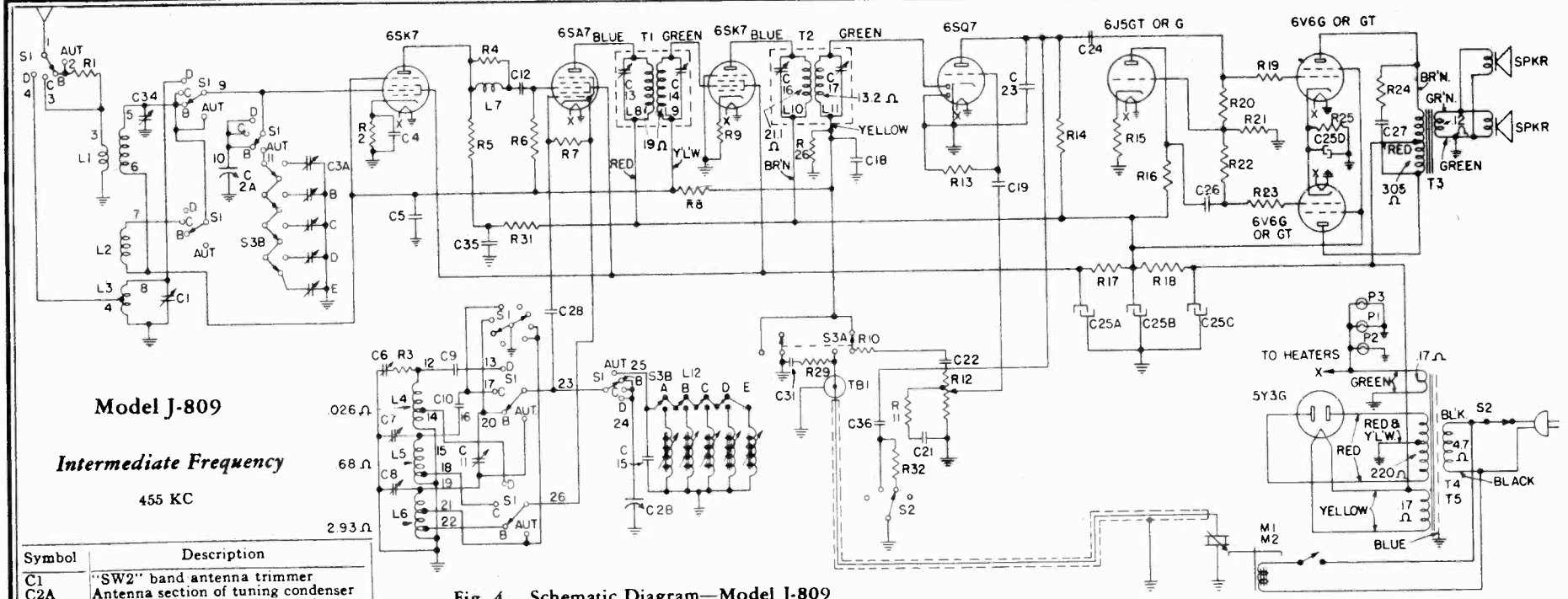


Fig. 4. Schematic Diagram—Model J-809

Symbol	Description
C1	"SW2" band antenna trimmer
C2A	Antenna section of tuning condenser
C2B	Oscillator section of tuning condenser
C3	Touch tuning trimmer strip
C4	.01 mfd. paper capacitor
C5	.05 mfd. paper capacitor
C6	"SW2" band oscillator trimmer
C7	"SW1" band oscillator trimmer
C8	"BC" band oscillator trimmer
C9	.008 mfd. polystyrene capacitor
C10	2400 mmf. ±5% mica capacitor
C11	"BC" band padder
C12	100 mmf. mica capacitor
C15	750 mmf. silvered mica capacitor
C18	330 mmf. mica capacitor
C19	.02 mfd. paper capacitor
C21	.003 mfd. paper capacitor
C22	.005 mfd. paper capacitor
C23	390 mmf. mica capacitor
C24	.03 mfd. paper capacitor
C25A	10 mfd. 350 V. dry electrolytic
C25B	20 mfd. 400 V. dry electrolytic
C25C	30 mfd. 400 V. dry electrolytic
C25D	20 mfd. 25 V. dry electrolytic
C26	.03 mfd. paper capacitor
C27	.002 mfd. paper capacitor
C28	47 mmf. mica capacitor
C31	.008 mfd. paper capacitor
C34	"BC" band antenna trimmer
C35	.01 mfd. paper capacitor
C36	.01 mfd. paper capacitor
L1	"BC" band Beam-a-Scope
L2	"SW1" band antenna coil
L3	"SW2" band Beam-a-Scope
L4	"SW2" band oscillator coil
L5	"SW1" band oscillator coil
L6	"BC" band oscillator coil
L7	R.F. interstage coil
L12	Touch tuning coils
P1	Dial lamp, MAZDA No. 44

Symbol	Description
P2	Dial lamp, MAZDA No. 44
P3	Dial lamp, MAZDA No. 44
R1	1000 ohms carbon resistor
R2	47 ohms carbon resistor
R3	27 ohms carbon resistor
R4	10,000 ohms carbon resistor
R5	3300 ohms carbon resistor
R6	47,000 ohms carbon resistor
R7	22,000 ohms carbon resistor
R8	2.2 megohms carbon resistor
R9	150 ohms carbon resistor
R10	47,000 ohms carbon resistor

Symbol	Description
R11	82,000 ohms carbon resistor
R12	2 megohms volume control (.5 megohms tap)
R13	4.7 megohms carbon resistor
R14	470,000 ohms carbon resistor
R15	2200 ohms carbon resistor
R16	68,000 ohms carbon resistor
R17	11,200 ohms wire wound resistor
R18	1940 ohms wire wound resistor
R19	1000 ohms carbon resistor
R20	150,000 ohms carbon resistor
R21	56,000 ohms carbon resistor
R22	330,000 ohms carbon resistor
R23	1000 ohms carbon resistor

Symbol	Description
R24	5600 ohms carbon resistor
R25	180 ohms 1 W. carbon resistor
R26	470,000 ohms carbon resistor
R29	100,000 ohms carbon resistor
R31	1000 ohms carbon resistor
R32	39,000 ohms carbon resistor
S1	Band switch
S2	Tone control switch
S3	Touch tuning switch
T1	1st I.F. transformer
T2	2nd I.F. transformer
T3	Output transformer
T4	60-cycle power transformer
T5	25/50-cycle power transformer

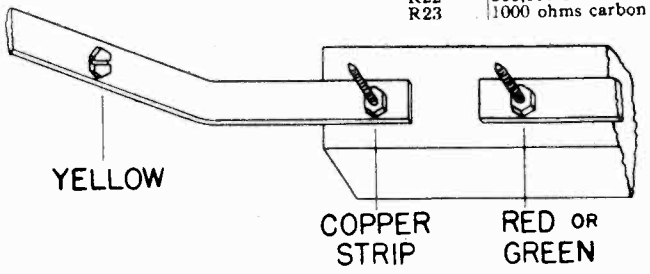


Fig. 9. Shortwave Beam-a-Scope Connections (Model J-809)

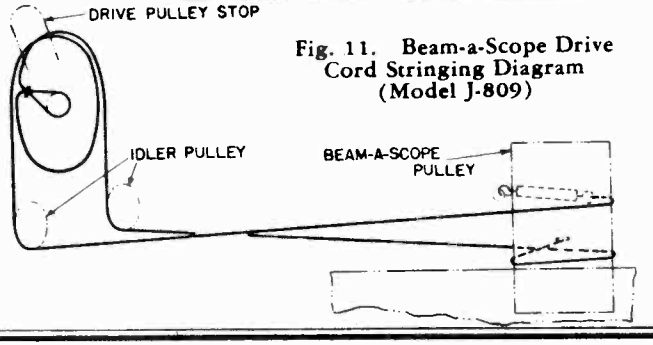
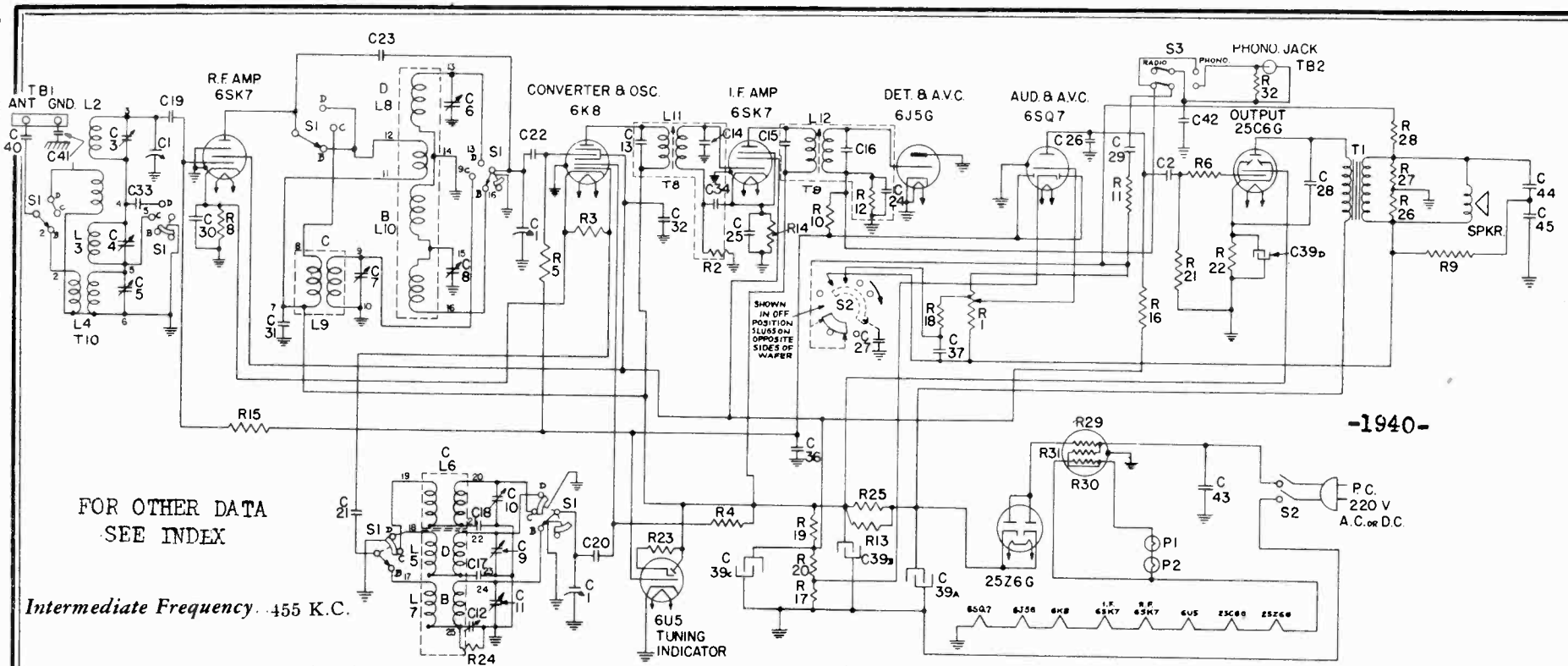
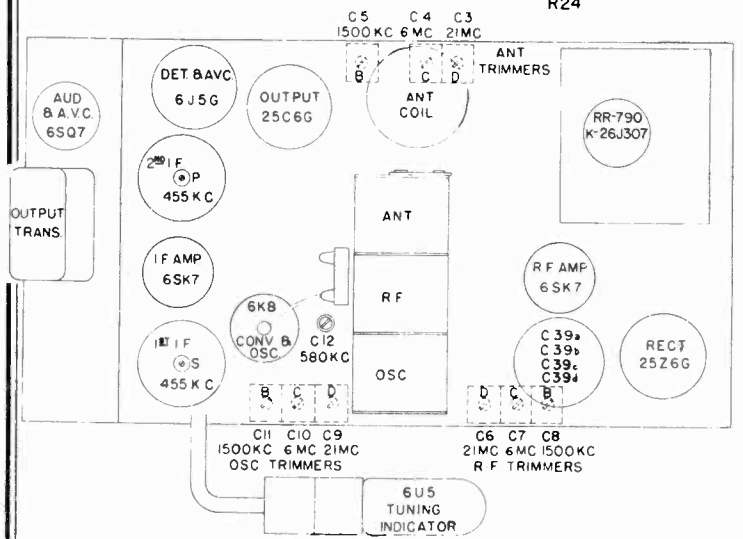


Fig. 11. Beam-a-Scope Drive Cord Stringing Diagram (Model J-809)



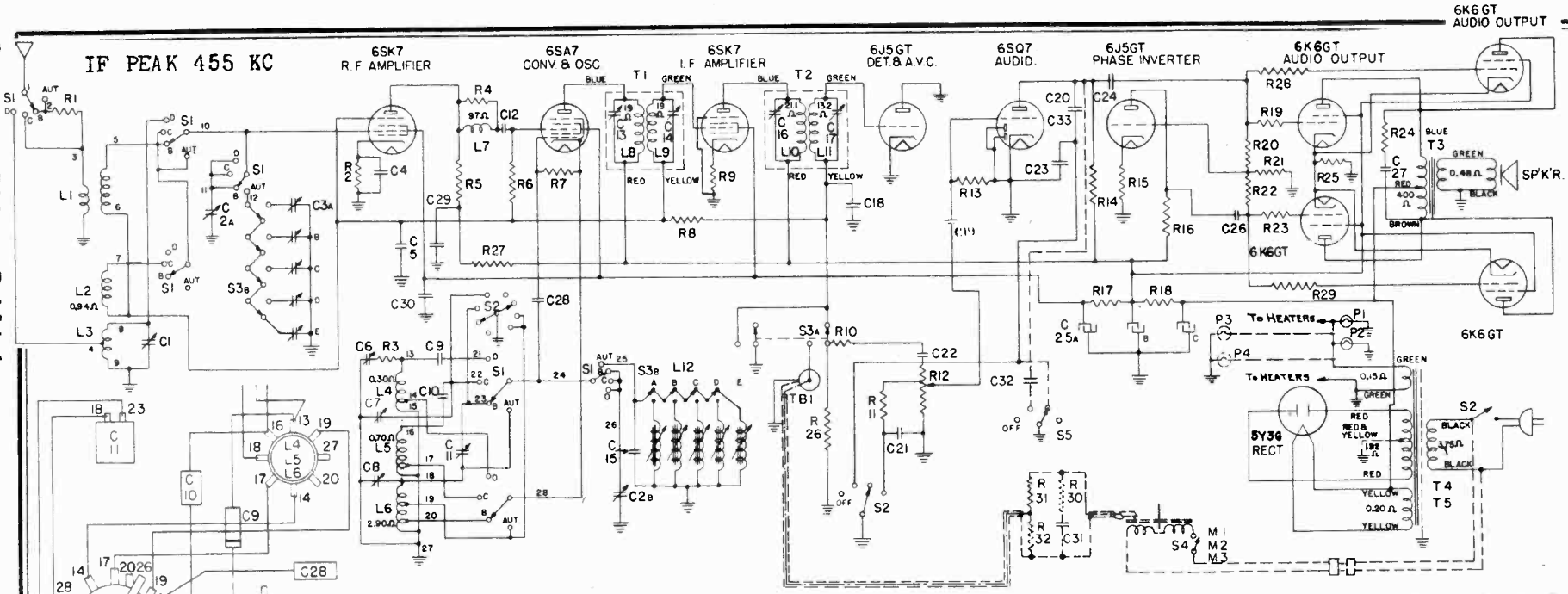


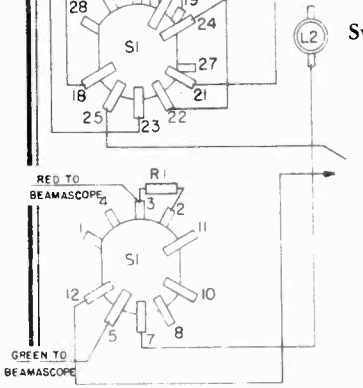
POWER CONSUMPTION 105 WATTS

Symbol	Description	Symbol	Description	Symbol	Description
C1	Tuning Condenser	C33	.006 Mfd. 600 V. Paper	R4	22,000 Ohms Carbon
C2	.05 Mfd. 600 V. Paper	C34	.05 Mfd. 200 V. Paper	R5	560,000 Ohms Carbon
C3	5-40 Mmf. "D" Ant. Trimmer	C36	.05 Mfd. 200 V. Paper	R6	1000 Ohms Carbon
C4	3-30 Mmf. "C" Ant. Trimmer	C37	.002 Mfd. 600 V. Paper	R8	120 Ohms Carbon
C5	2-20 Mmf. "B" Ant. Trimmer	C39a	40 Mfd. 300 V. Dry Electrolytic	R9	220 Ohms Carbon
C6	3-30 Mmf. "D" R.F. Trimmer	C39b	50 Mfd. 250 V. Dry Electrolytic	R10	2.2 Megohms Carbon
C7	3-30 Mmf. "C" R.F. Trimmer	C39c	20 Mfd. 250 V. Dry Electrolytic	R11	47,000 Ohms Carbon
C8	3-30 Mmf. "B" R.F. Trimmer	C39d	20 Mfd. 25 V. Dry Electrolytic	R12	330,000 Ohms Carbon
C9	3-30 Mmf. "D" Osc. Trimmer	C40	.01 Mfd. 600 V. Paper	R13	3900 Ohms 2 W. Carbon
C10	3-30 Mmf. "C" Osc. Trimmer	C41	.01 Mfd. 600 V. Paper	R14	330 Ohms Carbon
C11	5-45 Mmf. "B" Osc. Trimmer	C42	.25 Mfd. 400 V. Paper	R15	560,000 Ohms Carbon
C12	300-650 Mmf. "B" Osc. Padder	C43	.02 Mfd. Metal Cased	R16	330,000 Ohms Carbon
C17	2800 Mmf. ±5% Mica	C44	0.1 Mfd. 200 V. Paper	R17	150 Ohms Carbon
C18	1600 Mmf. ±5% Mica	C45	.05 Mfd. 200 V. Paper	R18	120,000 Ohms Carbon
C19	470 Mmf. Mica	L2	"D" Antenna Coil	R19	2700 Ohms 2 W. Carbon
C20	470 Mmf. Mica	L3	"C" Antenna Coil	R20	15,000 Ohms 1 W. Carbon
C21	47 Mmf. Mica	L4	"B" Antenna Coil	R21	470,000 Ohms Carbon
C22	470 Mmf. Mica	L5	"D" Oscillator Coil	R22	270 Ohms 2 W. Carbon
C23	10 Mmf. L.P.F. Mica	L6	"C" Oscillator Coil	R23	1.0 Megohm Carbon
C24	100 Mmf. Mica	L7	"B" Osicllator Coil	R24	5600 Ohms Carbon
C25	.05 Mfd. 200 V. Paper	L8	"D" R.F. Coil	R25	3900 Ohms 2 W. Carbon
C26	220 Mmf. Mica	L9	"C" R.F. Coil	R26	270 Ohms Carbon
C27	.002 Mfd. 600 V. Paper	L10	"B" R.F. Coil	R27	1500 Ohms Carbon
C28	.008 Mfd. 1000 V. Paper	P1	Dial Lamp. Mazda No. 44	R28	6.8 Megohms Carbon
C29	.002 Mfd. 600 V. Paper	P2	Dial Lamp. Mazda No. 44	R29	200 Ohms 10 W. Ballast
C30	.05 Mfd. 200 V. Paper	R1	2.0 Megohms Volume Control	R30	200 Ohms 15 W. Ballast
C31	.05 Mfd. 600 V. Paper	R2	330,000 Ohms Carbon	R31	434 Ohms 45 W. Ballast
C32	.05 Mfd. 600 V. Paper	R3	33,000 Ohms Carbon	R32	220,000 Ohms Carbon

GENERAL ELECTRIC CO.

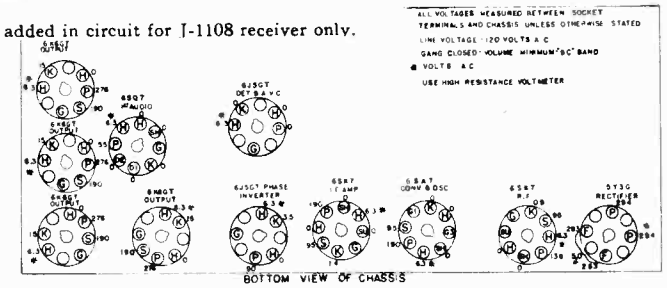
MODELS J11C6 J11C3

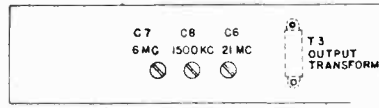


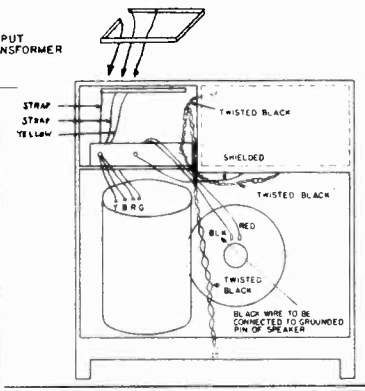


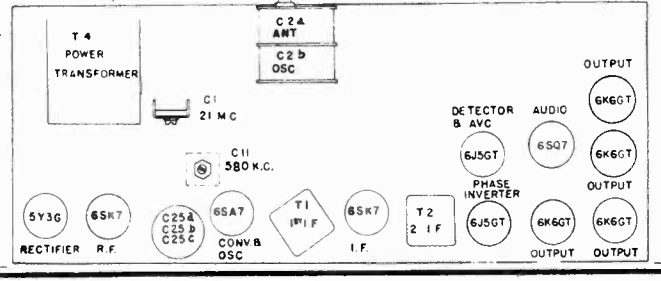
Switch and Coil Section of Chassis Underview

NOTE—Parts and lines shown dotted are to be added in circuit for J-1108 receiver only.









Symbol	Description
C1	2–20 mmf. trimmer
C2a, 2b	Tuning condenser
C3a, b, c, d, e	Touch tuning trimmer strip
C4	.01 mfd. paper capacitor
C5	.10 mfd. paper capacitor
C6, 7, 8	Osc. trimmer strip
C9	.008 mfd. paper capacitor
C10	2400 mmf. mica capacitor
C11	"BC" band padder
C12	100 mmf. mica capacitor
C15	750 mmf. silvered mica
C18	220 mmf. mica capacitor
C19	.02 mfd. paper capacitor
C20	.003 mfd. paper capacitor
C21,22	.005 mfd. paper capacitor
C23	220 mmf. mica capacitor
C24	.03 mfd. paper capacitor
C25a	10 mfd. dry electrolytic
C25b	15 mfd. dry electrolytic
C25c	30 mfd. dry electrolytic
C26	.03 mfd. paper capacitor
C27	.002 mfd. paper capacitor
C28	47 mmf. mica capacitor
C29, 30	.01 mfd. paper capacitor
C31	.008 mfd. paper capacitor
C32	.005 mfd. paper capacitor
C33	.002 mfd. paper capacitor
R1	1000 ohm carbon resistor
R2	47 ohm carbon resistor
R3	27 ohm carbon resistor
R4	10,000 ohm carbon resistor
R5	3300 ohm carbon resistor
R6	47,000 ohm carbon resistor
R7	22,000 ohm carbon resistor
R8	2.2 megohm Carbon resistor
R9	150 ohm carbon resistor
R10	47,000 ohm carbon resistor
R11	82,000 ohm carbon resistor
R12	2.0 megohm volume control
R13	4.7 megohm carbon resistor
R14	470,000 ohm carbon resistor
R15	3300 ohm carbon resistor
R16	68,000 ohm carbon resistor
R17	6800 ohm carbon resistor
R18	1900 ohm carbon resistor
R19	1000 ohm carbon resistor
R20	150,000 ohm carbon resistor
R21	120,000 ohm carbon resistor
R22	270,000 ohm carbon resistor
R23	1000 ohm carbon resistor
R24	5600 ohm carbon resistor
R25	220 ohm, carbon resistor
R26	470,000 ohm carbon resistor
R27, 28, 29	1000 ohm carbon resistor
R30	100,000 ohm carbon resistor
R31, 32	220,000 ohm carbon resistor
S1	Band change switch
S2	Tone control switch
S3	Station selector switch
L1	"BC" band Beam-a-Scope
L2	"SW1" ant. coil
L3	"SW2" band Beam-a-Scope
L4	"SW2" band osc. coil
L5	"SW1" band osc. coil
L6	"BC" band osc. coil
L7	RF coil
L12	Station selector coils
T1	1st I.F. transformer
T2	2nd I.F. transformer
T3	Output transformer
T4, T5	Power transformer

MODELS J1106
J1108

GENERAL ELECTRIC CO.

Tuning Frequency Range

Broadcast Band	540–1700 KC
Short-wave Band No. 1	2400–7000 KC
Short-wave Band No. 2	7000–22,000 KC

Intermediate Frequency ..... 455 KC

Electrical Power Output

Undistorted	6 watts
Maximum	9.5 watts

Loud-speaker "Alnico" Magnet Dynamic

Outside Diameter	14 inches
Voice Coil Impedance (400 cycles)	3.5 ohms

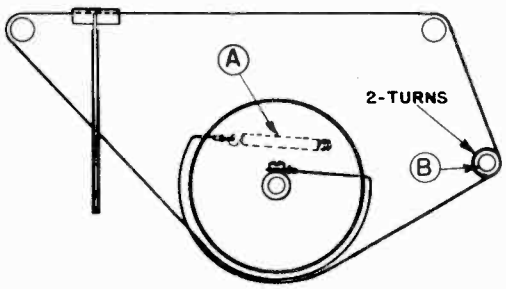


Fig. 5. Dial Cord Stringing Diagram

BEAM-A-SCOPE REMOVAL

Before either the chassis or Beam-a-Scope can be removed, the leads between them must be disconnected. Fig. 1 shows the location of the Beam-a-Scope leads when connected.

Model J-1106—To remove Beam-a-Scope, disconnect the leads, unscrew the long self-tapping screw from cabinet shelf, then pry loose the cardboard strap which is stapled to the bottom of the cabinet and holds the Beam-a-Scope in place. Now rotate the Beam-a-Scope from right to left until it comes loose. NOTE: The upper pivot bolt support should never be loosened.

To replace the Beam-a-Scope the reverse procedure is followed and the strap should be restapled to the cabinet.

Model J-1108—To remove the Beam-a-Scope from this model, use the same procedure as above with the exception of the bottom support removal. This receiver uses a wooden support held in place by two wood screws which are accessible from underneath the cabinet base. When the screws are removed the wood support can be removed allowing the Beam-a-Scope to be rotated from right to left until it is free.

Special Service Information

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains*
  (a) Antenna Post to R. F. Grid at
    1000 KC 6.5
    4000 KC 3.0
    18000 KC 2.3
  (b) R.F. Grid to Converter Grid at
    1000 KC 5.0
    4000 KC 3.0
    18000 KC 2.0
  (c) R.F. on Converter Grid to I.F. on 1st I.F. Grid at
    1000 KC 47
    4000 KC 47
    18000 KC 39
  (d) I.F. on Converter Grid to I.F. on 1st I.F. Grid at
    455 KC 55
  (e) I.F. Amplifier Grid to Detector Plate at
    455 KC 77
(2) Voltage across Volume Control to Give ½-watt** Speaker Output at
    400 cycles ..... 0.05 volts
(3) DC Voltage Developed across Oscillator Grid Resistor (R-7) at
    1000 KC 6.0
    4000 KC 5.5
    18000 KC 3.9

* Variations of ±20 per cent are permissible. All readings obtained with enough input signal to give ½-watt speaker output.

** ½-watt speaker output at 400 cycles is equivalent to a reading of 1.32 volts as measured by a high resistance A-C voltmeter across the voice coil of the receiver speaker.

Phonograph Mechanism (Model J-1108)

Type	Automatic Record Changer
Record Capacity	Twelve 10-inch or ten 12-inch records
Type Pickup	Crystal
Turntable Speed	78 Rpm

ALIGNMENT PROCEDURE

The alignment procedure, performed with the chassis in the cabinet, is given in table form below. All R.F. alignment is performed by capacity coupling the test oscillator to the receiver input. This is accomplished by using a three-foot piece of wire as an antenna connected to the high side of the test oscillator output and brought to within three feet of the Beam-a-Scope input when making the alignment. Metal objects such as tools, meters, etc. should not be placed on top of the cabinet.

Before making the R.F. alignment make sure the pointer is set to the line at the left-hand edge of the dial scale when the gang condenser plates are closed. Output meter alignment is preferable and the meter may be connected across the voice coil; then turn volume control to maximum. Keep the signal input as low as possible to avoid AVC action.

ALIGNMENT CHART

Step	Test-Osc. Connect to	Osc. Output Frequency	Pointer Setting	Tune Trimmer for Max. Output
1	6SK7 I.F. grid in series with .05 mfd.	455 KC	"BC" Band 550 KC	C16 &C17
2	6SA7 grid in series with .05 mfd	455 KC	"BC" Band 550 KC	C13 & C14
3	Use Capacity Coupling 580 KC		"BC" Band 580 KC	C11**
4	Use Capacity Coupling 1500 KC		"BC" Band 1500 KC	C8
5	Repeat step 3			
6	Use Capacity Coupling 6.0 MC		"SW1" Band 6 MC	C7
7	Use Capacity Coupling 21.0 MC		"SW2" Band 21 MC	C6*
8	Use Capacity Coupling 21.0 MC		"SW2" Band 21 MC	C1**

* Use minimum capacity peak.
** Rock gang condenser for optimum peak.

R.F. Alignment with Chassis Outside of Cabinet

R.F. alignment can be performed only on the "BC" and "SW1" bands with the chassis outside of the cabinet. Any alignment attempted on "SW2" band will not be satisfactory. The same relative position between the chassis and broadcast loop should be maintained when aligning outside the cabinet as these components occupy in the cabinet. Since the glass dial scale is fastened to the cabinet it cannot be used for reference during alignment of the chassis outside of the cabinet. Use must be made, therefore, of 0–180° calibrated scale which is cemented to the back of the dial-reflector plate. From the "frequency-degree reference chart" the degree readings for corresponding frequency settings may be obtained. To use these degree readings, first completely close the gang condenser plates and then slide the pointer along the cord until the left-hand edge of the pointer-guide slide lines up with the 0° mark. By using this left-hand edge (as viewed from the rear) of the slide as the degree-scale pointer the receiver may be tuned to any frequency. Example: By rotating the tuning control until the left-hand edge of the slide is in line with 154°, the receiver will be tuned to 1500 KC on the "BC" band.

The "BC" and "SW1" band alignment procedure is the same as outlined in steps 3 to 6 inclusive of the chart—"R.F. Alignment with Chassis Mounted in Cabinet."

The chassis should be mounted in the cabinet and "SW2" band alignment checked as described in steps 7 and 8 of the chart.

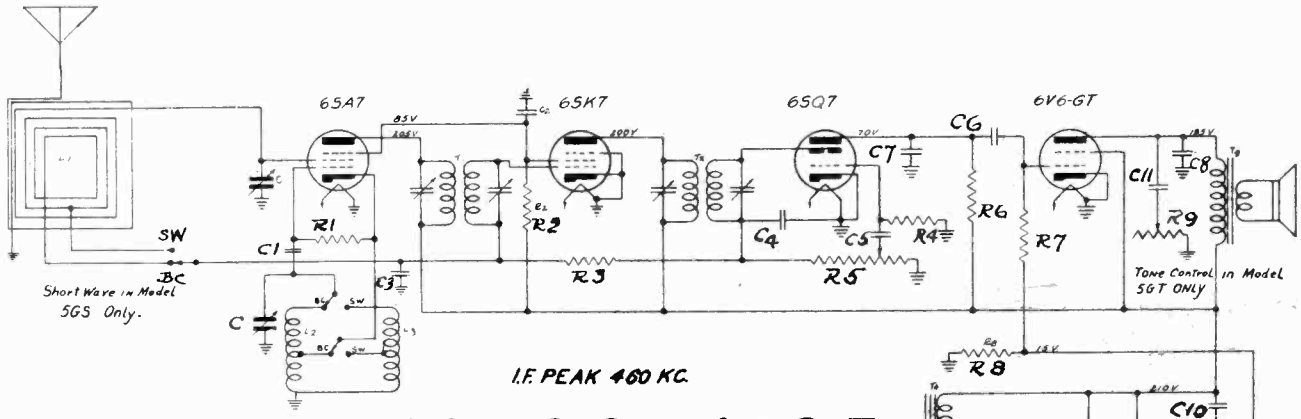
NOTE: After moving the pointer along the cord to use the left-hand edge as a reference pointer for the degree scale, it will be necessary after reassembly in the cabinet for the gang condenser plates to be closed and the pointer to be moved back along the cord so that it lines up with the first dial markings on the left.

FREQUENCY-DEGREE REFERENCE CHART

"BC" Band		"SW1" Band		"SW2" Band	
1500 KC	154°	6.0 MC	143°	21 MC	162°
1000 KC	104°	4.0 MC	96°	12 MC	101°
580 KC	20°	2.5 MC	20°	7 MC	28°

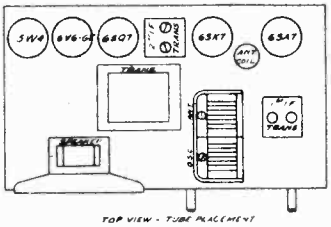
GILFILLAN BROS. INC.

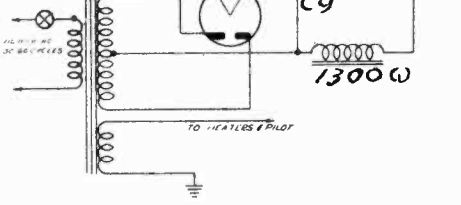
MODELS 5G-S, 5G-T
MODEL 5L



Models 5G-S and 5G-T

CONDENSERS		RESISTORS		MISC.
C1 .0003 MFD MICA		R1 .25M OHMS ½ WATT		T1 I.F. TRANSFORMER
C2 .03 400 VOLTS		R2 .1M " "		T2 OUTPUT "
C3 .03 400 "		R3 .1 MEG " "		T3 POWER "
C4 .00025 MICA		R4 .5 MEG " "		L1 LOOP
C5 .01 400 VOLTS		R5 500M VOL CONTROL		L2 OSCILLATOR COIL
C6 .01 600 "		R6 .25M ½ WATT		L3
C7 .001 " "		R7 .5 MEG " "		ALL VOLTAGES CHECK- ED AT 115 VOLTS AC PRIMARY.
C8 .004 " "		R8 400 " "		
C9 8 - 450V FILTER		R9 50,000 - TONE CONTROL		
C10 .03 - 800 VOLTS				

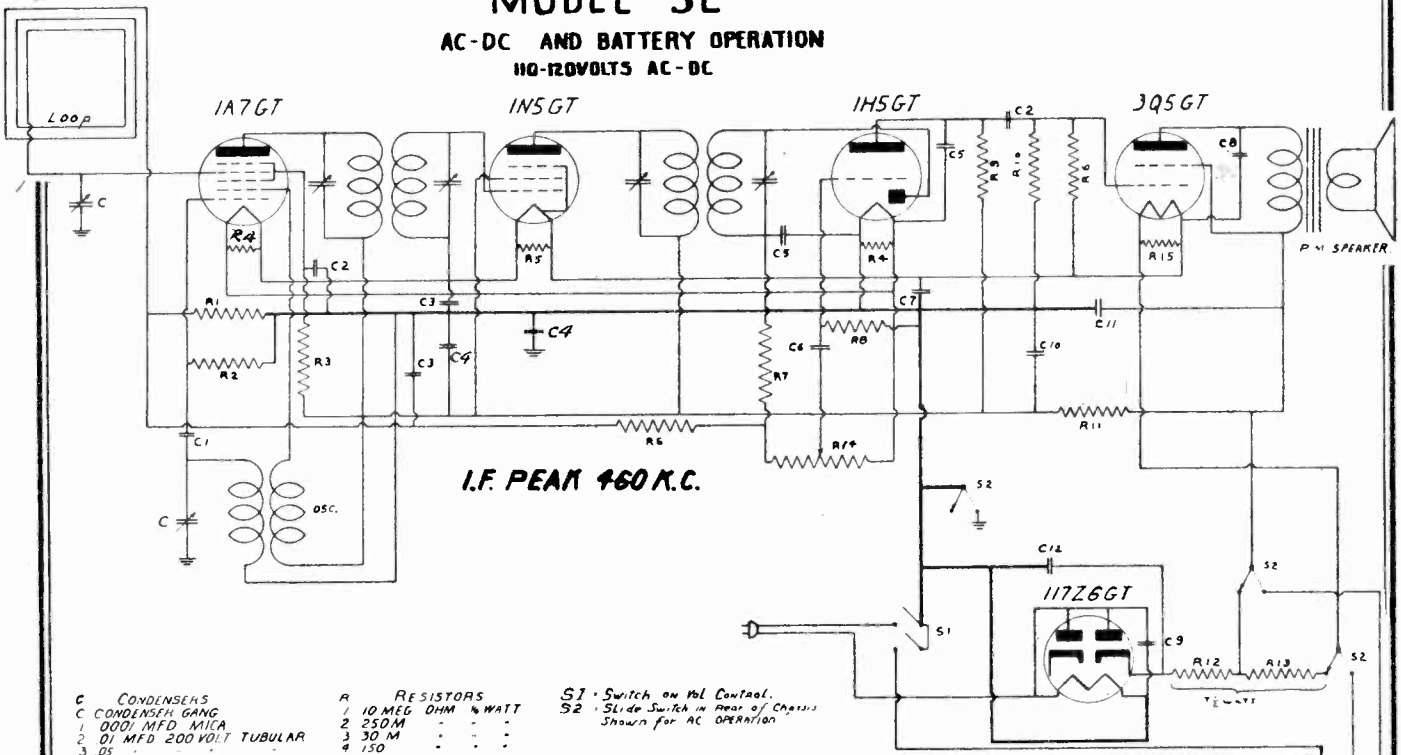




MODEL 5L

AC-DC AND BATTERY OPERATION

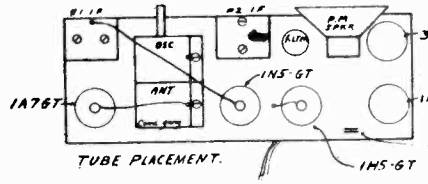
110-120 VOLTS AC-DC



C	CONDENSERS
C	CONDENSER GANG
1	.0001 MFD MICA
2	.01 MFD 200 VOLT TUBULAR
3	.05 " " "
4	.25 " " "
5	.00025 MFD MICA
6	.006 MFD 600 VOLT "
7	.100 " 25 " "
8	.001 " 400 " "
9	.05 " " " "
10	
11	40 - 150 - FILTER
12	

R	RESISTORS	
1	10 MEG OHM	½ WATT
2	250M "	" "
3	30 M "	" "
4	150 "	" "
5	250 "	" "
6	3 MEG "	" "
7	50M "	" "
8	5 MEG "	" "
9	500M "	" "
10	700M "	" "
11	500 "	" "
12	500 "	1 "
13	1650 "	" "
14	500M VOL.	CONTROL
15	1000 OHM	½ WATT.

S1 - Switch on Vol Control.
S2 - Slide Switch in Rear of Chassis Shown for AC OPERATION



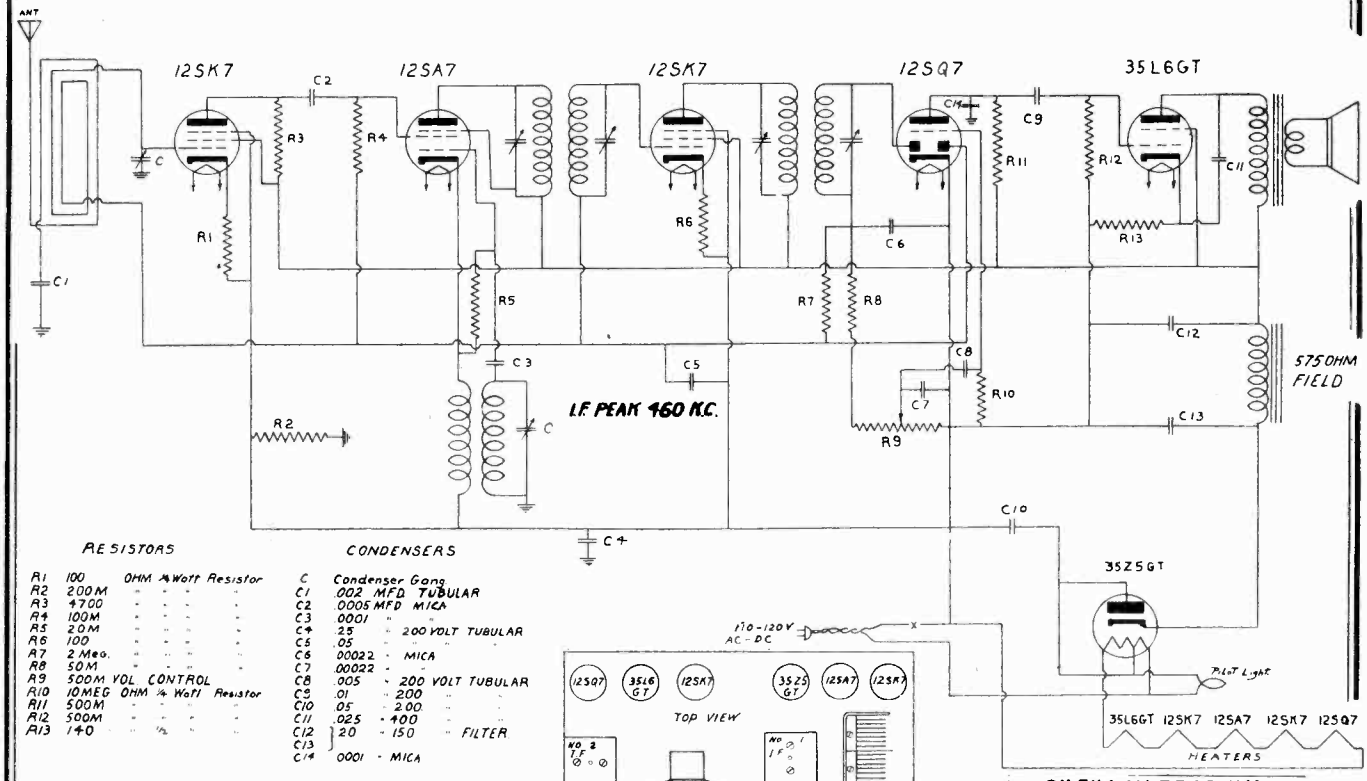
USE BATTERY PACK
RAY-O-VAC
No. AB-794

INSERT A.C. PLUG HERE FOR BATTERY OPERATION.

MFG by.
Gilfillan Bros Inc. 9/21/40

MODELS 6K, 6L, 6R
MODEL 6U

GILFILLAN BROS. INC.



RESISTORS

R1	100	OHM ½ Watt Resistor
R2	200 M	" " " "
R3	4700	" " " "
R4	100 M	" " " "
R5	2 M	" " " "
R6	100	" " " "
R7	2 Meg.	" " " "
R8	50 M	" " " "
R9	500 M	VOL CONTROL
R10	10 MEG	OHM ½ Watt Resistor
R11	500 M	" " " "
R12	500 M	" " " "
R13	140	" " " "

CONDENSERS

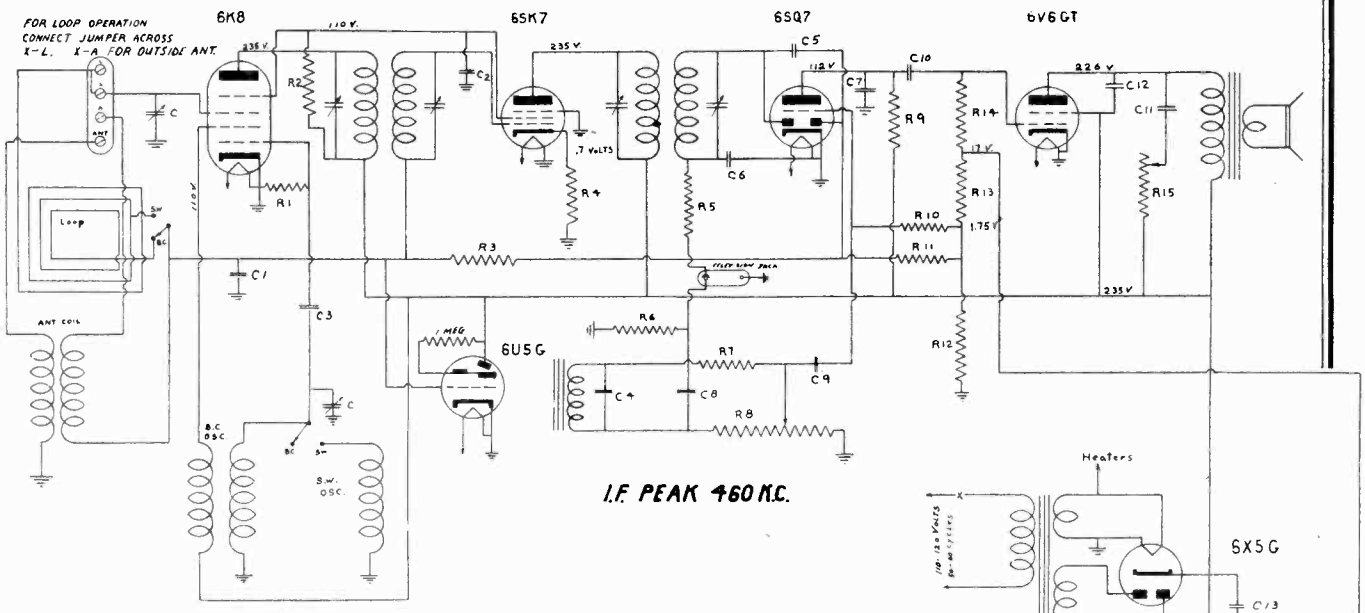
C	Condenser Gang	
C1	.002 MFD	TUBULAR
C2	.0005 MFD	MICA
C3	.0001	"
C4	.25	" 200 VOLT TUBULAR
C5	.05	" " "
C6	.00022	" MICA
C7	.00022	" "
C8	.005	" 200 VOLT TUBULAR
C9	.01	" 200 " "
C10	.05	" 200 " "
C11	.025	" 400 " "
C12	.20	" 150 " FILTER
C13		
C14	.0001	" MICA

TUBE PLACEMENT

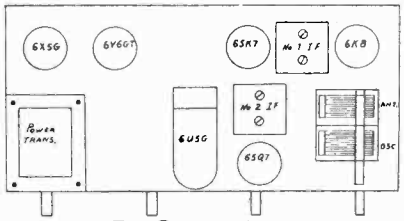
GILFILLAN BROS INC

MODELS 6K-6L-6R

FEB.-20-40

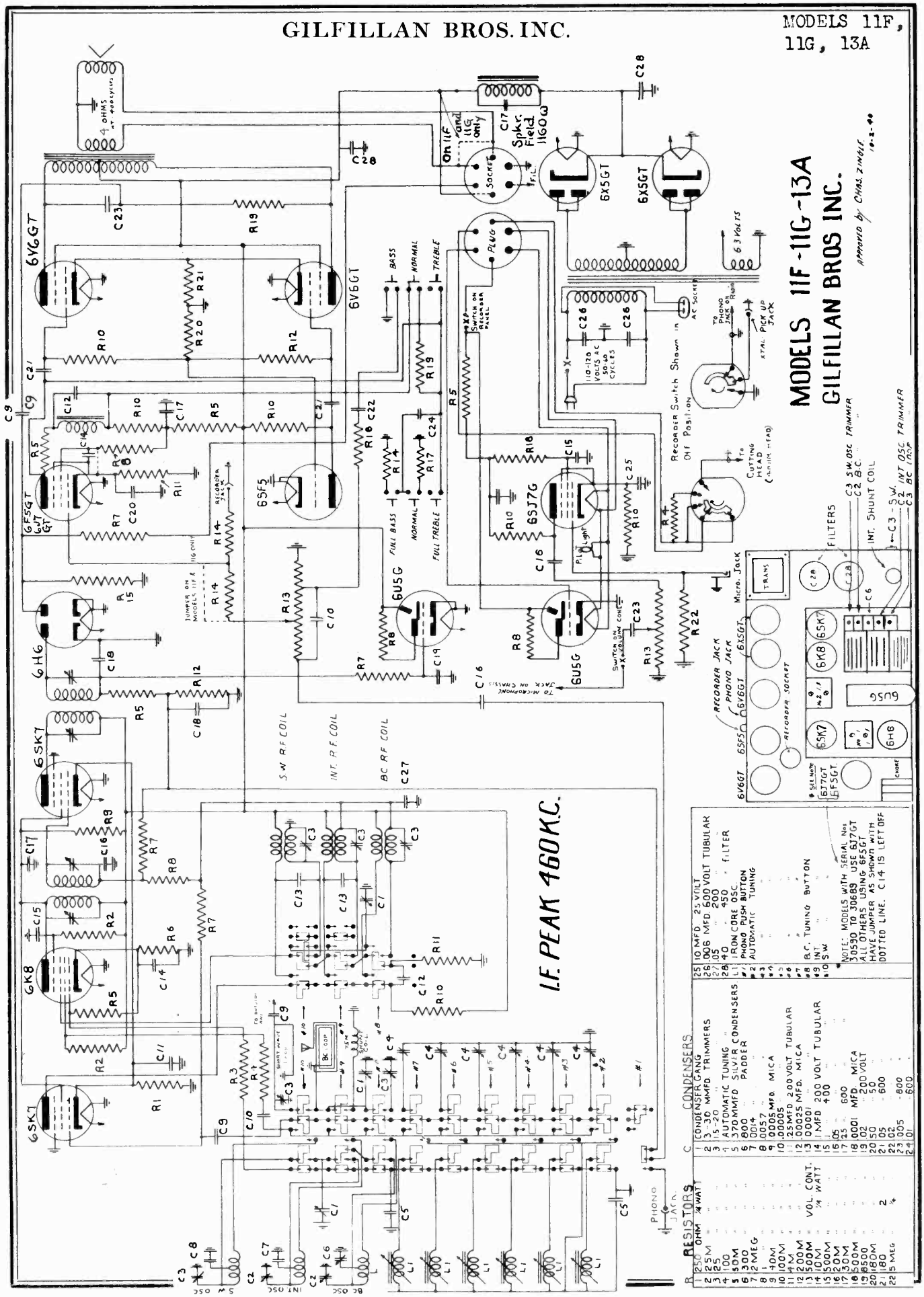


CONDENSERS		RESISTORS	
C	CONDENSER GANG	R1	100 M OHM ½ WATT RESISTOR
C1	.05 MFD 200 VOLT TUBULAR	R2	10 M " 2 " " "
C2	.05 " 400 " "	R3	1 MEG " ½ " "
C3	70 MMFD MICA CONDENSER	R4	100 " " " "
C4	70 " " "	R5	2.5 M " " " "
C5	70 " " "	R6	100 M " " " "
C6	.00025 MFD " "	R7	" " " " "
C7	.0005 " "	R8	500 M " VOLUME CONTROL
C8	.01 MFD 400 VOLT "	R9	250 M " ½ WATT RESISTOR
C9	.01 MFD 400 " "	R10	10 MEG " " "
C10	.01 MFD 600 " "	R11	3 " " " "
C11	.05 " 800 " "	R12	40 " " " "
C12	.004 " 600 " "	R13	400 " " "
C13	16 MFD 450 " FILTER	R14	1 MEG " ½ " "
C14	4 MFD " " "	R15	2.5 M " TONE CONTROL



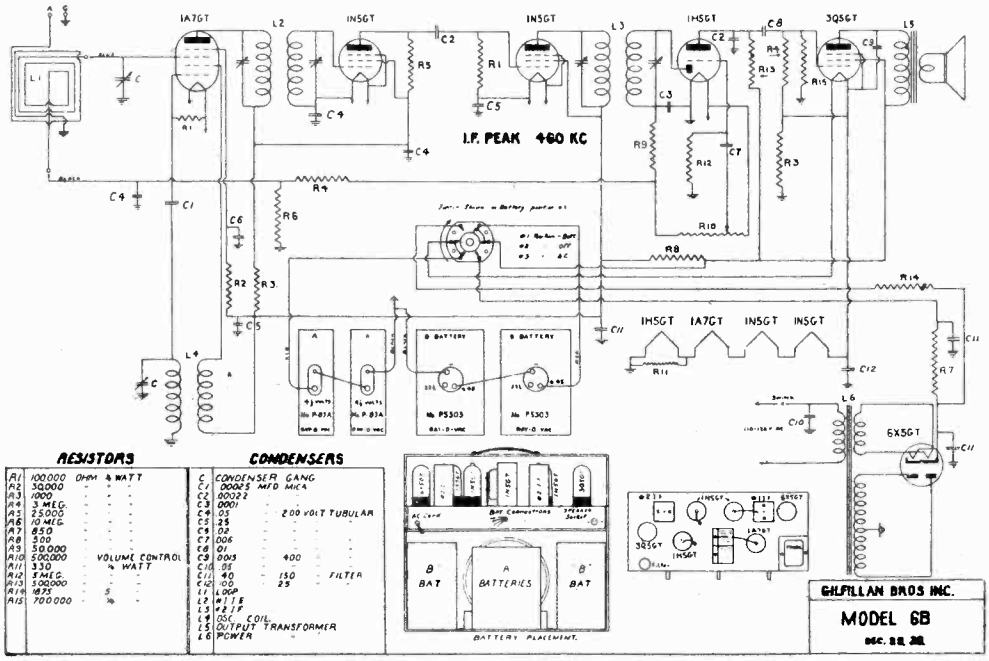
Tube Placement.

GILFILLAN BROS. INC.
ENGINEERING DEPT.
MODEL 6U
2-10-40

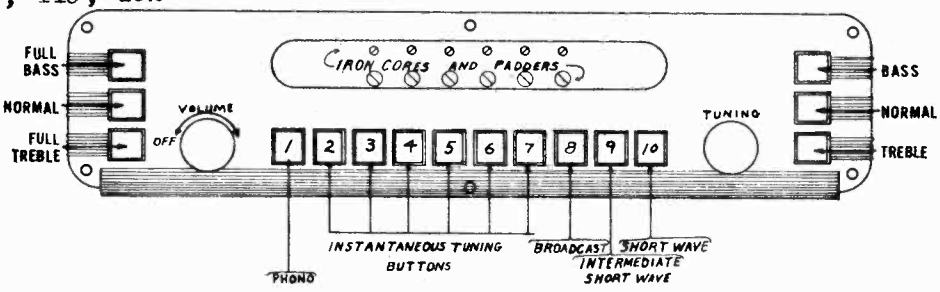


MODEL 6B
MODELS 11F, 11G, 13A

GILFILLAN BROS. INC.



MODELS 11F, 11G, 13A



Plug in AC cord, turn "Off Volume" knob on, push in "Broadcast" button, and select stations as desired by using tuning knob.

Use same procedure, though push in "Intermediate Short Wave" or "Short Wave" buttons for tuning these bands.

To set broadcast band stations to buttons for instantaneous tuning:

Remove decorated cover above long row of knobs (with fingernail or screw driver). This will expose six pairs of screws. These are the iron-core tuners and padders. From left to right these iron cores tune stations for buttons number two to seven, inclusive. Select the six stations desired, remove the call letters from the station tab sheet, insert the tabs in the buttons, assigning the station with the lowest KC frequency to button No. 2 and, in order, to the station with the highest KC frequency to button No. 7.

To actually set stations to the buttons:

By means of manual tuning, play the station to be set; then push the button at which the station is to be set; then with a screwdriver turn iron-core (long screw) till station is located. Adjust station to loudest volume, using padder screw (short screw); then readjust long screw till station is set to a point where the tuning eye is at its most closed position. The station is then "set" to the button.

This procedure must be repeated for each station to be set to each button, and it is suggested that, after the stations are all once set to their buttons, they be rechecked before replacing the cover.

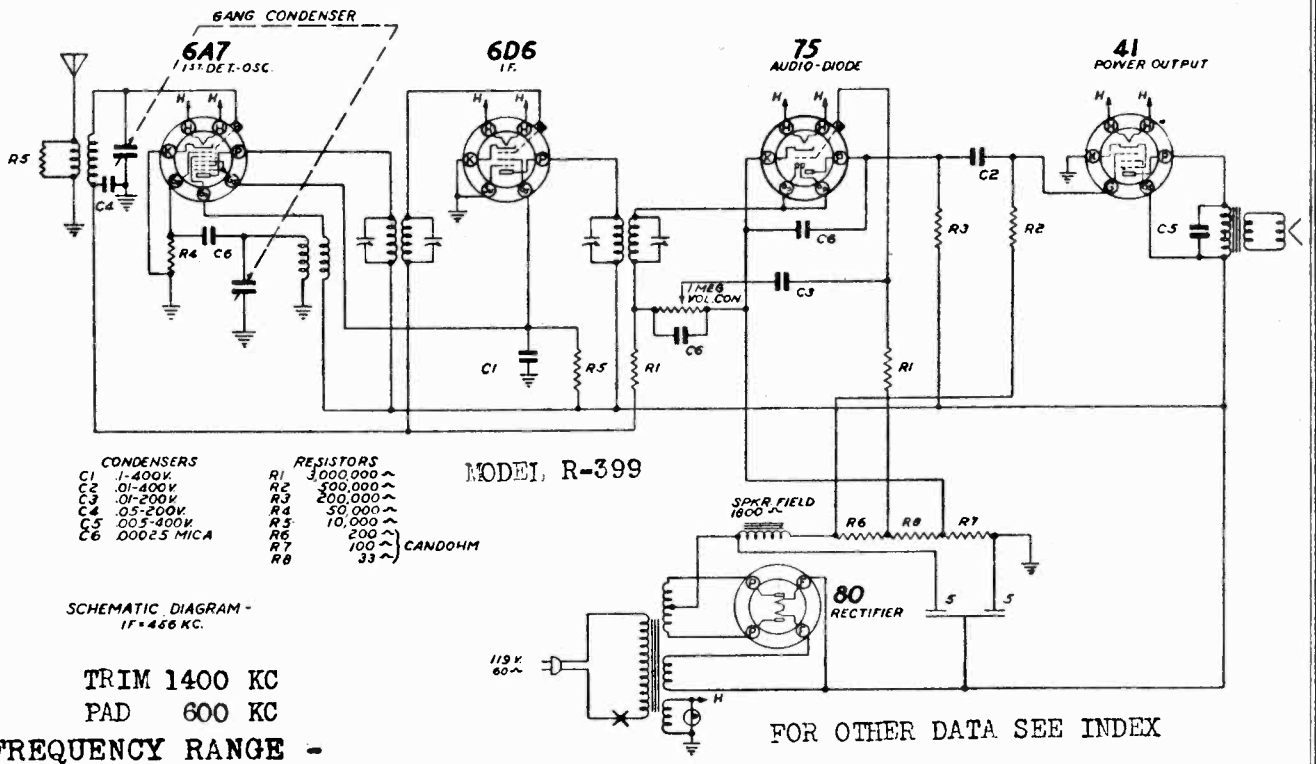
Standard broadcast antenna is mounted on a swivel in rear of cabinet. For tuning some more distant stations, it may be desirable to rotate antenna to position of loudest volume or, if necessary, an outside antenna may be connected to a green wire lead coming from this broadcast loop. For short wave tuning, some locations will require an outside antenna. This outside antenna should be connected to the green wire coming from the short wave loop, which is located directly above the chassis. If extra antenna is desired for both short wave and standard broadcast performance, both green antenna leads can be joined together satisfactorily to one outside antenna.

If a phonograph or microphone is to be used, they should be plugged into the rear of the chassis in place provided and so marked. To use as a phonograph or with microphone, push in "Phono" button. In the rear of the chassis is provided a 110 volt plug. This is for your convenience for using this radio with a phonograph attachment or with a lamp.

A six-prong outlet is provided in the chassis pan. This outlet is wired into the circuit and can be used only in conjunction with a special microphone pre-amplifier and control that has been designed especially for recording purposes. The consumer owning this receiver may purchase a portable recorder and, by connecting it to our microphone pre-amplifier, it is possible to make recordings of the highest quality.

B. F. GOODRICH

MODELS R-399, R-405



CONDENSERS		RESISTORS	
C1	.1-400V.	R1	3,000,000 Ω
C2	.01-400V.	R2	500,000 Ω
C3	.01-200V.	R3	200,000 Ω
C4	.05-200V.	R4	50,000 Ω
C5	.005-400V.	R5	10,000 Ω
C6	.00025 MICA	R6	200 Ω
		R7	100 Ω
		R8	33 Ω

CANDOHM

MODEL R-399

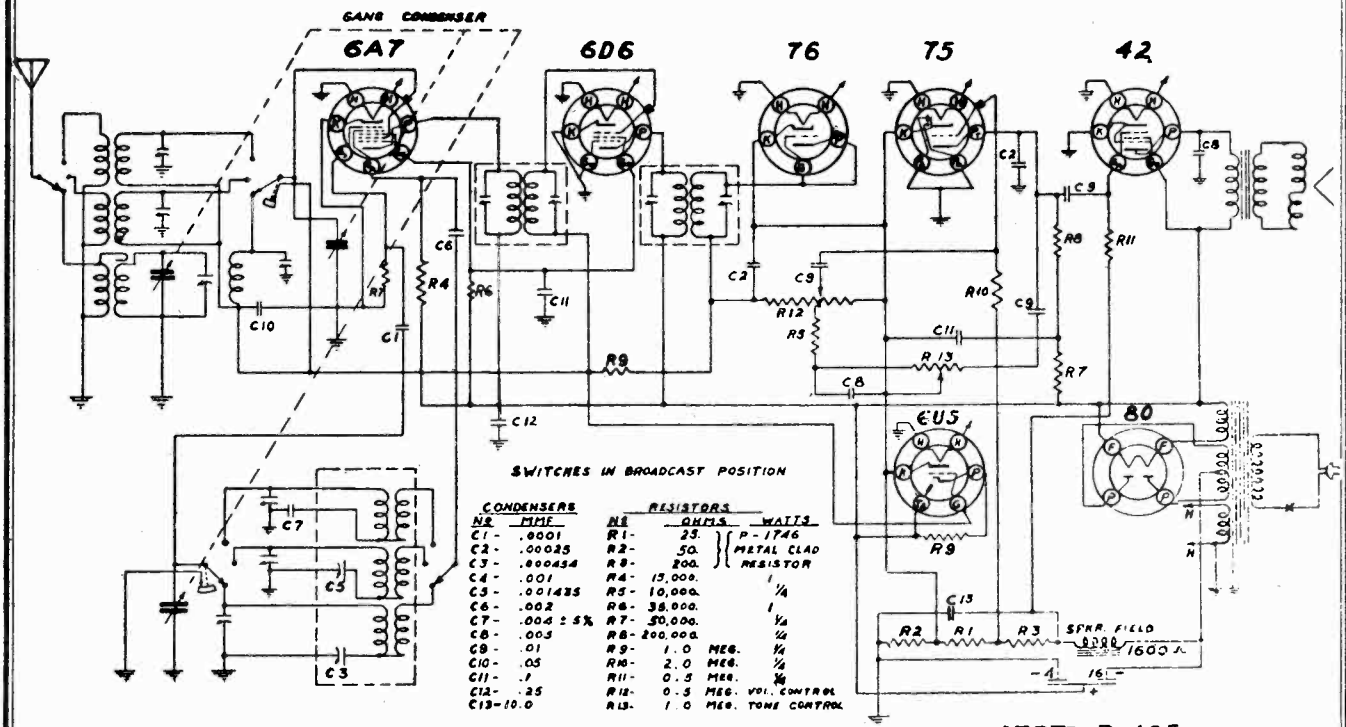
SCHEMATIC DIAGRAM - IF = 456 KC.

TRIM 1400 KC
PAD 600 KC

FREQUENCY RANGE - 535 to 1720 KC

FOR OTHER DATA SEE INDEX

CONVENTIONAL ALIGNMENT SEE SPECIAL SECT. VOL. VIII



CONDENSERS		RESISTORS		
NO.	MMF	NO.	OHMS	WATTS
C1 -	.0001	R1 -	25.	P-1746 METAL CLAD RESISTOR
C2 -	.00025	R2 -	50.	
C3 -	.000454	R3 -	200.	
C4 -	.001	R4 -	15,000.	1
C5 -	.001435	R5 -	10,000.	1/4
C6 -	.002	R6 -	38,000.	1
C7 -	.004 ± 5%	R7 -	50,000.	1/2
C8 -	.005	R8 -	200,000.	1/4
C9 -	.01	R9 -	1.0 MEG.	1/4
C10 -	.05	R10 -	2.0 MEG.	1/4
C11 -	.1	R11 -	0.5 MEG.	1/4
C12 -	.25	R12 -	0.5 MEG.	VOL. CONTROL
C13 -	10.0	R13 -	1.0 MEG.	TONE CONTROL

MODEL R-405

FREQUENCY RANGE -

550 to 1700 KC
1700 to 5400 KC
5600 to 18100 KC

IF PEAKED AT 456 KC

FOR OTHER DATA SEE INDEX

MODELS R-399, R-400, R-404, R-405, R-419, R-421

B. F. GOODRICH

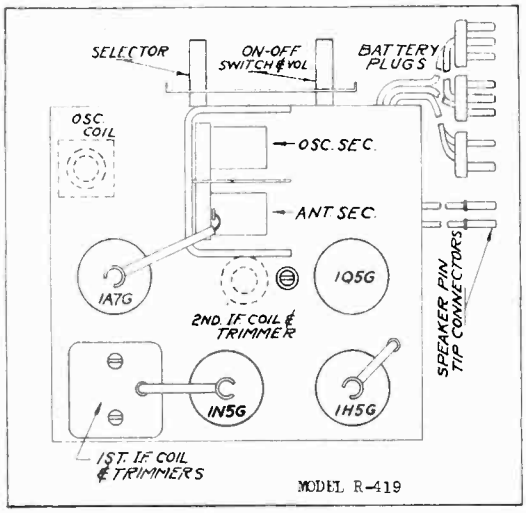
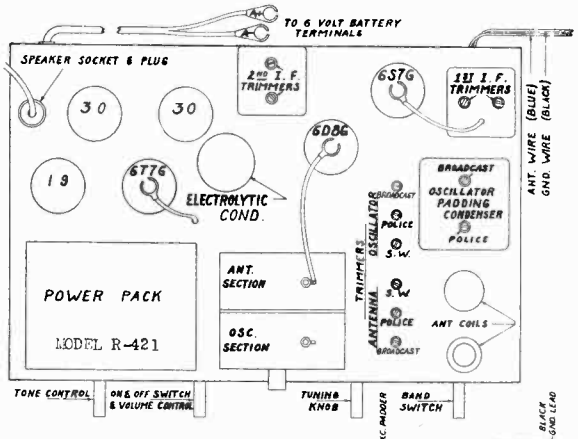
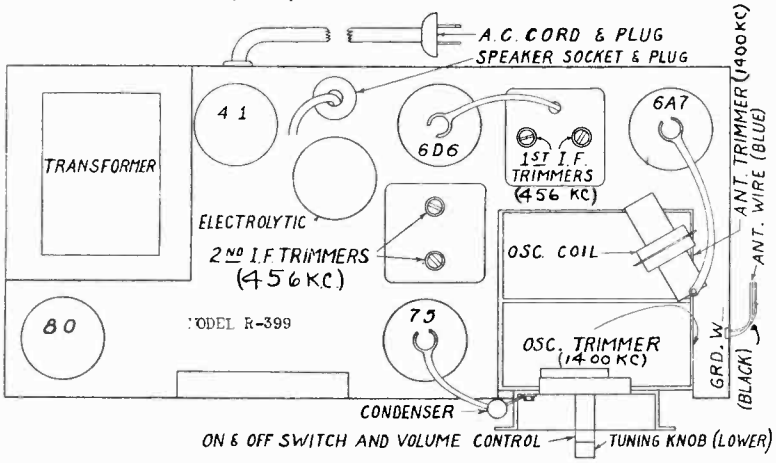
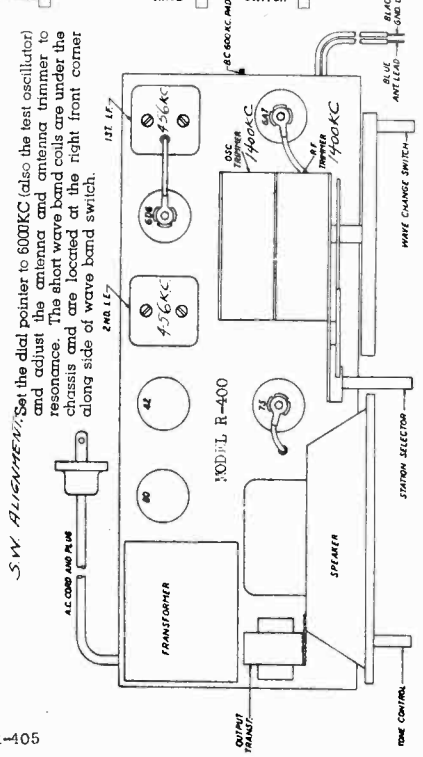
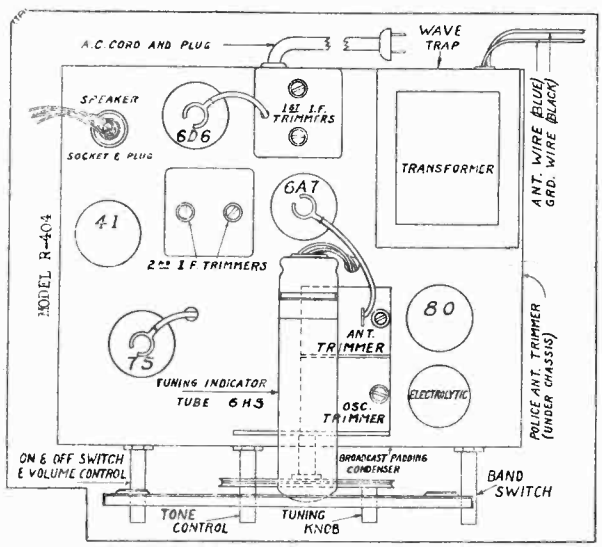


Fig. 1 - Top View

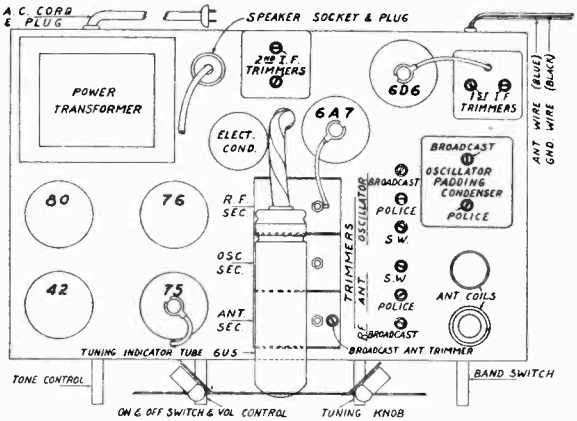






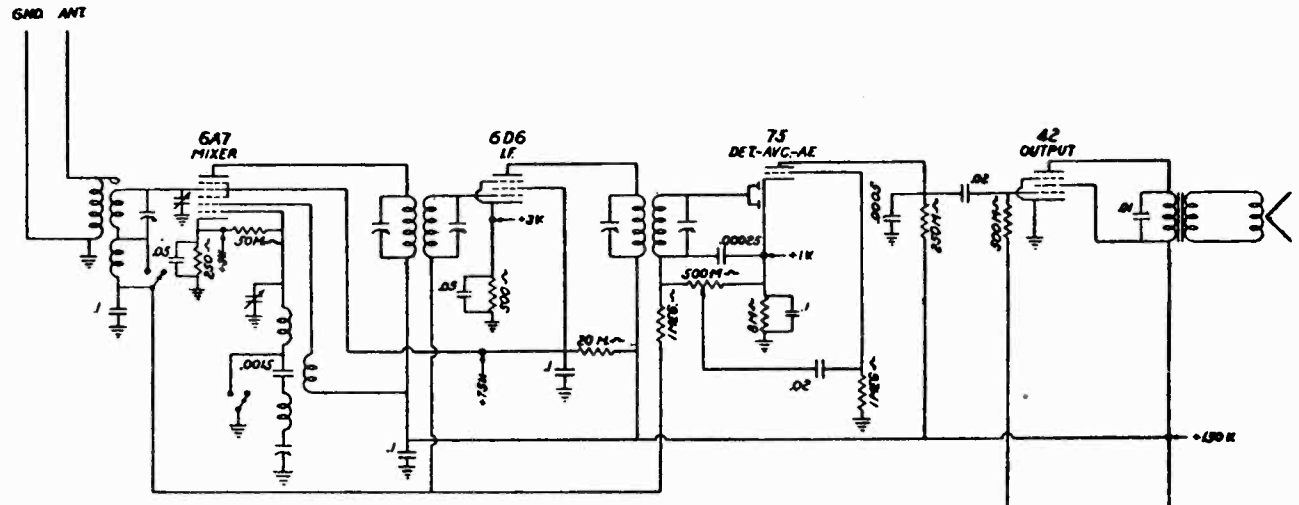


MODEL R-405



B. F. GOODRICH

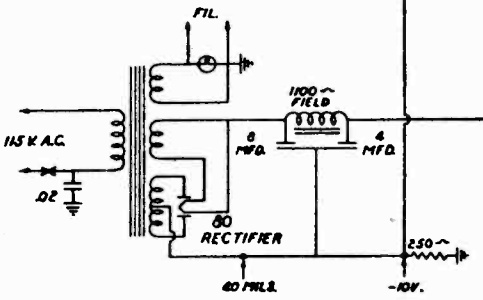
MODELS R-400, R-424



SCHEMATIC DIAGRAM
BI CHASSIS

5 TUBE A.C. 2 BAND { B.C.-540 TO 1720 K.C. / S.W.-2000 TO 7000 K.C.

I.F. = 456 K.C.
SWITCH SHOWN IN B.C. POSITION
ALL VOLTAGES SHOWN TO GROUND

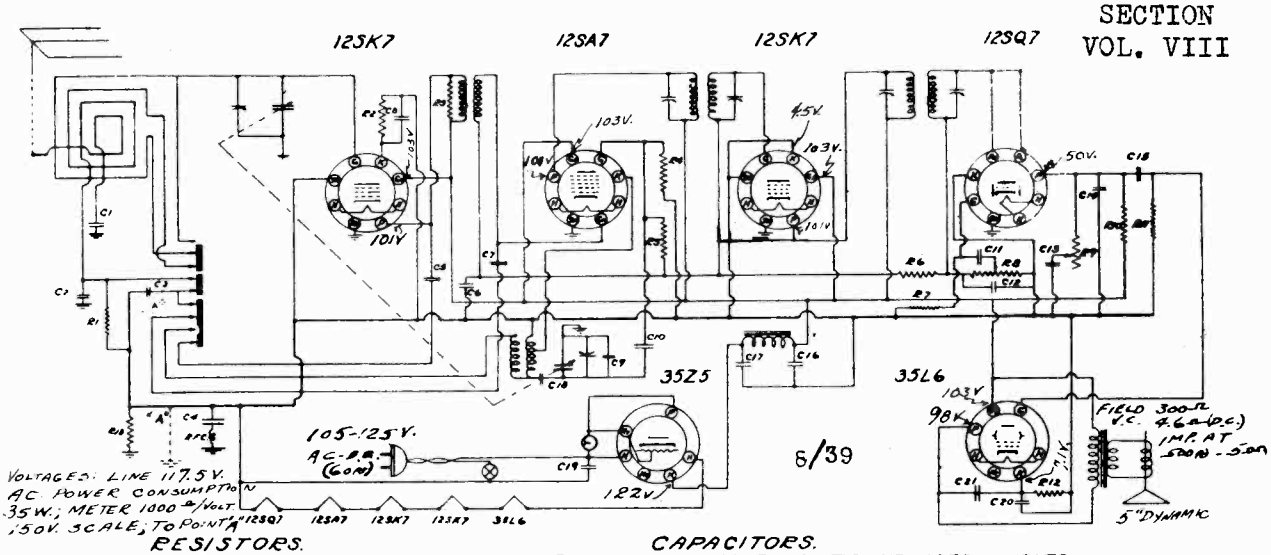


FOR OTHER DATA SEE INDEX

MODEL R-400

CONVENTIONAL ALIGNMENT

SEE SPECIAL SECTION VOL. VIII



RESISTORS.

Nº	OHMS	WATTS	Nº	OHMS	WATTS
R1	150K ±10%	½	R8	500K-V.C.	½
R2	600Ω ±10%	½	R9	500K-T.C.-	½
R3	5K ±10%	½	R10	150K	½
R4	15 Meg.	½	R11	250K	½
R5	25K	½	R12	200Ω ±10%	½
R6	2 Meg.	½	R13	150K	½
R7	5 Meg.	½			

CAPACITORS.

Nº	MFD.	VOLTS	Nº	MFD.	VOLTS.	Nº	MFD.	VOLTS
C1	.001	600	C8	.05	200	C15	.01	400
C2	.00127 ±5% Mica		C9	.000010 Mica		C16	20.	150
C3	.05	400	C10	.00005 Mica		C17	20.	150
C4	.25	200	C11	.01	400	C18	.02	400
C5	.00006 ±5% Mica		C12	.00025 Mica		C19	.05	400
C6	.05	200	C13	.005	600	C20	20.	25
C7	.00006 ±5% Mica		C14	.0005 Mica		C21	.02	400

I.F. 455 KC.

In some sets C3, C4, C18, R13 and the R.F. choke (RFC) are not used and points "A" are connected to chassis.

