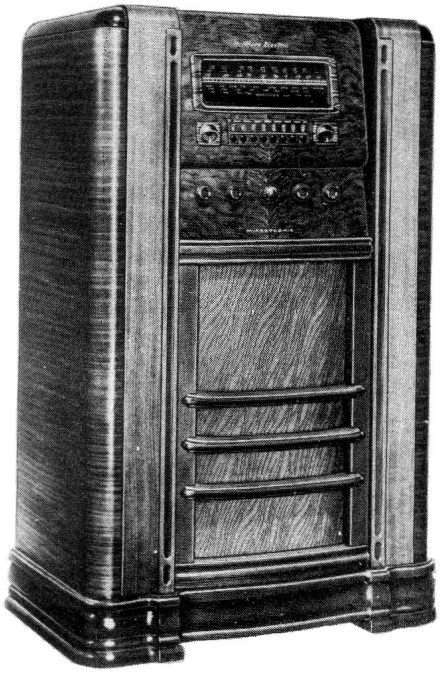
Model 1831A

Radio Receiver



Specifications

Frequency Range:

Broadcast: .535 to 1.712 megacycles
Police—1.690 to 5.100 megacycles
49 Meter—5.65 to 6.65 megacycles
31 Meter—8.9 to 10.1 megacycles
25 Meter—11.2 to 12.3 megacycles
19 Meter—14.9 to 15.9 megacycles

I.F.:

470 K.C.

Tubes:

Type	Function
6K7	R.F. Amplifier
6A8	1st Detector, Manual Tuning
6J5	Oscillator, Manual Tuning
6K7	1st I.F. Amplifier
6K7	2nd I.F. Amplifier
6H6	2nd Detector, A.V.C.
6J5	1st A.F. Amplifier
6J5	2nd A.F. Amplifier
6J5	Phase Inverter Amplifier
6F6G	Output Amplifier
6F6G	Output Amplifier
6K7	Limiter Amplifier
6H6	Suppressor Rectifier
6V6G	Relay Amplifier
6A8	Auto-tuning Oscillator and 1st Detector
6U5	Tuning Eye
5Y4G	Rectifier
5Y4G	Rectifier

Power Supply:

105 to 125 volts A.C., 25 to 60 cycles.

A.V.C.:

Applied to R.F. tubes, 1st Detector and 1st I.F. Tube.

Controls:

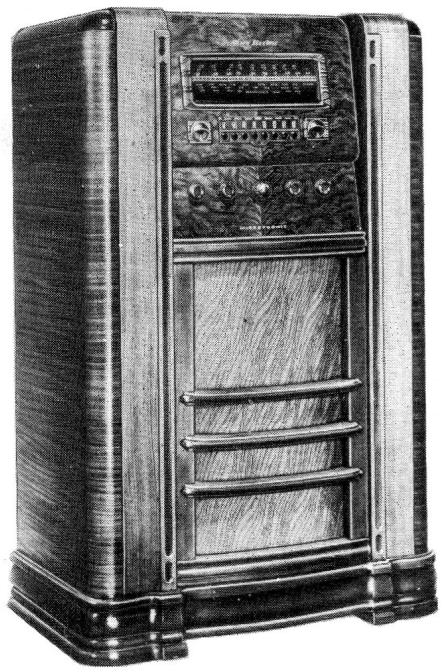
Left to Right—Bass tone control, silent tuning; volume control; tuning control; treble tone control; wave band switch.
Push Button Panel, left to right—Tuning eye; power switch; six station selector buttons; automatic-manual change-over button; automatic silent tuning indicator.

Loudspeaker:

Ten inch electrodynamic speaker enclosed in a "Master Mirrophonic Tone Chamber".

Cabinet:

Console model.



GENERAL:—This model is an a-c operated radio receiver in a console cabinet using eighteen tubes and a superheterodyne circuit. Six tuning bands are provided, of which the broadcast and police bands are of the usual range, but the four short-wave bands have "spread-tuning" and consist of the 49-Meter, 31-Meter, 25-Meter and 19-Meter bands. The automatic tuning feature provides the selection of any one of six predetermined stations by merely pressing the proper button. Eight buttons are provided, having functions as shown in Figure 1. The button marked "OFF" is pressed in to turn the receiver off. The next six buttons tune automatically the predetermined stations. The eighth button is the transfer button from automatic to manual tuning. When it is desired to tune the receiver by the normal method, this button is pressed in. When the receiver is "off" it is turned on automatically by pressing any of the station buttons or the manual tuning button. Variable selectivity of the two i.f. stages is controlled by the fidelity control switch. This gives three stages of selectivity and is combined with a four point treble tone control. Two tuning indicators are used on this receiver. One is the "Northern Electric Tuning Eye" which is used in a special circuit to make it extremely sensitive. The other is the "Stop and Go" tuning indicator. This indicator shows green when no station is tuned in and the receiver output is muted by the relay. When a station is tuned in, the indicator becomes red and the receiver plays normally. This indicator may be turned off by the crank under the "Bass" control knob. When turned off, the silent tuning is inoperative and the indicator remains red whether a station is tuned in or not. Emphasis of the bass notes of the musical scale is obtained by the "Bass" control which has three positions. The chassis is made in two sections, the turret, which mounts the r.f. coils, switch and gang capacitor, and the main chassis which mounts the i.f. amplifier, the audio amplifier power supply and dial mechanism. A special tuning capacitor gang having separate small sections for the spread bands is used mounted on rubber cushions. The gang capacitor is further isolated from the chassis by use of a flexible coupling to the dial drive mechanism. The tuning drive is of a special type having a flywheel which permits rapid spinning of the indicator across the dial scale. Because of the wide spread band on the short-wave bands, the tuning is no more critical than on the broadcast band and a vernier tuning control is not required. The dial is a special curved glass drum having large horizontal etched scales with important stations marked on each band. This drum is rotated by the wave-change switch, thereby changing the scale so that only the band in use is in view. The dial scale is illuminated by edge-lighting. The ten-inch loudspeaker is enclosed in the "Master Mirrophonic Tone Chamber".

The a-c load rating at 115 volts is 160 watts for both 60 and 25 cycles. The transformer is designed to operate on frequencies from 25 to 60 cycles.

For the various tuning bands, the frequency ranges and wave-change switch positions are as follows:—

Band	*Frequency Range*		*Wave-Change Switch Position*
Standard Broadcast	.535–1.712	megacycles	Furthest to left
Police	1.690–5.100	"	Second from left
49-Meter	5.65 –6.65	"	Third from left
31-Meter	8.9 –10.1	"	Third from right
25-Meter	11.2 –12.3	"	Second from right
19-Meter	14.9 –15.9	"	Furthest to right

CIRCUIT:—

(*a*) **Circuit for manual tuning:—**

The manual push button through contacts 27 and 19 connects the antenna lead to the antenna section, item 2, of the wave-change switch. This section selects the primaries of the antenna transformers. The broadcast coil, items 20 and 21, and the police coil, items 18 and 19, are on separate forms. The spread band coils, items 12, 13, 14, 15, 16 and 17, are on one form. Switch section, item 3, selects the secondaries of the

