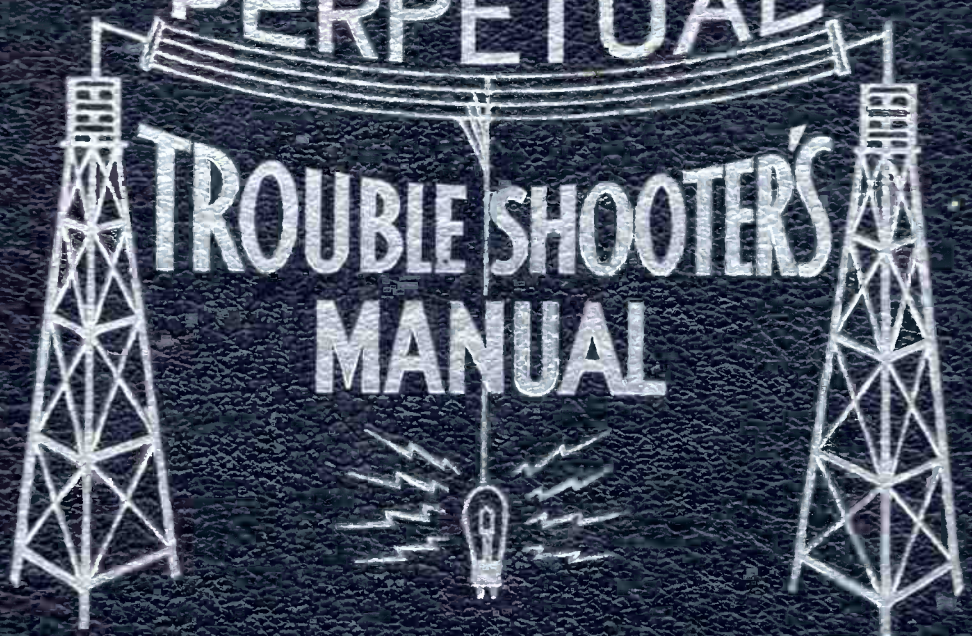
VOLUME II

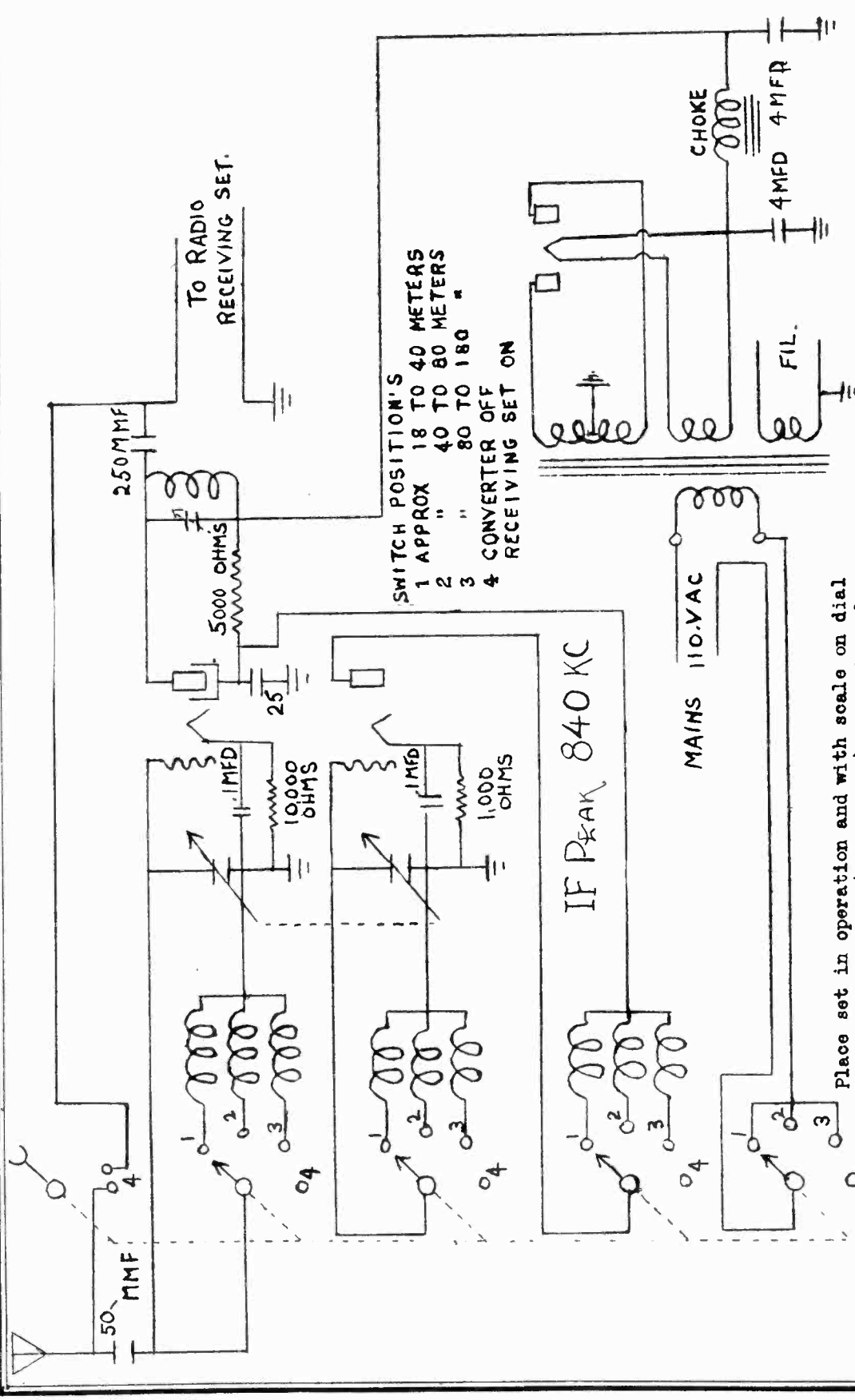
# PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER

MODEL 33

# JACKSON-BELL CO., LTD.



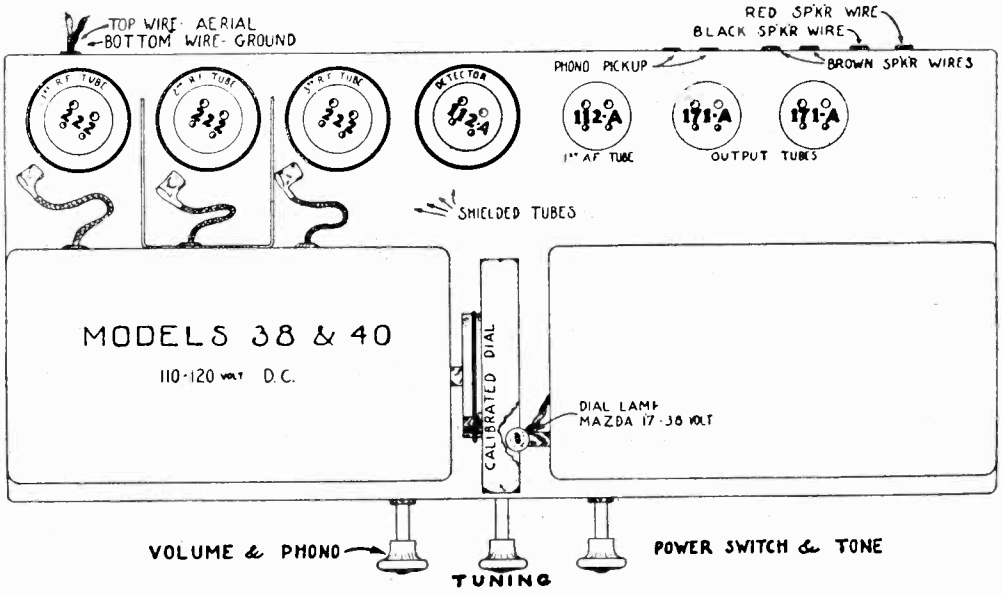

Place set in operation and with scale on dial at first position (200 to 300) set external oscillator at 1710 kc and adjust oscillator trimmer on variable condenser. The oscillator trimmer is the second section viewed from the front of the chassis. Next adjust front trimmer to resonance and maximum output.

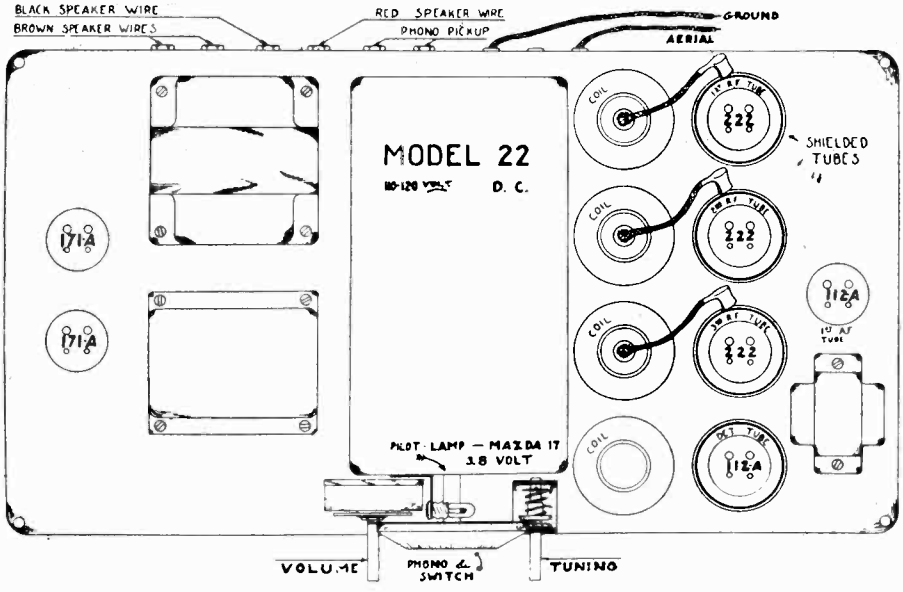
To check the '27 oscillator tube, set the dial at approximately 35 meters. Now, reading, the screen grid voltage, touch the grid winding of the oscillator system with the finger. The screen voltage should mount 20 volts.

MODELS 38 & 40
MODEL 22
MODEL 36

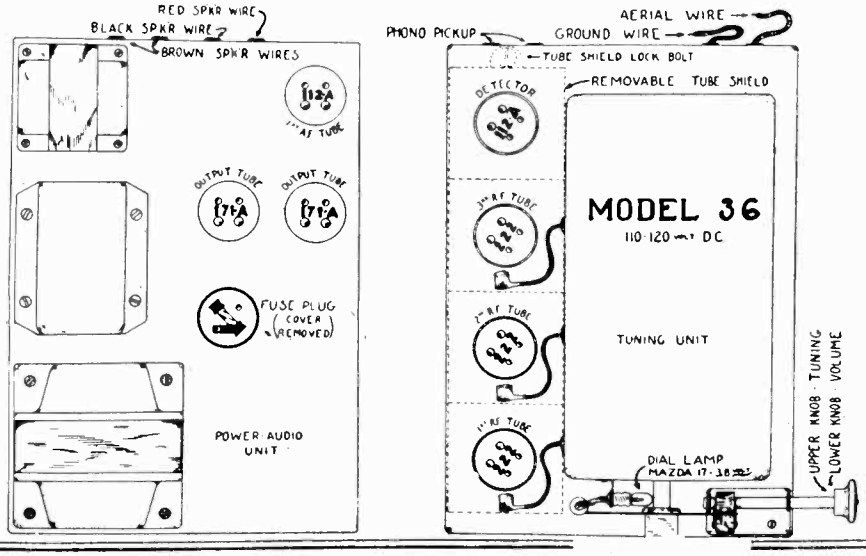
# COLIN B. KENNEDY CORP.

**Tube Socket Diagram for Chassis Models Nos. 38 and 40**



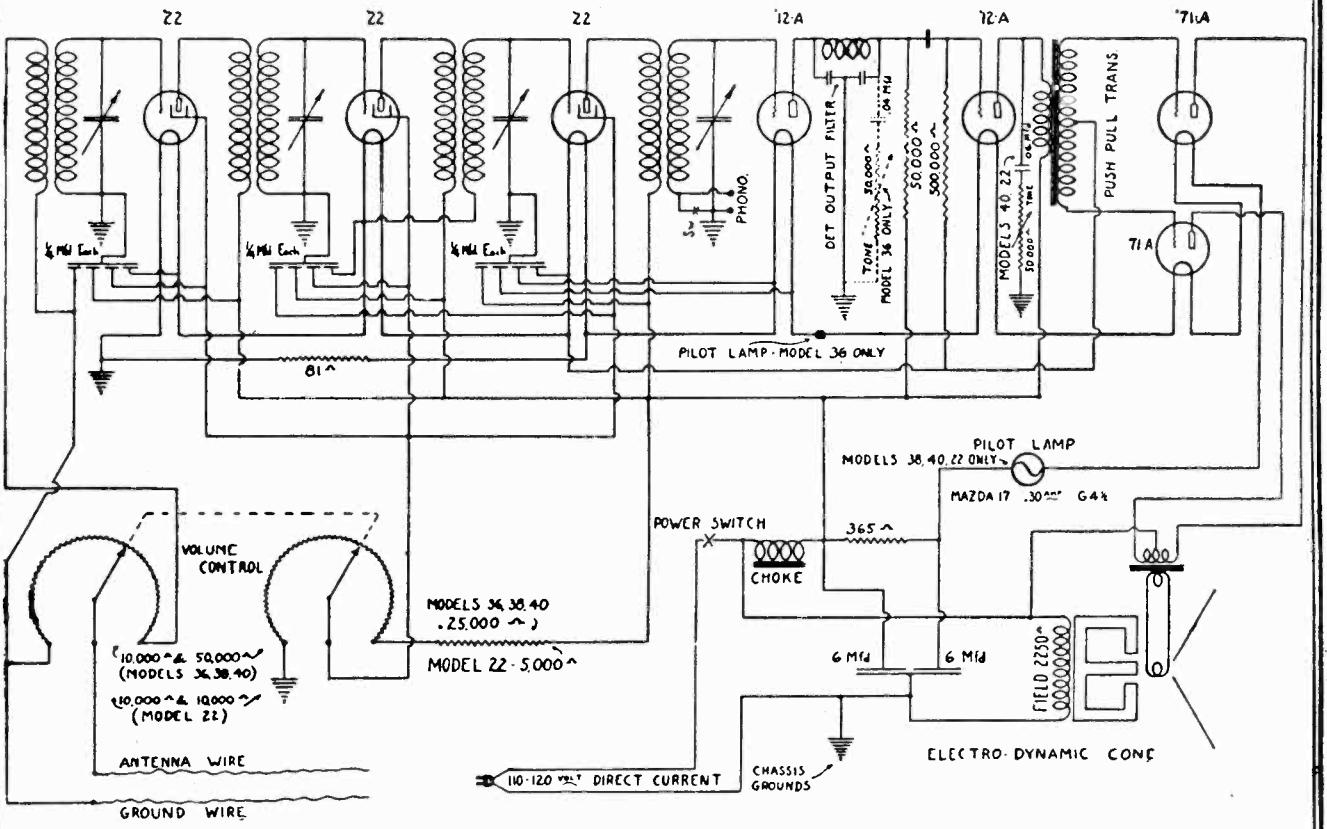

**Tube Socket Diagram for Chassis Model No. 22**




**Tube Socket Diagram for Chassis Model No. 36**

MODELS 22,36,38,40
Direct Current S.G. Chassis
Schematic,Data

COLIN B. KENNEDY CORP.




## MODELS 22, 36, 38, 40, DIRECT CURRENT S.G. CHASSIS.

The majority of the parts are interchangeable with those in the corresponding A. C model.

The standard filter choke is omitted, the power transformer being replaced by the heavy D. C. choke

It will be noted that the position of the pilot lamp differs, in the model 36, from its position in the models, 38, 40 and 22.

The position of the tone control also is different in the model 36 from the models 40 and 22.

All variations in parts are indicated on the accompanying circuit diagram.

The coils for the D. C. models differ slightly from those used in A. C. models, and are obtainable in matched sets of four.

The same dynamic speaker as used on the A. C. models is employed

The filaments of all tubes, a heavy 365 ohm vitreous resistor and the pilot lamp are are all in series across the line, following the choke. An 81 ohm resistor "by passes" a portion of the current across the three audio frequency tubes as the type 222 tubes do not draw the full quarter ampere as do the 171-A and 112-A type tubes. As the pilot lamp is also in series with the tubes a bulb of the proper voltage and current draw must be used.

The mechanical layout of the D. C. models corresponds to the equivalent A. C. model in each case except for the few variations noted below.

| *D. C. Model* | *Corresponding A. C. Model* |
|---|---|
| 36 | 26 |
| 38 | 30 |
| 40 | 32 |
| 22 | 20B |

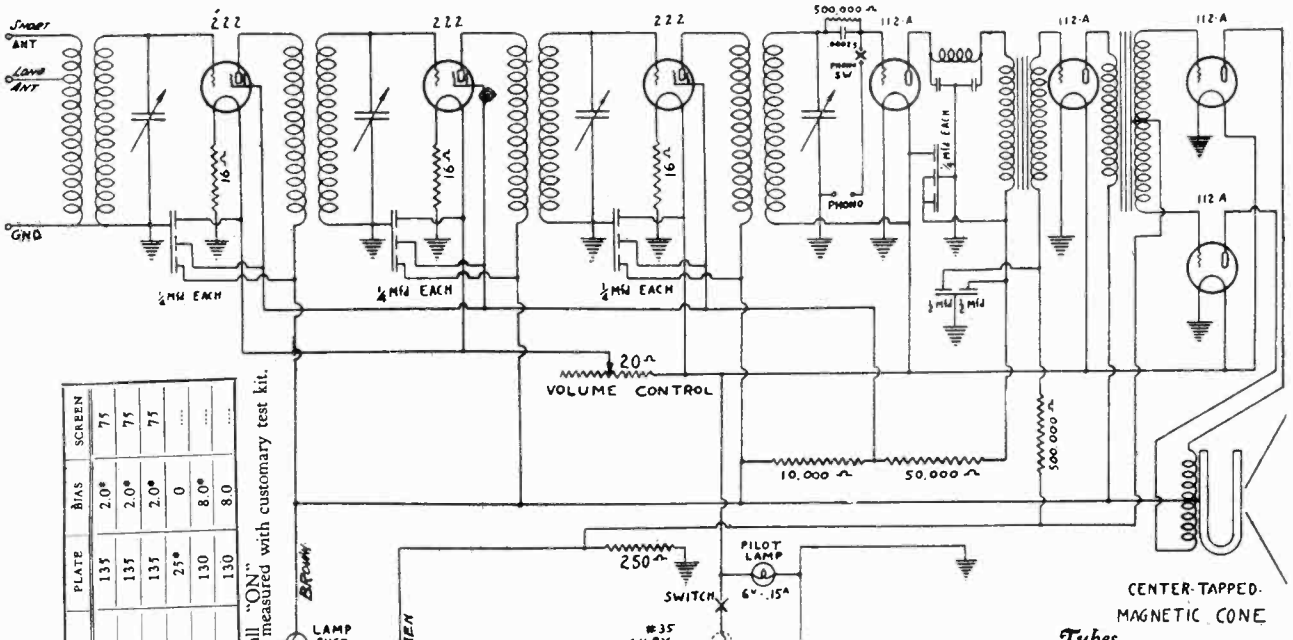
# PARTS LIST

| | |
|---|---|
| 116202 | Heavy D. C. Filter Choke |
| 116302 | Filter Condenser (Paper, 6 mfd. and 6 mfd.) |
| 116158 | 365 ohm Vitreous Resistor |
| 116405 | 81 ohm Wire Wound Resistor |
| 116600 | Set of 4 Matched D. C. Model Coils |
| 116513 | 4-prong Single Socket marked 222 |
| 116515 | 4-prong Single Socket marked 112-A |
| 116507 | 4-prong Single Socket marked 171-A |
| 116154 | Pilot Lamp 3.8 volt Mazda—17 0.30 amp. G-4½ |
| 123406 | Dual 10,000 ohm volume control (Model 22) |
| 117406 | Dual 10,000 - 50,000 ohm volume control (Models 36, 38, 40) |

Parts identical with those used in the corresponding models are not listed here.