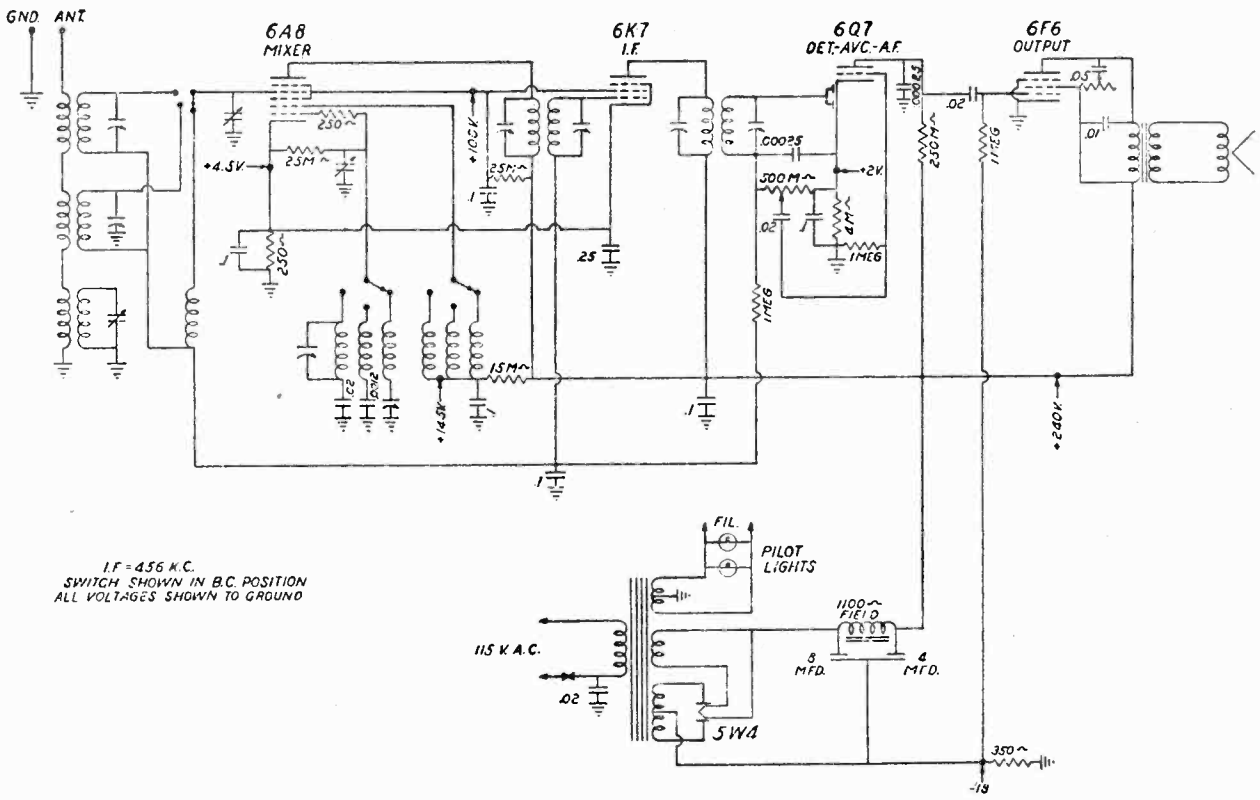
I.F. ALIGNMENT CONVENTIONAL (SEE VOL. VIII).
BROADCAST BAND
TRIM OSC 1630 KC
TRIM ANT 1400 KC

FOR OTHER DATA SEE INDEX

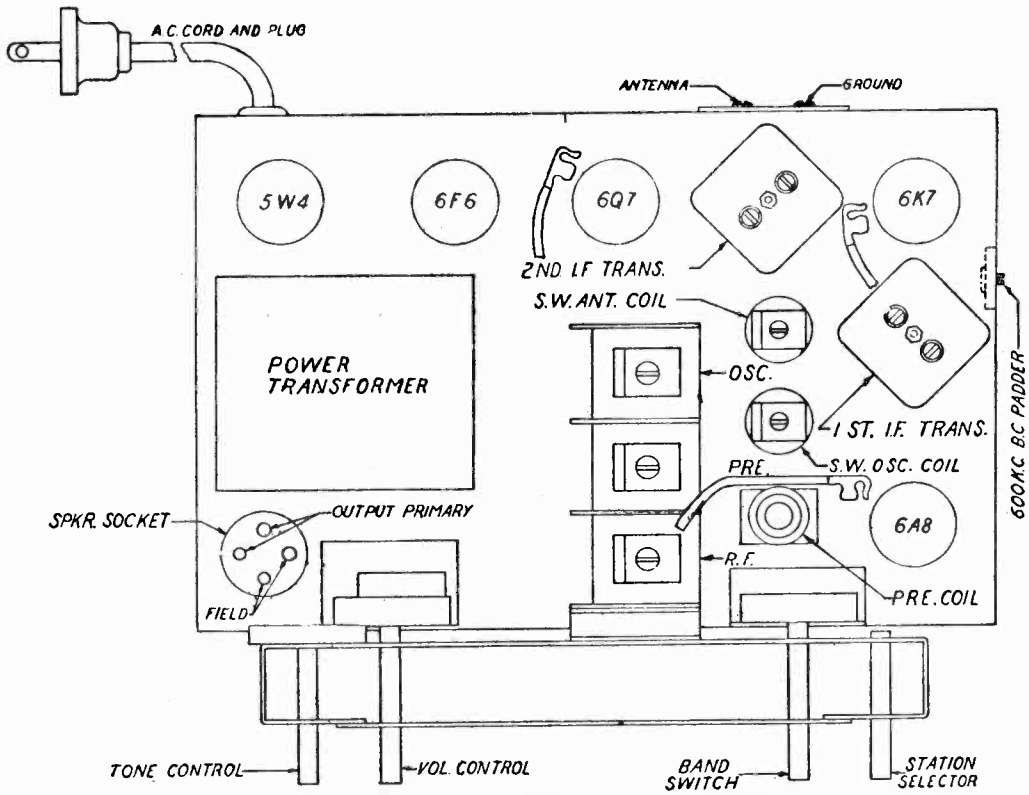
MODEL R-424

MODEL R-401

B. F. GOODRICH

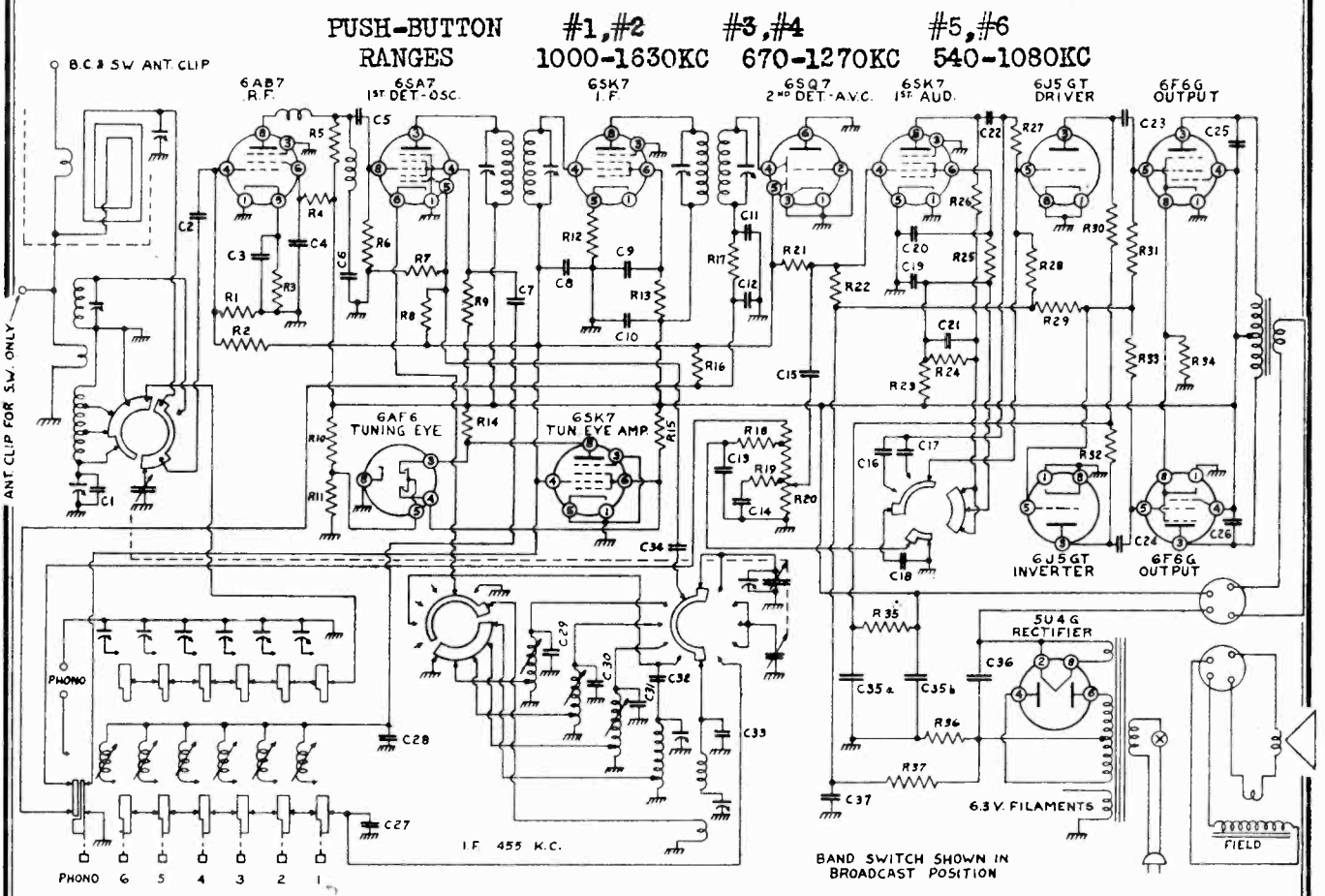


FOR CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL.VIII



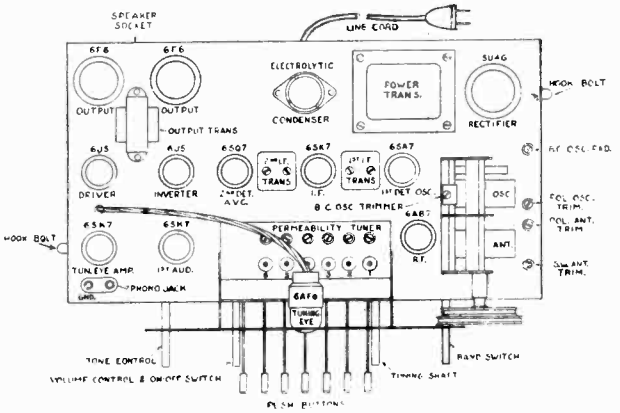
B. F. GOODRICH

MODEL R-459

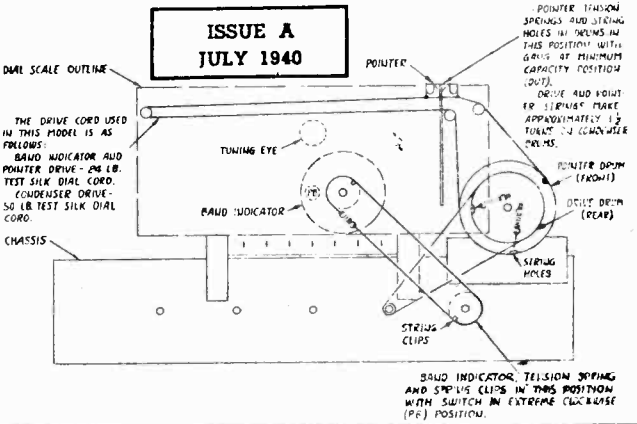


ALIGNMENT CONVENTIONAL-SEE SPECIAL SECTION VOL. VIII

R 1	1,000,000 ohm	½ watt	R20	500,000 ohm	V.C.	C1	.00002	10% Mica	C20	.05	400 V.
R 2	2,000,000 ohm	½ watt	R21	1,000,000 ohm	½ watt	C2	.0001	Mica	C21	.05	400 V.
R 3	250 ohm	½ watt	R22	2,000,000 ohm	½ watt	C3	.05	200 V.	C22	.01	400 V.
R 4	50,000 ohm	½ watt	R23	50,000 ohm	½ watt	C4	.05	400 V.	C23	.02	400 V.
R 5	5,000 ohm	½ watt	R24	100,000 ohm	½ watt	C5	.0001	Mica	C24	.02	400 V.
R 6	100,000 ohm	½ watt	R25	500,000 ohm	½ watt	C6	.00006	5% Mica	C25	.005	600 V
R 7	25,000 ohm	½ watt	R26	15,000 ohm	½ watt	C7	.05	400 V.	C26	.005	600 V.
R 8	5,000,000 ohm	½ watt	R27	500,000 ohm	½ watt	C8	.05	200 V.	C27	.0005	2½% Mica
R 9	15,000 ohm	2 watt	R28	100,000 ohm	½ watt	C9	.05	400 V.	C28	.003	5% Mica
R10	25,000 ohm	1 watt	R29	250,000 ohm	½ watt	C10	.1	400 V.	C29	.0003	2½% Mica
R11	30,000 ohm	½ watt	R30	50,000 ohm	½ watt	C11	.0001	Mica	C30	.00025	2½% Mica
R12	100 ohm	½ watt	R31	250,000 ohm	½ watt	C12	.0001	Mica	C31	.0002	2½% Mica
R13	50,000 ohm	½ watt	R32	50,000 ohm	½ watt	C13	.02	200 V.	C32	.003	5% Mica
R14	200,000 ohm	½ watt	R33	300,000 ohm	½ watt	C14	.02	200 V.	C33	.00003	10% Mica
R15	200,000 ohm	½ watt	R34	220 ohm	1 watt	C15	.05	400 V.	C34	.0001	Mica
R16	1,000,000 ohm	½ watt	R35	20,000 ohm	½ watt	C16	.0001	Mica	C35a	16 Mfd.	450 V.
R17	50,000 ohm	½ watt	R36	25 ohm	1 watt	C17	.00025	Mica	C35b	20 Mfd.	450 V.
R18	30,000 ohm	½ watt			10%	C18	.001	600 V.	C36	25 Mfd.	450 V.
R19	30,000 ohm	½ watt	R37	250,000 ohm	½ watt	C19	.25	400 V.	C37	.25	200 V.

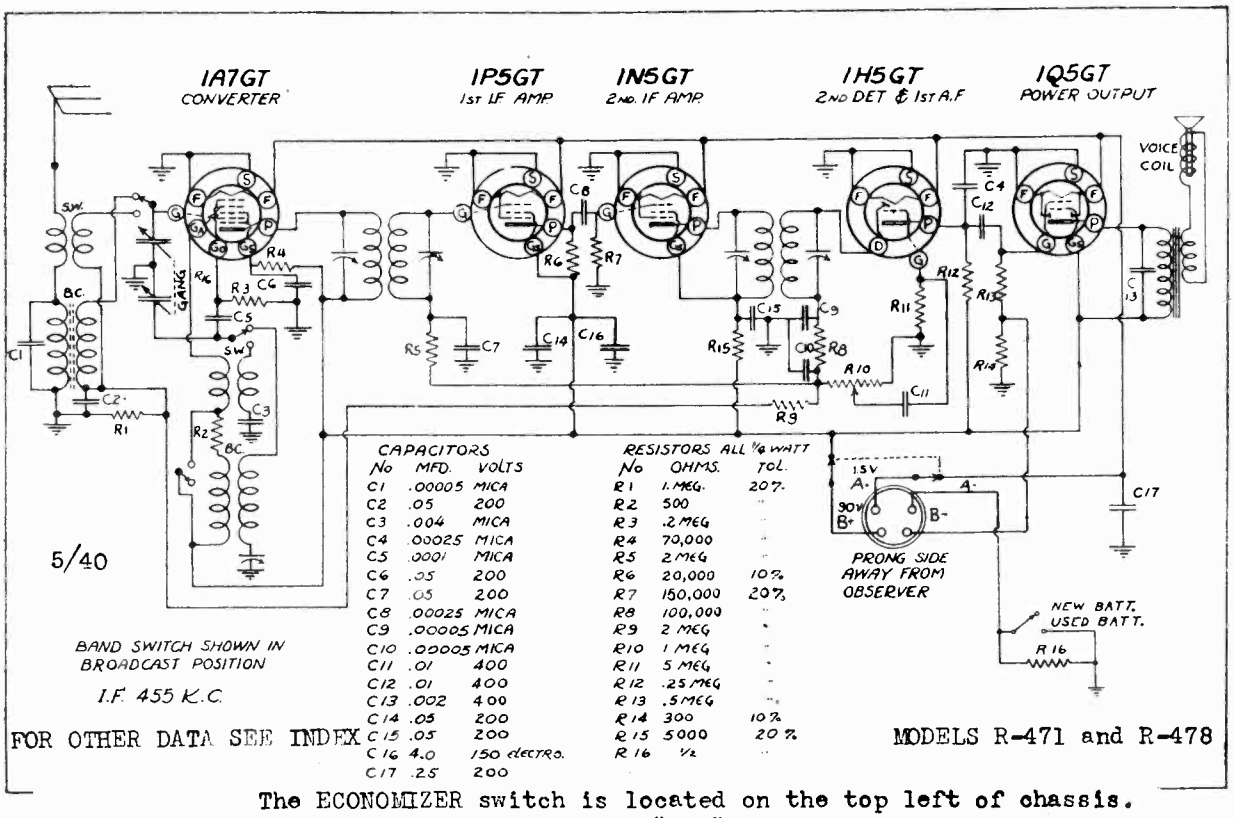


ISSUE A
JULY 1940



MODELS R-471, R-478
R-480

B. F. GOODRICH



CAPACITORS

No	MFD.	VOLTS
C1	.00005	MICA
C2	.05	200
C3	.004	MICA
C4	.00025	MICA
C5	.0001	MICA
C6	.05	200
C7	.05	200
C8	.00025	MICA
C9	.00005	MICA
C10	.00005	MICA
C11	.01	400
C12	.01	400
C13	.002	400
C14	.05	200
C15	.05	200
C16	4.0	150 electro.
C17	.25	200

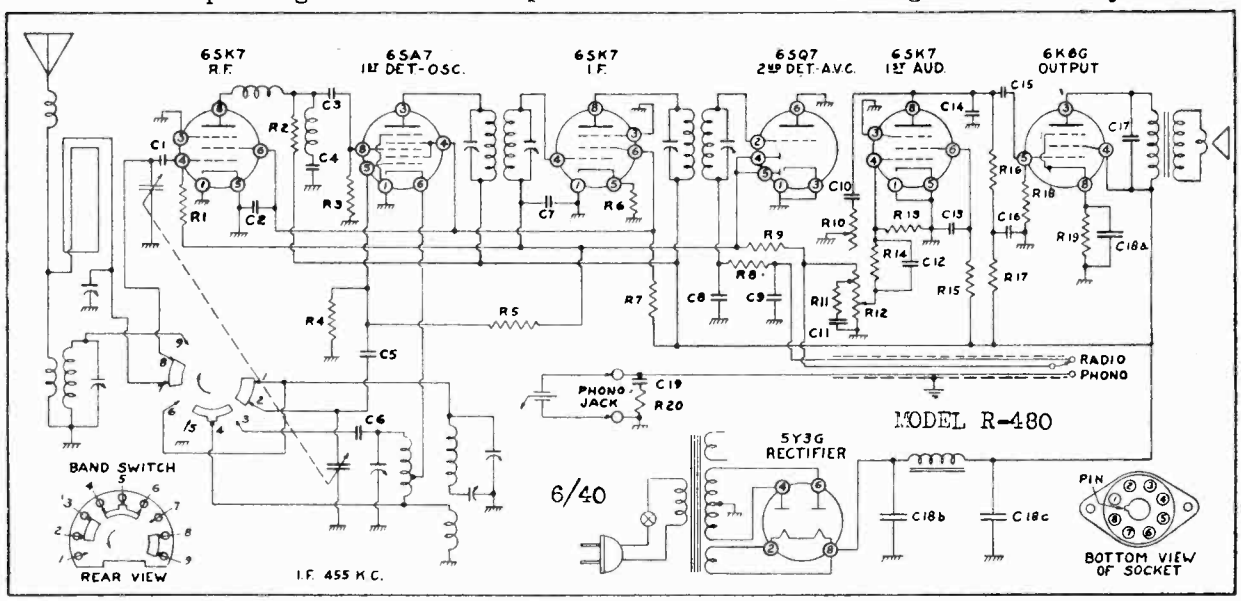
RESISTORS ALL 1/2 WATT

No	OHMS.	TOL.
R1	1. MEG.	20%
R2	500	"
R3	.2 MEG	"
R4	70,000	"
R5	2 MEG	"
R6	20,000	10%
R7	150,000	20%
R8	100,000	"
R9	2 MEG	"
R10	1 MEG	"
R11	5 MEG	"
R12	.25 MEG	"
R13	.5 MEG	"
R14	300	10%
R15	5000	20%
R16	1/2	"

FOR OTHER DATA SEE INDEX

MODELS R-471 and R-478

The ECONOMIZER switch is located on the top left of chassis. Always have this switch in the "NEW" battery position when first placing the radio in operation or when installing a new battery.



Band switch shown in broadcast position in schematic and in short wave position in pictorial view in lower left corner.

RESISTORS

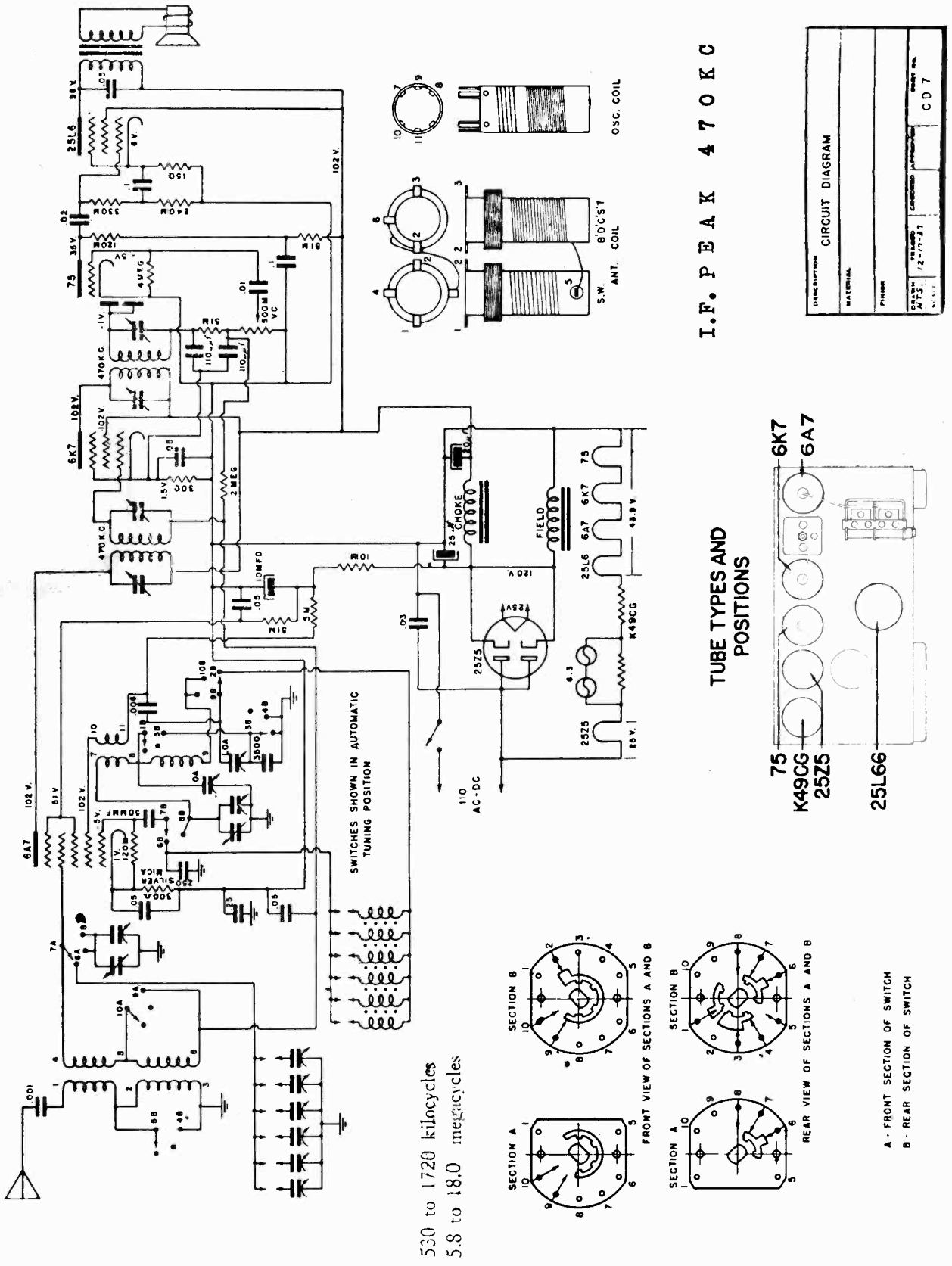
No.	Ohms	Watts	No.	Ohms	Watts
R1	500,000	1/4	R12	500,000	V.C.
R2	2,500	1/2	R13	2,000,000	1/4
R3	100,000	1/2	R14	2,000,000	1/4
R4	25,000	1/2	R15	2,000,000	1/4
R5	5,000,000	1/4	R16	250,000	1/4
R6	100	1/4	R17	50,000	1/4
R7	15,000	2	R18	500,000	1/4
R8	50,000	1/4	R19	600—10%	1/2
R9	1,000,000	1/4	R20	50,000	1/4
R10	500,000	T.C.			
R11	15,000	1/4			

CONDENSERS

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.0001	Mica	C12	.05	200
C2	.05	400	C13	.25	400
C3	.0001	Mica	C14	.00025	Mica
C4	.00006—5%	Mica	C15	.01	400
C5	.0001	Mica	C16	.25	400
C6	.003—5%	Mica	C17	.002	600
C7	.05	200	C18a	20.	25
C8	.00005	Mica	C18b	30.	350
C9	.0001	Mica	C18c	30.	350
C10	.002	600	C19	.005	400
C11	.05	200			

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 01006



Automatic Unit

Principle of Operation

The basic circuit of any radio receiver is the inductance coil and tuning condenser which determines the frequency to which the system is tuned. The frequency at which this circuit resonates can be varied in two ways; either by holding the inductance coil at a fixed value of inductance and changing the capacity of the condenser, or by holding the condenser at a fixed value of capacity and changing the inductance of the coil. This is so because the frequency is proportional to the inductance times the capacity and changing one or the other will change their product.

Previous push-button systems accomplished their purpose in one of two ways. They either rotated the tuning condenser mechanically with an electric motor, or disconnected the tuning condenser by means of a switch and substituted pre-set padding condensers in the antenna and oscillator circuits.

In the push-button system the entire oscillator circuit (coil and gang condenser) is disconnected and in its place is put a silvered mica condenser of fixed capacity and a coil, the inductance of which can be varied by means of an iron slug that moves with a screw adjustment, inside the coil. This is the second system of tuning mentioned above and has the following advantages in this case. The condenser is made by electroplating a small deposit of silver on each side of a piece of mica and encasing the whole unit in a weatherproof compound. The silver, having a low temperature coefficient has a negligible expansion with changes in temperature, and humidity has no effect because of the weatherproof compound. Therefore, changes in the condenser capacity are controlled. The coil is impregnated with a moisture-proof wax and the whole circuit is tuned by varying the inductance of the coil. The only uncontrollable factor in the system is the variation in capacity of the wiring and other parts. But this variation is so small that its detuning effect is not noticeable to the ear.

In the system the silvered mica condenser which tunes all six of the push button coils is in the main part of the receiver and connected on the wave switch. The push-button coils are mounted on the push-button unit and are adjusted from the back by slotted screws. The adjustable padding condensers directly above the slotted screws are used to align the antenna coil in the receiver to each of the push-button coils depending on which button is pushed. Variation in capacity of this padder has no effect on the tuning of the system. It simply drops the sensitivity slightly.

Instructions for Pre-setting "Fingertip Control" Circuits for Six Stations in the Broadcast Tuning Range

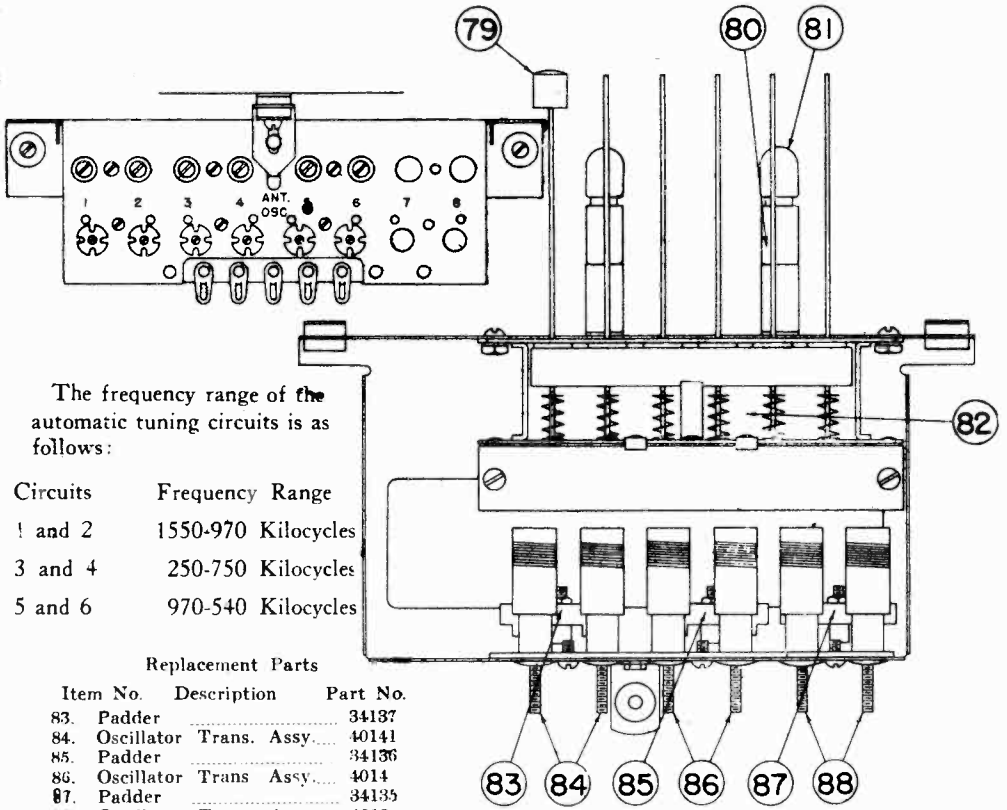
The automatic tuning unit is located immediately above the receiver chassis, the circuits being adjustable from the rear of this unit. Although it is possible to adjust the circuits without the aid of a signal generator, for best results it is recommended that a serviceman be allowed to pre-set the tuning circuits in the following manner.

Turn the wave change switch to the left. Six stations in the broadcast band may be chosen, and the tabs on which are printed the call letters of these stations should be selected from the sheet provided and inserted in the escutcheon slots. It is preferable to place the tabs in the slots according to frequency; that is to say, the low frequency stations should appear at the left as the unit is faced and the high frequency stations at the right.

The tuning circuits corresponding to a given station will be found at the rear of the automatic unit housing, immediately behind the station call letter tab slot. Assuming that you are facing the rear of the receiver and it is desired to set up WJZ at 760 kilocycles on the third circuit from the right, the following is the recommended procedure. Adjust the signal generator, modulated with an audio frequency, to 760 kilocycles. Using a small screw driver adjust the converter oscillator circuit, third hole from right in the lower row, until signal is loudest. Then adjust antenna circuit, third hole in upper row, until signal is at a maximum.

Readjust converter circuit carefully for maximum signal strength. Other frequencies may be set up in a similar manner on the remaining circuits.

If a signal generator is not available turn the wave switch to the middle position for manual tuning and tune the receiver to the desired station. Then turn the switch to the left ("fingertip-control" automatic position) and adjust the automatic unit oscillator and antenna circuits exactly as described abov Repeat procedure until all desired stations are set up. When all desired stations are set up recheck all oscillator adjustments for calibration accuracy



The frequency range of the automatic tuning circuits is as follows:

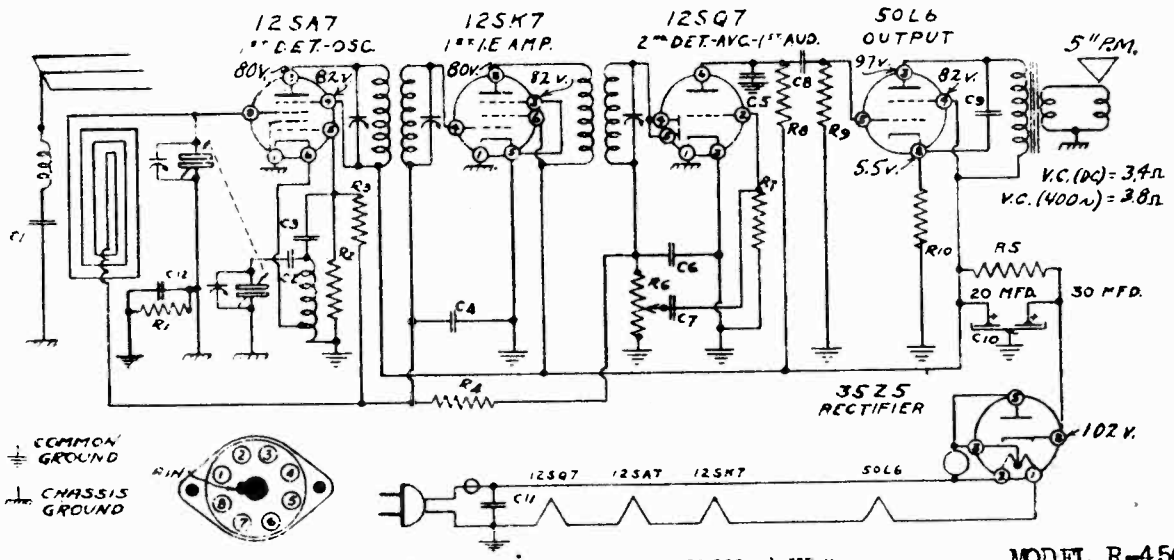
Circuits	Frequency Range
1 and 2	1550-970 Kilocycles
3 and 4	250-750 Kilocycles
5 and 6	970-540 Kilocycles

Replacement Parts

Item No.	Description	Part No.
83.	Padder	34137
84.	Oscillator Trans. Assy.	40141
85.	Padder	34136
86.	Oscillator Trans Assy.	4014
87.	Padder	34135
88.	Oscillator Trans. Assy	40138

B. F. GOODRICH

MODELS R-450, R-47C



MODEL R-450

CONDENSERS						RESISTORS					
No.	Capacity	Volts	C8	.002	600	R2	20,000	½ Watt			
C1	.001	600	C9	.01	400	R3	15,000,000	½ Watt			
C2	.02	400	C10	(20.0	150	R4	2,000,000	½ Watt			
C3	.00005	Mica		(30.0	150	R5	1,000	1 Watt			
C4	.05	200	C11	.05	400	R6	500,000	Vol. Cont.			
C5	.0005	Mica	C12	.25	200	R7	5,000,000	½ Watt			
C6	.00025	Mica				R8	250,000	½ Watt			
C7	.01	400	No.	Ohms		R9	500,000	½ Watt			
			R1	150,000	½ Watt	R10	150	½ Watt	10%		

ISSUE A
MARCH 1940

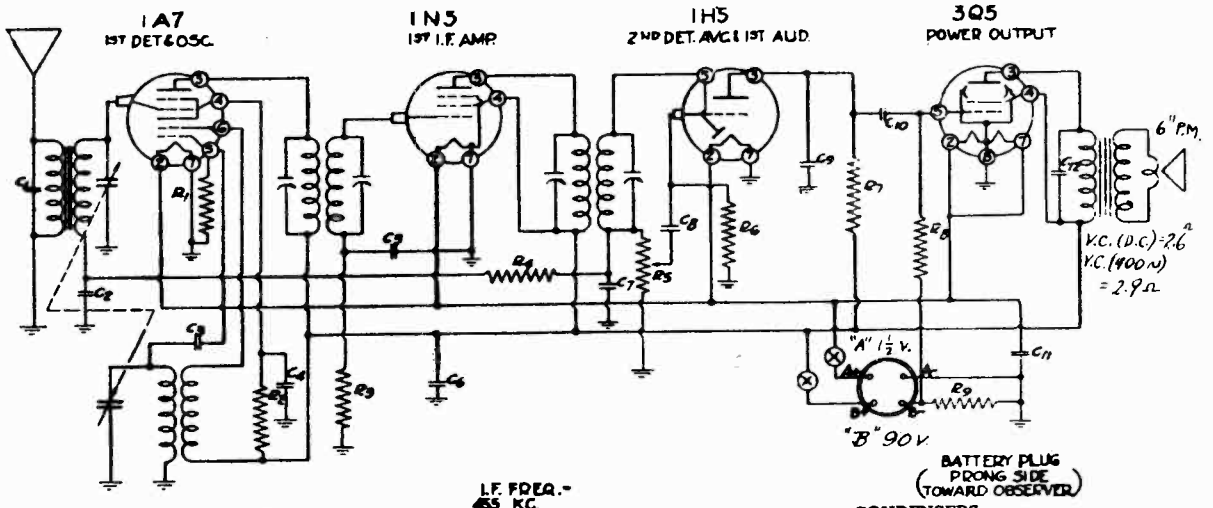
For SOCKET LAYOUT
See INDEX

C2, C12 and R1 are not used in some sets, all grounds connecting to chassis ground

I.F. PEAK - 455 KC
TRIM OSC. - 1730 KC
TRIM ANT. - 1400 KC

VOLTAGES: Line 115 v. AC. Power consumption, 30 watts. Volume control maximum. Meter 1000 ohms per volt. Read from point indicated to common ground.

CONVENTIONAL ALIGNMENT



RESISTORS

No.	Ohms	Watts	No.	Ohms	Watts
R1	200,000	½	R6	5 Meg.	¼
R2	30,000	½	R7	1 "	¼
R3	5 Meg.	¼	R8		¼
R4	1 Meg.	¼	R9	440 10%	¼
R5	500,000	V.C.			

CONDENSERS

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.00005	Mica	C7	.00025	Mica
C2	.05	200	C8	.01	400
C3	.00005	Mica	C9	.00025	Mica
C4	.1	200	C10	.01	400
C5	.002	400	C11	20 (Elect.)	25
C6	.001	200	C12	.005	400

I.F. PEAK - 455 KC
TRIM OSC. - 1730 KC
TRIM ANT. - 1400 KC

ISSUE A
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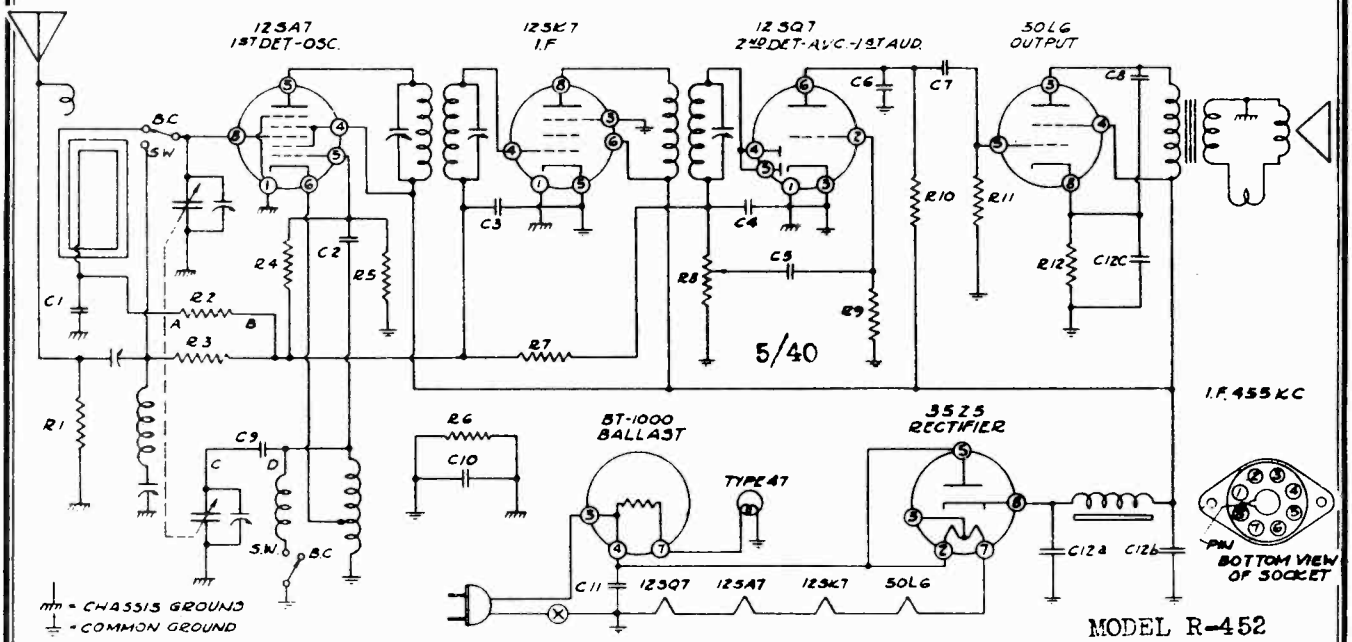
MODEL R-470

For SOCKET LAYOUT
See INDEX

MODELS R-452, R-453

B. F. GOODRICH



MODEL R-452

RESISTORS

No.	Ohms	Watts	No.	Ohms	Watts
R1	250,000	1/4	R7	2,000,000	1/4
R2	100,000	1/4	R8	500,000	V.C
R3	250,000	1/4	R9	5,000,000	1/4
R4	10,000,000	1/4	R10	250,000	1/4
R5	25,000	1/4	R11	500,000	1/4
R6	150,000	1/4	R12	150—10%	1/4

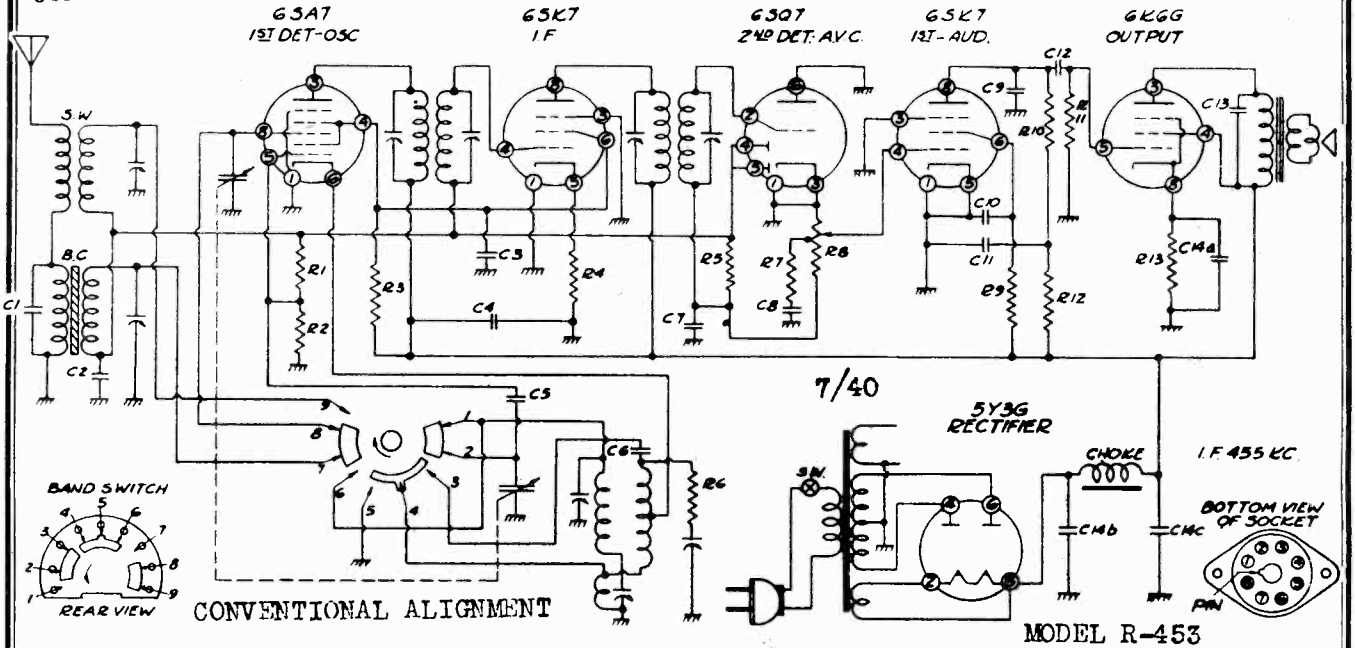
CONDENSERS

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.05	200	C8	.02	400
C2	.0001	Mica	C9	.02	200
C3	.05	200	C10	.2	200
C4	.00025	Mica	C11	.05	400
C5	.005	400	C12a	30.	150
C6	.0005	Mica	C12b	20.	150
C7	.01	400	C12c	20.	85

In model J6 all common grounds become chassis grounds, C1, C9, C10, R2 and R6 are omitted. Point "A" is connected to point "B" and point "C" to point "D."

CONVENTIONAL ALIGNMENT

FOR OTHER DATA SEE INDEX



MODEL R-453

Band switch shown in broadcast position in schematic and in short wave position in pictorial view in lower left corner.

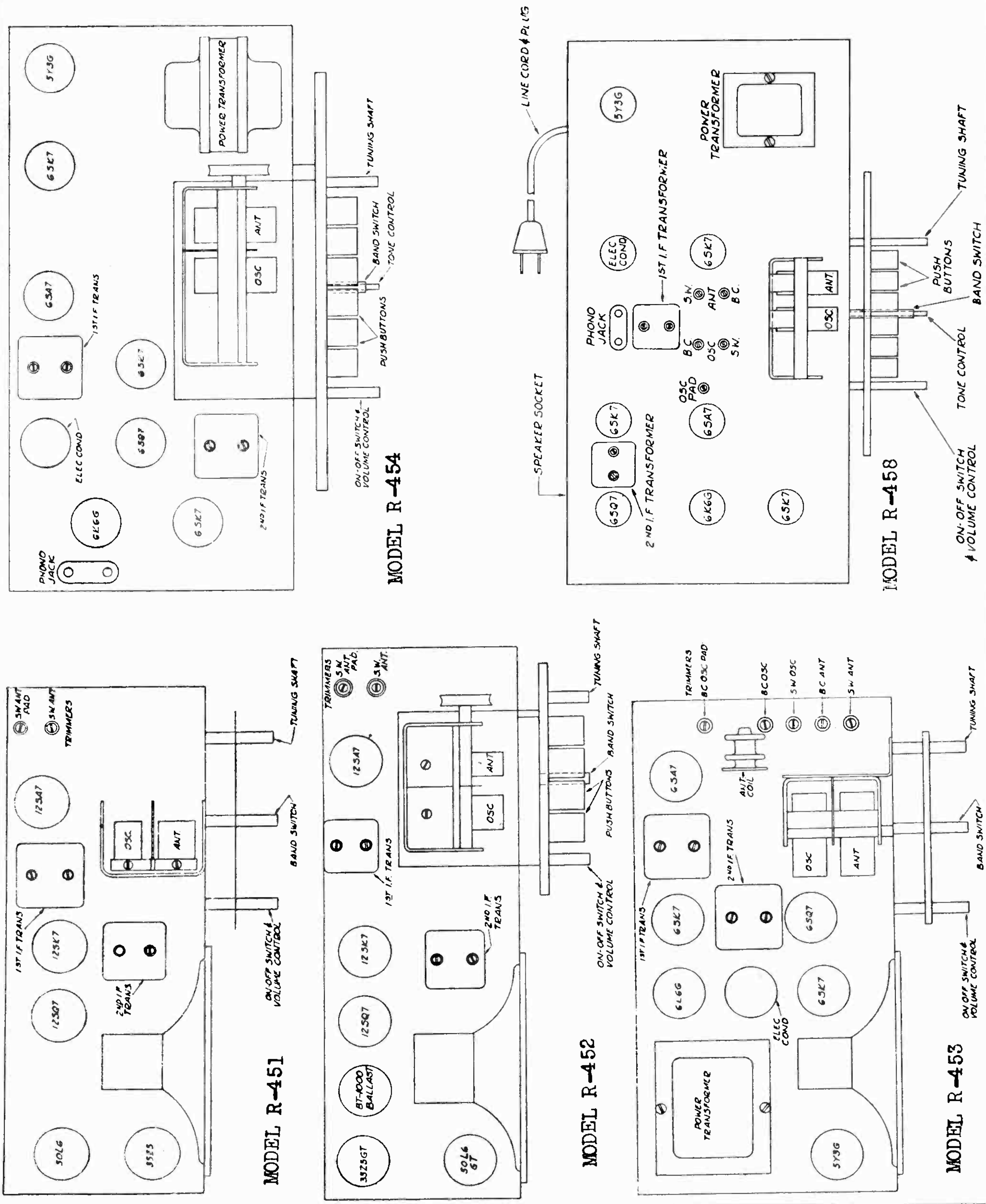
FOR OTHER DATA SEE INDEX

No.	Ohms	Watts	No.	Ohms	Watts
R1	10,000,000	1/4	R9	1,000,000	1/4
R2	20,000	1/4	R10	200,000	1/4
R3	10,000	1	R11	500,000	1/4
R4	100—10%	1/4	R12	50,000	1/4
R5	2,000,000	1/4	R13	500—10%	1/2
R6	30	1/4			
R7	8,000	1/4			
R8	500,000	V.C.			

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.0001	Mica	C9	.00025	Mica
C2	.05	200	C10	.05	200
C3	.05	400	C11	.1	200
C4	.05	400	C12	.01	400
C5	.00005	Mica	C13	.005	600
C6	.004 —5%	Mica	C14a	20.	25
C7	.00025	Mica	C14b	20.	350
C8	.05	200	C14c	20.	350

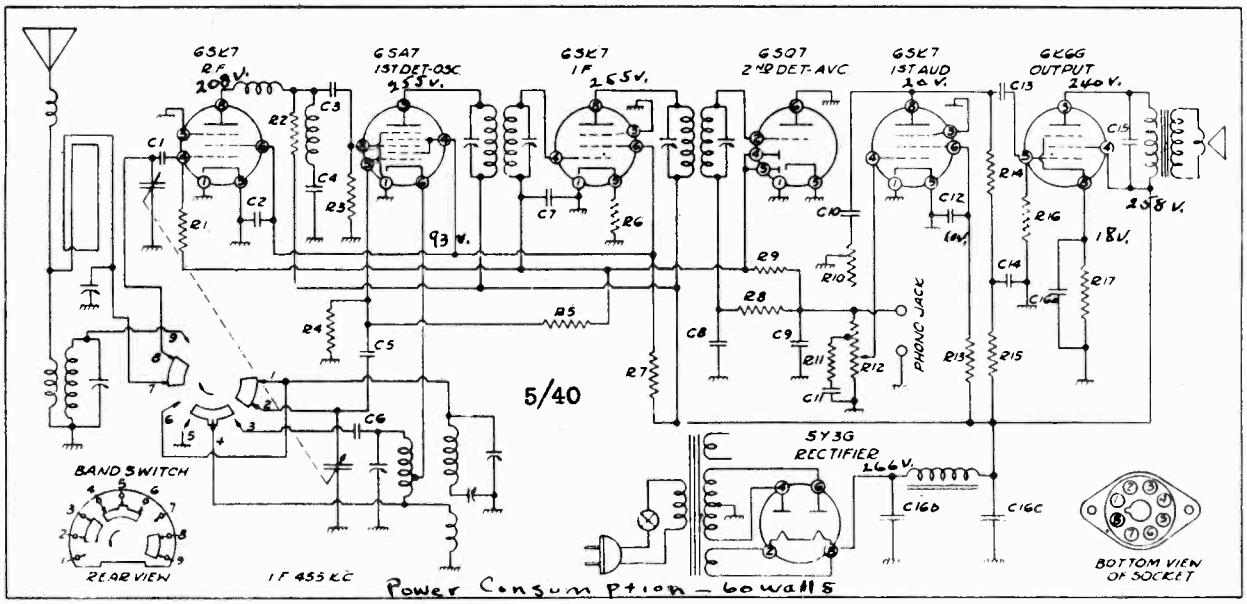
B. F. GOODRICH

MODELS R-451, R-452, R-453, R-454, R-458



MODELS R-454, R-458

B. F. GOODRICH



Band switch shown in broadcast position in schematic and in **short** wave position in pictorial view in lower left corner.

RESISTORS

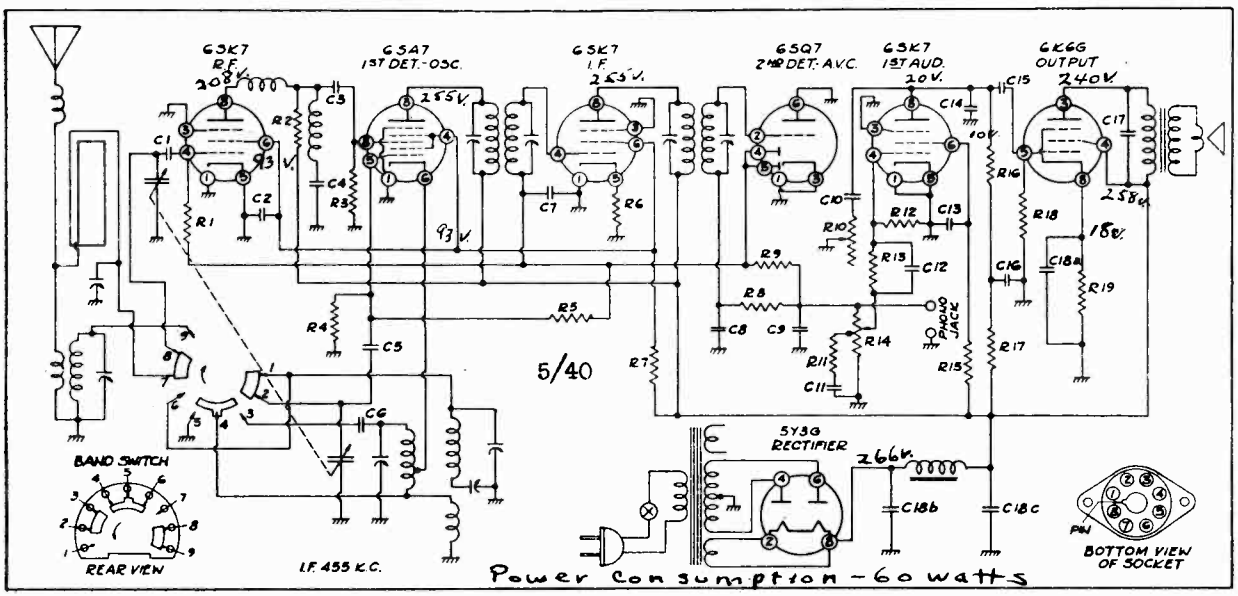
No.	Ohms	Watts	No.	Ohms	Watts
R1	500,000	¼	R10	500,000	T.C.
B2	4,000	½	R11	10,000	¼
R3	100,000	½	R12	500,000	V.C.
R4	25,000	½	R13	2,000,000	¼
R5	5,000,000	¼	R14	250,000	¼
R6	100	¼	R15	50,000	¼
R7	15,000	2	R16	500,000	¼
R8	50,000	¼	R17	600—10%	½
R9	1,000,000	¼			

CONDENSERS

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.0001	Mica	C10	.002	600
C2	.05	400	C11	.05	200
C3	.0001	Mica	C12	.25	400
C4	.00006—5%	Mica	C13	.01	400
C5	.0001	Mica	C14	.25	400
C6	.003—5%	Mica	C15	.005	600
C7	.05	200	C16a	20.	25
C8	.0001	Mica	C16b	20.	350
C9	.00025	Mica	C16c	20.	350

FOR OTHER DATA SEE INDEX

MODEL R-454



Band switch shown in broadcast position in schematic and in short wave position in pictorial view in lower left corner.

RESISTORS

No.	Ohms	Watts	No.	Ohms	Watts
R1	500,000	¼	R11	15,000	¼
R2	2,500	½	R12	2,000,000	¼
R3	100,000	½	R13	2,000,000	¼
R4	25,000	½	R14	500,000	V.C.
R5	5,000,000	¼	R15	2,000,000	¼
R6	100	¼	R16	250,000	¼
R7	15,000	2	R17	50,000	¼
R8	50,000	¼	R18	500,000	¼
R9	1,000,000	¼	R19	600—10%	½
R10	500,000	T.C.			

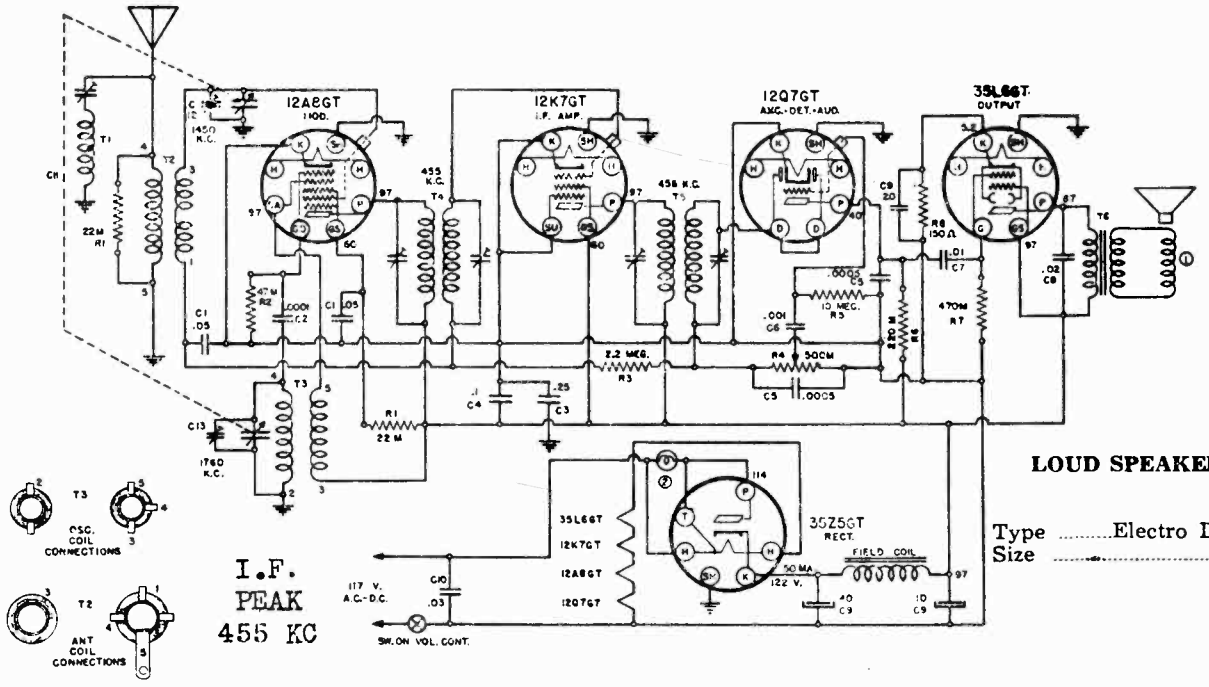
CONDENSERS

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.0001	Mica	C11	.05	200
C2	.05	400	C12	.05	200
C3	.0001	Mica	C13	.25	400
C4	.00006—5%	Mica	C14	.00025	Mica
C5	.0001	Mica	C15	.01	400
C6	.003 —5%	Mica	C16	.25	400
C7	.05	200	C17	.002	600
C8	.00005	Mica	C18a	20.	25
C9	.0001	Mica	C18b	30.	350
C10	.002	600	C18c	30.	350

FOR OTHER DATA SEE INDEX

MODEL R-458

GOODYEAR TIRE & RUBBER CO., INC. MODELS 015150, 015151



ALIGNMENT IS TO BE MADE AT THE FREQUENCY, SHOWN AT EACH TRIMMER CONDENSER.
WHERE NO VOLTAGE READING IS SHOWN, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.

TUBE SOCKETS ARE VIEWED FROM UNDERSIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO COMMON GROUND.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
CAPACITY VALUES ARE IN MICROFARADS.

9-962

LOUD SPEAKER:

Type ..... Electro Dynamic
Size 5-inch

PILOT LAMP:

The pilot lamp is a 6.3 volt 150 Mill. type (No. 47) and should be replaced with such, in order that the filament voltages across the radio tubes do not change.

FREQUENCY RANGE:

Broadcast ..... 538 K.C. to 1760 K.C.

ALIGNMENT FREQUENCIES:

Antenna	Oscillator
Trimmer	Trimmer
1450 KC	1760 KC

INTERMEDIATE FREQUENCY ..... 455 K.C.

POWER SUPPLY:

Power Main ..... 105-130 Volts AC/DC
Power Consumption ..... 30 Watts

POWER OUTPUT:

Type ..... Single Class A
Undistorted ..... 1.4 Watts
Maximum ..... 2 Watts

ALIGNMENT PROCEDURE

PRELIMINARY

Output Meter Connections ..... Across Loud Speaker Voice Coil
Output Meter Reading to Indicate 1 Watt ..... 1.95 Volts
Generator Ground Lead Connection ..... Receiver Chassis
Dummy Antenna Value to Be in Series with Generator Output ..... See Chart Below
Connection of Generator Output Lead ..... See Chart Below
Generator Modulation ..... 30%, 400 Cycles
Position of Volume Control ..... Fully On

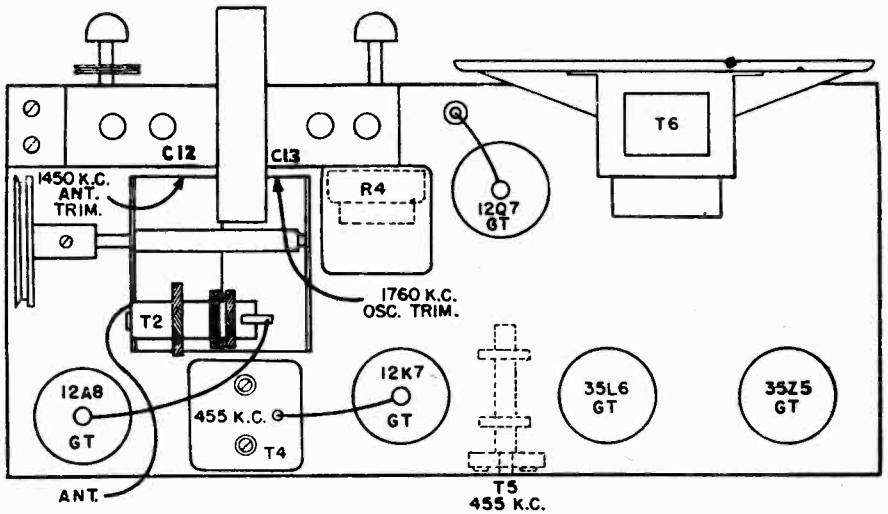
POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTIONS	TRIMMER ADJUSTMENT (In Order Shown)	TRIMMER FUNCTION
Closed	455 Kc.	.1 mfd.	12A8GT	T4-T5	I. F.
Closed	455 Kc.	.0002 mfd.	Antenna Conn.	T1 (Min. Output)	Wave Trap
Fully Open	1760 K.C.	.0002 mfd.	Antenna Conn.	C13	Osc. Trimmer
Fully open	1450 K.C.	.0002 mfd.	Antenna Conn.	C12	Ant. Trimmer

The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy.

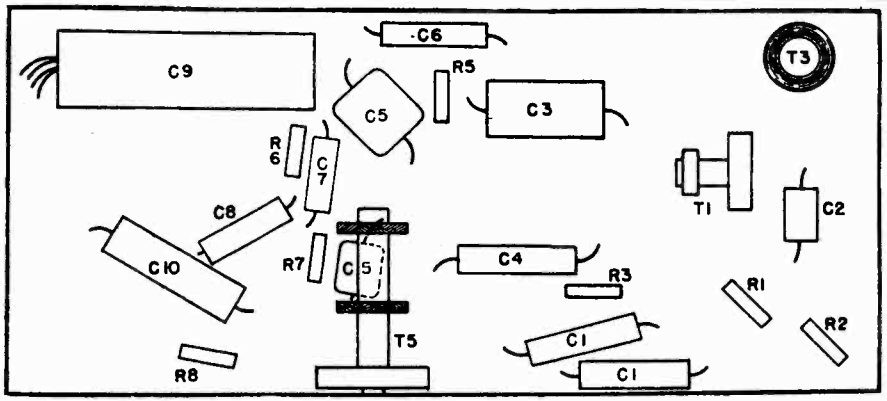
Always keep the output power from the generator at its lowest possible value to prevent the A.V.C. of the receiver from interfering with accurate alignment.

When adjusting T1, Antenna Wave Trap, Trimmer, increase generator output. To obtain clearly defined trimmer setting for a minimum output.

MAR. 21, 1939



LOCATION OF PARTS ON TOP OF CHASSIS



LOCATION OF PARTS UNDER CHASSIS

C10		Condenser .03 mf. 600V
C8		Condenser .02 mf. 400V
C5		Condenser .0005 mf. mica
C7		Condenser .01 mf. 200V
C2		Condenser .0001 mf. mica
C1		Condenser .05 mf. 200V
C6		Condenser .001 mf. 400V
C3		Condenser .25 mf. 200V
C4		Condenser .1 mf. 200V
C9	1012118239	Condenser Electrolytic (40x10) & 20 mf
C11	1012019132	Condenser Variable C12 & C13
R4	1012524134	Control Volume 500M
R7		Resistor 470M ohm 1/3W
R6		Resistor 220M ohm 1/3W
R3		Resistor 2.2 meg. ohm 1/3W
R1		Resistor 22M ohm 1/3W
R2		Resistor 47M ohm 1/3W
R5		Resistor 10 meg. ohm 1/3W
R8		Resistor 150 ohm 1/3W
T2	1011810239	Transformer Antenna
T4	1015510241	Transformer 1st I.F.
T5	1015710283	Transformer 2nd I.F.
T3	1011810240	Transformer Oscillator
T1	1016310256	Wave Trap (coil & trimmer)

FOR SETTING OF PUSH-BUTTONS SEE MODEL 015140

HOW THE AUTOMATIC PUSH-BUTTON TUNER FUNCTIONS:

This unit is mechanically operated by means of a proven cam and lever action, designed to rotate a shaft 90 degrees. Since the variable gang condenser shaft must rotate 180 degrees, a 2 to 1 step up mechanical lever action is incorporated to give full rotation to the gang condenser. Three links are used to transmit the operation of the push-button to the variable gang condenser; first, a driver lever or link connected to the tuner lever bar, (see Pictorial); second, a driven lever arm connected to the gang condenser shaft; and third, a connecting link, connecting the two lever arms together mechanically.

The plunger bar that retains the screw type push-buttons, also holds a cam to itself by a shoulder rivet. This cam floats on the rivet proper and is locked into position with a small square plate, floating in the plunger bar. To lock cam into position, screw the push-button knob toward the right (clock-wise). The end of the push-button screw will then force a small square plate known as a brake shoe against the periphery of the cam. The push-button must be tightened firmly after the position of the station selection is determined. To change the setting of the cam, the push-button knob must be loosened by rotating it toward the left (counter-clockwise). When this push-button screw is loosened, it will automatically release the brake shoe from the cam, leaving the cam free to rotate and set its new position to the setting of the lever bar.

If it becomes necessary to realign the tuner in relation to the gang condenser, the following procedure should be followed to assure perfect tuning operation:

1. Attach driver arm to the lever bar by means of two machine screws, making sure that they are assembled with lockwashers and tightened securely.

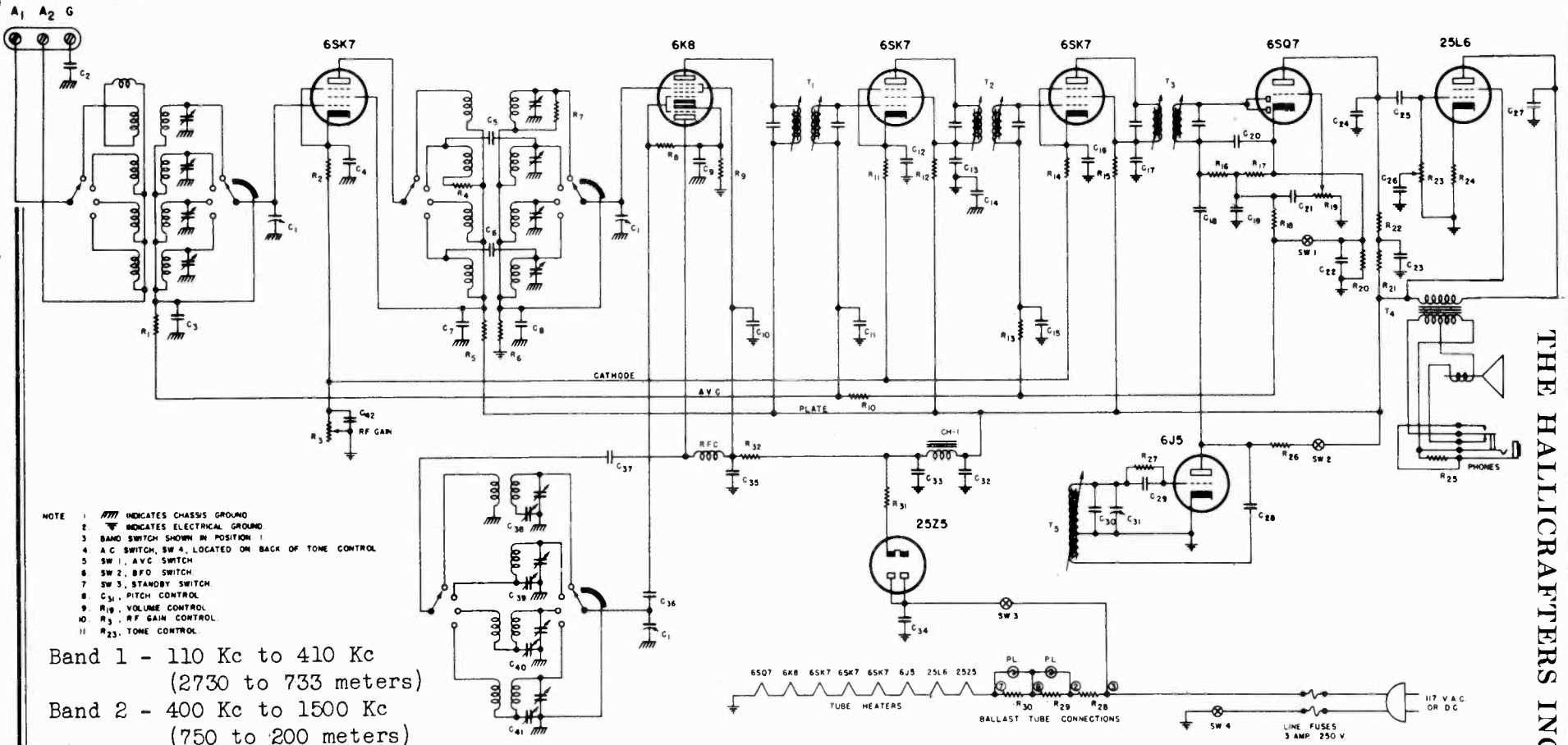
2. Slip the drum assembly, which consists of the drum, drum hub, and the driven arm, over the variable condenser shaft but do not tighten set screws.

3. Connect these two lever arms by slipping the connecting link over the heads of the shoulder rivets. This link has a slight bend (offset) about 1/3 of its length and is to be installed with the shorter end towards the top and the offset towards the rear when looking at it from the drum end. Attach the tension spring between the two shoulder rivets. This spring is incorporated to take up all the unnecessary slack in the drive.

4. In making the final adjustment, that of setting the condenser in relation to the tuner, close the condenser completely to maximum capacity and rotate drum with the left hand in a clock-wise rotation, until the driver arm comes gradually down to within 1/8 of an inch of the variable condenser shaft. When in this position, tighten set screws in the drum hub with the right hand.

It is essential that all set screws be tightened securely so as to prevent a variation from original setting.

If, for some reason, a replacement is necessary for some particular item on the tuner proper, such as a lever bar, cam, plunger bar or brake shoe, it would be advisable to return the complete tuner proper for replacement.



NOTE:
1. INDICATES CHASSIS GROUND
2. INDICATES ELECTRICAL GROUND
3. BAND SWITCH SHOWN IN POSITION 1
4. A.C. SWITCH, SW 4, LOCATED ON BACK OF TONE CONTROL
5. SW 1, A.V.C. SWITCH
6. SW 2, B.F.O. SWITCH
7. SW 3, STANDBY SWITCH
8. C_{31}, PITCH CONTROL
9. R_{19}, VOLUME CONTROL
10. R_3, RF GAIN CONTROL
11. R_{23}, TONE CONTROL

Band 1 - 110 Kc to 410 Kc
(2730 to 733 meters)
Band 2 - 400 Kc to 1500 Kc
(750 to 200 meters)
Band 3 - 1.7 Mc to 5.9 Mc
(177 to 51 meters)
Band 4 - 5.3 Mc to 18 Mc
(56 to 16.7 meters)

NOTE: The SKYRIDER MARINE Model S22R is an AC-DC receiver which operates on 110/125 volts only. Should operation be desired from a lower voltage DC source, an external converter delivering 110/125 volts should be used. A 220 volt DC Model S22R is available on order and uses a special line cord with dropping resistor.

If an inverted "L" antenna is used, connect lead-in to A_1 and leave the jumper between A_2 and G. If an "all wave" doublet is used, connect the transmission line to A_1 and A_2 with the jumper removed from A_2 and G. A separate antenna may be used for one s-w band; use a half-wave antenna whose length can be calculated from

$$\text{Length in feet} = \frac{463}{\text{Frequency in megacycles}}$$

ALIGNMENT PROCEDURE

ALIGNMENT INSTRUCTIONS:

Equipment needed for aligning:
1 - An all wave signal generator which will provide an accurately calibrated signal at the test frequencies indicated.
2 - Output indicating meter connected to a headphone plug, and inserted in the headphone jack.
3 - Non-metallic screw driver.
4 - Dummy antenna of .002 mfd. condenser and 400 ohm resistor.

SETTING OF CONTROLS PRIOR TO ALIGNMENT - IF AND RF.

1 - Tone control at maximum high frequency position.
2 - AVC switch OFF.
3 - BFO switch OFF.
4 - RF Gain at maximum.
5 - AF gain at maximum.

1600 Kc IF ALIGNMENT.

Tune receiver to 5,000 Kc with the band switch in #3 position.

Connect hot side of signal generator to 6K8 grid cap through 1 MFD condenser - ground of generator to the chassis. Signal generator output - 1,600 Kc.

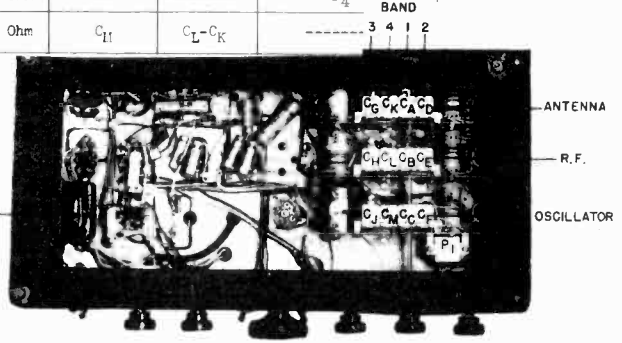
Adjust screws S1 to S6 inclusive on IF transformers T 1-2-3 for maximum gain.

BFO ADJUSTMENT - With a 1600 Kc signal being fed into the IF amplifier, and the BFO switch ON, place the Pitch Control with the white dot UP. Now adjust the screw S7 on the top of T5 for zero beat. Further adjustment of the Pitch Control from the front of the panel will enable you to vary the frequency of the beat note to your satisfaction.

R.F. ALIGNMENT

Connect hot Lead of Signal Generator to A_1 through dummy Antenna shown in Table. Leave Jumper connected between A_2 and G. Ground of Generator to Chassis.