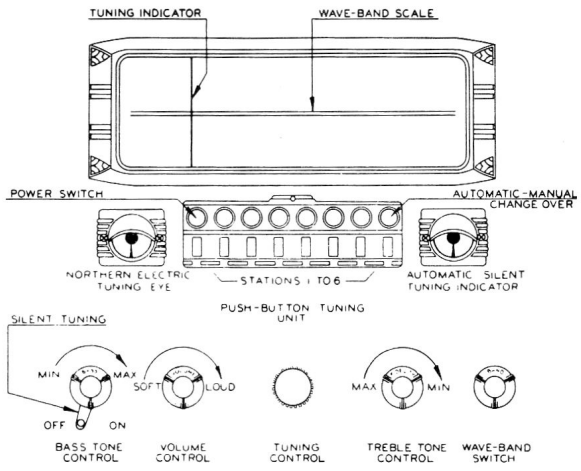


Figure 1.—Control Layout.

antenna transformers and also selects the proper antenna tuning capacitor. Item 30 is the large capacitor gang section used on the broadcast and police bands, while item 31 is the small section used on the four spread bands. Items 27, 28, and 29 are fixed series capacitors used to adjust the tuning capacitor to the correct value for the 31-Meter, 25-Meter and 19-Meter bands respectively. Items 26 and 25 are the trimmers for the broadcast and police bands. Item 24 is the trimmer for the 19-meter band; item 32 is the trimmer for the 49-meter band. Switch section, item 1, short-circuits the coils not being used. Trimmers are not required for the 25-Meter and 31-Meter bands.

The r-f amplifier stage uses a type 6K7 tube. The primaries and secondaries of the r-f transformers are selected by switch sections, items 5 and 6, respectively. Item 4 short-circuits the coils not being used. Item 6 also selects the proper tuning capacitor and fixed series capacitor.

The first detector is a type 6A8 tube used as a mixer tube, the oscillator being a type 6J5 tube used in a plate-tuned circuit to obtain improved frequency stability with respect to voltage changes. The oscillator signal is supplied to the 6A8 oscillator grid through the capacitor, item 148. Switch contacts, items 15 and 7, disconnect the cathodes of the 6A8 and 6J5 from ground and thus stop the oscillator and mixer when the manual button is released by depressing one of the station buttons. Resistor, item 146, is connected in the 6A8 cathode on the broadcast, police and 49-Meter bands in order to equalize sensitivity and noise on all bands. Switch section, item 7, shorts out the resistor on the 31-Meter, 25-Meter and 19-Meter bands. Switch section, item 8, selects the proper oscillator grid winding. Switch section, item 10, selects the oscillator plate windings of the spread band coils and the tuning capacitor for the police and broadcast bands. Switch section, item 11, selects the trimmers for the spread band coils and also selects the plate windings of the police and broadcast coils and the tuning capacitor for the spread bands. On the spread bands, the trimmers, items 81, 83, 85 and 87, are used to adjust the dial calibration of the low frequency ends of the bands. Switch section, item 9, short-circuits the broadcast and police coils when not being used. Resistor, item 143, is the oscillator grid leak and is coupled to the grid coils through capacitor, item 144. The oscillator plate is parallel fed from the B supply through resistor, item 141. Capacitor, item 142, supplies the path for the r.f. current to the plate windings. The plate of the 6A8 mixer tube is connected to the primary of the 1st I.F. transformer, item 152.

(*b*) Circuit for push-button tuning:—

When a station button is depressed, the manual button is automatically released and the antenna is switched by contacts 27 and 34 from the wave-change switch to the capacitor, item 137. The impedance of this capacitor couples the signal into the tuned circuit composed of one of the coils, items 88, 92, 96, 100, 104 and 108 and the trimmer, item 132. Resistor, item 136, prevents modulation of the signal by power line voltage on the antenna. The amplified signal is applied through capacitor, item 131, to the grid of a type 6A8 tube used as a combined oscillator and mixer. Bias and a.v.c. voltage is supplied to the grid through resistor, item 139. A Colpitts oscillator circuit is used composed of one of the coils, items 90, 94, 98, 102, 106 and 110, and the two Silvercap capacitors, items 127 and 128. Plate voltage is supplied to the anode grid through resistor, item 140. Resistor, item 133, is the grid leak. The tuned circuit is coupled to the grid through capacitor, item 134, and to the plate through capacitor, item 135. The cathode of the 6A8 tube is disconnected from ground by contacts, 15 and 17, when the manual tube button is depressed, thus making the tube inoperative. The plate of the 6A8 tube is connected to the primary of the first I.F. transformer, item 152.

(*c*) I.F. and Audio Amplifier:—

There are two i.f. amplifier stages using type 6K7 tubes. The transformers are all double-tuned air-core type. The primaries of the first and second transformers are tapped to give high selectivity and proper gain. Both have their secondaries split into two coils, items 153 and 154, for the first and items 166 and 167, for the second. When the single coils, items 153 and 166, only are in the circuit, high selectivity is obtained. When the single coil, item 166, and the two coils, items 153 and 154, are in circuit, the selectivity is broadened. When the two coils, items 153 and 154, and also the two coils, items 166 and 167, are in circuit a flat-topped selectivity curve, necessary for high fidelity response, is produced. These changes in connection are made by the fidelity switch, items 159 and 172. Resistor, item 150, and capacitor, item 149, form a plate filter for the first i.f. stage. Capacitor, item 173, and resistor, item 174, form an i.f. filter on the second i.f. amplifier grid.

The third i.f. transformer, item 177, feeds a type 6H6 tube used as the second detector and automatic volume control rectifier. The secondary coil is connected directly to the plate of the audio-demodulating diode. Resistor, item 184, forms the diode load across which the audio voltages are produced. Resistor, item 183, and capacitor, item 182, form an i.f. filter. The a.v.c. diode plate is coupled to the i.f. secondary through capacitor, item 188. Resistor, item 190, is the load across which the a.v.c. voltage is developed. This is applied to the r.f. tubes, the 1st detector and the 1st i.f. tube through the resistors, item 161, 44 and 129. Capacitors, items 160, 43 and 23, are by-pass capacitors for the high-frequency currents. The minimum bias is also applied through the resistor network and is obtained from the voltage developed across resistor, item 257, in the negative lead of the power supply. This voltage is also supplied with no a.v.c. voltage to the grid of the 2nd i.f. tube through resistor, item 174.

The capacitor, item 185, is connected from the audio diode load to the terminals, item 186, on the rear of the chassis. With the strap as shown, the phonograph pick-up if connected to the "Phono" terminals, is shorted and the radio output is applied across the volume control, item 187. If the strap is moved to the "Phono" position, the radio output is connected to ground and the phonograph pick-up is connected across the volume control.

The signal from the volume control is applied to the grid of the first audio amplifier, a type 6J5 tube.

Capacitor, item 189, is a by-pass for the i.f. voltages. In the plate circuit of the first audio amplifier is a resistor and capacitor network used to obtain a boost of the bass frequencies. Resistor, item 205, forms the plate load. The audio voltages developed across item 205 are applied through capacitor, item 206, for the minimum bass position and through capacitors, items 206 and 207, in parallel for the medium and maximum bass position across the resistors, items 210 and 211, and capacitor, item 212, in series. For minimum and medium bass response the capacitor, item 212, is shorted to ground, then resistors, items 210 and 211, form a voltage divider whose ratio is constant with frequency and hence the frequency response is flat, except for the drop due to capacitor 206. For maximum bass boost, the capacitor, item 212, is unshorted, then for frequencies above 400 cycles, the impedance of this capacitor is small, while below 150 cycles the impedance rises to a high value. Hence this network forms a voltage divider, the ratio of which decreases as the frequency is lowered, thus causing the amplification to rise at the low frequencies and producing the bass boost. These changes of connections are made by the bass control, switch sections 208 and 209. Resistor, item 213, prevents undue rise at extremely low frequencies and also provides the d.c. path to the grid of the tube.