MODEL 24
Schematic, Data

# COLIN B. KENNEDY CORP.



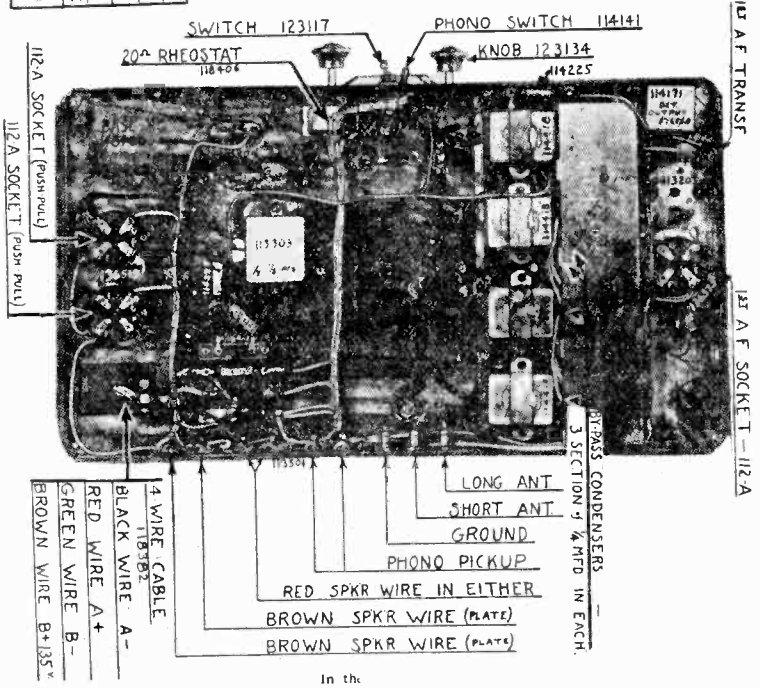

| TUBE | FIL. | PLATE | BIAS | SCREEN |
|---|---|---|---|---|
| 1st R.F. | 3 | 135 | 2.0* | 75 |
| 2nd R. F. | 3 | 135 | 2.0* | 75 |
| 3rd R. F. | 3 | 135 | 2.0* | 75 |
| Detector | 5 | 25* | 0 | ..... |
| 1st A. F. | 5 | 130 | 8.0* | ..... |
| Pwr. Tubes | 5 | 130 | 8.0 | ..... |

* Voltages not easily measured with customary test kit. volume control full "ON"

## Tubes

The tubes employed are:

1st radio frequency.....type 222 or 322
2nd radio frequency.....type 222 or 322
3rd radio frequency.....type 222 or 322
Detector tube.....type 112-A or 312-A
1st audio frequency.....type 112-A or 312-A
Push-Pull power tubes.....type 112-A or 312-A




## General Information

THE KENNEDY Battery Operated Chassis Model 24 is constructed on a base similar to the Kennedy Models 20 and 22 (A.C. and D.C. line models) A great many of the component parts of the battery operated chassis are interchangeable with those of the corresponding A.C. and D.C. line models, 20 and 22.

If set oscillates over entire dial range, it is possible that the detector output filter is defective, and a new one may be tried.

The wires at the tops of the coil shield (to control grids) may have been pulled sufficiently to bend coil lugs and permit more than 3¼ inches of wire (from shield to start of clip) to be exposed. Extra length here tends to cause an unstable receiver.

If receiver oscillates at just a small spot or two of dial range, it may frequently be corrected by pushing a piece of solid, bare copper wire between the rubber grommet and coil shield (barely through) of the second R. F. coil shield, and twisting a few times around the wire leading to the control grid of the 2nd R. F. tube.

## Resistors

The resistance values of the various colored resistors employed are

| | |
|---|---|
| 10,000 ohms | Grey |
| 50,000 ohms | Yellow |
| 500,000 ohms | Brown |

## Fuses and Ballast

Under a cover plate near the battery cable will be found a pilot lamp bulb and a piece of small wire held by two posts. This bulb is used as a fuse in the "B" battery circuit and is identical with the pilot lamp — both being Mazda No. 40 (6 volt, 0.15 amp.) The fuse lamp does not light up when set is operating, and, if it should do so it is an indication of trouble elsewhere in the receiver.

The small wire held by the two posts is a fuse and ballast in the storage battery circuit. In addition to its function as a fuse it serves to compensate for variations in the voltage of the storage battery. Extra pieces of this wire are provided with the set, and it is IMPORTANT that no other wire be used. This wire is No. 34 B. & S. gauge Gilby ballast wire. If other wire is used there is danger of injury to the tubes.

In the event it becomes necessary to change a coil it is extremely desirable to change all four coils for a new set of four matched and impregnated coils that are designed to work together.

Tests for resonance, or matching of the tuned circuits, are accomplished with an oscillator—connections to the resonant circuits being made from ground to grid terminals of the R. F. sockets for the R. F. coils and from A+ terminal of detector socket to end of grid leak or grid condenser furthest from detector socket grid terminal for the detector coil.

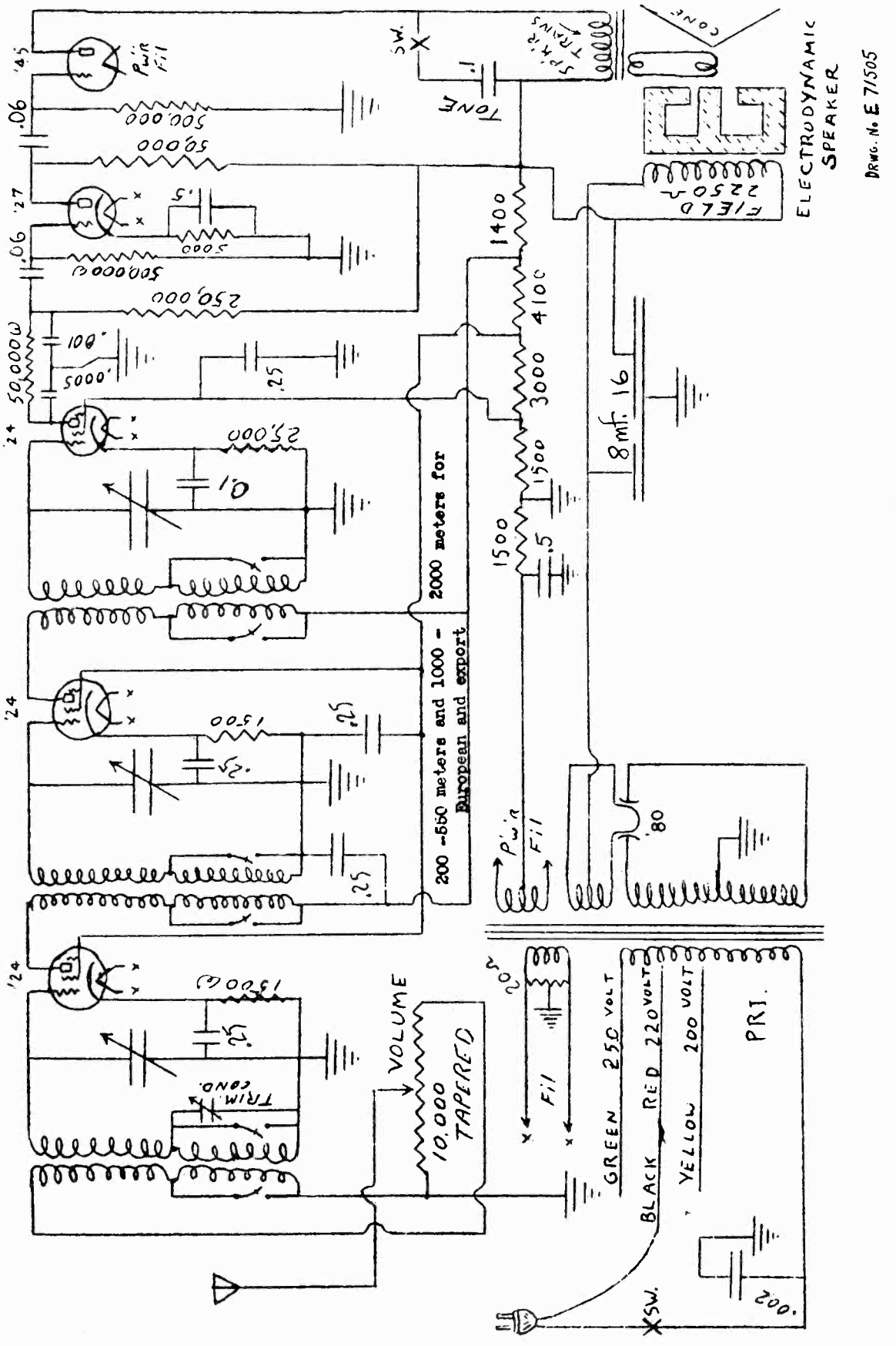
## Batteries

The model 24 receiver requires one six volt storage "A" battery and one 135 volt "B" battery (or three 45 volt "B" batteries). No "C" batteries are required as all bias voltages are obtained automatically within the receiver.

The storage battery drain is exceptionally low for this type of receiver, being approximately 1.37 amperes.

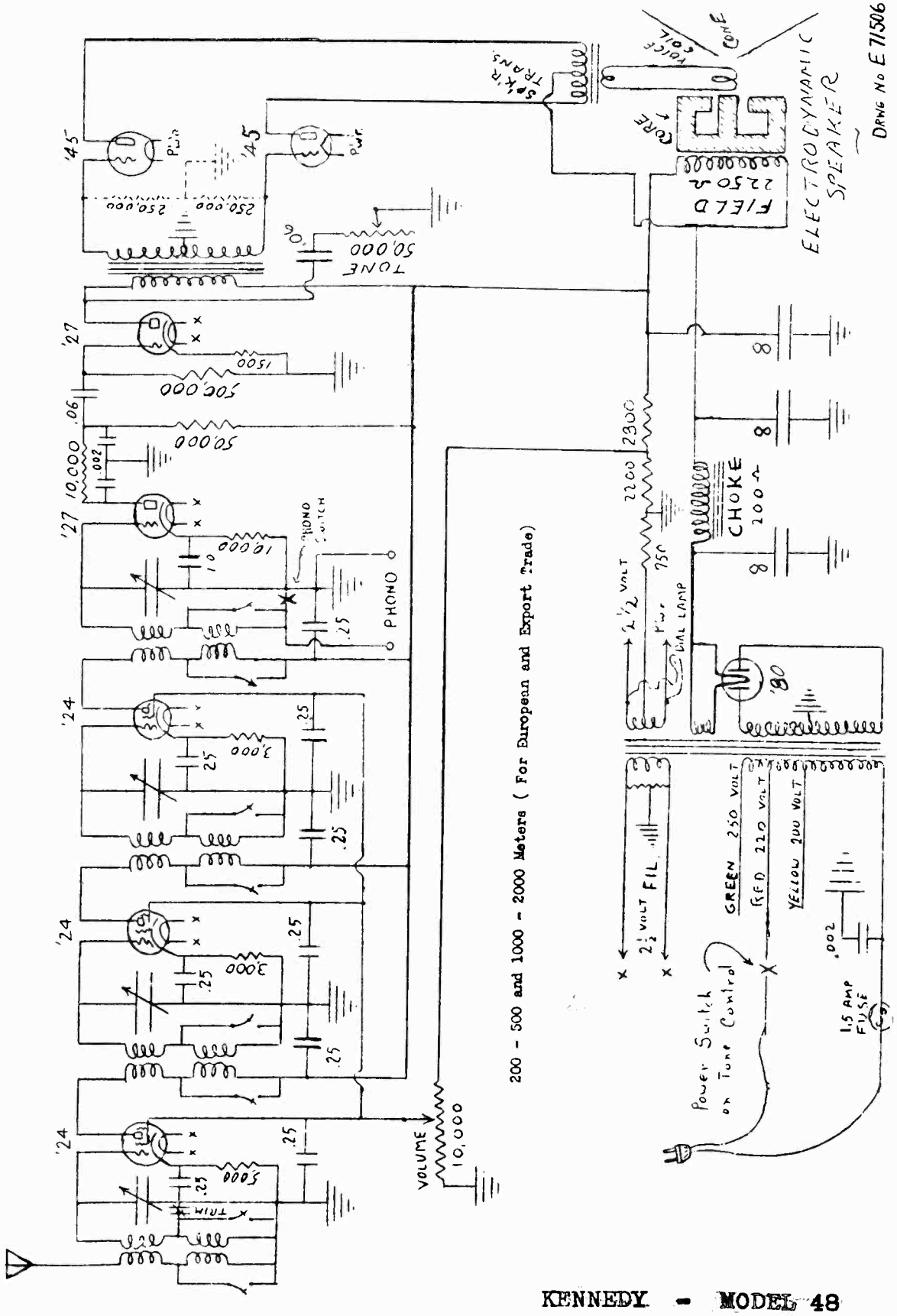
MODEL 44

# COLIN B. KENNEDY CORP.



MODEL 48

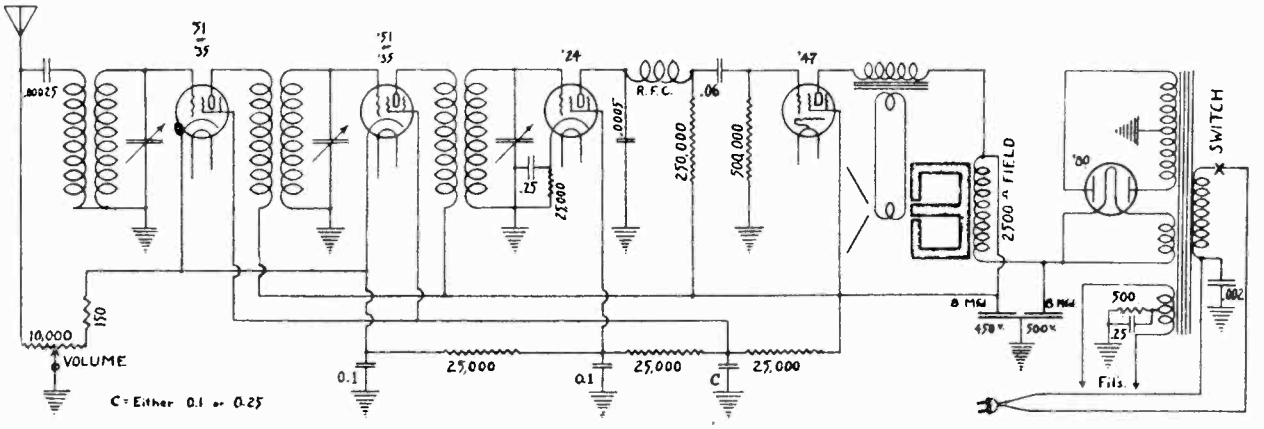
# COLIN B. KENNEDY CORP.

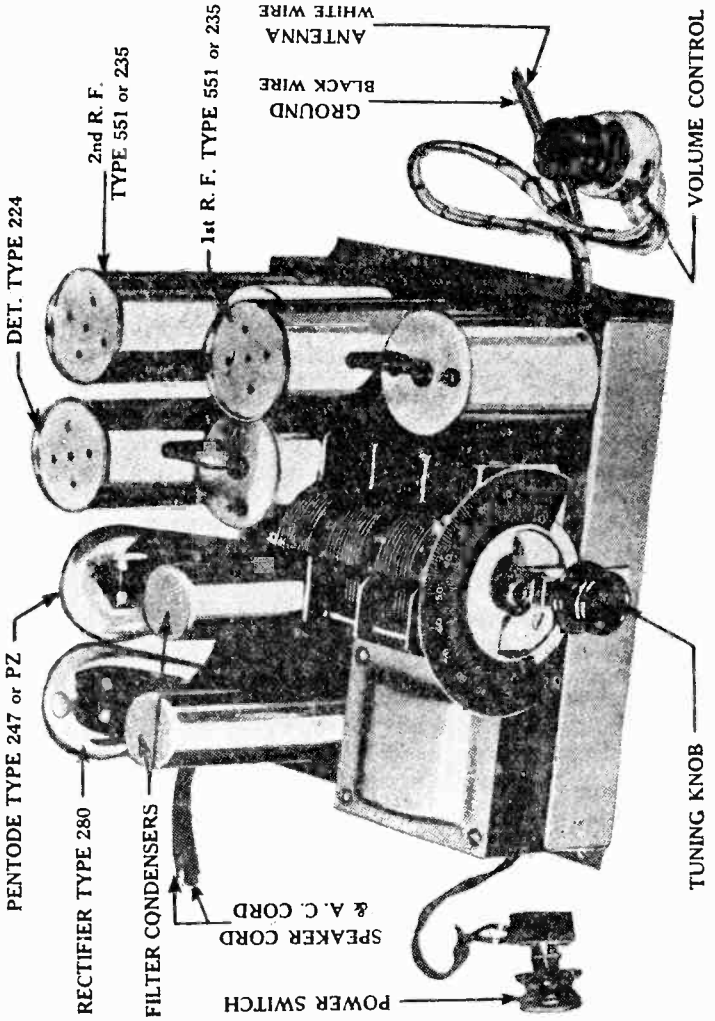



KENNEDY - MODEL 48

# COLIN B. KENNEDY CORP.

MODEL 50
Schematic
Chassis
Alignment Data




**Coils**

| | | |
|---|---|---|
| 11759 | Coils, set of 3 matched, shielded | |

**Condensers**

| | | |
|---|---|---|
| 13417 | Condenser, ¼, ¼ and ¼ mfd., 300-volt | |
| 15417 | Condenser, ¼ and ¼ mfd., 200-volt | |
| 13306 | Condenser, 0.1 mfd. tubular 200-volt | |
| 13226 | Condenser, 0.06 mfd. tubular 200-volt | |
| 11A473 | Condenser, .0005 Mica | |
| 113306 | Condenser, .002 Mica | |
| 113305 | Condenser, .00025 Mica | |
| 15302 | Condenser, 8.0 mfd. filter, 500-volt | |
| 16302 | Condenser, 8.0 mfd. filter, 450-volt | |
| 13301 | Condenser, three-gang, tuning | |

**Resistors**

| | | |
|---|---|---|
| 114225 | Resistor, | 500,000-ohm graphite |
| 114224 | Resistor, | 50,000-ohm graphite |
| 117366 | Resistor, | 25,000-ohm graphite |
| 114173 | Resistor, | 10,000-ohm graphite |
| 114215 | Resistor, | 5,000-ohm graphite |
| 12158 | Resistor, | 500-ohm vitreous |
| 16406 | Resistor, | 10,000-ohm variable with 150-ohm fixed |

## *Alignment*

Alignment of the tuned circuits is made in the conventional manner. An oscillator covering the broadcast band and an output meter or indicator will be found helpful and will speed up the procedure.