BAND	REC. DIAL SETTING	SIG. GEN. FREQ.	DUMMY ANTENNA	HIGH FREQUENCY END		LOW FREQUENCY END
				ADJUST OSC WITH	ADJUST TRIMMERS WITH	ADJUST OSCILLATOR WITH
1	125 Kc	125 Kc	.002 mfd	--------	--------	P_1
	350 Kc	350 Kc	.002 mfd	C_C	C_A-C_B	--------
2	450 Kc	450 Kc	.002 mfd	--------	--------	P_2
	1400 Kc	1400 Kc	.002 mfd	C_F	C_E-C_D	--------
3	2 Mc	2 Mc	400 Ohm	--------	--------	P_3
	4.5 Mc	4.5 Mc	400 Ohm	C_J	C_G-C_H	--------
4	7 Mc	7 Mc	400 Ohm	--------	--------	P_4
	15 Mc	15 Mc	400 Ohm	C_M	C_L-C_K	--------



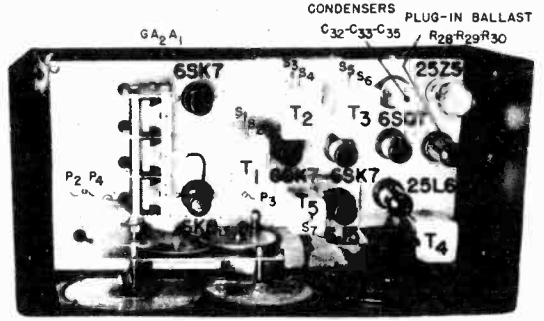
NO.	VALUE	VOLTAGE OR PURPOSE	TYPE
C_1	Tuning Condenser	563 mmfd per section	
C_2	.01 mfd	400 V.	Paper
C_3	.05 mfd	400 V.	Paper
C_4	.05 mfd	400 V.	Paper
C_5	5 mmf		Ceramicon
C_6	5 mmf		Ceramicon
C_7	.25 mfd	400 V.	Paper
C_8	.05 mfd	400 V.	Paper
C_9	.05 mfd	400 V.	Paper
C_{10}	.1 mfd	400 V	Paper
C_{11}	.02 mfd	400 V.	Paper
C_{12}	.02 mfd	400 V.	Paper
C_{13}	.01 mfd	400 V.	Paper
C_{14}	.25 mfd	400 V.	Paper
C_{15}	.02 mfd	400 V.	Paper
C_{16}	.02 mfd	400 V.	Paper
C_{17}	.01 mfd	400 V.	Paper
C_{18}	10 mmf		Ceramicon
C_{19}	100 mmf		Mica
C_{20}	100 mmf		Mica
C_{21}	.02 mfd	400 V.	Paper
C_{22}	10 mf	25 V.	Electrolytic
C_{23}	.05 mfd	400 V.	Paper
C_{24}	250 mfd		Mica
C_{25}	.05 mfd	400 V.	Paper
C_{26}	.01 mfd	400 V.	Paper
C_{27}	.005 mfd	600 V.	Paper
C_{28}	.01 mfd	400 V.	Paper
C_{29}	250 mmfd		Mica
C_{30}	200 mmfd		Mica
C_{31}	5 mmf	BFO Pitch Con.	Air Variable
C_{32}	40 mfd	150 V.	Electrolytic
C_{33}	40 mfd	150 V.	Electrolytic
C_{34}	.05 mfd	400 V.	Paper
C_{35}	30 mfd	150 V.	Electrolytic
C_{36}	100 mmfd		Mica
C_{37}	2000 mmfd		Mica
C_{38}	32 mmfd	Band 1 Pad	
C_{39}	110 mmfd	Band 2 Pad	
C_{40}	480 mfd	Band 3 Pad	
C_{41}	1300 mfd	Band 4 Pad	
C_{42}	.1 mfd	200 V.	Paper

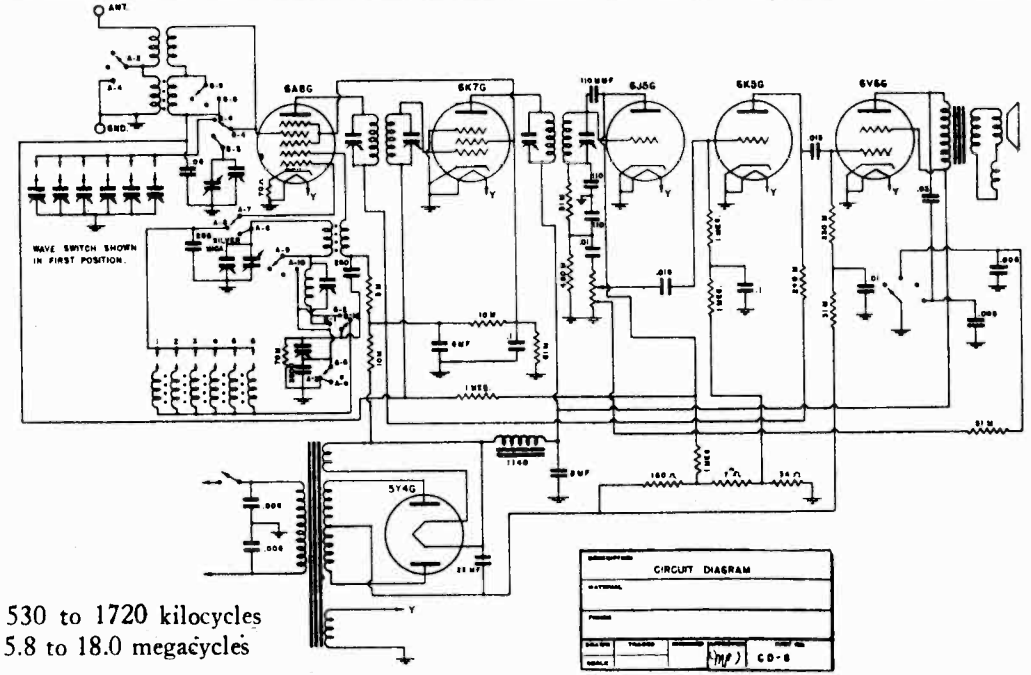
SW1	A.V.C. "ON-OFF"
SW2	B.F.O. "ON-OFF"
SW3	Standby
SW4	A.C.-D.C. Line

NO.	VALUE IN OHMS	WATTAGE OR PURPOSE
R_1	100,000	1/3
R_2	300	1/3
R_3	25,000	R. F. Gain Control
R_4	400	1/3
R_5	1,000	1/3
R_6	100,000	1/3
R_7	100,000	1/3
R_8	50,000	1/3
R_9	400	1/3
R_{10}	100,000	1/3
R_{11}	500	1/3
R_{12}	1,000	1/3
R_{13}	100,000	1/3
R_{14}	400	1/3
R_{15}	1,000	1/3
R_{16}	100,000	1/3
R_{17}	250,000	1/3
R_{18}	1 Meg.	1/3
R_{19}	500,000	Audio Gain Control
R_{20}	7,500	1/3
R_{21}	100,000	1/3
R_{22}	250,000	1/3
R_{23}	500,000	Tone Control
R_{24}	140	1/2
R_{25}	100	1/2
R_{26}	5,000	1/3
R_{27}	250,000	1/3
R_{28}	Plug-in Ballast Tube Muter-Type 8K29D	
R_{29}	Plug-in Ballast Tube Muter-Type 8K29D	
R_{30}	Plug-in Ballast Tube Muter-Type 8K29D	
R_{31}	25	1 Watt
R_{32}	4,000	1/2 Watt

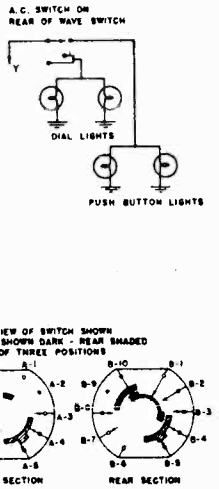
ELECTROLYTIC CONDENSERS C_{32}-C_{33}-C_{35}

PLUG-IN BALLAST R_{28}-R_{29}-R_{30}





530 to 1720 kilocycles
5.8 to 18.0 megacycles



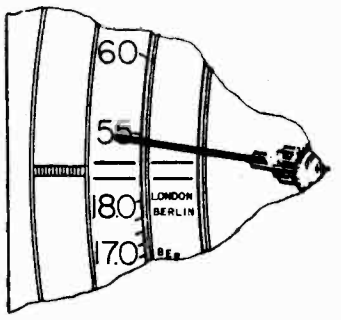


Fig. 3

Aligning I. F. System

Connect a 470KC signal Generator to the grid of the 6A7 converter tube through a .002MFD condenser. Connect an output meter across the speaker voice coil. Turn receiver volume control on full and with wave switch in broadcast position, adjust trimmers (74) and (75) (See Fig. 2) for maximum output. Then adjust (71) and (73) for maximum reading. Repeat adjustments on (74) and (75).

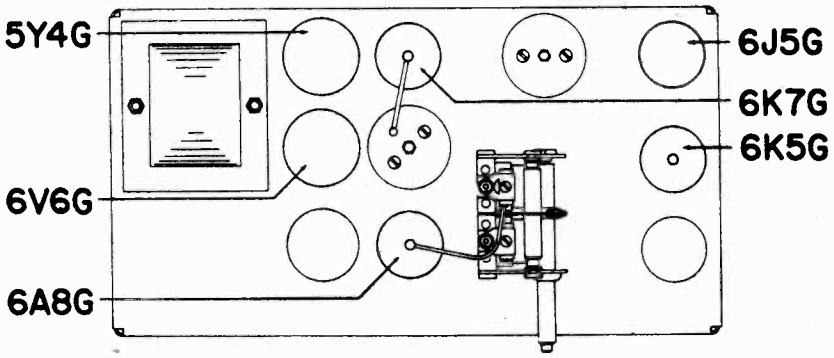
Broadcast and Short Wave Band Adjustments

Note: The following adjustments must proceed in the order specified

(1) Turn variable condenser to maximum capacity and set pointer as indicated in Fig. 3. Turn band selector switch to left or broadcast position. Tune set to a scale frequency of 1550KC and connect a 1550KC signal generator to the antenna post through a 200MMFD condenser. Loosen trimmer screw (66) and adjust trimmer (77) until signal is tuned in. Adjust trimmer (65) for maximum output.

(2) Then set band selector switch to extreme right or short wave position. Set signal generator to 18 megacycles and substitute a 400 ohm resistor for the 200MMFD condenser. Adjust trimmer (66) until signal is tuned in. At this point check the dial at 17.1 megacycles for the 18 megacycle image.

TUBE TYPES AND POSITIONS



(3) Turn band selector switch to broadcast position and reset the signal generator to 1550KC. Substitute the 200MMFD condenser for the 400 ohm resistor in the generator lead and adjust trimmer screw (77) until signal is tuned in. Then tune receiver to 600KC on dial and with the signal generator, set to 600KC, rock the gang while adjusting trimmer (76) for maximum 1550KC and if incorrect, repeat 1550KC adjustment procedure outlined in Section (1).

All of the above adjustments must be made before pre-setting the "fingertip control" circuits.

MODELS 01006,01007 GOODYEAR TIRE & RUBBER CO., INC.

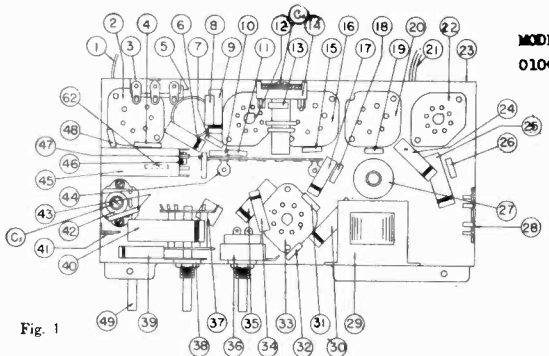


Fig. 1

Item No.	Description	Part No.
1.	Antenna Assembly	77110
2.	7 Prong Socket	15124
3.	Wire Panel 3 Lug	10103
4.	Resistor 300 Ohm 1 Watt	47122
5.	Tub. Cond. .001-1000 Volt	32113
6.	Tub. Cond. .05-200 Volt	32114
7.	Res. 51,000 Ohm ½ Watt	47120
8.	Resistor, 300 Ohm 1 Watt	47122
9.	Tub. Cond. .05-200 Volt	32114
10.	Res. 4,000,000 Ohm ½ Wt.	47125
11.	Res. 5,000 Ohm ½ Watt	47105
12.	8 Prong Socket	15113
13.	Res. 51,000 Ohm ½ Watt	47120
14.	2nd. I. F. Transformer	41102
15.	Res. 10,000 Ohm ½ Watt	47110
16.	6 Prong Socket	15123
17.	Tubular Cond. .02-200 Volt	32118
18.	Res. 240,000 Ohm ½ Watt	47128
19.	Res. 120,000 Ohm ½ Watt	47127
20.	6 Prong Socket	15123
21.	A. C. Cord & Plug	78110
22.	8 Prong Socket	15113
23.	Sub base	20110
24.	Tun. Cond. .03-400 Volt	32115
25.	Tubular Cond. .1-200 Volt	32117
26.	Res. 51,000 Ohm ½ Watt	47120
27.	Electrolytic Condenser	31109
28.	Speaker Socket	15130
29.	Choke	42102
30.	Tubular Cond. .1-200 Volt	32117
31.	Res. 330,000 Ohm ½ Watt	47130
32.	Resistor 150 Ohm ½ Watt	47129
33.	6 Prong Socket	15123
34.	Tubular Cond. .01-200 Volt	32102
35.	Tubular Cond. .05-200 Volt	32114
36.	Volume Control	49102
37.	Mica Cond. 3500 MMFD	30102
38.	Wave Switch	65114
39.	Tub. Cond. .05-200 Volt	32123
40.	Tubular Cond. .25-200 Volt	32105
41.	Wire Panel 2 Lug	10101
42.	Padding Condenser	34109
43.	Mica Condenser Silvered	30111
44.	Wire Panel 7 Lug	10107
45.	Oscil. Trans. Bc. & S. W.	40155
46.	Tub. Cond. .05-200 Volt	32114
47.	Mica Cond. 600 MMFD	30105
48.	Res. 120,000 Ohm ½ Watt	47127
49.	Tun. Cond Ft. & Dr. Assy.	20117
50.	Pilot Lamp	51101
51.	Pilot Lamp Socket Assy.	90111
52.	25L6G Tube	50113
53.	K19CG Tube	54103
54.	25Z5G Tube	50108
55.	75G Tube	50112
56.	6K7M Tube	50127
57.	1st. I. F. Transformer	41109
58.	6A7G Tube	50110
59.	Ant. Trans. Broadcast	40153
60.	Variable Condenser	33107
61.	Dial Plate	20212
62.	Mica Cond. 50 MMFD	30109
63.	Ant. Trans. Shortwave	40154
C-1	1st. I. F. Primary Padder	
C-2	Ant. Broadcast & S.W. Padder	
C-3	Shortwave & Oscillator Padder	
C-4	2nd. I. F. Padder	
C-5	Broadcast Oscillator Padder	
C-6	Broadcast Oscil. Series Padder	
C	1st. I. F. Secondary Padder	
79.	Knob	13124
82.	Tuning Unit Switch	65114

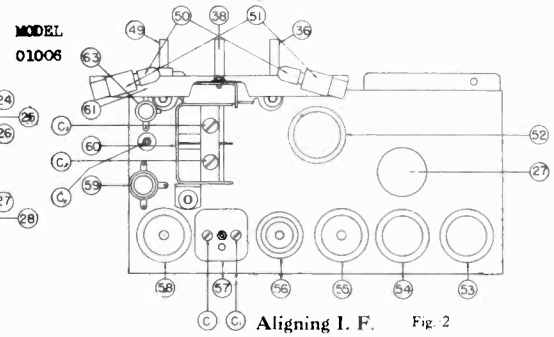


Fig. 2

Aligning I. F.

Connect an output meter across the speaker voice coil and turn receiver volume control on full. Turn wave switch to manual position and variable condenser to extreme high frequency end of scale. Connect a 470 K.C. signal generator to the grid of the 6A7 tube through a condenser in the order of .002 Mfd capacity. Keep the signal to a low audible value and adjust trimmer (C4) (See Fig. 2) for maximum output. Then adjust trimmers (C) and (C1) (See Fig. 1 for maximum output. Finally repeat (C4) adjustment.

Broadcast and Shortwave Band Adjustments

Note: The following adjustments must proceed in order specified.

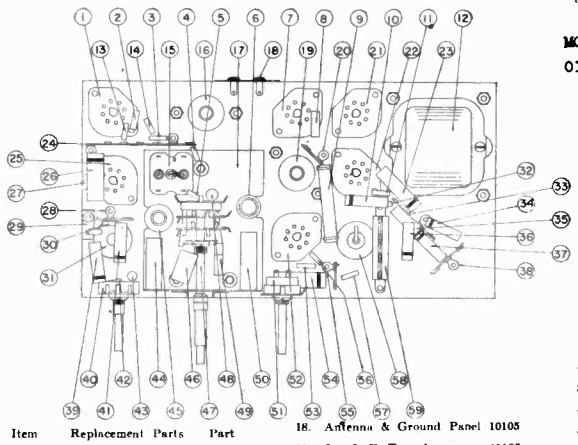
(1.) Turn variable condenser to maximum capacity and set pointer on small dot approximately 1-16 inch above top horizontal scale dividing line. Tune set to a scale frequency of 1550 K.C. and connect a 1550 K.C. generator to antenna lead through a 100 Mmfd condenser. Turn center knob to manual position. Volume control should be on full.

(2.) Loosen trimmer (C2) and adjust trimmer (C5), until signal is tuned in. Then adjust (C3) for maximum output.

(3.) Turn center knob to shortwave position, substitute a 400 ohm resistor for the condenser in the signal generator lead and set generator to a frequency of 18 megacycles. Tune set to 18 megacycles and adjust trimmer (C2) until signal is tuned in.

(4.) Turn center knob back to manual and substitute the 100 Mmfd condenser for the 400 ohm resistor in the generator lead. Set signal generator to 1550 K.C. Tune set to 1550 K.C. and adjust trimmer (C5) until signal is tuned in. Set signal generator to 600 K.C. With the set tuned close to 600 K.C. on the dial, vary the gang condenser slowly back and forth, adjusting (C6) at the same time until maximum output is indicated. Finally recheck dial for calibration accuracy against signal generator at the 1550 K.C. point. If found to be incorrect, repeat the 1550 K.C. adjustment procedure outlined in step number (1).

All of the above adjustments must be made before pre-setting the automatic circuits.



Item No.	Replacement Parts Description	Part No.
1	7 Prong Socket	15119
2.	Mica Cond. 110 M. Mfd.	30101
3.	Res. 490,000 Ohm ½ Watt	47119
4.	Ris. 5,000 Ohm, ½ Watt	47105
5.	Res. 70,000 Ohm, ½ Watt	47135
6.	Ant. Trans. Short Wave	40116
7.	7 Prong Socket	15119
8.	Res. 10,000 Ohm, 1 Watt	47114
9.	Res. 10,000 Ohm, 3 Watt	47115
10.	Tubu. Cond. .01-200 Volt	32102
11.	Res. 330,000 Ohm, ½ Watt	47130
12.	Power Transformer	42101
13.	Res. 1,000,000 Ohm, ½ W.	47106
14.	Res. 1,000,000 Ohm, ½ W.	47106
15.	Padding Condenser	34103
16.	2nd. I. F. Transformer	41104
17.	R. F. Base	20114
18.	Antenna & Ground Panel	10105
19.	1st. I. F. Transformer	41105
20.	Wire Panel 2 Lug	10101
21.	7 Prong Socket	15119
22.	7 Prong Socket	11119
23.	Tubu. Cond. .03-500 Volt	32110
24.	Wire Panel 17 Lug	10106
25.	7 Prong Socket	15119
26.	Tubular Cond. .1-200 Volt	32117
27.	Res. 240,000 Ohm, ½ W.	47128
28.	Wire Panel 8 Lug	10103
29.	Wire Panel 2 Lug	10101
30.	Res. 1,000,000 Ohm, ½ W.	47106
31.	Electrolytic Condenser	31102
32.	Res. 51,000 Ohm, ½ W.	47120
33.	Wire Panel 4 Lug	10104
34.	Pap. M'ld Cond. .006-400V	32125
35.	Tub. Cond. .015-400V.	32112
36.	Tub. Cond. .008-400V.	32107
37.	Pap. M'ld. Cond. 006-400V	32125

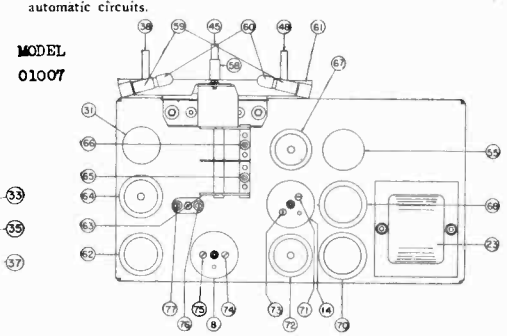
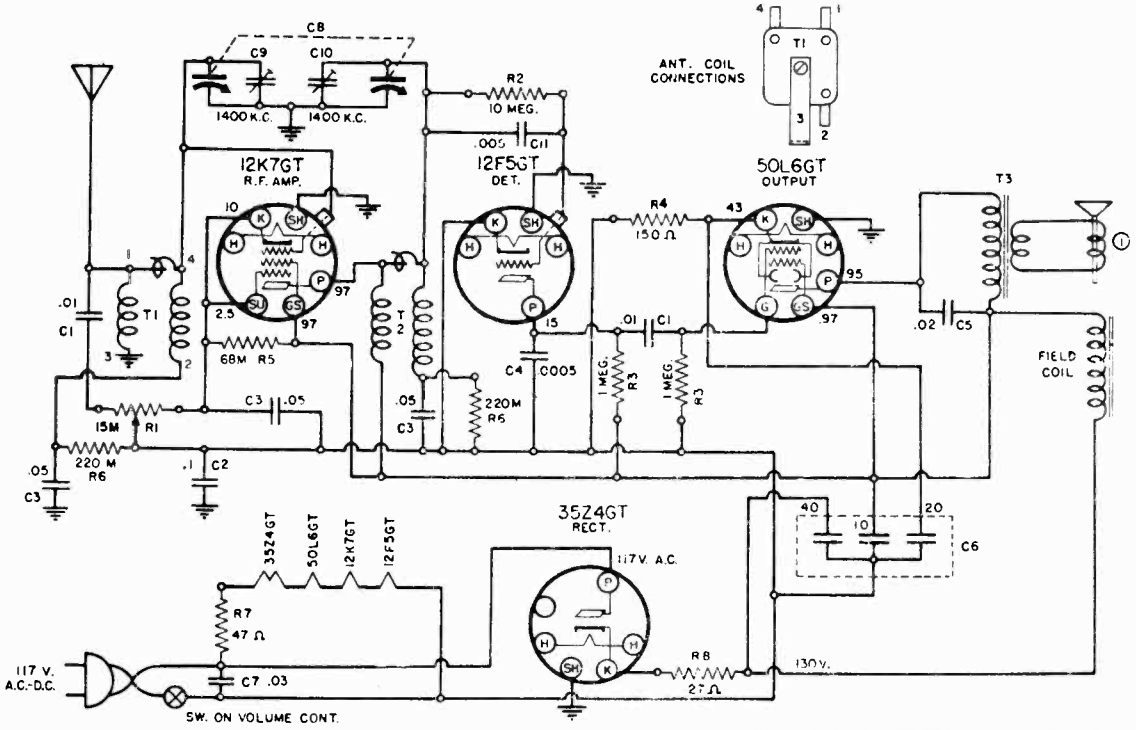
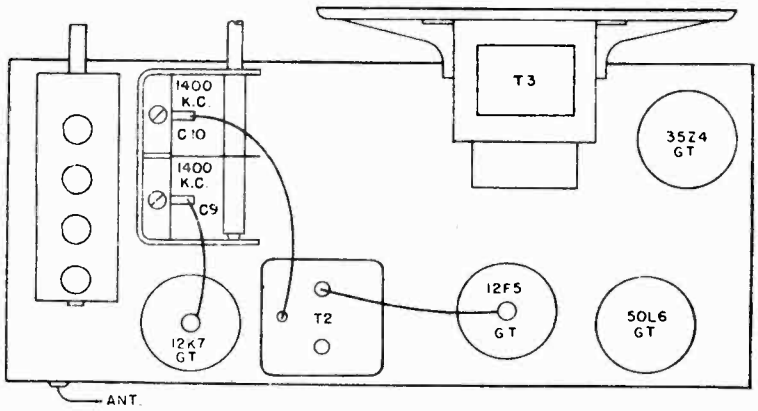


Fig. 2

38.	Wire Panel 2 Lug	10102
39.	Tub. Condenser .01-200V	32102
40.	Volume Control	49107
41.	Tubular Cond. .015-200V	32109
42.	Res. 51,000 Ohm, ½ Watt	47120
43.	Tub. Cond. .006-200V.	32104
44.	Oscill'tr Trans. Broadc'st	40145
45.	Antenna Trans. Br'de'st.	40144
46.	Mica Condenser Silvered	30111
47.	Wave Switch	65113
48.	Tub. Cond. .05-200V.	32123
49.	Mica Cond. 3500 M-Mfd.	30102
50.	Oscillator Trans. Srt. W've	40115
51.	Tone Cont. & Line Sw'tch	66101
52.	7 Prong Socket	15119
53.	Res. 51,000 Ohm, ½ Watt	47120
54.	Tubular Cond. .1-400 V.	32111
55.	Wire Panel 2 Lug	10101
56.	Res. 70 Ohm. ½ Watt.	47134
57.	6A8G Tube	50106
58.	6V6G Tube	50104
59.	B. C. Resistor	48100
60.	Pilot Lamp	51102
61.	Scale Plate	20123
62.	6f5G Tube	50103
63.	Variable Condenser	33104
64.	6K5G Tube	50109
65.	Bro'de'st & Shortw've, Ant. Pan	
66.	Shortwave Oscillator Pad.	
67.	6T8G Tube	50106
68.	6V6G Tube	5010A
69.	Pilot Lamp Soc. Assembly	9013
70.	5Y4G Tube	50105
71.	1st. I. F. Primary Pad	
72.	JK7G Tube	50107
73.	1st. I. F. Secondary Pad.	
74.	2nd. I. F. Primary Pad	
75.	2nd. I. F. Secondary Pad.	
76.	Br'd'c'st Series Oscillator Pad	
77.	Broadcast Parallel Oscil. Pad.	
78.	Drive Shaft	21126
79.	Knob	13124
80.	Pilot Lamp Soc't Assem.	
81.	Pilot Lamp	51102
82.	Push Button Switch	65112

GOODYEAR TIRE & RUBBER CO., INC. MODELS 015140, 015141





TUBE SOCKETS ARE VIEWED FROM UNDERSIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO COMMON GROUND.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
CAPACITY VALUES ARE IN MICROFARADS.

WHERE NO VOLTAGE READING IS SHOWN, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.
ALIGNMENT IS TO BE MADE AT THE FREQUENCY SHOWN AT EACH TRIMMER CONDENSER.

9-462

SETTING PUSH-BUTTONS:

1. By means of the Station Selector Knob, tune in WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE the station having the lowest frequency—that is, your selected station which is tuned in nearest the top of the dial.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).

3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is now correctly set up for your first selected station of lowest frequency and the Call Letter Tab for this station should be at the extreme right of the Call Letter Holder.

Follow through with this same procedure, setting up the other 3 stations in the order of their frequency—that is, the second station set up will be second lowest in frequency and the third station set up will be third lowest in frequency.

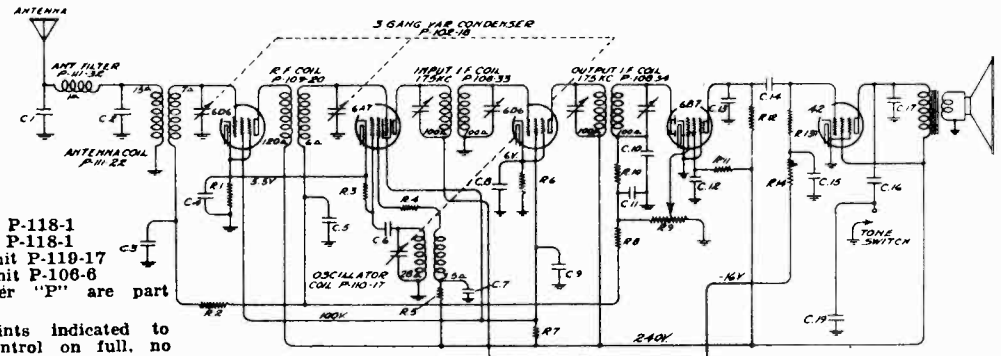
Carefully check each Push-Button for the accuracy of its setting. If, when tuning in any station with its Automatic Push-Button it does not have equal volume or clarity to that obtained with manual tuning, this may indicate the automatic adjustment for that station was not made accurately. Should there be any inaccuracy in any one of the Push-Button adjustments, correction can be made by repeating the above procedure for that button only. Do not reset those Push-Buttons that are accurately adjusted.

No further adjustments are necessary to operate your radio automatically or manually. To receive any one of your selected stations for automatic operation, merely push in ALL THE WAY the Button set up for that station.

To receive all other stations in the regular manner turn the tuning knob to the frequency of the station desired.

MODEL 690

GOODYEAR TIRE & RUBBER CO., INC.



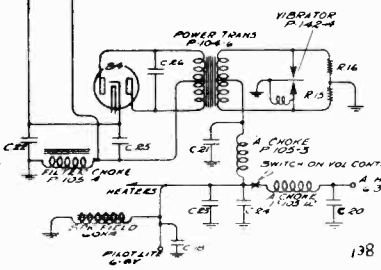
NOTE:

C.4 and C.9 are in one unit P-118-1
C.7 and C.8 are in one unit P-118-1
C.22 and C.25 are in one unit P-119-17
R.16 and R.15 are in one unit P-106-6
Numbers prefixed by letter "P" are part numbers.

Voltages taken from points indicated to chassis ground. Vol. control on full, no signal.

Serial No. 40001 up.

IF PEAK 175 KC



DESCRIPTION:

Model 690 is a six tube superheterodyne receiver, with an intermediate frequency of 175 K.C. and a tuning range of from 520 to 1550 K.C. This receiver has been carefully designed to facilitate servicing, the top and bottom covers are both removable and are fastened in place by spring clips. All adjustments are accessible and any part replaceable without removing the chassis from the cabinet.

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

In order to prevent signal from acting upon A.V.C. and affecting accuracy of voltage measurements, aerial and ground leads should be short circuited while making measurements.

All voltages are to be measured with 6.3 volts input to receiver. Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Failure to operate, noisy or weak reception is usually due to defective tubes, the tubes making poor contact with sockets or grid clips making poor contact with the caps of the tubes. Tubes may be checked very easily by replacing with other tubes which are known to be good. If fuse blows out frequently and insulating sleeve has been properly placed over fuse, the trouble is probably in the vibrator, it should be replaced. Do not attempt to make any adjustments on the vibrators.

ANTENNA CONNECTION:

The antenna is connected to the receiver by means of the antenna cable. The antenna wire is the single black wire projecting from the end of the cable. Splice this wire to the roof antenna lead and ground the pig-tail shielding as close to the corner post of the car as possible.

On open and convertible models where underslung strap or plate antennas are used it may be necessary to ground the exhaust pipe and muffler to the frame at both ends with heavy copper braid

CONNECTIONS TO BATTERY:

The battery cable, number 152-2, (red wire with fuse receptacle at one end and terminal lug at other end) must be connected to battery terminal of ammeter. At the same time connect ammeter capacitor, number 148-3, to battery terminal of ammeter, other end of condenser to any convenient grounded screw on back of instrument panel. Make certain that insulating sleeve is slipped over fuse when fuse is placed in receptacle, before connecting to short battery cable from receiver.

When connected properly, the discharge due to current drawn by the receiver should not indicate on the ammeter. This is important, since if improperly connected, as shown by the deflection of ammeter, additional motor interference may be encountered.

GENERATOR INTERFERENCE:

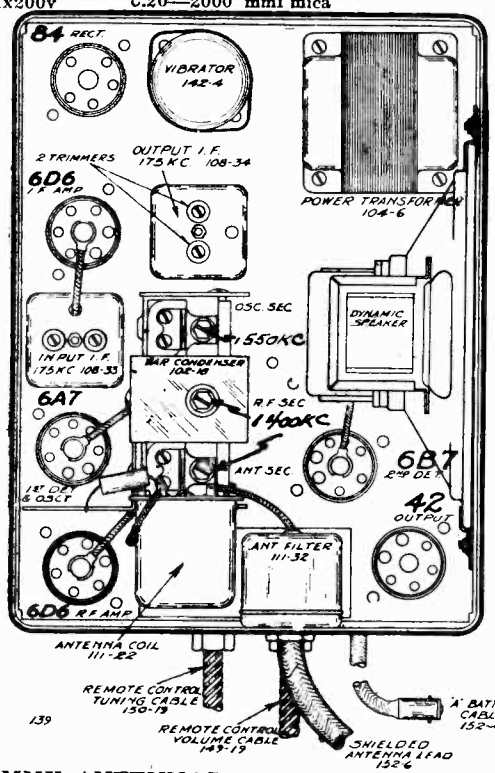
Remove the generator cutout mounting screw and fasten the condenser (148-1) bracket on the generator cutout mounting lug. Replace the cutout mounting screw and tighten down securely. Connect the condenser lead to the battery terminal of the cutout The generator condenser is absolutely necessary as it is used to eliminate a high pitched whining noise which would otherwise be heard as the motor is accelerated.

RESISTORS

No.	Value
R.1	500 ½ w
R.2	100M ½ w
R.3	50M ½ w
R.4	3500 ½ w
R.5	20M ½ w
R.6	1500 ½ w
R.7	25M 1w
R.8	500M ½ w
R.9	1 meg vol. control P-101-21
R.10	100M ½ w
R.11	1 meg ½ w
R.12	250M ½ w
R.13	301M ½ w
R.14	301m ½ w
R.15	100
R.16	100

CONDENSERS

No.	Value
C.1	20 mmf mica
C.2	20 mmf mica
C.3	.01x400v
C.4	.1x200v
C.5	.05x200v
C.6	100 mmf mica
C.7	.1x200v
C.8	.1x200v
C.9	.1x200v
C.10	100 mmf mica
C.11	100 mmf mica
C.12	.1x200v
C.13	100 mmf mica
C.14	.01x400v
C.15	.25x400v
C.16	.025x400v
C.17	.006x600v
C.18	500 mmf mica
C.19	500 mmf mica
C.20	2000 mmf mica
C.21	1.0 mfdx120v
C.22	8 mfd x300v
C.23	.5 mfd x120v
C.24	.01x400v
C.25	8 mfd x300v
C.26	.01x400v



DUMMY ANTENNAS.

I.F. —A .1 mfd. condenser connected in series with the test oscillator output lead.

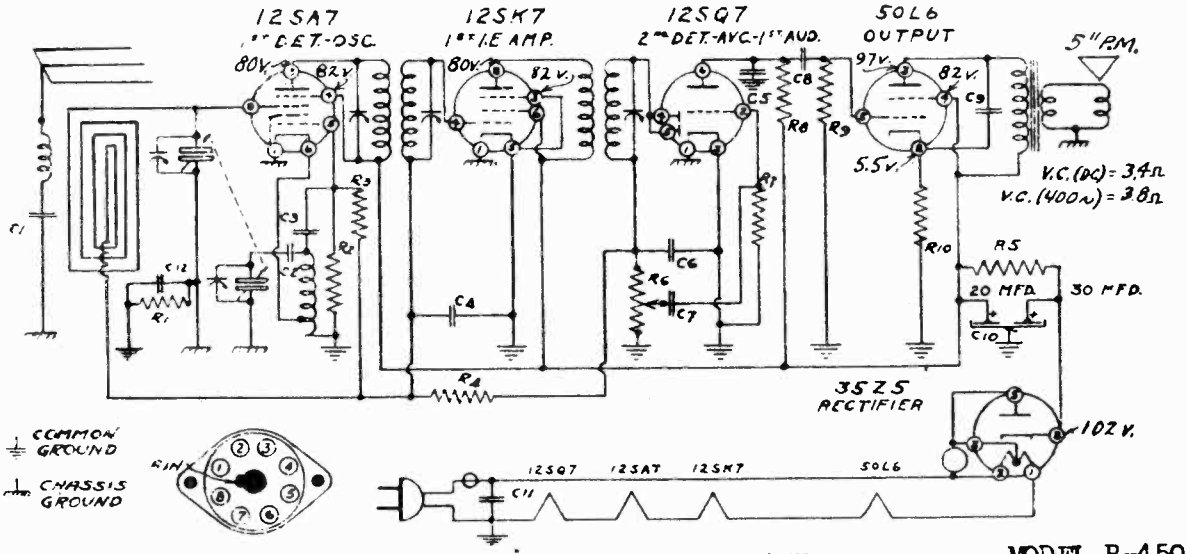
Broadcast —A 200 mmfd. condenser connected in series with the output lead of the test oscillator.

CONVENTIONAL ALIGNMENT

SEE SPECIAL SECTION VOL. VIII

B. F. GOODRICH

MODELS R-450, R-470



MODEL R-450

CONDENSERS

No.	Capacity	Volts
C1	.001	600
C2	.02	400
C3	.00005	Mica
C4	.05	200
C5	.0005	Mica
C6	.00025	Mica
C7	.01	400
C8	.002	600
C9	.01	400
C10	20.0 / 30.0	150
C11	.05	400
C12	.25	200

RESISTORS

No.	Ohms	
R1	150,000	½ Watt
R2	20,000	½ Watt
R3	15,000,000	½ Watt
R4	2,000,000	½ Watt
R5	1,000	1 Watt
R6	500,000	Vol. Cont.
R7	5,000,000	½ Watt
R8	250,000	½ Watt
R9	500,000	½ Watt
R10	150	½ Watt 10%

ISSUE A
MARCH 1940

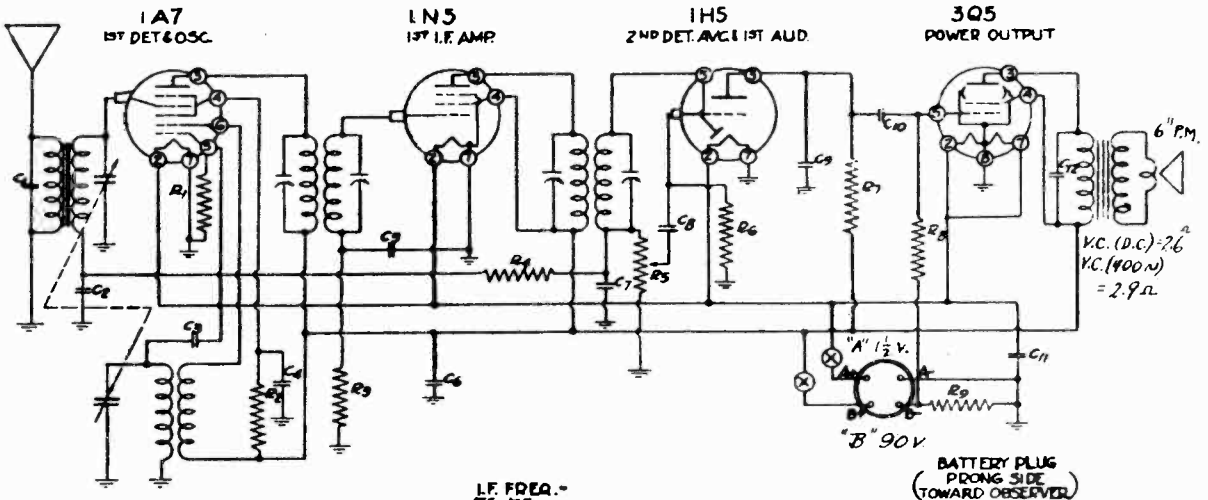
For SOCKET LAYOUT See INDEX

C2, C12 and R1 are not used in some sets, all grounds connecting to chassis ground

I.F. PEAK - 455 KC
TRIM OSC. - 1730 KC
TRIM ANT. - 1400 KC

VOLTAGES: Line 115 v. AC. Power consumption, 30 watts. Volume control maximum. Meter 1000 ohms per volt. Read from point indicated to common ground.

CONVENTIONAL ALIGNMENT



MODEL R-470

RESISTORS

No.	Ohms	Watts
R1	200,000	½
R2	30,000	½
R3	5 Meg.	¼
R4	1 Meg.	¼
R5	500,000	V.C.
R6	5 Meg.	¼
R7	"	¼
R8	"	¼
R9	440 10%	¼

CONDENSERS

No.	Capacity (Mid.)	Volts
C1	.00005	Mica
C2	.05	200
C3	.00005	Mica
C4	.1	200
C5	.002	400
C6	.001	200
C7	.00025	Mica
C8	.01	400
C9	.00025	Mica
C10	.01	400
C11	20 (Elect.)	25
C12	.005	400

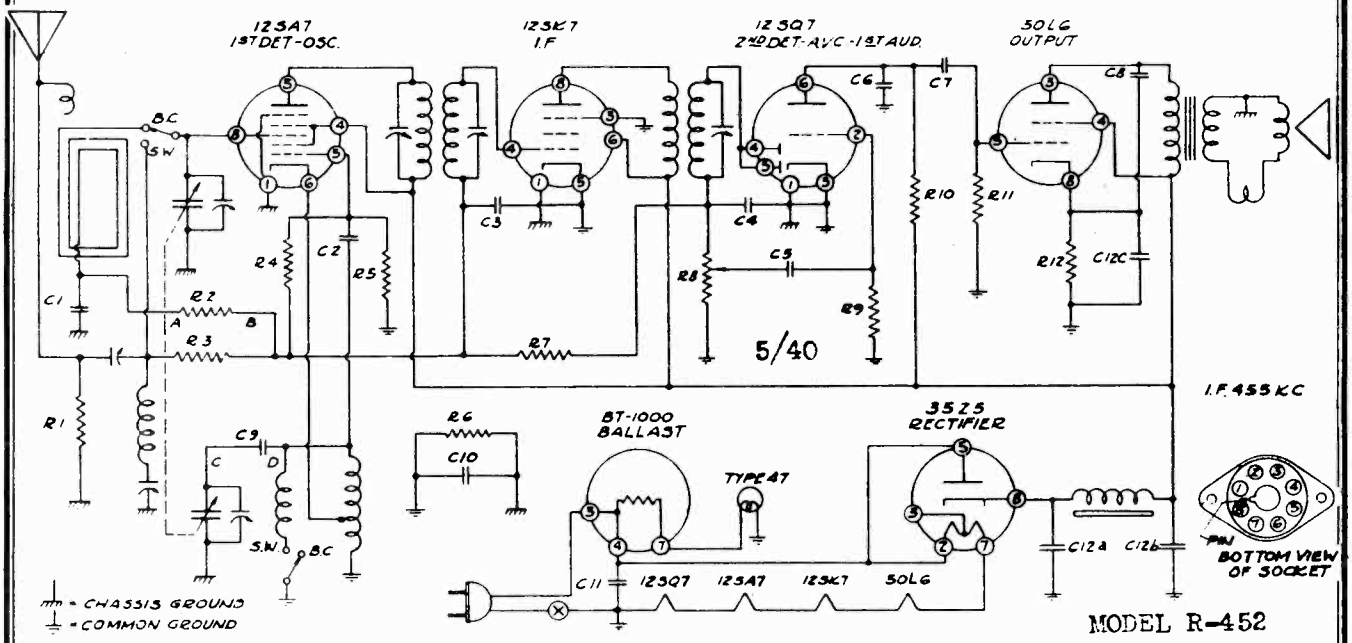
I.F. PEAK - 455 KC
TRIM OSC. - 1730 KC
TRIM ANT. - 1400 KC

ISSUE A
MARCH 1940

For SOCKET LAYOUT See INDEX

MODELS R-452, R-453

B. F. GOODRICH



MODEL R-452

RESISTORS

No.	Ohms	Watts	No.	Ohms	Watts
R1	250,000	1/4	R7	2,000,000	1/4
R2	100,000	1/4	R8	500,000	V.C
R3	250,000	1/4	R9	5,000,000	1/4
R4	10,000,000	1/4	R10	250,000	1/4
R5	25,000	1/4	R11	500,000	1/4
R6	150,000	1/4	R12	150—10%	1/4

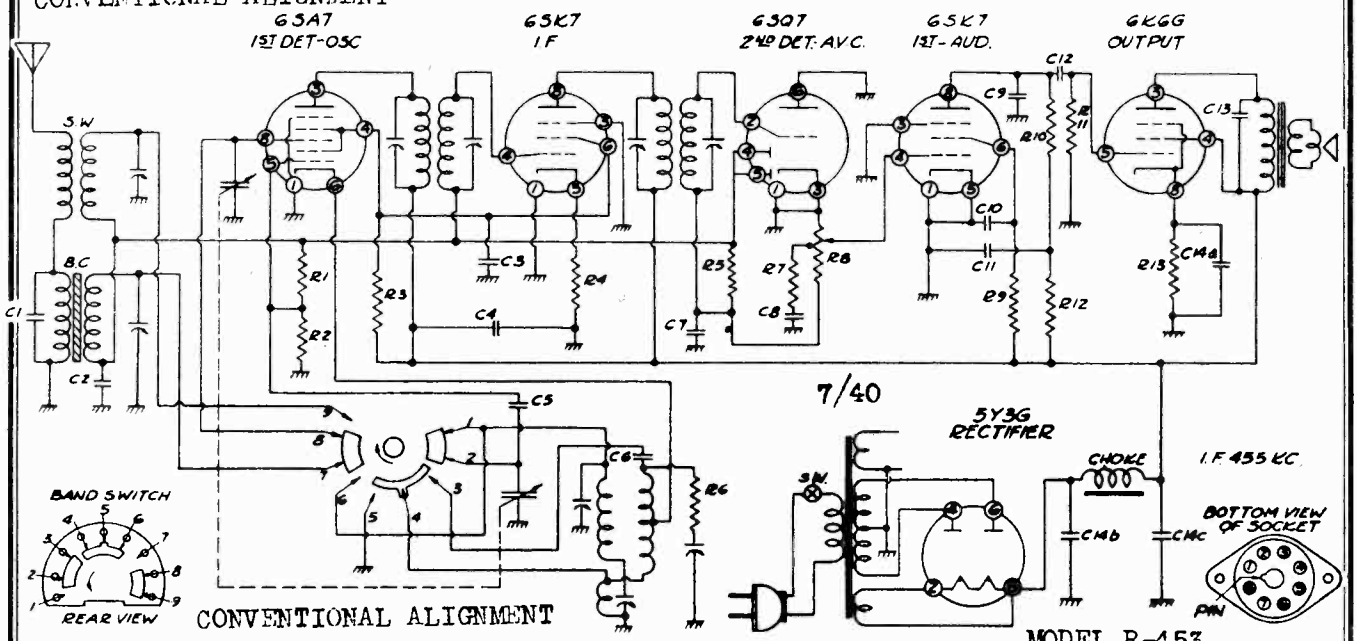
CONDENSERS

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.05	200	C8	.02	400
C2	.0001	Mica	C9	.02	200
C3	.05	200	C10	.2	200
C4	.00025	Mica	C11	.05	400
C5	.005	400	C12a	30.	150
C6	.0005	Mica	C12b	20.	150
C7	.01	400	C12c	20.	25

In model J6 all common grounds become chassis grounds, C1, C9, C10, R2 and R6 are omitted.
Point "A" is connected to point "B" and point "C" to point "D."

CONVENTIONAL ALIGNMENT

FOR OTHER DATA SEE INDEX



MODEL R-453

Band switch shown in broadcast position in schematic and in short wave position in pictorial view in lower left corner.

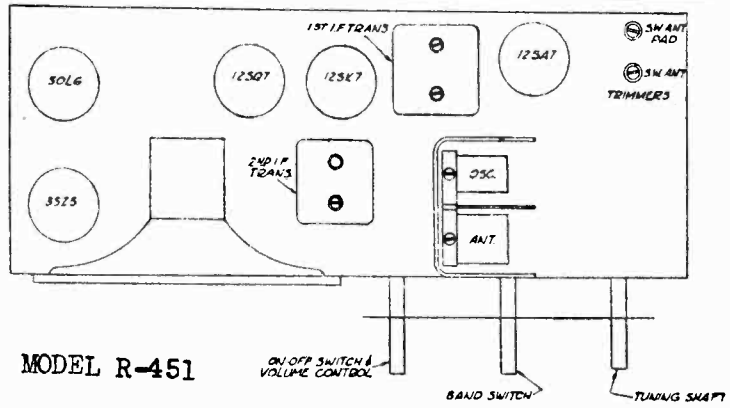
FOR OTHER DATA SEE INDEX

No.	Ohms	Watts	No.	Ohms	Watts
R1	10,000,000	1/4	R9	1,000,000	1/4
R2	20,000	1/4	R10	200,000	1/4
R3	10,000	1	R11	500,000	1/4
R4	100—10%	1/4	R12	50,000	1/4
R5	2,000,000	1/4	R13	500—10%	1/2
R6	30	1/4			
R7	8,000	1/4			
R8	500,000	V.C.			

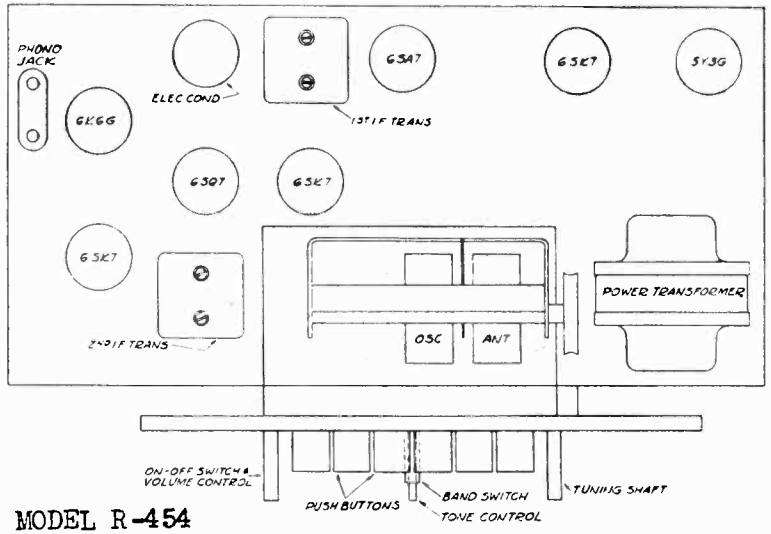
No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.0001	Mica	C9	.00025	Mica
C2	.05	200	C10	.05	200
C3	.05	400	C11	.1	200
C4	.05	400	C12	.01	400
C5	.00005	Mica	C13	.005	600
C6	.004 —5%	Mica	C14a	20.	25
C7	.00025	Mica	C14b	20.	350
C8	.05	200	C14c	20.	350

B. F. GOODRICH

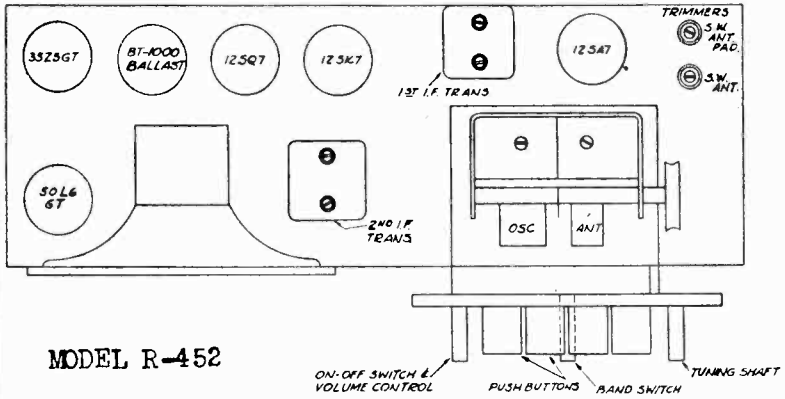
MODELS R-451, R-452, R-453, R-454, R-458



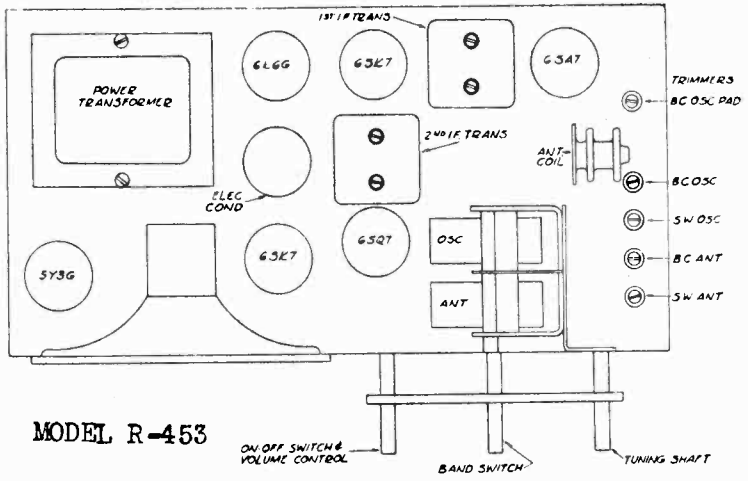
MODEL R-451



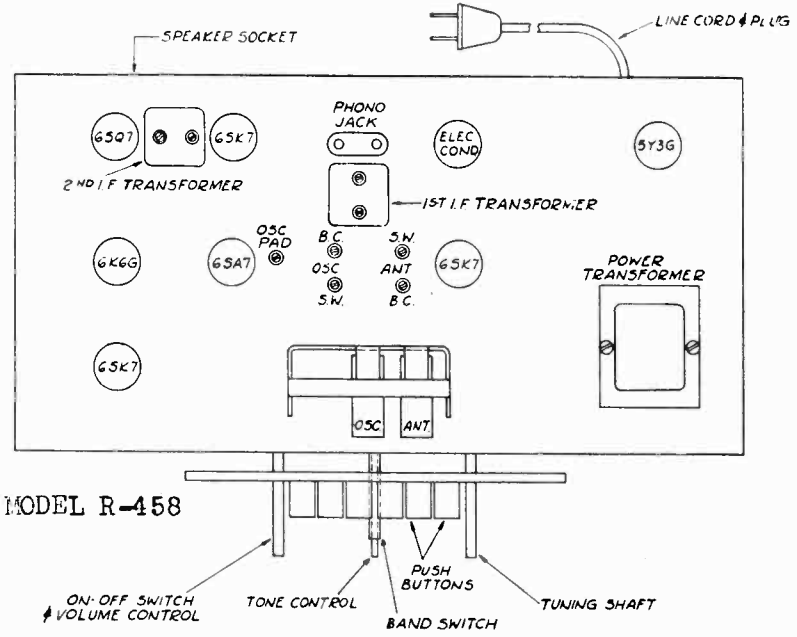
MODEL R-454



MODEL R-452



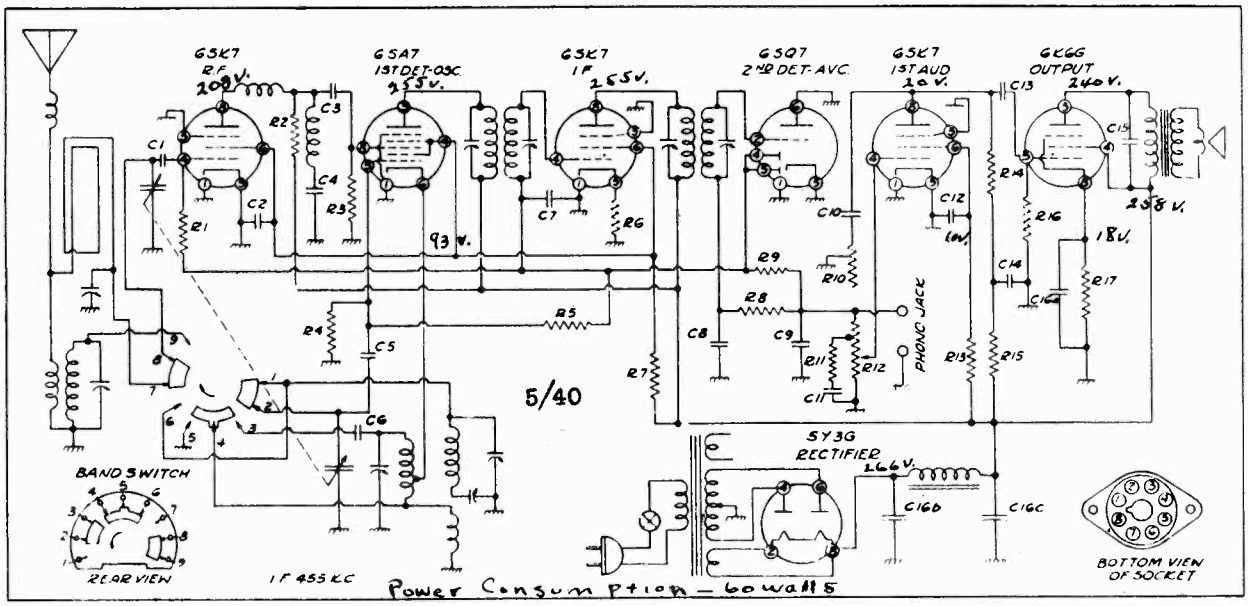
MODEL R-453



MODEL R-458

MODELS R-454, R-458

B. F. GOODRICH



Band switch shown in broadcast position in schematic and in short wave position in pictorial view in lower left corner.

RESISTORS

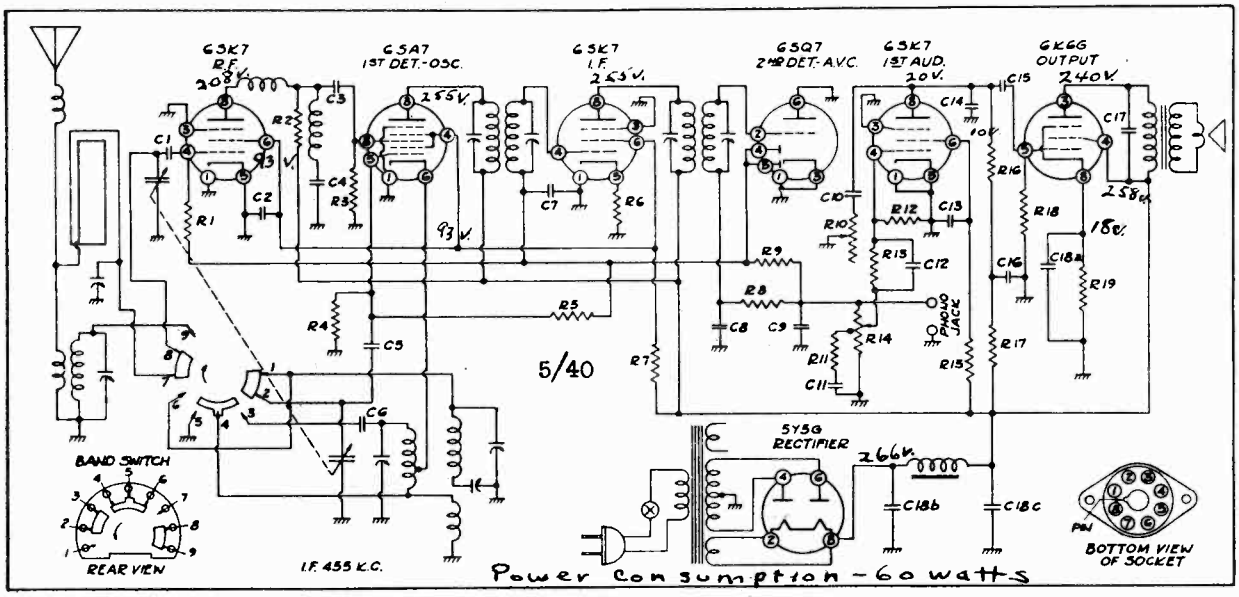
No.	Ohms	Watts	No.	Ohms	Watts
R1	500,000	¼	R10	500,000	T.C.
R2	4,000	½	R11	10,000	¼
R3	100,000	½	R12	500,000	V.C.
R4	25,000	½	R13	2,000,000	¼
R5	5,000,000	¼	R14	250,000	¼
R6	100	¼	R15	50,000	¼
R7	15,000	2	R16	500,000	¼
R8	50,000	¼	R17	600—10%	½
R9	1,000,000	¼			

CONDENSERS

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.0001	Mica	C10	.002	600
C2	.05	400	C11	.05	200
C3	.0001	Mica	C12	.25	400
C4	.00006—5%	Mica	C13	.01	400
C5	.0001	Mica	C14	.25	400
C6	.003—5%	Mica	C15	.005	600
C7	.05	200	C16a	20.	25
C8	.0001	Mica	C16b	20.	350
C9	.00025	Mica	C16c	20.	350

FOR OTHER DATA SEE INDEX

MODEL R-454



Band switch shown in broadcast position in schematic and in short wave position in pictorial view in lower left corner.

RESISTORS

No.	Ohms	Watts	No.	Ohms	Watts
R1	500,000	¼	R11	15,000	¼
R2	2,500	½	R12	2,000,000	¼
R3	100,000	½	R13	2,000,000	¼
R4	25,000	½	R14	500,000	V.C.
R5	5,000,000	¼	R15	2,000,000	¼
R6	100	¼	R16	250,000	¼
R7	15,000	2	R17	50,000	¼
R8	50,000	¼	R18	500,000	¼
R9	1,000,000	¼	R19	600—10%	½
R10	500,000	T.C.			

CONDENSERS

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.0001	Mica	C11	.05	200
C2	.05	400	C12	.05	200
C3	.0001	Mica	C13	.25	400
C4	.00006—5%	Mica	C14	.00025	Mica
C5	.0001	Mica	C15	.01	400
C6	.003 —5%	Mica	C16	.25	400
C7	.05	200	C17	.002	600
C8	.00005	Mica	C18a	20.	25
C9	.0001	Mica	C18b	30.	350
C10	.002	600	C18c	30.	350

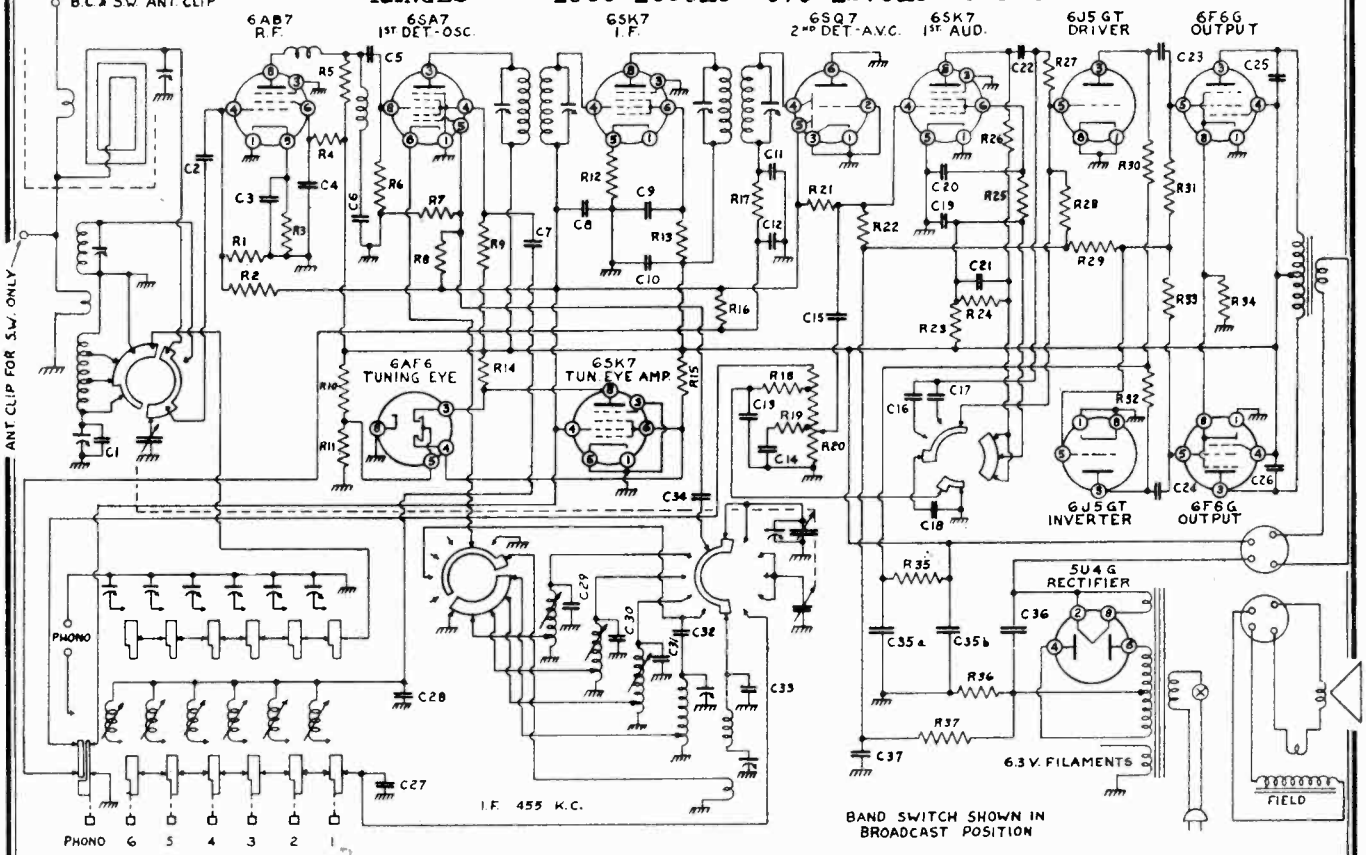
FOR OTHER DATA SEE INDEX

MODEL R-458

B. F. GOODRICH

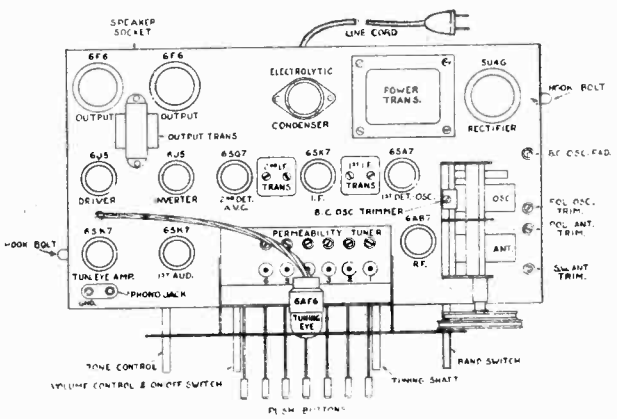
MODEL R-459

PUSH-BUTTON RANGES	#1,#2	#3,#4	#5,#6
	1000-1630KC	670-1270KC	540-1080KC

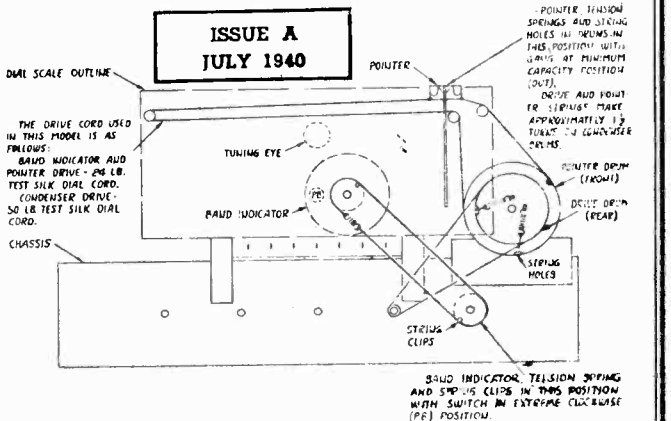


ALIGNMENT CONVENTIONAL-SEE SPECIAL SECTION VOL. VIII

R 1	1,000,000	ohm	½ watt	R20	500,000	ohm V.C.	C1	.00002	10% Mica	C20	.05	400 V.
R 2	2,000,000	ohm	½ watt	R21	1,000,000	ohm ½ watt	C2	.0001	Mica	C21	.05	400 V.
R 3	250	ohm	½ watt	R22	2,000,000	ohm ½ watt	C3	.05	200 V.	C22	.01	400 V.
R 4	50,000	ohm	½ watt	R23	50,000	ohm ½ watt	C4	.05	400 V.	C23	.02	400 V.
R 5	5,000	ohm	½ watt	R24	100,000	ohm ½ watt	C5	.0001	Mica	C24	.02	400 V.
R 6	100,000	ohm	½ watt	R25	500,000	ohm ½ watt	C6	.00006	5% Mica	C25	.005	600 V
R 7	25,000	ohm	½ watt	R26	15,000	ohm ½ watt	C7	.05	400 V.	C26	.005	600 V.
R 8	5,000,000	ohm	½ watt	R27	500,000	ohm ½ watt	C8	.05	200 V.	C27	.0005	2½% Mica
R 9	15,000	ohm	2 watt	R28	100,000	ohm ½ watt	C9	.05	400 V.	C28	.003	5% Mica
R10	25,000	ohm	1 watt	R29	250,000	ohm ½ watt	C10	.1	400 V.	C29	.0003	2½% Mica
R11	30,000	ohm	½ watt	R30	50,000	ohm ½ watt	C11	.0001	Mica	C30	.00025	2½% Mica
R12	100	ohm	½ watt	R31	250,000	ohm ½ watt	C12	.0001	Mica	C31	.0002	2½% Mica
R13	50,000	ohm	½ watt	R32	50,000	ohm ½ watt	C13	.02	200 V.	C32	.003	5% Mica
R14	200,000	ohm	½ watt	R33	300,000	ohm ½ watt	C14	.02	200 V.	C33	.00003	10% Mica
R15	200,000	ohm	½ watt	R34	220	ohm 1 watt	C15	.05	400 V.	C34	.0001	Mica
R16	1,000,000	ohm	½ watt	R35	20,000	ohm ½ watt	C16	.0001	Mica	C35a	16 Mfd.	450 V.
R17	50,000	ohm	½ watt	R36	25	ohm 1 watt	C17	.00025	Mica	C35b	20 Mfd.	450 V.
R18	30,000	ohm	½ watt			10%	C18	.001	600 V.	C36	25 Mfd.	450 V.
R19	30,000	ohm	½ watt	R37	250,000	ohm ½ watt	C19	.25	400 V.	C37	.25	200 V.

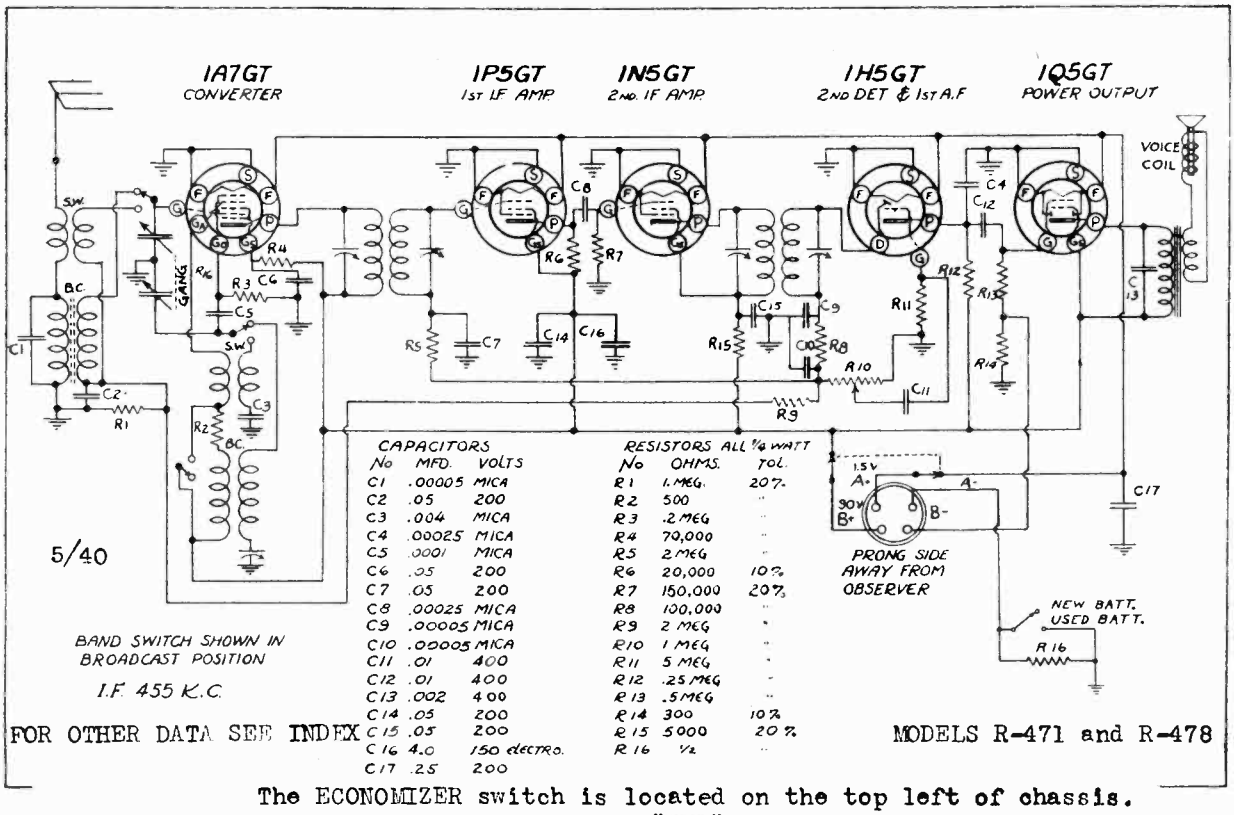


ISSUE A
JULY 1940



MODELS R-471, R-478
R-480

B. F. GOODRICH



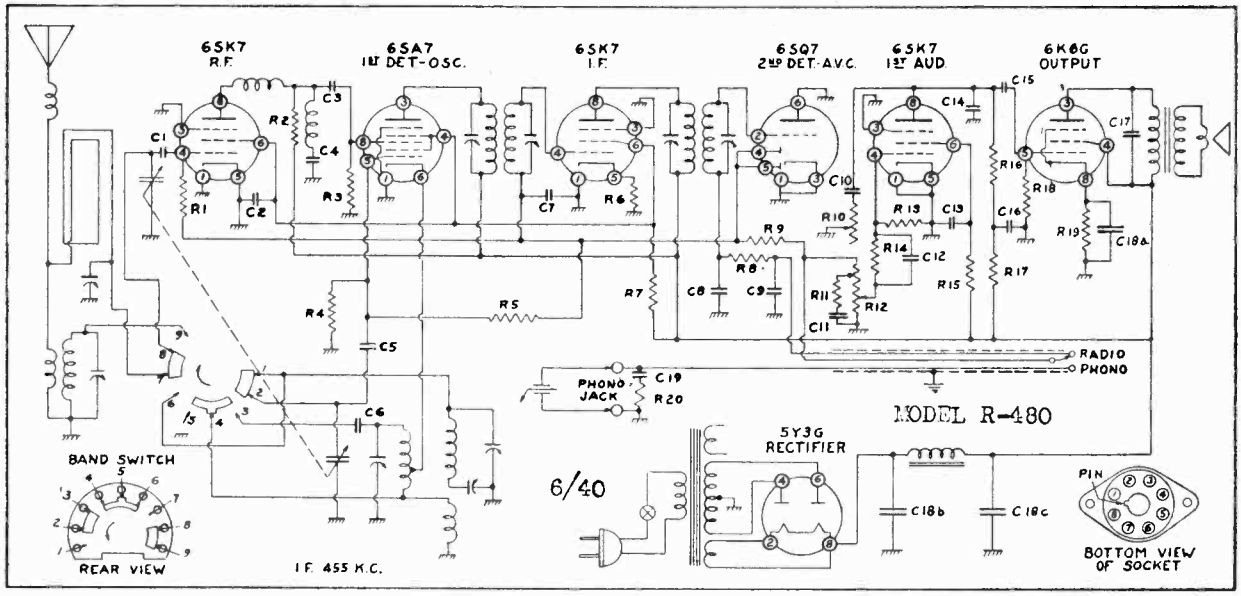
CAPACITORS

No	MFD.	VOLTS
C1	.00005	MICA
C2	.05	200
C3	.004	MICA
C4	.00025	MICA
C5	.0001	MICA
C6	.05	200
C7	.05	200
C8	.00025	MICA
C9	.00005	MICA
C10	.00005	MICA
C11	.01	400
C12	.01	400
C13	.002	400
C14	.05	200
C15	.05	200
C16	4.0	150 electro.
C17	.25	200

RESISTORS ALL 1/6 WATT

No	OHMS.	Tol.
R1	1. MEG.	20%
R2	500	"
R3	.2 MEG	"
R4	70,000	"
R5	2 MEG	"
R6	20,000	10%
R7	150,000	20%
R8	100,000	"
R9	2 MEG	"
R10	1 MEG	"
R11	5 MEG	"
R12	.25 MEG	"
R13	.5 MEG	"
R14	300	10%
R15	5000	20%
R16	1/2	"

The ECONOMIZER switch is located on the top left of chassis. Always have this switch in the "NEW" battery position when first placing the radio in operation or when installing a new battery.



Band switch shown in broadcast position in schematic and in short wave position in pictorial view in lower left corner.

RESISTORS

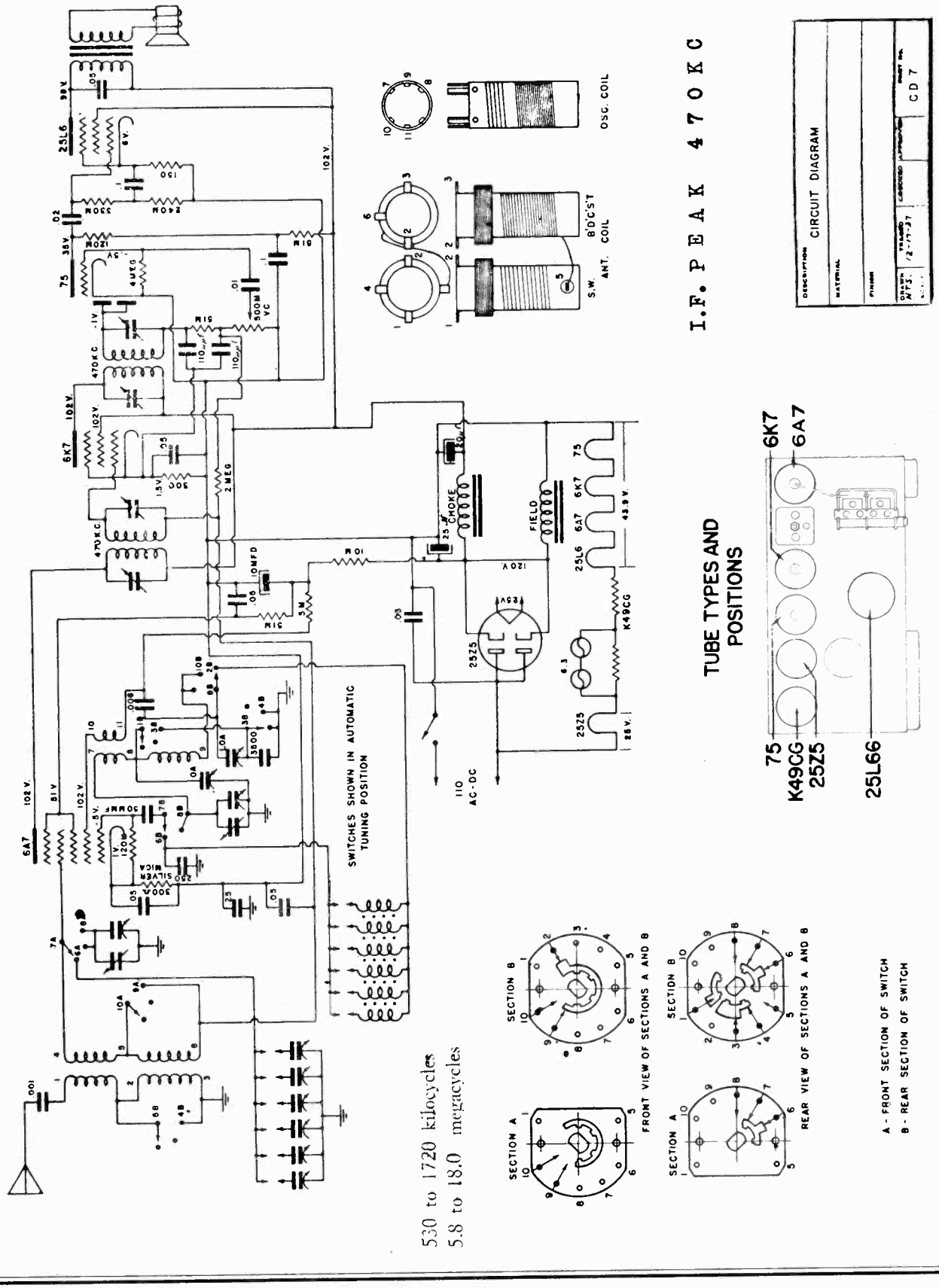
No.	Ohms	Watts	No.	Ohms	Watts
R1	500,000	1/4	R12	500,000	V.C.
R2	2,500	1/2	R13	2,000,000	1/4
R3	100,000	1/2	R14	2,000,000	1/4
R4	25,000	1/2	R15	2,000,000	1/4
R5	5,000,000	1/4	R16	250,000	1/4
R6	100	1/4	R17	50,000	1/4
R7	15,000	2	R18	500,000	1/4
R8	50,000	1/4	R19	600—10%	1/2
R9	1,000,000	1/4	R20	50,000	1/4
R10	500,000	T.C.			
R11	15,000	1/4			

CONDENSERS

No.	Capacity (Mfd.)	Volts	No.	Capacity (Mfd.)	Volts
C1	.0001	Mica	C12	.05	200
C2	.05	400	C13	.25	400
C3	.0001	Mica	C14	.00025	Mica
C4	.00006—5%	Mica	C15	.01	400
C5	.0001	Mica	C16	.25	400
C6	.003—5%	Mica	C17	.002	600
C7	.05	200	C18a	20.	25
C8	.00005	Mica	C18b	30.	350
C9	.0001	Mica	C18c	30.	350
C10	.002	600	C19	.005	400
C11	.05	200			

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 01006



Automatic Unit

Principle of Operation

The basic circuit of any radio receiver is the inductance coil and tuning condenser which determines the frequency to which the system is tuned. The frequency at which this circuit resonates can be varied in two ways; either by holding the inductance coil at a fixed value of inductance and changing the capacity of the condenser, or by holding the condenser at a fixed value of capacity and changing the inductance of the coil. This is so because the frequency is proportional to the inductance times the capacity and changing one or the other will change their product.

Previous push-button systems accomplished their purpose in one of two ways. They either rotated the tuning condenser mechanically with an electric motor, or disconnected the tuning condenser by means of a switch and substitu ed pre-set padding condensers in the antenna and oscillator circuits.

In the push-button system the entire oscillator circuit (coil and gang condenser) is disconnected and in its place is put a silvered mica condenser of fixed capacity and a coil, the inductance of which can be varied by means of an iron slug that moves with a screw adjustment, inside the coil. This is the second system of tuning mentioned above and has the following advantages in this case. The condenser is made by electroplating a small deposit of silver on each side of a piece of mica and encasing the whole unit in a weatherproof compound. The silver, having a low temperature coefficient has a negligible expansion with changes in temperature, and humidity has no effect because of the weatherproof compound. Therefore, changes in the condenser capacity are controlled. The coil is impregnated with a moisture-proof wax and the whole circuit is tuned by varying the inductance of the coil. The only uncontrollable factor in the system is the variation in capacity of the wiring and other parts. But this variation is so small that its detuning effect is not noticeable to the ear.