The second audio amplifier is a type 6J5 tube which is resistance capacity coupled to the type 6J5 phase inverter tube. The constant impedance treble tone control includes the resistors, items 225, 226, 227 and capacitor, item 228. The grid leak for this phase inverter is resistor, item 224. Bias is developed across resistor, item 230. Resistor, item 231, also in the cathode circuit has half the a.f. voltage developed across it 180 degrees out of phase with that across the plate resistor, item 233. Both these load resistors are resistance-capacity coupled to the type 6F6G pentode output tubes. Grid bias for the output tubes is obtained from the resistors, items 256 and 257, in the main filter.

The output stage is a push-pull amplifier. The capacitors, items 239 and 240, are plate by-pass capacitors. Resistor, item 238, and capacitor, item 237, form a compensating circuit to maintain a uniform load at all frequencies. The loudspeaker plug, item 247, cuts off the high voltage from the electrolytic capacitors when it is disconnected. The speaker field, item 252, and the choke coil, item 246, in conjunction with electrolytic capacitors, items 255, 254 and 253, form the power supply filter. The resistors, items 241, 242, 243, 244 and 245, compose the bleeder and voltage divider network. Electrolytic capacitor, item 175, on the screen voltage supply is an additional filter. Items 269 and 270 are capacitors to filter out the line noise.

The tuning eye and silent tuning relay are actuated through a type 6K7 tube used as a limiter amplifier. This tube is coupled to the plate of the second i.f. tube by capacitor, item 176. Resistor item 191, is the grid leak. No bias is applied as this is developed by grid rectification of the input signal. The 6K7 tube is operated at low plate and screen voltages so that the power output is very limited. Thus for signals above a few microvolts the tube overloads and the output becomes constant. Resistors, items 194 and 193, form a voltage divider for the screen. Capacitor, item 192, is the screen by-pass. Resistor, item 195, and capacitor, item 274, form a filter for the plate supply. The silencer transformer, item 196, which is a highly selective double-tuned transformer, has its secondary connected to the plate of a type 6H6 tube. Resistor, item 203, is the diode load across which the rectified voltage is developed. Capacitor, item 204, is a by-pass for the intermediate frequency currents. The d.c. voltage developed by the diode is applied through resistor, item 216, to the grid of the relay tube which is a type 6V6G. Capacitor, item 220, is a by-pass used to obtain the proper time constant. Minimum bias for the 6V6G is obtained across resistor, item 219, in the cathode circuit. This voltage is also used as a delay voltage on the 6H6 diode in order to sharpen the skirts of the silencer selectivity curve. A telephone type relay, item 214, in the plate circuit of the 6V6G tube is designed to have its contacts close when no signal is applied, that is the plate current is a maximum because the bias is at the minimum value. When a signal of a few microvolts is applied to the antenna an additional bias is produced and the plate current drops. At a predetermined point the relay contacts open. Due to the limiter action the minimum plate current is obtained with a very small input and then remains constant for all higher input signals. Because of this limiter action, the selectivity of the transformer and the time constants of the circuits, the relay is not actuated by strong noise but will open for a very weak carrier voltage. The relay has two contacts, one of which shorts the second audio grid when closed, thus rendering the receiver inoperative. The other contact is used to operate the "Stop and Go" tuning indicator. When the relay is closed, pilot lamp, item 264, is shorted to ground and the indicator shows green due to pilot lamp, item 263, being lit. When the relay is open, item 263, and item 254 are in series, but item 263 is shunted by resistor, item 265, and hence lights very dimly while item 264 lights brightly. The indicator therefore becomes red when the relay opens. The tuning eye grid receives its bias from the silencer diode through resistor, item 217, with capacitor, item 221, for a by-pass. Due to the limiter action of the 6K7 tube, the eye will close the same amount for all signals above a few microvolts. Also, due to the selectivity of the silencer transformer, the tuning action of the eye is very much more sensitive than conventional circuits.

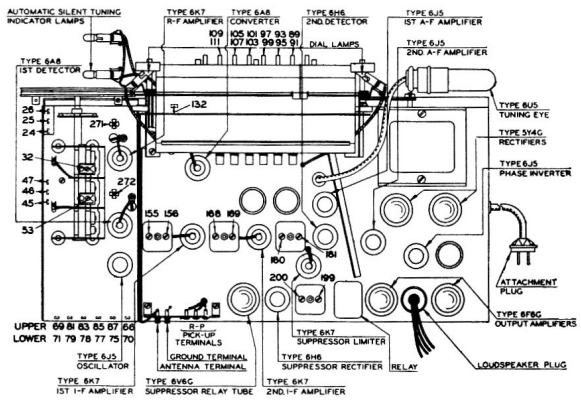


Figure 2.—Chassis Layout Showing Aligning Positions.

DIAL MECHANISM

This model has a somewhat elaborate dial mechanism and a brief description of the essential parts is necessary. The dial frame mounted on the main chassis and turret, serves as a mounting plate for the push-button tuner, variable capacitor, pulley, indicator drive shaft and detent mechanism. The cylinder assembly is supported by two upright brackets which are mounted on the main chassis and which also support the dial frame. A flexible coupling is provided to ensure proper alignment of pulley and variable capacitor shaft. A flywheel on the tuning shaft gives smooth operation and drives the tuning condenser and pointer through a bronze cable. A reduction of ratio of 24:1 gives satisfactory fine tuning and fast tuning can be accomplished by spinning the flywheel. The large cylindrical glass dial is edge-lighted with four pilot lamps and has the calibrations in megacycles in etched white figures. Each short-wave band is marked in green and identified by figures indicating the wave length. The tuning points for the main short and long wave stations together with their call letters are marked opposite the calibrations. The cylinder and band switch are connected to the detent mechanism by bronze cables and a single knob on the detent shaft operates both cylinder and band switch.

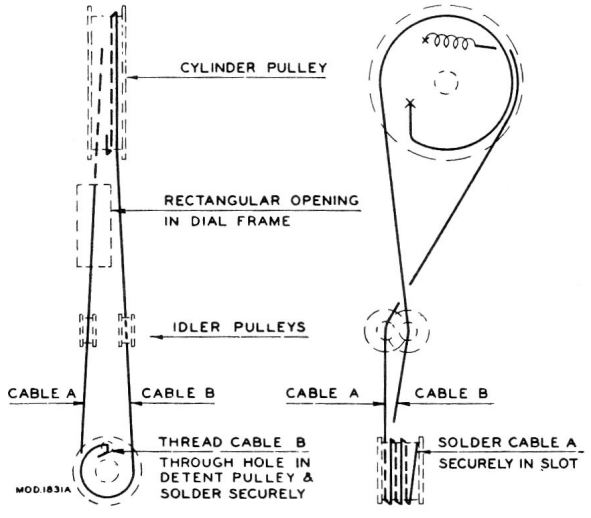
ADJUSTMENTS:—If it is necessary in service work to disturb the dial mechanism, *i.e.*, changing dials or restring cables, do not lisassemble the dial frame or remove cylinder shields or light shields. If the following instructions are followed closely, complications should not arise.

1.—To Remove Chassis from Cabinet:—

Remove all knobs and silent tuning lever from control shafts. Take out screws marked with red dots, from rear bottom edge of chassis. Pull chassis straight out. Bottom plate remains fastened to cabinet.