The three circuits are first aligned at, or near, the 1,500 K. C. end of the dial. The first condenser section has a "trimmer" condenser which may be adjusted. The other two sections may be adjusted by bending the proper segments of the slotted rotor end plates. A check at four or five positions across the dial range is usually ample.

| *Tube* | *Type* | *Fil.* | *A.C. Plate* | *Screen* | *Bias* |
|---|---|---|---|---|---|
| 1st R.F. | 551 | 2.3 | 250 | 175 | 2.5 to 39 |
| 2nd R.F. | 551 | 2.3 | 250 | 175 | 2.5 to 39 |
| Detector | 224 | 2.3 | 155 | ..... | 4 |
| Power Tube | 247 | 2.3 | 235 | 235 | 16 |
| Rectifier | 280 | 4.8 | 340-340 | ..... | .... |

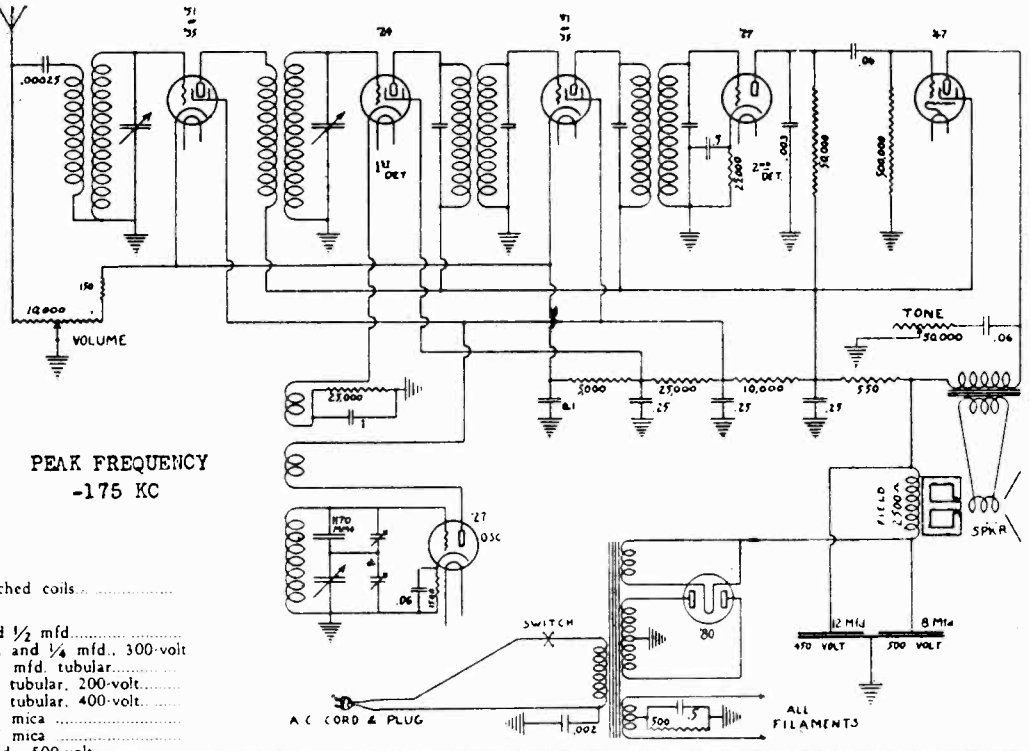
Line voltage = 115 Volume full on.

**MODEL 52**
**Schematic**
**Alignment Data**

# COLIN B. KENNEDY CORP.

| Purpose | Type | Fil A.C | Plate | Screen | Bias |
|---|---|---|---|---|---|
| Radio Frequency | 551 | 2.3 | 225 | 95 | 2.6 to 33. |
| 1st Detector | 224 | 2.3 | 225 | 30 | 2 |
| Oscillator | 227 | 2.3 | 100 | .... | 8.5 |
| Intermediate Freq. | 551 | 2.3 | 225 | 95 | 2.6 to 33 |
| 2nd Detector | 227 | 2.3 | 160 | .... | 21 |
| Power Tube | 247 | 2.3 | 225 | 225 | 14 |
| Rectifier | 280 | 4.8 | 335-335 A.C. | | |

Volume control full on. Line voltage = 115.
Plate, screen and bias voltages measured from ground or chassis to respective terminals




**Coils**

11600 Set of three matched coils

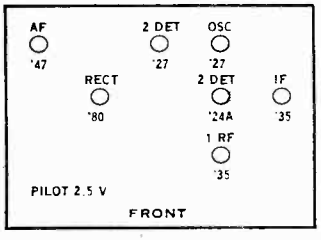
**Condensers**

| | | |
|---|---|---|
| 113303 | Condenser | ½ and ½ mfd |
| 13417 | Condenser | ¼, ¼ and ¼ mfd., 300-volt |
| 13306 | Condenser | .1 mfd. tubular |
| 13226 | Condenser | .06 tubular, 200-volt |
| 23226 | Condenser | .06 tubular, 400-volt |
| 14306 | Condenser | .003 mica |
| 113305 | Condenser | .00025 mica |
| 16302 | Condenser | 8 mfd., 500-volt |
| 17302 | Condenser | 12 mfd., 430-volt |

**Resistors**

| | | |
|---|---|---|
| 114225 | Resistor | 500,000-ohm graphite |
| 11F225 | Resistor | 250,000-ohm graphite |
| 114224 | Resistor | 50,000-ohm graphite |
| 117366 | Resistor | 25,000-ohm graphite |
| 114173 | Resistor | 10,000-ohm graphite |
| 114215 | Resistor | 5,000-ohm graphite |
| 114175 | Resistor | 1,500-ohm graphite |
| 12158 | Resistor | 500-ohm vitreous |
| 16406 | Resistor | 10,000-ohm variable and 150-ohm fixed, volume |
| 15369 | Resistor | 50,000-ohm variable with power switch |

Model 52 (1931)




TECHNICAL DATA - MODELS 52 AND 56

ALIGNMENT:-Use an output meter and 175 KC oscillator for aligning the IF transformers. Remove grid clip of first detector tube and fasten a short length of wire to the grid terminal of the tube. Place the oscillator in the vicinity of this wire. Adjust trimmers in tops of IF transformer shields for maximum output meter reading. For adjusting the tuning condenser, an oscillator covering the broadcast band should be used. In this case place the oscillator near the antenna of the receiver. The receiver and oscillator are first tuned to 1500 KC and the condenser trimmers adjusted for maximum output. Do the same thing at 550 KC. It is desirable to move the dial back and forth in making the above adjustments, particularly so when altering any capacities connected with the oscillator circuit.

MICROPHONICS:-This is occasioned by mechanical vibration of the oscillator tuning condenser plates. A particularly microphonic tube may also cause it. See that the tuning condenser is floating on the rubber and that the cabinet is not binding on the dial drive shaft. Oscillation is not paramount in this receiver but an effect similar to this may be encountered at spots on the dial if the IF transformers are not set at their proper setting of 175 KC. Too much RF energy reaching the speaker leads produces a similar effect, overcome by twisting the ground and plate wires together in the speaker cable. This is done before the other two speaker leads are tied along with them.

MODEL 53-SW
MODEL 54-SW
Parts List
Data

# COLIN B. KENNEDY CORP.

THE KENNEDY Model 53 short wave unit operates on the superheterodyne principle, and is commonly called a converter or adapter.

When switched to long wave position the power is shut off from the short wave unit. When switched to the short wave position the power is turned on, and after the tubes warm up the unit is ready to operate.

In factory assembled combinations the short wave unit is already properly connected to the broadcast receiver. It is always advisable to check over this wiring, however, and see that all connections are properly and securely made

The three wires from the rear-center of the unit are to be connected as follows:

BLACK The black wire is to be connected to the ground post of the long wave receiver. The actual ground wire is attached to the GND post of the short wave unit and left there permanently.

WHITE: The white wire is to be connected to the antenna post of the long wave receiver. The actual antenna, or aerial, is attached to the ANT post of the short wave unit and left there permanently.

RED: The red wire is to be attached to a source of "B" voltage—either at the long wave chassis or speaker. Any voltage of from 150 to 250 volts is suitable. It should be obtained from some point in the long wave receiver chassis, speaker or filter system, where it will receive fairly good filtering and be relatively free from A. C. hum.

IMPORTANT. As the output of the short wave unit is tuned to a definite frequency it is necessary to set the dial of the long wave receiver at this frequency, and leave it there while tuning for short wave stations. It is important that the long wave dial be set exactly at the output frequency of the short wave unit.

This point is approximately 1,000 kilocycles.

If for any reason the output frequency of the short wave unit has shifted it may be retuned as follows. Set long wave dial at 1,000 kilocycles or at mark. Tune in short wave signals. Tune output by means of adjustment screw, until signal is loudest. Use a bakelite screw driver. The output adjusting screw is at right hand end of short wave chassis, facing the rear.

In the event a strong local station at or near 1,000 kilocycles interferes with short wave reception, the long wave dial may be moved slightly to right or left of 1,000 kilocycle mark, and the output retuned, as above, to obtain greatest short wave output at this newly selected frequency. Move long wave dial off 1,000 K. C. only a few kilocycles at a time, returning the short wave output each time, until the interference is eliminated.

Should the short wave output adjustment be far out of tune, a simple method of resetting is to feed the output of a laboratory or service man's oscillator (tuned to 1,000 K. C.) into the grid of the 224 tube of the short wave unit (while operating) and with long wave receiver also set at 1,000 K. C. (previously set by means of same oscillator, for accuracy). The short wave output adjustment screw may now be turned until maximum oscillator signal is heard, or an output meter, on long wave set, indicates maximum.

## PARTS LIST
## MODELS 53 & 54-A

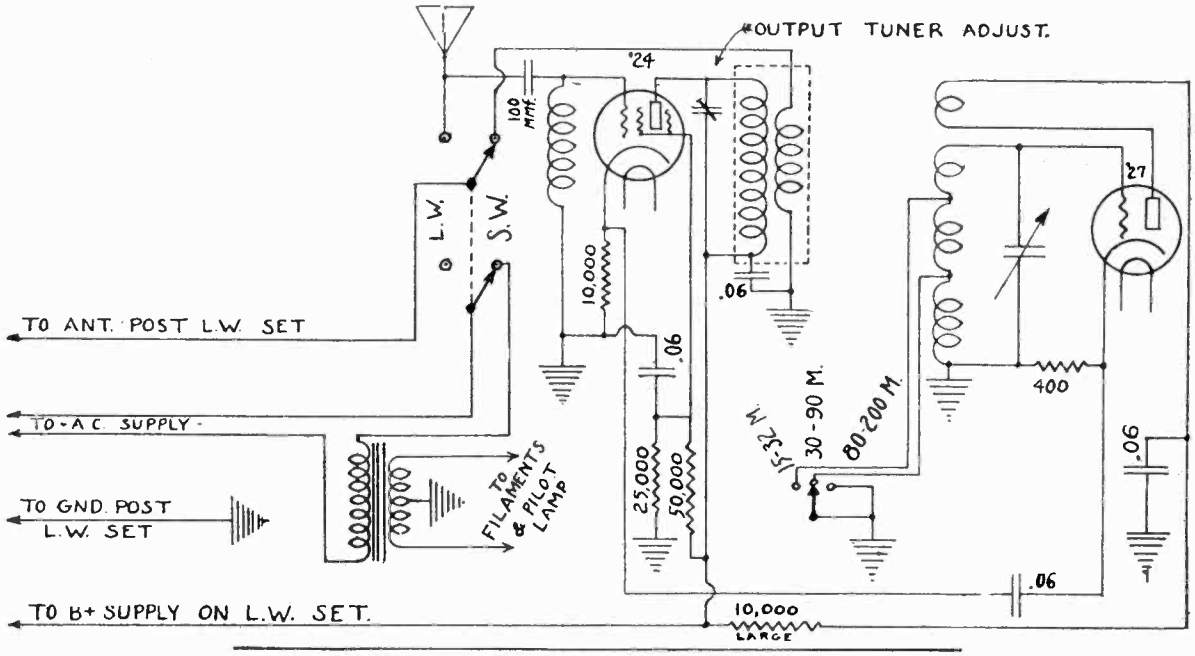
| | | |
|---|---|---|
| 1-4-450 | Coil, oscillator; with leads | $ .75 |
| 1-6-301 | Condenser, oscillator tuning, 200 Mmf | 3.25 |
| 1-3-226 | Condenser, tubular, 0.06 mfd | .30 |
| 1-4-462 | Condenser, output adjust, 10-70 Mmf | .50 |
| 1-1-A474 | Condenser, mica, 100 Mmf | .30 |
| 1-1-3154 | Dial lamp, 2½ volt | .30 |
| 1-2-7134 | Knob, large, wood | .20 |
| 2-2-7134 | Knob, small, wood | .18 |
| 1-1-F531 | Post, ant | .10 |
| 1-1-F530 | Post, gnd | .10 |
| 1-2-F529 | Post, bakelite insulating strip | 05 |
| 1-1-F550 | Post, insulating washer | .01 |
| 2-1-4173 | Resistor, 1 watt, 10,000 ohm | .25 |
| 1-1-4173 | Resistor, graphite, 10,000 ohm | .25 |
| 1-1-7366 | Resistor, graphite, 25,000 ohm | .25 |
| 1-1-4224 | Resistor, grapihte, 50,000 ohm | .25 |
| 1-2-172 | Resistor, 400 ohm | .25 |
| 1-7-103 | Shield, output coil, with bolts | .15 |
| 2-3-514 | Socket, 224 | .18 |
| 2-4-515 | Socket, 227 | .18 |
| 1-8-201 | Transformer, 60 cycle | 2.00 |
| 2-8-201 | Transformer, 25 cycle | 3.30 |

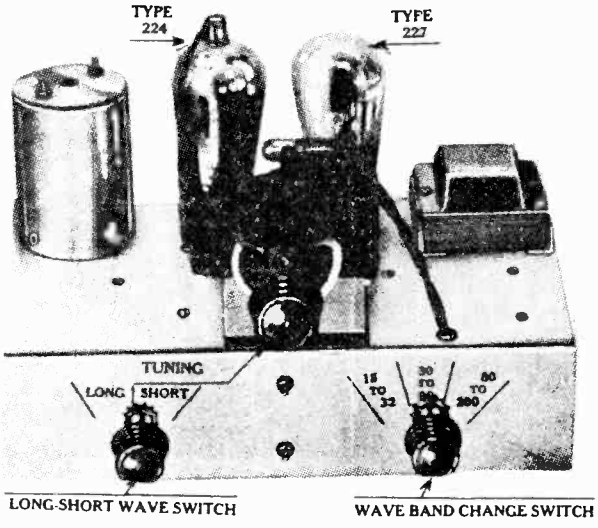
## ADDITIONAL PARTS
## MODEL 53

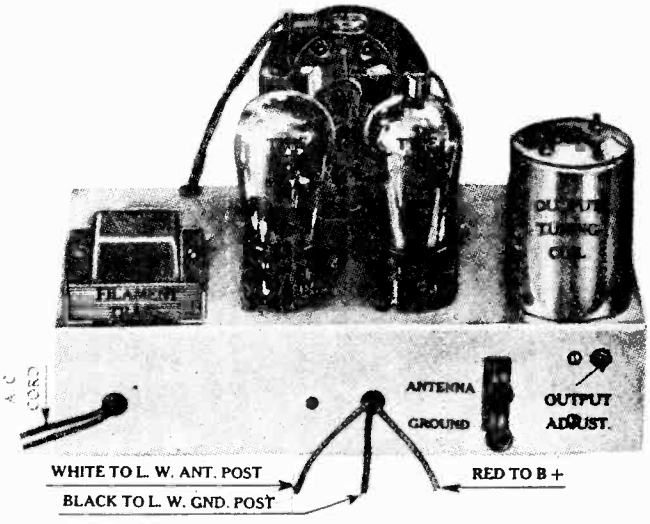
| | | |
|---|---|---|
| 1-2-253 | Coil, output | 1.00 |
| 1-6-122 | Dial, complete, with scale | 1.00 |
| 1-3-468 | Switch, 3 point, tap | .50 |
| 1-3-471 | Switch, A C. and LW-SW | .65 |

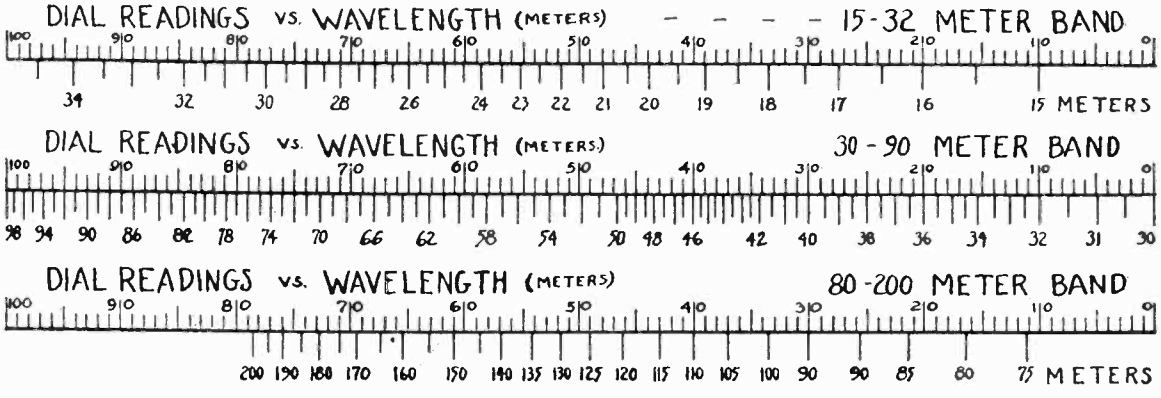
# COLIN B. KENNEDY CORP.