In the system the silvered mica condenser which tunes all six of the push button coils is in the main part of the receiver and connected on the wave switch. The push-button coils are mounted on the push-button unit and are adjusted from the back by slotted screws. The adjustable padding condensers directly above the slotted screws are used to align the antenna coil in the receiver to each of the push-button coils depending on which button is pushed. Variation in capacity of this padder has no effect on the tuning of the system. It simply drops the sensitivity slightly.

Instructions for Pre-setting "Fingertip Control" Circuits for Six Stations in the Broadcast Tuning Range

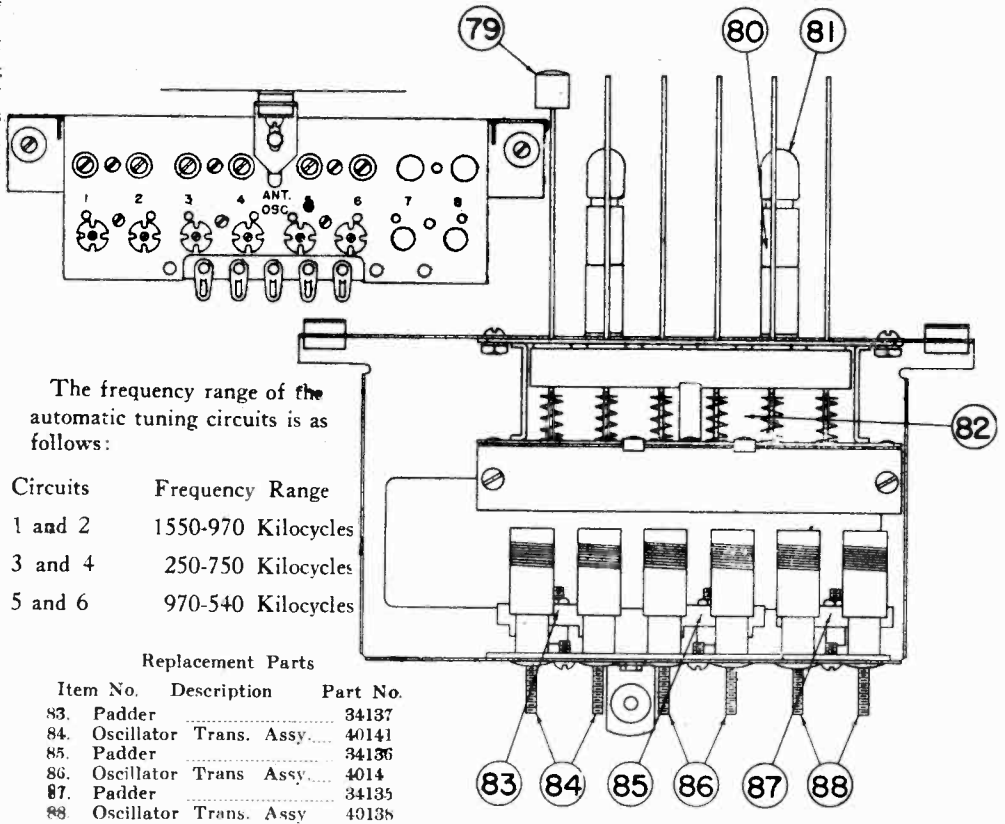
The automatic tuning unit is located immediately above the receiver chassis, the circuits being adjustable from the rear of this unit. Although it is possible to adjust the circuits without the aid of a signal generator, for best results it is recommended that a serviceman be allowed to pre-set the tuning circuits in the following manner.

Turn the wave change switch to the left. Six stations in the broadcast band may be chosen, and the tabs on which are printed the call letters of these stations should be selected from the sheet provided and inserted in the escutcheon slots. It is preferable to place the tabs in the slots according to frequency; that is to say, the low frequency stations should appear at the left as the unit is faced and the high frequency stations at the right.

The tuning circuits corresponding to a given station will be found at the rear of the automatic unit housing, immediately behind the station call letter tab slot. Assuming that you are facing the rear of the receiver and it is desired to set up WJZ at 760 kilocycles on the third circuit from the right, the following is the recommended procedure. Adjust the signal generator, modulated with an audio frequency, to 760 kilocycles. Using a small screw driver adjust the converter oscillator circuit, third hole from right in the lower row, until signal is loudest. Then adjust antenna circuit, third hole in upper row, until signal is at a maximum.

Readjust converter circuit carefully for maximum signal strength. Other frequencies may be set up in a similar manner on the remaining circuits.

If a signal generator is not available turn the wave switch to the middle position for manual tuning and tune the receiver to the desired station. Then turn the switch to the left ("fingertip-control" automatic position) and adjust the automatic unit oscillator and antenna circuits exactly as described abov Repeat procedure until all desired stations are set up. When all desired stations are set up recheck all oscillator adjustments for calibration accuracy

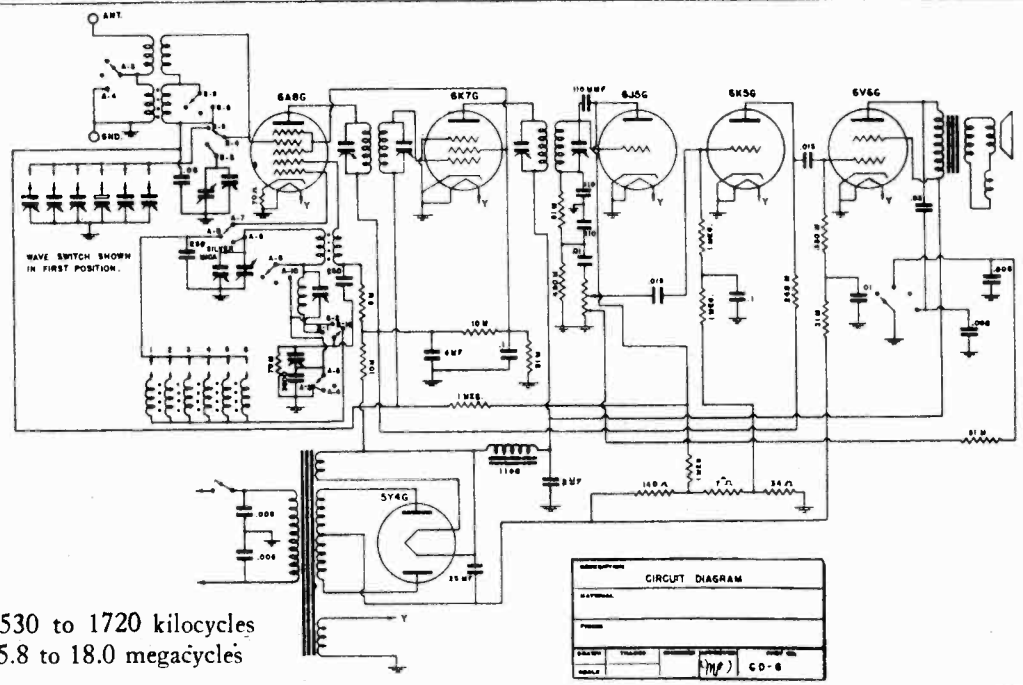


The frequency range of the automatic tuning circuits is as follows:

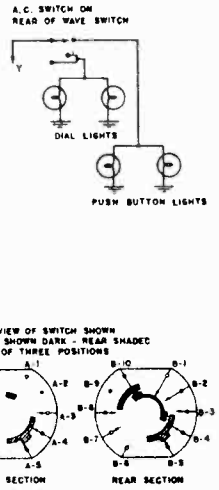
Circuits	Frequency Range
1 and 2	1550-970 Kilocycles
3 and 4	250-750 Kilocycles
5 and 6	970-540 Kilocycles

Replacement Parts

Item No.	Description	Part No.
83.	Padder	34137
84.	Oscillator Trans. Assy.	40141
85.	Padder	34136
86.	Oscillator Trans Assy.	4014
87.	Padder	34135
88	Oscillator Trans. Assy	40138



530 to 1720 kilocycles
5.8 to 18.0 megacycles



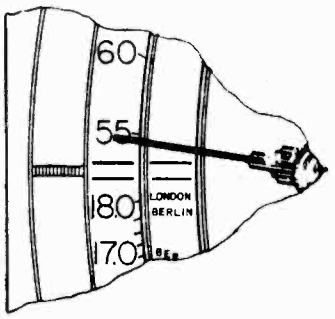


Fig. 3

Aligning I. F. System

Connect a 470KC signal Generator to the grid of the 6A7 converter tube through a .002MFD condenser. Connect an output meter across the speaker voice coil. Turn receiver volume control on full and with wave switch in broadcast position, adjust trimmers (74) and (75) (See Fig. 2) for maximum output. Then adjust (71) and (73) for maximum reading. Repeat adjustments on (74) and (75).

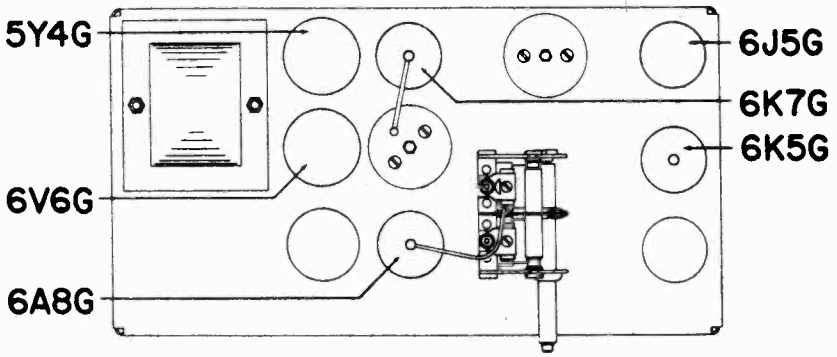
Broadcast and Short Wave Band Adjustments

Note: The following adjustments must proceed in the order specified

(1) Turn variable condenser to maximum capacity and set pointer as indicated in Fig. 3. Turn band selector switch to left or broadcast position. Tune set to a scale frequency of 1550KC and connect a 1550KC signal generator to the antenna post through a 200MMFD condenser. Loosen trimmer screw (66) and adjust trimmer (77) until signal is tuned in. Adjust trimmer (65) for maximum output.

(2) Then set band selector switch to extreme right or short wave position. Set signal generator to 18 megacycles and substitute a 400 ohm resistor for the 200MMFD condenser. Adjust trimmer (66) until signal is tuned in. At this point check the dial at 17.1 megacycles for the 18 megacycle image.

TUBE TYPES AND POSITIONS



(3) Turn band selector switch to broadcast position and reset the signal generator to 1550KC. Substitute the 200MMFD condenser for the 400 ohm resistor in the generator lead and adjust trimmer screw (77) until signal is tuned in. Then tune receiver to 600KC on dial and with the signal generator, set to 600KC, rock the gang while adjusting trimmer (76) for maximum 1550KC and if incorrect, repeat 1550KC adjustment procedure outlined in Section (1).

All of the above adjustments must be made before pre-setting the "fingertip control" circuits.

MODELS 01006,01007 GOODYEAR TIRE & RUBBER CO., INC.

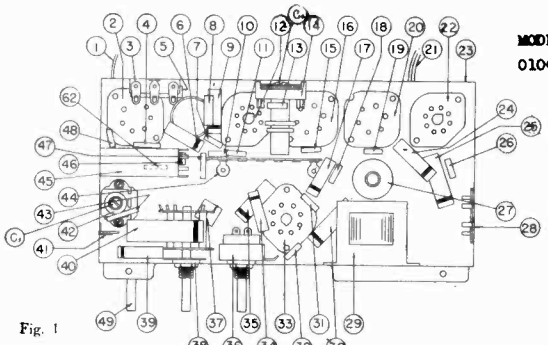


Fig. 1

MODEL 01006

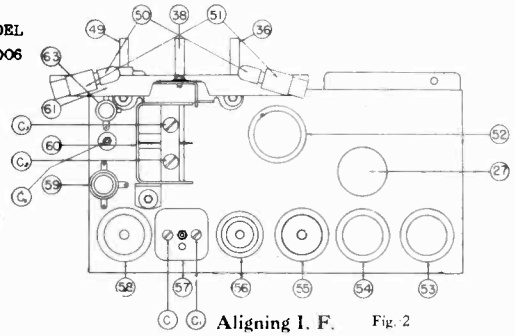


Fig. 2

Item No.	Description	Part No.
1.	Antenna Assembly	77110
2.	7 Prong Socket	15124
3.	Wire Panel 3 Lug	10103
4.	Resistor 300 Ohm 1 Watt	47122
5.	Tub. Cond. .001-1000 Volt	32113
6.	Tub. Cond. .05-200 Volt	32114
7.	Res. 51,000 Ohm ½ Watt	47120
8.	Resistor, 300 Ohm 1 Watt	47122
9.	Tub. Cond. .05-200 Volt	32114
10.	Res. 1,000,000 Ohm ½ Wt.	47125
11.	Res. 5,000 Ohm ½ Watt	47105
12.	8 Prong Socket	15113
13.	Res. 51,000 Ohm ½ Watt	47120
14.	2nd. I. F. Transformer	41102
15.	Res. 10,000 Ohm ½ Watt	47110
16.	6 Prong Socket	15123
17.	Tubular Cond. .02-200 Volt	32118
18.	Res. 240,000 Ohm ½ Watt	47128
19.	Res. 120,000 Ohm ½ Watt	47127
20.	6 Prong Socket	15123
21.	A. C. Cord & Plug	78110
22.	8 Prong Socket	15113
23.	Sub base	20110
24.	Tub. Cond. .03-400 Volt	32115
25.	Tubular Cond. .1-200 Volt	32117
26.	Res. 51,000 Ohm ½ Watt	47120
27.	Electrolytic Condenser	31107
28.	Speaker Socket	15130
29.	Choke	42102
30.	Tubular Cond. .1-200 Volt	32117
31.	Res. 330,000 Ohm ½ Watt	47130
32.	Resistor 150 Ohm ½ Watt	47129
33.	8 Prong Socket	15113
34.	Tubular Cond. .01-200 Volt	32102
35.	Tubular Cond. .05-200 Volt	32114
36.	Volume Control	49102
37.	Mica Cond. .3500 MMFD	30102
38.	Wave Switch	65114
39.	Tub. Cond. .05-200 Volt	32123
40.	Tubular Cond. .25-200 Volt	32105
41.	Wire Panel 2 Lug	10101
42.	Padding Condenser	34109
43.	Mica Condenser Silvered	30111
44.	Wire Panel 7 Lug	10107
45.	Oscil. Trans. Bc. & S. W.	40155
46.	Tub. Cond. .05-200 Volt	32114
47.	Mica Cond. 600 MMFD	30105
48.	Res. 120,000 Ohm ½ Watt	47127
49.	Tun. Cond. Ft. & Dr. Assy.	20117
50.	Pilot Lamp	51101
51.	Pilot Lamp Socket Assy.	90111
52.	25L6G Tube	50113
53.	K49CG Tube	54103
54.	25Z5G Tube	50108
55.	75G Tube	50112
56.	6K7M Tube	50127
57.	1st. I. F. Transformer	41109
58.	6A7G Tube	50110
59.	Ant. Trans. Broadcast	40153
60.	Variable Condenser	33107
61.	Dial Plate	20212
62.	Mica Cond. 50 MMFD	30109
63.	Ant. Trans. Shortwave	40154
C-1	1st. I. F. Primary Padder	
C-2	Ant. Broadcast & S.W. Padder	
C-3	Shortwave & Oscillator Padder	
C-4	2nd. I. F. Padder	
C-5	Broadcast Oscillator Padder	
C-6	Broadcast Oscil. Series Padder	
C	1st. I. F. Secondary Padder	
79.	Knob	18124
82.	Tuning Unit Switch	65114

Aligning I. F.

Connect an output meter across the speaker voice coil and turn receiver volume control on full. Turn wave switch to manual position and variable condenser to extreme high frequency end of scale. Connect a 470 K.C. signal generator to the grid of the 6A7 tube through a condenser in the order of .002 Mfd capacity. Keep the signal to a low audible value and adjust trimmer (C4) (See Fig. 2) for maximum output. Then adjust trimmers (C) and (C1) (See Fig. 1 for maximum output. Finally repeat (C4) adjustment.

Broadcast and Shortwave Band Adjustments

Note: The following adjustments must proceed in order specified.

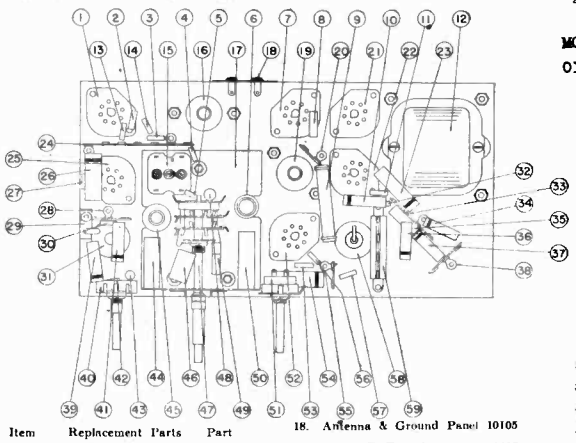
(1.) Turn variable condenser to maximum capacity and set pointer on small dot approximately 1-16 inch above top horizontal scale dividing line. Tune set to a scale frequency of 1550 K.C. and connect a 1550 K.C. generator to antenna lead through a 100 Mmfd condenser. Turn center knob to manual position. Volume control should be on full.

(2.) Loosen trimmer (C2) and adjust trimmer (C5), until signal is tuned in. Then adjust (C3) for maximum output.

(3.) Turn center knob to shortwave position, substitute a 400 ohm resistor for the condenser in the signal generator lead and set generator to a frequency of 18 megacycles. Tune set to 18 megacycles and adjust trimmer (C2) until signal is tuned in.

(4.) Turn center knob back to manual and substitute the 100 Mmfd condenser for the 400 ohm resistor in the generator lead. Set signal generator to 1550 K.C. Tune set to 1550 K.C. and adjust trimmer (C5) until signal is tuned in. Set signal generator to 600 K.C. With the set tuned close to 600 K.C. on the dial, vary the gang condenser slowly back and forth, adjusting (C6) at the same time until maximum output is indicated. Finally recheck dial for calibration accuracy against signal generator at the 1550 K.C. point. If found to be incorrect, repeat the 1550 K.C. adjustment procedure outlined in step number (1).

All of the above adjustments must be made before pre-setting the automatic circuits.



MODEL 01007

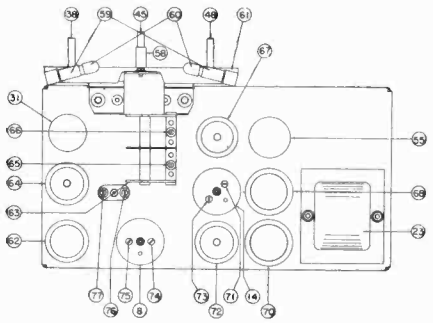
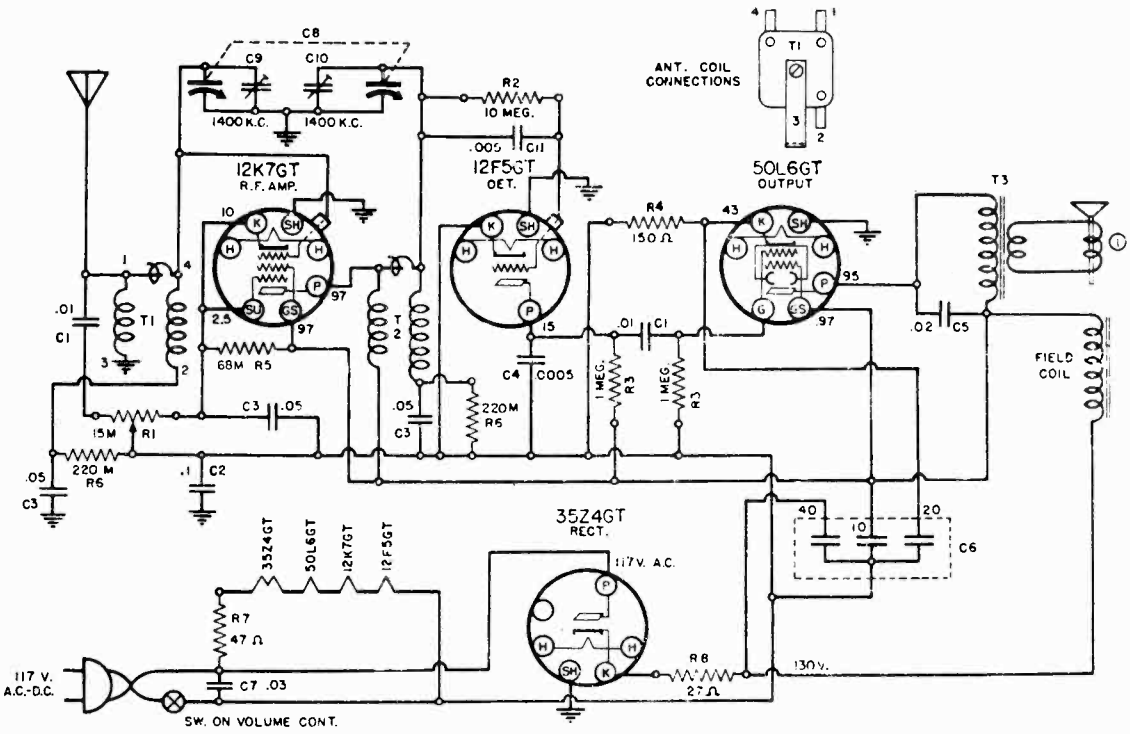


Fig. 2

Item No.	Replacement Parts Description	Part No.
1	7 Prong Socket	15119
2.	Mica Cond. 110 M. Mfd.	30101
3.	Res. 490,000 Ohm ½ Watt	47119
4.	Res. 5,000 Ohm, ½ Watt	47105
5.	Res. 70,000 Ohm, ½ Watt	47135
6.	Ant. Trans. Short Wave	40116
7.	7 Prong Socket	15119
8.	Res. 10,000 Ohm, 1 Watt	47114
9.	Res. 10,000 Ohm, 3 Watt	47115
10.	Tubu. Cond. .01-200 Volt	32102
11.	Res. 330,000 Ohm, ½ Watt	47130
12.	Power Transformer	42101
13.	Res. 1,000,000 Ohm, ½ W.	47106
14.	Res. 1,000,000 Ohm, ½ W.	47106
15.	Padding Condenser	34103
16.	2nd. I. F. Transformer	41104
17.	R. F. Base	20114
18.	Antenna & Ground Panel	10105
19.	Ist. I. F. Transformer	41105
20.	Wire Panel 2 Lug	10101
21.	7 Prong Socket	15119
22.	7 Prong Socket	11119
23.	Tubu. Cond. .03-300 Volt	32110
24.	Wire Panel 17 Lug	10106
25.	7 Prong Socket	15119
26.	Tubular Cond. .1-200 Volt	32117
27.	Res. 240,000 Ohm, ½ W.	47128
28.	Wire Panel 3 Lug	10103
29.	Wire Panel 2 Lug	10101
30.	Res. 1,000,000 Ohm, ½ W.	47106
31.	Electrolytic Condenser	31102
32.	Res. 51,000 Ohm, ½ W.	47120
33.	Wire Panel 4 Lug	10104
34.	Pap. M'ld Cond. .006-400V	32125
35.	Tub. Cond. .015-400V.	32112
36.	Tub. Cond. .006-400V	32107
37.	Pap. M'ld. Cond. 006-400V	32125
38.	Wire Panel 2 Lug	10102
39.	Tub. Condenser .01-200V	32102
40.	Volume Control	49107
41.	Tubular Cond. .015-200V	32109
42.	Res. 51,000 Ohm, ½ Watt	47120
43.	Tub. Cond. .006-200V.	32104
44.	O cill'tr Trans. Broade'st	40145
45.	Antenna Trans. Br'dc'st.	40144
46.	Mica Condenser Silvered	30111
47.	Wave Switch	65113
48.	Tub. Cond. .05-200V.	32121
49.	Mica Cond. 3500 M.Mfd.	30102
50.	Oscillator Trans. Srt. W've	40117
51.	Tone Cont. & Line Sw't'ch	66101
52.	7 Prong Socket	15119
53.	Res. 51,000 Ohm, ½ Watt	47120
54.	Tubular Cond. .1-400 V.	32111
55.	Wire Panel 2 Lug	10101
56.	Res. 70 Ohm. ½ Watt.	47134
57.	6A8G Tube	50106
58.	6V6G Tube	50104
59.	B. C. Resistor	48100
60.	Pilot Lamp	51102
61.	Scale Plate	20123
62.	6H5G Tube	50103
63.	Variable Condenser	33104
64.	6K5G Tube	50109
65.	Br'dc'st & Shortw've, Ant. Pan	
66.	Shortwave Oscillator Pad.	
67.	6T8G Tube	50105
68.	6V6G Tube	5010A
69.	Pilot Lamp. Soc. Assembly	90112
70.	5Y4G Tube	50105
71.	1st. I. F. Primary Pad	
72.	JK7G Tube	50107
73.	1st. I. F. Secondary Pad.	
74	2nd. I. F. Primary Pad	
75	2nd. I. F. Secondary Pad.	
76.	Br'd'c'st Series Oscillator Pad	
77.	Broadcast Parallel Oscil. Pad.	
78.	Drive Shaft	21126
79.	Knob	18124
80.	Pilot Lamp Soc't Assem.	
81.	Pilot Lamp	51102
82.	Push Button Switch	65112

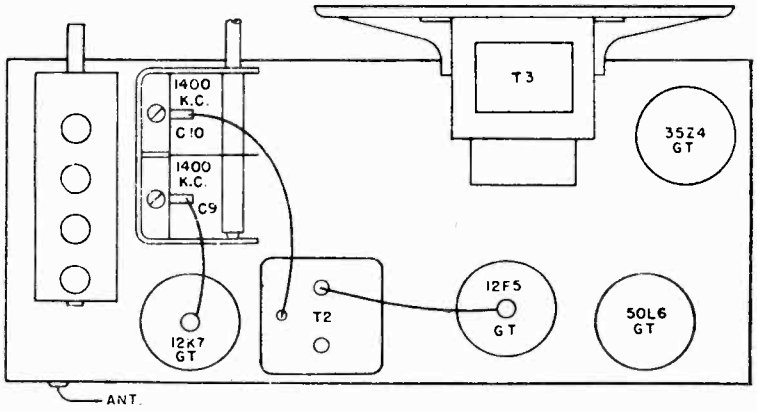
GOODYEAR TIRE & RUBBER CO., INC. MODELS 015140, 015141



TUBE SOCKETS ARE VIEWED FROM UNDERSIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO COMMON GROUND.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
CAPACITY VALUES ARE IN MICROFARADS.

WHERE NO VOLTAGE READING IS SHOWN, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.
ALIGNMENT IS TO BE MADE AT THE FREQUENCY SHOWN AT EACH TRIMMER CONDENSER.

9-462



SETTING PUSH-BUTTONS:

1. By means of the Station Selector Knob, tune in WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE the station having the lowest frequency—that is, your selected station which is tuned in nearest the top of the dial.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).

3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is now correctly set up for your first selected station of lowest frequency and the Call Letter Tab for this station should be at the extreme right of the Call Letter Holder.

Follow through with this same procedure, setting up the other 3 stations in the order of their frequency—that is, the second station set up will be second lowest in frequency and the third station set up will be third lowest in frequency.

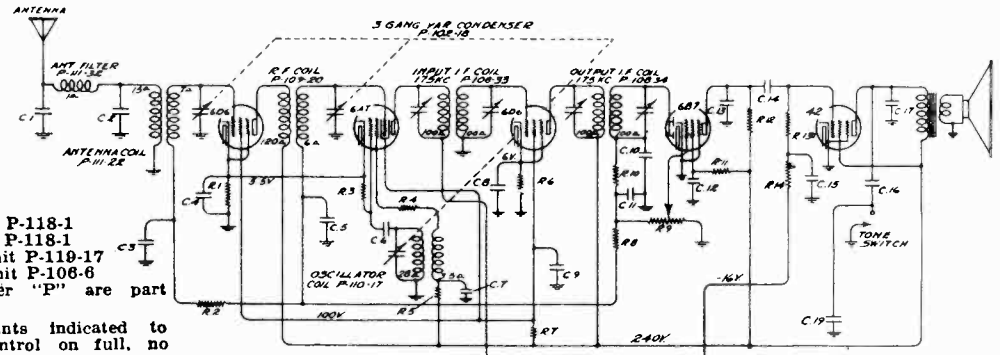
Carefully check each Push-Button for the accuracy of its setting. If, when tuning in any station with its Automatic Push-Button it does not have equal volume or clarity to that obtained with manual tuning, this may indicate the automatic adjustment for that station was not made accurately. Should there be any inaccuracy in any one of the Push-Button adjustments, correction can be made by repeating the above procedure for that button only. Do not reset those Push-Buttons that are accurately adjusted.

No further adjustments are necessary to operate your radio automatically or manually. To receive any one of your selected stations for automatic operation, merely push in ALL THE WAY the Button set up for that station.

To receive all other stations in the regular manner turn the tuning knob to the frequency of the station desired.

MODEL 690

GOODYEAR TIRE & RUBBER CO., INC.



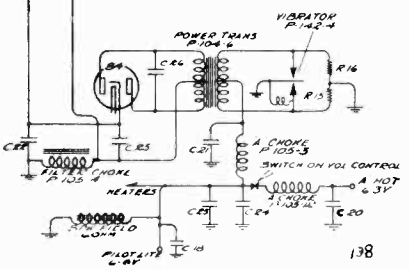
NOTE:

C.4 and C.9 are in one unit P-118-1
C.7 and C.8 are in one unit P-118-1
C.22 and C.25 are in one unit P-119-17
R.16 and R.15 are in one unit P-106-6
Numbers prefixed by letter "P" are part numbers.

Voltages taken from points indicated to chassis ground. Vol. control on full, no signal.

Serial No. 40001 up.

IF PEAK 175 KC



DESCRIPTION:

Model 690 is a six tube superheterodyne receiver, with an intermediate frequency of 175 K.C. and a tuning range of from 520 to 1550 K.C. This receiver has been carefully designed to facilitate servicing, the top and bottom covers are both removable and are fastened in place by spring clips. All adjustments are accessible and any part replaceable without removing the chassis from the cabinet.

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

In order to prevent signal from acting upon A.V.C. and affecting accuracy of voltage measurements, aerial and ground leads should be short circuited while making measurements.

All voltages are to be measured with 6.3 volts input to receiver. Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Failure to operate, noisy or weak reception is usually due to defective tubes, the tubes making poor contact with sockets or grid clips making poor contact with the caps of the tubes. Tubes may be checked very easily by replacing with other tubes which are known to be good. If fuse blows out frequently and insulating sleeve has been properly placed over fuse, the trouble is probably in the vibrator, it should be replaced. Do not attempt to make any adjustments on the vibrators.

ANTENNA CONNECTION:

The antenna is connected to the receiver by means of the antenna cable. The antenna wire is the single black wire projecting from the end of the cable. Splice this wire to the roof antenna lead and ground the pig-tail shielding as close to the corner post of the car as possible.

On open and convertible models where underslung strap or plate antennas are used it may be necessary to ground the exhaust pipe and muffler to the frame at both ends with heavy copper braid

CONNECTIONS TO BATTERY:

The battery cable, number 152-2, (red wire with fuse receptacle at one end and terminal lug at other end) must be connected to battery terminal of ammeter. At the same time connect ammeter capacitor, number 148-3, to battery terminal of ammeter, other end of condenser to any convenient grounded screw on back of instrument panel. Make certain that insulating sleeve is slipped over fuse when fuse is placed in receptacle, before connecting to short battery cable from receiver.

When connected properly, the discharge due to current drawn by the receiver should not indicate on the ammeter. This is important, since if improperly connected, as shown by the deflection of ammeter, additional motor interference may be encountered.

GENERATOR INTERFERENCE:

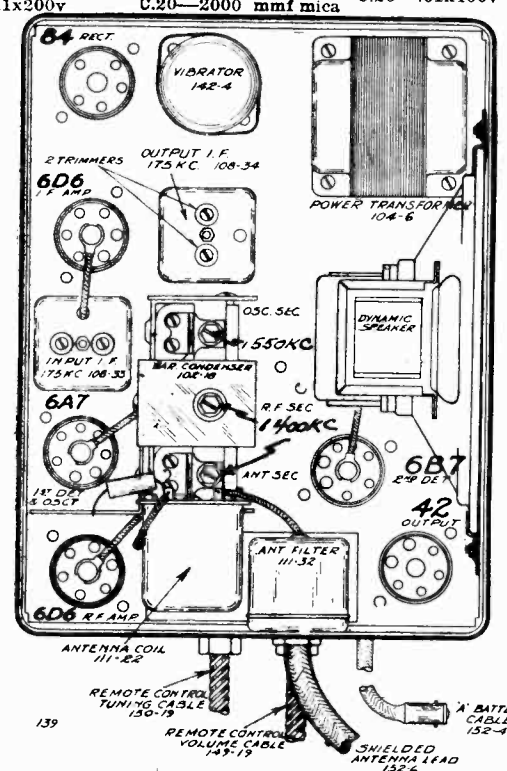
Remove the generator cutout mounting screw and fasten the condenser (148-1) bracket on the generator cutout mounting lug. Replace the cutout mounting screw and tighten down securely. Connect the condenser lead to the battery terminal of the cutout The generator condenser is absolutely necessary as it is used to eliminate a high pitched whining noise which would otherwise be heard as the motor is accelerated.

RESISTORS

No.	Value
R.1	500 ½ w
R.2	100M ½ w
R.3	50M ½ w
R.4	3500 ½ w
R.5	20M ½ w
R.6	1500 ½ w
R.7	25M 1w
R.8	500M ½ w
R.9	1 meg vol. control P-101-21
R.10	100M ½ w
R.11	1 meg ½ w
R.12	250M ½ w
R.13	301M ½ w
R.14	301m ½ w
R.15	100
R.16	100

CONDENSERS

No.	Value
C.1	20 mmf mica
C.2	20 mmf mica
C.3	.01x400v
C.4	.1x200v
C.5	.05x200v
C.6	100 mmf mica
C.7	.1x200v
C.8	.1x200v
C.9	.1x200v
C.10	100 mmf mica
C.11	100 mmf mica
C.12	.1x200v
C.13	100 mmf mica
C.14	.01x400v
C.15	.25x400v
C.16	.025x400v
C.17	.006x600v
C.18	500 mmf mica
C.19	500 mmf mica
C.20	2000 mmf mica
C.21	1.0 mfdx120v
C.22	8 mfd x300v
C.23	.5 mfd x120v
C.24	.01x400v
C.25	8 mfd x300v
C.26	.01x400v



DUMMY ANTENNAS.

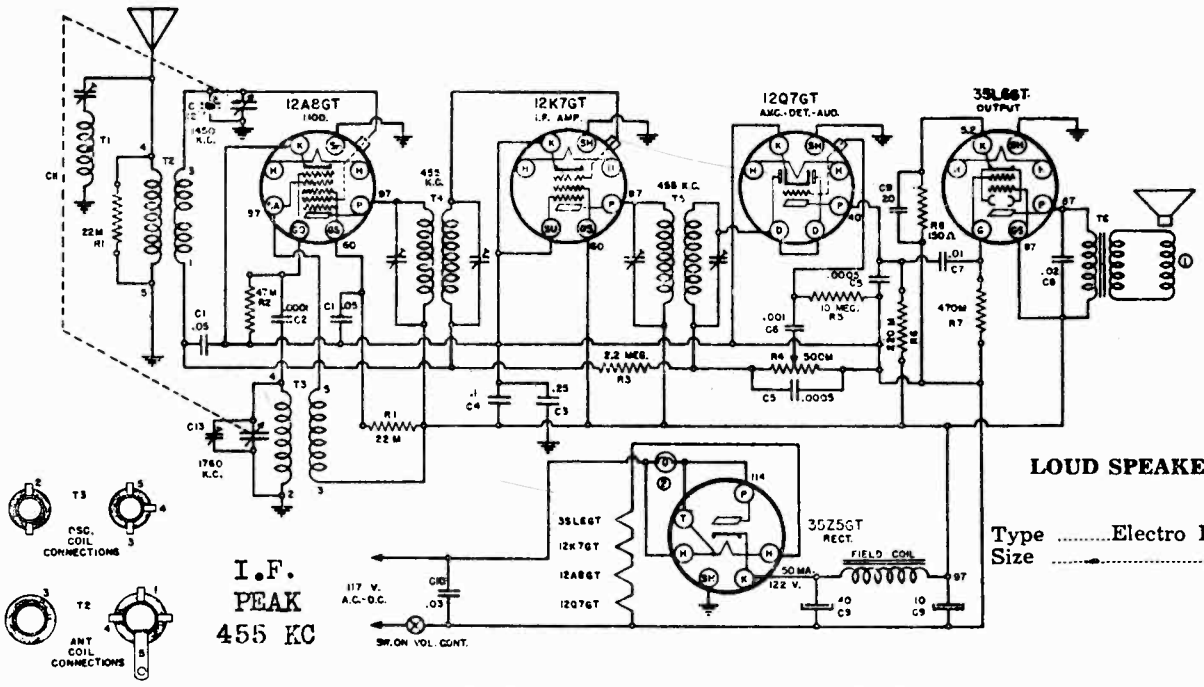
I.F. —A .1 mfd. condenser connected in series with the test oscillator output lead.

Broadcast —A 200 mmfd. condenser connected in series with the output lead of the test oscillator.

CONVENTIONAL ALIGNMENT

SEE SPECIAL SECTION VOL. VIII

GOODYEAR TIRE & RUBBER CO., INC. MODELS 015150, 015151



OSC. COIL CONNECTIONS

ANT COIL CONNECTIONS

I.F. PEAK 455 KC

LOUD SPEAKER:

Type .....Electro Dynamic
Size 5-inch

ALIGNMENT IS TO BE MADE AT THE FREQUENCY SHOWN AT EACH TRIMMER CONDENSER.
WHERE NO VOLTAGE READING IS SHOWN, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.

TUBE SOCKETS ARE VIEWED FROM UNDERSIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO COMMON GROUND.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
CAPACITY VALUES ARE IN MICROFARADS.

9-982

PILOT LAMP:

The pilot lamp is a 6.3 volt 150 Mill. type (No. 47) and should be replaced with such, in order that the filament voltages across the radio tubes do not change.

FREQUENCY RANGE:

Broadcast .....538 K.C. to 1760 K.C.

ALIGNMENT FREQUENCIES:

Antenna Trimmer	Oscillator Trimmer
1450 KC	1760 KC

INTERMEDIATE FREQUENCY .....455 K.C.

POWER SUPPLY:

Power Main .....105-130 Volts AC/DC
Power Consumption .....30 Watts

POWER OUTPUT:

Type .....Single Class A
Undistorted .....1.4 Watts
Maximum .....2 Watts

ALIGNMENT PROCEDURE

PRELIMINARY

Output Meter Connections ..... **Across Loud Speaker Voice Coil**
Output Meter Reading to Indicate 1 Watt ..... **1.95 Volts**
Generator Ground Lead Connection ..... **Receiver Chassis**
Dummy Antenna Value to Be in Series with Generator Output ..... **See Chart Below**
Connection of Generator Output Lead ..... **See Chart Below**
Generator Modulation ..... **30%, 400 Cycles**
Position of Volume Control ..... **Fully On**

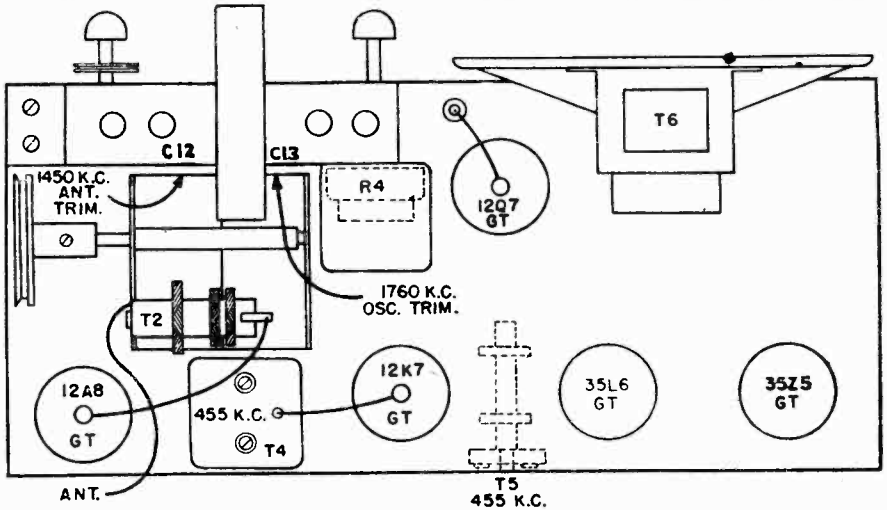
POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTIONS	TRIMMER ADJUSTMENT (In Order Shown)	TRIMMER FUNCTION
Closed	455 Kc.	.1 mfd.	12A8GT	T4-T5	I. F.
Closed	455 Kc.	.0002 mfd.	Antenna Conn.	T1 (Min. Output)	Wave Trap
Fully Open	1760 K.C.	.0002 mfd.	Antenna Conn.	C13	Osc. Trimmer
Fully open	1450 K.C.	.0002 mfd.	Antenna Conn.	C12	Ant. Trimmer

The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy.

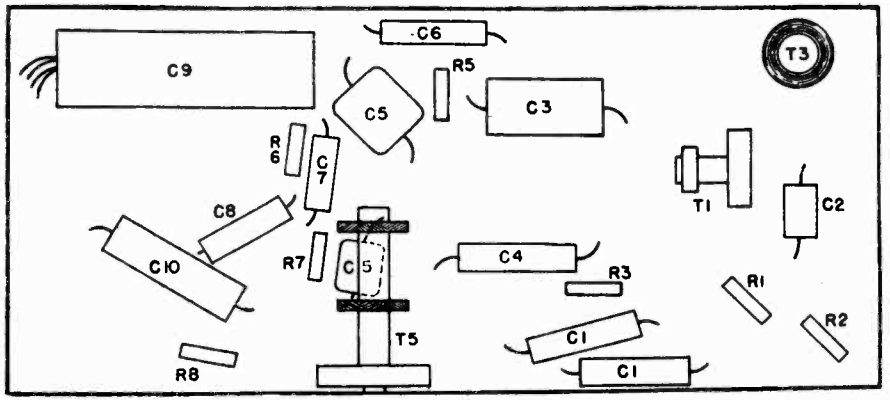
Always keep the output power from the generator at its lowest possible value to prevent the A.V.C. of the receiver from interfering with accurate alignment.

When adjusting T1, Antenna Wave Trap, Trimmer, increase generator output. To obtain clearly defined trimmer setting for a minimum output.

MAR. 21, 1939



LOCATION OF PARTS ON TOP OF CHASSIS



LOCATION OF PARTS UNDER CHASSIS

C10		Condenser .03 mf. 600V
C8		Condenser .02 mf. 400V
C5		Condenser .0005 mf. mica
C7		Condenser .01 mf. 200V
C2		Condenser .0001 mf. mica
C1		Condenser .05 mf. 200V
C6		Condenser .001 mf. 400V
C3		Condenser .25 mf. 200V
C4		Condenser .1 mf. 200V
C9	1012118239	Condenser Electrolytic (40x10) & 20 mf.
C11	1012019132	Condenser Variable C12 & C13
R4	1012524134	Control Volume 500M
R7		Resistor 470M ohm 1/3W
R6		Resistor 220M ohm 1/3W
R3		Resistor 2.2 meg. ohm 1/3W
R1		Resistor 22M ohm 1/3W
R2		Resistor 47M ohm 1/3W
R5		Resistor 10 meg. ohm 1/3W
R8		Resistor 150 ohm 1/3W
T2	1011810239	Transformer Antenna
T4	1015510241	Transformer 1st I.F.
T5	1015710283	Transformer 2nd I.F.
T3	1011810240	Transformer Oscillator
T1	1016310256	Wave Trap (coil & trimmer)

FOR SETTING OF PUSH-BUTTONS SEE MODEL 015140

HOW THE AUTOMATIC PUSH-BUTTON TUNER FUNCTIONS:

This unit is mechanically operated by means of a proven cam and lever action, designed to rotate a shaft 90 degrees. Since the variable gang condenser shaft must rotate 180 degrees, a 2 to 1 step up mechanical lever action is incorporated to give full rotation to the gang condenser. Three links are used to transmit the operation of the push-button to the variable gang condenser; first, a driver lever or link connected to the tuner lever bar, (see Pictorial); second, a driven lever arm connected to the gang condenser shaft; and third, a connecting link, connecting the two lever arms together mechanically.

The plunger bar that retains the screw type push-buttons, also holds a cam to itself by a shoulder rivet. This cam floats on the rivet proper and is locked into position with a small square plate, floating in the plunger bar. To lock cam into position, screw the push-button knob toward the right (clock-wise). The end of the push-button screw will then force a small square plate known as a brake shoe against the periphery of the cam. The push-button must be tightened firmly after the position of the station selection is determined. To change the setting of the cam, the push-button knob must be loosened by rotating it toward the left (counter-clockwise). When this push-button screw is loosened, it will automatically release the brake shoe from the cam, leaving the cam free to rotate and set its new position to the setting of the lever bar.

If it becomes necessary to realign the tuner in relation to the gang condenser, the following procedure should be followed to assure perfect tuning operation:

1. Attach driver arm to the lever bar by means of two machine screws, making sure that they are assembled with lockwashers and tightened securely.

2. Slip the drum assembly, which consists of the drum, drum hub, and the driven arm, over the variable condenser shaft but do not tighten set screws.

3. Connect these two lever arms by slipping the connecting link over the heads of the shoulder rivets. This link has a slight bend (offset) about 1/3 of its length and is to be installed with the shorter end towards the top and the offset towards the rear when looking at it from the drum end. Attach the tension spring between the two shoulder rivets. This spring is incorporated to take up all the unnecessary slack in the drive.

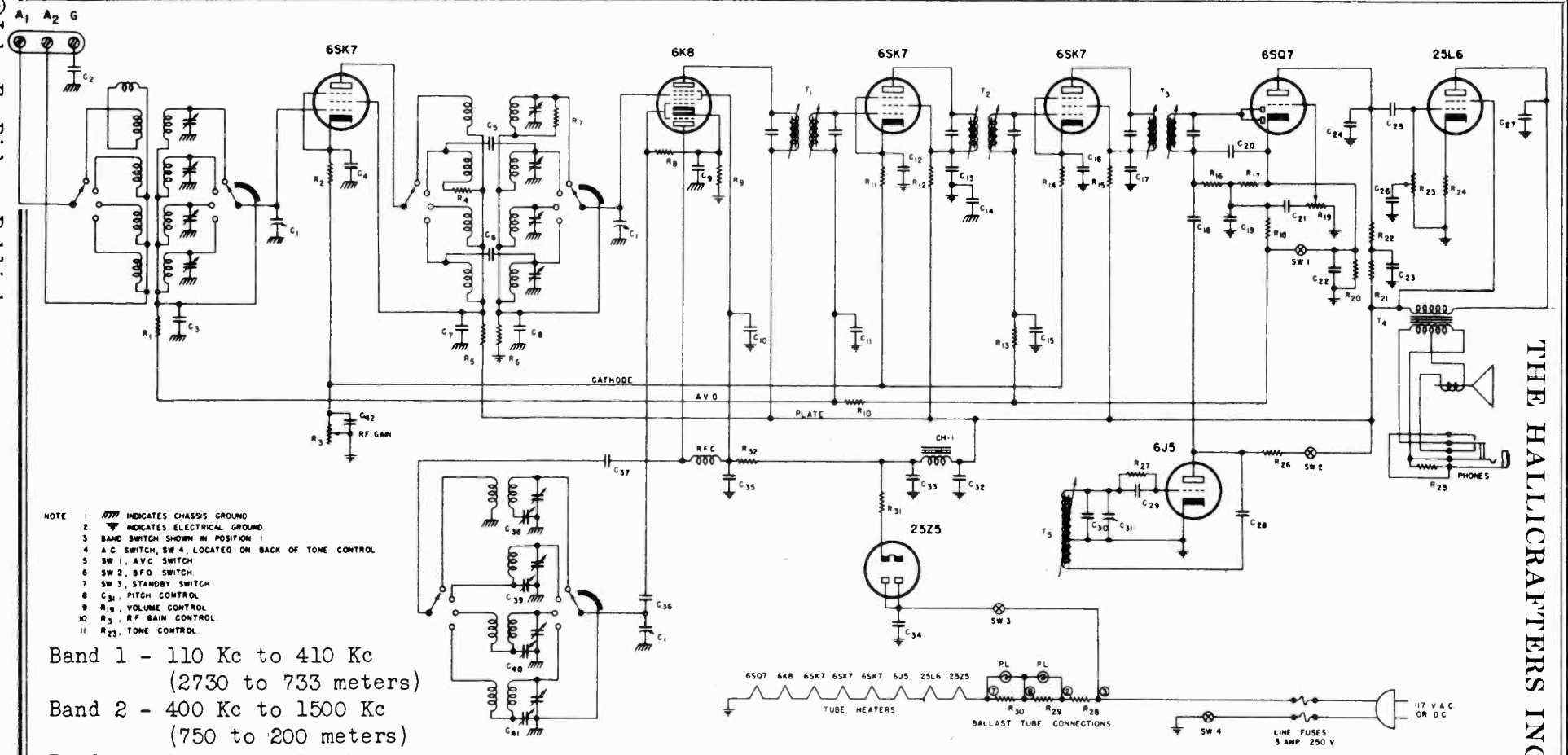
4. In making the final adjustment, that of setting the condenser in relation to the tuner, close the condenser completely to maximum capacity and rotate drum with the left hand in a clock-wise rotation, until the driver arm comes gradually down to within 1/8 of an inch of the variable condenser shaft. When in this position, tighten set screws in the drum hub with the right hand.

It is essential that all set screws be tightened securely so as to prevent a variation from original setting.

If, for some reason, a replacement is necessary for some particular item on the tuner proper, such as a lever bar, cam, plunger bar or brake shoe, it would be advisable to return the complete tuner proper for replacement.

THE HALLICRAFTERS INC.

MODEL S-22R
Skyrider Marine



NOTE
1. INDICATES CHASSIS GROUND
2. INDICATES ELECTRICAL GROUND
3. BAND SWITCH SHOWN IN POSITION 1
4. A C SWITCH, SW 4, LOCATED ON BACK OF TONE CONTROL
5. SW 1, A.V.C. SWITCH
6. SW 2, B.F.O. SWITCH
7. SW 3, STANDBY SWITCH
8. C_{31}, PITCH CONTROL
9. R_{19}, VOLUME CONTROL
10. R_3, R.F. GAIN CONTROL
11. R_{23}, TONE CONTROL

Band 1 - 110 Kc to 410 Kc
(2730 to 733 meters)

Band 2 - 400 Kc to 1500 Kc
(750 to 200 meters)

Band 3 - 1.7 Mc to 5.9 Mc
(177 to 51 meters)

Band 4 - 5.3 Mc to 18 Mc
(56 to 16.7 meters)

NOTE: The SKYRIDER MARINE Model S22R is an AC-DC receiver which operates on 110/125 volts only. Should operation be desired from a lower voltage DC source, an external converter delivering 110/125 volts should be used. A 220 volt DC Model S22R is available on order and uses a special line cord with dropping resistor.

If an inverted "L" antenna is used, connect lead-in to A_1 and leave the jumper between A_2 and G. If an "all wave" doubtlet is used, connect the transmission line to A_1 and A_2 with the jumper removed from A_2 and G. A separate antenna may be used for one s-w band; use a half-wave antenna whose length can be calculated from

$$\text{Length in feet} = \frac{463}{\text{Frequency in megacycles}}$$

ALIGNMENT PROCEDURE

ALIGNMENT INSTRUCTIONS:

Equipment needed for aligning:
1 - An all wave signal generator which will provide an accurately calibrated signal at the test frequencies indicated.
2 - Output indicating meter connected to a headphone plug, and inserted in the headphone jack.
3 - Non-metallic screw driver.
4 - Dummy antenna of .002 mfd. condenser and 400 ohm resistor.

SETTING OF CONTROLS PRIOR TO ALIGNMENT - IF AND RF.

1 - Tone control at maximum high frequency position.
2 - AVC switch OFF.
3 - BFO switch OFF.
4 - RF Gain at maximum.
5 - AF gain at maximum.

1600 Kc IF ALIGNMENT.

Tune receiver to 5,000 Kc with the band switch in #3 position.

Connect hot side of signal generator to 6K8 grid cap through 1 MFD condenser - ground of generator to the chassis. Signal generator output - 1,600 Kc.

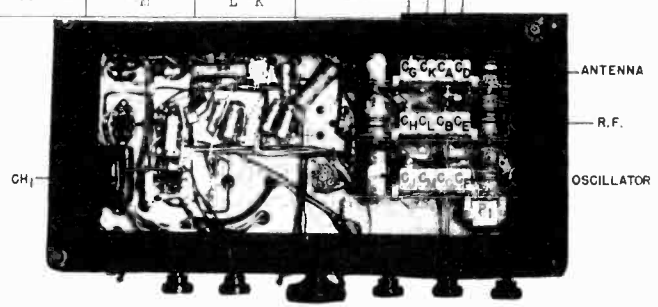
Adjust screws S1 to S6 inclusive on IF transformers T 1-2-3 for maximum gain.

BFO ADJUSTMENT - With a 1600 Kc signal being fed into the IF amplifier, and the BFO switch ON, place the Pitch Control with the white dot UP. Now adjust the screw S7 on the top of T5 for zero beat. Further adjustment of the Pitch Control from the front of the panel will enable you to vary the frequency of the beat note to your satisfaction.

R.F. ALIGNMENT

Connect hot Lead of Signal Generator to A_1 through dummy Antenna shown in Table. Leave Jumper connected between A_2 and G. Ground of Generator to Chassis.

BAND	REC. DIAL SETTING	SIG. GEN. FREQ.	DUMMY ANTENNA	HIGH FREQUENCY END		LOW FREQUENCY END
				ADJUST OSC WITH	ADJUST TRIMMERS WITH	ADJUST OSCILLATOR WITH
1	125 Kc	125 Kc	.002 mfd	--------	--------	P_1
	350 Kc	350 Kc	.002 mfd	C_C	C_A-C_B	--------
2	450 Kc	450 Kc	.002 mfd	--------	--------	P_2
	1400 Kc	1400 Kc	.002 mfd	C_F	C_E-C_D	--------
3	2 Mc	2 Mc	400 Ohm	--------	--------	P_3
	4.5 Mc	4.5 Mc	400 Ohm	C_J	C_G-C_H	--------
4	7 Mc	7 Mc	400 Ohm	--------	--------	P_4
	15 Mc	15 Mc	400 Ohm	C_M	C_L-C_K	--------



NO.	VALUE	VOLTAGE OR PURPOSE	TYPE
C_1	Tuning Condenser	563 mmfd per section	
C_2	.01 mfd	400 V.	Paper
C_3	.05 mfd	400 V.	Paper
C_4	.05 mfd	400 V.	Paper
C_5	5 mmf		Ceramicon
C_6	5 mmf		Ceramicon
C_7	.25 mfd	400 V.	Paper
C_8	.05 mfd	400 V.	Paper
C_9	.05 mfd	400 V.	Paper
C_{10}	.1 mfd	400 V	Paper
C_{11}	.02 mfd	400 V.	Paper
C_{12}	.02 mfd	400 V.	Paper
C_{13}	.01 mfd	400 V.	Paper
C_{14}	.25 mfd	400 V.	Paper
C_{15}	.02 mfd	400 V.	Paper
C_{16}	.02 mfd	400 V.	Paper
C_{17}	.01 mfd	400 V.	Paper
C_{18}	10 mmf		Ceramicon
C_{19}	100 mmf		Mica
C_{20}	100 mmf		Mica
C_{21}	.02 mfd	400 V.	Paper
C_{22}	10 mf	25 V.	Electrolytic
C_{23}	.05 mfd	400 V.	Paper
C_{24}	250 mfd		Mica
C_{25}	.05 mfd	400 V.	Paper

NO.	VALUE	VOLTAGE OR PURPOSE	TYPE
C_{26}	.01 mfd	400 V.	Paper
C_{27}	.005 mfd	600 V.	Paper
C_{28}	.01 mfd	400 V.	Paper
C_{29}	250 mmfd		Mica
C_{30}	200 mmfd		Mica
C_{31}	5 mmf	BFO Pitch Con.	Air Variable
C_{32}	40 mfd	150 V.	Electrolytic
C_{33}	40 mfd	150 V.	Electrolytic
C_{34}	.05 mfd	400 V.	Paper
C_{35}	30 mfd	150 V.	Electrolytic
C_{36}	100 mmfd		Mica
C_{37}	2000 mmfd		Mica
C_{38}	32 mmfd	Band 1 Pad	
C_{39}	110 mmfd	Band 2 Pad	
C_{40}	480 mfd	Band 3 Pad	
C_{41}	1300 mfd	Band 4 Pad	
C_{42}	.1 mfd	200 V.	Paper

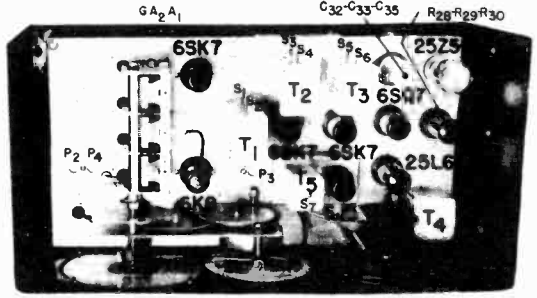
SW1	A.V.C. "ON-OFF"
SW2	B.F.O. "ON-OFF"
SW3	Standby
SW4	A.C.-D.C. Line

NO.	VALUE IN OHMS	WATTAGE OR PURPOSE
R_1	100,000	1/3
R_2	300	1/3
R_3	25,000	R. F. Gain Control
R_4	400	1/3
R_5	1,000	1/3
R_6	100,000	1/3
R_7	100,000	1/3
R_8	50,000	1/3
R_9	400	1/3
R_{10}	100,000	1/3
R_{11}	500	1/3
R_{12}	1,000	1/3
R_{13}	100,000	1/3
R_{14}	400	1/3
R_{15}	1,000	1/3
R_{16}	100,000	1/3

NO.	VALUE IN OHMS	WATTAGE OR PURPOSE
R_{17}	250,000	1/3
R_{18}	1 Meg.	1/3
R_{19}	500,000	Audio Gain Control
R_{20}	7,500	1/3
R_{21}	100,000	1/3
R_{22}	250,000	1/3
R_{23}	500,000	Tone Control
R_{24}	140	1/2
R_{25}	100	1/2
R_{26}	5,000	1/3
R_{27}	250,000	1/3
R_{28}	Plug-in Ballast Tube Muter-Type BK29D	
R_{29}	Plug-in Ballast Tube Muter-Type BK29D	
R_{30}	Plug-in Ballast Tube Muter-Type BK29D	
R_{31}	25	1 Watt
R_{32}	4,000	½ Watt

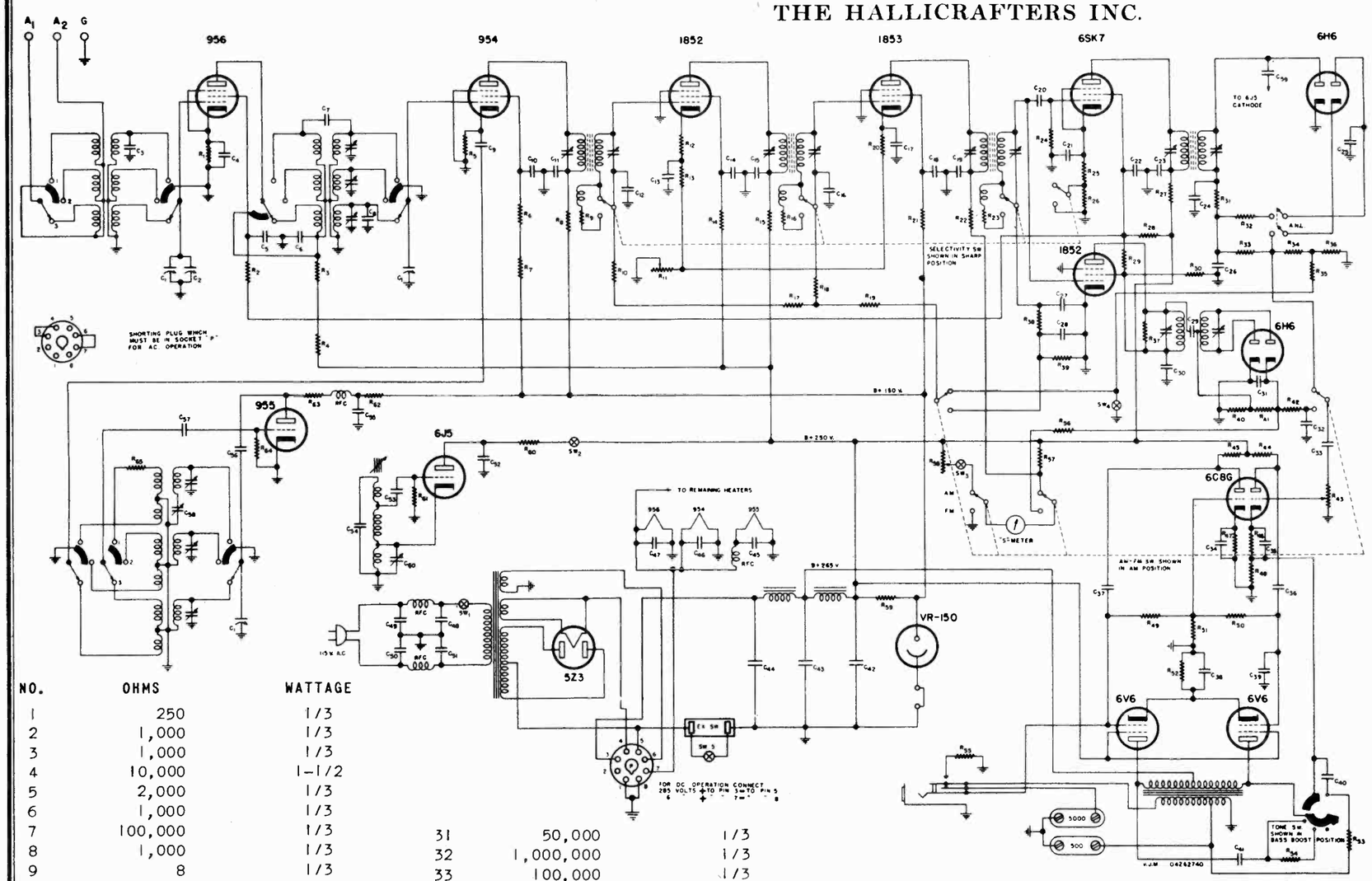
ELECTROLYTIC CONDENSERS C_{32}-C_{33}-C_{35}

PLUG-IN BALLAST R_{28}-R_{29}-R_{30}



MODEL S-27

THE HALLICRAFTERS INC.

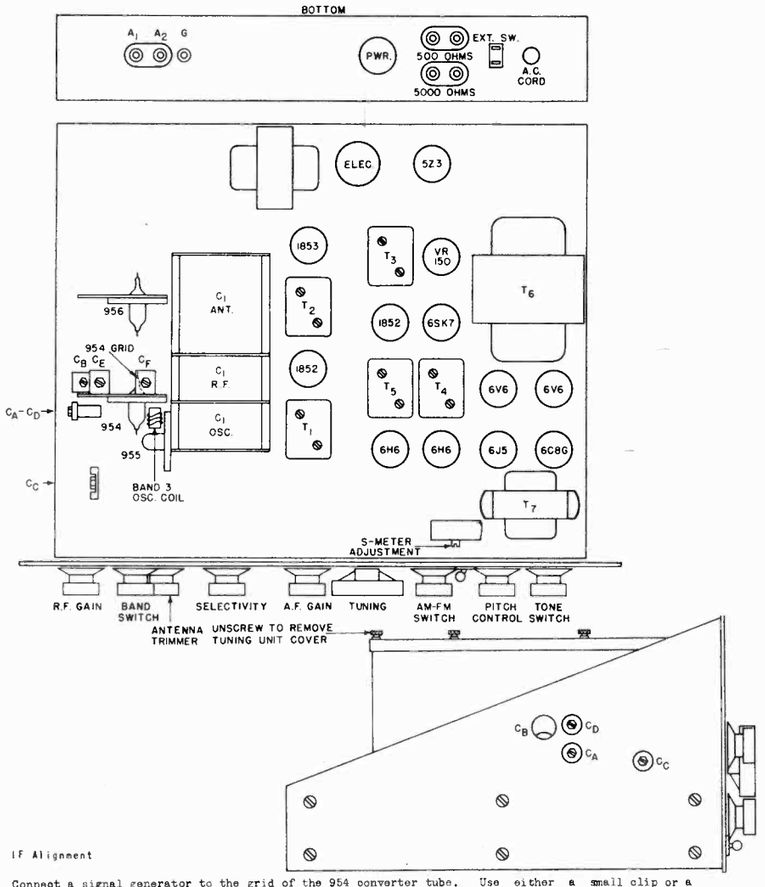


NO.	OHMS	WATTAGE
1	250	1/3
2	1,000	1/3
3	1,000	1/3
4	10,000	1-1/2
5	2,000	1/3
6	1,000	1/3
7	100,000	1/3
8	1,000	1/3
9	8	1/3
10	100,000	1/3
11	10,000	R.F. Gain Control
12	35	1/3
13	120	1/3
14	40,000	1/3
15	300	1/3
16	8	1/3
17	100,000	1/3
18	100,000	1/3
19	100,000	1/3
20	200	1/3
21	1,000	1/3
22	300	1/3
23	8	1/3
24	500,000	1/3
25	300	1/3
26	5,000	1/3
27	1,000	1/3
28	7,500	10 Wire Wound
29	2,000	1/3
30	20,000	1-1/2
31	50,000	1/3
32	1,000,000	1/3
33	100,000	1/3
34	250,000	1/3
35	500,000	1/3
36	250,000	1/3
37	15,000	1/3
38	50,000	1/3
39	250,000	1/3
40	100,000	1/3
41	100,000	1/3
42	200,000	1/3
43	500,000	Audio Gain Control
44	250,000	1/3
45	250,000	1/3
46	5,000	1/3
47	5,000	1/3
48	120	1/3
49	250,000	1/3
50	250,000	1/3
51	100,000	1/3
52	250	1-1/2
53	10,000	1/3
54	4,000	1-1/2
55	5,000	1-1/2
56	600,000	1/3
57	17	1/3 Wire Wound
58	1,500	S. Meter Zero Adj. Wire Wound
59	3,200	10
60	25,000	1-1/2
61	50,000	1/3
62	300	1/3
63	5,000	1/3
64	20,000	1/3
65	35	1/3

Band 1	27.5	to	47 mc
Band 2	46	to	82 mc
Band 3	82	to	145 mc

I.F. PEAK 5.25 MC

NO.	CAPACITY	VOLTAGE	TYPE
1	60 mmf	Per Section	Air
2	15 mmf	Ant.Trimmer	Air
3	5 mmf		3 Ceramicon
4	.002 mfd		Mica
5	300 mmf		Mica
6	.002 mfd		Mica
7	10. mmf		Ceramicon
8	10. mmf		Ceramicon
9	300 mmf		Mica
10	300 mmf		Mica
11	.01 mfd	600	Paper
12	.001 mfd		Mica
13	.02 mfd	400	Paper
14	.02 mfd	400	Paper
15	01 mfd	600	Paper
16	.001 mfd		Mica
17	.02 mfd	400	Paper
18	.02 mfd	400	Paper
19	.01 mfd	600	Paper
20	50 mmf		Mica
21	.02 mfd	400	Paper
22	.02 mfd	400	Paper
23	.01 mfd	600	Paper
24	50 mmf		Mica
25	.05 mfd	400	Paper
26	50 mmf		Mica
27	100 mmf		Mica
28	500 mmf		Mica
29	25 mmf		Mica
30	.002 mfd		Mica
31	50 mmf		Mica
32	500 mmf		Mica
33	.05 mfd	400	Paper
34	30 mfd	25	Electrolytic
35	30 mfd	25	Electrolytic
36	.05 mfd	400	Paper
37	.05 mfd	400	Paper
38	20 mfd		Electrolytic
39	.002 mfd		Mica
40	.05 mfd	400	Paper
41	.05 mfd	400	Paper
42	10. mfd	350	Electrolytic
43	30 mfd	350	Electrolytic
44	10 mfd	400	Electrolytic
45	300 mmf		Mica
46	300 mmf		Mica
47	300 mmf		Mica
48	.01 mfd	600	Paper
49	.01 mfd	600	Paper
50	.01 mfd	600	Paper
51	.01 mfd	600	Paper
52	.002 mfd		Mica
53	100 mmf		Mica
54	200 mmf		Ceramicon
55	300 mmf		Mica
56	50 mmf		Ceramicon
57	.001 mfd		Mica
58	450 mmf		Pad
59	2 mmf		Twisted Pair
60	25 mmf		B.O. Pitch Control Air



IF Alignment

Connect a signal generator to the grid of the 954 converter tube. Use either a small clip or a piece of flexible wire wound around the grid terminal. Do not attempt to solder to the tube as the heat is certain to crack the glass. Connect a suitable output meter across the speaker terminals.

Controls should be set as follows:

RF gain control at maximum sensitivity.	Audio gain control in maximum position.
Band switch in band 2.	AVC switch in off position.
Selectivity switch in sharp position.	ANL switch in off position.
AM-FM switch in AM position.	BFO switch in off position.

Tune the signal generator to 5.25 megacycles and align transformers T_1, T_2, T_3 and T_4 for maximum response.

A bakelite screw-driver with a metal or insulated tip is necessary for accurate alignment.

This alignment process should be repeated at least once to assure greatest possible selectivity.

To align the "discriminator" transformer (T_5) turn the selectivity switch to the broad position and the AM-FM switch to the AM position.

Leave the signal generator set at the frequency originally used for IF alignment with the modulation left on. Rotate the trimmer control across the discriminator (T_5) secondary (nearest the front of the chassis) until the signal drops to zero. As this point is approached very suddenly, turn the control very slowly. Now slightly detune the signal generator until the output meter gives a readable indication. Adjust the primary trimmer control of the discriminator transformer for maximum response.

Next detune the signal generator to either side of resonance and note the maximum output in each case as indicated on the output meter. These values should be the same for good balance. If they are not, then tune the signal generator to the lower of the two peaks and adjust the primary until the output rises an amount equal to about half the difference of the two outputs previously noted.

Retest for balance as above and readjust the primary till both maximum readings are alike when the signal generator is detuned to either side of resonance.

If a balance cannot be obtained, it is an indication that the discriminator secondary trimmer control has been adjusted off its proper center and will require a very slight readjustment in either direction. The direction of adjustment that will cause the off-tune peaks to assume the same values is the correct one. Care must be taken in adjusting the discriminator secondary control as even a slight misadjustment will result in the distorted reception of frequency-modulated signals.

RF Alignment

Connect a high frequency signal generator to the antenna terminal (A_1) through a 75 ohm resistor and the ground of the generator to the ground terminal of the receiver. Leave terminal A_2 connected to the ground terminal.

The Ferris Signal Generator Model 18B is recommended for alignment purposes. If this is not available, harmonics of a standard signal generator may be used.

The controls should be set in the same position as for IF alignment.

Set the AM-FM switch in the AM position.
Set the bandswitch on band 1.
Tune the generator and receiver to 42 mc.

Adjust oscillator trimmer C_A until the signal is heard. The frequency of the oscillator is higher than that of the signal. Next adjust trimmer C_B and the antenna trimmer for maximum response.

Tune both receiver and signal generator to 28 megacycles and adjust padder C_C for maximum response while rocking the tuning control. Then repeat the alignment at the high frequency end as described.

BAND 2

Tune the receiver and signal generator to 75 megacycles. Adjust trimmer C_D until the signal is heard. In this band, the frequency of the oscillator is lower than that of the signal. Adjust the antenna trimmer and trimmer C_E for maximum response while rocking the gang condenser. No padder condenser adjustment is provided for the low-frequency end of this band.

BAND 3

Tune the receiver and signal generator to 120 megacycles. Adjust trimmer C_F and the antenna trimmer for maximum response while rocking the gang. It is not recommended that the frequency of the oscillator in this band be adjusted except at the factory. Should it be impractical to return the receiver to the factory for adjustment, then the following instructions are included.

Remove the top cover and locate the high frequency oscillator coil. The white wire winding, one end of which is connected to a terminal on the form is the primary. By carefully shifting the free end of this winding the frequency can be changed over a sufficient range. This lead should be cemented in place with Q-Max or any other low loss cement when adjustment is completed.

Repeat the adjustment of C_F as described above after shifting the frequency of the oscillator.

As in band 2, the frequency of the oscillator is higher than that of the signal. No padder condenser adjustment is provided for the low frequency end of this band.

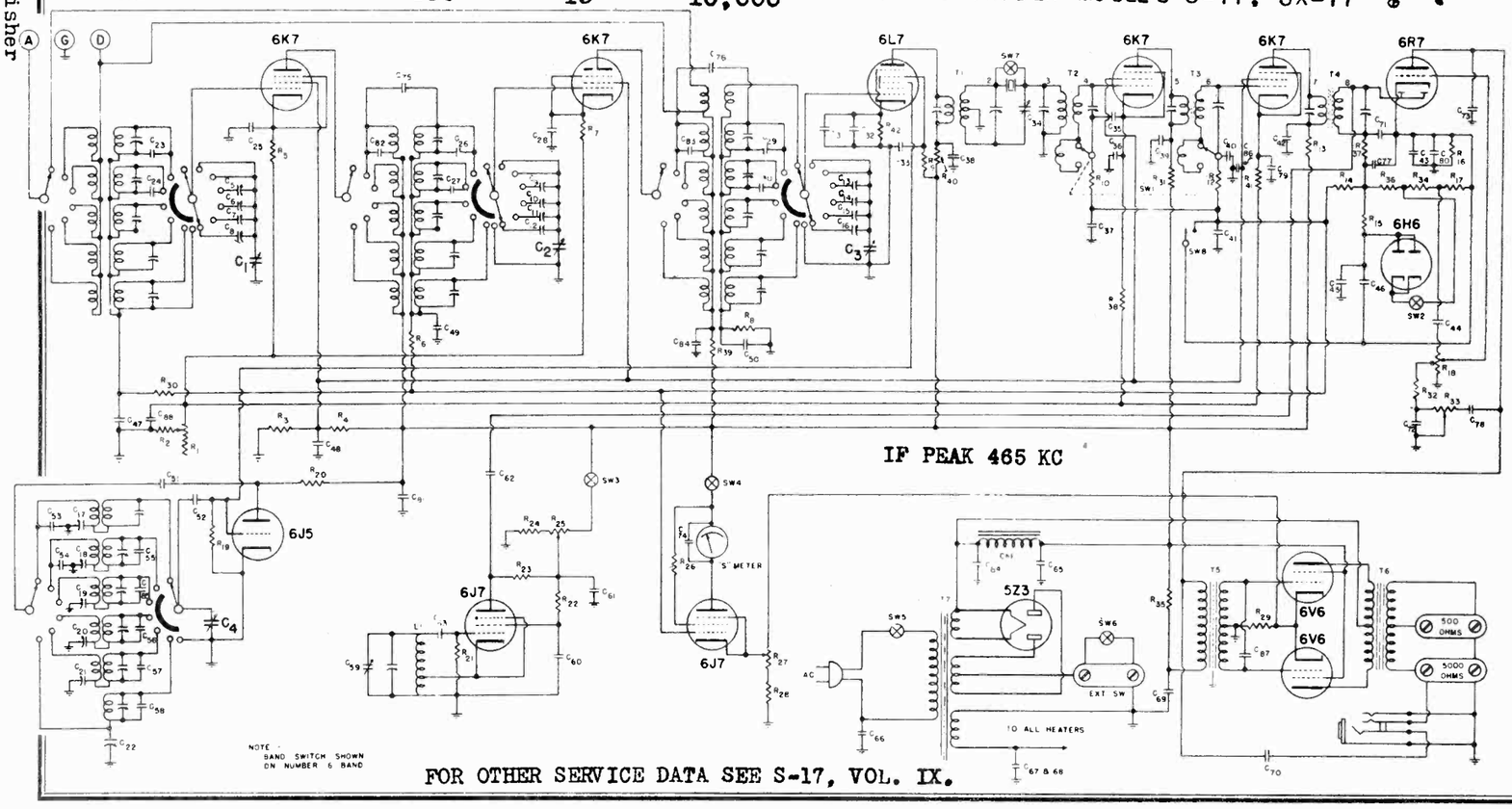
For other parts see S-17. VOL.IX

No.	Capacity	Type	Voltage
36	.1 mfd	Air	200
38	.05 "		400
39	.05 "		400
42	.05 "		400
45	.1 mfd		200
46	.002 "	Mica	
48	25 "		400
69	8 "		450
78	.1 mfd		400
79	.1 "		200
86	.1 mfd		200
87	.0005 "		450
88	.25 "		400

No.	Ohms	Wattage
1	10,000	R.F.Gain 1/3
2	95	1/3
10	100,000	1/3
13	10,000	"
29	400	2
31	10,000	
32	60,000	
38	2,000	
40	10,000	
41	1,500	
42	280	1

NOTE: 6H6 Silencer voltages;pins 3,4,5, and 8 are -2 volts; pin 7,6.3 volts. See chart VOL. IX.

SKYRIDER MODELS S-17, SX-17



FOR OTHER SERVICE DATA SEE S-17, VOL. IX.

THE HALLICRAFTERS INC.