2.—To Remove Dial Glasses and Cylinder:—

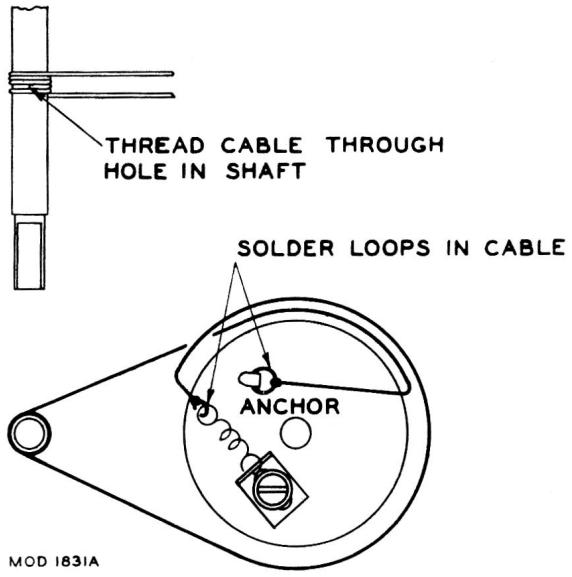
Unsolder cables on detent pulley. Remove "C" washer from either end of cylinder shaft. Loosen set screws in left end of cylinder and remove cylinder shaft.



Figu e 3.—Band Indicator Stringing Diagram, No. 1.

3.—To Replace Dial Glasses and Cylinder:—

Insert cylinder shaft in hole at either end of dial mechanism and through cylinder. Replace "C" washers. Tighten set screws at left end of cylinder.



ASSEMBLE WITH SWITCH IN COUNTER-CLOCKWISE POSITION AND DIAL SCALE IN BROADCAST BAND POSITION

Figure 4.—Band Indicator Stringing Diagram, No. 2.

4.—Band Indicator Stringing No. 1 (See Fig. 3):—

Adjust stops at left end of cylinder so that the "Broadcast" and "19-Meter" bands show in the dial frame opening when the cylinder is at either end of its travel. Now, with the cylinder in the "Broadcast" position and with the hole in the flange of the detent pulley at its top position, take the cable "A" attached to the spring and thread it through the rectangular hole in the dial frame over the left idler pulley and take two and one-half turns counter-clockwise around detent pulley and solder securely in slot. Take one turn of cable "B" counter-clockwise around the cylinder pulley, thread behind right idler pulley, take three-quarters of a turn clockwise around detent pulley, thread through hole in flange, and solder securely in position.

5.—Band Indicator Stringing No. 2 (See Fig. 4):—

With switch in counter-clockwise position, anchor pulley to shaft with two set screws and locate approximately as shown in diagram. Anchor cable securely to spring, take three-quarters of a turn of the cable clockwise around the switch pulley and then over to detent shaft. Continue in clockwise direction, taking three more complete turns around shaft. Proceed to switch pulley and anchor to lug. To ensure proper detent action, make sure that rollers are in position before anchoring cable.

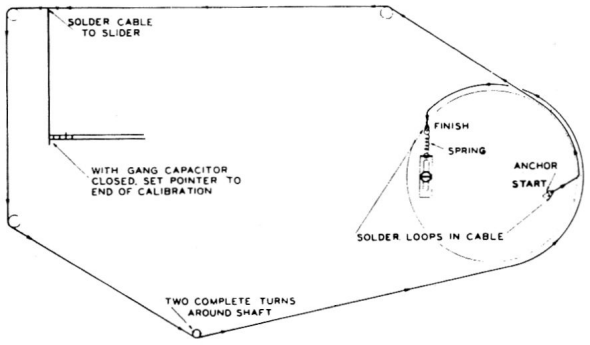


Figure 5.—Indicator Stringing Diagram.

6.—Indicator Stringing (See Fig. 5):—

With variable capacitor in closed position, fasten main drive pulley to flexible coupling with two set screws. Locate pulley approximately as shown in diagram. Anchor cable securely to lug and thread over pulleys at top and left hand side of dial frame, then take two complete counter-clockwise turns around threaded shaft. Care must be taken to ensure that the cable follows the threads in the shaft. Now take one-half turn of cable on pulley and anchor securely to spring on adjusting bracket. To ensure smooth flywheel tuning, care must be taken in the adjustment of this bracket. Now adjust pulley with adjusting screws so as to relieve variable capacitor of excess strain. Set pointer to end of calibration and solder cable to slider.

7.—Changing Pilot Lamps and Tuning Eye:—

The four dial lamps and the tuning eye can be changed without removing the chassis from the cabinet. To change the tuning eye loosen the thumb nut from the bracket. Should it be necessary to change the two tuning eye lamps, the chassis will have to be removed from the cabinet. See instructions in section 1.

8.—Putting Chassis into Cabinet:—

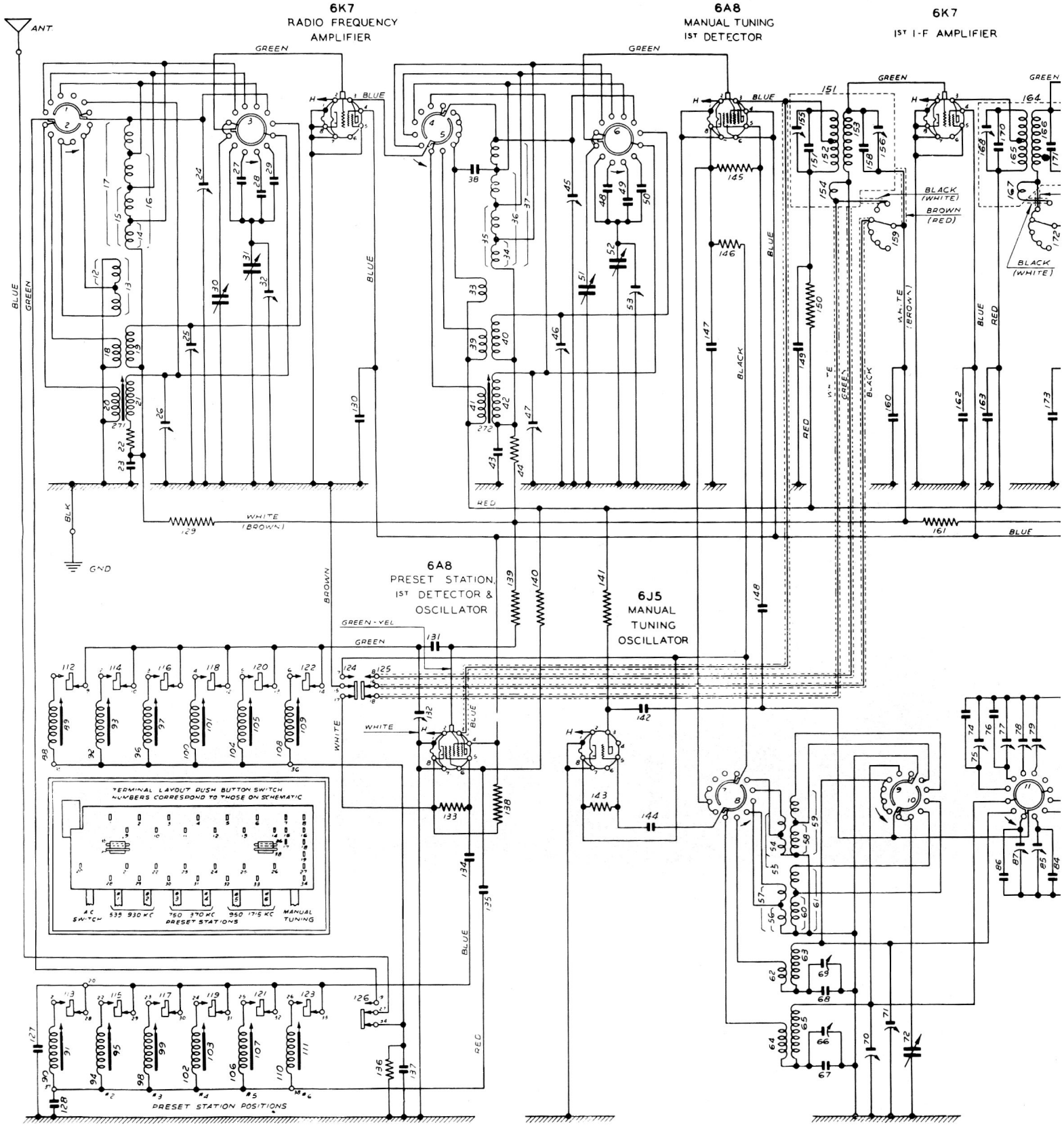
Make sure that all knobs and silent tuning lever have been removed from shafts. Put chassis into cabinet and see that the tuning eye bracket projects through the rectangular opening in the left-hand side of the dial frame. Push chassis forward until it is stopped by the bottom plate. Centre push-button shafts in escutcheon openings and replace the three chassis mounting screws. In case the two tuning eye pilot lamps have been disturbed make sure that they now clear the cylinder cable and are in proper position in respect to the relay, *i.e.*, with no signal and tuning lever in counter-clockwise position tuning eye should be green.