MODEL 53-SW
MODEL 54-SW
Schematic, Chassis
Calibration Scales



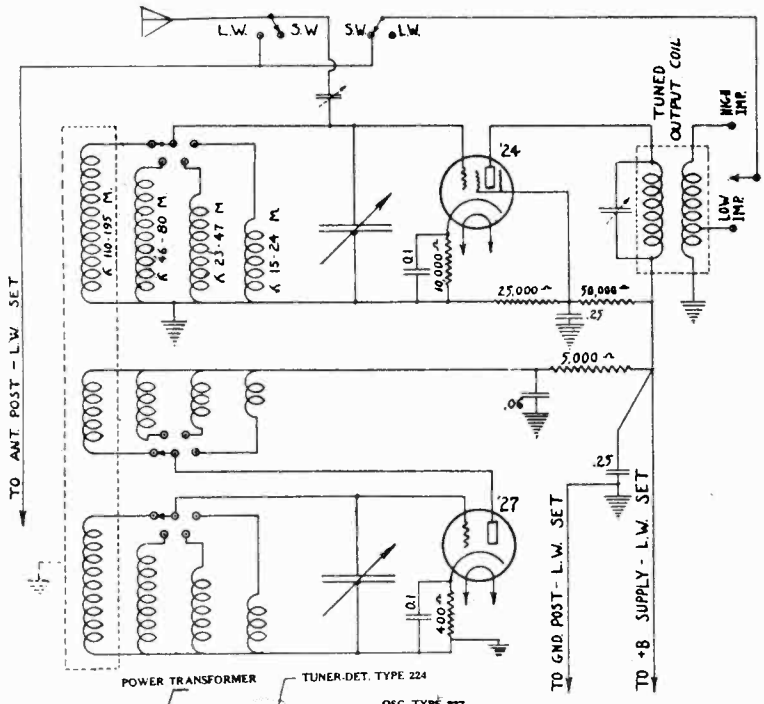



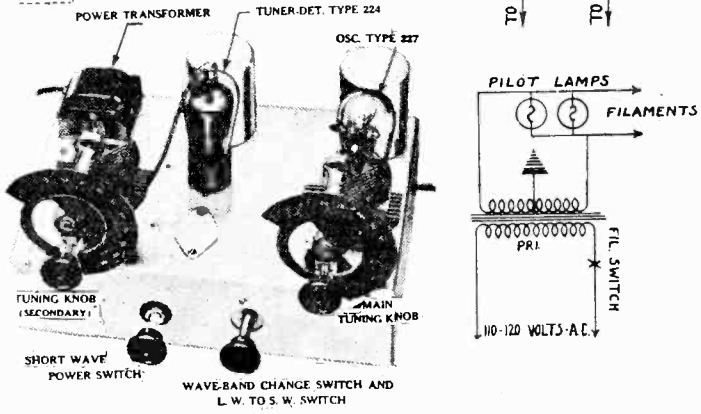



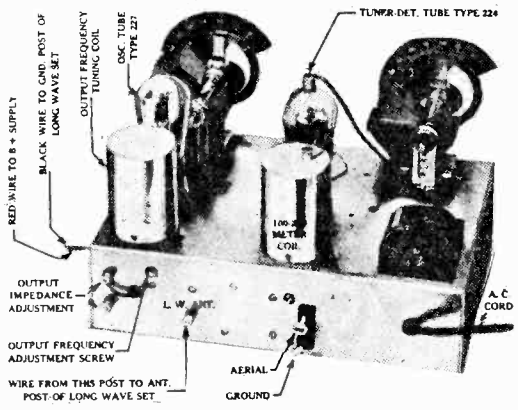



MODEL 54 "Globe Trotter"
Schematic, Chassis
Data

# COLIN B. KENNEDY CORP.




When testing the short wave unit at the factory, it is adjusted for use with an average antenna. Improved results may sometimes be obtained by re-adjusting to the antenna actually used. The procedure for this adjustment is as follows:

Almost exactly in the center of the back of the short wave unit is an adjustment screw which can be operated through a hole provided for it. This screw should be turned with a bakelite screw driver, which most service men carry. A metal screw driver will disturb the adjustment.

Set the switch on the position marked "15-25 meters"—tune in a station (music or code) at about 50 on the right-hand dial. Then adjust the screw described above until the left-hand dial also reads approximately 50 when properly tuned in. This adjustment then holds for all wave bands.

The BLACK wire is connected to the "ground" binding post of the long wave set. The RED wire is connected to the negative side of the speaker field coil (dynamic speaker), to the speaker wire or connection carrying a filtered "B" voltage supply, or, inside the chassis, to the positive end of the voltage divider resistor.

If difficulty is had in getting the unit to operate when initially hooked up, and the "B" source is suspected, 90 to 135 volts of "B" batteries may temporarily be tried. The red wire goes to the "B" +, the black wire to the long wave receiver ground post as before, and the "B" — to the same ground post.

Any source of "B" voltage from 150 to 250-volts is suitable. It should be obtained from some point in the long wave receiver speaker or filter system, where it will receive fairly good filtering and be relatively free from hum. A lower voltage, well filtered, is more to be desired than a higher voltage with a large proportion of A.C. modulation.

Obtaining this plate supply is very simple on many receivers, such as the Kennedy models 210, 310, 220, 320, 1030, 632, 426, 526, 726, and 826. In these cases the B supply may be taken from the tip jack terminating the black speaker wire. In Kennedy models 42, 50 and 52 it may be obtained at the speaker terminal panel from the side of the field winding which is common with the speaker transformer primary

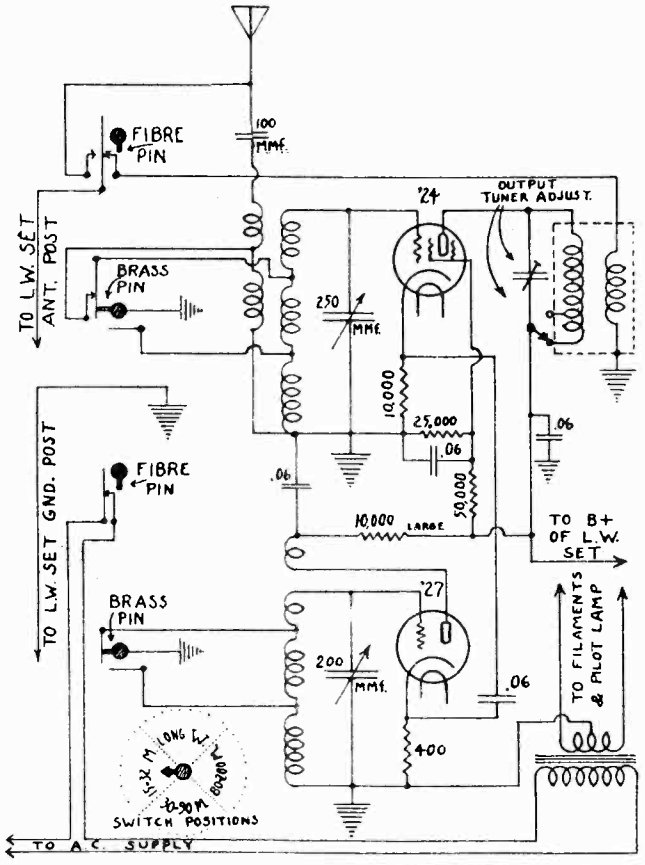
The output of the short wave unit is tuned. It is set at the factory, to tune to approximately 1525 kilocycles. Naturally, the long wave receiver dial must be set at this point for short wave reception, and left there.

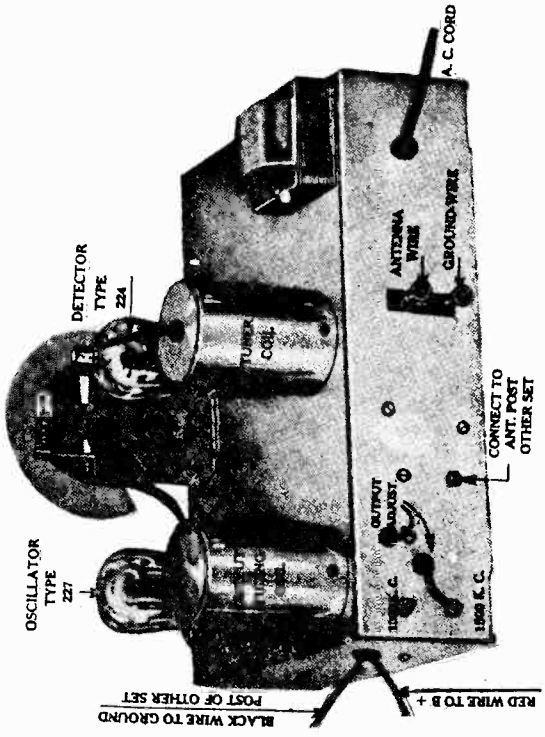
In the event the long wave receiver will not tune past 1500 kilocyles, or a strong local broadcast station interferes at that point, the output frequency tuning may be altered slightly to avoid the difficulty. An adjusting screw for this tuning may be reached through a hole in the rear of the chassis. It is located near the impedance adjusting wire and binding posts, and is to be adjusted with a bakelite screw driver, as a metal tool will upset the adjustment.

It will be noted, facing the rear of the chassis, that on the left hand side a wire has been brought out which may be connected to either one of two small binding posts near the end of the base. The purpose of this is to adjust the output impedance of the unit to that of the antenna input circuit of the receiver it is to be used with. The Kennedy models named above have high impedance antenna circuits and therefore require this wire to be on the upper binding post. In doubtful cases this wire may be tried first on one and then on the other, with unit operating, and permanently left where best results are obtained. These connections are indicated on the accompanying illustration.

# COLIN B. KENNEDY CORP.

MODEL 54-A
Schematic, Chassis Data




THE KENNEDY Model 54-A short wave unit operates on the superheterodyne principle, and is commonly called a converter or adapter.

A four-position rotary cam switch changes all connections to any one of three short wave band circuits or to long wave position. This switch makes the proper power and antenna connections, turning off the short wave unit and connecting the antenna directly to the broadcast receiver when in the long wave position. When switched to any one of the short wave bands, the tubes of the short wave unit are supplied with power, and antenna and output connections are made. The short wave unit is, naturally, not used for long wave broadcast reception.

In factory assembled combinations the short wave unit is already properly connected to the broadcast receiver. It is always advisable to check over this wiring, however, and see that all connections are properly and securely made

The two wires from the left side (facing rear) are to be connected as follows:

BLACK: The black wire is to be connected to the ground post of the long wave receiver. The actual ground wire attached to the GND post of the short wave unit and left there permanently.

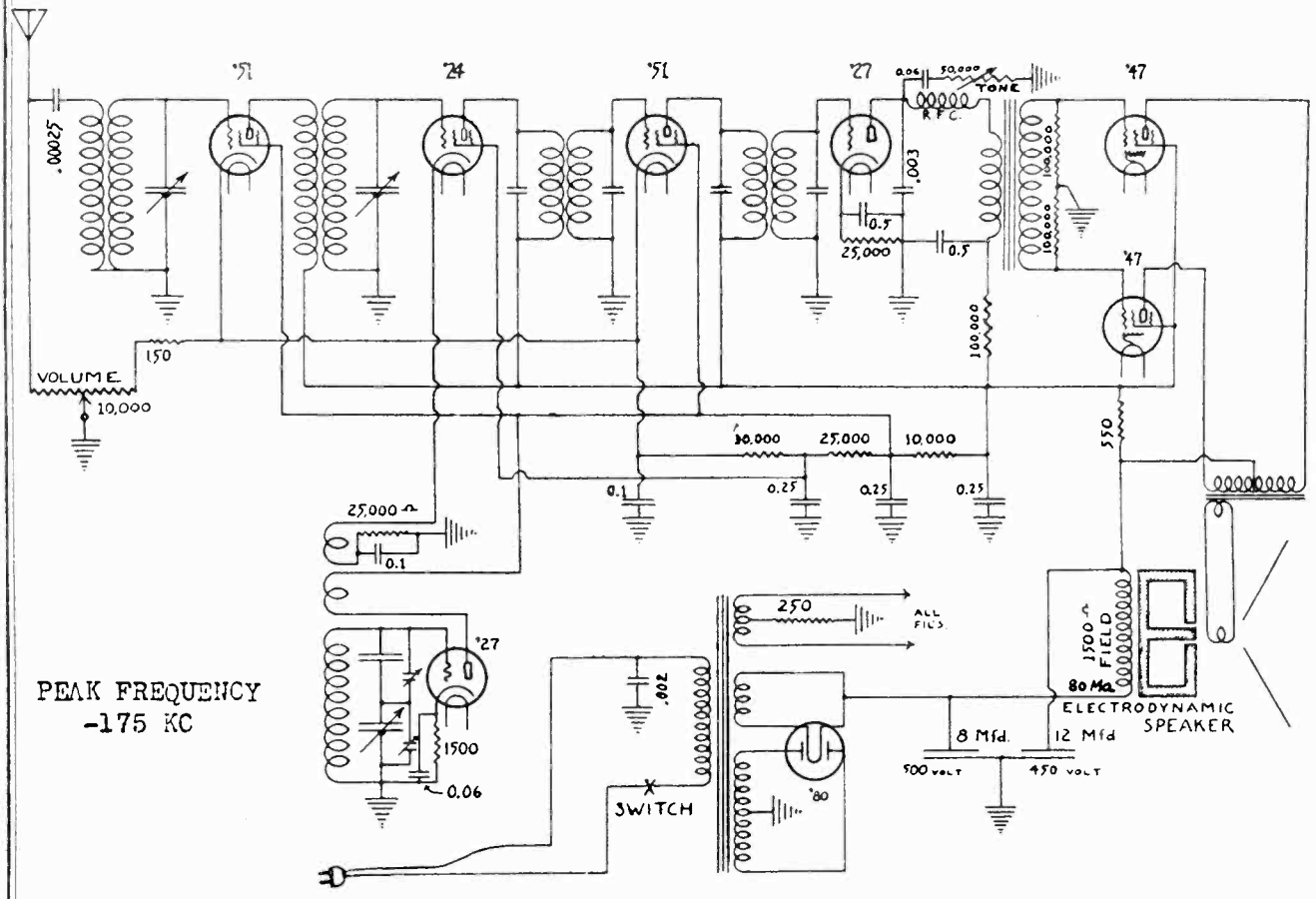
RED: The red wire is to be attached to a source of "B" voltage—either at the long wave chassis or speaker. Any voltage of from 150 to 250 volts is suitable. It should be obtained from some point in the long wave receiver chassis, speaker or filter system, where it will receive fairly good filtering and be relatively free from A. C. hum.

A wire, as short as practical, must be connected from the binding post at left-center (facing rear) of unit to the antenna post of the broadcast chassis. The actual antenna, or aerial, is attached to the ANT post of the short wave unit and left there permanently.

**For Calibration Scale refer to Model 53-SW**

MODEL 56
Schematic
Voltage

# COLIN B. KENNEDY CORP.



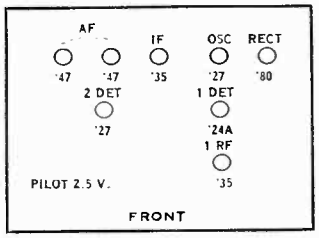

PEAK FREQUENCY
-175 KC

| Purpose | Type | Fil A | C | Plate | Screen | Bias |
|---|---|---|---|---|---|---|
| Radio Frequency | 551 | 2.35 | | 208 | 98 | 3 to 30 |
| 1st Detector | 224 | 2.35 | | 208 | 30 | 5 |
| Oscillator | 227 | 2.35 | | 90 | | 10 |
| Intermediate Freq | 551 | 2.35 | | 208 | 98 | 3 to 30 |
| 2nd Detector | 227 | 2.35 | | 120 | | 16 |
| Power Tubes | 247 | 2.35 | | 220 | 208 | 14 |
| Rectifier | 280 | 4.90 | | | | |

Volume control full on except for R F and I F bias extremes. Line voltage 115

Plate, screen and bias voltages measured from ground or chassis to respective terminals.