MODEL SX28
Super Skyrider

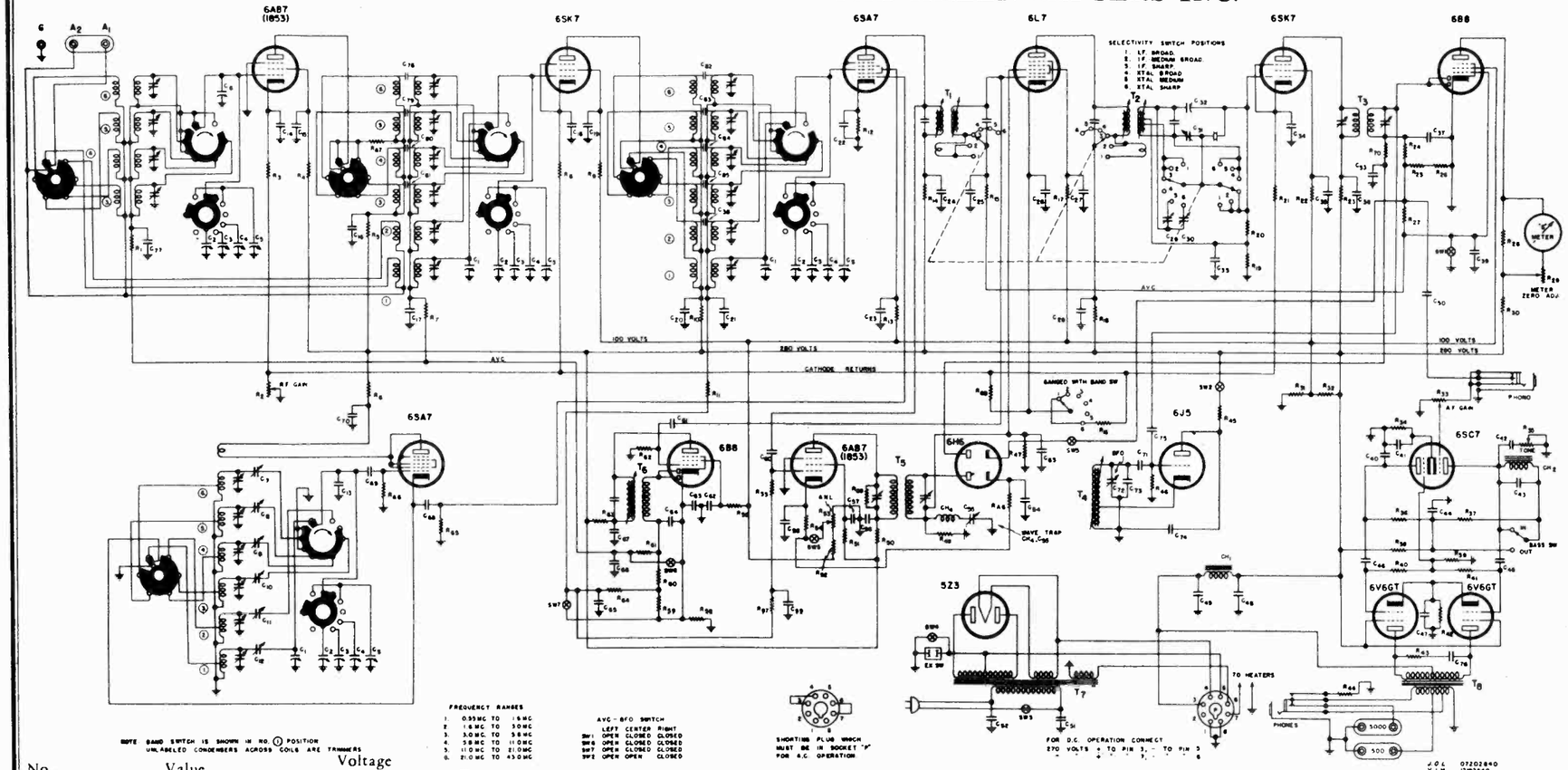
Power Consumption—at 117 volts—60 cycles—138 watts
Power Consumption—DC operation—18 amp. at 6 volts or 108 watts
Power Output —8 watts undistorted
Sensitivity—(for .05 watts output) Bands 1 to 5—2 MV and under; 6th band 4 MV

Selectivity—IF broad (high fidelity)	2 x	1000 x
IF Sharp	12 kc	36 kc
	4.1 kc	22 kc

Frequency Range RF—Note: These are the actual frequencies covered corresponding to nominal figures indicated on the front panel.

550	to	1,620 kilocycles
1.5	to	3.1 megacycles
2.9	to	5.9 megacycles
5.75	to	11.5 megacycles
10.3	to	21.5 megacycles
20.4	to	42 megacycles

Frequency response AF (audio filter out broad IF—tone control high-70 to 3000 cycles ± 2½ DB
Speaker Output Impedances—5000 and 500 ohms
Intermediate Frequency—455 kc

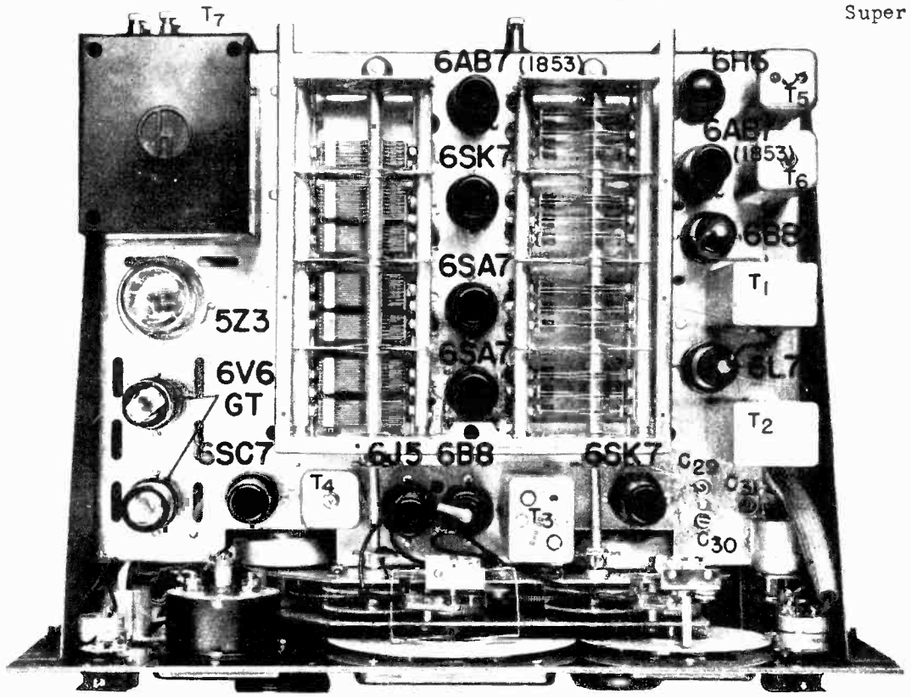


No.	Value	Voltage or Purpose	Type
C 1	Band No. 1 Tuning Condenser	.....	.....
C 2	Main Tuning Condenser	.....	.....
C 3	3 Plate Bandspread Condenser	.....	.....
C 4	4 Plate Bandspread Condenser	.....	.....
C 5	5 Plate Bandspread Condenser	.....	.....
C 6	50 mmf		Variable Air
C 7	2,160 mmf	Band No. 6 Pad	Mica
C 8	2,962 mmf	5 Pad	Mica
C 9	2,276 mmf	4 Pad	Mica
C10	1,600 mmf	3 Pad	Mica
C11	876 mmf	2 Pad	Mica
C12	515 mmf	1 Pad	Mica
C13	Temperature Compensated	Condenser	
C14	.02 mfd	400	Tubular
C15	.02 mfd	400	Tubular
C16	.02 mfd	400	Tubular
C17	.05 mfd	200	Tubular
C18	.02 mfd	400	Tubular
C19	.02 mfd	400	Tubular
C20	.02 mfd	400	Tubular
C21	.05 mfd	200	Tubular
C22	.02 mfd	400	Tubular
C23	.02 mfd	400	Tubular
C24	.02 mfd	400	Tubular
C25	.02 mfd	400	Tubular
C26	.05 mfd	200	Tubular
C27	.02 mfd	400	Tubular
C28	.02 mfd	400	Tubular
C29	20 mmf	Trimming Condenser	
C30	20 mmf	Trimming Condenser	
C31	20 mmf	Trimming Condenser	
C32	20 mmf	Crystal Phasing	Air
C33	.02 mfd	400	Tubular
C34	.05 mfd	200	Tubular
C35	.02 mfd	400	Tubular
C36	.02 mfd	400	Tubular
C37	50 mmf		Mica
C38	5 mmf		Ceramic
C39	.02 mfd	400	Tubular
C40	500 mmf	.....	Mica
C41	10. mfd	25	Electrolytic
C42	.02 mfd	400	Tubular
C43	5000 mmf	.....	Mica
C44	10. mfd	300	Electrolytic
C45	.05 mfd	400	Tubular
C46	.05 mfd	400	Tubular
C47	40 mfd	25	Electrolytic
C48	30 mfd	400	Electrolytic
C49	30 mfd	450	Electrolytic
C50	.02 mfd	400	Tubular
C51	.01 mfd	600	Tubular
C52	.01 mfd	600	Tubular
C53	.05 mmf	200	Mica
C54	.05 mfd	400	Tubular
C55		Trimming Cond.	
C56	.02 mfd	400	Tubular
C57	.02 mfd	400	Tubular
C58	.05 mfd	200	Tubular
C59	.05 mfd	200	Tubular
C60	50 mmf	.....	Mica
C61	250 mmf	.....	Mica in T_1
C62	.02 mfd	400	Tubular
C63	.05 mfd	200	Tubular
C64	100 mmf	.....	Mica
C65	.02 mfd	400	Tubular
C66	.05 mfd	200	Tubular
C67	.02 mfd	400	Tubular
C68	50 mmf	.....	Mica
C69	50 mmf	.....	Mica
C70	2000 mmf	.....	Mica
C71	100 mmf	.....	Mica
C72	25 mmf	BFO Control	Air
C73	500 mmf	.....	Mica in T_4
C74	.01 mfd	600	(Braided Leads)
C75	2 mmfd	.....	Twisted Leads
C76	2000 mmfd	.....	Mica
C77	.05 mfd	200	Tubular
C78	10 mmfd	.....	Ceramic
C79	5 mmfd	.....	Ceramic
C80	5 mmfd	.....	Ceramic
C81	2 mmfd	.....	Twisted Leads
C82	10 mmfd	.....	Ceramic
C83	5 mmfd	.....	Ceramic
C84	5 mmfd	.....	Ceramic
C85	2 mmfd	.....	Twisted Leads

No.	Value in Ohms	Wattage or Purpose
R 1	100,000	⅓
R 2	10,000	RF Gain Control
R 3	300	⅓
R 4	25,000	½
R 5	3,000	⅓
R 6	7,000	2
R 7	100,000	⅓
R 8	300	⅓
R 9	1,000	⅓
R10	3,000	⅓
R11	100,000	⅓
R12	400	⅓
R13	1,000	⅓
R14	3,000	⅓
R15	100,000	⅓
R16	250	⅓
R17	1,000	⅓
R18	3,000	⅓
R19	100,000	⅓
R20	500,000	⅓
R21	400	⅓
R22	1,000	⅓
R23	3,000	⅓
R24	100,000	⅓
R25	250,000	⅓
R26	250,000	⅓
R27	500,000	⅓
R28	100	⅓
R29	500	"S" Meter Control
R30	30,000	2
R31	11,000	1½ Candohm
R32	4,000	7
R33	500,000	AF Gain Control
R34	1,000	½
R35	500,000	Tone Control
R36	100,000	⅓
R37	100,000	⅓
R38	50,000	⅓
R39	200,000	⅓
R40	250,000	⅓
R41	250,000	⅓
R42	200	2
R43	20,000	1
R44	5,000	10
R45	20,000	1
R46	50,000	⅓
R47	5,000	1
R48	100,000	⅓
R49	1,000,000	⅓
R50	5,000	⅓
R51	20,000	½
R52	50,000	⅓
R53	50,000	ANL Control
R54	54	⅓
R55	500,000	⅓
R56	1,000	⅓
R57	100,000	⅓
R58	200	⅓
R59	250,000	⅓
R60	250,000	⅓
R61	500,000	⅓
R62	500,000	⅓ Inside T_1
R63	3,000	⅓
R64	500,000	⅓
R65	50,000	⅓
R66	50,000	⅓
R67	500	⅓
R68	600	½
R69	100,000	⅓
R70	1,000,000	⅓

THE HALLICRAFTERS INC.

MODEL SX 28
Super Skyrider

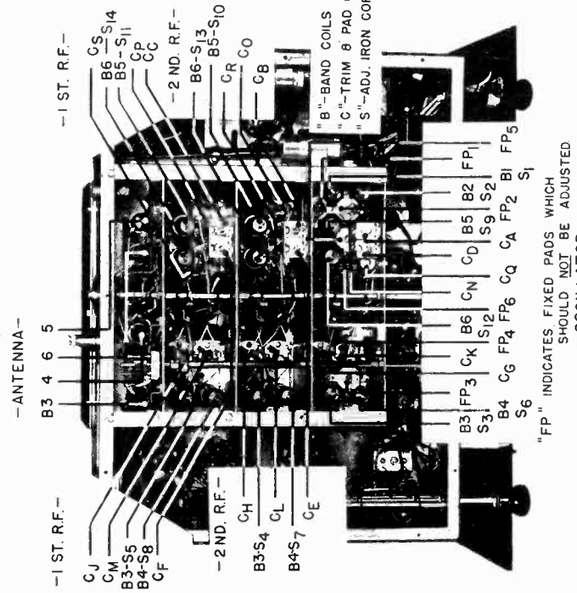


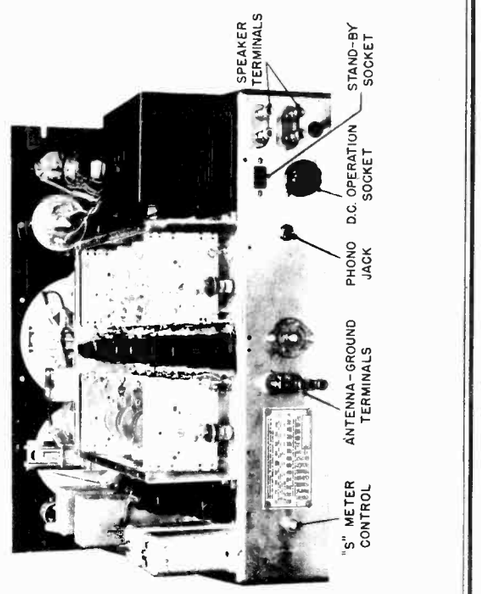
The following measurements made with a 20,000 ohms per volt meter and taken from the socket terminal indicated to ground or receiver chassis. Antenna and ground were disconnected from the receiver when these measurements were taken and the RF and AF gain controls set at maximum. "DL" means Dead Lug but will indicate voltage when used as a tie. Normal tolerance allows a variation of ±10% from the indicated values.

TUBE	FUNCTION	SOCKET TERMINALS								
		1	2	3	4	5	6	7	8	Cap.
6AB7	RF Amp. (1)	...	...	...	0.1	4.15	170	6.3	227	.....
6SK7	RF Amp. (2)	...	...	4.35	0.1	4.35	105	6.3	279	.....
6SA7	Mixer	...	...	250	100	0.12	4.1	6.3	...	.....
6SA7	HF Osc.	...	...	116	116	0.3	...	6.3	116	.....
6L7	IF Amp. (1) Noise Limiter	...	...	245	102	...	...	6.3	4	−.075
6SK7	IF Amp. 2	...	...	4	...	4	107.5	6.3	235	.....
6B8	2nd Det. S Meter Tube	...	...	17.2	−.255	−.255	108	6.3	...	−.17
6B8	AVC Amp.	...	...	225.5	0.2	0.2	107	6.3	2	.....
6AB7	Noise Amp.	...	...	...	.07	1.1	150	6.3	225	.....
6H6	Noise Rectifier	...	...	...	.1	...	17.6 DL	6.3	−.1	.....
6J5	Beat Osc.	...	...	140	...	−7.4	...	6.3	...	BFO ON ONLY FOR TEST
6SC7	1st Audio Amp.	...	140	...	...	137	1.4	6.3	...	.....
6V6GT	P.P. Audio Amp.	...	...	310	290	...	198 DL	6.3	17	.....
6V6GT	P.P. Audio Amp.	...	...	310	290	...	...	6.3	17	.....
5Z3	Rectifier	320	340 AC	340 AC	320	...	...	...	...	.....

MODEL SX28
Super Skyrider

THE HALLICRAFTERS INC.





ALIGNMENT PROCEDURE MODEL SX-28—SUPER SKYRIDER

Equipment Needed for Aligning:

1—An all wave signal generator which will provide an accurately calibrated signal at the test frequencies indicated.

2—Output indicating meter connected to 5000 ohm output terminals.

3—Non-metallic screw driver.

4—Dummy antenna of 200 mmf and also 400 ohm carbon resistor.

Setting of controls prior to alignment—IF and RF.

Tone control at maximum high frequency position (#9)—BFO at 0—Bass switch at Bass IN—AF Gain at #9—RF Gain at #9—Band switch—IF alignment position .55 to 1.6 band—RF alignment depending on band aligned.

Selectivity control at sharp IF—Send-Receive switch in Receive—Crystal phasing at #3 on left side—ANL—OFF at 0—AVC OFF.

Important: Have bandspread control so logging scale reads 100.

Antenna trimmer adjusted for Maximum gain at each RF alignment point on Bands 3-4-5-6.

Note: Antenna trimmer not in circuit on bands 1 and 2.

455 KC—IF Alignment: Tune main dial to 1400 kc on .55 to 1.6 mc band. Connect the hot lead from the signal generator to 6SA7 mixer terminal #8—Ground to chassis. Roughly adjust the aligning screws of T1, the lower screw of which is accessible through hole in right mounting bracket, for maximum gain. Now adjust lower screw on T2 (do not adjust upper screw). Also adjust C31 and the air trimmer condenser at the top of T3 for maximum gain.

Switch to Crystal Broad Position—Turn on BFO and adjust to a tone of about 1000 cycles. Vary the frequency of the signal generator while adjusting the top screw on T2 until the output goes through a maximum, dips down and starts going up again. Adjust the phasing control for maximum selectivity and then back off the top screw on T2 until the output reaches a minimum value between the two maximum values first noted. The frequency of the signal generator should be varied over a small range while adjusting the top screw of T2. A swishing note, in contrast to the usual sharp crystal tone will be apparent when the correct adjustment has been reached.

Switch to "Xtal Sharp" and adjust C_{38} for maximum output while varying signal generator frequency. Two points of maximum output will be noted corresponding to two adjustments of C_{38}. Either one of these points may be used at which to leave C_{38} a sharply peaked tone will result at the correct adjustment.

Switch to "Xtal Medium" and adjust C_{38} till the output is midway between the outputs reached while aligning the "Xtal Sharp" and "Xtal Broad" positions. The apparent sharpness of tone should be midway between the "Sharp" and "Broad" positions.

Switch again to "Xtal Sharp" and set the signal generator to exact crystal frequency. Set BFO front panel control to a tone of approximately 1000 cycles. Switch again to "Sharp IF" and carefully realign the IF transformers as earlier described in the first paragraph of these instructions.

BFO Adjustment: Set front panel control to zero—BFO switch ON—Signal Generator tuned to crystal frequency—selectivity switch in IF Sharp position—now adjust screw on top of T4, after loosening lock nut, to zero beat.

Noise Limiter and AVC Amplifier Adjustment: Have the controls set as before except that the AVC switch is now in the ON position. Connect a high resistance type voltmeter across R47 which is connected between terminal #5 of the 6L7 tube and chassis.

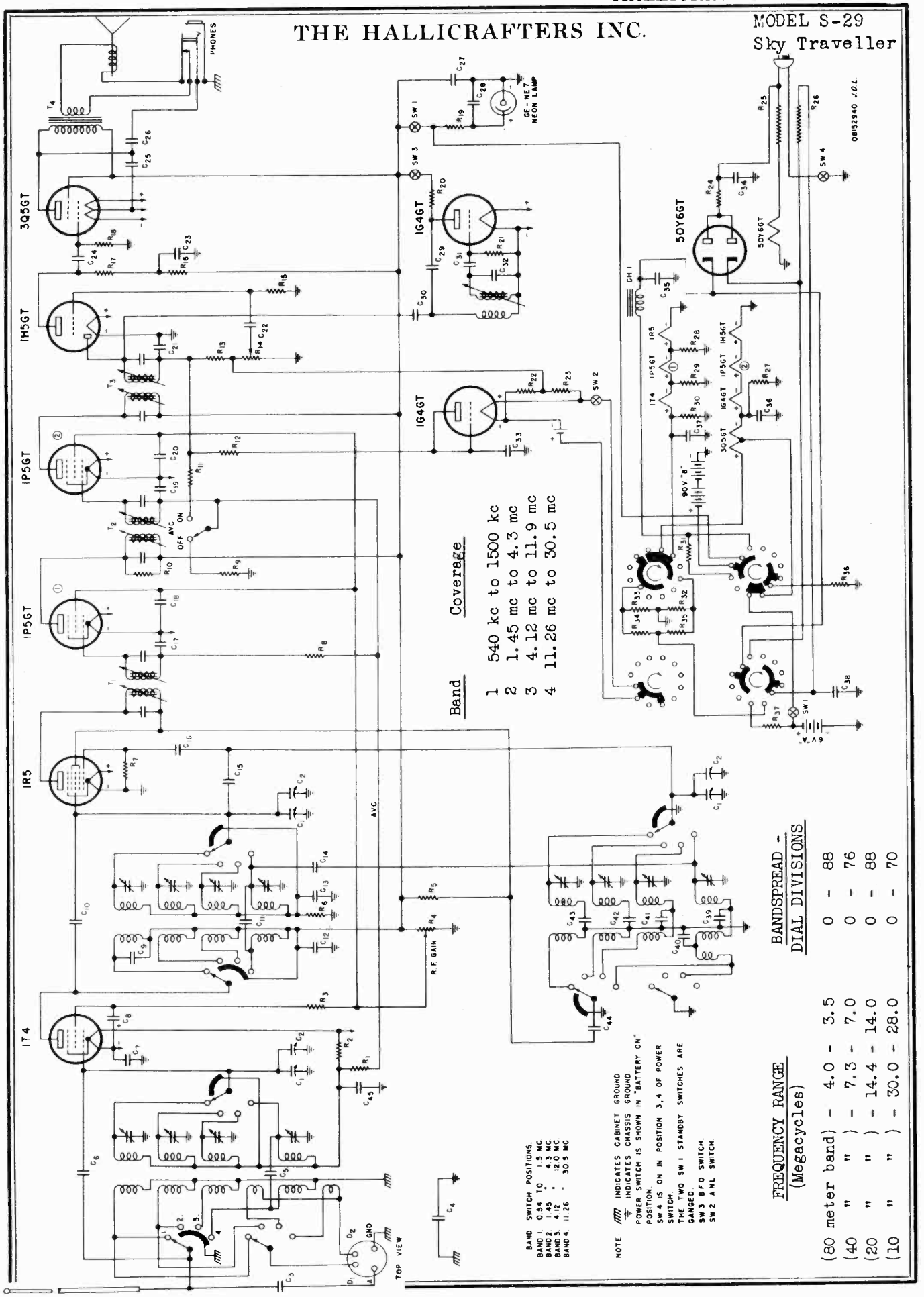
ANL & AVC Amplifier Adjustment. Connect a 50,000 ohm resistor across primary of T5 (Red and blue leads). Set signal generator at 455 kc and fully modulated. Connect crystal to grid of 6AB7 tube (pin #8). Rotate ANL control to all the way to the right, or position #9. Adjust screws on top of T5 for maximum indication on DC meter connected across R47. Reconnect generator, as for IF alignment, to mixer grid of 6SA7 tube. Remove 50,000 ohm resistor which was inserted across primary of T5 during alignment. Remove grid clip off top of 6L7 tube. With generator set at 455 kc and ANL control at extreme right adjust wave trap trimmer C55 for minimum signal as indicated on output meter.

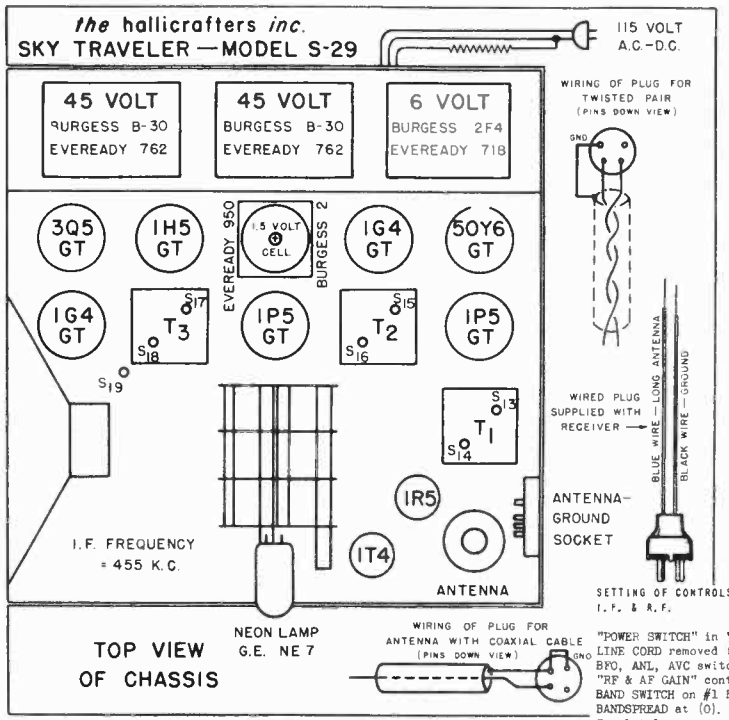
With generator connected to 6SA7 mixer grid as above, replace 6L7 grid and turn ANL control to extreme left until switch clicks. Connect high resistance DC meter across 6B8 diode filter resistor C64. Adjust screw on top of T6 for maximum indication on DC meter across C64.

RF ALIGNMENT

Connect hot lead of signal generator to A1—through dummy antenna shown in table. Leave jumper connected between A1 and G. Ground of Generator to Chassis.

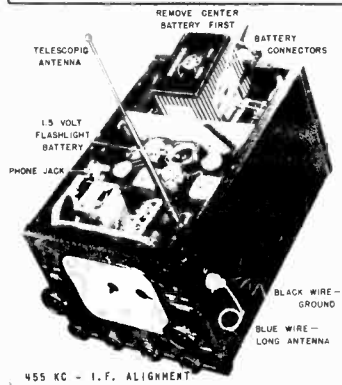
Band	Rec. Dial Setting	Sig. Gen. Freq	Dummy Antenna	HIGH FREQUENCY END			LOW FREQUENCY END		
				Adjust Osc. With	Adjust Trimmers for Max. Gain		Adjust Osc. With	Permeability Tuned By	
1	1.4 mc	1.4 mc	200 mmf	C_{A1}	C_B	C_C			
1	6	6	200 mmf				S_1	.....	
2	2.8	2.8	400 ohms	C_D	C_F	C_F			
2	1.6	1.6	400 ohms				S_2	.....	
3	5.6	5.6	400 ohms	C_G		C_H	C_J		
3	3.2	3.2	400 ohms					S_3	S_4 S_5
4	11	11	400 ohms	C_K		C_L	C_M		
4	6	6	400 ohms					S_6	S_7 S_8
5	20	20	400 ohms	C_N		C_O	C_P		
5	11	11	400 ohms					S_9	S_{10} S_{11}
6	36	36	400 ohms	C_Q		C_R	C_S		
6	22	22	400 ohms					S_{13}	S_{14}



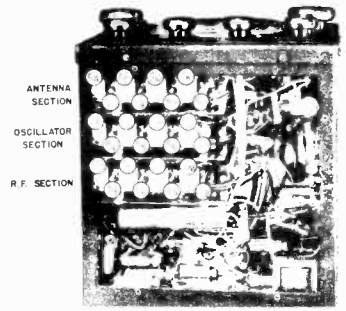


SETTING OF CONTROLS PRIOR TO ALIGNMENT I.F. & R.F.

"POWER SWITCH" in "BAT" position.
LINE CORD removed from outlet.
BFO, ANL, AVC switches "OFF".
"RF & AF GAIN" controls for maximum vol
BAND SWITCH on #1 Band.
BANDSPREAD at (0).
Completely compress the telescopic ant



455 KC - I.F. ALIGNMENT



BOTTOM VIEW

Set "MAIN TUNING" control at 1500 kc.
Have antenna plug removed from antenna socket.
Tune generator to 455 kc.
Connect low side (GND) of generator to chassis.
Connect high side (HOT) of generator to lug on rear Stator section (R.F.) of main tuning condenser through a 0.1 mfd condenser.
Proceed to adjust the screws S_{13} to S_{18} inclusive protruding from the tops of the I.F. transformers, T_1, T_2 and T_3, for maximum output.

Without changing the frequency of the generator after completing I.F. alignment - turn BFO switch "ON" and remove modulation from the signal generator. Adjust screw S_{19} to the desired tone (approximately 1000 cycles).

NOTE: - It is also possible to adjust the BFO without the aid of the signal generator by tuning a signal to exact resonance with the BFO switch "OFF" - with BFO "ON" adjust S_{19} to desired tone.

Insert "long-antenna" plug, furnished with receiver, into antenna socket and connect generator as indicated in chart below. A condenser in the receiver in series with the blue lead compensates for the reduction in capacity when the antenna is folded and the covers removed - thus, a dummy antenna is unnecessary.

NOTE: - On #3 and 4 Bands, it may be necessary to "rock" the main tuning condenser to compensate for slight shifts in oscillator frequency. When adjusting the trimmers and slugs for maximum gain, the oscillator frequency is 455 kc. less than the signal frequency on #4 band.

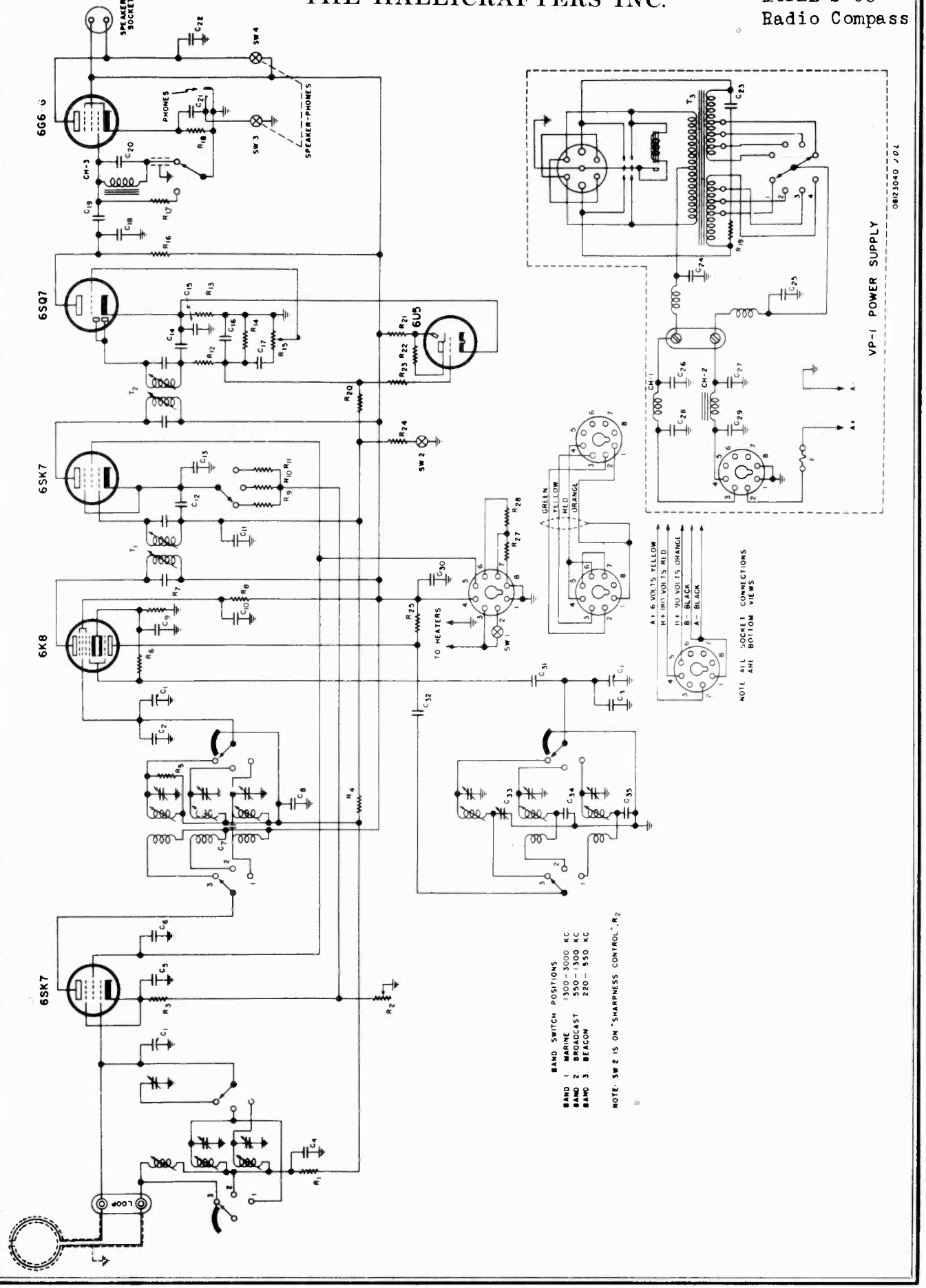
Connect hot lead of signal generator to BLUE wire of antenna plug and low side of generator to BLACK wire. A dummy antenna is unnecessary.

Band	Signal Generator Frequency and Receiver Dial Setting	Oscillator Frequency Relative to Signal	HIGH FREQUENCY END: Adjust Osc. with	HIGH FREQUENCY END: Adjust Trimmers For Max. Grain	LOW FREQUENCY END: Adjust Osc. with	LOW FREQUENCY END: Adjust Slugs For Max. Grain
1	1.4 mc	Above	C_B	C_A C_C		
	.6				S_2	S_1 S_3
2	4.0	Above	C_E	C_D C_F		
	1.6				S_5	S_4 S_6
3	11.0	Above	C_H	C_G C_J		
	5.0				S_8	S_7 S_9
4	28.0	Below	C_L	C_K C_M		
	14.0				S_{11}	S_{10} S_{12}

No.	Capacity	Voltage	Type	No.	Ohms	Wattage
C1	Main Tuning Gang		air	R1	2 megs	1/3
2	Bandspread Gang		air	2	2 megs	1/3
3	25 mmfd		ceramicon	3	9000	1/3
4	0.1 mfd	400	paper	4	500,000	R.F. Gain
5	10 mmfd		ceramicon	5	5,000	1/3
6	5 mmfd		ceramicon	6	2 megs	1/3
7	.05 mfd	200	paper	7	100,000	1/3
8	.01 mfd	400	paper	8	1 meg	1/3
9	15 mmfd		ceramicon	9	2 megs	1/3
10	5 mmfd		ceramicon	10	40,000	1/3
11	5 mmfd		ceramicon	11	2 megs	1/3
12	.05 mfd	200	paper	12	1 meg	1/3
13	.05 mfd	200	paper	13	100,000	1/3
14	3 mmfd		twisted pair	14	500,000	A.F. Gain
15	2 mmfd		twisted pair	15	10 megs	1/3
16	50 mmfd		mica	16	100,000	1/3
17	.05 mfd	200	paper	17	500,000	1/3
18	.01 mfd	400	paper	18	500,000	1/3
19	.05 mfd	200	paper	19	400,000	1/3
20	.01 mfd	400	paper	20	50,000	1/3
21	50 mmfd		mica	21	50,000	1/3
22	.003 mfd	400	paper	22	300	1/3
23	0.1 mfd	200	paper	23	1100	1/3
24	0.01 mfd	400	paper	24	25	1
25	.005 mfd	400	paper	25	450	line cord
26	.01 mfd	400	paper	26	450	line cord
27	60 mfd	150	electrolytic	27	1100	1/3
28	.02 mfd	200	paper	28	500	1/3
29	.01 mfd	400	paper	29	550	1/3
30	2 mmfd		twisted pair	30	600	1/2
31	100 mmfd		mica	31	9000	1/3
32	500 mmfd		mica	32	900	1/3
33	.05 mfd	200	paper	33	800	1
34	.05 mfd	400	paper	34	800	3
35	60 mfd	150	electrolytic	35	845	3
36	100 mfd	40	electrolytic	36	750	1/3
37	60 mfd	40	electrolytic	37	2000	2
38	60 mfd	150	electrolytic			
39	4230 mmfd		mica			
40	250 mmfd		mica			
41	2030 mmfd		mica			
42	880 mmfd		mica			
43	380 mmfd		mica			
44	.01 mfd	400	paper			
45	.05 mfd	200	paper			

THE HALLICRAFTERS INC.

MODEL S-30
Radio Compass



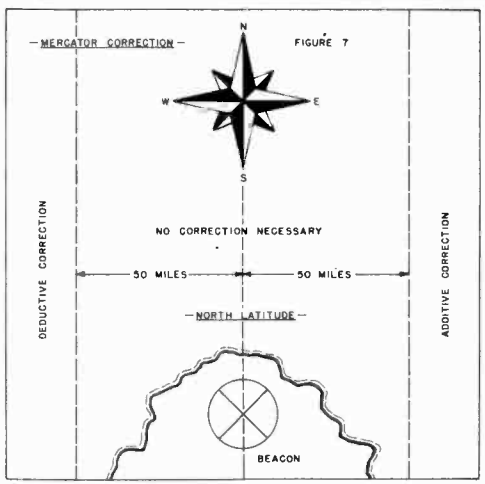
PARTS LIST

RESISTORS

NO.	OHMS	WATTAGE
1	200,000	1/2
2	10,000	R. F. Gain Control
3	400	1/2
4	200,000	1/2
5	250,000	1/2
6	50,000	1/2
7	300	1/2
8	30,000	1
9	1,000	1/2
10	400	1/2
11	200	1/2
12	50,000	1/2
13	2,000	1/2
14	200,000	1/2
15	500,000	Audio Gain Control
16	500,000	1/2
17	1 Meg.	1/2
18	600	1/2
19	200	1/2
20	1 Meg.	1/2
21	1 Meg.	1/2
22	1 Meg.	1/2
23	2 Meg.	1/2
24	200	1/2
25	15,000	1
26		
27	30,000	1/2
28	15,000	1/2

CONDENSERS

NO.	CAPACITY	VOLTAGE	TYPE
1	530 mmf	Per Section	Air
2	50 mmf		Ceramicon
3	50 mmf		Ceramicon
4	.05 mfd	400	Paper
5	.05 mfd	400	Paper
6	0.1 mfd	400	Paper
7	10 mmf		Ceramicon
8	.05 mfd	400	Paper
9	.05 mfd	400	Paper
10	.02 mfd	400	Paper
11	.05 mfd	400	Paper
12	.01 mfd	400	Paper
13	.01 mfd	400	Paper
14	.0001 mfd		Mica
15	10 mfd	25	Elect.
16	.0001 mfd		Mica
17	.01 mfd	400	Paper
18	.00025 mfd		Mica
19	.01 mfd	400	Paper
20	.0075 mfd		Mica
21	20 mfd	50	Elect.
22	.01 mfd	600	Paper
23	.01 mfd	1600	Paper
24	.02 mfd	600	Paper
25	.5	200	Paper
26	8 mfd	450	Elec.
27	30 mfd	25	Elec.
28	8 mfd	450	Elec.
29	30 mfd	25	Elec.
30	.25	400	Paper
31	.0001 mfd		Mica
32	.001 mfd		Mica
33	No.44066 800 mmf		Variable Pad
34	.0019 mfd		2½% Mica
35	.0037		5% Mica

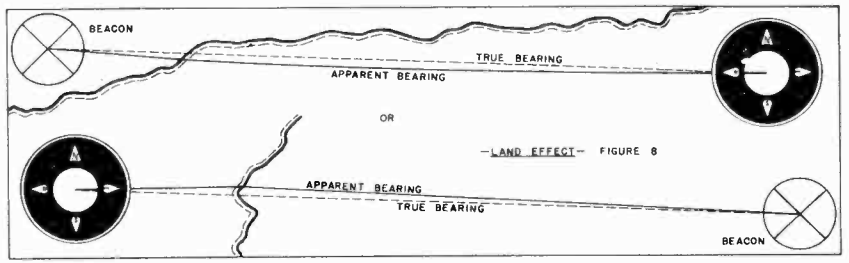


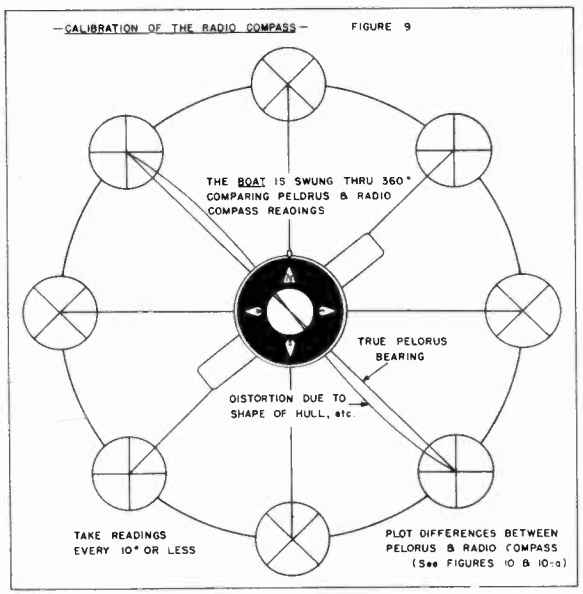
ERRORS TO BE CONSIDERED

1 - THE OPERATOR - Errors of the operator which depend entirely on his experience, may be difficult to predict. After he has familiarized himself with adjustment of the "SHARPNESS" control, he need only allow about ± 1/2 degree on strong static-free signals that produce a NULL of about 2 degrees width. If the NULL should cover some 10 degrees after complete adjustment, he cannot allow less than ± 2 degrees.

2 - MOTION OF THE VESSEL - Yawing and pitching usually only affect the ship's course. The HELMSMAN must apply the correct magnetic deviation to the compass indication and must sometimes estimate possible error at the time readings are taken.

3 - MERCATOR ERROR - occurs in plotting the earth - a spherical volume, on the conventional MERCATOR CHART - a plane area. Since MERCATOR CORRECTION is necessary only on rare occasions, as shown by Figure 7, it will not be treated in detail.





4 - LAND EFFECT - occurs when the signal passes over land before its course over water. In this respect, radio waves are comparable to light passing thru materials of various density. (Figure 8 illustrates the error).

CAUTION - Do not rely on readings taken over land or along a shoreline.

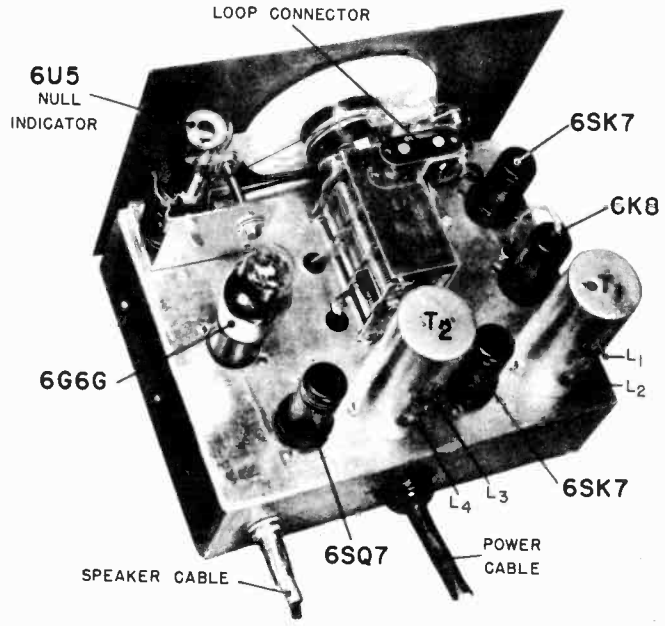
5 - NIGHT EFFECT - is most noticeable at sunrise and sunset. More radio waves are reflected back to earth at night than during daylight. It is evident by a broadening of the NULL and possible shifts in apparent bearings taken at distances greater than 250 miles. Over short ranges the effect is negligable.

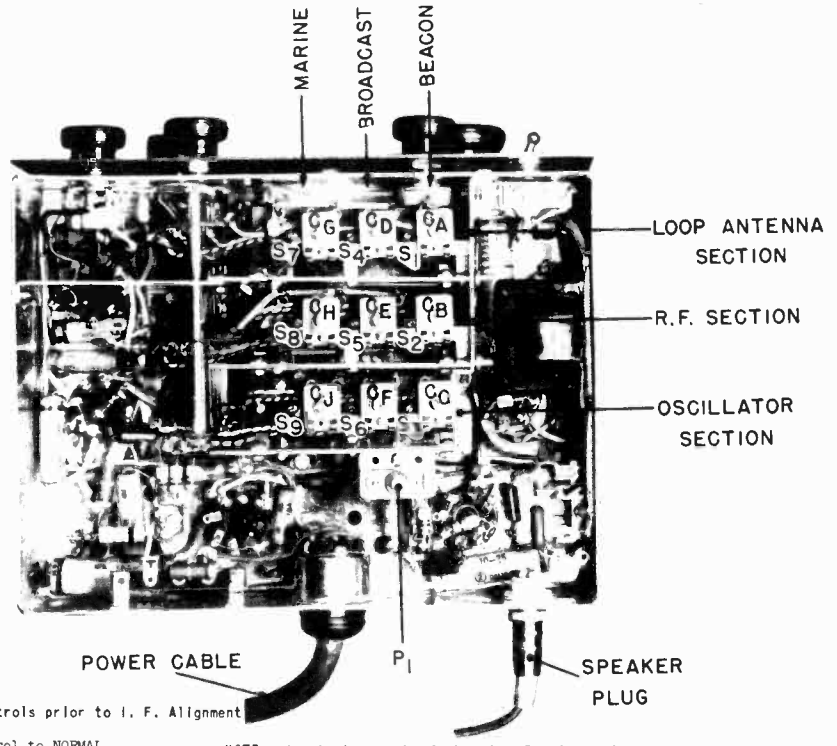
6 - RADIO COMPASS DEVIATION - must be determined and accounted for as in the magnetic compass. A calibration curve (figure 10) determined as indicated by the self-explanatory Figure 9, must be made with the aid of the PELORUS, immediately after installation.

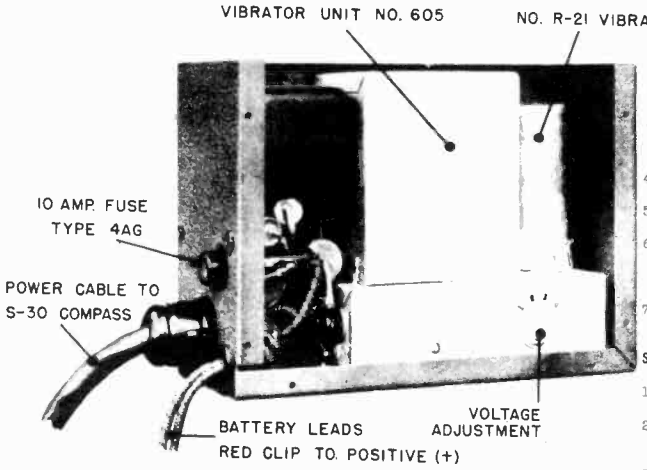
If the RADIO COMPASS is not in line with the LUBBER LINE, the CALIBRATION curve will be similar to that shown by the dotted line.

If the RADIO COMPASS is located too close to a metal object (see LOCATION) a curve similar to the other broken line will result.

REMEDIES are immediately evident to the operator.







Setting of controls prior to I. F. Alignment

1 - "OFF" control to NORMAL

2 - "Volume" on full

3 - "Sharpness" on full

4 - main tuning dial set at 3 mc

5 - Bandswitch - Marine Band

6 - Connect signal generator to grid of 6K8 tube. Ground lead of generator to chassis of receiver

7 - Adjust indicated trimmers as per instructions.

Setting of controls for R. F. Alignment

1 - All controls similar to I. F. alignment

2 - Receiver dial adjusted to the aligning frequency

3 - **NOTE:** Generator connected to receiver inductively by forming a loop with a few turns of wire and placing it in the field of the loop on the receiver - leave end of wire free.

NOTE: On the beacon band the slug S_3, is used for calibrating the center of the band - the pad, P_1, for calibrating the low frequency end of the band.

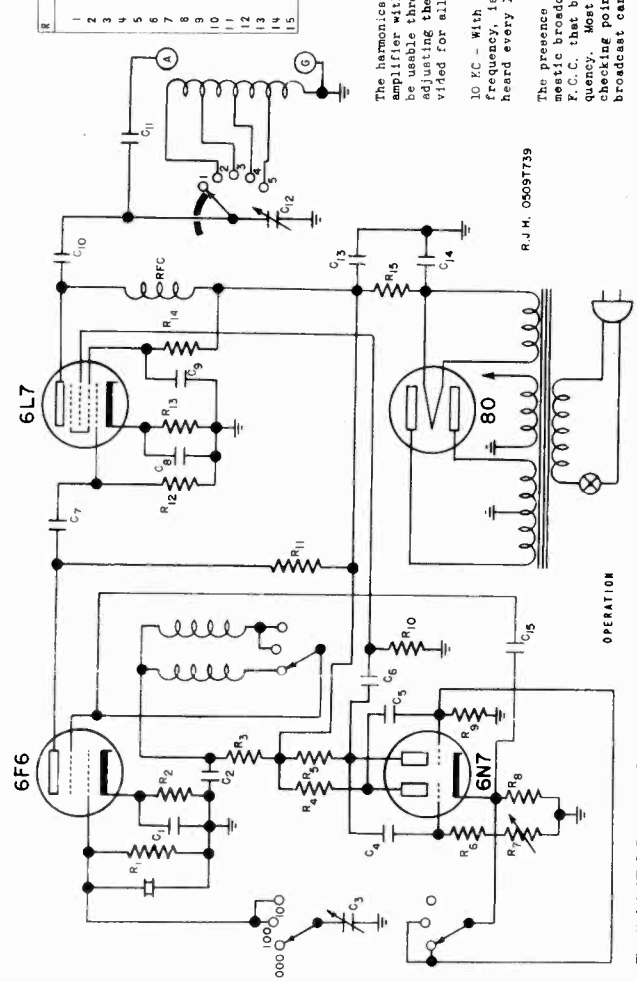
Allow receiver and signal generator to reach operating temperature before making adjustments.

RANGE	SIG. GEN. & TUNING DIAL SETTING	DUMMY ANTENNA	PAD	TRIMMERS OR SLUGS	ADJUSTMENT
IF	175 kc 3 mc Marine	.1 mfd	None	L_1-L_2-L_3-L_4 on sides of I. F. cans T_1 & T_2	Adjust to maximum output
Beacon	250 kc	inductive	P_1	S_1-S_2-S_3	"
	500 kc	loop	None	C_A-C_B-C_C	"
Broadcast	600 kc	loop	Fixed	S_4-S_5-S_6	"
	1200 kc	loop	None	C_D-C_E-C_F	"
Marine	1300 kc	loop	Fixed	S_7-S_8-S_9	"
	2800 kc	loop	None	C_G-C_H-C_1	"

MODEL HT 7
Frequency
Standard

THE HALLICRAFTERS INC.

R	RESISTOR OHMS	WATTAGE	C	CONDENSERS CAPACITY	TYPE & VOLTAGE
1	5000000	1/2	1	.1 mfd	200
2	500	1/2	2	.1 "	400
3	25000	1	3	25 mmfd	air variable
4	2500	1	4	.002 mfd.	Mica
5	2500	1	5	.002 "	"
6	20000	1	6	.002 "	"
7	15000	variable	7	.001 "	"
8	300	1/2	8	.01 "	400
9	30000	1	9	.01 "	"
10	50000	1/2	10	.002 "	Mica
11	85000	1	11	10 mmfd	"
12	100000	1/2	12		
13	500	1/2	13	8 mfd	350 electrolytic
14	15000	1	14	8 "	350 electrolytic
15	4000	10	15	35 mmfd	Ceramic



OPERATION

The Model HT 7 Frequency Standard is designed to be operated on 110-125 volt 50-60 cycle alternating current. It is suggested that the user connect the HT 7 to a receiver; "A" terminal on Standard to antenna post on receiver and "G" terminal to receiver ground post. After you have become familiarized with the way the unit should be operated, the wire which is connected to the "A" post on the standard can be more loosely coupled to the receiver by twisting this wire around the antenna lead until the most satisfactory amount of coupling has been reached.

1000 KC - Set the Freq.-KC Switch to the 1000 KC position after the OFF-ON switch has been placed in the "ON" position. Now turn the band switch on the Standard to #1 band. The receiver should be adjusted for standard broadcast band coverage during these initial steps of adjustment. With the beat oscillator in the receiver turned on you should be able to hear a strong signal at 1000 KC in the broadcast band and at every 1000 KC throughout the other tuning ranges of the receiver.

The 1000 KC frequency is ground to a tolerance of .05% and has a temperature co-efficient of about 23 cycles per megacycle per degree centigrade. Obviously, the 1000 KC harmonics should be used only as markers to approximately locate the even 100 KC divisions. For accurate measurements, the crystal switch should be placed in the 100 KC position.

100 KC - Place the crystal switch at the 100 KC position. A signal from the standard will now be heard every 100 KC on the receiver.

NOTE - To accurately adjust the standard the following procedure should be carefully followed: Place the crystal switch at the 1000 KC position. Turn off the beat frequency oscillator in the receiver. Now tune in a broadcast station, or preferably WWV, transmitting on an even 100 KC frequency (600-700-800 KC). Tune in this signal accurately. Place the crystal switch in the 100 KC position. Undoubtedly a beat note will be heard. Now adjust the "Crystal Tuning" control slowly until you have reached zero beat. If the receiver is equipped with a resonance indicator, such as a meter or eye, this adjustment will be more accurately made by watching the pulses of the indicator while exact zero beat is being approached.

In the 100 KC position the crystal has a temperature drift of about 10 cycles per megacycle per degree centigrade. Temperature variations is normal service over several hours may cause frequency variations of approximately 20 parts per million.

The harmonics of the 100 KC oscillator become noticeably weak above 7 megacycles. A harmonic amplifier with a tunable output circuit is provided to raise the output level so that it will be useable through the 30 MC band. By setting the "Band Switch" to positions 2, 3, 4 or 5, and adjusting the "Output tuning" control a point will be found where sufficient output is provided for all checking purposes.

10 KC - With the crystal switch set at the 10 KC position, a multivibrator, locked to crystal frequency, is connected into the circuit. This will provide output signals which will be heard every 10 KC apart between the 100 KC points.

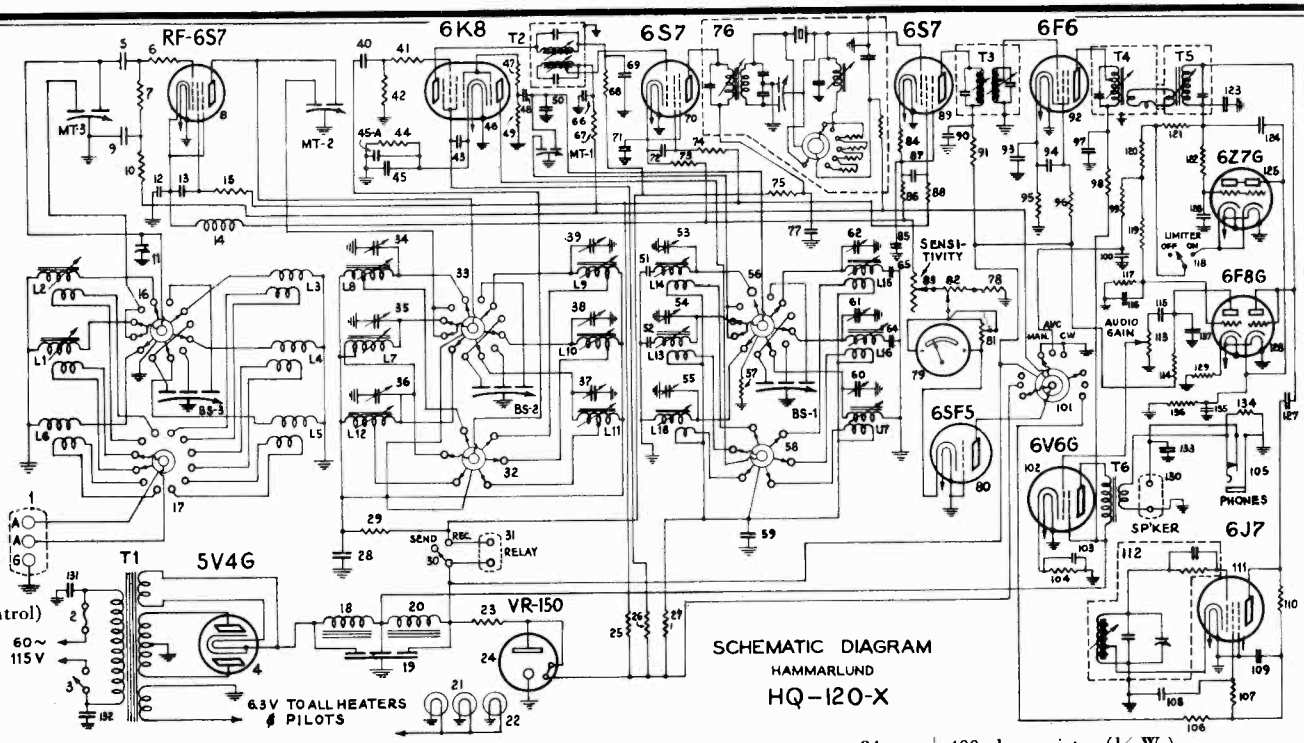
The presence of the 10 KC harmonics allows the standard to be set to zero beat with any domestic broadcast station inasmuch as they are spaced 10 KC apart. It is required by the F.C.C. that broadcast stations remain within 50 cycles plus or minus of their assigned frequency. Most station maintain 5 or 10 cycle deviation as maximum so they constitute accurate checking points. Highest accuracy is, of course, obtained when beating against WWV, but broadcast carriers allow sufficient accuracy for most purposes.

The adjustment screw on the rear of the unit selects the sub-harmonic of 100 KC on which the multivibrator operates. If this control is improperly adjusted, there may be more or less than 9 signals between 100 KC points - that is the signals may be $\frac{100}{8}$ or $\frac{100}{10}$ KC apart - 8 or 10 signals being heard instead of 9. Count the number of 10 KC harmonics between 100 KC points and if you find more or less than 9, adjust this control until 9 signals are heard between the 100 KC markers. This adjustment is originally made at the factory so it is improbable any further adjustment will be found necessary. Once the multivibrator has been locked to the proper sub-harmonic the output will be very stable.

USES

The HT 7 will be of great help in providing an accurate source of signal energy for receiver alignment purposes. When aligning receivers connect the standard to the receiver as outlined previously; establish the 1000 KC marker positions and then align the receiver accurately from the 100 KC signals it delivers.

With the widespread use of the Electron coupled oscillator for frequency control in amateur transmitters, in addition to the most recent FCC regulations imposing the necessity for accurate frequency checking, the HT 7 fills a needed want. The edges of the various amateur bands can be immediately established roughly by using the 1000 KC signal output. Exact band edge location can then be determined by resetting to the 100 KC output frequency. In the 10 KC position the standard can then be used for frequency measurement purposes by interpolating between dial divisions and the frequency of the standard. Presume for example, that you wish to locate a signal on 7263 KC on the receiver. Set the standard to 1000 KC and locate the band edge at 7000 KC. Then switch the standard to the 100 KC position and count over two 100 KC points. We have now located 7200 KC. Now set to 10 KC crystal position and count over six 10 KC points from 7200. We now have 7260 KC. Log the dial setting for 7260 KC. Now tune over one more 10 KC harmonic to 7270 KC. Let us suppose that 7260 KC came in at 76 on the dial and 7270 KC was heard at 79. This represents a difference of three divisions to cover 10 KC, consequently each KC represents .3 divisions on the dial. To locate our exact frequency of 7263 KC simply move the dial .9 divisions past 76 (the 7260 calibration point) or namely to 76.9.



SCHEMATIC DIAGRAM
HAMMARLUND
HQ-120-X

HQ-120-X

CRYSTAL MODEL

FOR OTHER DATA,
SEE MODEL HQ-120-X
VOL. X

Tuning Range

31-.54 MC

Form IM 3-4

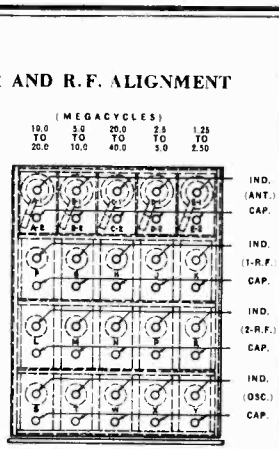
L-1	Antenna coil .54–1.32 mc. range	42-49-119-121	50,000 ohm resistor (½ W.)
L-2	Antenna coil 1.32–3.2 mc. range	44-129	230 ohm resistor (½ W.)
L-3	Antenna coil 3.2–5.7 mc. range	126-131-132-133-45-71-85-94-100-108-109	.05 mf. condenser (500 V.)
L-4	Antenna coil 5.7–10 mc. range	45A	.005 mf. mica condenser
L-5	Antenna coil 10–18 mc. range	46	Tube socket 6K8-Conv. (iso.)
L-6	Antenna coil 18–31 mc. range	47	15 ohm resistor (½ W.)
L-7	R.F. coil .54–1.32 mc. range	48	50. mmf. condenser (silver)
L-8	R.F. coil 1.32–3.2 mc. range	50-127	5.5 mmf. condenser (silver)
L-9	R.F. coil 3.2–5.7 mc. range	51	673 mmf. condenser (silver)
L-10	R.F. coil 5.7–10 mc. range	52	300 mmf. condenser (silver)
L-11	R.F. coil 10–18 mc. range	56	H.F. osc. grid switch wafer
L-12	R.F. coil 18–31 mc. range	57	10. ohm resistor (½ W.)
L-13	H.F. osc. coil .54–1.32 mc. range	64	.0015 mf. mica condenser
L-14	H.F. osc. coil 1.32–3.2 mc. range	65	.001 mf. mica condenser
L-15	H.F. osc. coil 3.2–5.7 mc. range	70-89	Tube socket 6S7
L-16	H.F. osc. coil 5.7–10 mc. range	73	700. ohm resistor (½ W.)
L-17	H.F. osc. coil 10–18 mc. range	76	Crystal filter
L-18	H.F. osc. coil 18–31 mc. range	78	50. ohm resistor ½ (W.)
T-1	Power transformer 50–60 cycle, 115-V	79	Tuning meter
T-2	First I.F. transformer	80	Tube socket 6SF-5
T-3	Third I.F. transformer	81-82	80. ohm meter circ. potentiometers
T-4	I.F. output coil assembly	83	Sensitivity control 10,000 ohms
T-5	Diode input coil	84	400 ohm resistor (½ W.)
T-6	Audio output transformer 6 ohm	86	300. ohm resistor (½ W.)
1	Antenna terminal strip	92	Tube socket 6F6
2	Fuse block (1.5A fuse Pt. No. 6065)	93	.1 mf. condenser (500 V.)
3	Power switch (comb. with audio gain control)	95	600 ohm resistor (½ W.)
4	Rectifier tube socket 5V4-G	96	50,000 ohm resistor 1 watt
5-40-116	600 mmf. mica condensers	99-122	1-meg. resistor (½ W.)
6-41	25. ohm resistor (½ W.)	101	AVC-MAN-BFO switch
7	500,000 ohm resistor (½ W.)	102	Tube socket 6V6G—Audio
8	Tube socket 6S7-RF (iso.)	103	40 mf. electrolytic condenser
9-12-13-43-59-66-69-72-77-87-90-97	.02 mf. paper cond. (500 V.)	104	350. ohm resistor (1 W.)
10-67-106	10,000 ohm resistor (½ W.)	105	Phone jack
11	Antenna compensating condenser	136-107-110	100,000 ohm resistor (½ W.)
14	R.F. choke	111	Tube socket 6J7
15-29-68-74-75-88-91-98	2000 ohm resistor (½ W.)	112	Beat oscillator
16-33	R.F. and detector grid switch wafer	113	Audio gain control (500,000 ohm combined with power switch)
17	Antenna switch wafer	115	.01 mf. condenser (500 V.)
18	First filter choke	117	20,000 ohm resistor (½ W.)
19	Filter condenser	120	25,000 ohm resistor (½ W.)
20	Second filter choke	123-124-135	50. mmf. mica condenser
21	.15 amp. pilot lamps (6-8 V.)	137	1000. mmf. mica condenser
22	Dial and meter lamps socket assembly	125	Tube socket 6Z7-G
23	3000 ohm resistor (10 W. wire wound)	128	Tube socket 6F8-G
24	Tube socket VR-150	130	Speaker terminal strip
25	6000 ohm resistor (1 W.)	134	25 ohm resistor (1 W.)
26	7000 ohm resistor (1 W.)		
27-114	10,000 ohm resistor (1 W.)		
28	.005 mf. mica condenser		
30-118	Send-Receive and Limiter switches		
31	Relay pin jack		
32	Det. grid tap and osc. plate switch wafers		
34-35-36-37-38-39-53-54-55-60-61-62	Special MEX trimmer cond.		

H.F. OSCILLATOR AND R.F. ALIGNMENT

Connect the output of the test oscillator to the "A.A." terminal strip. Connect the output meter to the speaker voice coil terminals. The controls on the front panel should be set as follows:

(1) Band Change Switch on 540–1160 K.C. (2) Main Tuning Dial on 1100 K.C. (3) Band Spread Dial on 100. (4) Sensitivity Control "To Produce appropriate output meter reading." (5) Audio Gain Control "Full On." (6) C.W.-MOD switch on "MOD." (7) A.V.C.-MANUAL Switch on "MANUAL." (8) SEND-RECEIVE Switch on "RECEIVE." (9) "Phones-Speaker" Switch on "PHONES."

Turn the receiver over, bottom side up, placing a small block of wood under the rear of the switch section to protect the shield cans and tubes. The main tuning unit bottom plate should remain in place while H.F. oscillator and R.F. adjustments are being made. In order to facilitate the alignment of these stages, we have indicated in dotted lines, the coil positions beneath the bottom cover plate, together with all capacity and inductance adjusters. Capacity adjusting condensers are located on the coil bases and inductance adjusters extend through the top of each coil. The coil markings correspond to the designations on the schematic wiring diagram. Set the test oscillator to produce a 2.5 MC. signal. Adjust the trimmer capacitor "Y" until a peak reading is obtained in the output meter. Now set the main tuning condenser dial to 1.26 MC. and adjust the test oscillator for a 1.26 MC. signal. Turn the inductance adjustment on coil "Y" for a peak reading on the output meter. As these two adjustments react on each other it will be necessary to repeat them until no further change in either capacity or inductance is necessary. This realignment should only be done after making sure that the calibration of main dial is incorrect.



Turn the main tuning dial to 2.5 MC. and set the test oscillator for 2.5 MC. signal. Adjust each capacitor on coil "R"-"K"-"E2" in the order named, for peak reading on the output meter. The Sensitivity control should be adjusted so that no overloading occurs and an appropriate reading on the output meter is maintained. Now set the main tuning dial at 1.26 MC. and the test oscillator on the same frequency and turn the "inductance adjustments" on coil "R"-"K"-E1" for peak reading on the output meter. These adjustments are also interlocking and should be repeated until no further improvement can be noticed. This completes the H.F. Oscillator and R.F. coil alignment for the frequency range of 1.25 to 2.50 MC.

The alignment procedure of the H.F. Oscillator and R.F. coils in the remaining frequency ranges is exactly the same as outlined for the 1.25-2.50 MC. band. Test oscillator frequencies and main tuning dial settings vary as follows:

Range	*Capacity Frequency*	*Condensers*	*Inductance Frequency*	*Coils*
1.25 to 2.50 MC.	2.5 MC.	Y-R-K-E2	1.26 MC.	Y-R-K-E1
2.5 to 5.0 MC.	5.0 MC.	X-P-J-D2	2.5 MC.	X-P-J-D1
20.0 to 40.0 MC.	40 MC.	W-N-H-C2	20 MC.	W-N-H-C1
5.0 to 10.0 MC.	10.0 M.C.	T-M-G-B2	5.0 M.C.	T-M-G-B1
10.0 to 20.0 MC.	20.0 M.C.	S-L-F-A2	10.0 M.C.	S-L-F-A1

I. F. ALIGNMENT

The following adjustments should only be attempted after making *certain* that the I.F. channel of the receiver is out of alignment.

The alignment of the I.F. amplifier may be checked as follows: Connect a low reading (1 volt) output meter across the voice coil terminals. Connect a test oscillator (modulated at 400 cycles or less) to the antenna terminals of the receiver. Set the crystal selectivity switch on Number 1, the phasing control on the arrow, and the band-width control at 3. With the AVC-MANUAL switch on "manual" and the A.F. gain at 10, adjust the sensitivity control for an output meter reading of approximately 1 volt, with the test signal tuned accurately. Now, check the settings of the I.F. tuning condenser on T-2, T-3, and T-4 (*DO NOT DISTURB* the screw tuning adjustments of the Crystal Filter T-1). Then reduce the A.F. gain to protect the output meter and throw the AVC-MANUAL to "AVC" and turn the sensitivity control to 10. Then adjust T-6 for maximum "S" meter reading. This can be done most satisfactorily by adjusting the input from the test oscillator to produce an "S" reading of approximately 8.

To check the alignment of the Crystal Filter T-1, an oscillograph and sweep frequency oscillator are required. First adjust the sweep frequency oscillator to exact agreement with the crystal resonant frequency with the Crystal Selectivity switch on Number 5, and the phasing control on the arrow. Then, set the switch on Number 1 and adjust the lower screw on T-1 for maximum height, and the upper screw for symmetry of oscillograph image.

SELECTIVITY

The selectivity curves shown on page are representative curves made on a sample receiver and will hold reasonably true for all models. These curves were taken with the signal generator operating at the intermediate frequency and these curves will maintain throughout the entire range of the receiver, except at the very low frequency end of the broadcast band where the R.F. selectivity has a very slight narrowing effect. The selectivity of the "Super-Pro" is divided into two distinct ranges. In Fig. 5, appear the wide band curves. These curves were made at 4 different positions of the band width control. However, the actual selectivity obtainable is continuously variable between curves 3 and 16. Particular attention should be paid to the steepness of the sides of these curves. They are relatively straight and do not have the usual flare at the outer limits. This means that there will be less background interference from stations operating either higher or lower in frequency than the station being received. The advantage of having continuously variable selectivity over relatively wide limits in a receiver is readily apparent when one considers that the operator has absolute control and can adjust the receiver to compensate for almost any degree of interference that may be present. For example, when interference is not serious, the band width control can be set to the widest position and permit high quality reproduction of either voice or music. In other cases where interference is present, the band width control can be adjusted to the point where selectivity is just sufficient to eliminate interference. This adjustment provides maximum fidelity with a minimum of interference. It also permits the operator to utilize the extreme sensitivity of the "Super-Pro." Even in crowded bands, the selectivity can be adjusted to a point where interference is not bothersome and the sensitivity can be turned up to provide reception of extremely weak signals with marked clarity.

In Fig. 6, the variable selectivity crystal filter curves are illustrated. It will be noticed that the crystal filter fills in the gap very nicely between position "3" of the band width control and what would normally be maximum crystal selectivity for code reception. This variable selectivity crystal filter is an exclusive HAMMARLUND development and will be found only in a HAMMARLUND receiver. The crystal filter has five ranges of selectivity. The first three are intended for phone reception. The widest position of these, however, will permit good quality music under conditions where interference would, in most cases, make reception impossible. Positions four and five are for CW code reception and provide the usual single signal response.

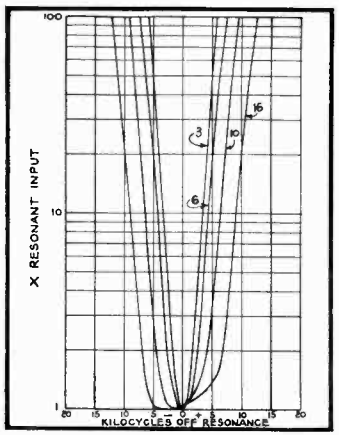


FIG. 5—I.F. curves taken at four positions of the band width control. The actual selectivity of the I.F. amplifier is continuously variable between curves 3 and 16. Particular attention should be paid to the sharp cut-off which greatly reduces back-ground interference.

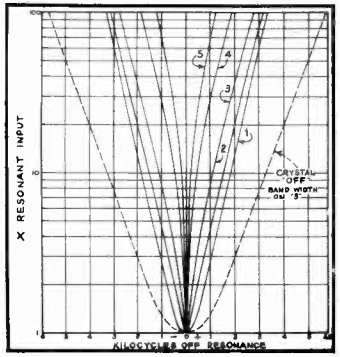
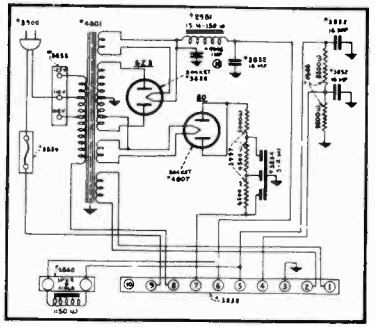


FIG. 6—Variable crystal filter selectivity curves showing five positions of the control switch. Positions 1, 2 and 3 are intended for voice reception. Position 1 is broad enough to permit reception of music. Positions 4 and 5 are for single signal code reception.



POWER SUPPLY

1	Power transformer 110 volts 60 cycle A.C.
2	Filter choke
3	A.C. input Cord and Plug
4	Fuse Block for 2A. fuse
5	Line Voltage Adjusting Strip
6	Speaker Field Terminal Strip
7	Connecting Terminal Strip
8-9-10	Filter Condenser 16 mfd. electrolytic 450 volts
11	Filter Condenser 8-8-8 mfd. electrolytic 450 volts
12	Resistor 18,000 ohms (2 taps)
13	Resistor 18,000 ohms (1 tap)
14	Tube socket 80
15	Tube socket 5Z3
16	1 mf. paper filter condenser

FIG. 12—Standard "Super-Pro" power supply for use with electro-dynamic speaker. Special models have filter choke connected in place of the speaker field.

The "Super-Pro" is available to cover several frequency ranges. Such information as is given in this book will pertain to all models. The two standard models have the following tuning ranges:

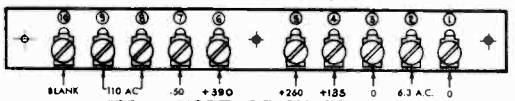
SP-200
540 – 1160 kc.
1160 – 2500 kc.
2.5 – 5 mc.
5 – 10 mc.
10 – 20 mc.

SP-200-S
1250 – 2500 kc.
2.5 – 5 mc.
5 – 10 mc.
10 – 20 mc.
20 – 40 mc.

Other models cover low frequencies in the neighborhood of 150 to 400 kc. as well as certain higher frequencies.

* In this model, the 1000 to 2000 meter band is substituted for the 60 to 120 meter band. *NOTE BELOW

Drawing below provides voltage readings at the various terminals on either the receiver or power supply when the two are connected together.



VOLTAGE CHART

TUBE	FUNCTION IN RECEIVER	VOLTS AT SOCKET TERMINAL No. 1	2	3	4	5	6	7	8
6K7	1st Radio Freq.	0	0	250	135	...	135	6.3 AC	0
6K7	2nd Radio Freq.	0	0	250	135	...	135	6.3 AC	0
6L7	1st Detector	0	0	250	115	...	...	6.3 AC	...
6J7	Hugh Freq. Oscillator	0	0	160	160	160	...	6.3 AC	...
6K7	1st I.F. Amplifier	0	0	250	135	0	...	6.3 AC	0
6SK7	2nd I.F. Amplifier	0	0	0	—43	0	135	6.3 AC	250
6SK7	3rd I.F. Amplifier	0	0	0	—2	0	100	6.3 AC	240
6N7	Noise Limiter	0	0	+ 4	— 2	— 2	+ 4	6.0 AC	— 2
6H6	2nd Detector	0	0	— 2	+ 4	— 2	...	6.3 AC	+ 4
6SK7	AVC Amplifier	0	0	0	—2	0	110	6.3 AC	240
6H6	AVC	0	0	—3 2	—3 4	—3 2	...	6.3 AC	—3.4
6SJ7	Beat Oscillator	0	0	0	— 1	0	40	6.3 AC	155
6C5	1st A.F. Amplifier	0	0	110	...	...	—3.3	6.3 AC	0
6F6	A.F. Driver	0	0	240	240	...	—20	6.3 AC	0
6F6	P.P. A.F. Output	0	0	380	380	0	...	6.3 AC	38
6F6	P.P. A.F. Output	0	0	380	380	0	...	6.3 AC	38

Measurements were made on 115 volt AC line, with line voltage adjustment set at 115 volt tap. Set sensitivity and audio gain controls at minimum. A.V.C. Manual Switch should be in manual position. CW-MOD Switch in C.W. position, Limiter Switch in "On" position, and "Send-Receive" switch in receive position. D.C. readings were obtained with voltmeter having a resistance of 1000 ohms per volt. Use chassis as a common terminal. Voltages within ± 10% are satisfactory. The 6.3 volt A.C. filament reading is obtained between chassis and terminal No. 2 on strip. Terminal No. 10 on strip is blank except when used for battery operation.

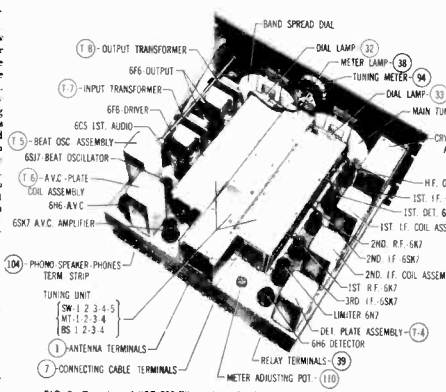


FIG. 7—Top view of "SP-200-X" receiver showing the general layout of parts. All important parts are labeled. Encircled numbers correspond to numbers appearing in the circuit diagram.