D.C. RESISTANCE OF COILS — OHMS

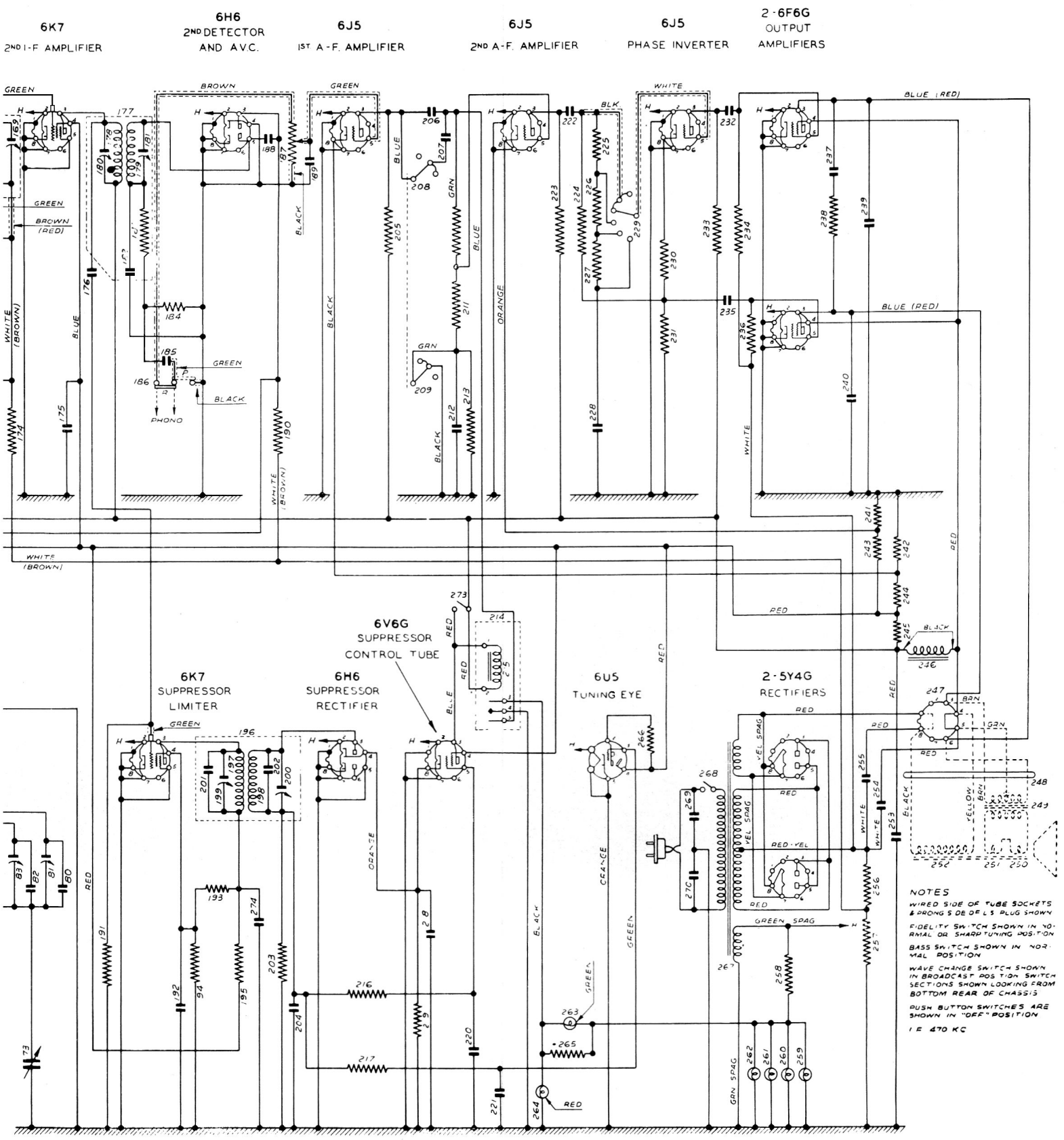
Description	*Resistance*
Ant. Transformer, 19 and 25 Meter Band, Primary	4.3
Ant. Transformer, 31 and 49 Meter Band, Primary	0.58
Ant. Transformer, 19 Meter Band, Secondary	Below 0.5
Ant. Transformer, 25 Meter Band, Secondary	Below 0.5
Ant. Transformer, 31 Meter Band, Secondary	Below 0.5
Ant. Transformer, 49 Meter Band, Secondary	Below 0.5
R.F. Transformer, Spread Band, Primary	1.7
R.F. Transformer, 19 Meter Band, Secondary	Below 0.5
R.F. Transformer 25 Meter Band, Secondary	Below 0.5
R.F. Transformer, 31 Meter Band, Secondary	Below 0.5
R.F. Transformer, 49 Meter Band, Secondary	Below 0.5
Osc. Coil, 19 Meter Band, Grid Winding	Below 0.5
Osc. Coil, 19 Meter Band, Plate Winding	Below 0.5
Osc. Coil, 25 Meter Band, Grid Winding	Below 0.5
Osc. Coil, 25 Meter Band, Plate Winding	Below 0.5
Osc Coil, 31 Meter Band, Grid Winding	0.52
Osc. Coil, 31 Meter Band, Plate Winding	Below 0.5
Osc. Coil, 49 Meter Band, Grid Winding	1.13
Osc. Coil, 49 Meter Band, Plate Winding	Below 0.5
Antenna Transformer, Police, Primary	6.4
Antenna Transformer, Police, Secondary	1.7
Antenna Transformer, Bdct., Primary	24.0
Antenna Transformer, Bdct., Secondary	4.0
R.F. Transformer, Police, Primary	3.5
R.F. Transformer, Police, Secondary	2.0
R.F. Transformer, Bdct., Primary	3.1
R.F. Transformer, Bdct., Secondary	5.6
Oscillator Coil, Police, Grid Winding	2.5
Oscillator Coil, Police, Plate Winding	1.7
Oscillator Coil, Bdct., Grid Winding	1.4
Oscillator Coil, Bdct., Plate Winding	Below 0.5
Push Button, Antenna Coil, Station No. 1	11.0