Model 56 (1931)




**Resistors**

| | | |
|---|---|---|
| 117366 | Resistor | 25,000-ohm graphite |
| 114173 | Resistor | 10,000-ohm graphite |
| 114175 | Resistor | 1,500-ohm graphite |
| 12158 | Resistor | 500-ohm vitreous |
| 26406 | Resistor | 10,000-ohm variable and 150 ohm fixed, volume, with switch |
| 25369 | Resistor | 50,000-ohm variable |

**Coils**

| | | |
|---|---|---|
| 11600 | Set of three matched coils | |

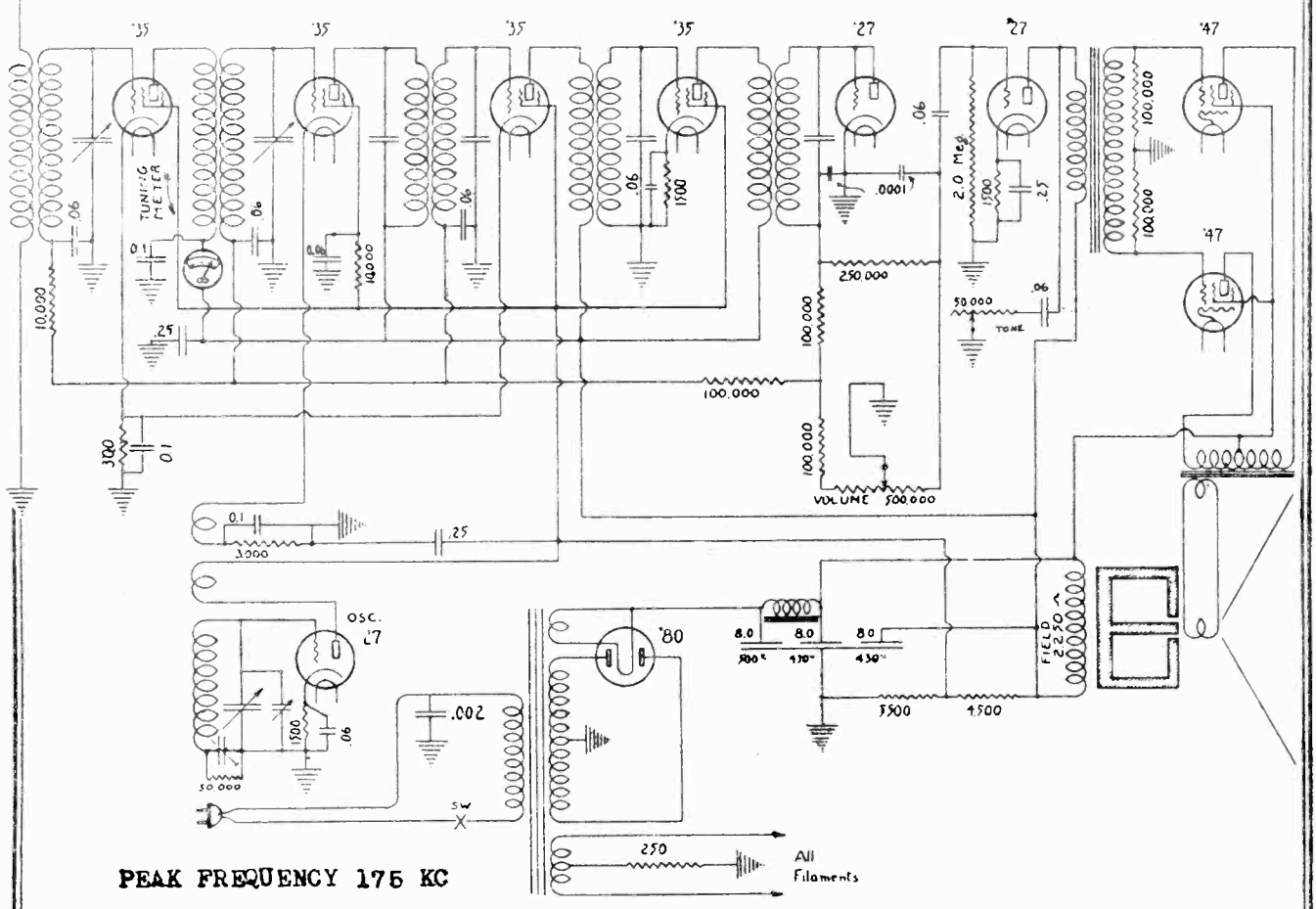
**Condensers**

| | | |
|---|---|---|
| 113303 | Condenser | ½ and ½ mfd |
| 13417 | Condenser | ¼, ¼ and ¼ mfd, 300-volt |
| 13306 | Condenser | 1 mfd tubular |
| 13226 | Condenser | .06 tubular 200-volt |
| 14306 | Condenser | .003 mica |
| 113305 | Condenser | .00025 mica |
| 16302 | Condenser | 8 mfd 500-volt |
| 17302 | Condenser | 12 mfd 450-volt |

**For Technical Data refer to Model 52**

# COLIN B. KENNEDY CORP.

MODEL 62
Schematic
Parts List
Voltage Data




**PEAK FREQUENCY 175 KC**

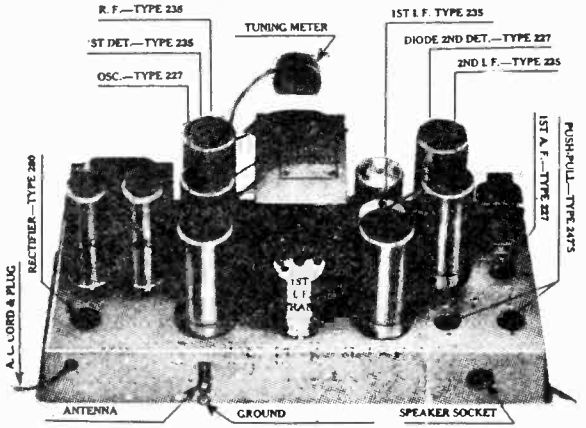
| | | |
|---|---|---|
| ***Coils*** | | |
| 1-5-600 | Set three matched coils | 3.00 |
| ***Condensers*** | | |
| 1-3-417 | Condenser ¼, ¼ & ¼ mfd., 300 volt | 1.25 |
| 1-3-306 | Condenser 0.1 mfd. tubular, 200 volt | .35 |
| 1-3-226 | Condenser 0.06 mfd. tubular, 200 volt | .30 |
| 1-1-A474 | Condenser .0001 mfd. mica | .30 |
| 1-6-302 | Condenser 8 mfd. wet elect'lytic 500 v. | 2.50 |
| 2-7-302 | Condenser 8 mfd. wet elect'lytic 430 v. | 2.25 |
| 4-8-302 | Condenser 8 mfd. dry elect'lytic 430 v. | 1.75 |
| 1-4-301 | Condenser three-gang, tuning | 4.25 |
| ***Resistors*** | | |
| 1-1-3404 | Graphite, 2 megohm | .25 |
| 1-1-F225 | Graphite, 250,000 ohm | .25 |
| 1-1-8484 | Graphite, 100,000 ohm | .25 |
| 1-1-4224 | Graphite, 50,000 ohm | .25 |
| 1-1-4173 | Graphite, 10,000 ohm | .25 |
| 1-1-4172 | Graphite, 3,000 ohm | .25 |
| 1-1-4175 | Graphite, 1,500 ohm | .25 |
| 1-2-172 | Graphite, 400 ohm | .25 |
| 1-4-172 | Graphite, 1,000 ohm | .25 |
| 1-6-369 | Tone control with Sw 50,000 ohm | 1.35 |
| 1-7-406 | Volume control, 500,000 ohm | 1.00 |
| 1-1-F158 | Voltage divider, 4,500 and 5,500 ohm | 1.25 |
| ***Transformers*** | | |
| 1-11-201 | Power, 60-cycle | 6.00 |
| 1-11-200 | Power, 25-cycle | 8.50 |
| 1-1-3203 | Audio, push-pull | 3.50 |
| 1-3-963 | I. F. first stage | 2.50 |
| 2-3-963 | I. F. second stage | 2.50 |
| 3-3-963 | I. F. third stage | 2.75 |
| ***Speaker*** | | |
| D-9XP | Speaker, 2,250 ohm P-P pentode, 12" | 12.00 |

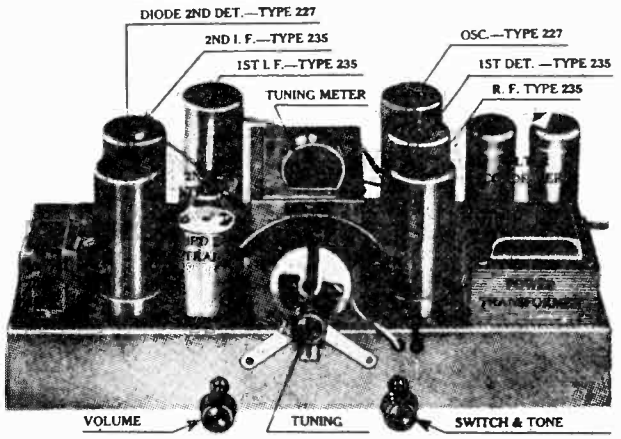
The electrodynamic speaker used with this receiver has a field resistence of 2,250 ohms. It acts as a filter choke, preceded by an 8 henry, 200 ohm choke incorporated in the chassis.

| *Purpose* | *Type* | *Fil., A. C.* | *Plate* | *Screen* | *Bias* |
|---|---|---|---|---|---|
| R. F. | 235 | 2.45 | 212 | 80 | 4 |
| 1 Det. | 235 | 2.45 | 214 | 70 | 6 |
| Osc. | 227 | 2.45 | 80 | | 6 |
| 1 I. F. | 235 | 2.45 | 215 | 80 | 4 |
| 2 I. F. | 235 | 2.45 | 214 | 80 | 7 |
| 2 Det. | 227 | 2.45 | (DIODE) | | |
| 1 A. F | 227 | 2.45 | 200 | | 10 |
| Power Tubes | 247 | 2.44 | 300 | 285 | 19 |
| Rect. | 280 | 4.95 | | | |

Volume control full on. Line voltage 120. Plate and screen voltages measured from cathodes to socket terminals. Bias measured from cathodes to ground.

Small deviations above or below the values given may be expected due to variations in parts, tubes and meters used.




## *Alignment*

Before aligning or testing alignment of tuned circuits, it is desirable to "short out" the automatic volume control action. This is done by grounding the grid return wire of the first three tubes at some point between the 10,000 ohm and 100,000 ohm grid return filter resistors. It will be noted that the low ends of the detector coil and 1st I. F. coil secondaries are connected to this wire. The antenna coil is also connected, but through a 10,000 ohm filtering resistor.

In aligning, it is first desirable to see that the intermediate frequency transformers are properly set. This is most readily accomplished by using an output meter and an accurate source of 175 kilocycle radio frequency, such as an oscillator. The accuracy of this oscillator may be checked by tuning a radio set to a station on 700 kilocycles and placing the oscillator near the antenna. A harmonic of the 175 kilocycle oscillator will "zero beat" with the station if the oscillator is correct. Other "harmonic" points may also be tried.

Remove the grid clip from the top of the first detector tube and fasten a short length of wire to the grid terminal of this tube. Lay this wire sufficiently near the 175 K. C. oscillator to note the energy from it in the output meter. With the oscillator set on exactly 175 K. C., adjust the trimmers in the tops of the I. F. transformer shields for maximum reading of the output meter. If the meter tends to read "off scale," move oscillator farther from set and wire, thereby reducing input energy. If these I. F. transformers are badly out of alignment, it may be necessary to place the "pick up" wire on the grid of the 1st I. F. tube and adjust the second transformer alone, at first, then moving wire to detector grid and proceed as above. It will be noted that the 2nd and 3rd I. F. transformers have but one adjustment, while the first has two.

The tuning condenser may be adjusted for alignment or "tracking" of the tuned circuits by a similar method except that an oscillator covering the broadcast band should be used. The output meter is used as before. The energy from the oscillator, in this case, is coupled weakly into the antenna circuit—a simple means being to place the oscillator near the antenna wire.

The receiver and oscillator are first tuned to approximately 1,500 kilocycles, and by watching the output indicator, the three condenser trimmers (reached through three holes in top right of condenser shield, or, in some cases, through removable plate) are adjusted for maximum output. These three trimmers must then be left *untouched* for all further aligning.

The next step is to tune both receiver and oscillator to some point near 550 kilocycles. Here, the alignment is made by adjusting the "padding" condenser (through hole in rear of condenser shield) for maximum response. If necessary to adjust the two R. F. condenser sections, it may be accomplished by bending the condenser end plates. If found necessary to align at other than the ends of the "band," it may be done by bending the slotted end plate of the condenser rotors. Alignment of the two ends of the scale is usually quite sufficient.

IMPORTANT: It is desirable to move the dial back and forth across the signal while making the above alignments. This is particularly necessary when altering any capacities connected with the oscillator circuit. An insulated or bakelite screw driver (containing little, if any, metal) is advised for use in adjusting "trimmer" or "padding condensers."

Circuit correction. The bias for the oscillator tube, on later models, will be found to be obtained from the 1st detector cathode resistor instead of the 1,500 ohm self bias resistor as indicated. In this case, the 1st detector bias resistor has been changed from 3,000 ohms, as shown, to 1,000 ohms. The self bias resistor of the 2nd I. F. tube will be found changed to 3,000 ohms.

The automatic volume control functions with the diode second detector. The rectified radio frequency flows from the grid and plate (which are joined) to cathode and ground. It returns through the manual volume control and the two 100,000 ohm resistors to the secondary of the last I. F. transformer, and back to the plate and grid, completing the rectifying circuit. No current flows in this circuit until a carrier wave is tuned in. With no current flowing, the bias for the R. F. and 1st I. F. tubes is obtained in the 300 ohm resistor in series with their two cathodes. The biases of the 1st detector and 2nd I. F. tubes are obtained by individual cathode resistors. When current flows in the diode circuit, points along the resistence path from volume control ground to secondary coil are successively more and more negative with respect to ground due to the drop in these resistors. They are naturally more negative when more current flows in this circuit. Advantage is taken of this to provide almost perfect automatic bias control for the first three tubes by returning the grid circuits of these tubes to a determined point on these resistors. Thus, the negative voltage developed by the diode circuit is added to the fixed bias already provided for these tubes. Stronger signals increase this added bias; weaker signals reduce the added bias; and the result in the over-all response is uniformity of volume level. As the volume control is rotated toward minimum or "OFF," more resistance is added to the automatic circuit, increasing its action, and at the same time operates in the audio system by tending to short out the signal to the first audio tube grid.

In all other respects, the circuit is entirely conventional, and may be tested in the regular ways with standard equipment.

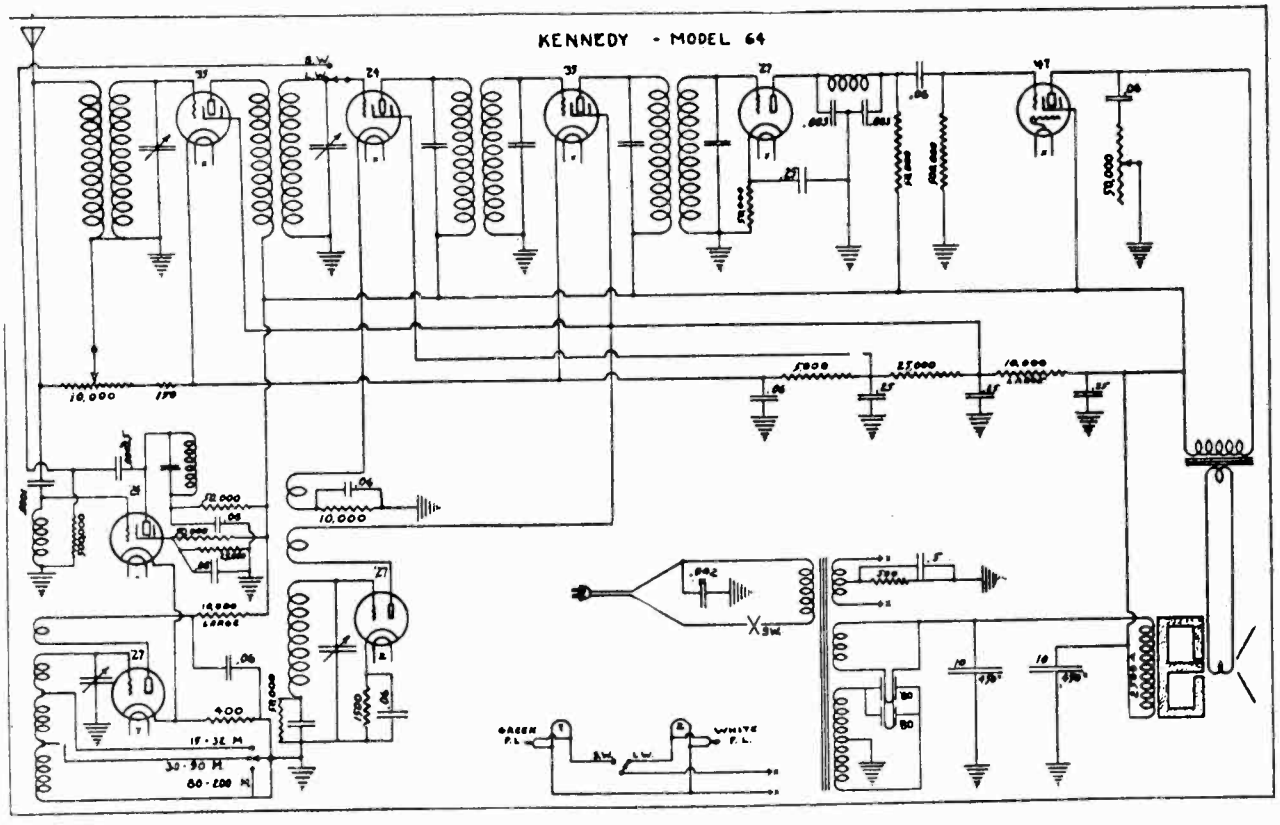
Continuity of circuit and coils may be tested with a battery, meter and pair of test leads. If necessary to replace a coil, it is advisable to replace the entire set of three with a new correctly matched set.

COLIN B. KENNEDY CORP.

MODEL 64
Schematic

# Kennedy 10 Tube Long *and* Short Wave Receiver

CHASSIS MODEL 64




The tubes employed are as follows, and are operated at normal voltages and biases:

| | | | |
|---|---|---|---|
| Short Wave mixer .... | 224 | Long Wave Oscillator ... | 227 |
| Short Wave Oscillator | 227 | Intermediate frequency .. | 235 |
| Radio frequency .... | 235 | 2nd Detector ..... | 227 |
| Long Wave mixer .... | 224 | Output ..... | 247 |
| Rectifier ..... | 280's | | |

For short wave reception the long wave mixer becomes an I.F. amplifier, while the long wave oscillator filament goes out. For long wave reception, the short wave oscillator filament goes out. These circuits are indicated above. The intermediate frequency used throughout is 175 K.C.

In aligning, it is first desirable to see that the intermediate frequency transformers are properly set. This is most readily accomplished by using an output meter and an accurate source of 175 kilocycle radio frequency, such as an oscillator. The accuracy of this oscillator may be checked by tuning a radio set to a station on 700 kilocycles and placing the oscillator near the antenna. A harmonic of the 175 kilocycle oscillator will "zero beat" with the

MODEL 64
Alignment
Socket

# COLIN B. KENNEDY CORP.

station if the oscillator is correct. Other "harmonic" points may also be tried. With the receiver switched to short wave position, remove the grid clip from the top of the S.W. mixer tube and fasten a short length of wire to the grid terminal of this tube. Lay this wire sufficiently near the 175 K.C. oscillator to note the energy from it in the output meter. With the oscillator set on exactly 175 K.C., adjust the trimmers in the tops of the I.F. transformer shields for maximum reading of the output meter. If the meter tends to read "off scale," move oscillator farther from set and wire, thereby reducing input energy. If these I.F. transformers are badly out of alignment, it may be necessary to place the "pick up" wire on the grid of the long wave mixer and adjust the last two transformers alone, at first, then moving wire back to S.W. mixer and proceed as before. It will be noted that the first I.F. transformer has but one adjustment.