	Tuning Range
SP-210-X	15-560 Meters
SPR-210-X	15-560 Meters
SP-220-X	15-560 Meters
SPR-220-X	15-560 Meters
SP-210-SX	7½-240 Meters
SPR-210-SX	7½-240 Meters
SP-220-SX	7½-240 Meters
SPR-220-SX	7½-240 Meters
SP-210-LX	*15-2000 Meters
SPR-210-LX	*15-2000 Meters
SP-220-LX	*15-2000 Meters
SPR-220-LX	*15-2000 Meters

* SEE NOTE ABOVE

MODEL SP-200-SX

Form P-10-40

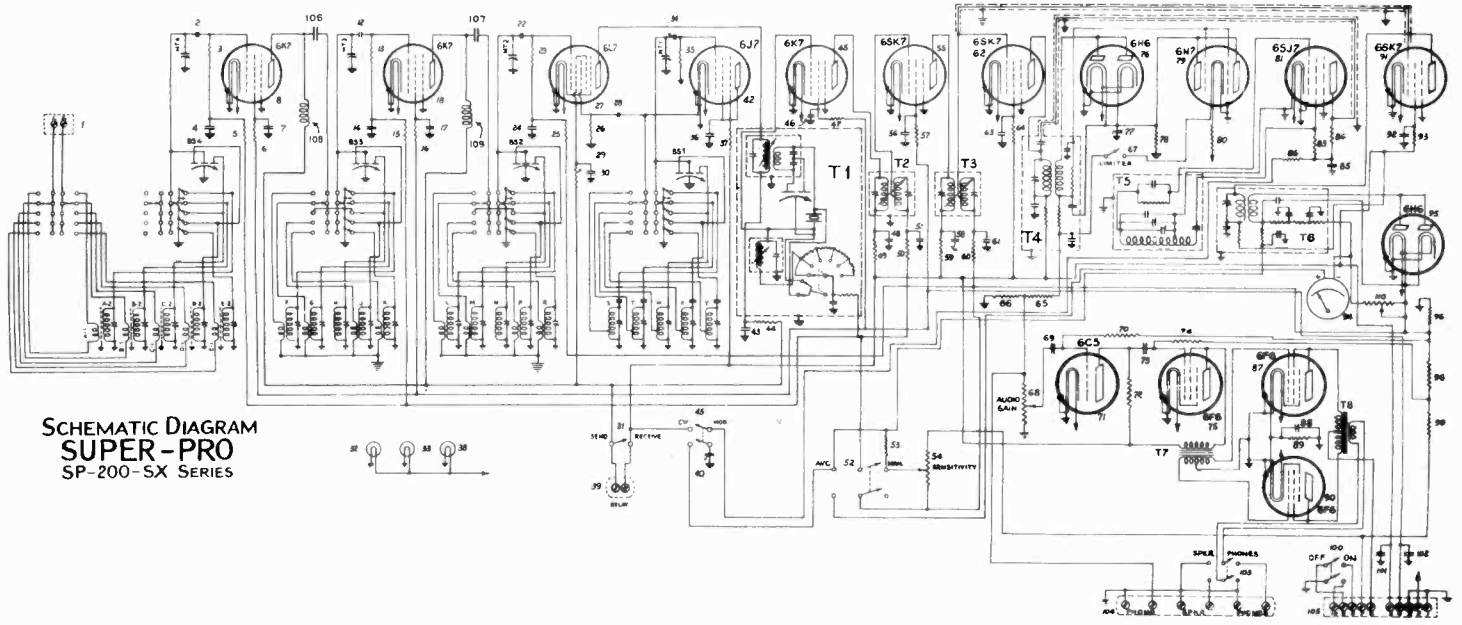


FIG. 11

A1	Antenna Input Coil Assembly	10.0 to 20.0 m.c.	T-7
A2	Antenna Output Coil Assembly	10.0 to 20.0 m.c.	T-8
B1	Antenna Input Coil Assembly	5.0 to 10.0 m.c.	1
B2	Antenna Output Coil Assembly	5.0 to 10.0 m.c.	2-12-22
C1	Antenna Input Coil Assembly	20.0 to 40.0 m.c.	28
C2	Antenna Output Coil Assembly	20.0 to 40.0 m.c.	34
D1	Antenna Input Coil Assembly	2.5 to 5.0 m.c.	77
D2	Antenna Output Coil Assembly	2.5 to 5.0 m.c.	69
E1	Antenna Input Coil Assembly	1250 to 2500 k.c.	4-14-24
E2	Antenna Output Coil Assembly	1250 to 2500 k.c.	7-17-30-36-
F	1st R.F. Coil Assembly	10.0 to 20.0 m.c.	43-46-48-51-
G	1st R.F. Coil Assembly	5.0 to 10.0 m.c.	56-58-61-63-
H	1st R.F. Coil Assembly	20.0 to 40.0 m.c.	73-85-92
J	1st R.F. Coil Assembly	2.5 to 5.0 m.c.	
K	1st R.F. Coil Assembly	1250 to 1160 k.c.	40-101-102
L	2nd R.F. Coil Assembly	10.0 to 20.0 m.c.	88
M	2nd R.F. Coil Assembly	5.0 to 10.0 m.c.	80
N	2nd R.F. Coil Assembly	20.0 to 40.0 m.c.	89
P	2nd R.F. Coil Assembly	2.5 to 5.0 m.c.	96
R	2nd R.F. Coil Assembly	1250 to 2500 k.c.	98
S	High Frequency Osc. Coil Assembly	10.0 to 20.0 m.c.	44-6-47-49-
T	High Frequency Osc. Coil Assembly	5.0 to 10.0 m.c.	57-59-16
W	High Frequency Osc. Coil Assembly	20.0 to 40.0 m.c.	99
X	High Frequency Osc. Coil Assembly	2.5 to 5.0 m.c.	86
Y	High Frequency Osc. Coil Assembly	1250 to 2500 k.c.	5-15-25-
T-1	Crystal filter assembly (465 kc.)		50-60
T-2, T-3	1st and 2nd, I.F. Transformer Coil Assembly		37
T-4	Detector plate coil assembly		29
T-5	Beat oscillator coil assembly		35-26
T-6	A.V.C. Plate coil assembly		66-84

Push-Pull Input Transformer		64-72-93
Push-Pull Output Transformer		65
Antenna terminal strip		78
Capacitor Fixed Mica	type 600 mmf	3-13-23
Capacitor Fixed Silver	type 95 mmf.	70-74-83
Capacitor Fixed Silver	type 50 mmf.	53
Capacitor Fixed Mica	type 50 mmf.	8-18-45
Capacitor Fixed Tubular	type .02 mf. 500 V.	55-62-91
Capacitor Fixed Tubular	type .01 mf. 500 V.	76-95
Capacitor Fixed Tubular	type .05 mf. 500 V.	79 81 71 75-87-90
Capacitor Fixed Tuhular	type .25 mf. 400 V.	27 42
Capacitor Dry Electrolytic	40 mf. 150 V.	32-33
Resistor 4 ohms wire wound	5 watt	38
Resistor 750 ohms wire wound	10 watt	94
Resistor 300 ohms metallized	½ watt	100
Resistor	1,700 ohms metallized ½ watt.	52-103
Resistor	2,000 ohms metallized ½ watt.	41
Resistor	3,000 ohms metallized 1 watt.	31 67
Resistor	5,000 ohms metallized ½ watt.	54 68
Resistor	10,000 ohms metallized ½ watt.	39 104
Resistor	12,000 ohms metallized 2 watt.	105
Resistor	25,000 ohms metallized 2 watt.	106-107
Resistor	25,000 ohms metallized ⅓ watt.	110
Resistor	50,000 ohms metallized ½ watt.	

Resistor	50,000 ohms metallized 1 watt
Resistor	75,000 ohms metallized ½ watt
Resistor	250,000 ohms metallized ½ watt
Resistor	250,000 ohms metallized ⅓ watt
Resistor	500,000 ohms metallized ½ watt
Resistor	2,000,000 ohms metallized ½ watt
Tube socket	6K7
Tube socket	6SK7
Tube socket	6H6
Tube socket	6N7
Tube socket	6SJ7
Tube socket	6C5
Tube socket	6F6
Tube socket	6L7
Tube socket	6J7
Dial lamps	6.3 volt .15 amp.
Meter lamp	6.3 volt .15 amp. Bayonet type
Tuning meter	
Off-on Switch	
AVC-MANUAL and SPEAKER-PHONES Switch	
CW-MOD Switch	
Send-Receive Switch	
Limiter switch	
Sensitivity control	50,000 ohm
Audio Gain Control	250,000 ohm
Relay terminal strip	
Phono-Speaker-Phones terminal strip	
Connecting terminal strip	
Capacitor Fixed Silver type	300 mmf.
Meter adjusting potentiometer	1,000 W wire wound

OPERATION

Although the "Super-Pro" is a highly technical piece of apparatus, with quite a large number of controls, it is relatively easy to operate. There are 15 controls on the panel. However, they are not all used at the same time. The number of controls necessary for operation will depend on the type of service for which the receiver is being used. The major controls are the band switch, main tuning, band spread, and audio gain. The remaining controls are brought into play as conditions demand their use. Assuming that the speaker, power supply and antenna have been connected according to instructions, the various controls should be set in the following positions: crystal selectivity, off; "phasing" on zero; "band width" on 6; "limiter," off; switch under the limiter control in "AVC" position; "sensitivity," maximum (10); band spread dial on 100; "signal" switch, on "modulation"; the toggle switch just beneath, should be set on "Speaker"; "audio gain" on 6; send-receive switch on "Rec."; beat oscillator on zero. Then, turn the main switch in the center of the panel marked "On-and-Off" to the on position. This puts the entire receiver in operation. The band switch should be adjusted to either the broadcast band or the next highest frequency band. This should permit reception of local stations and allow the operator to familiarize himself with various adjustments. The band width control should be adjusted to provide the most pleasing tone when there is no serious interference. Otherwise, it should be adjusted to the point providing best tone quality with a minimum of interference. The beat oscillator is turned on when the "signal" switch is in the "CW" position. The beat oscillator control varies the pitch of the heterodyne. This feature is used for code reception and for locating weak signals. The "limiter" control turns the noise limiter on and off. The noise limiter is most valuable on the shorter waves where automobile ignition interference is more serious. So far, we have considered the receiver adjustments necessary for phone reception. For code reception, the "AVC-Man." control should be set in the "Man." position and the sensitivity control turned down to provide proper sensitivity. On strong signals, this control should not be turned all the way on because there will be a tendency to overload the receiver. Volume is controlled with the "audio gain" control and not with the "sensitivity" control. The crystal filter is very effective and easy to operate because of its excellent stability. The first three positions are generally used for phone reception and will serve for code reception where interference is not severe. The last two positions are for code reception exclusively. When the crystal selectivity control is adjusted for optimum selectivity, the phasing control should be used to reject heterodyne interference or "whistle." The receiver can be temporarily silenced by turning the "Send-Receive" switch in the "Send" position. This allows the receiver to be ready for instant service and is more commonly called the "stand by switch" when the receiver is used for communication purposes. All tuning can be done with the main tuning control. In this case, the band spread dial is left at 100. The band spread dial operates so as to spread out a narrow band of frequencies in the neighborhood of the frequency at which the main dial is set. The band spread dial works continuously throughout the entire range of the receiver except on the lowest frequency bands. In this manner, many short wave broadcast or amateur bands can be spread out over the band spread dial for easy tuning. The wave ranges of the receiver are so arranged that when the band spread and main dial are set for 80 meter amateur band reception, the 40-meter band as well as the other amateur bands will appear on the band spread dial merely by turning the wave change switch. This is a great convenience and eliminates the necessity for searching each time for the amateur band which is to be covered by the band spread dial. For ear-phone operation, ear-phones are plugged into the terminal strip so marked on the rear of the chassis, and a switch on the front panel changes the receiver from ear-phone to loud speaker operation.

The next feature for consideration is the "S" Meter. This is used to judge relative signal levels and also as a tuning indicator. Maximum reading of the meter always indicates that the receiver is in exact tune with the station. The meter is calibrated in "S" units from 1 to 9, and the relative reading on any particular signal can be changed by re-setting the meter control adjustment which is located toward the rear of the chassis. The chassis drawing shows the position of this adjustment. A suggested method of adjusting the meter would be to tune in a signal of moderate strength. If you are accustomed to calling this signal, "S-8" or "S-9," then adjust the meter control so that it indicates that value. This adjustable meter arrangement allows the operator to provide reports consistent with his usual system of reporting. No amount of explaining will teach the operator exactly how to control a receiver. Experience is absolutely necessary in order to obtain best results.

CIRCUIT ARRANGEMENT

TWO-STAGE T.R.F. AMPLIFIER: For maximum sensitivity, high image ratio, and low noise level, the "SP-200" has two stages of tuned radio frequency amplification ahead of the mixer stage. The antenna input circuit is electrostatically shielded from the grid circuit of the first tube. This permits the use of low impedance transmission lines between the antenna and the receiver with a minimum of noise pick-up. When lines or lead-ins of the two wire type having an impedance of approximately 100 ohms are employed, no matching transformer is necessary. The input impedance of the receiver is approximately 112 ohms. The two tuned R.F. stages are employed on all bands covered by the receiver. Both inductive and capacitive trimming are employed in all signal frequency circuits.

OSCILLATOR AND MIXER: Two separate tubes are employed in the oscillator and mixer stages to improve stability and prevent pulling. There is a very respectable gain in the mixer stage which tends to minimize any noise that may be generated in the rest of the receiver. In fact, the gain in this stage is so great that the noise contributed by the following stages is negligible.

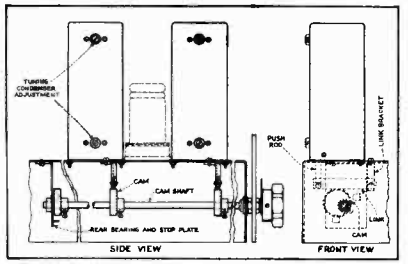


FIG. 1—Band width control which varies selectivity and permits the operator to adjust the receiver for best quality obtainable with minimum interference.

BAND SPREAD: In order to maintain relatively uniform band spread in the various tuning ranges of the receiver, every gang of the band spread condenser is subdivided into three sections. This allows the use of a proper sized condenser for maximum spread regardless of the position of the wave change switch. There are approximately 85 degrees spread for each of the important amateur bands, and there is also a corresponding spread over the other frequencies outside the amateur band.

CRYSTAL FILTER UNIT: The crystal filter used in the "Super-Pro" is an exclusive HAMMARLUND development and will be found only in HAMMARLUND receivers. This new filter has five ranges of selectivity varying from broad for phone reception, to knife-edge selectivity for single signal code reception. There are three positions for voice reception, and two for C.W. telegraph. The output of the filter is relatively constant over the entire selectivity range and has, therefore, little effect on "S" meter readings. Selectivity in the crystal filter circuit is not varied by detuning the load circuit. All circuits remain exactly in tune and selectivity is varied by changing the "Q" of the load circuit. This, together with the balanced phasing condenser, eliminates interlocking of controls and changes in filter gain when the selectivity is varied. Every precaution has been taken to effectively shield all circuits so that there is no feed-back or instability to impair the performance on even the highest frequencies. Stability is further insured by employing isolating resistor networks in every circuit that offers the slightest path for feed-back.

I.F. AMPLIFIER: There are three I.F. amplifier stages in the "SP-200." This elaborate amplifier is required in order to obtain a very high degree of selectivity. Special transformers are employed to hold down the gain per stage in order to maintain a high degree of selectivity and maximum stability. The band width of the I.F. amplifier is controlled by a cam arrangement which varies the coupling in two of the I.F. transformers. The I.F. channel is variable from 16 kc. down to 3 kc. with the crystal filter out of the circuit. The crystal filter, when in the circuit, is variable down to better than 100 cycles. Thus, full range selectivity is available. This wide degree of variable selectivity permits the operator to select the band width providing highest quality reproduction with a minimum of interference. In the "SP-200," the band width can be adjusted to suit operating conditions.

AVC SYSTEM: The automatic volume control system in the "SP-200" is extremely efficient. Both R.F. stages and the first two I.F. stages are automatically controlled by the incoming signal in order to compensate for variation in signal strength due to fading. This system is very fast in operation and will hold a rapidly fading signal to a relatively constant output. Special amplifier and rectifier stages are employed in order to obtain maximum efficiency.

BEAT FREQUENCY OSCILLATOR: The beat frequency oscillator circuit is designed to effectively heterodyne signals of various magnitudes. This oscillator is of the electron coupled type and is thoroughly isolated from the rest of the receiver. Careful selection of circuit values has resulted in excellent stability.

SECOND DETECTOR: A 6H6 connected in a half-wave rectifier circuit is employed for the second detector. The proper selection of circuit values in this circuit has resulted in a minimum of distortion. This circuit is more or less conventional and complete technical details are available by referring to the diagram.

NOISE LIMITER: The noise limiter in the "SP-200" is the latest development in audio peak limiting devices. It is designed to work with or without the AVC system and will follow variations in incoming signal strength. It is automatic and needs no adjustment. The limiter is designed to cut off interference of the automobile ignition nature at a point equal to approximately 100% modulation of the carrier of the signal being received. This provides for reception of 100% modulated signals without seriously affecting the quality of the voice or music. It must be remembered that this limiter will only limit interference of very short pulse duration. Such interference, as caused by auto ignition systems and similar disturbances will be reduced to a negligible quantity.

A.F. AMPLIFIER: The audio frequency channel of the series 200 "Super-Pro," is designed for high quality reproduction. The first stage is a 6C5 triode voltage amplifier. The second stage is a single 6F6 triode connected and used as a driver for the output amplifier which is a pair of 6F6's operated in push-pull, class AB. The rated output of this amplifier is approximately 14 watts. The fine quality of the A.F. amplifier in the "Super Pro" is particularly apparent when the band width control is set in the wide position. There is no tone control in this amplifier and none is needed. The A.F. portion of the "Super-Pro" will respond equally well to both low and high frequencies. Attenuation of the higher frequencies is accomplished by narrowing the I.F. band width. In this manner, the band width control serves to control tone.

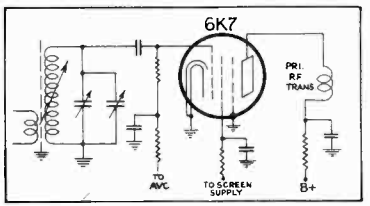


FIG. 2—Circuit diagram of first T.R.F. amplifier showing the electrostatic shield which reduces noise pickup.

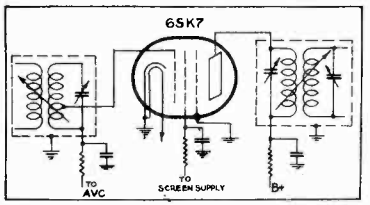


FIG. 3—Typical I.F. amplifier circuit with variable selectivity characteristics. Each circuit has isolating resistor and condenser to assure stability.

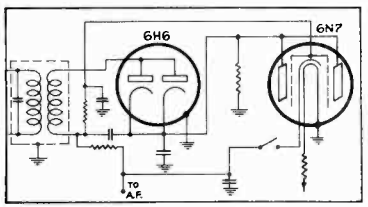


FIG. 4—"Super-Pro" noise limiter designed to reduce automobile ignition interference and other disturbances having similar characteristics.

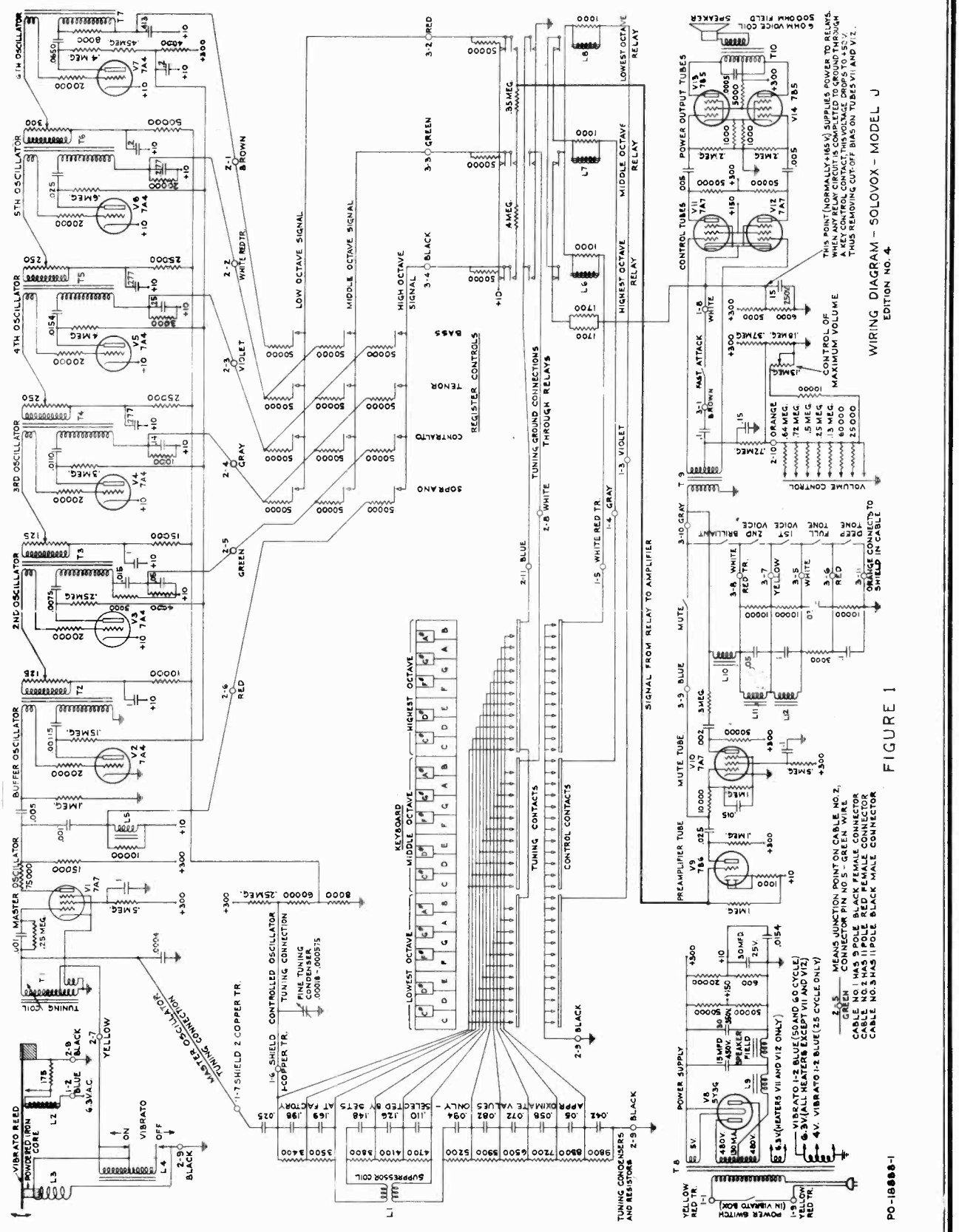
POWER SUPPLY: The power supply for the "SP-200" is an extra heavy duty unit designed to furnish filament plate and grid bias voltages. The power supply is a separate unit connected to the receiver by a flexible cable. Being a separate unit, the power supply introduces a minimum of hum in the receiver and also reduces the overall temperature rise of the receiver, and thus permits better stability. The high voltage rectifier in the power supply is a 5Z3 connected in a full wave circuit with a two-section filter consisting of 32 mf. capacity and a 15 henry filter choke. The field of the speaker serves as a second filter choke in standard model receivers. In special models, a choke is mounted in the power supply to take the place of the speaker field. Grid bias for the entire receiver is supplied by an 80 rectifier tube operating from a tap on the high voltage secondary. The C-Bias supply also has a multi-section filter consisting of three 8 mf. condensers, and three resistors. The primary of the standard power supply has three taps for operation on 105, 115, and 125 volt power lines. A fuse is also provided to guard against damage in cases of overload.

CALIBRATION: The main tuning dial of the "Super-Pro" is calibrated for all frequencies covered by the receiver. In the process of manufacture, every effort is made to maintain accuracy and, as a result, the accuracy of the calibration is guaranteed to be within ½ of 1% of the highest frequency of the band in use. When using the calibrated dial, it should be remembered that the figures are intended as a tuning guide and not for frequency measuring purposes.

"S" METER: The "S" meter in the "Super-Pro" was designed to provide greatest satisfaction to the operator. It is, in no way, limited by fixed, factory-made adjustments. A variable control on the rear of the chassis allows the operator to set the maximum reading of the meter to conform with his particular system of reporting signal strength in "S" numbers. The meter can be adjusted to read "S-9" on any signal from 10 to 10,000 microvolts. It is adjusted at the factory to indicate "S-9" on a 25 microvolt signal, but as pointed out above, this can readily be changed. Another feature is the centrally located scale. This is much more convenient than a scale that starts at the extreme left of the meter dial, and brings the indicating pointer well out in the clear. Special meter design has also eliminated the possibility of damage due to an extremely strong signal.

HAMMOND INSTRUMENT CO.

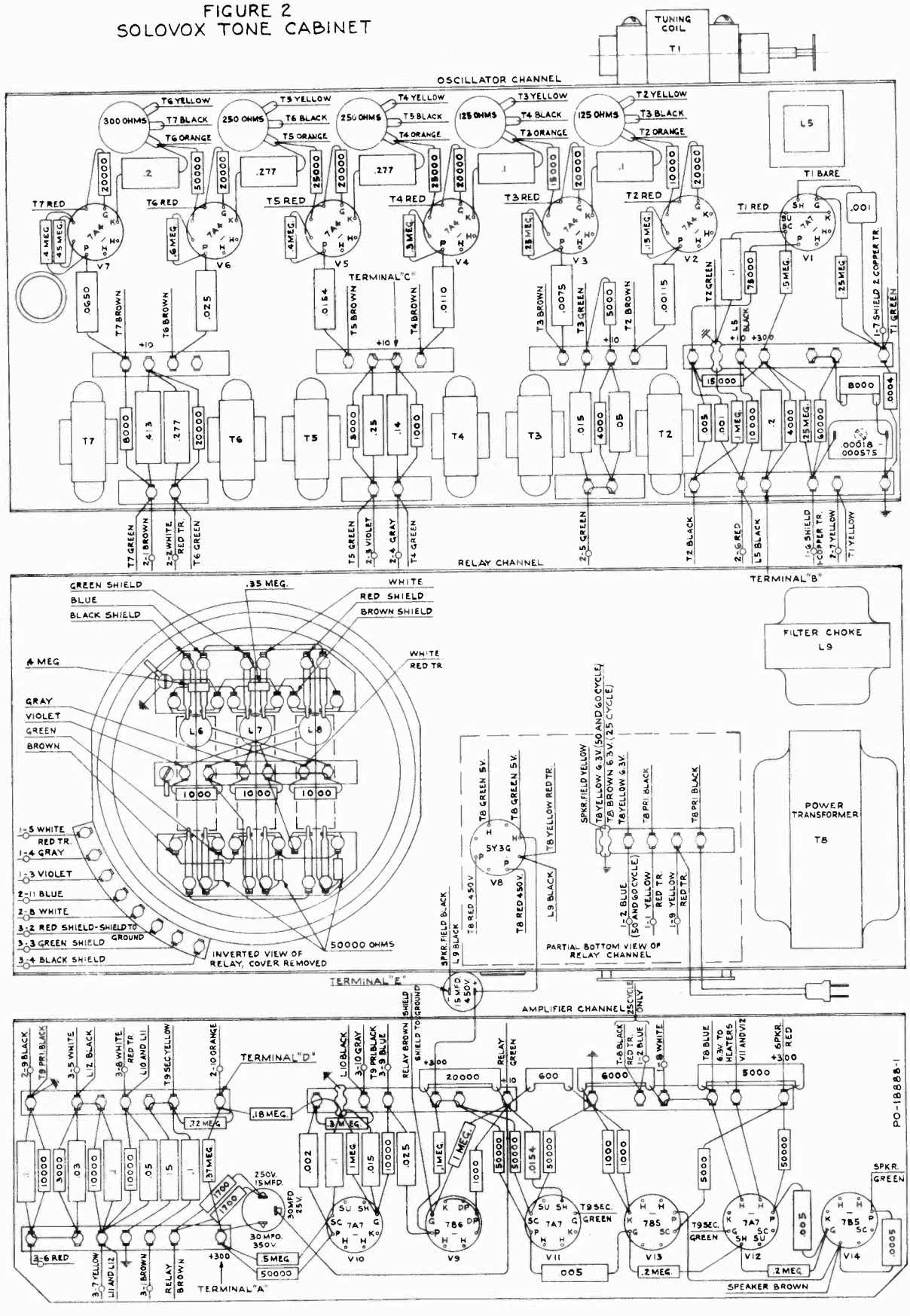
MODEL J
SOLOVOX



MODEL J
SOLOVOX

HAMMOND INSTRUMENT CO.

FIGURE 2
SOLOVOX TONE CABINET



HAMMOND INSTRUMENT CO.

MODEL J
SOLOVOX

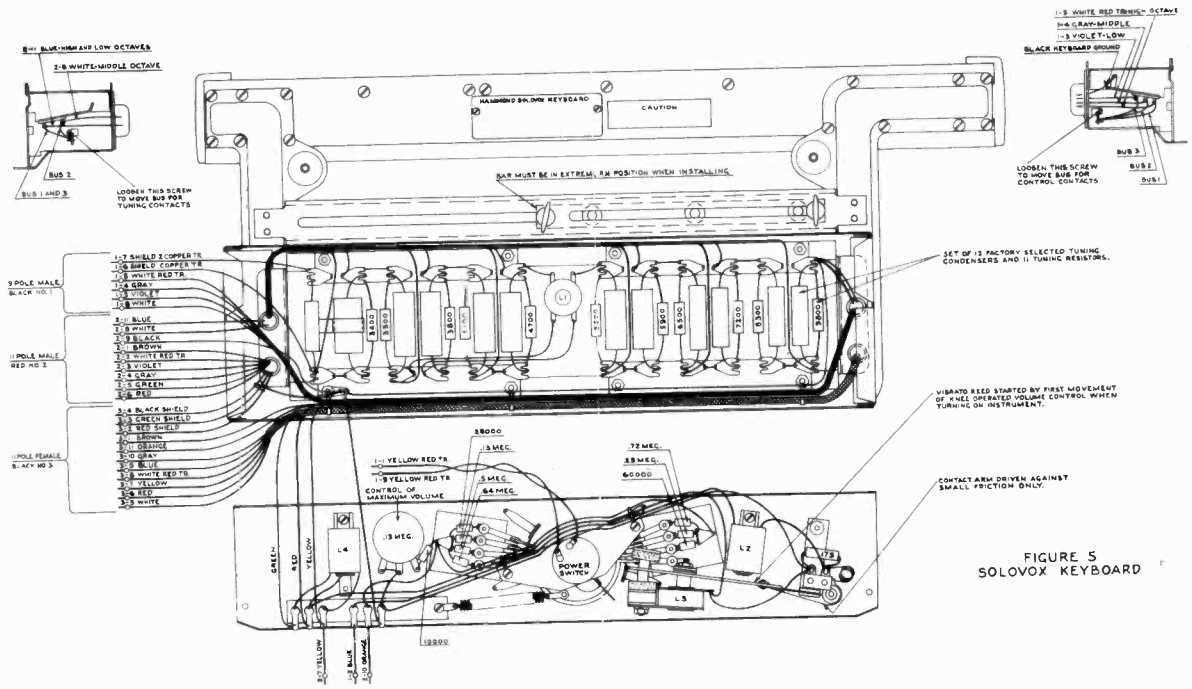


FIGURE 5
SOLOVOX KEYBOARD

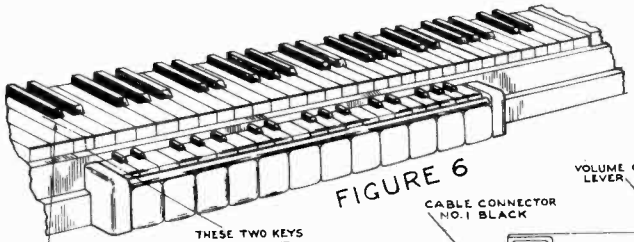
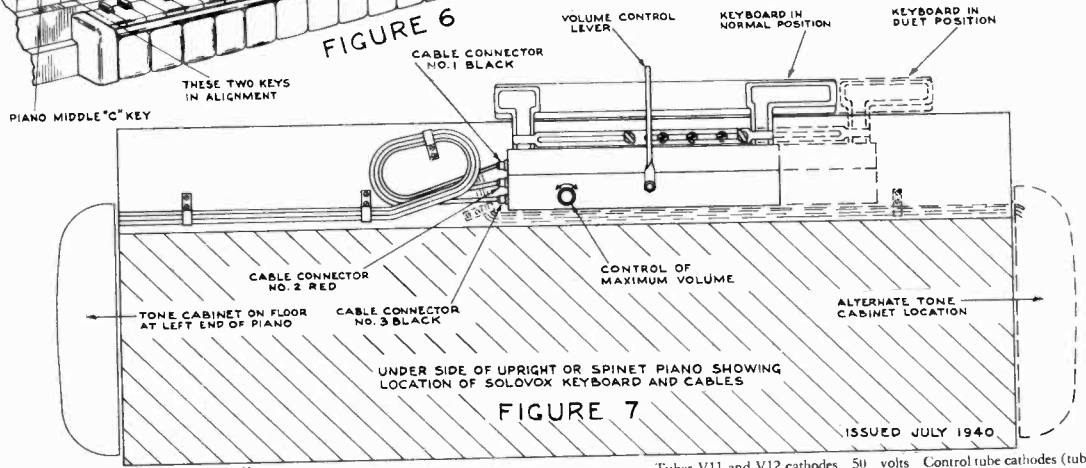


FIGURE 6



UNDER SIDE OF UPRIGHT OR SPINET PIANO SHOWING LOCATION OF SOLOVOX KEYBOARD AND CABLES

FIGURE 7

ISSUED JULY 1940

SOLOVOX TUBE SOCKET VOLTAGES

These readings are taken with a 1000 ohms-per-volt meter, having three scales of 15, 150 and 600 volts. All voltages are taken with a line voltage of 117 and deviations of as much as 20% may be caused by line voltage variations. All controls are off, the volume control is in its softest position, and no key is depressed unless specified. The negative lead of the voltmeter is connected to chassis ground.

Connect Positive Voltmeter Lead to	Meter Should Read		This Shows Voltage of
Terminal A (amplifier channel)	300	volts	Amplifier and master oscillator B +
Terminal B (oscillator channel)	290	volts	Controlled oscillator B +
Terminal C (oscillator channel)	10.5	volts	Controlled oscillator cathodes
Tube V1 plate	135	volts	Master oscillator plate
Tube V1 screen	35	volts	Master oscillator screen
Tube V9 plate	150	volts	Preamplifier plate
Tube V9 cathode	12.5	volts	Preamplifier bias
Tube V10 plate	137	volts	Mute plate
Tube V10 screen	26	volts	Mute screen
Tubes V11 and V12 plates	195	volts	Control tube plates
Tubes V11 and V12 screens	135	volts	Control tube screens
Tubes V11 and V12 cathodes (no key depressed)	170	volts	Control tube cathodes (tubes cut off)
Tubes V11 and V12 cathodes (any key depressed)	50	volts	Control tube cathodes (tubes operating)
Tubes V13 and V14 plates	305	volts	Output tube plates
Tubes V13 and V14 screens	290	volts	Output tube screens
Tubes V13 and V14 cathodes	24	volts	Output tube bias
Terminal D (volume control in softest position)	0	volts	Control tube grids
Terminal D (volume control in loudest position)	35	volts	Control tube grids (voltage will vary depending on setting of maximum volume control)
Terminal E (positive lead connected to ground)	76	volts	Speaker field

A. C. VOLTAGES

Heater voltage to all tubes except V8	=	6.3 volts R.M.S.
Heater tube V8 filament voltage	=	5.0 volts R.M.S.
Rectifier tube V8 filament voltage	=	490 volts R.M.S.
Ground to either plate of rectifier tube		3.5 volts R.M.S.
A.C. Ripple voltage across speaker field		

MODEL J
SOLOVOX

HAMMOND INSTRUMENT CO.

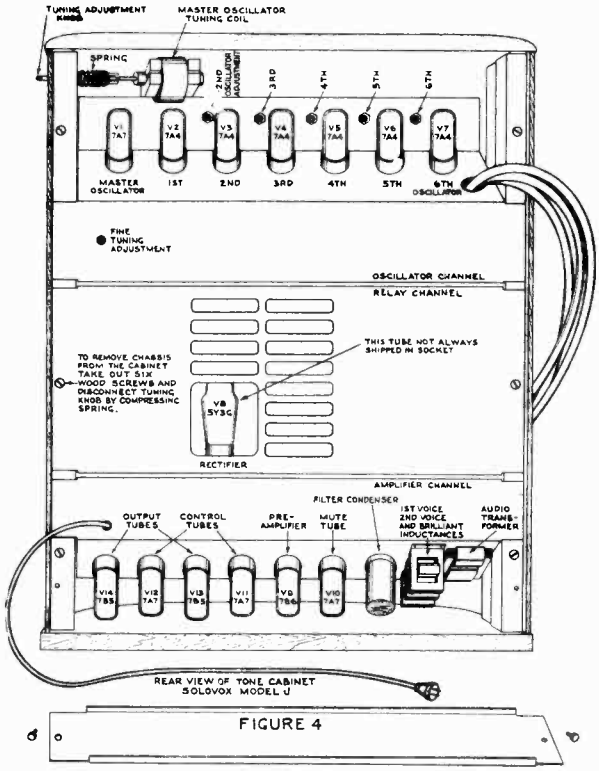


FIGURE 4

Tuning

The Solovox remains in tune indefinitely. However, because of the variation in pitch of the piano or other instrument with which the Solovox is to be played, a tuning adjustment knob has been provided. (The tuning knob, about the size of the end of a pencil, projects through the curved surface of the woodwork near one corner of the tone cabinet.)

Tuning the Solovox is a very simple matter as all of the tones are simultaneously tuned by making this single adjustment. Clockwise turning of the knob lowers the pitch and counter-clockwise turning raises it. For greatest accuracy, only the "CONTRALTO", "VIBRATO OFF" and "DEEP TONE" control tablets should be "in" and the middle octave F, F# or G keys of the Solovox tuned to the corresponding piano notes. (A control tablet is "in" when the top of the tablet is pushed in.)

Some favor tuning the Solovox a little sharper than the piano. We do not recommend too much of this, but in no case should it be at all flat to the piano.

There is another so-called "fine tuning adjustment" in the form of a control on the back of the tone cabinet. We suggest that you leave this alone, unless you want to get into something considerably more complicated, which is described further on in the technical section of this leaflet.

Limit of Tuning

Whereas the turning of the single tuning knob tunes all notes of the Solovox, there is of course a limit which cannot be exceeded before something starts to go wrong with the notes in some octaves. (Notes *"GARGLE,"* or play *exactly* one octave up, or an *exact* musical fifth down.)

A second very simple adjustment will then fix these notes as well, and you will find it easy to make this adjustment, if the occasion should arise, by following the procedure given below, called "Adjustment of Oscillators."

Of course you need not bother with these adjustments unless you hear the *"GARGLE"* or the wrong octave effect.

Adjustment of Oscillators

If some notes are noisy or play the wrong pitch, adjust the oscillators as follows: Push in the "SOPRANO," and "DEEP TONE" controls, with all others off. Tune highest F# to corresponding F# on piano with tuning knob, paying no attention to what other notes do. Notes in the highest octave of the Solovox will now have the same pitch as the top octave of the piano.

Holding down the F# key in the middle octave of the Solovox, place a screwdriver in the "second oscillator adjustment" slot (See Figure 4 on backside of this leaflet) and turn it, first one way and then the other. The instrument will play higher than the right pitch in one direction, and lower in the other, while in the range between it will play an F# note of the same pitch as the second highest F# key on the piano. The pitch can be checked by making sure that there is no sudden jump in pitch between the Solovox middle octave B and the highest octave C. When the proper pitch is determined, find the farthest point in each direction where it will play this note, and place the slot *exactly* midway between these limits.

Holding down the lowest octave Solovox F# key, repeat this procedure with the "third oscillator adjustment." As before, there should be a smooth transition in pitch between the B note of the octave being adjusted, and the C note of the next octave above, which has already been adjusted.

To adjust the fourth oscillator, hold down the lowest octave F# key with only the "CONTRALTO," and "DEEP TONE" controls in. For the fifth oscillator use "TENOR" and "DEEP TONE," and for the sixth oscillator adjustment, use "BASS," and "DEEP TONE," holding the lowest F# key in each case.

Adjustment of Maximum Volume Control Knob

The maximum volume obtainable is controlled by a knob located under the keyboard to the left of the volume control, and regulates the maximum loudness when the knee-operated lever is all the way to the right. With the lever in this position the knob may be turned by the player to suit himself.

To determine where to set this knob, first set the controls to some useful setting such as "TENOR" and "DEEP TONE." Now move the knee-operated volume control as far as it will go to the right, hold down some key such as middle C, and turn the maximum volume control knob to the right until the volume becomes as loud as is useful. Do not turn the knob to the right any farther as to do so will only mean that the knee-operated volume control will become unnecessarily sensitive which is particularly undesirable for the novice and beginner.

When playing in large halls, or with other instruments, it may be found advantageous to increase this maximum volume very materially. Under these conditions, when a very loud tone is played, the quality will become very bright. This increase in brilliance produces many novel tone qualities which are useful under conditions where a loud piercing tone is desirable.

HOW THE SOLOVOX WORKS

All of the notes of the Solovox are controlled by a single radio vacuum tube master oscillator operating at the audio frequencies of the highest octave of the instrument (2093-3951 c.p.s.). Each time a key is depressed, a switch under it tunes this master oscillator to the pitch associated with the key in this highest octave range. Thus, whenever a "C" key is depressed (the tuning key contacts for all the "C's" are in parallel), this oscillator is tuned to 2093 c.p.s., which is its lowest frequency. If a "B" note is depressed the frequency will be 3951 c.p.s., which is its highest frequency.

The output of this master oscillator controls the frequency of a first controlled oscillator (called the "buffer oscillator") which is adjusted to operate at the same frequency as the master oscillator. The output of this buffer oscillator, in turn, controls the frequency of the second controlled oscillator so adjusted to oscillate at one-half the frequency of the first oscillator. This new frequency corresponds to a note of pitch one octave lower than the buffer oscillator.

Similar cascaded oscillators provide pitches of two, three, four and five octaves below that of the buffer oscillator. In this way, each time the master oscillator is tuned to some given note, each of these six controlled oscillators produces a note which is in exact octave relation to the master, thus forming a series of six notes in exact octave relationships. The particular oscillator selected for sounding through an amplifier and speaker depends upon the particular playing key depressed, and also upon which of the BASS, TENOR, CONTRALTO or SOPRANO controls are used. A second contact under each key operates an electrical relay, having contacts to select the desired oscillator.

There are three relays—one for each of the three octaves of keys. A further function of the second key contact is to transmit the signal to the speaker with a controlled rate of attack so as not to be musically abrupt. Tuned electrical circuits and tone controls similar to radio tone controls alter the quality of tone over a wide range.

HAMMOND INSTRUMENT CO.

MODEL J
SOLOVOX

The Oscillators

All the tones of the Solovox are controlled by a single vacuum tube oscillator called the "MASTER OSCILLATOR" (V1, Figure 1). This oscillator operates at any one of the twelve audio frequencies comprising the twelve notes of the highest octave range of the instrument (2093 cycles to 3951 cycles). Each time a key is depressed, a contact under it closes to tune this oscillator to the pitch associated with that key. For instance, whenever any C key is depressed (there are three C keys on the keyboard), this master oscillator is tuned to 2093 cycles, its lowest frequency. If, on the other hand, any one of the three B keys is depressed, the master oscillator will operate at 3951 cycles, its highest frequency.
If, on the other hand, any one of the three B keys is depressed, the master oscillator will operate at 3951 cycles, its highest frequency.

The condensers which tune the master oscillator are shown at the left of Figure 1, and are located in the vibrato box fastened to the Solovox keyboard.

The output of this master oscillator controls the frequency of the first controlled oscillator, called the "BUFFER OSCILLATOR" (V2, Figure 1), which operates at the same frequency as the master oscillator.

Following this buffer oscillator is the SECOND CONTROLLED OSCILLATOR, whose frequency is tuned to approximately one-half that of the frequency of the buffer oscillator. Furthermore, its frequency is stabilized to be exactly one-half that of the buffer oscillator by applying a "locking" signal from the buffer oscillator to its grid circuit. The amount of this locking signal is regulated by a potentiometer. Thus, the output frequency of the second controlled oscillator is an octave lower in pitch than the master oscillator.

Similarly, the third, fourth, fifth and sixth CONTROLLED OSCILLATORS provide respective outputs of exactly two, three, four and five octaves lower in pitch than that of the master oscillator. A potentiometer associated with each provides the correct amount of locking signal. It is to be noted that these controlled oscillators (being of the relaxation type), are readily tuned by altering their grid bias. It is the function of the tuning resistors in parallel with the tuning condensers to apply the appropriate grid bias to tune all of the controlled oscillators simultaneously to their approximate sub-octave frequencies. The amount of bias varies, depending upon which tuning contact is connected by a playing key, and the frequencies of the controlled oscillators shift correspondingly.

When no key is depressed, all the oscillators operate at their highest pitches ("B" notes). Thus, whenever a key other than "B" is depressed, all oscillators shift simultaneously from their "B" frequencies to the frequencies corresponding to the key depressed. *The tuning condensers accurately tune the master oscillator, and the tuning resistors tune the controlled oscillators. By interconnecting the controlled oscillators in*

Register Controls and Relays

From the above, we see that whenever any one of the three G# keys, for instance, is depressed, the oscillators are tuned to provide a series of G# notes in exact octave relations. The selection of the particular oscillator output to sound through the speaker is determined by a second contact under each of the playing keys. This second contact is called the CONTROL CONTACT. There are three relays connected to the control contacts—one relay is operated any time a key in the lowest octave of playing keys is depressed, another relay for the middle octave of playing keys, and a third relay for the highest octave of playing keys.

Also, whenever a control contact is closed, a cutoff bias is removed from push-pull control tubes V11 and V12, causing them to transmit the signal with a smooth rate of tonal attack to the power output tubes and speaker. This function of the control tubes will be explained subsequently.

Each of the three relays has a contact to connect the grid of the preamplifier tube V9 to the desired oscillator through the register controls ("BASS-TENOR-CONTRALTO-SOPRANO"). For example, if we push in the "SOPRANO" control and depress the G key in the middle of the keyboard, the tuning contact will tune all the oscillators to the G notes of the respective octaves, and the control contact will operate the middle octave relay. This relay completes a circuit from the output of the second controlled oscillator, whose wire is numbered 2-5, through a 50,000 ohm register control resistor to the middle octave relay contact, and then to the preamplifier tube V9. Thus, the register controls function to shift the pitch range of the Solovox keyboard as a whole to four different positions. By simultaneously depressing two or more of these controls, a composite tone will be heard, consisting of the outputs of several oscillators simultaneously sounding in their octave relations to each other.

Other contacts associated with each of the relays serve to prevent undesirable tones from occurring when two keys are simultaneously depressed in adjoining octave groups through a legato style of playing on the part of the musician. If two keys are depressed within one of the three octave groups, the lowest pitched of the two will be automatically selected for sounding through the speaker.

The "Mute"

The signal from the plate of the preamplifier tube V9 is fed to the grid of the "MUTE" tube. This tube operates nonlinearly to suppress the sharp curvature of the input signal wave form, and thus renders the tone more mellow. When this muted effect is not desired, the mute switch is used to by-pass this portion of the circuit.

"Deep Tone," "Full Tone," "First Voice," "Second Voice" and "Brilliant" Controls

Following the "mute" is a series of tone controlling circuits arranged to alter the frequency characteristic of the amplifier in a manner similar to radio tone controls. For instance, with "DEEP TONE" the signal develops across a condenser which emphasizes the low frequencies; with "FULL TONE" the signal develops across a resistor with a small condenser in shunt, which leaves the frequency characteristic essentially flat except for the very high frequencies; "FIRST VOICE" puts a resonance in the 500 cycle zone; "SECOND VOICE" puts a resonance near 1000 cycles; and with "BRILLIANT" the signal develops across an inductance, L10, emphasizing the higher frequencies. It is to be noted that these tone control circuits are connected in series, and may be used singly or in groups.

Control Tubes V11 and V12

As mentioned before, the control contacts under the playing keys serve to remove the cutoff bias from control tubes V11 and V12, as well as to operate one of the three relays. This is explained by considering that the cathodes of tubes V11 and V12 are connected to the mid-point of the voltage divider shown to the left of the control tubes in Figure 1. When no playing key is down, this voltage is about 165 volts positive with respect to ground, and, therefore, these tubes are cut off. When any playing key control contact is closed, the resistance of the relay coil is put in parallel with the 6000 ohm resistor and this causes the cathode voltage to drop to 50 volts. This removes the cutoff bias from tubes V11 and V12, which are of the remote cutoff type. The 16 mfd. condenser across the 6000 ohm resistor serves to make the tonal attack and decay rate smooth. A .1 mfd. condenser connected between the control tube cathodes and the center tap of transformer T9 produces a slow rate of attack but can be disconnected if desired by operating the "fast attack" switch.

Volume Control

The volume of the Solovox is controlled by a knee-operated rheostat. This rheostat is actually a switch connected to seven fixed resistors, and is, therefore, not subject to wear as is the usual type of volume control. This rheostat forms part of a voltage divider circuit which varies the grid bias to the remote cutoff control tubes V11 and V12, and, therefore, changes the gain of these tubes to produce a corresponding change of volume in sound from the speaker. The grid potential varies from approximately +45 volts at the maximum volume position (depending on setting of maximum volume control), to ground potential at the minimum position.

The Vibrato

The vibrato effect is produced by means of a magnetically driven reed having a small piece of powdered iron attached to it in such a way as to vibrate in and out of a coil placed beside the reed. Thus, the inductance of the coil varies periodically as the powdered iron core swings in and out of it. This coil is connected to a tap on the master oscillator tuning coil, and causes the oscillator frequency to vary, producing a vibrato effect. This reed is caused to swing when the volume control lever is pulled forward in starting the instrument. After the reed is once started, the magnetic drive keeps it in motion as long as the instrument is on.

Tuning

The Solovox, as a whole, is tuned by adjusting the frequency of the master oscillator. The tuning knob accomplishes this by moving a powdered iron core in and out of inductance L1.

Power Output Tubes

V13 and V14 are power output pentodes connected in the usual push-pull manner to drive the loud speaker. The speaker field functions as a choke coil in the power supply system.

Power Supply

The power supply of the Solovox uses a single rectifier tube V8.

Note that control tubes V11 and V12 have a separate heater winding on power transformer T8. This prevents an appreciable difference in potential from arising between the heaters and cathodes of control tubes V11 and V12.

MODEL J
SOLOVOX

HAMMOND INSTRUMENT CO.

PRACTICAL SERVICE SUGGESTIONS

The materials and electrical parts in the Hammond Solovox are of the finest quality available. Aside from occasional replacement of a vacuum tube, no service problems need be expected to arise. A few conditions which might possibly be encountered are listed below with information which will enable a radio service technician to correct them without difficulty. Some additional information useful to the service technician is in the first section entitled "TUNING AND SIMPLE ADJUSTMENTS."

If any of the following conditions appear, first make sure that the three cable connectors in the left end of the keyboard under the piano are secure. The faces of the plugs and their receptacles should be together. If the Solovox does not play properly, this is the most likely cause.

1. *Changing tubes*—There are fourteen tubes in the Solovox: Six type 7A4, four type 7A7, two type 7B5, one type 7B6, and one type 5Y3G. These are all standard radio tubes, and can be tested and replaced, if necessary, by any radio dealer. All tubes can be reached from the back of the tone cabinet. A metal guard covering the lower row of tubes is easily removed by taking out two screws—see Fig. 4. Be sure to replace all tubes in the exact sockets from which they came.

If any of the 7A4 tubes are replaced, the oscillators should be readjusted as described under "Adjustment of Oscillators," Page 2.

The two type 7A7 control tubes (V11 and V12, located in the amplifier channel, Fig. 4) should be matched to avoid undesirable thumps when keying. It is therefore recommended that both be replaced at the same time with new tubes of the same make.

2. *Some notes are noisy or play the wrong pitch.* If a note is noisy, it may be due to (A) a faulty oscillator adjustment, (B) a faulty relay contact, or (C) a faulty key contact. To ascertain which of these is the cause, follow this procedure:

(A) If the trouble lies in a faulty oscillator adjustment, the corresponding note one octave lower in pitch will also be noisy because it is controlled by the higher oscillator. If, on the other hand, the lower note is not noisy, it indicates that the oscillator adjustment is satisfactory. In the event that readjustment is necessary, check as described in "TUNING AND SIMPLE ADJUSTMENTS." If any notes still do not play correctly, replace the 7A4 tube associated with the highest pitched oscillator that fails to operate properly on any note. The following chart will be helpful in finding the oscillator associated with notes of any particular octave.

	Lowest Octave of Playing Keys	Middle Octave of Playing Keys	Highest Octave of Playing Keys
"BASS" Control Connects to	6th Osc.	5th Osc.	4th Osc.
"TENOR" Control Connects to	5th Osc.	4th Osc.	3rd Osc.
"CONTRALTO" Control Connects to	4th Osc.	3rd Osc.	2nd Osc.
"SOPRANO" Control Connects to	3rd Osc.	2nd Osc.	Master Osc.

After the tube has been replaced, reset the oscillator adjustment potentiometers—see page 2, "Adjustment of Oscillators."

(B) If the trouble lies in a faulty relay contact, it will be present on all 12 keys of one of the octave groups and will persist on these 12 keys regardless of the combination of playing controls used. All contacts used are of precious material so that in all probability a particle of lint has lodged between the contacts which may be easily cleared by lifting and wiping the contact. Note that the relays are accessible without disconnecting any wires, it merely being necessary to first remove the two large nuts which hold the relay assembly to the tone cabinet frame work. After removing these two nuts, turn over the assembly and remove the four screws which hold the cover plate. After removing the cover plate, all contacts will be readily accessible.

(C) If the trouble lies in a faulty key contact, trouble will be present, of course, only on one note. In this case, move the bus bar shifters as described in the following suggestions numbered "6" and "7".

3. *Instrument fails to play.* Ordinarily the first thing to do in this case is to test all the tubes. If the tubes are lighted, the cable plugs are making proper connection, and the controls are in playing position, the most likely source of trouble is in the amplifier circuit. In most respects this is a conventional amplifier circuit, and the voltage measurements given on page 13 will enable a radio service technician to locate the trouble.

4. *Key thumps or clicks.* If a transient effect in the form of an annoying thump appears each time a key is released, the two type 7A7 control tubes (V11 and V12) are probably not matched properly. In this case, install two new tubes of the same make. A loud click each time a key is released indicates that the control tube cathode condenser is probably open, or partially open.

5. *Hum.* An excessive 120 cycle hum in the speaker indicates that the filter choke (L9) is defective, or one of the filter condensers is open.

6. *One key does not sound.* If a certain key fails to play on any of the register controls, it probably has a dirty control contact which can be cleared easily by shifting the control contact bus-bar whose adjustment is at the right end of the keyboard. To reach the bus-bar shifters, first remove the two molded bakelite end pieces. A drawing accompanying the keyboard (Figure 5), shows how the contact shifters are arranged. Loosen the clamping screw and shift the bus-bar about 1/32". Be sure to tighten the clamping screw carefully.

7. *One key plays note "B" instead of its correct pitch (with adjacent keys playing correctly).* If this occurs, the key under question has a dirty tuning contact which can be cleared easily by shifting the tuning contact bus-bar having adjustment at the left end of the keyboard. This is reached as described in the preceding paragraph.

8. *One octave of notes fails to play.* If a single octave of the Solovox keyboard fails to play for any combination of the register controls, the trouble is probably in the relay associated with that octave or a wire leading to it. Check voltage at the relay coil and the control tube cathodes (V10 and V11).

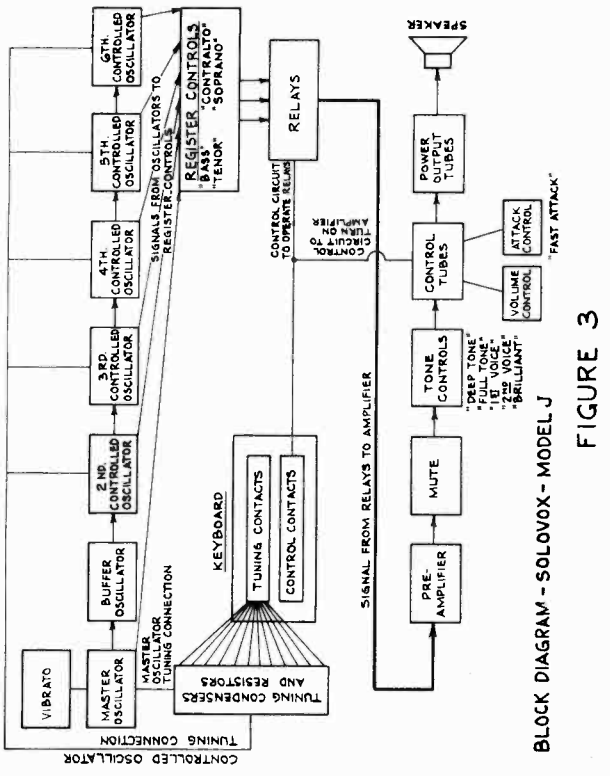
9. *Adjustment of Master Oscillator Fine Tuning Condenser.* An additional tuning adjustment is provided in the form of a screw driver operated trimming condenser at the back of the tone cabinet, upper left hand corner (See Fig. 4). After several years of use under very adverse conditions of humidity, or if an exceedingly accurate tuning is required, this adjustment may need to be made. First, however, always tune as described on page 1. If, after tuning F, F= or G, it is found that other notes (most likely C or B) are out of tune, the tuning breadth of the octave may be readjusted as follows:

(a) Depress the middle "C" key with the "VIBRATO OFF," "CONTRALTO," and "DEEP TONE" controls pushed in. Tune to zero beat, preferably with a Hammond Organ, or piano which has just been tuned. In tuning this "C," use the tuning knob of the tone cabinet. If it is found impossible to tune the "C" with the tuning knob, the two wood screws at the top of the tuner may be loosened, and the black bakelite tube moved to a position in the tuning coil such that the range of the tuning knob does cover the correct "C" pitch. Before making this adjustment, be sure the "VIBRATO" switch tablet is not set midway between its on and off positions. For tuning purposes, the "VIBRATO" tablet should be pushed in at the top of the tablet.

(b) After tuning the "C" key with the tuning knob, depress a "B" key and tune to zero beat with the screw driver operated trimming condenser located in back of the tone cabinet, see Fig. 4. The instrument will now be exceedingly accurately tuned.

DIRECTIONS FOR CONNECTING ADDITIONAL AMPLIFIERS TO SOLOVOX

When the Solovox is used in large auditoriums or with a large orchestra, additional amplifiers may be connected across the Solovox voice coil terminals which are accessible for this purpose on the speaker framework. Standard Hammond Organ Tone Cabinets are recommended as they may be connected with no changes necessary other than securing a push-pull ground with two 200 ohm resistors connected to the Solovox voice coil terminals and their junction point used as a ground for the Hammond Organ Tone Cabinet. By locating the resistors in the Hammond Organ Tone Cabinet, it is only necessary to run two wires (they need not be shielded and may be as long as 200 feet) to the extra tone cabinet.



BLOCK DIAGRAM - SOLOVOX - MODEL J

FIGURE 3

HOWARD RADIO CO.

MODELS 302R, 302RA
302RT (Late)

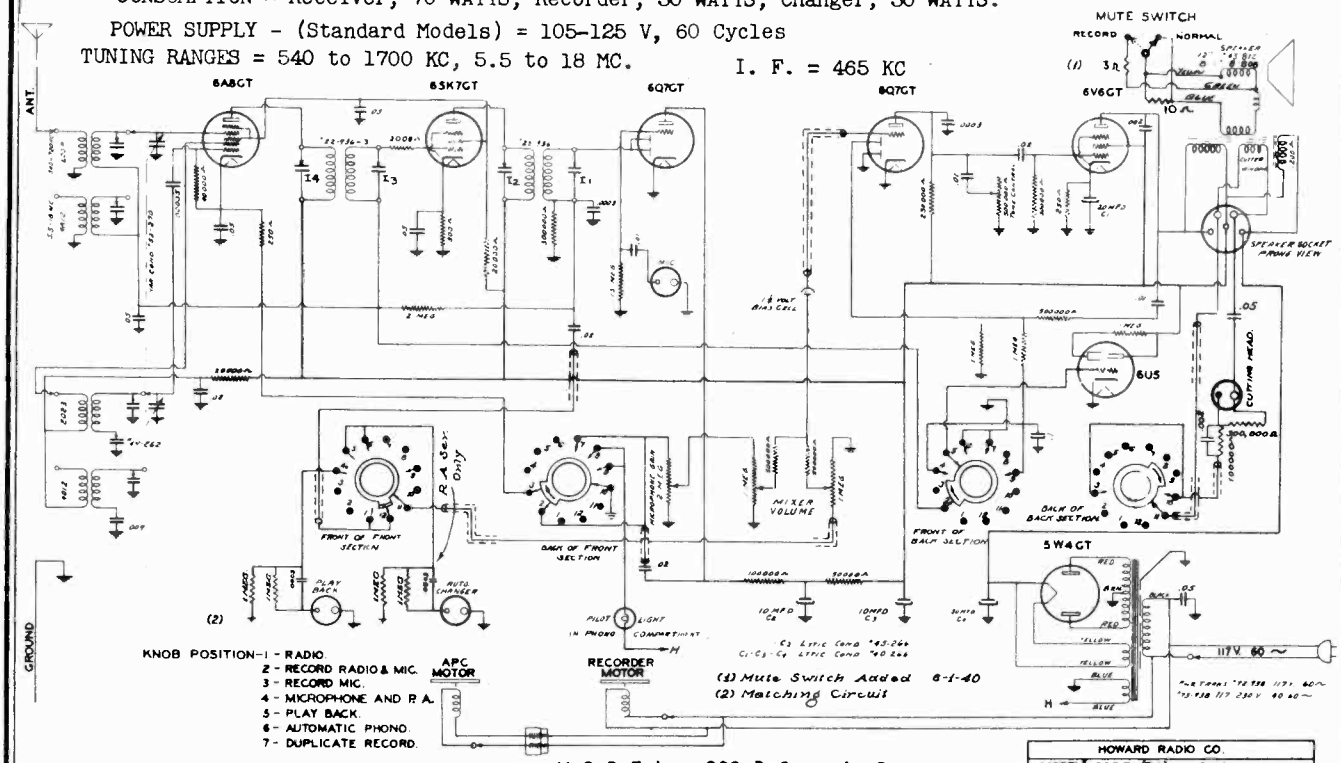
ANTENNA SYSTEM = Built-in loop with available connection from outside antenna. On short wave band, outside antenna required. BROWN lead to antenna, and BLACK lead to ground.

TYPE = Conventional | POWER OUTPUT - (MAX.) = 6 Watts; UPO = 4 Watts

CONSUMPTION - Receiver, 70 WATTS; Recorder, 30 WATTS; Changer, 30 WATTS.

POWER SUPPLY - (Standard Models) = 105-125 V, 60 Cycles

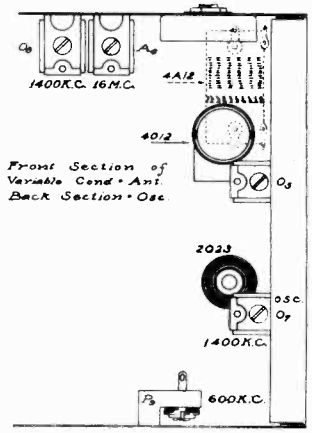
TUNING RANGES = 540 to 1700 KC, 5.5 to 18 MC. I. F. = 465 KC



KNOB POSITION-
1 - RADIO.
2 - RECORD RADIO & MIC.
3 - RECORD MIC.
4 - MICROPHONE AND P.A.
5 - PLAY BACK.
6 - AUTOMATIC PHONO.
7 - DUPLICATE RECORD.

HOWARD RADIO CO.		
MODEL 302 R (RA)		302 RT
DWG. NO. C71-715		2-21-40
DWN. BY.	CHCKD. BY.	APPVD. BY.
R.B.M.		JFR

M O D E L - 302-R Console Recorder
302-RT Table Model Recorder
302-RA Console Recorder with Automatic Record Changer



ALIGNMENT PROCEDURE

Wave-Band Switch position	Position of Dial Pointer	Signal Generator Frequency	Signal Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
BC	540	465 KC	Grid of 6A8GT	A,D	I_1, I_2, I_3, I_4	IF
SW	16 MC	16 MC	Brown Ant. lead	B,E	O_5, A_6	Osc. Ant.
BC	1400 KC	1400 KC	Brown Ant. lead		O_7, A_8	Osc. Ant.
BC	600 KC	600 KC	Brown Ant. lead	C	P_9	Osc. Pad.

A- Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I. F. trimmers are reached through the two holes on the top of each I.F. can.

B- When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 16 MC, then a weaker image will be heard at 15,070 KC, in other words 930 KC less on the dial.

C- When adjusting this pad, move the tuning hand back and forth and adjust padder until the peak of greatest intensity is obtained.

D- See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.

E- Check for oscillator cross-over between 16 and 18 MC. If necessary for stability, turn the antenna trimmer "IN" slightly.

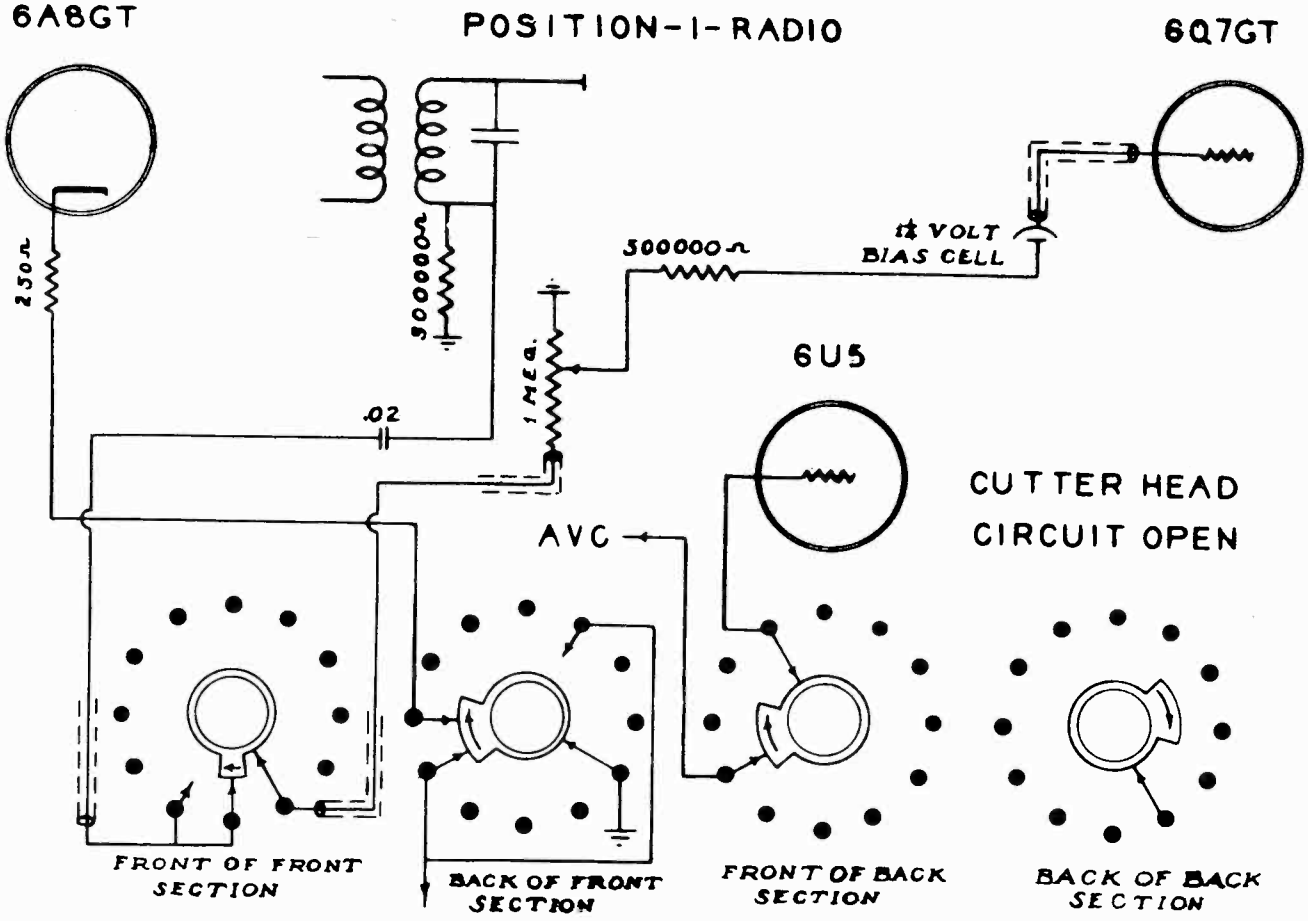
SOCKET VOLTAGE READINGS:

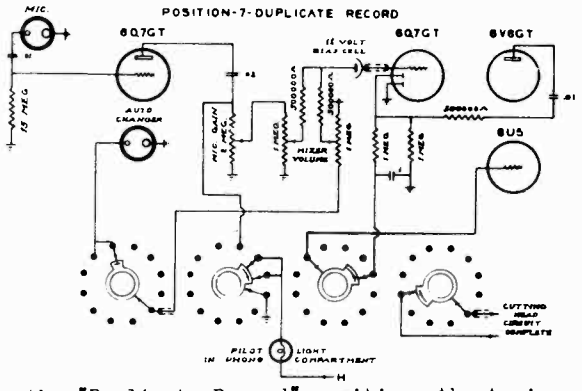
TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE	OSC. PLATE
6A8GT	Mixer	3	95	225	140
6SK7GT	I.F. Amp	3	95	225	
6Q7GT	Diode & Mic. Gain			90	
6Q7GT	Audio			75	

TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE
6U5	Tunning & level cont.			220
6V6GT	Output	12	230	220
5W4GT	Rect.			

MODELS 302R, 302RA
302RT (Late)
MODELS 568R, 568RA

HOWARD RADIO CO.



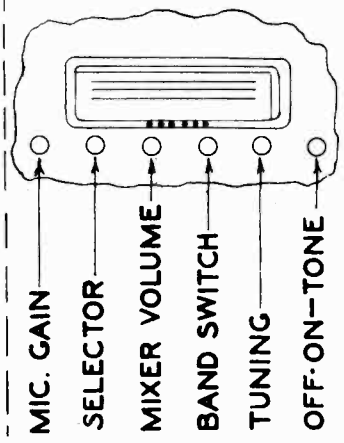


In the "Duplicate Record" position, the tuning-eye is again in the circuit, for indication of proper cutting level, the cutting head circuit is complete, and the duplication is made from the original blank in position on the automatic turntable. The microphone is in use for another superimposed registration if desired.

With our automatic record changer models when duplicating from a small 6½" record, due to the fact that this record, having a small surface, is liable to slip on the turntable, we have provided a spring finger that slips over the spindle that locks this record in place.

All chassis models have the input socket for the automatic changer pick-up, or if the model is not equipped with the automatic changer, a conventional turntable and crystal pick-up may be plugged into this socket and the duplication of the record can be accomplished.

CONTROL LAYOUT FOR 568R [RA] SERIES



THE MASTER SWITCH with which these features are selected, has seven positions as follows:

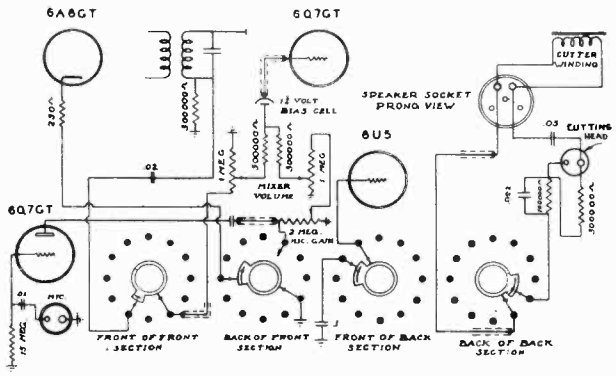
1. Radio
2. Record Radio & Microphone
3. Record Mic.
4. Microphone for P.A. System
5. Play-back
6. Automatic Phono
7. Duplicate Record

AUTOMATIC RECORD CHANGER WITH RA SERIES: USE ALSO FOR PLAYING RECORDS WHILE THEY ARE BEING DUPLICATED BY CUTTING ARM

HOWARD RADIO CO.

MODELS 302R, 302RA
302RT (Late)
MODELS 568R, 568RA

POSITION-2-RECORD RADIO & MIC



In the "Record-Radio & Mic." position, the radio circuit remains the same as in "Radio" position. The microphone circuit becomes effective as the short is removed from the Mic. Gain Control. The The percentage of radio and/or microphone is then controlled with the dual control feeding the 6Q7GT Audio and the Mic. Gain Control.

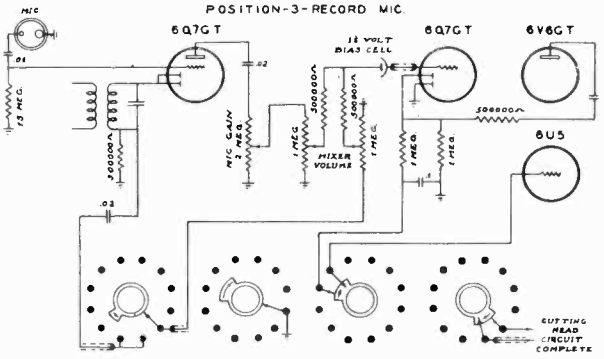
The 6U5 now becomes the visual amplitude indicator of the recording voltage. The voltage is taken from the output plate (6V6), rectified and applied to the grid of the 6U5.

The cutter head circuit is completed.

THE PROPER VOLTAGE LEVEL FOR THE CUTTING OPERATION IS VERY IMPORTANT. TOO HIGH A LEVEL AS INDICATED BY THE CONTINUOUSLY OVERLAPPING OF THE TUNING-EYE RESULTS NOT ONLY IN FEED-BACK, BUT ACTUAL OVERCUTTING OF THE RECORD, RESULTING IN DISTORTION. HOWEVER, IT SEEMS THAT THE GENERAL PRACTICE IS FOR THE OPERATOR TO MORE OFTEN "UNDERCUT" THE RECORDING BY NOT PROVIDING SUFFICIENT CUTTING VOLTAGE. THIS RESULTS IN A HIGH BACKGROUND LEVEL AND POOR QUALITY.

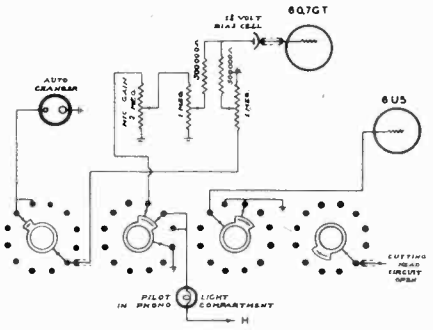
The series condenser (.002) in one side of the cutting head circuit is a controlling compensator for high response when recording. Increasing the value of this condenser will increase the high frequency effect in recording.

POSITION-3-RECORD MIC.



In the "Record Mic." position, the radio diode circuit is opened, the bias circuit is opened at the mixer tube, cutting out the radio, and cutting head circuit is closed.

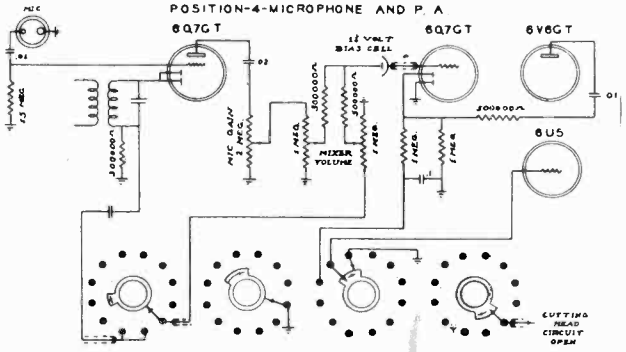
POSITION-6-AUTOMATIC PHONO



With the Howard "RA" Series, the automatic changer is included. With the switch in this position the audio system remains the same as in "Play-Back" position, except the pick-up arm of the changer is in use.

A pilot light is switched on over the changer unit when switch is in this position.

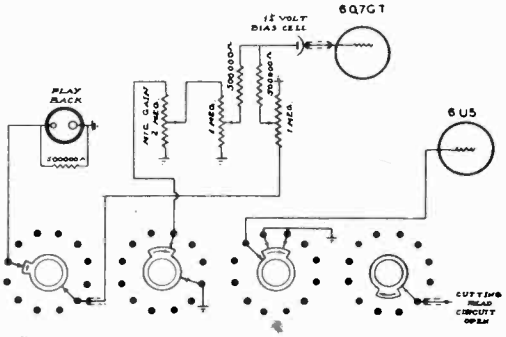
POSITION-4-MICROPHONE AND P. A.



In the "Mic. P.A." position, only the microphone is in the circuit. An additional microphone extension is usually used with the microphone at a remote point, using the receiver as a public address system.

As shown in the above diagram, the tuning-eye becomes inactive.

POSITION-5-PLAY BACK



In the "Play-Back" position the pick-up connects to one section of the dual volume control from which the audio output is regulated in the conventional manner.

The resistor directly in shunt with the play-back or pick-up circuit is a compensator controlling the low frequency response at "Play-Back" position. Decreasing this value will decrease the low response.

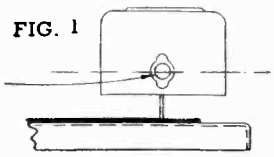
MODELS 302R,302RA
302RT (Late)
MODELS 568R,568RA

HOWARD RADIO CO.

GENERAL ADJUSTMENTS ON RECORDER MECHANISM.

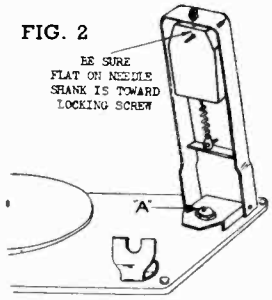
CUTTING HEAD POSITIONING ADJUSTMENT

FIG. 1



The cutting head position has been adjusted properly at the factory, using HOWARD Home Recording Blanks. However, check this adjustment by noticing if the Cutting Needle Locking Screw will locate itself in the Vertical Center of the clearance slot (See Fig. 1), when the record is being cut.

FIG. 2

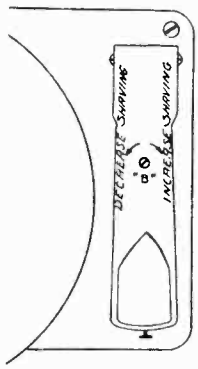


When necessary to change the position of this screw in the slot, loosen locking nut (See Fig. 2) and turn screw "A" to RIGHT to raise needle locking screw; or turn to LEFT to lower.

After any adjustment is completed, be sure to tighten locking nut.

CUTTING NEEDLE PRESSURE ADJUSTMENT

FIG. 3



For quality recordings, it is of vital importance that the right amount of pressure is obtained with the cutting needle. Observe the character of the shaving as the record is being cut. The size of the shaving should be about the size of a human hair (approx. .003"). If it is too heavy, the groove in the record may be too close to the adjacent groove which would cause distortion. If the shaving appears to be too fine and "kinky", an insufficient pattern will be cut with distortion as a result.

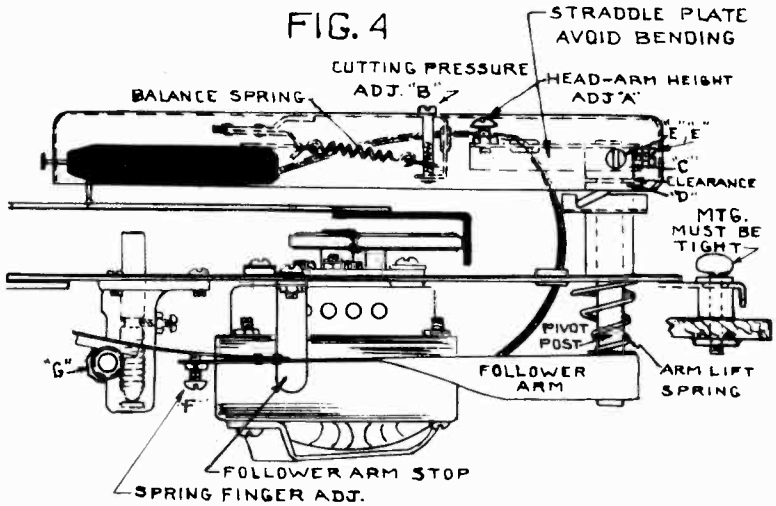
Before making any change in the amount of pressure, FIRST BE SURE THE CUTTING NEEDLE ITSELF IS NOT DEFECTIVE, LOOSE OR MOUNTED WRONG, since the conditions as mentioned above due to improper pressure can also be caused by a defective needle. Check needle first.