Description	*Resistance*
Push Button, Antenna Coil, Station No. 2	11.0
Push Button, Antenna Coil, Station No. 3	4.0
Push Button, Antenna Coil, Station No. 4	4.0
Push Button, Antenna Coil, Station No. 5	3.0
Push Button, Antenna Coil, Station No. 6	3.0
Push Button, Oscillator Coil, Station No. 1	9.0
Push Button, Oscillator Coil, Station No. 2	9.0
Push Button, Oscillator Coil, Station No. 3	5.0
Push Button, Oscillator Coil, Station No. 4	5.0
Push Button, Oscillator Coil, Station No. 5	4.0
Push Button, Oscillator Coil, Station No. 6	4.0
1st I.F. Transformer, Primary	6.25
1st I.F. Transformer, Secondary	6.25
1st I.F. Transformer, Tertiary	1.0
2nd I.F. Transformer, Primary	6.25
2nd I.F. Transformer, Secondary	6.25
2nd I.F. Transformer, Tertiary	1.3
3rd I.F. Transformer, Primary	9.5
3rd I.F. Transformer, Secondary	9.5
Suppressor I.F. Transformer, Primary	3.9
Suppressor I.F. Transformer, Secondary	13.8
Suppressor, Relay Winding	1800.0
Output Transformer, Primary	460.0
Output Transformer, Secondary	Below 0.5
Loudspeaker, Voice Coil (Imp. 1.82 ohms @ 400 cycles)	2.3
Loudspeaker, Humbucking Coil	Below 0.5
Loudspeaker, Field Coil	340.0
Filter Choke Coil	500.0
Power Transformer, Primary	2.5
Power Transformer, H.V. Secondary	120.0
Power Transformer, Heater Winding	Below 0.5
Power Transformer, Rectifier Winding	Below 0.5

MODEL 1831A RADIO RECEIVER



MODEL 1831A RADIO RECEIVER



REPLACEMENT PARTS LIST

Item	Description	Part No.
1	Ant. Trans. Sec. Shorting Switch Section	
2	Ant. Trans. Pri. Switch Section	
3	Ant. Trans. and Tuning Cap. Switch Section	
4	R-F Trans. Sec. Shorting Switch Section	
5	R-F Trans. Primary Switch Section	
6	R-F Trans. Sec. Switch Section	K-4136
7	1st Detector Bias Shorting Switch Section	
8	Osc. Coil Grid Switch Section	
9	Osc. Coil Plate Shorting Switch Section	
10	Osc. Tuning Cap. and Plate Switch Section	
11	Osc. Tuning Cap. and Plate Switch Section	
12	Ant. Trans. Primary, 19 and 25 Meter	
13	Ant. Trans. Primary, 31 and 49 Meter	
14	Ant. Trans. Sec., 19 Meter Band	K-4133
15	Ant. Trans. Sec., 25 Meter Band	
16	Ant. Trans. Sec., 31 Meter Band	
17	Ant. Trans. Sec., 49 Meter Band	
19	Ant. Trans. Primary, Police	K-4130
18	Ant. Trans. Sec., Police	
20	Ant. Trans. Primary, Bdct	K-4127
21	Ant. Trans. Secondary, Bdct	
22	Resistor, 1.6 ohms	K-2252-9
23	Capacitor, .05 mf., 200 volts	K-2227-8
24	Capacitor, Ant. Trim., 19 Meter, Var. 13-50 mmf.	K-3860-3
25	Capacitor, Ant. Trim., Police, Var 13-50 mmf.	K-3860-3
26	Capacitor, Ant. Trim., Bdct., Var 3-30 mmf.	K-3860-2
27	Capacitor, Ant. Series, 31 Meter, 340 mmf., Mica (±3%)	K-1611-26
28	Capacitor, Ant. Series, 25 Meter, 150 mmf., ± 5%, Mica	K-1611-34
29	Capacitor, Ant. Series, 19 Meter, 77 mmf., ± 3%, Mica	K-1611-35
30	Ant. (Bdct & Pol.) Sect. Gang Cap., 492.9 mmf., Max	Part of K-4137
31	Ant. (S-W) Sect. Gang Cap., 43.5 mmf., Max	
32	Capacitor Parallel Trim (S-W), 49 Meter Var., 10-55 mmf.	K-1458-3
33	R-F Trans. Primary, S-W	
34	R-F Trans. Sec., 19 Meter	
35	R-F Trans. Sec., 25 Meter	K-4134
36	R-F Trans. Sec., 31 Meter	
37	R-F Trans. Sec., 49 Meter	
38	Capacitor, 5 mmf, Mica K-4235-1	
39	R-F Trans, Police Primary	K-4131
40	R-F Trans., Police Sec	
41	R-F Trans., Bdct. Primary	K-4128
42	R-F Trans., Bdct. Secondary	
43	Capacitor, .02 mf., 200 Volt	K-2227-7
44	Resistor, .15 megohm	K-2226-36
45	R-F Trim Cap., 19 Meter, Var., 13-50 mmf	K-3860-3
46	R-F Trim., Police, Var., 1.5-12 mmf	K-3860-1
47	R-F Trim. Bdct. Var., 1.5-12 mmf	K-3860-1
48	Capacitor, R-F Series, 31 Meter, 350 mmf., Mica	K-1611-15
49	Capacitor, R-F Series, 25 Meter, 150 mmf., ± 5%, Mica	K-1611-34
50	Capacitor, R-F Series, 19 Meter, 77 mmf., ± 3%, Mica	K-1611-35
51	R.F. (Bdct. & Pol.) Sect. Gang Cap , 492.9 mmf., Max	Part of K-4137
52	R.F. (S-W) Sect. Gang Cap., 43.5 mmf. Max	
53	R-F Capacitor, Parallel Trim (S.W.), 49 Meter, Var. 10-55 mmf	K-1458-3
54	Osc., Grid Winding, 19 Meter	
55	Osc., Grid Winding, 25 Meter	
56	Osc , Grid Winding, 31 Meter	
57	Osc., Grid Winding, 49 Meter	K-4135
58	Osc., Plate Winding, 19 Meter	
59	Osc., Plate Winding, 25 Meter	
60	Osc., Plate Winding, 31 Meter	
61	Osc., Plate Winding, 49 Meter	
62	Osc., Grid Winding, Police	K-4132
63	Osc., Plate Winding, Police	
64	Osc., Grid Winding, Bdct	K-4129
65	Osc., Plate Winding, Bdct	
66	Osc. Series Capacitor, Bdct., 375 mmf., Mica	K-1611-11
67	Osc., Series Capacitor, Bdct., Var. 40-120 mmf.	K-3860-4
68	Osc., Series Capacitor, Police, 1200 mmf., ± 3%, Mica	K-1952-24
69	Osc., Series Capacitor, Police, Var. 200-410 mmf.	K-3860-8
70	Osc., Parallel Trim. Bdct., Var 3-30 mmf.	K-3860-2
71	Osc., Parallel, Trim., Police, Var. 3-30 mmf.	K-3860-2
72	Osc. (Bdct. & Police), Sect. Gang Cap., 492.9 mmf. max	K-4137
73	Osc. (S-W) Sect. Gang Cap., 43.5 mmf. Max	
74	Osc., Parallel Capacitor, 19 Meter, 20 mmf., ± 3%, Mica	K-1611-29
75	Osc., Parallel Capacitor, 19 Meter ,Var 13-50 mmf.	K-3860-3
76	Osc., Parallel Capacitor, 25 Meter, 20 mmf., ± 3%, Mica	K-1611-29
77	Osc., Parallel Capacitor, 25 Meter, Var., 13-50 mmf.	K-3860-3
78	Osc., Parallel Capacitor, 31 Meter, Var., 13-50 mmf.	K-3860-3
79	Osc., Parallel Capacitor, 49 Meter, Var., 13-50 mmf.	K-3860-3
80	Osc., Series Capacitor, 19 Meter, 20 mmf., ± 3%, Mica	K-1611-29
81	Osc., Series Capacitor, 19 Meter, Var., 13-50 mmf.	K-3860-3
82	Osc., Series Capacitor, 25 Meter, 77 mmf., ± 3%, Mica	K-1611-35
83	Osc., Series Capacitor, 25 Meter, Var., 13-50 mmf.	K-3860-3
84	Osc., Series Capacitor, 31 Meter, 130 mmf., ± 3%, Mica	K-1611-37
85	Osc., Series Capacitor, 31 Meter, Var., 13-50 mmf.	K-3860-3
86	Osc., Series Capacitor, 49 Meter, 170 mmf., ± 5%, Mica	K-1611-36
87	Osc., Series Capacitor, 49 Meter, Var., 40-120 mmf.	K-3860-4
88	Pre-set Ant. Coil, Station No. 1	
89	Pre-set Ant. Coil, Inductance Trim, Station No. 1	Part of
90	Pre-set Osc. Coil, Station No. 1	K-4141
91	Pre-set Osc. Coil, Inductance Trim., Station No. 1	
92	Pre-set Ant. Coil, Station No. 2	
93	Pre-set Ant. Coil, Inductance Trim., Station No. 2	Part of
94	Pre-set Osc. Coil, Station No. 2	K-4141
95	Pre-set Osc. Coil, Inductance Trim., Station No. 2	
96	Pre-set Ant. Coil, Station No. 3	K-4139
97	Pre-set Ant. Coil, Inductance Trim., Station No. 3	Part of
98	Pre-set Osc. Coil, Station No. 3	K-4142
99	Pre-set Osc. Coil, Inductance Trim., Station No. 3	
100	Pre-set Ant. Coil, Station No. 4	
101	Pre-set Ant. Coil, Inductance Trim., Station No. 4	Part of
102	Pre-set Osc. Coil, Station No. 4	K-4142
103	Pre-set Osc. Coil, Inductance Trim., Station No. 4	
104	Pre-set Ant. Coil, Station No. 5	
105	Pre-set Ant. Coil, Inductance Trim., Station No. 5	Part of
106	Pre-set Osc. Coil, Station No. 5	K-4143
107	Pre-set Osc. Coil, Inductance Trim., Station No. 5	
108	Pre-set Ant. Coil, Station No. 6	
109	Pre-set Ant. Coil, Inductance Trim., Station No. 6	Part of
110	Pre-set Osc. Coil, Station No. 6	K-4143
111	Pre-set Osc. Coil, Inductance Trim., Station No. 6	K-4139
112	Pre-set Ant. Coil Switch, Station No. 1	
113	Pre-set Osc. Coil Switch, Station No. 1	
114	Pre-set Ant. Coil Switch, Station No. 2	
115	Pre-set Osc. Coil Switch, Station No. 2	
116	Pre-set Ant. Coil Switch, Station No. 3	
117	Pre-set Osc. Coil Switch, Station No. 3	K-4188
118	Pre-set Ant. Coil Switch, Station No. 4	
119	Pre-set Osc. Coil Switch, Station No. 4	
120	Pre-set Ant. Coil Switch, Station No. 5	
121	Pre-set Osc. Coil Switch, Station No. 5	
122	Pre-set Ant. Coil Switch, Station No. 6	
123	Pre-set Osc. Coil Switch, Station No 6	