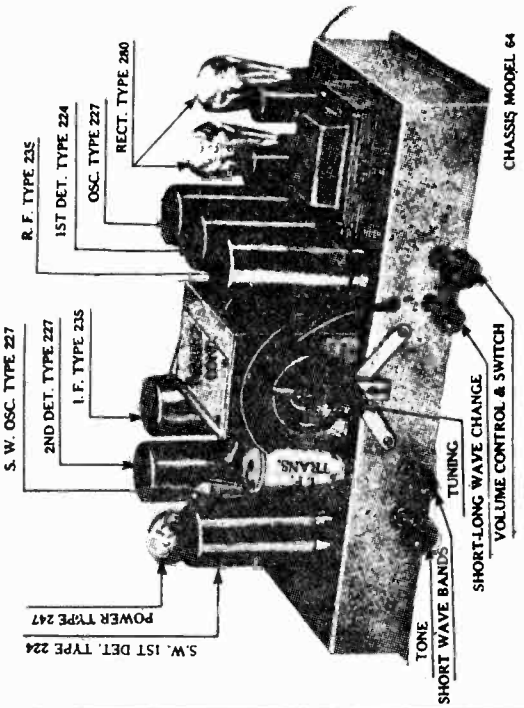
The tuning condenser may be adjusted for alignment or "tracking" of the tuned circuits by a similar method except that an oscillator covering the broadcast band should be used. The output meter is used as before. The energy from the oscillator, in this case, is coupled weakly into the antenna circuit - a simple means being to place the oscillator near the antenna wire.

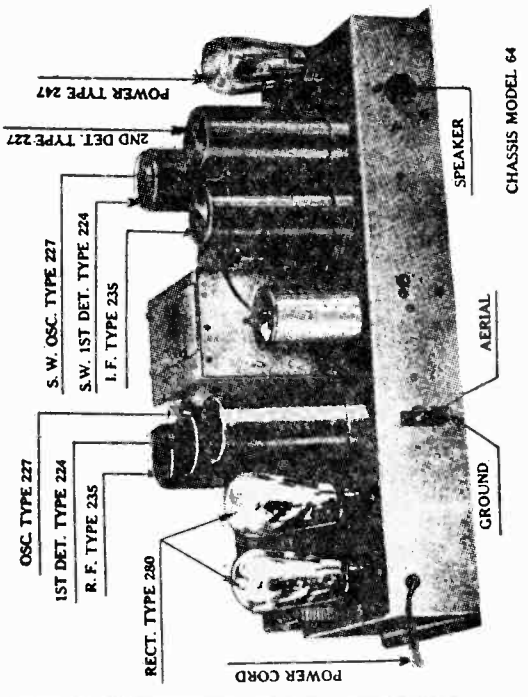
The receiver and oscillator are first tuned to approximately 1,500 kilocycles, and by watching the output indicator, the three condenser trimmers, reached through the removable plate, are adjusted for maximum output. These three trimmers must then be left untouched for all further aligning.

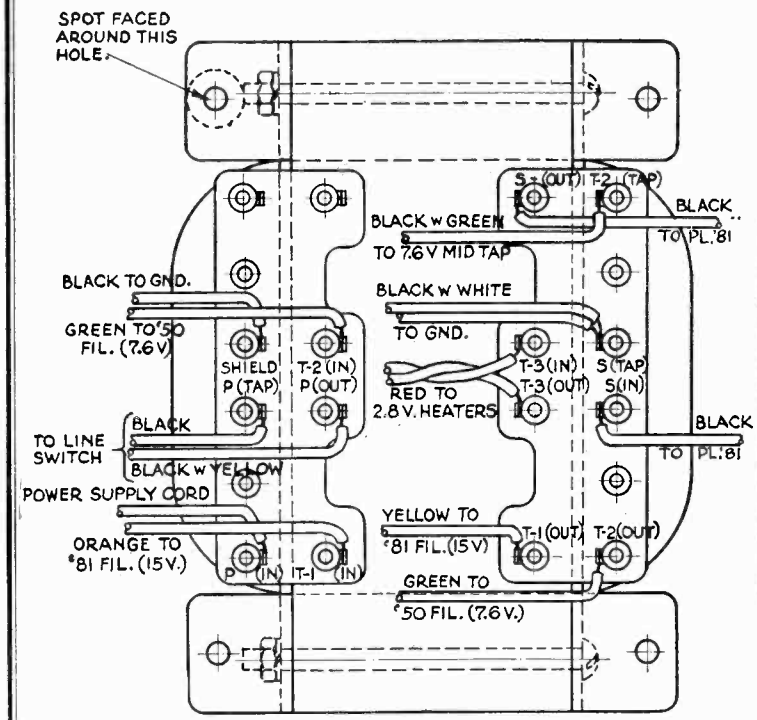
The next step is to tune both receiver and oscillator to some point near 550 kilocycles. Here, the alignment is made by adjusting the "padding" condenser for maximum response. It may be reached through hole in rear center of chassis base.

If necessary to adjust the two R.F. condenser sections, it may be accomplished by bending the condenser end plates. If found necessary to align at other than the ends of the "band", it may be done by bending the slotted end plate of the condenser rotors. Alignment of the two ends of the scale is usually quite sufficient.

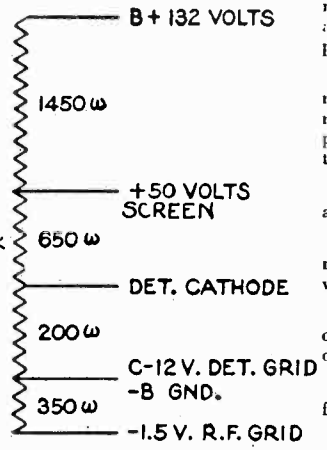
IMPORTANT: It is desirable to move the dial back and forth across the signal while making the above alignments. This is particularly necessary when altering any capacities connected with the oscillator circuit.






POWER TRANSFORMER ASSEMBLY



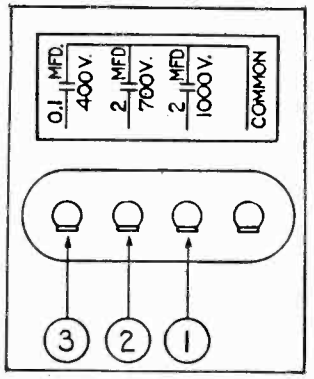

VOLTAGE DIVIDER

## K-45 Average Set Analysis

### LINE VOLTAGE 112—LINE SWITCH ON 110-120 VOLT TAP
### VOLUME CONTROL POSITION ON FULL

Approximate reading only as various tubes create different readings

| Tube No. in Order | Type of Tube | Position of Tube 1st RF Det., etc. | Readings, Plug in Socket of Set | | | | | | Normal Plate MA |
|---|---|---|---|---|---|---|---|---|---|
| | | | Tube Out | | Tube in Tester | | | Screen Volts | |
| | | | A | B | A | B | C | | |
| 1 | '24 | 1st RF | 2.4 | 132 | 2.2 | 128 | 1.5 | 45 | 1.2 |
| 2 | '24 | 2nd RF | 2.4 | 132 | 2.2 | 128 | 1.5 | 45 | 1.3 |
| 3 | '24 | 3rd RF | 2.4 | 132 | 2.2 | 128 | 1.5 | 45 | 1.1 |
| 4 | '27 | Detector | 2.4 | 130 | 2.2 | 125 | 9 | | 1.5 |
| 5 | '27 | 1st AF | 2.4 | 130 | 2.2 | 123 | 8 | | 4.5 |
| 6 | '27 | 2nd AF PP | 2.4 | 130 | 2.2 | 125 | 8 | | 5.0 |
| 7 | '27 | 2nd AF PP | 2.4 | 130 | 2.2 | 125 | 8 | | 4.5 |
| 8 | '50 | 3rd AF PP | 5 | 420 | 5 | 420 | 75 | | 68 |
| 9 | '50 | 3rd AF PP | 5 | 420 | 5 | 420 | 75 | | 68 |
| 10 | '81 | Rectifier | 5 | | | | | | |
| 11 | '81 | Rectifier | 5 | | | | | | |




CONDENSER BLOCK

It is sometimes noticeable that the Condenser Gang does not respond rapidly enough when a selector button is pressed. This is caused by a slow motor and the brake adjustment should be loosened. The method of adjusting the friction brake is as follows: (1) Unloosen the machine screw holding the slotted brake shoe to the motor. (2) Adjust the friction of the brake shoe by varying the pressure applied to the fibre washer fastened to the motor armature. (3) The brake is adjusted properly when the maximum speed is obtained without the condenser gang carrying by the station corresponding to the selector button pressed. (4) When the proper adjustment has been made, securely tighten the brake locking screw. Ordinarily, no adjustment need be made of this device, as it is properly set in manufacture or if proper line voltage is used.

The motor clutch device is for the purpose of mechanically disengaging the drive motor armature from the tuning condenser simultaneously with the opening of the motor circuit. This electrically operated device is necessary so as to eliminate the possibility of the inertia of the motor armature, when the motor circuit is open, from turning the tuning condenser past the pre-determined setting of the selector brush.

Make certain that the position of the line voltage switches in both the power pack and relay unit are set to correspond with the existing AC line voltage.

If it is desired, the remote cable may be disconnected from the receiver by removing the nuts holding the terminal card to the motor unit and relay box. This will in no way interfere with the operation of the set at the local position.

Four adjustable trimmer condensers are provided on top of the main gang condenser to compensate for small capacitive variations in the tuning circuits. This condition is made noticeable by the receiver becoming insensitive.

If it appears a certainty that the tuning circuits are not balanced, a simple method for readjusting is as follows:

1—Tune in a signal, preferably at the low end of the dial, and adjust the volume control for a moderate signal intensity.
2—Adjust with a short bakelite screwdriver the four compensating condensers successively, from the detector to the first RF stage, for the greatest signal intensity.
3—The various adjustments can now be checked at medium and high points on the dial, making slight variations if it is found necessary.

Bending the end plates of the variable tuning condensers in order to align the gang should only be resorted to if the trimmers are not sufficiently effective. This method will only be necessary in extreme cases where the condenser gang has been subjected to abuse or severe handling.

Should it ever be necessary to replace the cone assembly the proper procedure is as follows:

1—Place the speaker flat on the felt ring.
2—Unsolder the two leads coming from the output transformer to the voice coil.
3—Remove the four long bolts from the back of the field coil housing.
4—Lift the field coil and assembly straight upwards and away from the cone assembly to which remains the end plate.

To recenter a voice coil the above procedure is followed, and with the cone assembly remaining flat on the felt ring there will be found the heads of three small machine screws close to the opening in the end plate for the voice coil. Loosen these screws and shift the cone assembly until the voice coil is concentric with the hole in the end plate. Retighten the screws just loosened and reassemble the unit in the reverse manner in which it was disassembled.

Care must be taken against damaging the voice coil against the pole piece and also the four long assembly bolts must be drawn up as tightly as possible.

MODELS K-60,K-62,K-70,K-72
K-80,K-82,K-90,K-92
Condenser & Resistor Data

# KOLSTER RADIO, INC.

## MODELS K-60—K-62

Condenser, Electrolytic, 475 volts, 8 mfd. (C6-C7)
Condenser, Electrolytic, 430 volts, 8 mfd. (C8)
Condenser, fixed, Mica, .000725 mfd. (Yellow) (C2)
Condenser, fixed, Mica, .0002 mfd. (Gray) (BC-4)
Condenser, fixed, Mica, .001 mfd. (Orange) (C1)
Condenser, fixed, Mica, .0015 mfd. (Blue) (SC-1)
Condenser, fixed, Mica, .003 mfd. (Pink) (SC-2)
Condenser, fixed, paper, .025 mfd. (200 volts) (C4)
Condenser, fixed, paper, .1 mfd. (200 volts) (BC-6)
Condenser, fixed, paper, .1 mfd. (400 volts) (C-5)
Condenser, variable, 3 gang, comp. (VC-1, VC-2, VC-3)
Condenser block (4 sections) (BC-1, BC-2, BC-3, C3)
Resistor, fixed, carbon, 200 ohms (Body red, tip black, dot brown) (R5)
Resistor, fixed, carbon, 10000 ohms (Body brown, tip black, dot orange) (R2)
Resistor, fixed, carbon, 25000 ohms (Body red, tip green, dot orange) (R6)
Resistor, fixed, carbon, 100000 ohms (Body brown, tip black, dot yellow) (R3)
Resistor, fixed, carbon, .25 megohms (Body red, tip green, dot yellow) (R4, R7, R8, R9, R10)
Resistor, fixed, carbon, 1 megohm (Body brown, tip black, dot green) (R1)
Resistor, vitreous, tapped (R11, R12, R13, R14)

## MODELS K-70—K-72

Condenser, Electrolytic, 475 volts, 8 mfd. (C6-C7)
Condenser, Electrolytic, 430 volts, 8 mfd. (C8)
Condenser, fixed, Mica, .000725 mfd. (Yellow) (C2)
Condenser, fixed, Mica, .0002 mfd. (Gray) (BC-5)
Condenser, fixed, Mica, .0005 mfd. (Red) (C4)
Condenser, fixed, Mica, .001 mfd. (Orange) (C1)
Condenser, fixed, Mica, .0015 mfd. (Blue) (SC-1)
Condenser, fixed, Mica, .003 mfd. (Pink) (SC-2)
Condenser, fixed, paper, .025 mfd. (200 volts) (C-10)
Condenser, fixed, paper, 0.1 mfd. (200 volts) (C3, C-9, BC-1, BC-4, BC-7, BC-8)
Condenser, fixed, paper, 0.1 mfd. (400 volts) (C5), BC-11
Condenser, fixed, paper, 1.0 mfd. (K-72) (C11)
Condenser, variable, 3 gang, comp. (VC-1, VC-2, VC-3)
Condenser block (5 sections) (BC-2, BC-3, BC-6, BC-9, BC-10)
Resistor, fixed, carbon, 200 ohms (Body red, tip black, dot brown) (R2)
Resistor, fixed, carbon, 5000 ohms (Body green, tip black, dot red) (R9, R21)
Resistor, fixed, carbon, 10000 ohms (Body brown, tip black, dot orange) (R3)
Resistor, fixed, carbon, 20000 ohms (Body red, tip black, dot orange) (R11)
Resistor, fixed, carbon, 25000 ohms (Body red, tip green, dot orange) (R8, R16)
Resistor, fixed, carbon, 100000 ohms (Body brown, tip black, dot yellow) (R4)
Resistor, fixed, carbon, .25 megohms (Body red, tip green, dot yellow) (R1, R5, R17, R18, R19, R20)
Resistor, fixed, carbon, 2 megohms (Body red, tip black, dot green) (R6, R7)
Resistor, vitreous, tapped (R12, R13, R14, R15)

## MODELS K-80—K-82

Condenser, Electrolytic, 475 V. (C6-C7)
Condenser, Electrolytic, 430 V. (C8)
Condenser, fixed, Mica, .000725 Mfd. (Yellow) (C2)
Condenser, fixed, Mica, .0005 Mfd. (Red) (SC-1, C4)
Condenser, fixed, Mica, .001 Mfd. (Orange) (C1, BC-6)
Condenser, fixed, Mica, .002 Mfd. (Green) (SC-2, BC-9)
Condenser, fixed, paper, .025 Mfd. (200 volts) (C9)
Condenser, fixed, paper, .1 Mfd. (200 volts) (BC-1, BC-5, C3)
Condenser, fixed, paper, .1 Mfd. (400 volts) (C5) (BC-10)
Condenser, fixed, paper, 1 Mfd. (200 volts) (K-82) (C10)
Condenser, variable, 3 gang comp. (VC-1, VC-2, VC3)
Condenser block (5 sections) (BC-2, BC-3, BC-4, BC-7, BC-8)
Resistor, fixed, carbon, 200 ohms (Body red, tip black, dot brown) (R2)
Resistor, fixed, carbon, 5000 ohms (Body green, tip black, dot red) (R18) (K-82)
Resistor, fixed, carbon, 10000 ohms (Body brown, tip black, dot orange) (R3, R17)
Resistor, fixed, carbon, 20000 ohms (Body red, tip black, dot orange) (R9)
Resistor, fixed, carbon, 25000 ohms (Body red, tip green, dot orange) (R13, R14)
Resistor, fixed, carbon, 50000 ohms (Body green, tip black, dot orange) (R15, R16)
Resistor, fixed, carbon, 100000 ohms (Body brown, tip black, dot yellow) (R4)
Resistor, fixed, carbon, .25 megohms (Body red, tip green, dot yellow) (R1)
Resistor, fixed, carbon, 2 megohms (Body red, tip black, dot green) (R11, R12)
Resistor, vitreous, tapped (R5, R6, R7, R8)

## MODELS K-90—K-92

Condenser, Electrolytic, 475 V. (C6-C7)
Condenser, Electrolytic, 430 V. (C8)
Condenser, fixed, Mica, .000725 Mfd. (Yellow) (C2)
Condenser, fixed, Mica, .0005 Mfd. (Red) (SC-1, C4)
Condenser, fixed, Mica, .001 Mfd. (Orange) (BC-6, C1)
Condenser, fixed, Mica, .002 Mfd. (Green) (SC-2, BC-9)
Condenser, fixed, paper, .025 Mfd. (200 volts) (C9-C10)
Condenser, fixed, paper, .1 Mfd. (200 volts) (BC-1, BC-5, C3)
Condenser, fixed, paper, .1 Mfd. (400 volts) (C5)
Condenser, fixed, paper, 1 Mfd. (200 volts) K-92 (C11)
Condenser, variable, 4 gang, comp. (VC-1, VC-2, VC-3, VC-4
Condenser Block (5 sections) (BC-2 BC-3, BC-4, BC-7, BC-8)
Resistor fixed, carbon, 200 ohms (Body red, tip black, dot brown) (R2)
Resistor, fixed, carbon, 5000 ohms (Body green, tip black, dot red) (R19)
Resistor, fixed, carbon, 8000 ohms (Body gray, tip black, dot red) (R11)
Resistor, fixed, carbon, 10000 ohms (Body brown, tip black, dot orange) (R3-R20)
Resistor, fixed, carbon, 12000 ohms (Body brown, tip red, dot orange) (R-10)
Resistor, fixed, carbon, 25000 ohms (Body red, tip green, dot orange) (R13-R14)
Resistor, fixed, carbon, 50000 ohms (Body green, tip black, dot orange) (R15-R16-R19)
Resistor, fixed, carbon, 100000 ohms (Body brown, tip black, dot yellow) (R4)
Resistor, fixed, carbon, .25 megohms (Body red, tip green, dot yellow) (R1-R5)
Resistor, fixed, carbon, 1 megohm (Body brown, tip black, dot green) (R17-R18)
Resistor, vitreous, tapped (R6-R7-R8-R9)

Model K 80,82 sets as originally manufactured employed 15,000 ohm volume control unit, (Stamped No. 62018). To improve volume control action, this unit has been replaced with 15,000 ohm potentiometer, (Stamped No. 62025).

In addition to replacing the volume control unit as just described, a 1,000 ohm fixed resistor, Part No. 6569-15, is installed in the Cathode circuit of the automatic volume control tube. This should be connected between the end of the volume control unit (R-10) and the 20,000 ohm resistor (R-9).

MODELS K-60,K-62,K-70,K-72
K-80,K-82,K-90,K-92

KOLSTER RADIO, INC.