When necessary to INCREASE thickness of shaving thread (See Fig. 3) TURN CUTTING PRESSURE adjustment "B" to the right. TO DECREASE thickness of shaving thread, turn adjustment to the left.

THE CORRECT HEIGHT OF FOLLOWER ARM IN RELATION TO THE CUTTER ARM is obtained by seeing that the pivot post (which is a fixed part of the follower arm) is flush with the bushing on the top side of the arm platform. See Fig. 4. Also see that there is a small clearance between the pivot post bushings "C" and "D" when the cutting arm is lowered to the cutting position. The two hex. head screws "E" - "E" permits both this adjustment and at the same time the very important FOLLOWER ARM ADJUSTMENT IN RELATION TO THE SWING OF THE CUTTERARM as follows: When the follower arm touches the follower arm stop, the cutting stylus should be just outside the edge of the paper label on the Howard Record blanks.

THE BRONZE SPRING ADJUSTMENT ON THE FOLLOWER ARM. When the cutting arm is in cutting position, the bronze spring tongue should seat firmly into the bottom of the spiral groove of the lateral feed screw. This pressure should be great enough so that there will be no tendency of the knife edge tongue to climb out of the thread causing uneven grooves and distortion. However, too much pressure is to be avoided. The screw "F" controls this tension, and if the spring lifts itself away from the tip of this screw in the cutting position, it indicates too much pressure. This may also be caused by the follower arm being too low or bent downward for some reason.

FIG. 4



END PLAY ADJUSTMENT OF LATERAL FEED SCREW. Loosen locking nut for screw "G"; turn screw slowly to right until the end play cannot be felt; reverse screw slightly to left to allow running clearance,and tighten lock nut.

AUDIO FEED-BACK is controlled by placing Selector Switch in position for a recording. Turn fader to extreme left and adjust Mic. Gain Control just below the feed-back point.

THE CRYSTAL TYPE CUTTING HEAD is energized by a special 70,000 Ohm secondary winding (a part of the output transformer) that matches the impedance of the cutting head.

THE CUTTING HEAD CRYSTAL MICROPHONE AND CRYSTAL PLAY-BACK units are so designed and compensated to provide uniform frequency response for recording and play-back.

In the "Radio" position, the ground circuit return for the mixer tube bias is completed through the switch. Radio silencing is accomplished by opening the mixer tube cathode.

The 6U5 becomes the conventional tuning eye tube since the grid is connected through the switch directly to the AVC line.

The Microphone output circuit is shorted out.

Before we consider the cause and remedy of some of the troubles that may be encountered with any recording device, it is necessary to review the fundamental purpose of the records and needles themselves.

RECORD BLANKS

The ideal record material is that substance that has the right quality of material to respond to the variations of the cutting stylus and yet have the right amount of "GRAINING" so when used with the play-back needle, the needle takes most of the wear and not the record pattern.

Needle scratch will be objectionable with records having too coarse a grain material base. However, we do not recommend the use of non-metallic needles to reduce this needle scratch condition. For practical use the loss of volume with this type needle requires increase of audio volume and the background increases likewise.

NEEDLES

The function of a play-back needle is to act as a transmission medium between the modulated record groove and the reproducing unit. Therefore,the frequency characteristic of a needle depends upon its shape, material, and size. The metallic needles are superior to non-metallic for a greater range of response; likewise the heavier shank needles will naturally have a greater range.

Regarding the playing life of a needle, generally speaking the metallic type may be grouped into about three classes: (1) The soft metallic one-play type; (2) Hard steel types, 10 or 25 plays; (3) Semi-permanent and permanent types, 1000 or 2000 plays.

It must be remembered that the causes of faulty reproduction and the quick wearing out of records can more often be due to dull or rough edge needles than from the type of needle or record blank. This also applies to the cutting needle which, although it may be in the permanent life class, can become chipped by rough handling or damaged when used with inferior grade blanks on which the coating is insufficient, and the cutting needle may cut through to the hard core of the blank.

Since the actual depth of the groove is nearly three thousandths of an inch (.003") for safety the coating should be at least twice that thickness.

Getting back to the reproducing needle, since the variations that the needle is to follow are lateral in nature, it is obvious that the needle is not supposed to be extremely pointed so as to ride in the bottom of the groove; and at the other extreme it is obvious that the needle should not be too blunt (like a dull needle) so as to ride near the top edge of the groove, losing all of the higher frequencies. Since the bearing surface, or radius point, of the needle should be slightly over two thousandths of an inch (.002") it becomes apparent as to what happens to the quality when the point becomes blunt so that the diameter is greater than what we can call the "Wave Length" of the higher frequency pattern in which the blunt needle could not follow the small curve variation for the high frequency reproduction. Never rotate the needle in the socket once it has been used.

SERVICE NOTES

THE CUTTING HEAD

This crystal unit similar in structure to the regular reproducing head, is likewise subject to extreme temperatures both hot and cold.

Heat at about 123° Fahrenheit will begin to soften the crystals and permanently damage the unit. Average temperatures encountered in the home a distance from the radiator should not cause trouble.

Coldness does not cause permanent damage, the effect being to "stiffen" the unit resulting in an increase of background "rumble" if a recording is made during that period.

ROUGH HANDLING

To bounce either the play-back or the cutter head around carelessly will invite trouble. Severe shock against the end of the needle may not fracture the crystal, but at least the needle (or stylus) mounting will be damaged or the edge of the needle may be roughened which would ruin the next record.

Forcing the cutting arm by hand when it is not raised enough for the follower arm to become disengaged may throw arms out of alignment with each other.

CUTTING SHAVING TOO HEAVY

Under a magnifying glass, the grooves should appear as about the width as the spaces between them for proper cut. If the thread is coarse and stiff, try new cutting needle, then if necessary, refer to procedure of adjustments given herein.

When the record is being cut, watch the shavings as it leaves the needle and see that it winds toward the center of the record and does not work back underneath the cutting needle causing it to bounce over the shavings.

CUTTING SHAVING TOO FINE

If the thread is light, fluffy, or not continuous, after trying new cutting needle, refer to procedure of adjustment given herein.

MICROPHONICS OR FEED-BACK

This condition is the normal result of improper use of the "Mic. Gain Control" with the visual indicator for proper cutting voltage. Overcutting of the record is also possible with too high an input. At the other extreme, lack of sufficient input results not only in poor quality, but also raises the background level.

RUMBLE

Any recording system as sensitive as the Howard Recorder, is capable of picking up the mechanical vibrations of the motor. The sacrificing of this sensitivity to eliminate any possibility of motor rumble is not the cure or is it necessary. Under normal conditions of operation in which both the motor frame and turntable unit are suspended on soft rubber cushions, the rumble will not be recorded if:

(1) The amplitude of the signal is sufficient when the blank is being cut.

(2) The Tone Control is in the treble position at the time of recording.

(3) The cutting stylus is in good condition and is MOUNTED TIGHT.

(4) The crystal is at room temperature at the time of recording.

(5) The play-back needle is not dull or has become "shouldered".

WARBLE

By "warble" we mean the sing-song effect with the low frequencies predominating. We first consider the possibility that something has happened to vary the motor speed during recording. (See Speed Regulation below).

Although the recorder base is mounted on rubber feet at each corner, it is essential that the wing screws remain drawn tight against the washers. When the base floats too freely, vibrations are introduced from the drive mechanism causing a warble effect when played back. Examine the grooves closely if there appears to be a shaded spiral effect across the blank, you can be sure that the vibrations have created a regular pattern of their own due to the wing screws being too loose at each corner of the base. Tighten them.

Consider the possibility that the cutting needle might have been loose.

After the customary trial of a new play-back needle, check the mounting of the play-back arm. It is held in place with a "Y" shaped hand that could lose its tension causing the arm to vibrate. It can be tightened by removing arm and spreading out fingers for more tension.

"Warble" effect can be caused if the original cutting was made too heavy and which might be reproduced satisfactorily with one type needle having a wide point, but another type needle having an extremely fine point will wobble around the bottom of the groove with incomplete, uneven registration.

SPEED REGULATION

The motor being of a constant speed synchronous type, operating at its rated frequency, should not vary. However, we must check the frequency marking as shown on the Motor Frame with the power line.

It is suggested that the speed of the motor be checked in the conventional manner by the use of a cardboard stroboscope disc using a gas illuminated electric light.

The correct speed with the play-back arm in place on the record is 78 R.P.M.

The speed of the motor when used in a district requiring a converter cannot be depended upon.

Irregularities of speed can be caused by excessive shavings wound around the motor spindle and rubber drive mechanism beneath the turntable.

LOW RESPONSE

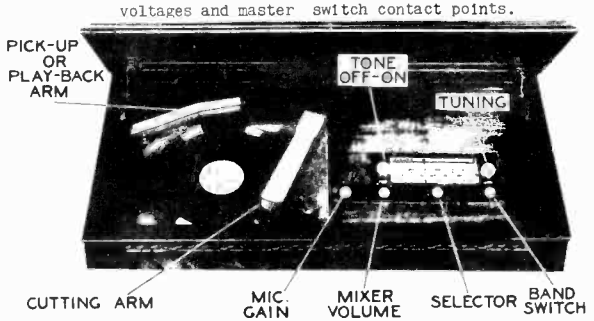
There is a conpensating resistor in the cutter circuit that will tend to make the play-back apparently to have a lower frequency response.

In recordings where the high frequencies seem to be missing, be sure to ascertain if the original recording was incorrectly made with the Tone Control in the "Bass" position.

Another reason for lack of "highs" is of course either a blunt play-back needle, or the ruination of the record during a previous play-back by a damaged needle that has trimmed the groove of its pattern for "highs".

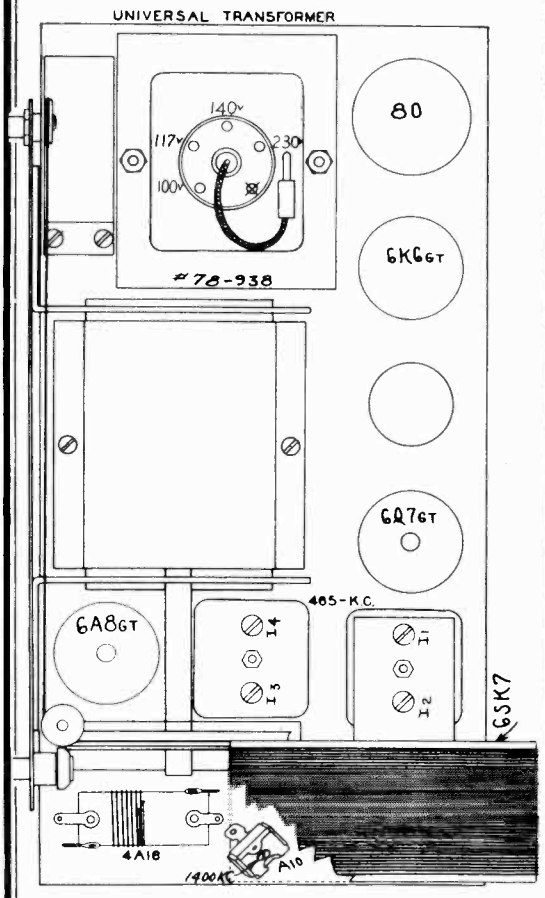
QUALITY RECORDINGS

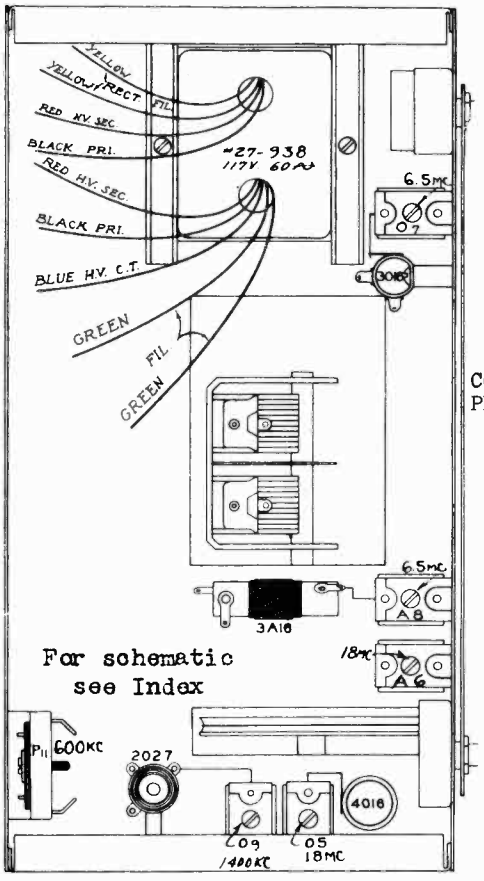
The elements effecting the cutting and reproducing of a blank have been outlined above. We are making no mention of the audio system of the radio since it is conventional and requires no special service attention other than the usual check of tubes, operating voltages and master switch contact points.



HOWARD RADIO CO.

MODEL 307
MODEL 307TP





TUNING RANGES - 540 to 1700 KC, 2.2 to 7 MC, 7 to 22 MC, (555-175, 140-47, 47-13 Meters)

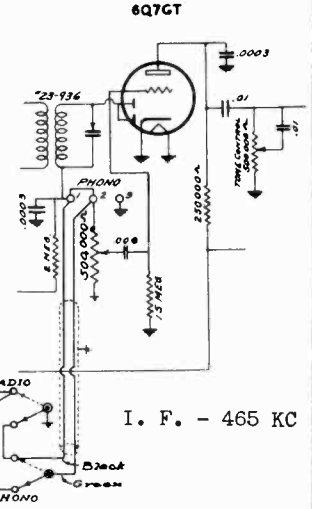
POWER OUTPUT - (MAX.) - 2.7 Watts; UPO 1.5 W.

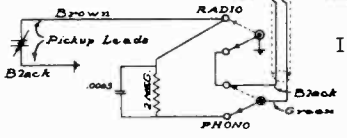
ANTENNA SYSTEM = Connect Antenna to BROWN lead - Connect Ground to BLACK lead.

CONSUMPTION 50 WATTS Plus 15 Watts for TP Model.

Phono Circuit 307 TP Only

Otherwise same as Model 307. See Index





I. F. - 465 KC

POWER SUPPLY - (Standard Models) = 105-125 V. 60 Cycles AC

L7

ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Signal Generator Frequency	Signal Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
BC	Min.Cap.	465 KC	6A8 Grid	A	I_1, I_2, I_3, I_4	IF
SW	18 MC	18 MC	Brown lead	B,D,E	O_5, A_6	Osc. Ant.
Int.	6.5 MC	6.5 MC	Brown lead		O_7, A_8	Osc. Ant.
BC	1400 KC	1400 KC	Brown lead		O_9, A_{10}	Osc. Ant.
BC	600 KC	600 KC	Brown lead	C	P_{11}	Osc. Pad.

NOTES

A - Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I.F. trimmers are reached through the two holes on the top of each I.F. can.

B - When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 18 MC, then a weaker image will be heard at 17,070 KC, in other words 930 KC less on the dial.

C - When adjusting this pad, move the tuning hand back and forth and adjust padder until the peak of greatest intensity is obtained.

D - See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.

E - Check for oscillator cross-over between 18 and 22 MC. If necessary for stability, turn the antenna trimmer "IN" slightly.

SPEAKER = Electro-Dynamic SIZE = 6" V.C.IMP.(400CPS) = 4 Ohms FIELD = 1300 Ohms

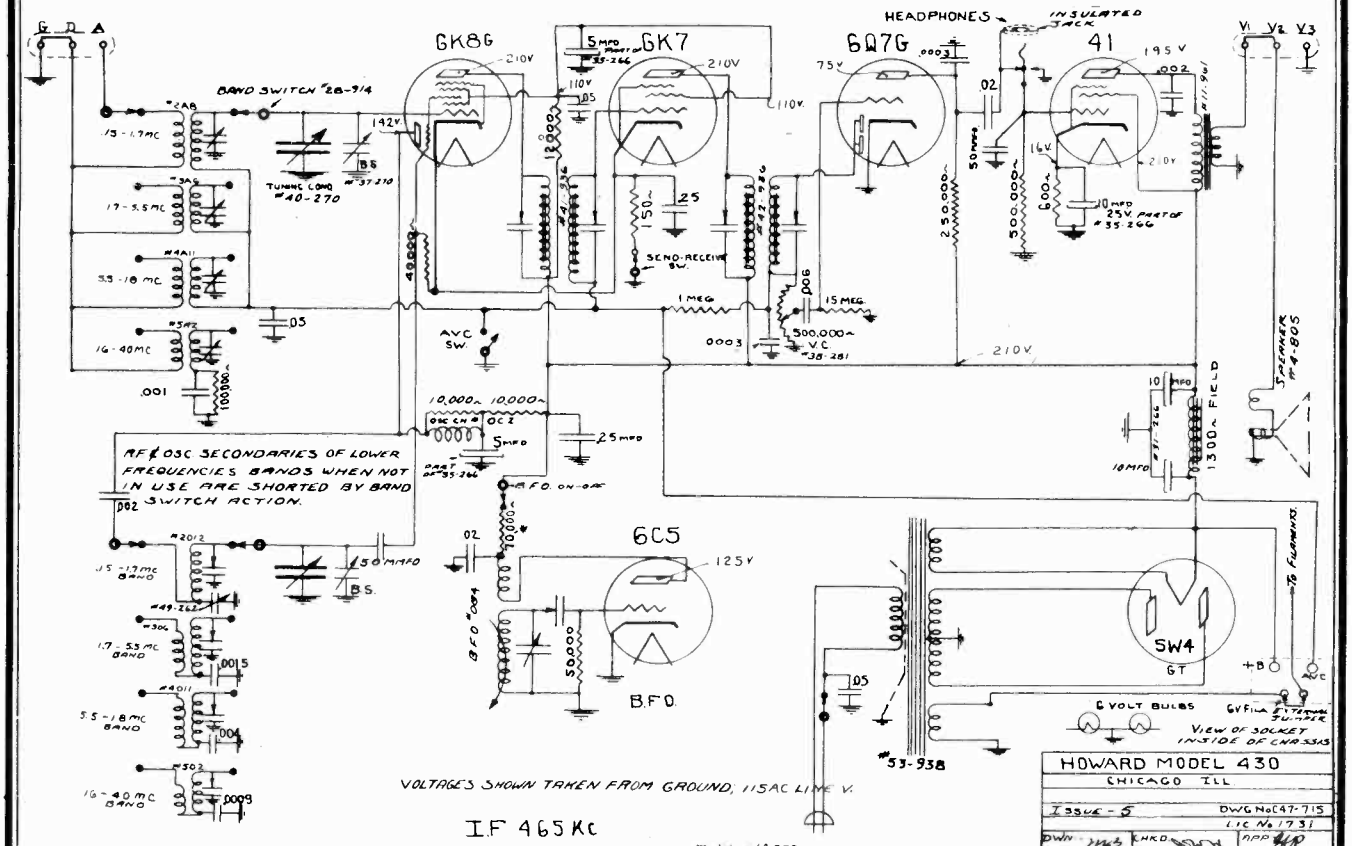
SOCKET VOLTAGE READINGS:

Voltage taken from ground with line voltage at - 117 AC.
High voltage reading off rectifier - 275 V.
Drop across speaker field = 75 V.
Voltage taken with 1,000 Ohm per volt meter.

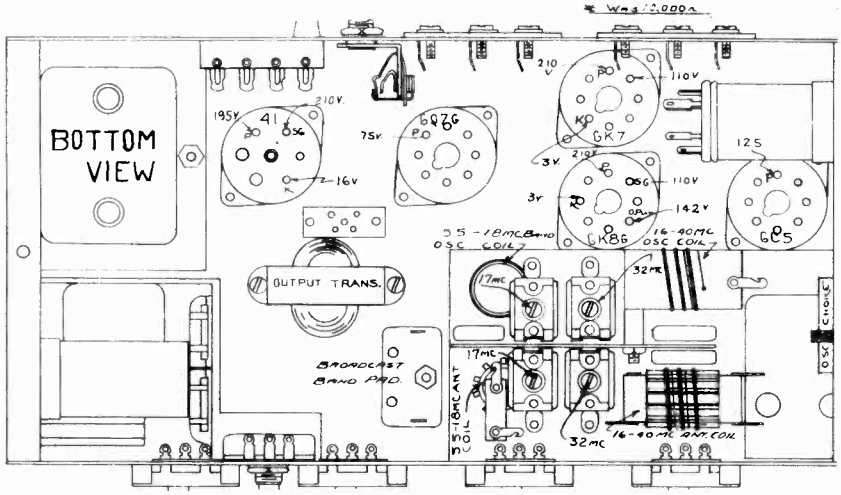
TUBE	FUNCTION	CATHODE	SCR. GRID	PLATE	OSC. PLATE
6A8GT	Mixer	1.5	105	195	195
6SK7	IF	4.5	105	195	
6Q7GT	Det.			60	
6K6GT	Output	16	195	185	

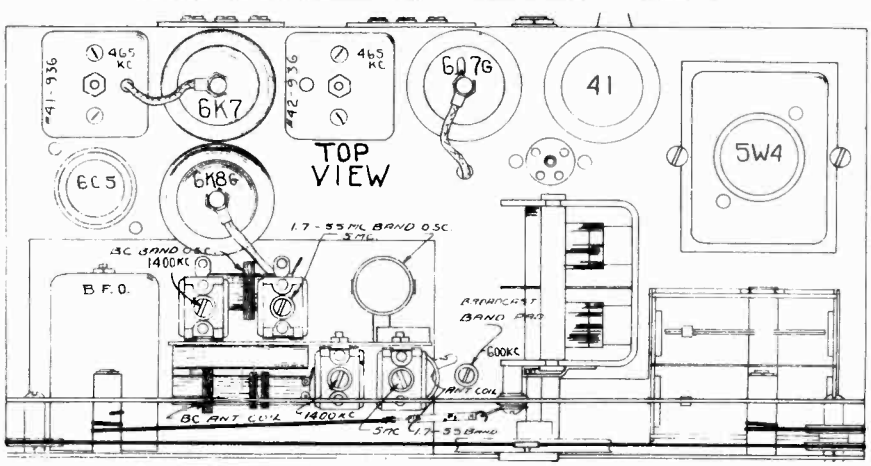
MODEL 430

HOWARD RADIO CO.



IF 465 Kc





NOTE 1: When aligning the I.F. channel, a condenser of .05 MFD may be used in series with the generator lead.

NOTE 2: When aligning the broadcast band, a 250 MMFD condenser may be used in series with the signal generator.

NOTE 3: When aligning the short wave bands, a 400 ohm resistor may be used in series with the signal generator.

NOTE 4: After the chassis has been removed from the cabinet, be sure when it is again assembled that the speaker plug is in place in the socket on top of the chassis and that the speaker cable wires do not lay back near the RF circuit, thus causing howling.

NOTE 5: Check for an image signal about .9 mc. lower in frequency. For example:- If a peak has been made at 6 mc. an image should be heard at about 5.1 mc. Otherwise the original setting was not correct.

HOWARD RADIO CO.

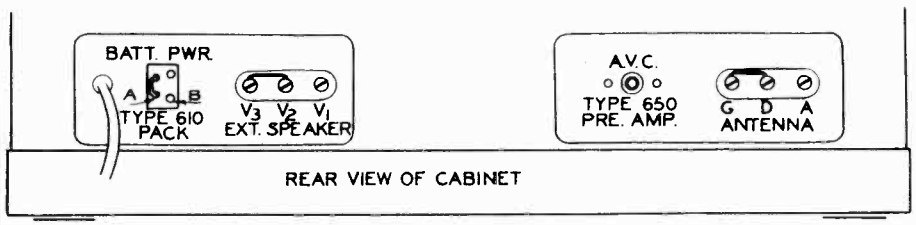
MODEL 435
MODEL 436
MODEL 437

MODELS—435-436-437 "PROGRESSIVE SERIES"

TYPE 3-820 EXTERNAL SPEAKER is designed especially for use with Howard Communications Receivers. The input impedance is of the correct value to perfectly match the output transformer of Models 435, 436, 437, and 460. The speaker unit consists of a heavy duty high efficiency permanent magnet, 8" dynamic speaker mounted in an acoustically treated (felt lined) welded steel cabinet finished in fine suede wrinkle, supplied with a 5 ft. spade terminal cable.

TYPE 610 "B" POWER PACK. For conversion of 6 Volts d.c. to 300 Volts d.c. for operation of Howard Models 435, 436, and 437 Communications Receivers from 6 Volt Storage Battery, the Type 610 Power Pack is a convenient and practical converter. A four prong plug fits the socket on Model 435, 436, and 437 Receivers, carrying both A and B power to the set. Only two connections from the Power Pack to the storage battery are required. Ample length of cable is provided. Battery current drawn for Model 435 is 6.6 amps; for Model 436 is 6.9 amps; and Model 437 is 7.75 amps. ON and OFF Switch on Power Unit.

(NOTE:- The Progressive Series 435, 436, 437, is based on the Model 435 receiver. The 436 is the 435 circuit with the addition of the noise silencer and additional features. The progressive additions to the original 435 circuit may include: 605 Carrier Level Meter, 3-820 External Speaker, 650 Pre-Selector, 660 Frequency Monitor, 655 Loop Kit, and 610 Power Pack. For data on these, SEE INDEX).



EXTERNAL CONNECTIONS

As we face the back of the receiver, the first terminal strip at the right coded G, D, A are the Antenna and Ground connections. For the conventional type of flat-top antenna systems leave the shorting wire between "G" and "D" and connect Antenna to "A". Connect ground to "G".

If a doublet antenna is used, remove the jumper between G and D and attach doublet wires to D and A and a ground to "G".

We have found it inadvisable to recommend a definite length of antenna due to variable conditions. We do, however, suggest that you refer to the recommendations as given in the A. R. R. L. Antenna handbook.

The single terminal next to the antenna-ground strip is coded for use with the Howard Model 650 Pre-Amplifier.

The three screw terminals coded V3, V2, and V1, of which V3 and V2 must be shorted when using the built-in speaker, can be adapted for the use of the Howard external speaker No. 3-820, by removing the shorting wire and connecting leads from the external permanent dynamic speaker to lugs V3 and V1.

The socket coded for use with the Howard 610 Power Pack must have the jumper in place between the two socket terminals as shown in the diagram below. See description of this Model 610, 6 Volt Power Supply.

ADAPTATION FOR BATTERY SUPPLY

When it is desired to use "A" and "B" batteries when the Howard 610 Power Pack is not available, connect as follows:

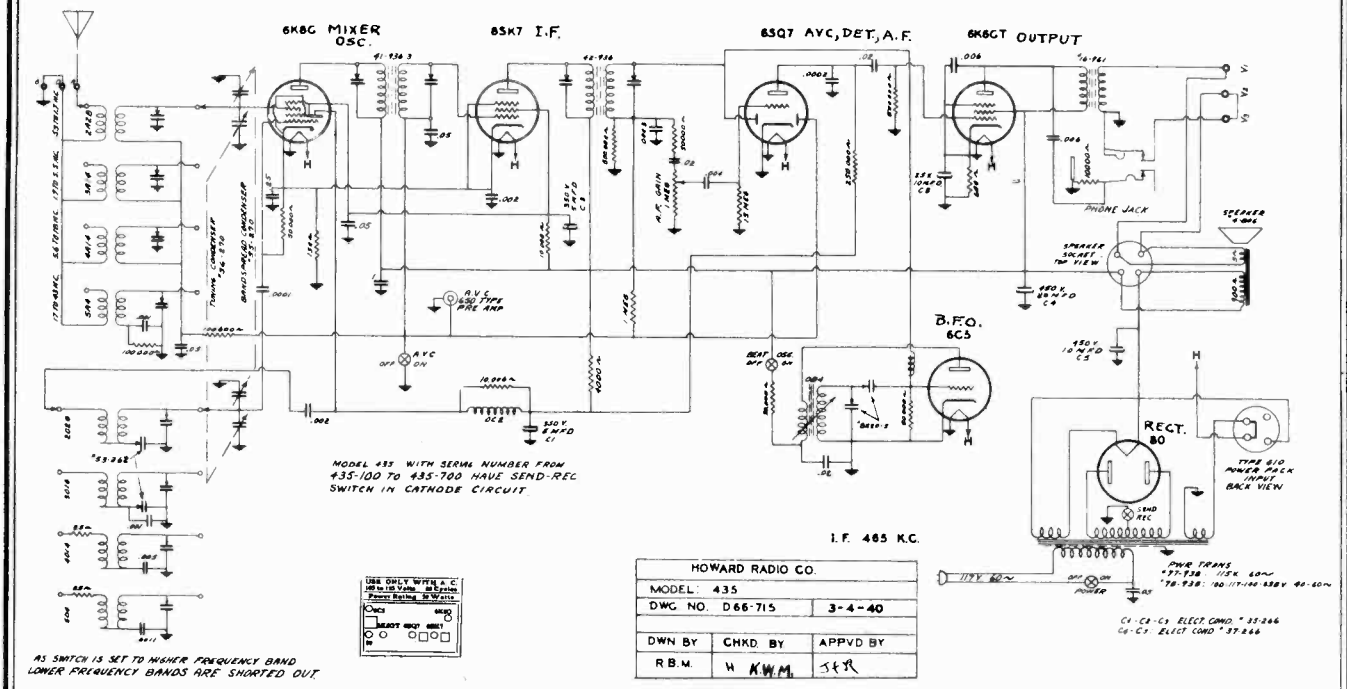
Remove the jumper from the battery power socket. Connect "B ±" 250 Volts to terminal marked "B ±" in diagram. Connect one side of the 6 Volt "A" supply to terminal marked "A". Connect the other side of the "A" supply and "B -" to the chassis ground terminal.

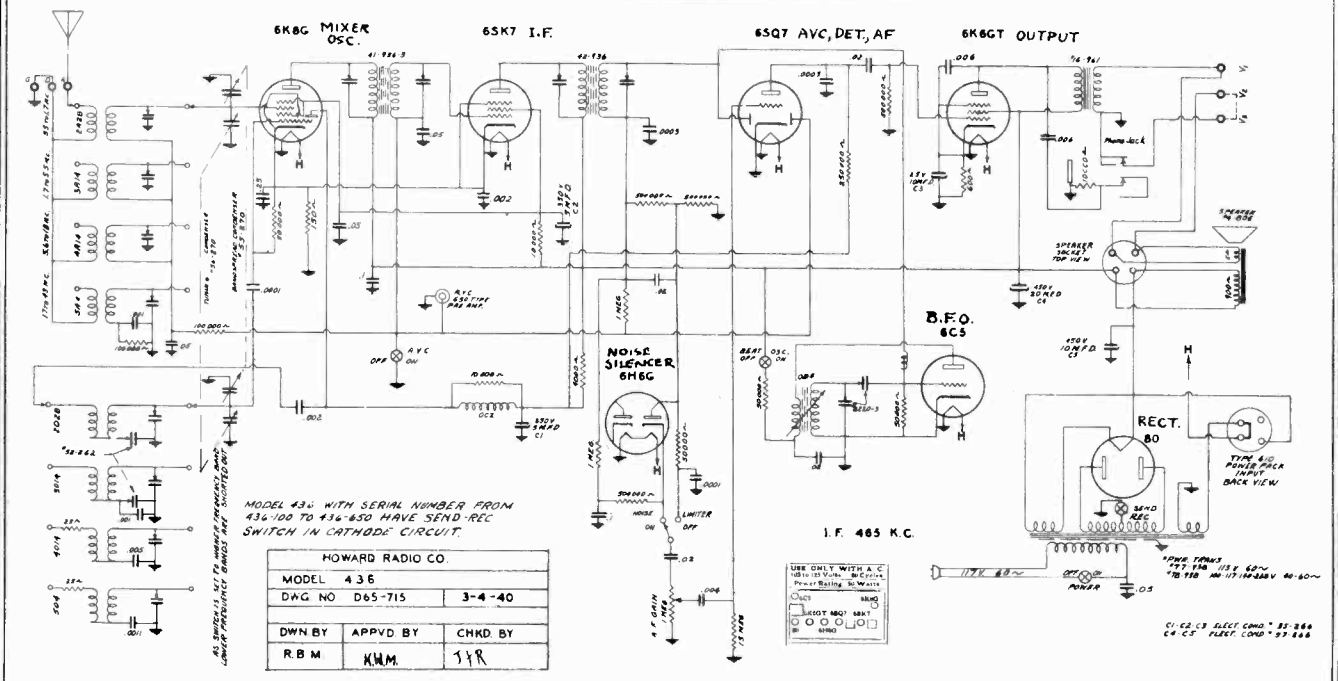
The "B" current required for Models 435 and 436 is 60 Mills. The "A" current requirement is 2.9 Amps. This includes the 605 Carrier Level Meter.

The "B" current required for Model 437 is 82 Mills. The "A" current requirement is 3.5 Amps, allowing for the 605 Carrier Level Meter.

MODEL 435
MODEL 436

HOWARD RADIO CO.





The following are the Engineering Specifications for Model 435,436.

POWER CONSUMPTION. . . . . .50 Watts, 105-125 Volts, A.C. 60 Cycle

INTERMEDIATE FREQUENCY . . . . . .465 KC

FREQUENCY RANGE - Divided into four bands as follows:

.55 to 1.7 mc (545-176 meters)
1.7 to 5.6 mc (176-54 meters)
5.6 to 18 mc (54-16.6 meters)
17 to 43 mc (17-7 meters)

SPEAKER SYSTEM

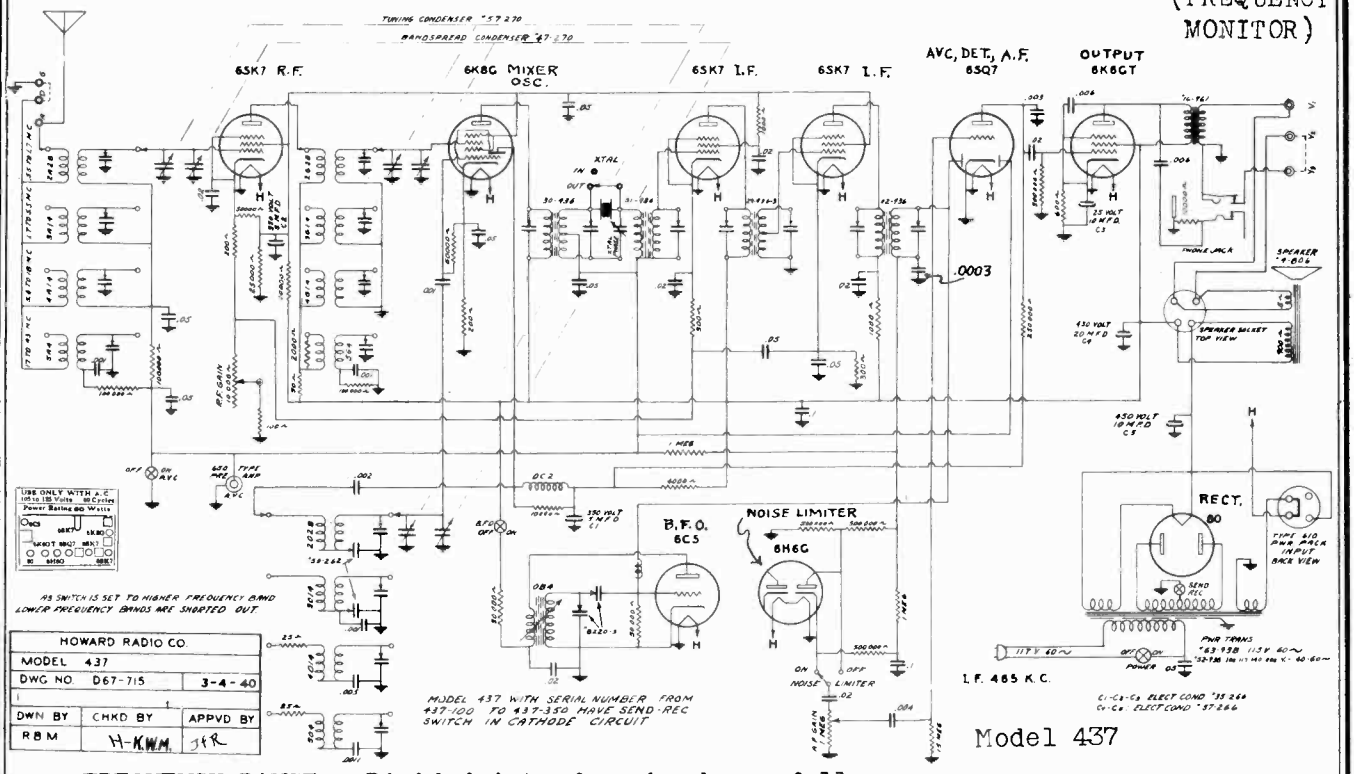
Built-in 6½" Electro Dynamic
Connections provided for External
Speaker (Howard Type 3-820)

POWER OUTPUT

Type. . . . . .Single 6K6G
Maximum . . . . . 2½ Watts

HOWARD RADIO CO.

MODEL 437
MODEL 660 (FREQUENCY MONITOR)



Model 437

FREQUENCY RANGE - Divided into four bands as follows:

.55 to 1.7 mc (545-176 meters)
1.7 to 5.6 mc (176-54 meters)
5.6 to 18 mc (54-16.6 meters)
17 to 43 mc (17-7. meters)

POWER CONSUMPTION. . . . . .60 Watts, 105-125 Volts, A.C. 60 Cycle

INTERMEDIATE FREQUENCY . . . . . .465 KC

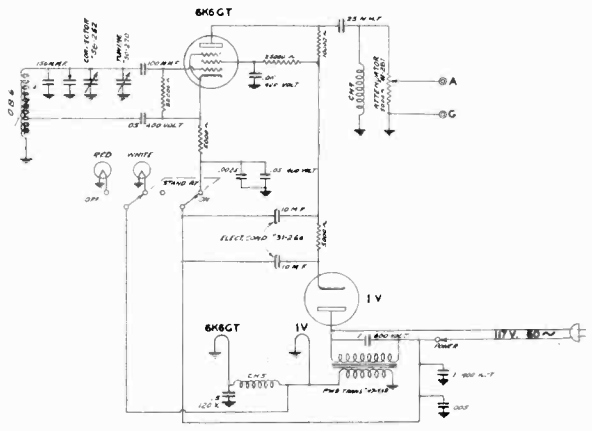
SPEAKER SYSTEM

Built-in 6½" Electro Dynamic
Connections provided for External
Speaker (Howard Type 3-820)

POWER OUTPUT

Type. . . . . .Single 6K6G
Maximum . . . . . .4 Watts

TYPE 660 FREQUENCY MONITOR



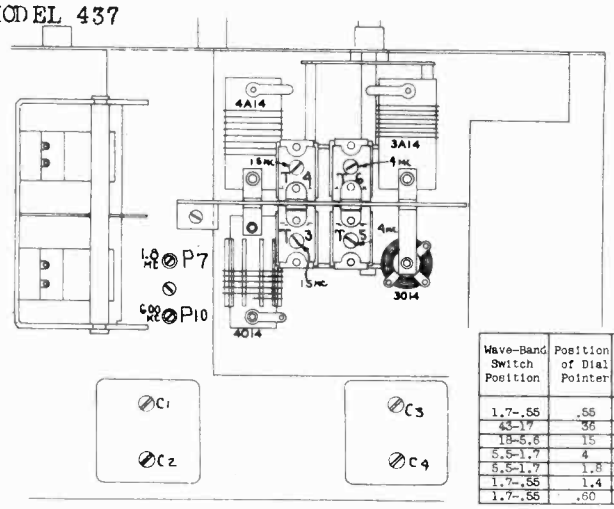
The Howard Frequency Monitor Model 660 consists of a highly stabilized oscillator covering the fundamental frequency range of 850 to 1030 kilocycles, harmonics of which are used as reference or measurement points on the higher bands. The R. F. Output of this oscillator is loosely coupled to the antenna circuit of the receiver, and the voltage applied to the receiver is controlled by a variable resistance attenuator.

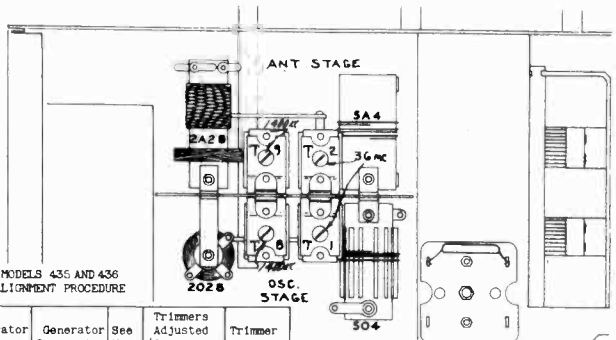
The Oscillator is tuned by a precision ceramic insulated variable condenser carrying an extremely accurate frequency scale covering the 10, 20, 40, 80 and 160 meter amateur bands as well as the fundamental range. The range is so selected that harmonics cover the entire length of all amateur bands, and these are calibrated so that frequency can be read within one kilocycle on the lower frequency bands and five kilocycles on the highest band.

The Power Supply for this unit is self-contained, and is for use on 105-125 Volts, A.C. 40-60 Cycle. Available at other voltages and frequencies on special order.

MODEL 435
MODEL 436
MODEL 437

HOWARD RADIO CO.





MODELS 435 AND 436
ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
1.7-.55	.55	465 KC	Mixer Grid	1	C1,C2,C3,C4	IF
43-17	36	36 MC	A and DG	2	T1,T2	Osc,Ant.
18-5.6	15	15 MC	A and DG	3	T3,T4	Osc,Ant.
5.5-1.7	4	4 MC	A and DG	3	T5,T6	Osc,Ant.
5.5-1.7	1.8	1.8 MC	A and DG	4	P7	Osc.Pad.
1.7-.55	1.4	1400 KC	A and DG		T8,T9	Osc,Ant.
1.7-.55	.60	600 KC	A and DG	4	P10	Osc.Pad.

The alignment is made with the BFO Off, the AVC Off, and the Band Spread set to 100.

The main dial hand must stop EXACTLY ON the last line at the end of the scale when the condenser is fully closed without force on the tuning control.

There should be an overload effect on powerful broadcast stations when the AVC is OFF.

NOTE 1: After the alignment of the I.F. stages is completed, align the BFO system as follows:

1. Set pitch control 3 turns back from the "IN" position and turn on the BFO Switch.
2. Adjust the trimmer in the BFO can to obtain maximum sound which will be a hissing noise. Turn tuning knob to be sure this sound is not some tunable frequency that is causing it.
3. Check beats against some broadcast station to determine if the strength of the beat is normal.

NOTE 2: In this band (17 to 43 MC) only the oscillator follows the received signal 465 KC lower in frequency. Therefore when checking for the image, if the alignment has been made at 36 MC, it will be found at about 37 MC. This will determine if the alignment was correctly made at 36 MC.

NOTE 3: Check for image on all bands except the 17 to 43 MC band at a point 930 KC lower on the dial.

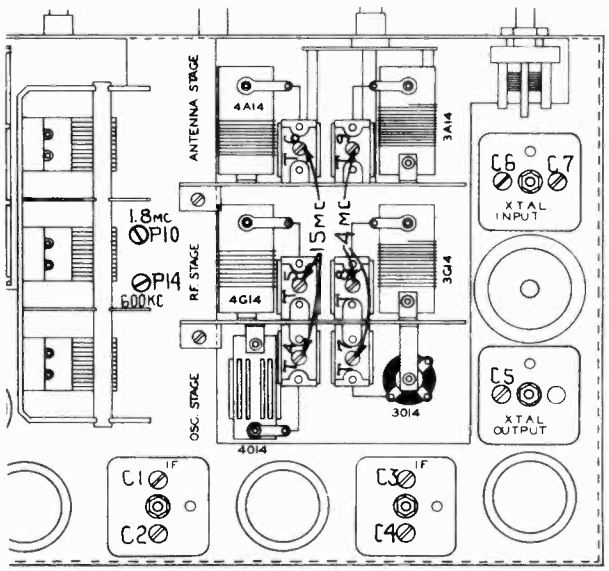
NOTE 4: Rock main dial slightly for point of maximum signal as the padding condenser is being adjusted.

MODELS 435 AND 436
SOCKET VOLTAGES

TUBE	FUNCTION	CATHODE	SCR. GRID	PLATE	OSC. PLATE
6K8G	Mixer	3	100	195	170
6SK7	I.F.Amp.	3	100	195	
6SQ7	Det.			70	

TUBE	FUNCTION	CATHODE	SCR. GRID	PLATE	OSC. PLATE
6G5	BFO			70	
6K6GT	Output	14	195	180	
80	Rect.	High Voltage = 250 V.			
	Drop across field = 35 V.				

Readings from ground with 1000 Ohm per V. Meter
Line Voltage 117 V.
Main Filament Voltage 6.2 V.
Rectifier filament Voltage 4.9 V.

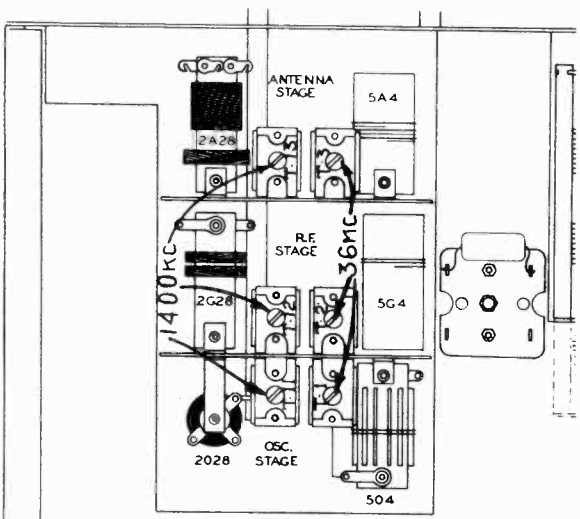


MODEL 437
SOCKET VOLTAGES

TUBE	FUNCTION	CATHODE	SCR. GRID	PLATE	OSC. PLATE
6SK7	RF	3	92	240	
6K8G	Mixer	3	92	240	
6SK7	I.F.Amp	3	92	240	200
6SK7	I.F.Amp	3	92	233	

TUBE	FUNCTION	CATHODE	SCR. GRID	PLATE	OSC. PLATE
6SQ7	Det.			70	
6V6GT	Output	17	240	223	
6G5	BFO			75	
80	Rect.	High Voltage = 313V.			
	Drop across Spkr. Field = 73 V.				

R.F. Gain Full On
Readings from ground with 1000 Ohm per V. Meter
Line Voltage 117 V.
Main Filament Voltage 6.2 V.
Rectifier Filament Voltage 5 V.



MODEL 437
ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
1.7-.55	.55	465 KC	Mixer Grid	1	C1,C2,C3,C4	IF
43-17	36	36 MC	A and DG	2	T1,T2	Osc,RF,Ant.
18-5.6	15	15 MC	A and DG	3	T3,T4,T5	Osc,RF,Ant.
5.5-1.7	4	4 MC	A and DG	3	P7,T7,T9	Osc,RF,Ant.
5.5-1.7	1.8	1.8 MC	A and DG	4	P10	Osc, Pad.
1.7-.55	1.4	1400 KC	A and DG		T11,T12,T13	Osc,RF,Ant.
1.7-.55	.60	600 KC	A and DG	4	P14	Osc, Pad.

The alignment is made with the BFO Off, the AVC Off, and the Band Spread set to 100.

The main dial hand must stop EXACTLY ON the last line at the end of the scale when the condenser is fully closed without force on the tuning control.

There should be an overload effect on powerful broadcast stations when the AVC is OFF.

NOTE 1: After the alignment of the I.F. stages is completed, align the BFO system as follows:

1. Set pitch control 3 turns back from the "IN" position and turn on the BFO Switch.
2. Adjust the trimmer in the BFO can to obtain maximum sound which will be a hissing noise. Turn tuning knob to be sure this sound is not some tunable frequency that is causing it.
3. Check beats against some broadcast station to determine if the strength of the beat is normal.

NOTE 2: In this band (17 to 43 MC) only the oscillator follows the received signal 465 KC lower in frequency. Therefore, when checking for the image, if the alignment has been made at 36 MC, it will be found at about 37 MC. This will determine if the alignment was correctly made at 36 MC.

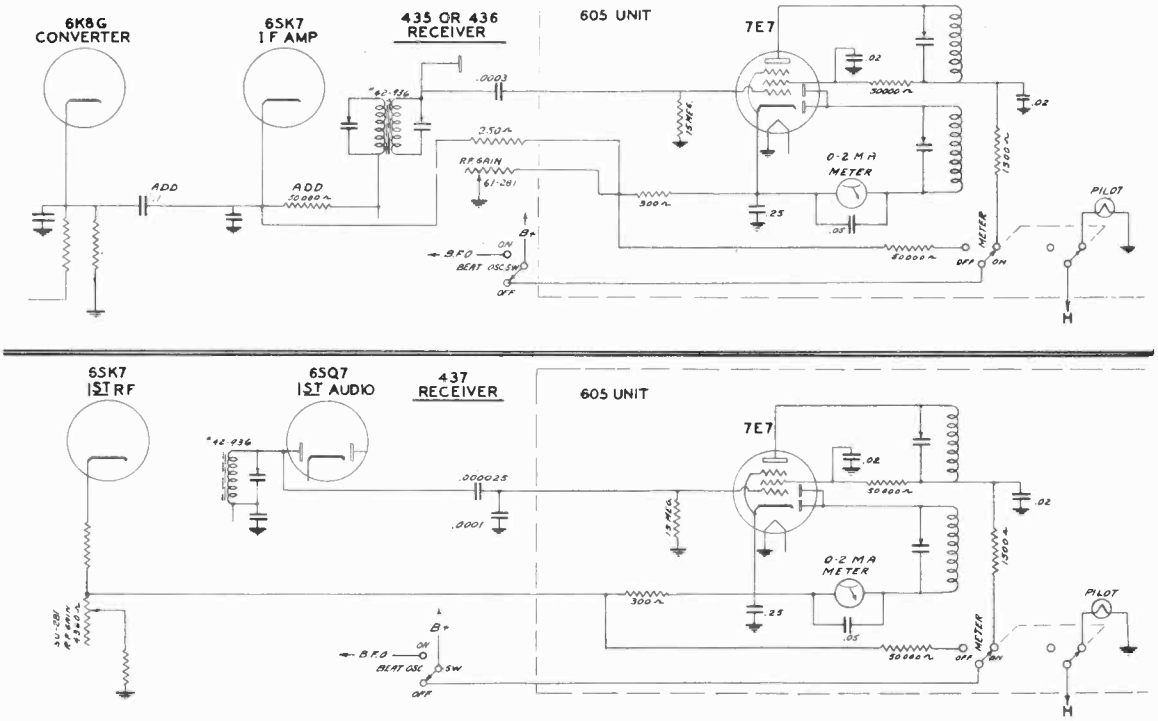
NOTE 3: Check for image on all bands except the 17 to 43 MC band at a point 930 KC lower on the dial.

NOTE 4: Rock main dial slightly for point of maximum signal as the padding condenser is being adjusted.

HOWARD RADIO CO.

MODEL 435
MODEL 436
MODEL 437

TYPE 605 CARRIER LEVEL METER ADAPTABLE TO MODELS 435, 436, 437



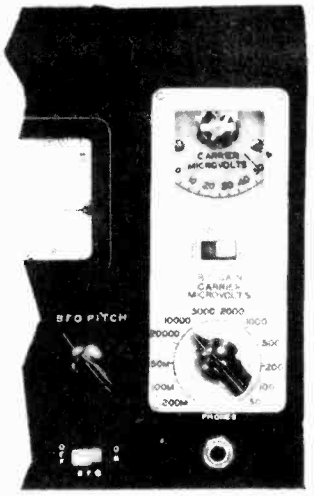
THE HOWARD CARRIER LEVEL METER gives an indication of the strength of the signal carrier in microvolts as delivered at the receiver.

MODEL 605		
DWG. NO. 68-715		3-1-40
DWN BY	CHCKD BY	APPVD BY
R B M	K.W.M.	J & R

The meter scale is calibrated from 0 to 50. When the meter set control (R. F. Gain) located directly below meter, is set exactly on the 50 division, the reading on the meter will be the actual microvolts delivered to the receiver.

Before using the carrier level meter, tune the signal to exact resonance with the meter switch in the OFF position, and adjust the R. F. GAIN CONTROL to a point where the signal is just audible. This will not throw the meter off scale when the meter switch is thrown to the ON position. Follow instructions given below.

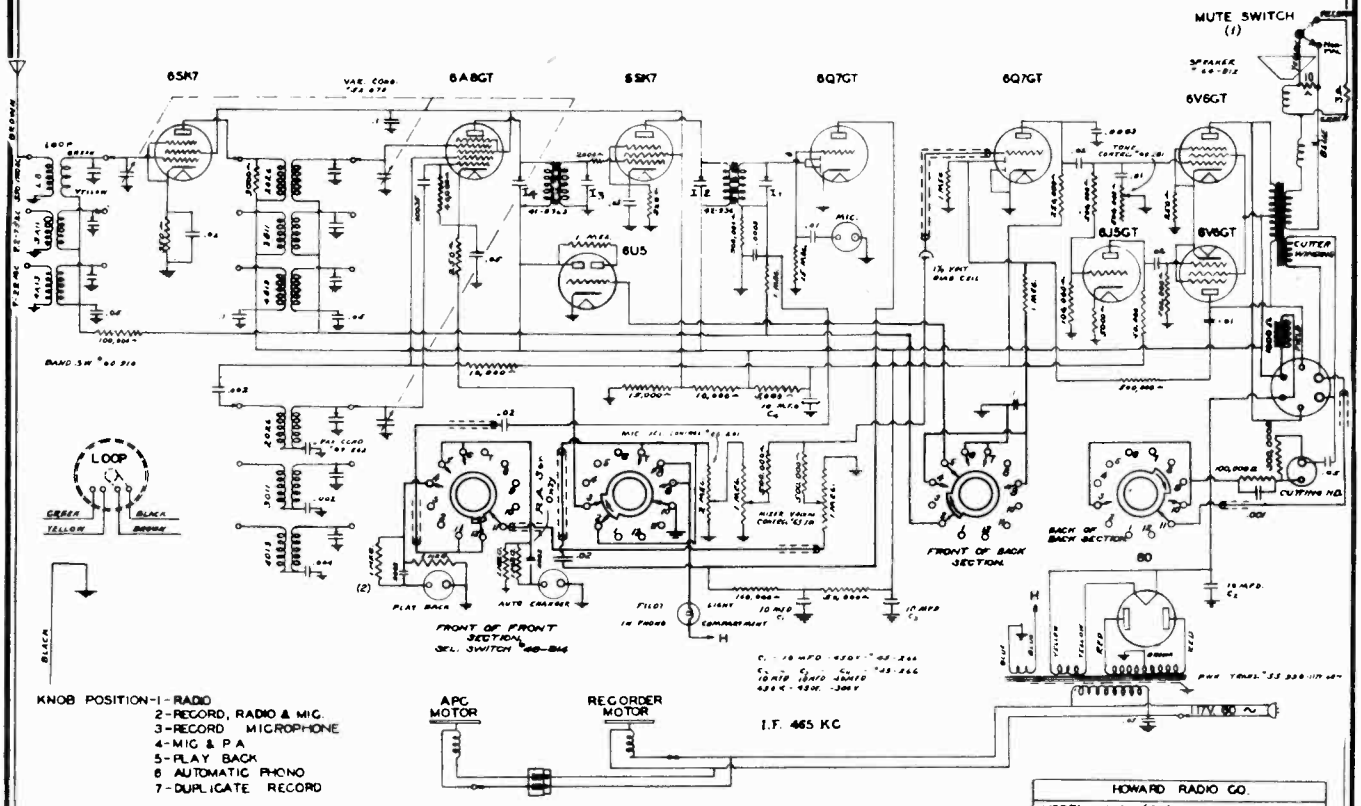
The AVC Switch must be ON.
The Meter Switch must be ON.
The BFO Switch must be OFF.



To avoid the possibility of introduced error, the BFO Switch is so connected that the meter is not in the circuit when the BFO Switch is in the ON position. Therefore the meter can be used only when the BFO Switch is in the OFF position.
The maximum deflection of meter pointer is the true indication of resonance in tuning. With a strong signal the meter will naturally be thrown off scale until the R. F. Control is rotated counter-clockwise. A point will be reached during this rotation where the meter hand is at 50. Then the input value in microvolts is read direct at the position of the pointer knob. For better accuracy this reading is multiplied by a correction factor as given on a separate chart to cover the various bands calibrated for each receiver.

MODELS 568R, 568RA Late

HOWARD RADIO CO.



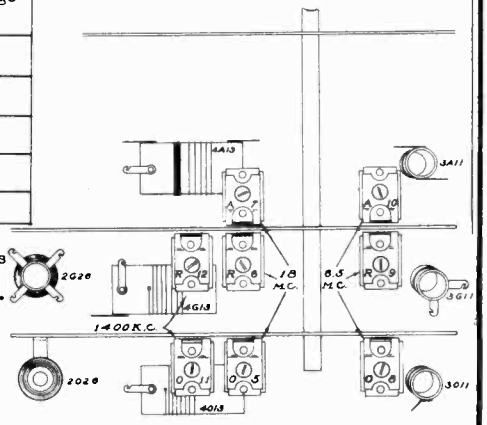
HOWARD RADIO CO.		
MODEL 568 R(RA)		
DWG. NO C73-715		
DWN. BY.	CHCKD. BY.	APPVD. BY
R.L. dR.		JFR

(1) Mute Switch Added 6-1-40
(2) Matching Circuit

FOR OTHER DATA, SEE INDEX

ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Signal Generator Frequency	Signal Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function	Check for Image at
BC	Min.Cap.	465 KC	Grid of 6A8GT	A,D	I_1, I_2, I_3, I_4	IF	
SW	18 MC	18 MC	Ant.Brown lead	B,E	O_5, R_6, A_7	Osc.RF.Ant.	17
PB	6.5 MC	6.5 MC	Ant.Brown lead		O_8, R_9, A_{10}	Osc.RF.Ant.	
BC	1400 KC	1400 KC	Ant.Brown lead		O_{11}, R_{12}	Osc.RF	
BC	600 KC	600 KC	Ant.Brown lead	C	P_{13}	Osc.Pad.	



A- Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I.F. trimmers are reached through the two holes on the top of each I.F. can.
B- When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 18 MC, then a weaker image will be heard at 17,070 KC, in other words 930 KC less on the dial.
C- When adjusting this pad, move the tuning hand back and forth and adjust padder until the peak of greatest intensity is obtained.
D- See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.
E- Check for oscillator cross-over between 18 and 22 MC. If necessary for stability, turn the mixer trimmer "IN" slightly.

SOCKET VOLTAGE READINGS:

Voltage taken from ground with line voltage at - 117 V.
High voltage reading off rectifier = 340 V.
Drop across speaker field = 95 V.
Voltage taken with 1,000 Ohm per volt meter.

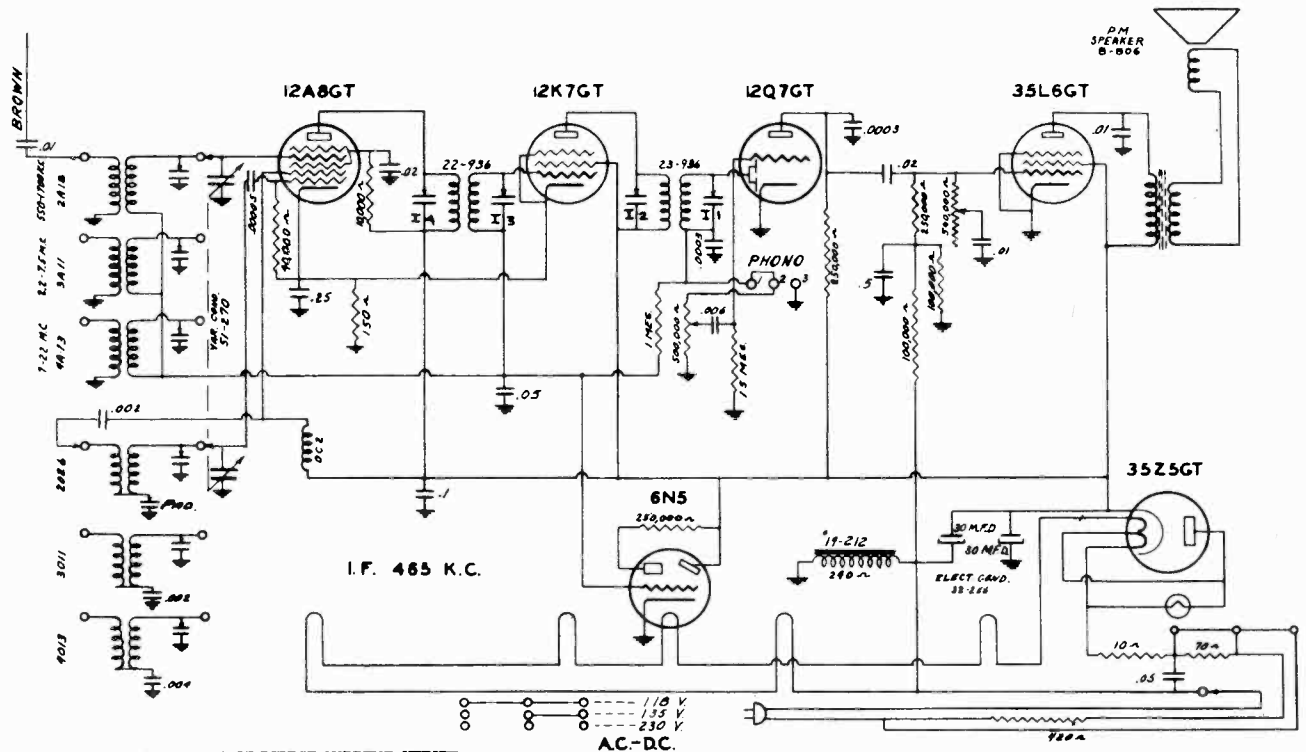
TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE	OSC. PLATE	TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE	OSC. PLATE
6SK7	RF	2½	100	245		6J5GT	Inverter	7		125	
6A8GT	Mixer	3½	100	245	140	6V6GT	Output	16	245	240	
6SK7	I.F.Amp.	3½	100	245		6V6GT	Output	16	245	240	
6Q7GT	Diode & Mic.Gain			80		6U5	Tuning & level cont.				
6Q7GT	Audio			70		80	Rect.				

CONSUMPTION - Receiver, 90 WATTS; POWER SUPPLY - (Standard Models) = 105-125 V. 60 Cycles Changer, 30 WATTS. Recorder, 30 WATTS; I.F. = 465 KC TYPE = Iron Core POWER OUTPUT - (MAX.) = 11 Watts; UPO = 8 Watts TUNING RANGES = 540 to 1700 KC, 2.2 to 7.5 MC and 7 to 22 MC.

M O D E L - 568-R
10 tube console Recorder
568-RA
Recorder with Automatic Record Changer

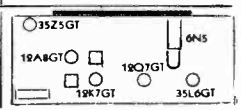
HOWARD RADIO CO.

MODEL 585



FOR ALTERNATING OR DIRECT CURRENT, VERIFY LINE VOLTAGE AND ARRANGE VOLTAGE TAPS.

LINE VOLTAGE	TOP REAR VIEW OF TERMINALS
105 to 120	
120 to 150	
210 to 250	NO CONNECTIONS



POWER SUPPLY - (Standard Models) = AC-DC 3 Range 118V, 135V, 230V.

CONSUMPTION 25-50 WATTS

POWER OUTPUT - (MAX.) = 2.7W. up to 1.3

SPEAKER = Permanent Magnet SIZE = 6½"

V.C.IMP. (400CPS) = 4 Ohms

Tubes:

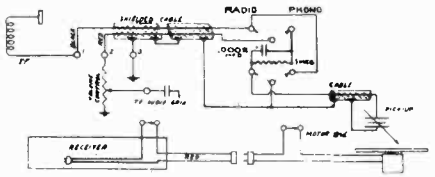
12A8GT Converter
12K7GT I F Amp.
12Q7GT Det. - Audio
35L6GT Output
6N5 Tuning Eye
35Z5GT Rectifier

SOCKET VOLTAGE READINGS

Voltage taken from ground with line voltage at - 117 AC.
High voltage reading off rectifier = 107 V.
Drop across speaker field - %
Voltage taken with 1,000 Ohm per volt meter

TUBE	FUNCTION	CATHODE	SCR GRID	PLATE
12A8 gt	Mixer	3	72	105 OR 105
12K7 gt	IF	3	105	105
12Q7 gt	Det.	x	x	85
35L6 gt	Output		105	105

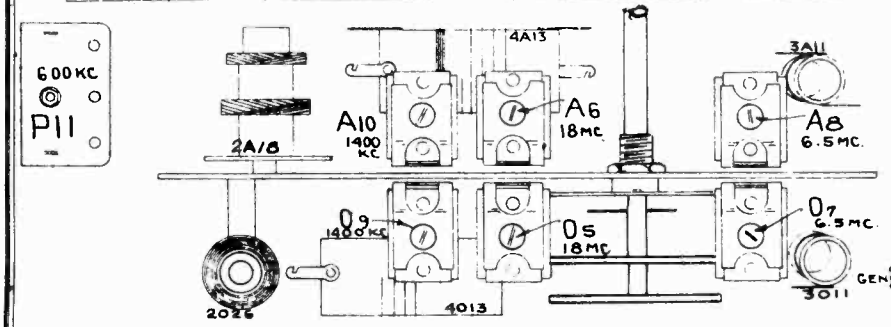
THE ADAPTION OF THE SET FOR USE WITH PHONOGRAPH



HOWARD RADIO CO.		
MODEL: 585		
DWG. NO. D60-715		9-18-39.
DWN. BY.	CHKD. BY.	APPVD. BY.
R.B.M.	H	

ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
BC	Min. Cap.	465 KC	6A8 Grid	A,E	I_1 I_2 I_3 I_4	IF
SW	18 MC	18 MC	Brown lead	B,D	O_5, A_6	Osc., Ant.
PB	6.5 MC	6.5 MC	Brown lead		O_7 A_8	Osc., Ant.
BC	1400 KC	1400 MC	Brown lead		O_9 A_{10}	Osc., Ant.
BC	600 KC	600 KC	Brown lead	C	P_{11}	Osc., Pad.



NOTES

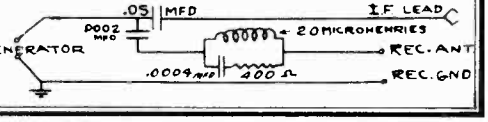
A- Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I.F. trimmers are reached through the two holes on the top of each I.F. can.

B- When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 21 MC, then a weaker image will be heard at 21,000 KC less 930 KC, or about 20,070 KC on the dial.

C- When adjusting this pad, move the tuning hand back and forth and adjust padder until the peak of greatest intensity is obtained.

D- See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.

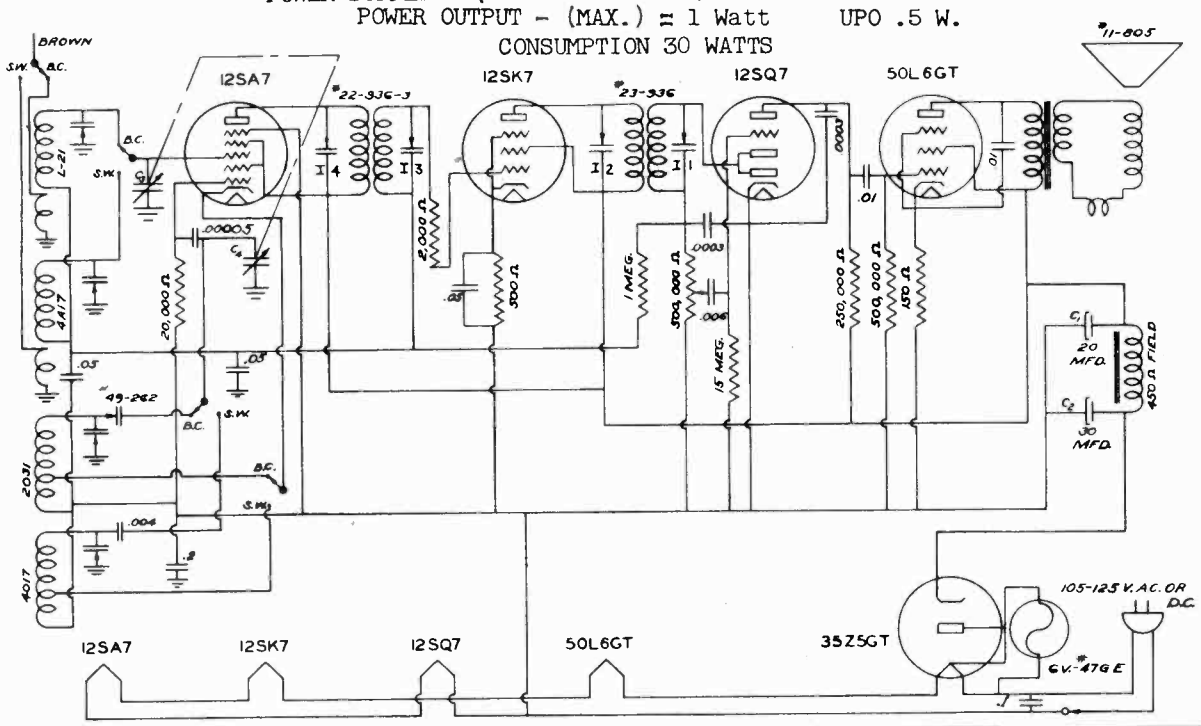
E- The following dummy antenna circuit is recommended, since it is adaptable for any frequency range. The grid cap should remain in place during alignment.



MODEL 702

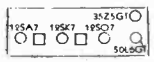
HOWARD RADIO CO.

POWER SUPPLY - (Standard Models) = 105-125 V. AC-DC
POWER OUTPUT - (MAX.) = 1 Watt UPO .5 W.
CONSUMPTION 30 WATTS



C, C_7-20, 30 MFD.-150, 150 V.-NO. 47-266.
C, C_4-VARIABLE CONDENSER-NO. 63-270.
VOLUME CONTROL AND SWITCH-NO. 69-281
V.C. IMP. (400CPS) = 5 Ohms | FIELD =450 Ohms
SPEAKER = Electro-dynamic
SIZE = 5"

I. F-465 K.C.



HOWARD RADIO CO.		
MODEL 702		
D78-715		4-5-40
DWN BY.	CHKD. BY	APPVD. BY

TUNING RANGES = 540 to 1720 KC and 4.6 to 16 MC (178-550 and 18-65 Meters)

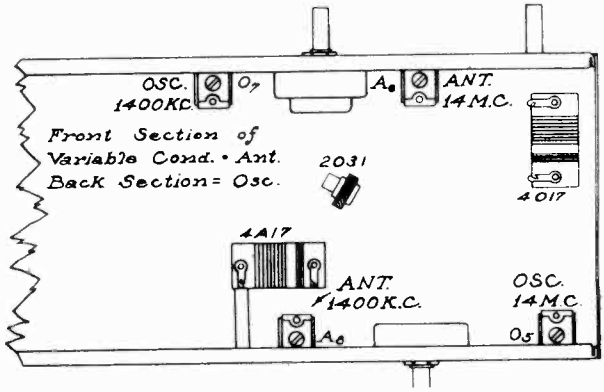
ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Signal Generator Frequency	Signal Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function	Check for Image at
KC	540	456	Grid of 12SA7	A	I_1, I_2, I_3, I_4	IF	
MC	14 MC	14 MC	Ant. (Brown)	B	O_5, A_6	Osc. Ant.	13 MC
KC	14 KC	14 KC	Ant. (Brown)		O_7, A_8	Osc. Ant.	

A- Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I.F. trimmers are reached through the two holes on the top of each I.F. can.
B- When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 14 MC, then a weaker image will be heard at 13,070 KC, in other words 930 KC less on the dial.

The tubes are connected in series in the order as shown by the schematic diagram.

The dual section filter condenser has a common negative, but note that it does not return to ground as the can is insulated from the chassis.



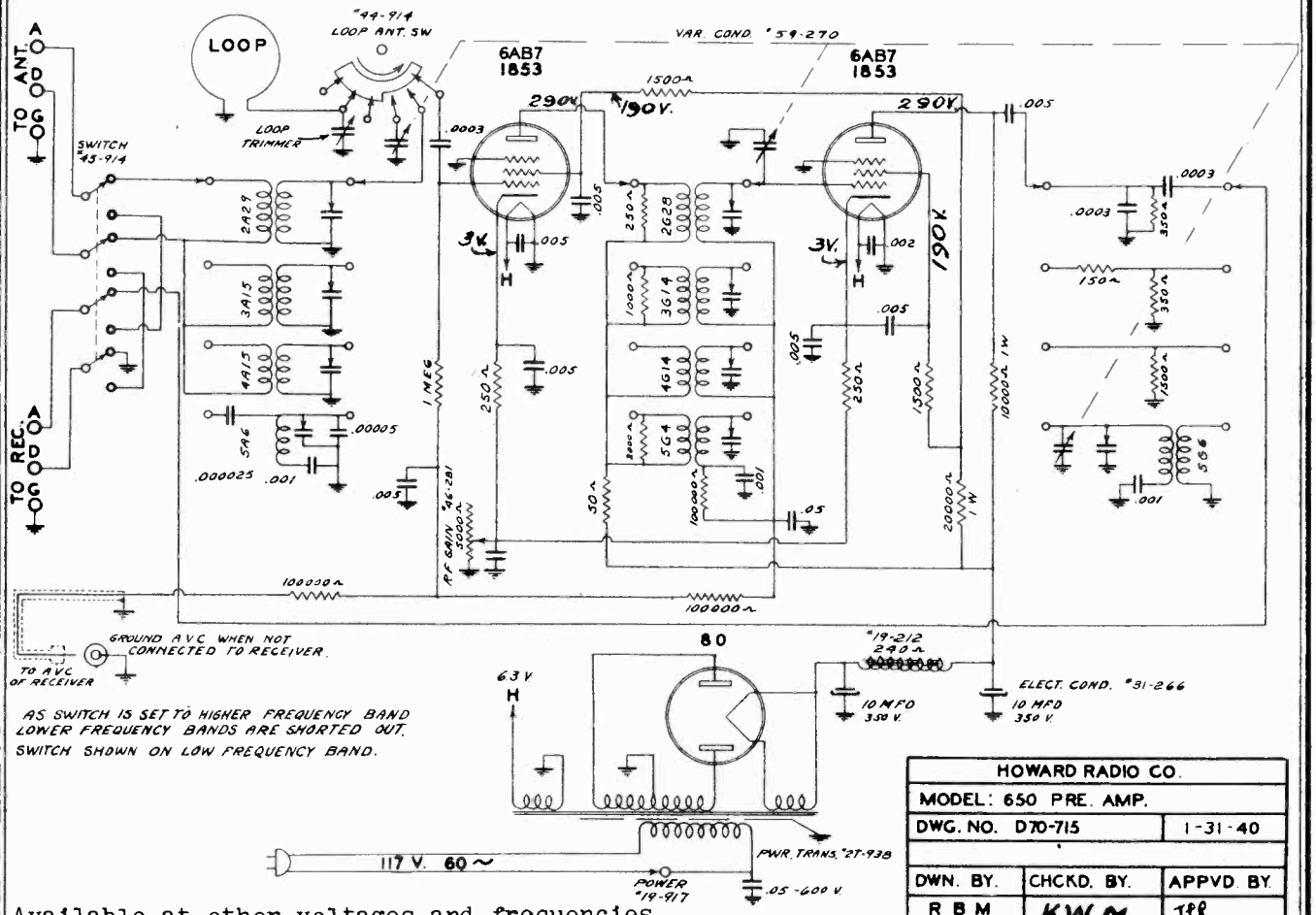
TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE	OSC. PLATE
12SA7	Mixer		95	95	95
12SK7	I.F. Amp.	3.5	95	95	
12SQ7	Det.			45	
50L6GT	Output	6	9	82	

SOCKET VOLTAGE READINGS:

Voltage taken from ground with line voltage at - 117 V. AC.
High voltage reading off rectifier = 115 V.
Drop across speaker field = 20 V.
Voltage taken with 1,000 Ohm per volt meter, from cathode return to points as given.

HOWARD RADIO CO.

MODEL 650 Pre.Amp.
MODEL 655
LOOP KIT



HOWARD RADIO CO.		
MODEL: 650 PRE. AMP.		
DWG. NO. D70-715		1-31-40
DWN. BY.	CHCKD. BY.	APPVD. BY.
R B M	K.W.M.	JFR

Available at other voltages and frequencies.

The Howard Type 650 Pre-Amplifier is designed to be used with ANY RECEIVER and covers a frequency range of .55 mc. to 43 mc. The Pre-Amplifier is constructed for the use with an antenna having either single wire or doublet lead-in or the Howard Type 655 Loop Antenna Kit.

The use of the Loop Kit, Type 655, with this Pre-Amplifier will be indispensable in separating interfering signals and reducing certain noise conditions.

The Antenna-Loop Switch provides a convenient shift from either the loop or an external antenna system.

This unit is coupled at the back to the regular receiver without changing the receiver in any way.

The "IN-OUT" Switch allows the unit to be switched out of the input system allowing the regular antenna to be coupled direct to the receiver.