REPLACEMENT PARTS LIST—(Continued)

Item	Description	Part No.
124	Manual Push Button, 1st Detector Cathode Switch	K-4188
125	Manual Push Button, 1st I-F Expansion Switch	K-4188
126	Manual Push Button Antenna Switch	K-4139
127	Capacitor (Osc. Grid), 320 mmf., Silvercap	K-4144-2
128	Capacitor (Osc. Plate), 270 mmf., Silvercap	K-4144-1
129	Resistor, .15 megohm	K-2226-36
130	Capacitor, .1 mf., 220 volt	K-2227-9
131	Capacitor, 1000 mmf., Mica	K-1611-23
132	Ant. Trim. Cap,. Pre-set Stations, Var., 40-120 mmf.	K-3860-4
133	Resistor, 50,000 ohms	K-2226-6
134	Capacitor, 100 mmf., Mica	K-1611-2
135	Capacitor, 2000 mmf., Mica	K-1952-6
136	Resistor, 10,000 ohms	K-2226-10
137	Capacitor, 2000 mmf , Mica	K-1952-6
138	Resistor, 20,000 ohms	K-2226-8
139	Resistor, 1 megohm	K-2226-2
140	Resistor, 20,000 ohms, 1 watt	K-1870-6
141	Resistor, 20,000 ohms, 1 watt	K-1870-6
142	Capacitor, 100 mmf., Mica	K-1611-2
143	Resistor, 50,000 ohms	K-2226-6
144	Capacitor, 100 mmf., Mica	K-1611-2
145	Resistor, 50,000 ohms	K-2226-6
146	Resistor, 500 ohms	K-2226-18
147	Capacitor, .05 mf., 200 volts	K-2227-8
148	Capacitor, 5 mmf., Mica	K-4235-1
149	Capacitor, .05 mf., 400 volts	K-2228-8
150	Resistor, 1000 ohms	K-2226-16
151	1st I-F Transformer Assy. (Includes items 152-158)	K-3998
152	1st I-F Transformer, Primary Wdg	K-4074
153	1st I-F Transformer, Secondary Wdg	K-4074
154	1st I-F Transformer, Tertiary Wdg	K-4074
155	Trimmer Capacitor, 15-100 mmf	K-2134-3
156	Trimmer Capacitor, 15-100 mmf	K-2134-3
157	Capacitor, 180 mmf., Mica	K-1611-38
158	Capacitor, 180 mmf., Mica	K-1611-38
159	Fidelity Control Switch (1st I.F. Sect.)	Part of K-4152
160	Capacitor, .05 mf., 200 volts	K-2227-8
161	Resistor, 1 megohm	K-2226-5
162	Capacitor, .1 mf, 200 volts	K-2227-9
163	Capacitor, .1 mf., 400 volts	K-2228-9
164	2nd I.F. Transformer Assy. (includes items 165-171)	K-3999
165	2nd I.F. Transformer, Primary	K-4075
166	2nd I F Transformer, Secondary	K-4075
167	2nd I.F. Transformer, Tertiary	K-4075
168	Trimmer Capacitor, 15-100 mmf	K-2134-3
169	Trimmer Capacitor, 15-100 mmf	K-2134-3
170	Capacitor, 180 mmf., Mica	K-1611-38
171	Capacitor, 180 mmf., Mica	K-1611-38
172	Fidelity Control Switch (2nd I.F. Sect.)	Part of K-4152
173	Capacitor, .05 mf. 200 volts	K-2227-8
174	Resistor, 1 megohm	K-2226-5
175	Capacitor, 8 mf., Elec., 315 P.V.	K-3399
176	Capacitor, 5 mmf., Mica	K-4235-1
177	3rd I.F. Trans. Assy. (Includes items 178-183)	K-4050
178	3rd I.F. Transformer, Primary	K-4080
179	3rd I.F. Transformer, Secondary	K-4080
180	Trimmer Capacitor, 70-170 mmf	K-2932-2
181	Trimmer Capacitor, 70-170 mmf	K-2932-2
182	Capacitor, 100 mmf. (Part of item 181)	K-2932-2
183	Resistor, 50,000 ohms	K-2226-6
184	Resistor, .5 megohm	K-2226-3
185	Capacitor, .02 mf., 200 volt	K-2227-7
186	Phono. Terminal Strip Assy	K-4250
187	Volume Control, 2 megohms	K-3858-2
188	Capacitor, 100 mmf., Mica	K-1611-2
189	Capacitor, 100 mmf., Mica	K-1611-2
190	Resistor, 1 megohm	K-2226-2
191	Resistor, 1 megohm	K-2226-2
192	Capacitor, .1 mf., 200 volt	K-2227-9
193	Resistor, .1 megohm	K-2226-5
194	Resistor, 20,000 to 30,000 ohms	(See note *