Condenser Adjustments, Data

Models K-60—K-62— K-70—K-72 — K-80—K-82— K-90—K-92

## R.F. TUNING AND OSCILLATOR TRIMMING CONDENSER ADJUSTMENTS

Located on the front of the gang condenser are three trimmer condensers (TC-1-2-3) which are provided for aligning the R.F. circuits. The 600 K.C. trimmer condenser (OC-1) for the OSCILLATOR will be found on the right hand top of the chassis base directly in front of the '80 socket and opposite the coil shield. Poor tone, lack of sensitivity and selectivity, or complete inoperation of the receiver may be caused by these condensers being out of adjustment.

(a) Place the oscillator in operation at exactly 1400 K.C. and couple it to the antenna. Connect the output device in accordance with the type used. Tune in the oscillator signal and adjust the coupling between the oscillator and the antenna lead of the set, or increase the volume control setting until a deflection is obtained in the output meter.

(b) With an insulated screw driver adjust each of the trimmer condensers mounted on the gang condenser frame until a maximum deflection is obtained in the output meter. If the pointer goes off scale reduce the coupling or the volume control.

(c) Set the oscillator now at 600 K.C. Tune in this signal with the receiver and adjust coupling or volume control for a deflection in the output meter. Now adjust the oscillator 600 K.C. trimmer condenser (OC-1) until a maximum deflection is obtained. In making this adjustment it is advisable to rock the tuning condenser back and forth a few degrees each side of the normal position.

(d) Change the setting of the oscillator back to 1400 K.C. and readjust the three trimmer condensers.

If attention is given to the adjustments the R.F. and oscillator circuits will be properly aligned and satisfactory results should be obtained. If not the next step is to adjust the I.F. circuits.

## I.F. CIRCUIT ADJUSTMENTS

A single intermediate frequency stage with two transformers is used in band-pass arrangement. Each transformer has both the primary and secondary windings tuned accurately for 175 K.C.

To adjust these circuits proceed as follows:

(a) Set the previously mentioned oscillator at 175 K.C.

(b) Connect the output device.

(c) Remove the oscillator tube, which is the type '27 adjacent to the type '80, and make a good ground connection to the chassis.

(d) Connect the output of the oscillator to the Control Grid cap of the first detector, which is the type '24 tube.

(e) Adjust the oscillator output or the receivers volume control until a deflection is obtained in the output device.

(f) Place the chassis on end and the adjusting screws for the I.F. transformer condensers (IC-1-2-3-4) will be found through holes in the under side of the base after the bottom shield has been removed.

(g) Adjust the secondary and primary of the second and first I.F. transformers in the order just mentioned until a maximum deflection is obtained in the output meter. Make these adjustments the second time to insure proper aligning. It is now advisable to recheck the R.F. and oscillator condensers again.

## LINE VOLTAGE VARIATIONS Models K-60—K-62 and Models K-70, K-72

These models were tested on 115 volts, and are therefore suitable for operation on line voltages ranging from 110 to 120 volts. Should lower line voltages be encountered it will be necessary to remove the chassis from the cabinet and unsolder the BLUE lead, which comes from the under side of the power transformer and is connected to one side of the line switch mounted on the rear of the volume control. In its place solder the GREEN lead, taping the end of the Blue lead just removed so that it will not short against other leads in the chassis. In locations where the line voltages exceed 120 volts, a suitable resistor will be necessary to reduce the voltage applied to the correct value.

**CAUTION**

**NEVER TURN ON THE POWER TO THE SET WHEN THE SPEAKER IS DISCONNECTED**

All tubes removed from sockets and AC plug removed from power supply. Speaker connected. Volume control maximum unless otherwise stated.

| From Chassis To | Correct | | Incorrect |
|---|---|---|---|
| Aerial | 1.55 | ohms | |
| RF Control Grid | 1,000,000 | ohms | Includes one rf wdg<br>TC- rf Cg-Y<br>BC- across 1 meg unit<br>TC- across first rf wdg |
| RF Control Grid and first tuning condenser stator | 6.4 | ohms | |
| RF Cathode (V.C.Max) | 200 | ohms | BC- rf K-Y (.25 mfd) |
| RF Screen Grid | 2,653 | ohms | BC- rf Sg-Y (.25 mfd) |
| RF Plate | 6,679 | ohms | BC- rf P wdg Y(.25 mfd) |
| RF Plate to 80 Fil | 26 | ohms | |
| 1 Detector Control Grid | 26 | ohms | |
| 1 Detector Cathode | 10,003.9 | ohms | BC across 10,000 ohms<br>C plg wdg 3.9 ohms |
| 1 Detector Screen Grid | 2,653 | ohms | See RF Screen |
| 1 Detector Plate | 6,703 | ohms | TC- IF Tr Primary<br>.25 meg resistor across primary |
| IF Control Grid | 50 | ohms | TC- if Cg-Y |
| IF Cathode | 200 | ohms | See RF Cathode |
| IF Screen Grid | 2,653 | ohms | See RF Screen |
| IF Plate | 6,703 | ohms | See RF Plate |
| 2 Detector Control Grid | 50 | ohms | TC- 2 D Cg-Y |
| 2 Detector Cathode | 25,000 | ohms | BC- 2 DK-Y (1. mfd) |
| 2 Detector Screen | 252,653 | ohms | BC- 2 D Sg-Y (.1 mfd) |
| 2 Detector Plate | 256,838 | ohms | BC 2 DP-2DK<br>BLC- 2 DP-'47 Cg |
| Oscillator Control Grid | 100,000 | ohms | |
| Oscillator Cathode | 0 | ohm | |
| Oscillator Plate | 2,656 | ohms | BC- rf Sg-Y |
| '47 Control Grid | 500,200 | ohms | Tone Control Condensers<br>BC- '47 grid fil res-Y<br>See 2 D Plate |
| RF Plate to '47 Screen | 26 | ohms | |
| 1 Detector Plate to '47 Screen | 50 | ohms | |
| IF Plate to '47 Screen | 50 | ohms | |
| '47 Screen Grid to '80 Fil | 0 | ohm | |
| '47 Plate to Chassis | 850 | ohms | |
| '47 Plate to '80 Filament | 650 | ohms | |
| '80 Anode to Chassis | 1,733 | ohms | |
| '80 Anode to '80 Anode | 166 | ohms | |
| '80 Filament to Chassis | 6,653 | ohms | FC |
| '80 Filament to '80 Anode | 8,369 | ohms | FC |
| Output Transformer Secondary Only | 0.3 | ohm | |
| Voice Coil only | 3 | ohms | |
| Voice Coil and Secondary | 0.273 | ohm | |
| Across AC Plug (110-120 V) | 1.9 | ohm | |
| Across AC Plug (100-110 V) | 1.7 | ohm | |
| AC plug to chassis | 0 | ohm | BC- between power transformer primary and chassis (.1 mfd) |

Notes** Oscillator coil is isolated from oscillator control grid by means of blocking condenser. Oscillator coil only has a resistance of 2.5 ohms.

KOLSTER K 60-K 62 **

| Tube | Heater Voltage | Control Grid Voltage | Screen Grid Voltage | Plate Voltage | Plate Current |
|---|---|---|---|---|---|
| RF | | 3.* | 80. | 230. | 6.0 ma |
| 1 Det | | 6. | 74. | 225. | 1.0 |
| IF | | 4. | 80. | 225. | 7.0 |
| 2 Det | | 6. | 22.* | 125.* | .2 |
| Osc. | | - | - | 85. | 6.0 |
| Pwer Rect. | | .2* | 245. | 225. | 24.<br>48. per anode |

* Indicates incorrect reading due to high resistance in circuit.

** Volume control at maximum and tone control in natural position.

KOLSTER RADIO, INC.

MODEL K-60, K-62
Voltage, Test Data

# KOLSTER RADIO, INC.

## MODEL K-70, K-72
Test Data
Voltage

All tubes removed from sockets and AC plug disconnected from power supply
Speaker disconnected. Volume control maximum unless otherwise stated.

| From Chassis To | Correct | | Incorrect |
|---|---|---|---|
| Aerial | 1.55 | ohms | |
| RF Control Grid | 2,250,000 | ohms | TC- rf Cg-Y |
| RF Control Grid to Stator of first tuning condenser | 6.4 | ohms | |
| RF Cathode | 200 | ohms | BC- rf K-Y (.25 mfd) |
| RF Screen | 23,000 | ohms | BC-Y (1 mfd) BC Osc P-Y |
| RF Plate | 6,026 | ohms | BC- rf P wdg-Y |
| RF Plate to '47 Screen | 26 | ohms | |
| 1 Detector Control Grid | 26 | ohms | |
| 1 Detector Cathode | 10,003.9 | ohms | BC across 10,000 ohms Osc Cplg wdg-3.9 ohms |
| 1 Detector Screen Grid | 23,000 | ohms | See RF Screen |
| 1 Detector Plate | 6,050 | ohms | See RF Plate TC- if Tr wdg 250,000 ohm resistor across IF Tr primary |
| 1 Detector Plate to '47 Screen | 50 | ohms | TC- if Tr |
| IF Control Grid | 2,000,050 | ohms | TC- if Cg BC- if Cg TC-Y |
| IF Control Grid to AVC Plate | 50 | ohms | TC- if Tr sec |
| IF Cathode | 200 | ohms | See RF Cathode |
| IF Screen Grid | 23,000 | ohms | See RF Screen |
| IF Plate | 6,050 | ohms | TC- IF Tr pri See RF Plate |
| IF Plate to '47 Screen | 50 | ohms | TC- IF Tr |
| 2 Detector Control Grid | 50 | ohms | TC- 2 D Cg-Y |
| 2 Detector Cathode | 250,000 | ohms | BC- 2 D K-Y |
| 2 Detector Screen | 253,000 | ohms | BC- 2 D Sg-Y |
| 2 Detector Plate | 256,185 | ohms | BC- 2 D P- 2 D K |
| 2 Detector Plate to '47 Screen | 250,000 | ohms | BLC- 2 DP-'47 Cg |
| '47 Control Grid | 502,200 | ohms | BLC-'47 Cg- 2 DP BC-'47 Cg filter res-Y Tone Control condensers |
| '47 Filament | 2,000 | ohms | |
| '47 Screen | 6,000 | ohms | FC See IF Plate |
| '47 Screen to '80 Fil | 0 | ohm | |
| AVC Control Grid | 2,032,000 | ohms | CC AVC Cg- if P |
| AVC Control Grid to AVC Cathode | 2 megohms | | |
| AVC Cathode | 32,000 | ohms | |
| AVC Screen Grid | 27,000 | ohms | |

| From Chassis To | Correct | | Incorrect |
|---|---|---|---|
| AVC Plate | 2,000,000 | ohms | See RF Control Grid See 1 Det Control Grid |
| '80 Anode to '30 Anode | 166 | ohms | |
| '80 Anode to AVC Cathode* | 15,483 | ohms | TC |
| '80 Anode to 80 Filament * | 53,483 | ohms | FC |
| Across Filament contacts of speaker plug | 830 | ohms | |
| Across Grid- Plate contacts of speaker plug | 650 | ohms | |
| Across Voice Coil only | 7.5 | ohms | |
| Across Output Transformer secondary only | 0.92 | ohm | |
| Across AC Plug (110-120 V) | 1.9 | ohm | |

Note- Field coil resistance 830 ohms
Output transformer primary 650 ohms

Speaker Connected

'47 Plate to '47 Screen 650 ohms

Model 72

** Everything as in model 70, except for the following-

Speaker Disconnected

| | | |
|---|---|---|
| '80 Anode to AVC Cathode | 20,483 | ohms |
| '80 Anode to '80 Filament | 58,483 | ohms |

KOLSTER K 70-K 72

Volume control at maximum. Tone contral at natural position.

| Tube | Control Grid Voltage | Screen Grid Voltage | Cathode Voltage | Plate Voltage | Plate Current |
|---|---|---|---|---|---|
| RF | .5* | 60. | 80. | 190. | .25 ma |
| 1 Det | 5. | 50. | 84. | 180. | .6 |
| IF | 3. | 75. | 80. | 195. | 1. |
| AVC | .25 | 25. | 50. | 20. | - |
| 2 Det | 4. | 24* | 80. | 100* | .25 |
| Pwer | 4. * | 260. | | 235. | 35. |
| Osc. | 2.5 | | 80. | 80. | 5. |
| Rect. | | | | | 48. per anode |

* Indicates incorrect reading due to high resistance in cirouit.

# KOLSTER RADIO, INC.

## MODEL K-80, K-82
## Voltage
## Test Data

All tubes out of receivers and AC plug disconnected from power supply.
Speaker disconnected. Volume control maximum unless otherwise stated.

| From Chassis To | Correct | | Incorrect |
|---|---|---|---|
| Aerial | 1.55 | ohms | |
| RF Control Grid | 2,250,000 | ohms | BC- rf grid filter resistor-Y<br>BC- if Cg wdg-Y (.1 mfd |
| RF Control Grid to first tuning condenser stator | 6.4 | ohms | |
| RF Cathode | 200 | ohms | BC- rf K-Y (.25 mfd) |
| RF Screen | 7,000 | ohms | BC- rf Sg-Y (.25 mfd) |
| RF Plate | 13,026 | ohms | BC- rf P wdg-Y (1.mfd)<br>BC- 2 D AF Tr-2 DK<br>FC- 2 RF P wdg-Y-(8mfd) |
| RF Plate to '47 Screen | 26 | ohms | |
| 1 Detector Control Grid | 26 | ohms | |
| 1 Detector Cathode | 10,003.9 | ohms | BC- across 10,000 ohms<br>Osc. cplg wdg 3.9 ohms |
| 1 Detector Screen Grid | 7,000 | ohms | BC- rf Sg-Y (.25 mfd) |
| 1 Detector Plate | 13,050 | ohms | TC- if Tr<br>See RF Plate |
| 1 Detector Plate to '47 Screen | 50 | ohms | |
| IF Control Grid | 2,000,050 | ohms | BC- if wdg- if K |
| IF Control Grid to AVC Plate | 50 | ohms | TC- IF Tr |
| IF Cathode | 200 | ohms | See RF Cathode |
| IF Screen Grid | 7,000 | ohms | See RF Screen |
| IF Plate | 13,050 | ohms | See RF Plate |
| IF Plate to '47 Screen | 50 | ohms | |
| 2 Detector Control Grid | 50 | ohms | TC- 2 D Cg-Y |
| 2 Detector Cathode | 25,000 | ohms | BC- 2 DK-Y (1.mfd)<br>BC- 2 DK- 2 DP(.001 mfd |
| 2 Detector Plate | 42,545 | ohms | BC- AF Tr- 2 DK( 1 mfd)<br>BC- 2DP-2DK (.001 mfd)<br>See RF Plate |
| 2 Detector Plate to '47 Screen | 29,545 | ohms | |
| '47 Control Grid | 59,250 | ohms | Tone Control Condenser |
| '47 Control Grid to Control Grid | 112,500 | ohms | Tone Control Condenser<br>Tone Switch closed |
| '47 Cg to Cg-Tone Switch closed | 9,100 | ohms | |
| '47 Screen Grid | 13,000 | ohms | |
| '47 Screen to '80 Fil | 0 | ohm | |
| AVC Control Grid | 2,020,000 | ohms | CC- AVC Cg-if P |
| AVC Cathode | 5,000 | ohms | |
| AVC Screen Grid | 3,000 | ohms | |
| AVC Plate | 2,000,000 | ohms | |
| AVC Filament | 3,255 | ohms | |

| From Chassis To | Correct | | Incorrect |
|---|---|---|---|
| '80 Anode to '80 Anode | 166 | ohms | |
| '80 Anode to AVC Cathode(K-80) | 15,483 | ohms | TC across filter chk FC |
| '80 Anode to AVC Cathode(K-82) | 20,483 | ohms | |
| '80 Anode to '80 Fil (K-80) | 33,483 | ohms | FC |
| '80 Anode to '80 Fil (K-82) | 38,573 | ohms | |
| Field coil only | 830 | ohms | |
| Output transformer primary | 830 | ohms | |
| Output transformer secondary only | 0.812 | ohm | |
| Voice coil only | 8.7 | ohms | |
| Oscillator Control Grid | 100,000 | ohms | |
| Oscillator Cathode | 0 | ohm | |
| Oscillator Plate | 7,003.1 | ohms | |
| Oscillator Plate to RF Screen | 3.1 | ohms | |

**Notice.*****

In later production of the K-80, a 1000 ohm fixed resistor was added to the cathode circuit of the AVC tube. This must be added to the various values obtained by working between the AVC tube cathode and other points in the receiver.

### KOLSTER K 80-K 82

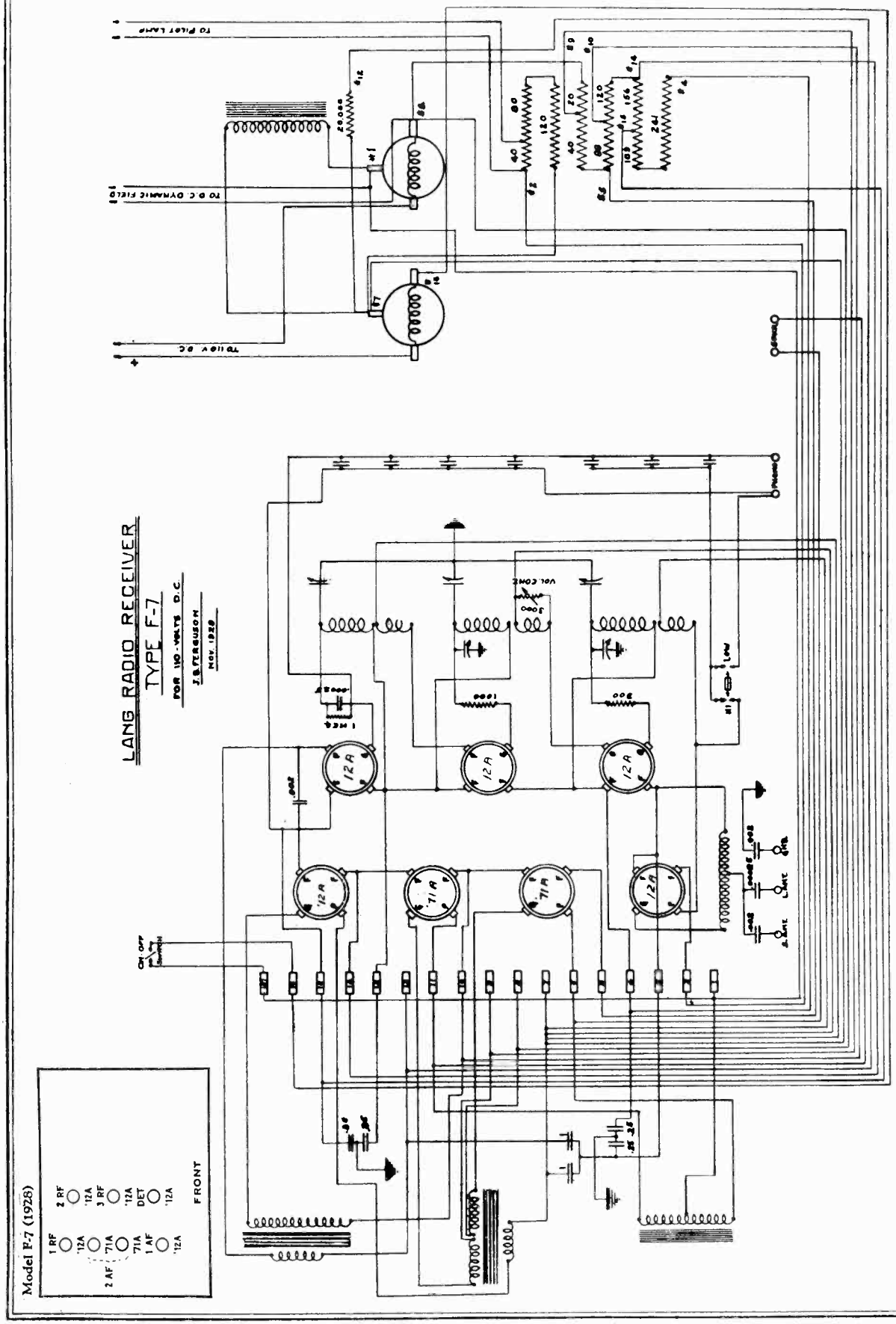
Volume control at maximum. Tone control at natural position.