TYPE 655 LOOP KIT

The Kit consists of four separate loops having band coverage as follows:

NO. OF LOOP	COVERAGE
L14	1700 KC to 550 KC
L13	5.6 MC to 1.7 MC
L12	18 MC to 5.6 MC
L11	34 MC to 22 MC

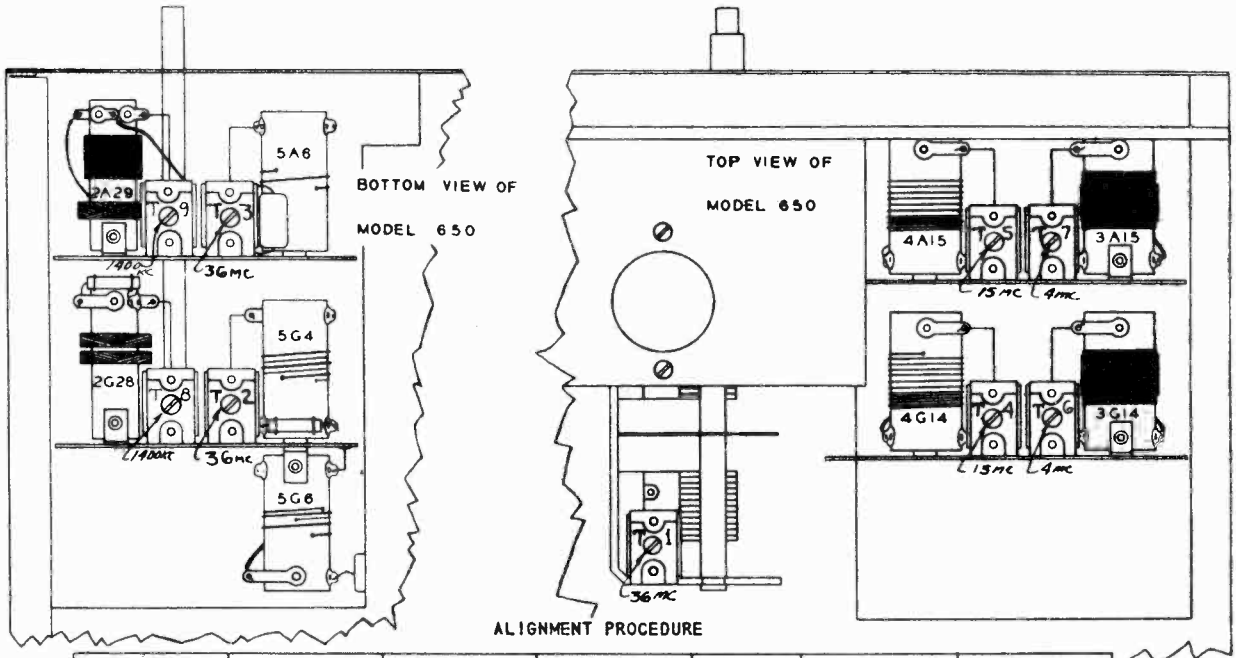
The Pre-Amplifier has a special switch position for the 30 MC LOOP (L11). When the switch is on this position, the Loop Trimmer is connected directly to the Loop, and the main variable condenser disconnected from the Loop. This is done to secure a loop of more effective height on the 30 MC BAND.

When using loops covering the three lower frequency ranges and with switch at Loop, the Loop Trimmer is used to bring the Loop into exact resonance with the incoming signal to secure greater loop performance. The High Frequency end range of the three lower frequency loops can be extended by having loop switch on 30 MC LOOP. In this position the Loop Trimmer will cover the following ranges:

L14 1400-1990 KC L13 4.4-6 MC L12 15.5-22 MC

MODEL 650 Pre-Amp.
MODEL 660 Freq. Mon.

HOWARD RADIO CO.

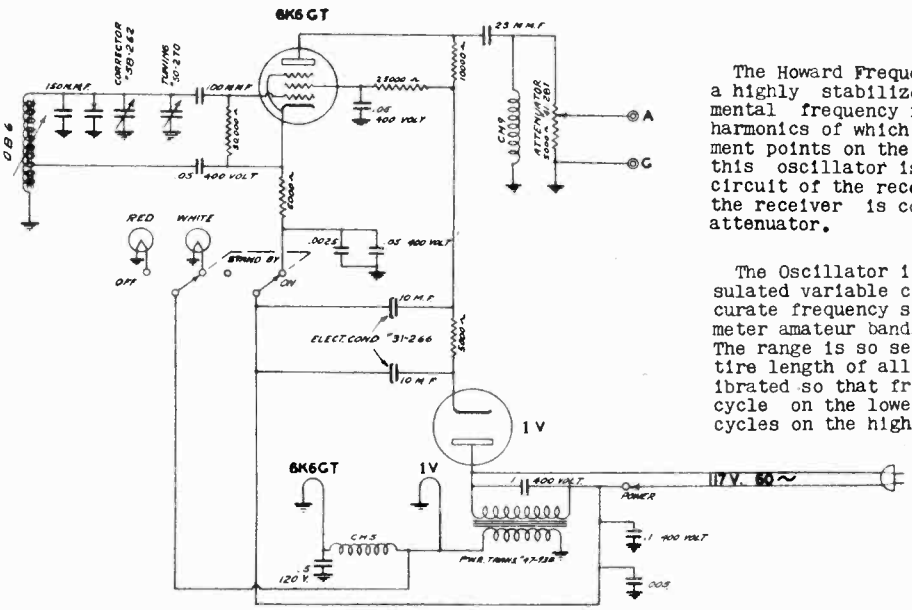


ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
43-17	36	36 MC	A and DG	5	T1,T2,T3	RF,RF,Ant.
18-5.6	15	15 MC	A and DG		T4,T5	RF,Ant.
5.5-1.7	4	4 MC	A and DG		T6,T7	RF,Ant.
1.7-.55	1.4	1400 KC	A and DG		T8,T9	RF,Ant.
	NOTE 5: Align regular receiver first. Set "Ant. Loop" to "Ant." position.					

DUE TO THE CRITICAL ADJUSTMENTS THAT ARE REQUIRED WITH THE FREQUENCY MONITOR, MODEL 660, WE DO NOT ADVISE THAT ANY ATTEMPT BE MADE TO CALIBRATE THIS UNIT; WE THEREFORE SUGGEST IF IT HAS BEEN DETERMINED THAT THE UNIT IS OFF CALIBRATION, IT SHOULD BE SENT BACK TO THE FACTORY FOR A RECALIBRATION.

TYPE 660 FREQUENCY MONITOR



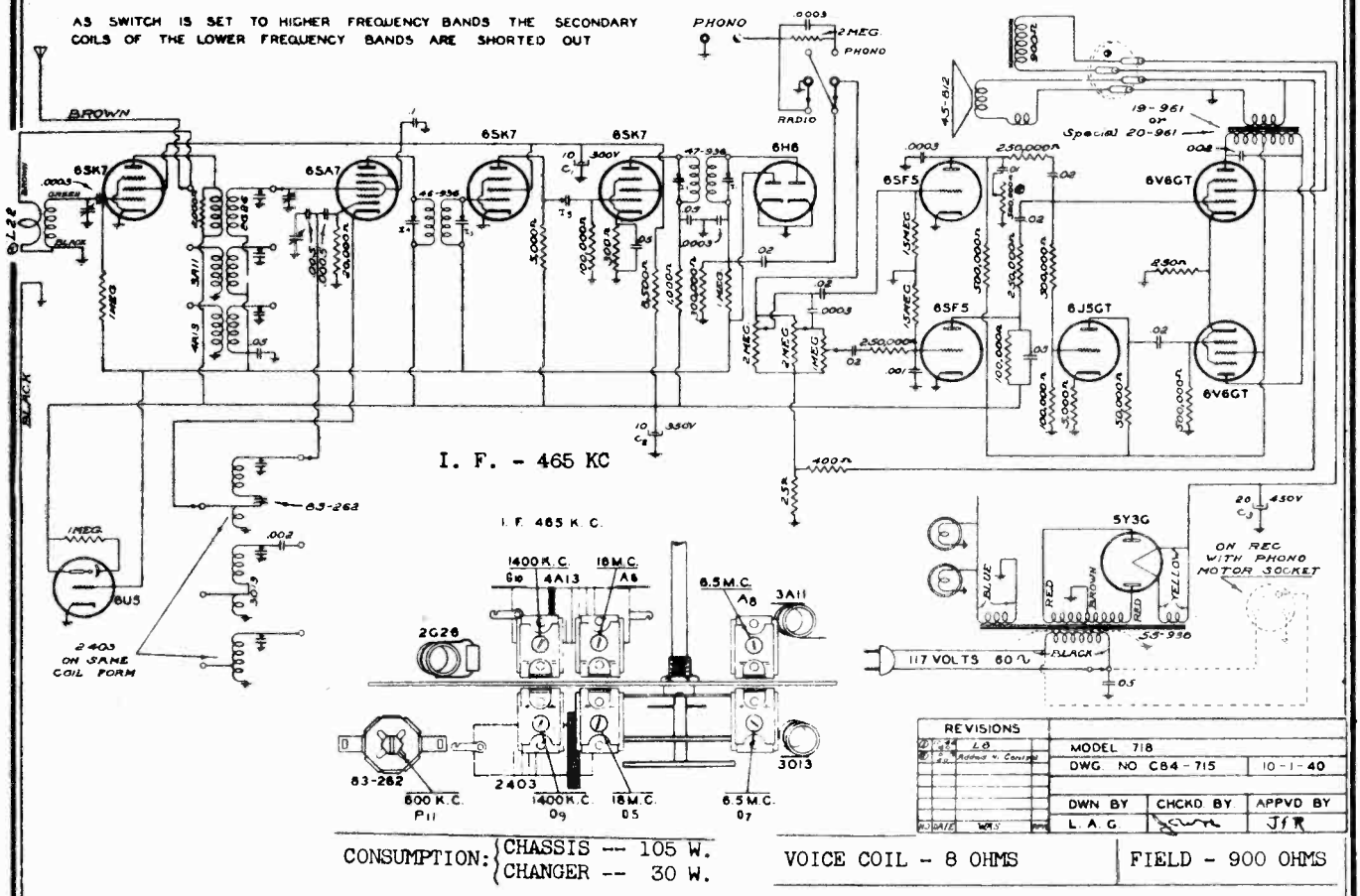
The Howard Frequency Monitor Model 660 consists of a highly stabilized oscillator covering the fundamental frequency range of 850 to 1030 kilocycles, harmonics of which are used as reference or measurement points on the higher bands. The R. F, Output of this oscillator is loosely coupled to the antenna circuit of the receiver, and the voltage applied to the receiver is controlled by a variable resistance attenuator.

The Oscillator is tuned by a precision ceramic insulated variable condenser carrying an extremely accurate frequency scale covering the 10,20,40,80 and 160 meter amateur bands as well as the fundamental range. The range is so selected that harmonics cover the entire length of all amateur bands, and these are calibrated so that frequency can be read within one kilocycle on the lower frequency bands and five kilocycles on the highest band.

HOWARD RADIO CO.		
MODEL 660 FREQ. MON.		
DWG. NO. D69-715		1-3-40
DWN. BY	CHKD. BY	APPVD. BY
R. B. M.	K.W.M	J.H.R

HOWARD RADIO CO.

MODEL 718



REVISIONS		
	MODEL 718	
	DWG. NO C84-715	10-1-40
DWN BY	CHCKD BY	APPVD BY
L. A. G.		JFR

CONSUMPTION: { CHASSIS -- 105 W. / CHANGER -- 30 W.

VOICE COIL - 8 OHMS | FIELD - 900 OHMS

ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
BC	Max.Cap.	465 KC	Converter	A,E	I_1, I_2, I_3, I_4	IF
7-22	18	18 MC	Ant. Lead	B,D	O_5, A_6	Osc.,Ant.
2.2-7	6.5	6.5 MC	Ant. Lead		O_7, A_8	Osc.,Ant.
BC	1400	1400 KC	Ant. Lead		O_9, G_{10}	Osc., RF
BC	600	600 KC	Ant. Lead	C	P_{11}	Osc.,Pad.

A - Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I.F. trimmers are reached through the two holes on the top of each I.F. can.

B - When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 21 MC, then a weaker image will be heard at 21,000 KC less 930 KC, or about 20,070 KC on the dial.

C - When adjusting this pad, move the tuning hand back and forth and adjust padder until the peak of greatest intensity is obtained.

D - See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.

E - The Interstage resistance coupled I.F. stage is coupled by a trimmer. Adjust to maximum capacity for Maximum gain.

Voltage taken from ground with line voltage at - 115 V.Ac.
High voltage reading off rectifier - 320 V.
Drop across speaker field - 100 V.
Voltage taken with 1,000 Ohm per volt meter.
Tune set off station

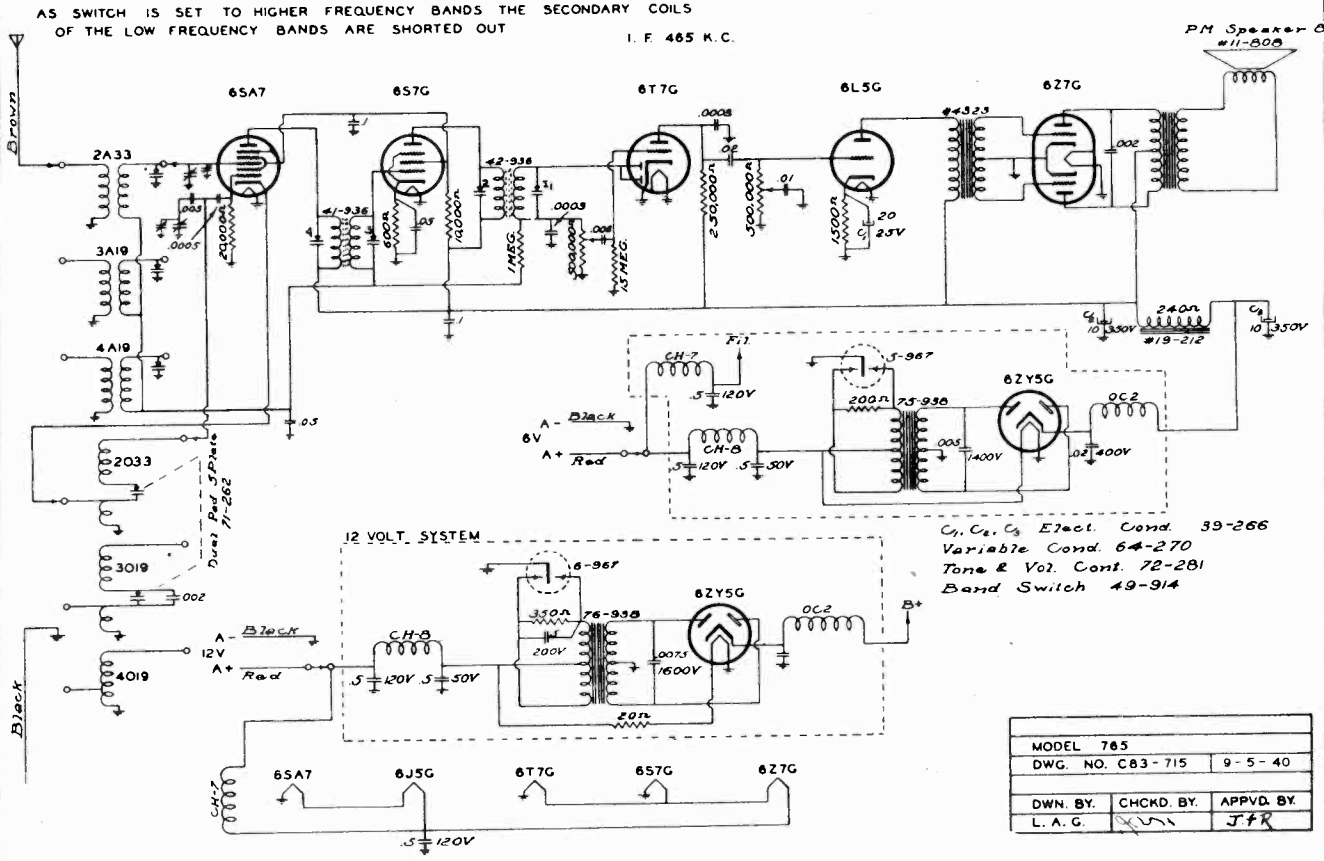
TUBE	FUNCTION	CATHODE	SCR.GRID	PLATE	OSC. PLATE
6SK7	RF		75 - 100	212	
6SA7	Converter		75 - 100	215	75-100
6SK7	I.F.Amp.		75 - 100	150	
6SK7	I.F.Amp.	3	75 - 100	205	
6H6	Det.				
6SF5	Audio			25	

TUBE	FUNCTION	CATHODE	SCR.GRID	PLATE
6SF5	Bass Amp.			112
6J5GT	Inverter	6.5		130
6V6GT	Output	13	220	205
6V6GT	Output	13	220	210
5Y3G	Rectifier			
6U5	Tuning Eye			

MODEL 765
MODEL 768

HOWARD RADIO CO

AS SWITCH IS SET TO HIGHER FREQUENCY BANDS THE SECONDARY COILS OF THE LOW FREQUENCY BANDS ARE SHORTED OUT

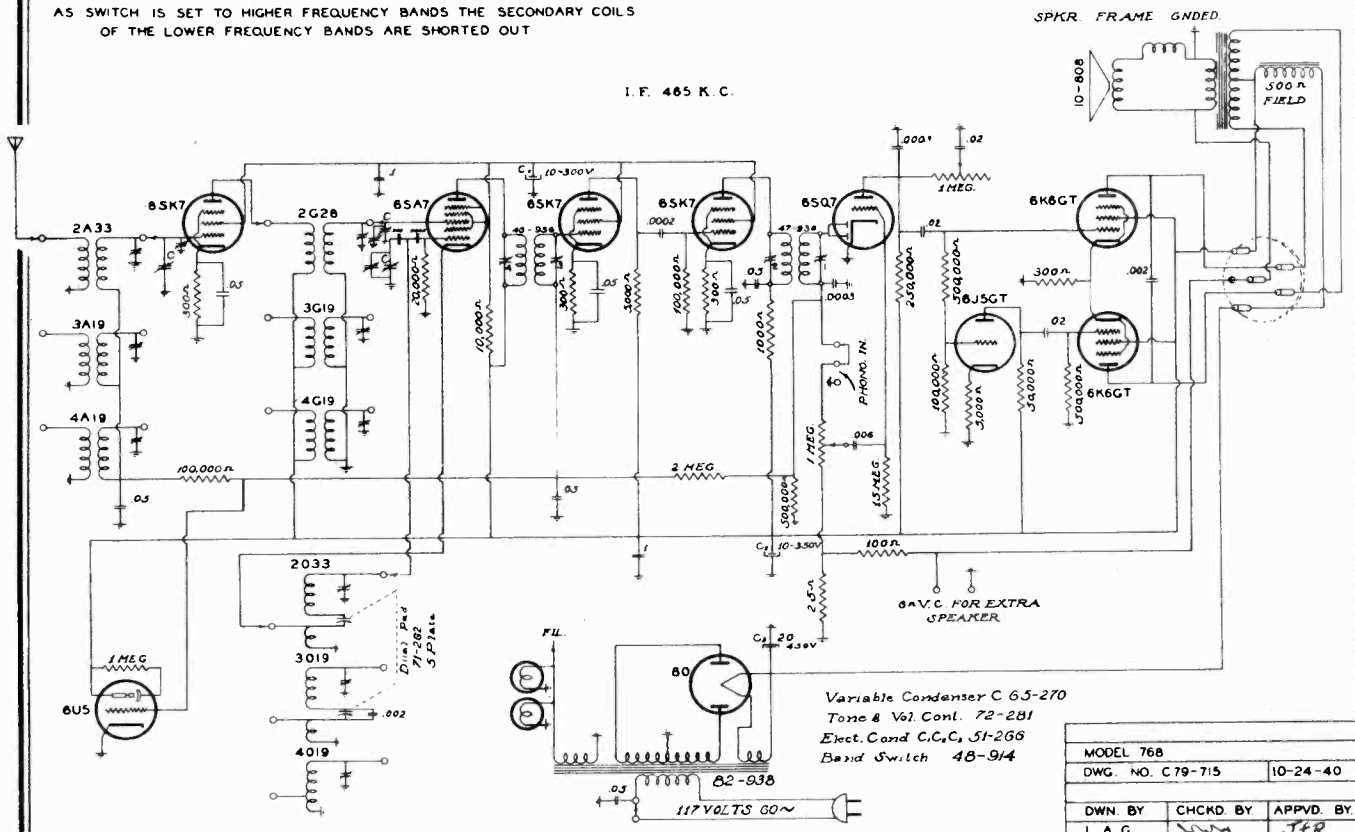


C1, C2, C3 Elect. Cond. 39-266
Variable Cond. 64-270
Tone & Vol. Cont. 72-281
Band Switch 49-914

MODEL 765		
DWG. NO. C83-715		9-5-40
DWN. BY.	CHCKD. BY.	APPVD. BY.
L. A. G.		J.F.R.

FOR OTHER DATA, SEE INDEX

AS SWITCH IS SET TO HIGHER FREQUENCY BANDS THE SECONDARY COILS OF THE LOWER FREQUENCY BANDS ARE SHORTED OUT



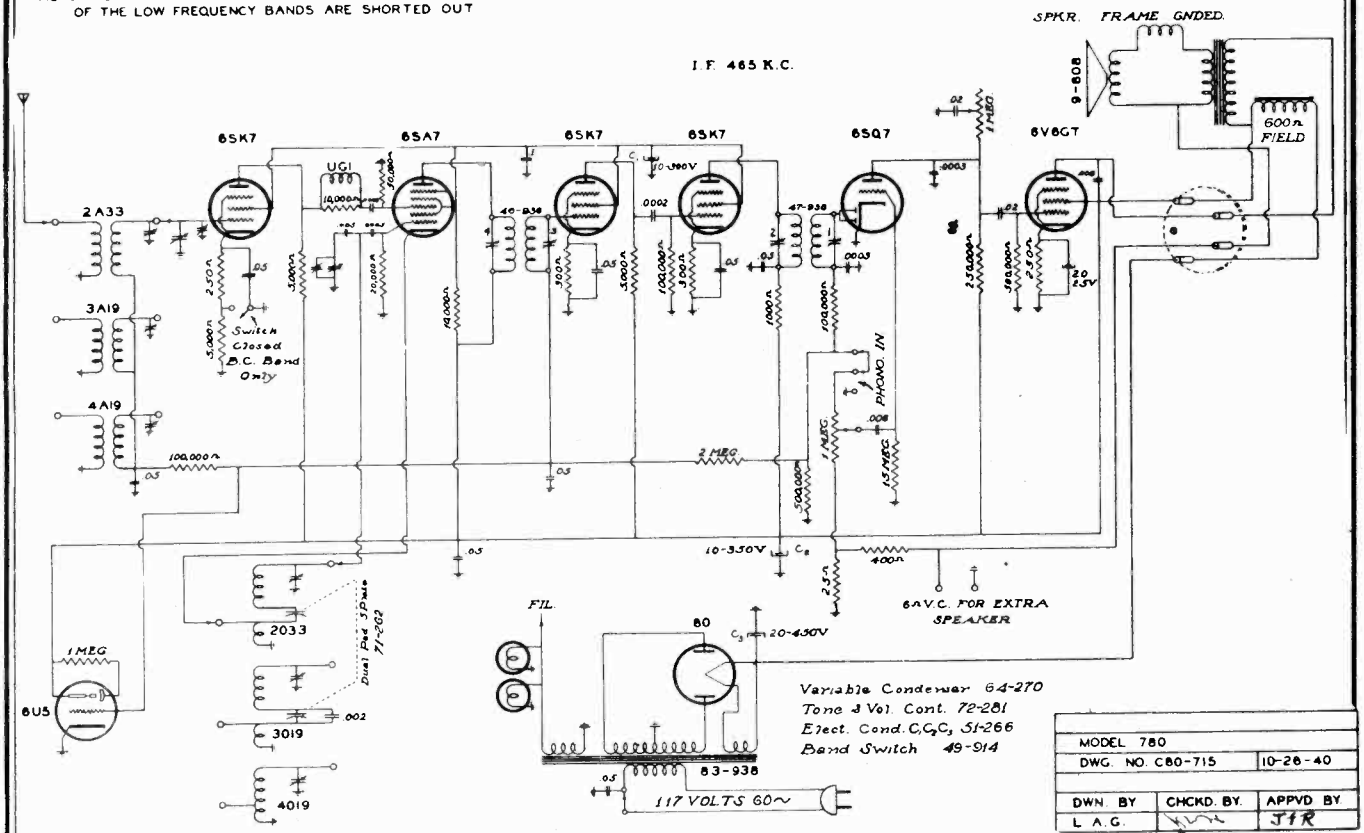
Variable Condenser C 65-270
Tone & Vol. Cont. 72-281
Elect. Cond C1,C2,C3 51-266
Band Switch 48-914

MODEL 768		
DWG. NO. C79-715		10-24-40
DWN. BY	CHCKD. BY.	APPVD. BY.
L. A. G.		J.F.R.

MODEL 780

HOWARD RADIO CO.

AS SWITCH IS SET TO HIGHER FREQUENCY BANDS THE SECONDARY COILS OF THE LOW FREQUENCY BANDS ARE SHORTED OUT



MODEL 780		
DWG. NO. C80-715		10-26-40
DWN. BY	CHCKD. BY.	APPVD BY
L. A. G.		J.F.R.

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
Broadcast	Max. Cap.	465 KC	Converter Grid	A,D	I_1, I_2, I_3, I_4	IF
7-22 MC	21	21 MC	Ant. (Brown)	B	O_5, A_6	Osc., Ant.
2.2-7 MC	6	6 MC	" "		O_7, A_8	Osc., Ant.
2.2-7 MC	2.2	2.2 MC	" "		P_9	Osc. Pad.
Broadcast	1400	1400 KC	" "		O_{10}, A_{11}	Osc., Ant.
Broadcast	600	600 KC	" "	C	P_{12}	Osc. Pad.

A--Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I.F. trimmers are reached through the two holes on the top of each I.F. can.

B--When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 21 MC, then a weaker image will be heard at 21,000 KC less 930 KC, or about 20,070 KC on the dial.

C--When adjusting this pad, move the tuning hand back and forth and adjust padder until the peak of greatest intensity is obtained.

D--See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.

Voltage taken from ground with line voltage at - 120 V.
High voltage reading off rectifier - 325 V.
Drop across speaker field - 58 V.
Voltage taken with 1,000 Ohm per volt meter.
Band Switch in BC position except R.F. Stage measurements.

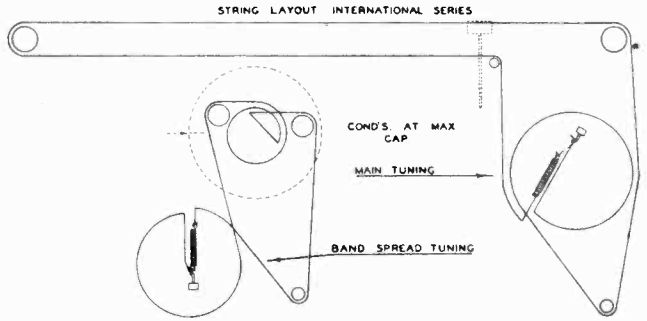
MODEL 780
SOCKET VOLTAGE READINGS:

TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE	OSC. PLATE
6SK7	R.F. BC	8.5	110	260	
	R.F. SW	2.5	98	210	
6SA7	Mixer		110	265	110
6SK7	I.F. Amp.	2	110	230	
6SK7	I.F. Amp.	4	110	250	

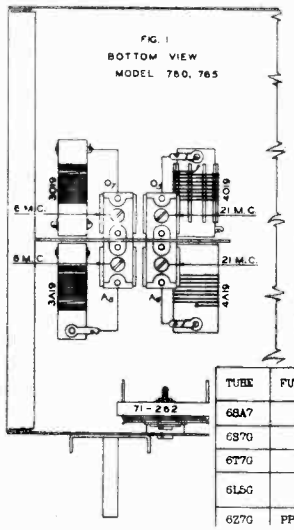
TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE
6SQ7	Diode-AVC			50
6V6GT	Output	12.5	265	250
80	Rect.			
6U5	Tuning Eye	265		

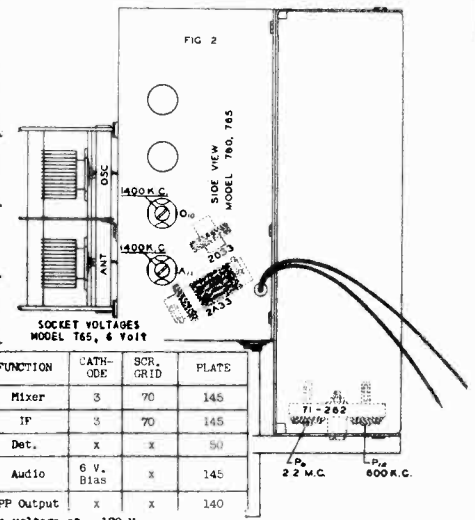
This sheet is a part of Form 75-480, 76-480, or 77-480 for International Models 780, 768, 765, etc.

The below layout shows the order of the drive cord for the tuning and Band Spread mechanisms should any servicing or replacement be necessary.



Trimmer Location for Models 765 and 780





SOCKET VOLTAGES
MODEL 765, 6 Volt

TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE
6BA7	Mixer	3	70	145
6S7G	IF	3	70	145
6T7G	Det.	x	x	50
6L5G	Audio	6 V. Bias	x	145
6Z7G	PP Output	x	x	140

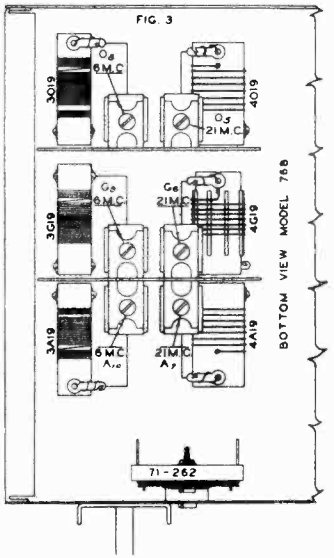
Voltage taken from ground with line voltage at - 120 V.
High voltage reading off rectifier - 300 V.
Drop across speaker field - 65 V.
Voltage taken with 1,000 Ohm per volt meter.

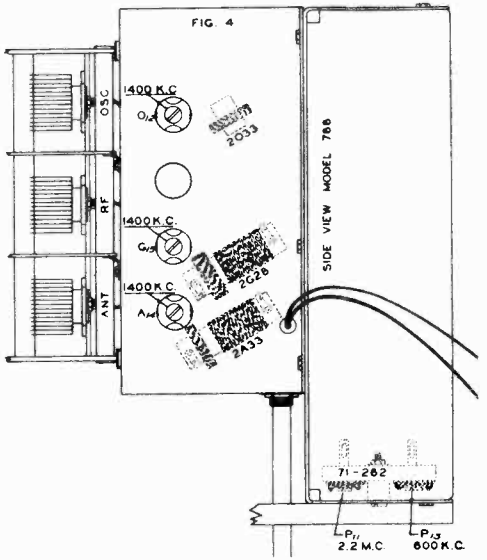
TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE	OSC. PLATE
6BK7	R.F.	2.5	95	235	
6BA7	Mixer		95	236	95
6BK7	I.F.Amp.	3	95	195	
6BK7	I.F.Amp.	3	95	215	
6BQ7	Diode-AVC			47	

MODEL 768
SOCKET VOLTAGE READINGS:

TUBE	FUNCTION	CATH-ODE	SCR. GRID	PLATE
6K8GT	Output	17	236	225
6K8GT	Output	17	236	225
6J5GT	Inverter	7.5		145
80	Rect.			
6U5	Tuning Eye			235

The below diagrams are the trimmer location layout for the International Series, such as the Model 768





MODEL 765
ALIGNMENT PROCEDURE

See Fig. 1 and Fig. 2.

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
Broadcast	Max. Cap.	465 KC	Converter Grid	A,D	I_1, I_2, I_3, I_4	IF
7-22 MC	21	21 MC	Ant. (Brown)	B	O_5, A_6	Osc., Ant.
2.2-7 MC	6	6 MC	" "		O_7, A_8	Osc., Ant.
2.2-7 MC	2.2	2.2 MC	" "		P_9	Osc. Pad.
Broadcast	1400	1400 KC	" "		O_{10}, A_{11}	Osc., Ant.
Broadcast	600	600 KC	" "	C	P12	Osc. Pad.

MODEL 768
ALIGNMENT PROCEDURE

Wave-Band Switch Position	Position of Dial Pointer	Generator Frequency	Generator Connection	See Note	Trimmers Adjusted (In order shown)	Trimmer Function
Broadcast	Max. Cap.	465 KC	Converter Grid	A,D	I_1, I_2, I_3, I_4	IF
7-22 MC	21	21 MC	Ant. (Brown)	B	O_5, G_6, A_7	Osc, RF, Ant.
2.2-7 MC	6	6 MC	" "		O_8, G_9, A_{10}	Osc, RF, Ant.
2.2-7 MC	2.2	2.2 MC	" "		P11	Osc, Pad.
Broadcast	1400	1400 KC	" "		O_{12}, O_{13}, A_{14}	Osc, RF, Ant.
Broadcast	600	600 KC	" "	C	P_{15}	Osc, Pad.

A--Each step of the alignment should be repeated in the original order for greater accuracy. Keep output from Signal Generator low. The I.F. trimmers are reached through the two holes on the top of each I.F. can.

B--When aligning the short wave bands, do not adjust to the IMAGE frequency. For example, if the adjustment is correctly made at 21 MC, then a weaker image will be heard at 21,000 KC less 930 KC, or about 20,070 KC on the dial.

C--When adjusting this pad, move the tuning hand back and forth and adjust padder until the peak of greatest intensity is obtained.

D--See that the tuning hand is set exactly on the last line above 540 when the condenser is at maximum capacity.

ELECTRICAL SPECIFICATIONS

I.F. Frequency 455 K.C.

I.F. Sensitivity (from 6K8 Grid) = 60 Microvolts for ½ Watt Output

Power Output, Max. 5 Watts; Undistorted 2.3 Watts

SPEAKER

5-inch P. M. Dynamic

Voice Coil Impedance 3.5 Ohms at 400 cycles

TUNING RANGE

540 K.C. to 1580 K.C.

TUBE COMPLEMENT

6K8GT Mixer

6K7GT I.F. Amplifier

6SQ7 2nd Detector AVC Audio

6V6GT Output

0Z4 Rectifier

VOLTAGE READINGS-

6 volts *at the set*

0Z4 cathode to chassis = 225 volts.

Output of filter = 205 volts (set B+).

Plate to cathode of 6V6 output tube pins = 3(+) and 8(−) = 205 volts.

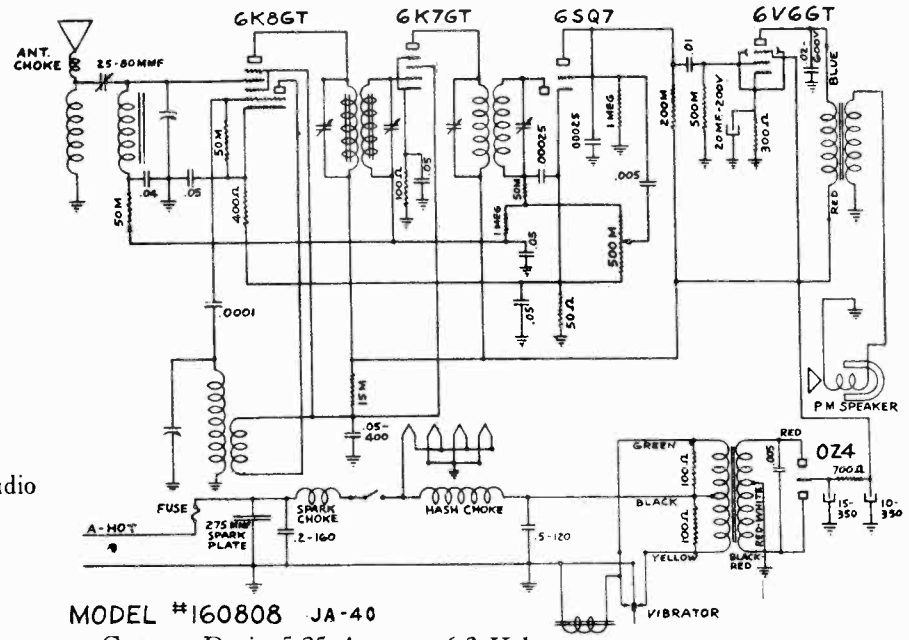
Cathode of 6V6 output (pin #8) to chassis 10 volts.

Screens of 6K7—6K8 (pin #4) to chassis 95 volts.

Screen of 6V6 to chassis (pin #4) 205 volts.

VIBRATOR

Non Synchronous Type



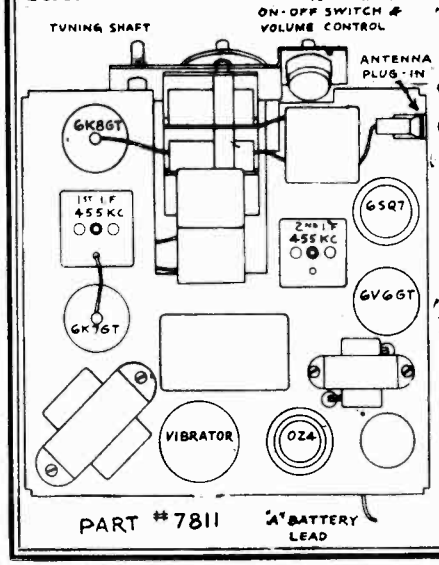
MODEL #160808 JA-40

Current Drain 5.25 Amps at 6.3 Volts

Fuse 14 Ampere

1940—Hudson

NOTE. Receivers with serial numbers above 14000 have a 1/10 MF condenser across vibrator points and a 200 ohm resistor in the cathode of the 6K8GT tube.



TO ALIGN I.F.

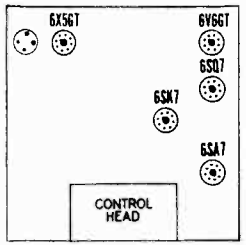
Attach signal generator "hot" lead to grid of 6K7 through a 1/10 MF condenser, connect ground side of generator to case. Set signal generator at 455 K.C., turn volume control to maximum, attach an output meter or resonance indicator, either the plate circuit of the 6V6 tube or across the voice coil terminals of the speaker. Adjust 2nd I.F. transformer for maximum output. Shift hot generator lead to 6K8 grid and adjust 1st I.F. transformer for maximum output. Recheck 2nd I.F. adjustment, with generator connected to 6K8 grid. Do not use greater generator signal than is necessary to obtain good output meter reading. For location of 1st and 2nd I.F. transformers, see tube layout diagram. I.F. sensitivity = approximaely 60 micrtovolts for ½ watt output, measured from 6K8 grid.

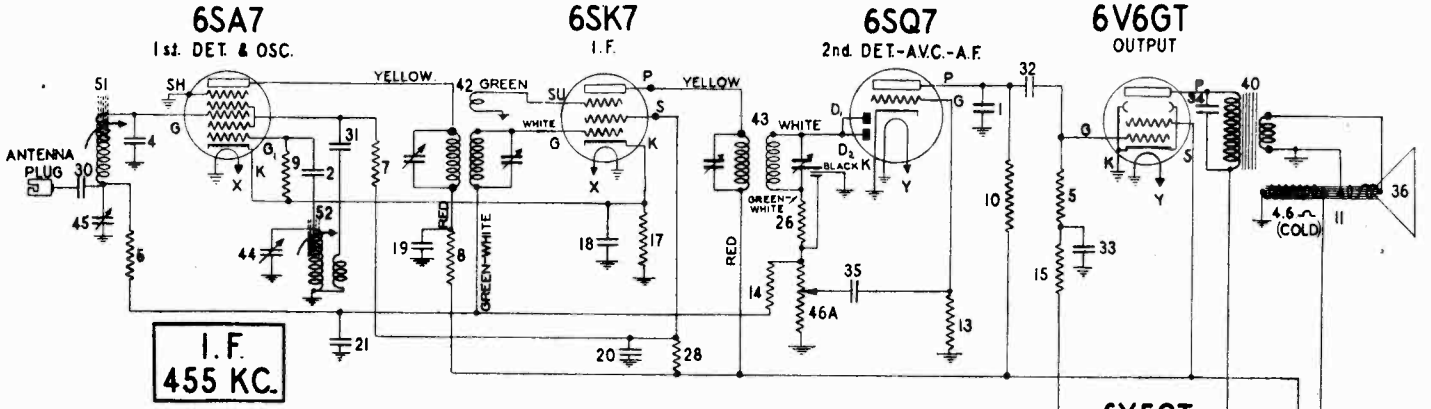
TO ALIGN R.F.

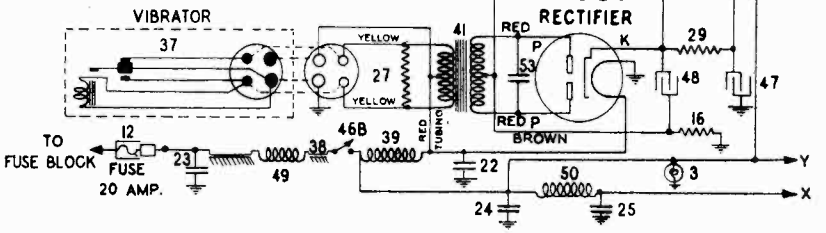
Use standard cowl antenna cable to connect signal generator to set. Connect a 35 micrmicro farad condenser to the signal generator "hot" terminal and the other side of the condenser to the antenna cable. Connect the ground side of the signal generator to the shield side of the cable. Turn variable condenser to zero capacity. Set signal generator to 1580 K.C. Adjust trimmer on oscillator section (front section of condenser) until signal is heard. Tune set to approximately 1400 K.C., set signal generator to this frequency, and adjust antenna compensator for maximum output. R.F. sensitivity 6 micro volts at 1400 K.C. and 10 micro volts at 600 K.C. for ½ watt output.

HUDSON AUTOMOBILE RADIO RECEIVER—JUNIOR MODEL JA-41

TUBE LOCATIONS

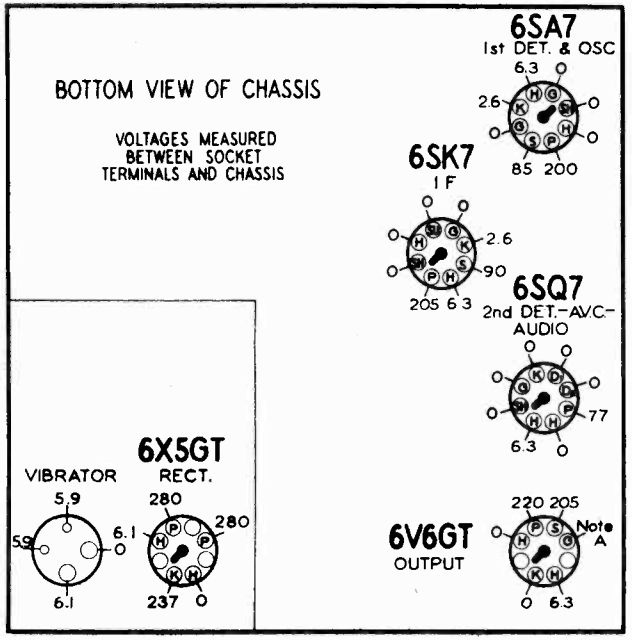






SOCKET VOLTAGES

6.6 V. BATTERY — TOTAL DRAIN 5.7 AMP



IMPORTANT: Use a high resistance voltmeter of at least 1000 ohms per volt.

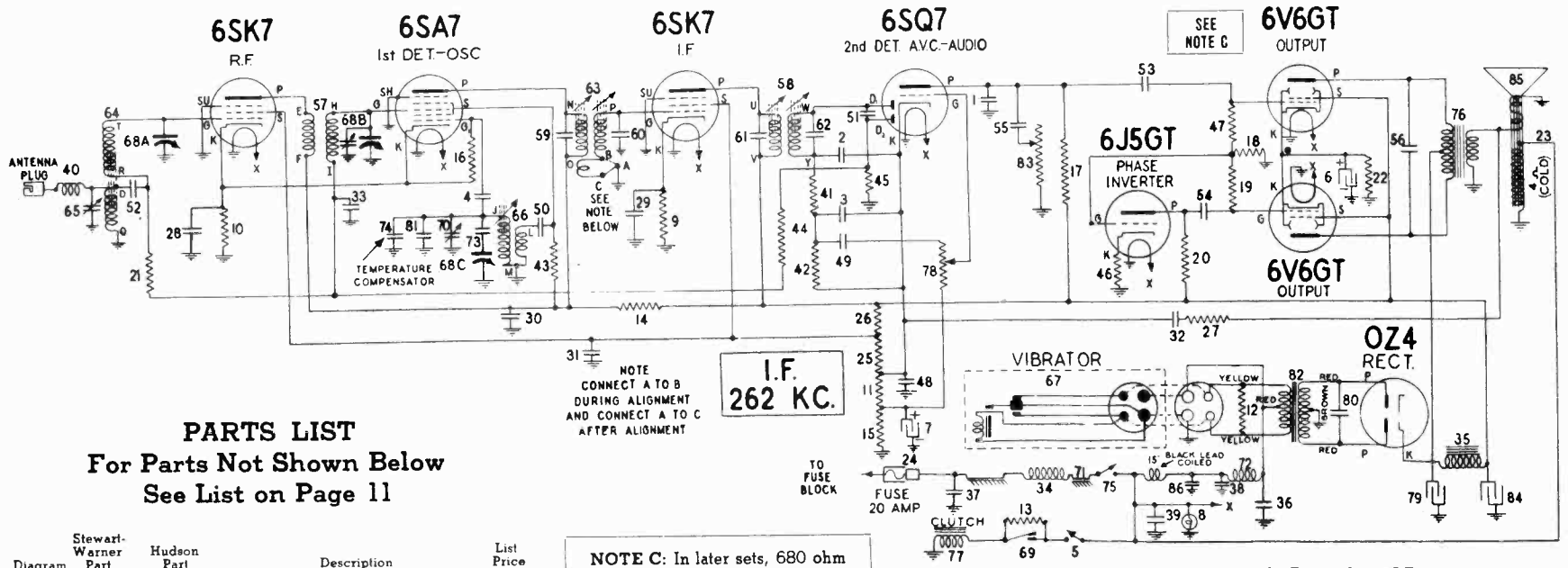
NOTE A: The bias for the control grid of the 6V6GT tube is—12 volts measured across resistor No. 16.

FOR PARTS NOT SHOWN BELOW SEE LIST ON PAGE 11

Diagram Number	Stewart-Warner Part Number	Hudson Part Number	Description	List Price
1	83539	BO-158447	Condenser—mica 260 mfd.	$0.20
2	85061	BO-158450	Condenser—mica 51 mmfd.	.15
3	110629	BO-200571	Dial light—6.3 volt	.15
4	112008	BO-200204	Condenser—mica 120 mmfd.	.16
5-6	112971	BO-158477	Resistor—insulated 470,000 ohm ¼ watt	.15
7	112977	BO-158481	Resistor—insulated 470 ohms ¼ watt	.15
8	112980	BO-158483	Resistor—insulated 1000 ohms ¼ watt	.15
9-10	112987	BO-158489	Resistor—insulated 220,000 ohms ¼ watt	.15
11	U-115121	BO-200681	Speaker—dynamic 5"	3.80
12	116049	BO-170420	Fuse—20 amp. 25 volt	.05
13	116050	BO-200231	Resistor—insulated 10 meg. ¼ watt	.12
14	116056	BO-200232	Resistor—2.2 meg. ¼ watt	.10
15	116058	BO-161479	Resistor—insulated 47,000 ohms ¼ watt	.12
16	116083	BO-200236	Resistor—insulated 300 ohms 2 watts wire wound	.24
17	116095	BO-161488	Resistor—220 ohms ¼ watt	.12
18-19-20	116625	BO-161461	Condenser—1. mfd. 600 volt	.25
21	116819	BO-161465	Condenser—.05 mfd. 600 volt	.20
22-23	118225	BO-161473	Condenser—.5 mfd. 150 volt	.45
24-25	118231	BO-200205	Condenser—.25 mfd. 150 volt	.32
26	118829	BO-200239	Resistor—47,000 ohms 1/10 watt	.10
27	118833	BO-200240	Resistor—220 ohms 1 watt	.15
28	118834	BO-200241	Resistor—insulated 15,000 ohms 1 watt	.15

Diagram Number	Stewart-Warner Part Number	Hudson Part Number	Description	List Price
29	118835	BO-200242	Resistor—insulated 1500 ohms 1 watt	.15
30-31	119193	BO-200206	Condenser—.01 mfd. 600 volt	.15
32-33	119414	BO-200207	Condenser—.02 mfd. 600 volt	.15
34	119415	BO-200208	Condenser—.015 mfd. 600 volt	.15
35	119817	BO-200211	Condenser—.004 mfd. 600 volt	.15
36	U-160762	BO-200684	Cone & voice coil for U-115121 speaker	1.60
37	160796	BO-200577	Vibrator	3.00
38	160845	BO-200218	Condenser—metal clad—.0002 mfd.	.18
39	160858	BO-200583	Choke coil	1.00
40	160938	BO-200586	Output transformer	1.50
41	160940	BO-200587	Power transformer—6 volt primary	3.65
42	160976	BO-200589	Transformer—1st I.F.	1.35
43	160981	BO-200590	Transformer—2nd I.F.	1.35
44	161006	BO-200221	Condenser—trimmer	.25
45	161007	BO-200222	Condenser—trimmer	.22
46A-46B	161019	BO-200592	Volume control—1 mg. with switch	1.30
47	161024	BO-200223	Condenser—electrolytic 10 mfd. 450 volt	.70
48	161025	BO-200224	Condenser—electrolytic 10 mfd. 450 volt	.70
49-50	161078	BO-200593	Choke coil	.25
51	161081	BO-200594	Antenna coil & tuning core (less shield can)	1.40
52	161086	BO-200595	Oscillator coil & tuning core (less shield can)	1.40
53	161101	BO-200227	Buffer condenser—.01 mfd. 2000 volts	.35

HUDSON AUTOMOBILE RADIO RECEIVER—CUSTOM MODEL DB-41



PARTS LIST

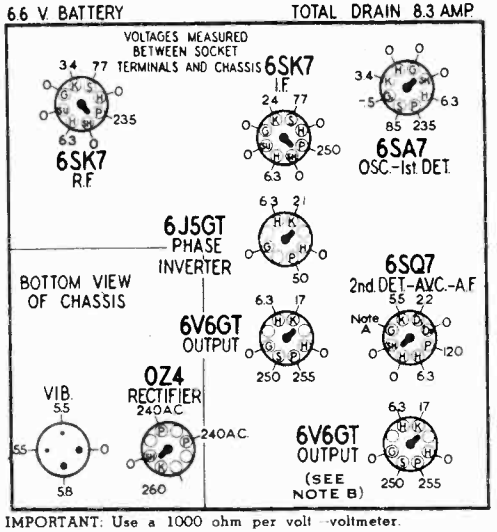
For Parts Not Shown Below See List on Page 11

Diagram Number	Stewart-Warner Part Number	Hudson Part Number	Description	List Price
1	83539	BO-158447	Condenser—mica 260 mmfd.	$0.20
2-3	83783	BO-158448	Condenser—mica 110 mmfd.	.20
4	85563	BO-200203	Condenser—mica 26 mmfd.	.15
5	88054	BO-200570	Switch for "set-up"	.30
6-7	110377	BO-158460	Condenser—electrolytic 10 mfd. 35 volt	.80
8	110629	BO-200571	Dial light—6.3 volt	.15
9-10-11	112963	BO-158470	Resistor—insulated 330 ohms ¼ watt	.15
12-13	112976	BO-158480	Resistor—wire wound 220 ohms ½ watt	.15
14-15	112980	BO-158483	Resistor—insulated 1000 ohms ¼ watt	.15
16-17-18 19-20	112987	BO-158489	Resistor—insulated 220,000 ohms ¼ watt	.15
21	112993	BO-161477	Resistor—carbon 470,000 ohms 1/10 watt	.12
22	114335	BO-158493	Resistor—wire wound 430 ohms 2 watts	.20
23 M-115123		BO-200683	Speaker—dynamic 8"	5.80
24	116049	BO-170420	Fuse—20 amp. 25 volt	.05
25	116075	BO-200234	Resistor—27000 ohms 1 watt	.18
	116080	BO-200235	Resistor—680 Ohms ¾ Watt	.15
26	116084	BO-200237	Resistor—insulated 27000 ohms 2 watts	.15
27	116091	BO-161486	Resistor—insulated 6800 ohms ¼ watt	.15
28-29 30-31 32	116625	BO-161461	Condenser—.1 mfd. 600 volt	.25
33	116819	BO-161465	Condenser—.05 mfd. 600 volt	.20
34	117332	BO-161495	Choke coil in "A" line	.30
35	117334	BO-200702	Filter Choke—Iron Core	.95
36-37	118225	BO-161473	Condenser—.5 mfd. 150 volt	.45
38-39	118231	BO-200205	Condenser—.25 mfd. 150 volt	.32
40	118726	BO-161580	Antenna motor noise choke	.24
41	118829	BO-200239	Resistor—47,000 ohm 1/10 watt	.10
42	118836	BO-200243	Resistor—330,000 ohms 1/10 watt	.10
43	118837	BO-200244	Resistor—39,000 ohms 1 watt	.15
44-45	118839	BO-200246	Resistor—1.5 megohm 1/10 watt	.10
46	118840	BO-200247	Resistor—2,200 ohms ¼ watt	.10
47	118841	BO-200248	Resistor—130,000 ohms ¼ watt	.10
48-49 50-51	119193	BO-200206	Condenser—.01 mfd. 600 volt	.15
52-53-54	119414	BO-200207	Condenser—.02 mfd. 600 volt	.15
55	119416	BO-200208	Condenser—.008 mfd. 600 volt	.15
56	160430	BO-200212	Condenser—.001 mfd. 600 volt	.15
57	160661	BO-200572	Coil—R. F.	1.25
58	160681	BO-200573	Transformer—2nd I.F.	2.20
59-60 61-62	160685	BO-200213	Condenser—mica 110 mmfd. (5%)	.25
63	160721	BO-200573	Transformer—1st I.F.	2.20
64	160735	BO-200575	Coil—antenna	2.00
65	160760	BO-200214	Condenser—trimmer	.24
66	160765	BO-200576	Coil—oscillator	1.20
67	160796	BO-200577	Vibrator	3.00
68A to C	160801	BO-200215	Condenser—variable gang	3.65
69	160817	BO-200619	Contact switch for clutch	.90
70	160844	BO-200217	Condenser—air trimmer	.85
71	160845	BO-200218	Condenser—metal clad—.0002 mfd.	.18
72	160858	BO-200583	Choke coil	1.00
73	160859	BO-200219	Condenser—mica 840 mmfd.	.45
74	160860	BO-200220	Temperature compensator condenser	.40
75	160861	BO-200584	Switch—on-off	1.20
76	160863	BO-200585	Output transformer	1.70
77	160919	BO-200645	Clutch case & coil assembly	1.25
78	160954	BO-200588	Volume control—1 megohm	1.00
79	161025	BO-200224	Condenser—electrolytic 10 mfd. 450 volt	.70
80	161101	BO-200227	Buffer condenser—.01 mfd. 2000 volts	.35
81	161126	BO-200228	Condenser—mica 21 mmfd. (5%)	.20
82	161130	BO-200599	Power transformer—6 volt primary	4.90
83	161156	BO-200600	Tone control—500,000 ohms	.75
84	161168	BO-200229	Condenser—electrolytic 15 mfd. 450 volt	.80
85	161185	BO-200686	Cone & voice coil assembly	1.90
86	88205	BO-158455	Condenser .0021 mfd. mica	.35

NOTE C: In later sets, 680 ohm resistors (Part No. 116080) are connected in series with each output tube grid. A few sets used 800 ohms.

SOCKET VOLTAGES

6.6 V. BATTERY — TOTAL DRAIN 8.3 AMP.



IMPORTANT: Use a 1000 ohm per volt voltmeter.

NOTE A: The voltage on the control grid of the 6SQ7 tube is 4.5 volts measured across resistor No. 15.

NOTE B: This socket mounted with keyway in opposite direction in later sets.

ALIGNMENT PROCEDURE FOR MODEL JA-41 ONLY

IMPORTANT: The "Simplified Alignment Procedure" should always be used unless the adjustments on the tuner cores have become loose or if someone has tampered with them.

Use the "**General Alignment Procedure**" only in instances of poor calibration, and poor sensitivity at the low frequency end even after the Simplified Procedure has been completed. The General Alignment Procedure is also necessary if the antenna or oscillator coils or cores are replaced.

SIMPLIFIED ALIGNMENT PROCEDURE

REMOVE TOP COVERS OF RECEIVER - BOTH SPEAKER SECTION AND CONTROL COVER

Dummy Antenna in Series with Signal Generator	Connection of Sig. Gen. output to Receiver	Signal Generator Frequency	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD. Condenser	Antenna Connection on Set	455 KC	Any point where it does not affect the Signal.	1—2	2ND I.F.	Adjust for maximum output.
				3—4	1ST I.F.	
50 MMFD. Mica Condenser	Antenna Connection on Set	1600 KC	Turn tuning knob to max. clockwise position.	5	Oscillator (Shunt) Condenser	Carefully adjust for maximum output.
50 MMFD. Mica Condenser	Antenna Connection on Set	1400 KC	Accurately tune to 1400 KC generator Signal.	6	Antenna (Shunt) Condenser	Adjust for maximum output.

CALIBRATE DIAL AS SHOWN UNDER HEADING "DIAL CALIBRATION" OVER FIG. 2 BELOW

After the set has been installed in the car, tune in a fairly weak station near 1400 KC and adjust trimmer No. 6 until maximum volume is obtained. This trimmer can be reached by removing the plug button at the left front corner of the bottom of the case.

GENERAL ALIGNMENT PROCEDURE

TO PERFORM THIS ALIGNMENT PROCEDURE THE RECEIVER CHASSIS MUST BE REMOVED FROM THE CASE.

Dummy Antenna in Series with Signal Generator	Connection of Sig. Gen. output to Receiver	Signal Generator Frequency	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD. Condenser	Antenna Connection on Set	455 KC	Any point where does not affect the signal.	1—2	2ND I.F.	Adjust for maximum output.
				3—4	1ST I.F.	

ADJUSTMENT OF TUNING CORES IN ANTENNA AND OSCILLATOR COILS:

1. Loosen the lock nuts at the ends of the threaded tuning core shafts (see Fig. 2 below).
2. Rotate the tuning knob of the receiver to the maximum clockwise position so that tuning cores are out as far as possible.
3. Rotate each tuning core so it extends out of the coil form exactly the amount shown in Fig. 2, below. Hold the core stationary, tighten the lock nut on the oscillator core (top coil) (see Fig. 2 below). Use a small amount of speaker cement on the lock nut to insure against change in setting. Do not tighten the lock nut on the antenna core as further adjustment is necessary.

50 MMFD. Mica Condenser	Antenna Connection on Set	1600 KC	Turn tuning knob to max. clockwise position.	5	Oscillator (Shunt) Condenser	Carefully adjust for maximum output.
50 MMFD. Mica Condenser	Antenna Connection on Set	1600 KC	Same as above	6	Antenna (Shunt) Condenser	Adjust for maximum output.
50 MMFD. Mica Condenser	Antenna Connection on Set	1400 KC	Accurately tune to 1400 KC generator signal.	7	Tuning core of Antenna coil.	Rotate core in or out for max. output. Tighten lock nut; use speaker cement on nut.

CALIBRATE DIAL AS SHOWN UNDER HEADING "DIAL CALIBRATION" OVER FIG. 2 BELOW

After the set has been installed in the car, tune in a fairly weak station near 1400 KC and adjust trimmer No. 6 until maximum volume is obtained. This trimmer can be reached by removing the plug button at the left front corner of the bottom of the case.

DIAL CALIBRATION: Place the case nose on the receiver case. Check the calibration by tuning in a station of known frequency on the high frequency end of the dial. If calibration is incorrect, hold the tuning knob and turn the dial drum, using the eraser on your pencil to rotate the drum, to the correct frequency. Repeat this after set is installed in car.

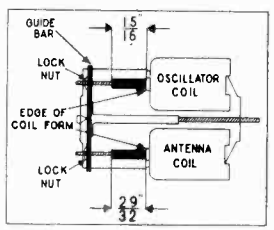


FIG. 2

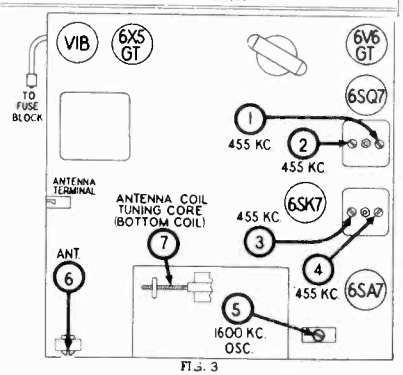


FIG. 3

ALIGNMENT PROCEDURE FOR MODELS DB-41 OR SA-41

For alignment an output meter and accurately calibrated signal generator are required.

1. Remove the top and bottom covers of the receiver case.
2. Connect output meter across voice coil or between the plates of the 6V6GT output tubes.
3. Connect the ground lead of the signal generator to the receiver chassis and leave it connected throughout this procedure.
4. Turn volume control to maximum volume position.
5. Check to see that pointer is ¾" from end of dial window (Vol. Control end) when gang condenser is fully meshed.

Dummy Antenna in Series with Signal Generator	Connection of Sig. Gen. output to Receiver	Signal Generator Frequency	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
I. F. ALIGNMENT FOR MODEL DB-41 ONLY (8 tube Set) BEFORE ALIGNING THE I.F. TRANSFORMERS, CONNECT GREEN-WHITE JUMPER LOCATED UNDER 1ST I.F. TRANSFORMER BETWEEN TERMINALS A AND B AS SHOWN IN FIGURE 6.						
.1 MFD. Condenser	To point Marked "X" in Fig. 6	262 KC	Any point where it does not affect the signal.	1—2 (See Figs. 5 & 6)	2ND I.F.	Adjust for maximum output. **Reconnect green-jumper (under 1st I. F.) between terminals A and C (see Fig. 6).** This must be done before alignment of the rest of the receiver.
				3—4 (See Figs. 5 & 6)	1ST I.F.	
I. F. ALIGNMENT FOR MODEL SA-41 ONLY (6 tube Set)						
.1 MFD. Condenser	To point marked "X" in Fig. 8	455 KC	Any point where it does not affect the signal.	1—2 (See Figs. 7 & 8)	2ND I.F.	Adjust for maximum output. Then repeat adjustment.
				3—4 (See Figs. 7 & 8)	1ST I.F.	
R. F. ALIGNMENT FOR EITHER MODEL SA-41 OR DB-41						
50 MMFD. Mica Condenser	Antenna Connection of Set	1600 KC	Gang condenser completely open. Dial pointer as far to right as possible.	5	Oscillator (Shunt) Condenser	Carefully adjust for maximum output.
50 MMFD. Mica Condenser	Antenna Connection on Set	1400 KC	Carefully tune to 1400 KC. generator signal.	**8 This trimmer used on model DB-41 only (See Fig. 5)**	R.F. (Shunt) Condenser	Adjust for maximum output.
50 MMFD. Mica Condenser	Antenna Connection on Set	1400 KC	Carefully tune to 1400 KC. generator signal.	6	Antenna (Shunt) Condenser	Adjust for maximum output.
50 MMFD. Mica Condenser	Antenna Connection of Set	600 KC	Tune to 600 K.C. generator signal.	7	Ajustable core of oscillator coil.	Adjust for maximum output. Try to increase output by detuning adjusting screw and retuning receiver dial until maximum output is obtained.

NOW REPEAT ADJUSTMENTS MADE ON TRIMMERS 5, 8, 6 AND 7

After the set had been installed in the car tune in a fairly weak station near 1400 KC. and adjust trimmer No. 6 until maximum volume is obtained. This trimmer can be reached by removing the plug button at the left front corner of the bottom of the case.

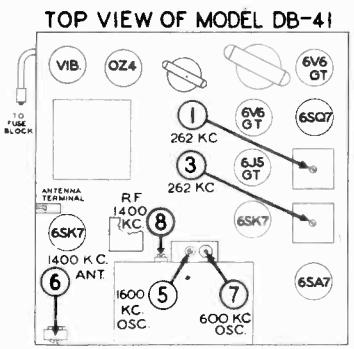


FIG. 5

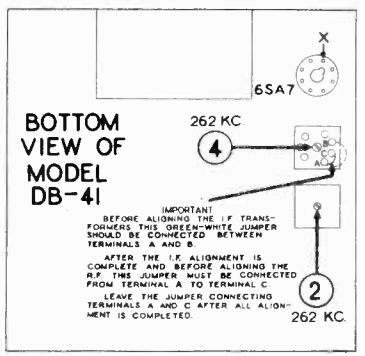
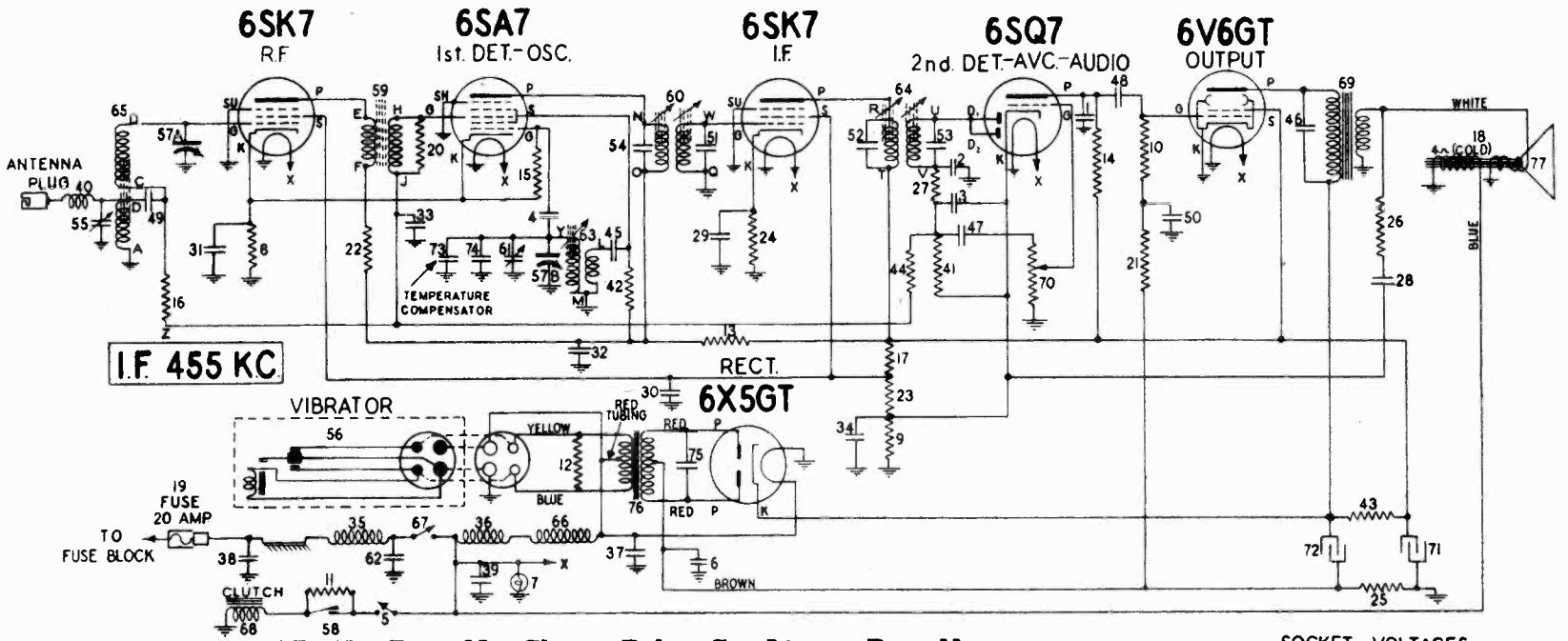


FIG. 6

HUDSON MOTOR CAR CO.

HUDSON AUTOMOBILE RADIO RECEIVER—DELUXE MODEL SA-41

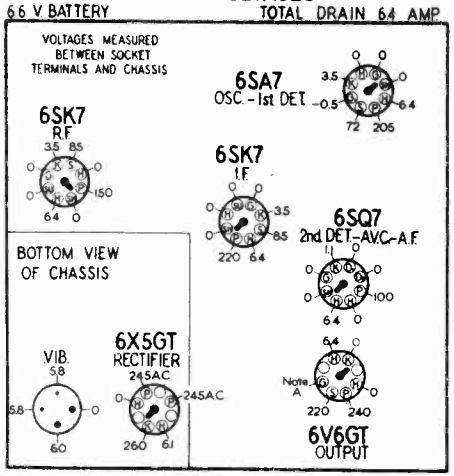


PARTS LIST—For Parts Not Shown Below See List on Page 11

Diagram Number	Stewart-Warner Part Number	Hudson Part Number	Description	List Price
1	83539	BO-158447	Condenser—mica 260 mmfd	$0.20
2-3	83783	BO-158448	Condenser—mica 110 mmfd	.20
4	85563	BO-200203	Condenser—mica 26 mmfd	.15
5	88054	BO-200570	Switch—for "set-up"	.30
6	88205	BO-158455	Condenser—mica 2100 mmfd	.35
7	110629	BO-200571	Dial light—6.3 volt	.15
8-9	112963	BO-158470	Resistor—insulated 330 ohms ¼ watt	.15
10	112971	BO-158477	Resistor—insulated 470,000 ohms ¼ watt	.15
11-12	112976	BO-158480	Resistor—wire wound 220 ohms ½ watt	.15
13	112980	BO-158483	Resistor—insulated 1000 ohms ¼ watt	.15
14-15	112987	BO-158489	Resistor—insulated 220,000 ohms ¼ watt	.15
16	112993	BO-161477	Resistor—carbon 470,000 ohms 1/10 watt	.12
17	112998	BO-200230	Resistor—insulated 22,000 ohms 2 watts	.20
18 M	115122	BO-200682	Speaker—dynamic 6 inch	4.50
19	116049	BO-170420	Fuse—20 amp. 25 volt	.05
20	116052	BO-161478	Resistor—insulated 33,000 ohms 1/10 watt	.12
21	116066	BO-200233	Resistor—insulated 68,000 ohms ¼ watt	.12
22	116073	BO-161480	Resistor—insulated 10,000 ohms ½ watt	.15
23	116075	BO-200234	Resistor—27,000 ohms 1 watt	.18
24	116080	BO-200235	Resistor—insulated 660 ohms ½ watt	.15
25	116083	BO-200236	Resistor—insulated 300 ohms 2 watts wire wound	.24
26	116091	BO-161486	Resistor—insulated 6800 ohms ¼ watt	.15
27	116096	BO-200238	Resistor—22,000 ohms 1/10 watt	.10
28-29-30-31-32	116625	BO-161461	Condenser—.1 mfd. 600 volt	.25
33-34	116819	BO-161465	Condenser—.05 mfd. 600 volt	.20
35-36	117332	BO-161495	Choke coil in "A" line	.30
37-38	118225	BO-161473	Condenser—.5 mfd. 150 volt	.45
39	118231	BO-200205	Condenser—.25 mfd. 150 volt	.32
40	118726	BO-161580	Antenna motor noise choke	.24
41	118836	BO-200243	Resistor—330,000 ohms 1/10 watt	.10
42	118837	BO-200244	Resistor—39,000 ohms 1 watt	.15
43	118838	BO-200245	Resistor—1500 ohms 2 watts	.15
44	118839	BO-200246	Resistor—1.5 megohm 1/10 watt	.10
45-46-47	119193	BO-200206	Condenser—.01 mfd. 600 volt	.15
48-49-50	119414	BO-200207	Condenser—.02 mfd. 600 volt	.15
51-52 53-54	160685	BO-200213	Condenser—mica 110 mmfd. (5%)	.25
55	160760	BO-200214	Condenser—trimmer	.24
56	160796	BO-200577	Vibrator	3.00
57A-57B	160808	BO-200216	Condenser—variable gang	2.40
58	160817	BO-200619	Contact switch for clutch	.90
59	160839	BO-200578	Coil—R. F. with shield	1.00
60	160841	BO-200579	Transformer—1st I.F.	.25
61	160844	BO-200217	Condenser—air trimmer	.85
62	160845	BO-200218	Condenser—metal clad—.0002 mfd.	.18
63	160846	BO-200580	Coil—oscillator	1.00
64	160847	BO-200581	Transformer—2nd I.F.	1.25
65	160849	BO-200582	Antenna coil & shield	2.00
66	160858	BO-200583	Choke coil	1.00
67	160861	BO-200584	Switch—on-off	1.20
68	160919	BO-200645	Clutch case & coil assembly	1.25
69	160938	BO-200586	Output transformer	1.50
70	160954	BO-200588	Volume control—1 megohm	1.00
71	161024	BO-200223	Condenser—electrolytic 10 mfd. 450 volt	.70
72	161025	BO-200224	Condenser—electrolytic 10 mfd. 450 volt	.70
73	161066	BO-200225	Temperature compensator condenser	.40
74	161098	BO-200226	Condenser—mica 15 mmfd	.20
75	161101	BO-200227	Buffer condenser—.01 mfd. 2000 volts	.35
76	161120	BO-200598	Power transformer—6 volt primary	4.50
77	161158	BO-200685	Cone & voice coil assembly	1.80

SOCKET VOLTAGES

6.6 V BATTERY — TOTAL DRAIN 6.4 AMP



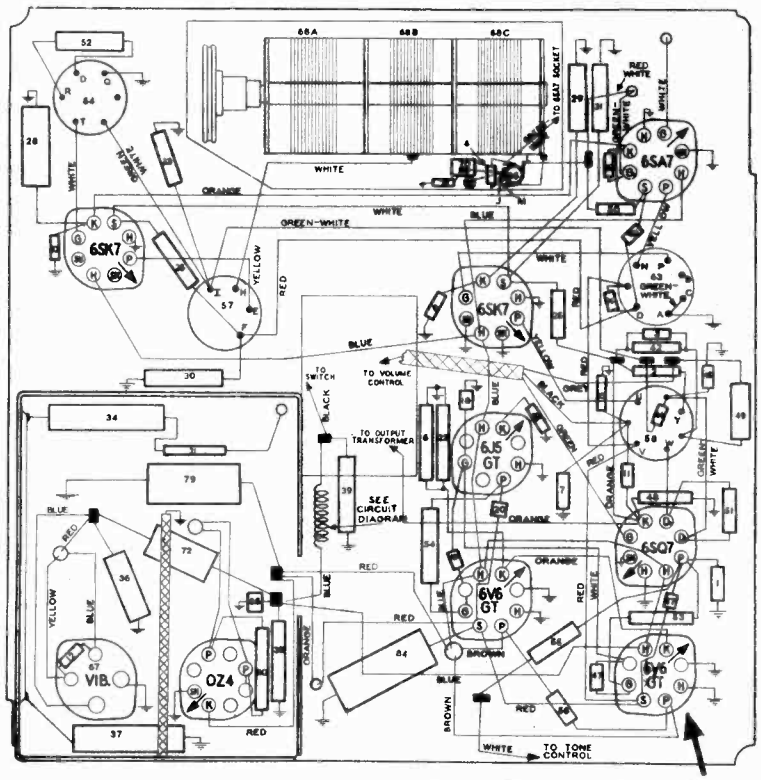
IMPORTANT: Use a high resistance voltmeter of at least 1000 ohms per volt.

NOTE A: The bias for the control grid of the 6V6GT tube is —13.5 volts measured across resistor No. 25.

MODEL DB-41
MODEL SA-41

HUDSON MOTOR CAR CO.

CHASSIS WIRING DIAGRAM FOR MODEL DB-41



TOP VIEW OF MODEL SA-41

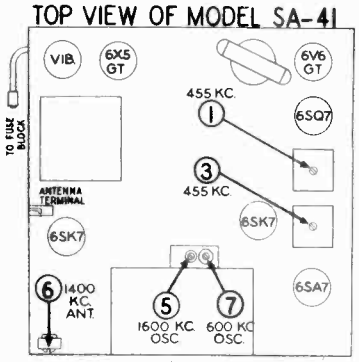


FIG. 7

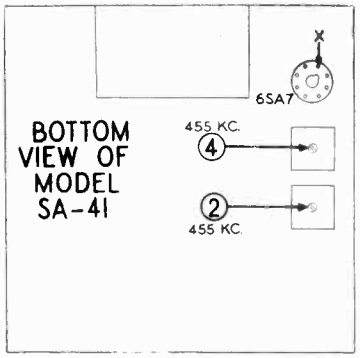


FIG. 8

THIS SOCKET MOUNTED WITH KEYWAY IN OPPOSITE DIRECTION IN LATE SETS

CHASSIS WIRING DIAGRAM FOR MODEL SA-41

HOW TO SET UP PUSH BUTTONS ON MODELS SA-41 AND DB41

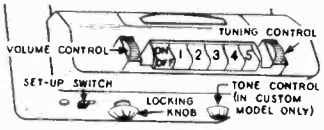
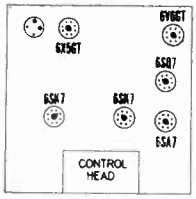


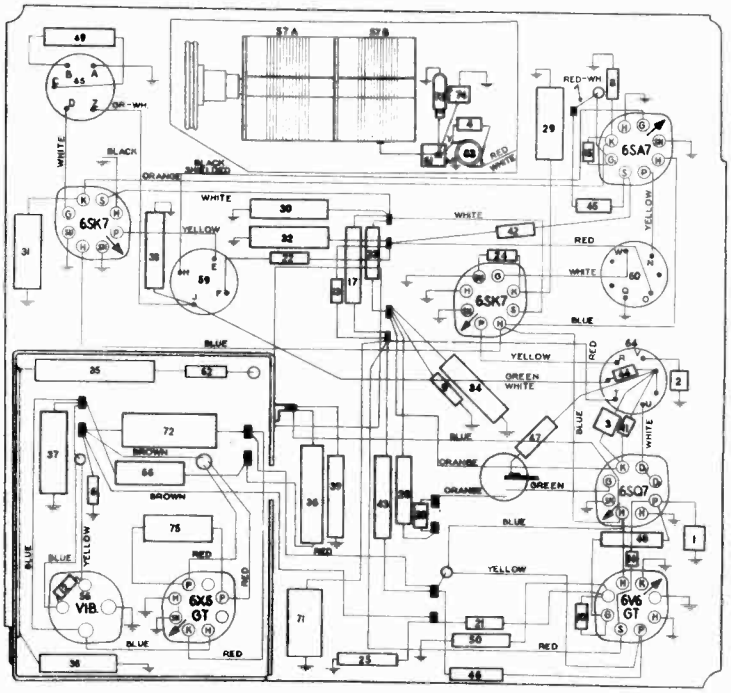
FIG. 4

(Radio must be connected to battery when buttons are operated). Numbered buttons can be set to stations on any part of the dial.

1. Operate set for 10 minutes before set-up.
2. TO UNLOCK MECHANISM
   (a) Rotate tuning control downward until dial pointer is at "RE-SET."
   (b) Move black set-up switch to right.
   (c) Push up locking knob and turn counter-clockwise approximately 2 turns, or until slight resistance is felt. Pull locking knob down to disengage.
3. Push in selected button as far as it will go and tune manually to desired station, while holding button in. Release button.
4. Follow same procedure for other buttons. After setting any button, do not touch it again until mechanism is locked as in 5. Otherwise, it must be reset as in 3.
5. TO LOCK MECHANISM
   (a) Rotate tuning control downward until dial pointer is at RESET.
   (b) Push up locking knob and turn clockwise as tightly as possible by hand. Pull locking knob down to disengage.
   (c) Push set-up switch to the left.

MODEL SA-41 TUBE LOCATIONS





Terminals of coils shown in the circuit diagrams on the adjacent page are lettered to correspond to similarly lettered terminals on the chassis wiring diagrams and coil illustrations shown on this page. Terminals which are connected together carry the same letter.