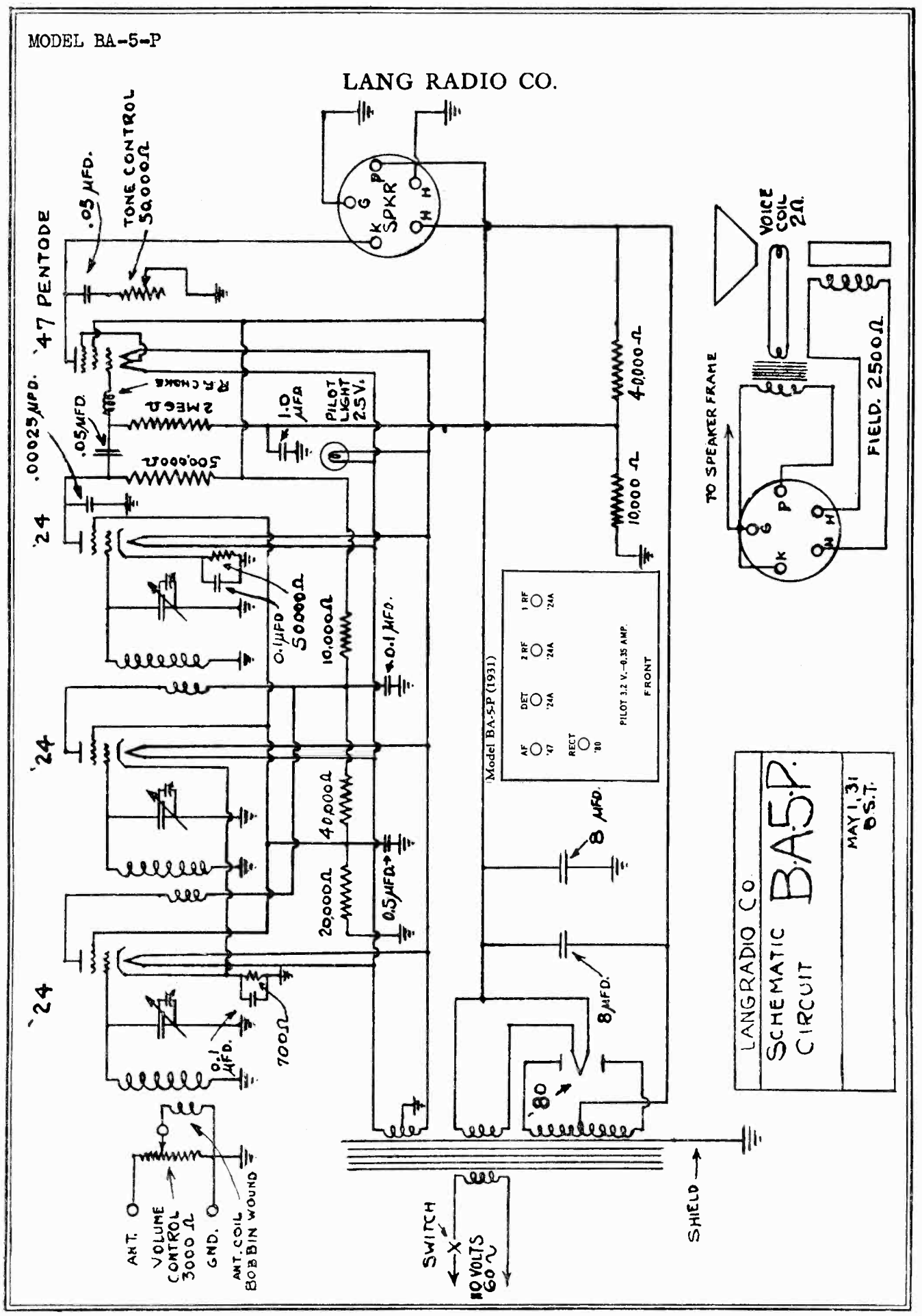
| Tube | Control Grid Voltage | Screen Grid Voltage | Cathode Voltage | Plate Voltage | Plate Current |
|---|---|---|---|---|---|
| RF | 0.4 * | 80. | 48. | 185. | 2.5 ma. |
| 1 Det | 5.5 | 80. | 58. | 185. | .6 |
| IF | 0.2 * | 90. | 44. | 195. | 1.0 |
| AVC | 0.5 | 44. | -60. | 15. | 0.0 |
| 2 Det | 15. | - | 75. | 150. | 0.6 |
| Pwer | 12. * | 245. | - | 225. | 30. |
| Pwer | 12. * | 245. | - | 225. | 30. |
| Osc. | 0. * | - | 52. | | 6.0 |
| Rect. | | | | | 48. per anode |

* Indicates incorrect reading due to high resistance in circuit.

MODEL F-7
110 Volt D-C.

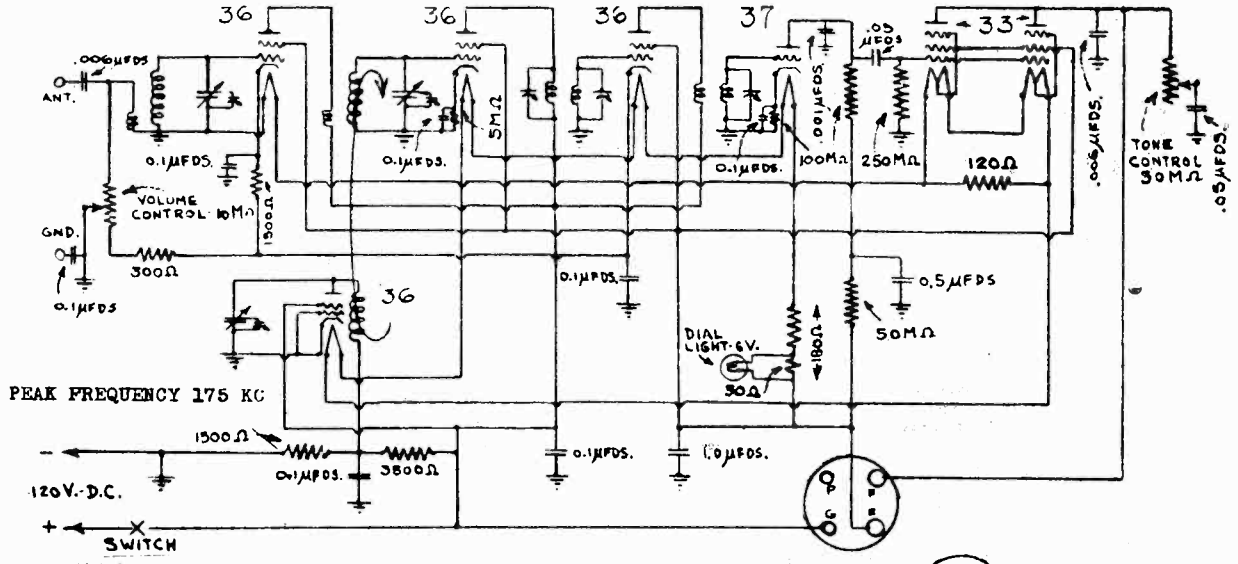
# LANG RADIO CO.



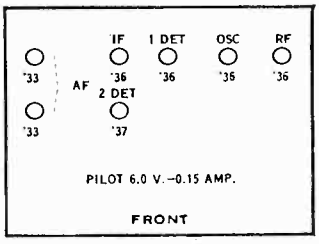


MODEL MA-7
MODEL MD-7

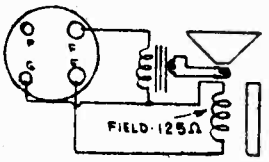
# LANG RADIO CO

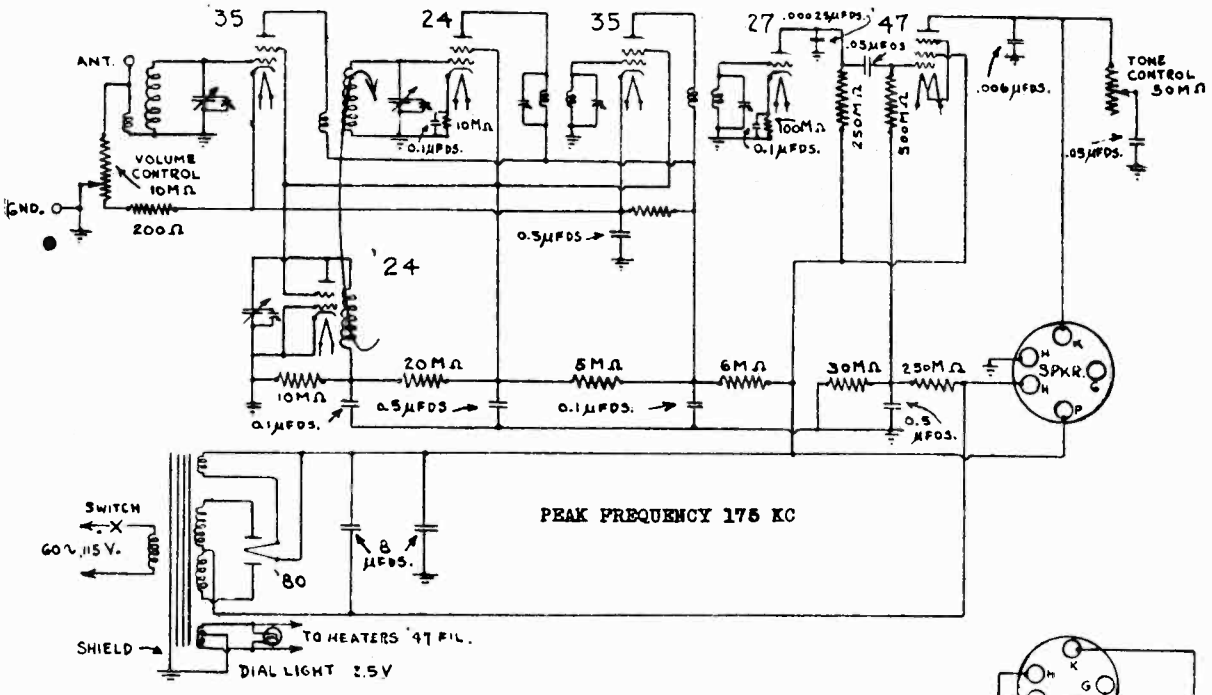



Model MD-7 (1931)

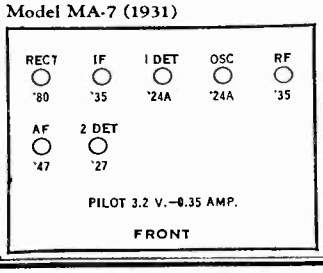



Model MD-7

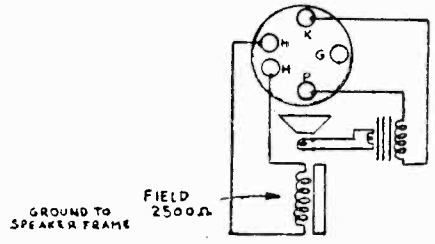



Model MA-7 (1931)

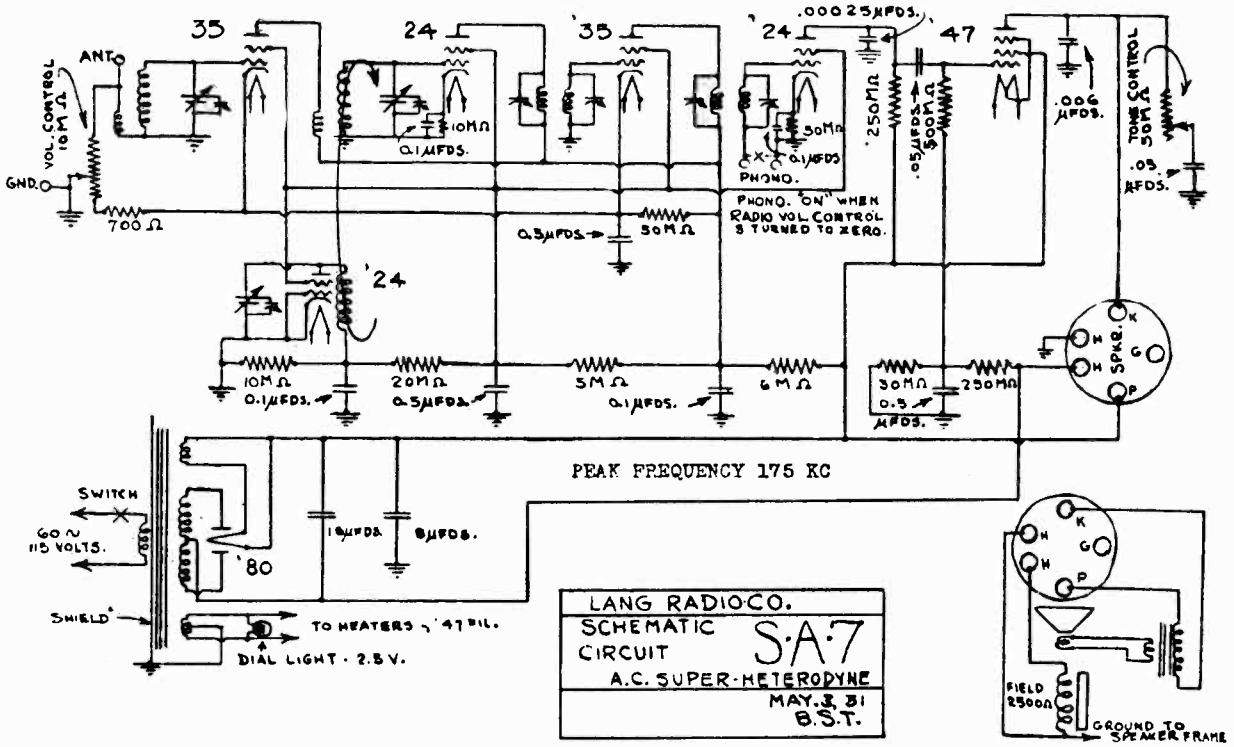



Model MA-7

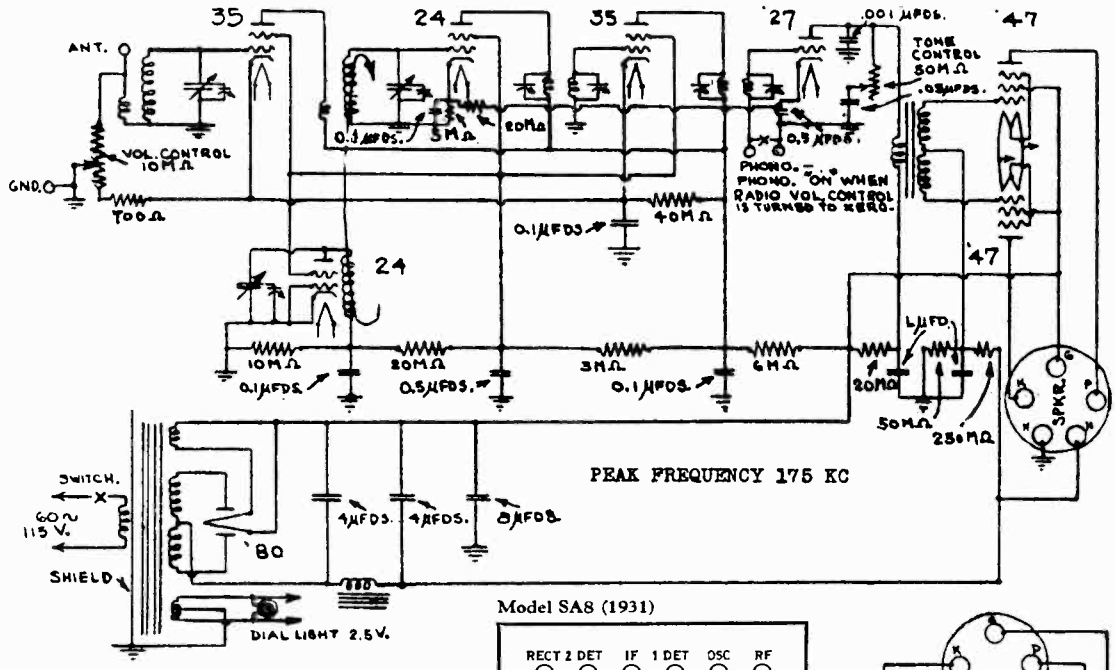


MODEL SA-7
MODEL SA-8

# LANG RADIO CO.




LANG RADIO CO.
SCHEMATIC CIRCUIT S.A.7
A.C. SUPER-HETERODYNE
MAY. 1, 31
B.S.T.



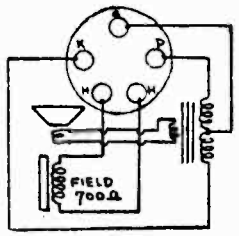

Model SA8 (1931)

| RECT | 2 DET | IF | 1 DET | OSC | RF |
|---|---|---|---|---|---|
| '80 | '27 | '35 | '24A | '24A | '35 |

| 2 AF | 1 AF |
|---|---|
| '47 | '27 |

PILOT 3.2 V.–0.35 AMP.

FRONT




LANG RADIO CO.
SCHEMATIC CIRCUIT S.A.8
A.C. SUPER-HETERODYNE
MAY. 4, '31
B.S.T.