* Resistor, item 194, varies according to the particular requirements of each set and may be 20,000 ohms (K-2226-8), 25,000 ohms (K-2226-7), or 30,000 ohms (K-2226-44)

Item	Description	Part No.
195	Resistor, 5,000 ohms	K-2226-12
196	Suppressor I.F. Trans. Assy. (includes items 197-201)	K-4001
197	Suppressor, I.F. Trans Primary	K-4076
198	Suppressor, I.F. Trans. Secondary	K-4076
199	Trimmer Capacitor, 15-100 mmf.	K-2134-3
200	Trimmer Capacitor, 15-100 mmf.	K-2134-3
201	Capacitor, 50 mmf., Mica	K-1611-1
202	Capacitor, 1000 mmf., Mica	K-1611-30
203	Resistor, .5 megohm	K-2226-3
204	Capacitor, 250 mmf., Mica	K-1611-14
205	Resistor, 50,000 ohms	K-2226-6
206	Capacitor, .02 mf., 400 volt	K-2228-7
207	Capacitor, .1 mf., 400 volt	K-2228-9
208	Bass Control Switch	K-2464-2
209	Bass Control Switch	K-2464-2
210	Resistor, 50,000 ohms	K-2226-6
211	Resistor, 10,000 ohms	K-2226-10
212	Capacitor, .1 mf., 200 volt	K-2227-9
213	Resistor, .1 megohm	K-2226-5
214	Suppressor Relay Assy	K-4282-1
215	Suppressor Relay Winding (Part of item 214)	—
216	Resistor, 1 megohm	K-2226-2
217	Resistor, 1 megohm	K-2226-2
218	Capacitor, .05 mf., 200 volt	K-2227-8
219	Resistor, 300 ohms	K-2226-20
220	Capacitor, .01 mf., 200 volt	K-2227-6
221	Capacitor, .05 mf., 200 volt	K-2227-8
222	Capacitor, .1 mf., 400 volt	K-2228-9
223	Resistor, 50,000 ohms	K-2226-6
224	Resistor, 1 megohm	K-2226-2
225	Resistor, .2 megohm	K-2226-67
226	Resistor, .15 megohm	K-2226-36
227	Resistor, .15 megohm	K-2226-36
228	Capacitor, .001 mf., 400 volt	K-2228-1
229	Fidelity Control Switch (Treble Tone Cont. Sect.)	Part of K-4152
230	Resistor, 2500 ohms	K-2226-13
231	Resistor, 15,000 ohms	K-2226-9
232	Capacitor, .1 mf., 400 volt	K-2228-9
233	Resistor, 15,000 ohms	K-2226-9
234	Resistor, .1 megohm	K-2226-5
235	Capacitor, .1 mf., 200 volt	K-2227-9
236	Resistor, .1 megohm	K-2226-5
237	Capacitor, .003 mf., 400 volt	K-2228-3
238	Resistor, 20,000 ohms, 1 watt	K-1870-6
239	Capacitor, .001 mf., 400 volt	K-2228-1
240	Capacitor, .001 mf., 400 volt	K-2228-1
241	Resistor, 450 ohms	K-2226-43
242	Resistor, 450 ohms	K-2226-43
243	Resistor, 13,000 ohms, 1 watt	K-1870-33
244	Resistor, 13,000 ohms, 1 watt	K-1870-33
245	Resistor, 5000 ohms, ± 5%, 10 watts	K-4300-1
246	Filter Choke Assy	K-4315
247	Loudspeaker Plug—K-2678	K-4149-1
248	Loudspeaker Cable	K-4149-1
249	Output Transformer—K-2718-12	K-4149-1
250	Voice Coil & Diaphragm Assy. K-3483-3	K-4149-1
251	Hum Bucking Coil	K-4149-1
252	Field Coil K-4247	K-4149-1
253	Capacitor, 16 mf., Elec., 500 P.V	K-4199
254	Capacitor, 16 mf., E ec., 500 P.V.	K-4199
255	Capacitor, 16 mf. Elec., 550 P.V	K-3240
256	Resistor, 100 ohms ± 5%, 10 watts	K-4300-2
257	Resistor, 20 ohms	K-2226-51
258	Resistor, .25 ohms	K-2252-15
259	Dial Lamp, 6.3 volt	K-2589-3
260	Dial Lamp, 6.3 volt	K-2589-3
261	Dial Lamp, 6.3 volt	K-2589-3
262	Dial Lamp, 6.3 volt	K-2589-3
263	Tuning Lamp, 6.3 volt	K-2589-3
264	Tuning Lamp, 6.3 volt	K-2589-3
265	Resistor, 10 ohms, 10 watts	K-4300-5
266	Resistor, ½ megohm	K-2226-3
267	Power Transformer	K-4244-1

REPLACEMENT PARTS LIST—(Continued)

Item	Description	Part No.
268	Power On-Off Switch, K-4140	Part of K-4136
269	Buffer Capacitor, .025 mf., 525 volt	K-3750
270	Buffer Capacitor, .025 mf., 525 volt	K-3750
271	Ant. Trans. Inductance Trimmer	Part of K-4127
272	R.F. Trans. Inductance Trimmer	Part of K-4128
273	Suppressor Relay Switch	K-4277
274	Capacitor, .05 mf., 200 volt	K-2227-8

MISCELLANEOUS:—

Description	Part No.
Sockets	K-1924-1
Terminal Strip (single stand-offs)	K-2594
Dial Scale (Bdcst. & Police)	K-4222-1
Dial Scale (31 and 49 meters)	K-4222-2
Dial Scale (19 and 25 meters)	K-4222-3
Dial Scale Backing (cylinder cover)	K-4329
Fibre Strips, Dial Scale Retaining	K-4085
Screws No. 2/56-5/16 FHNS (for dial strips)	K-4248-5
Light Shields (left)	K-4237-1
Light Shields (right)	K-4237-2
Cylinder Shield (bottom)	K-4354
Cylinder Shield (top)	K-4355
Indicator Assy	K-4119-2
W/C Pulley & Bushing Assy.	K-4229
Detent. Plate & Shaft Assy. (with rollers)	K-4249
Idler Pulleys with Brackets (left)	K-4232-1
Idler Pulleys with Brackets (right)	K-4232-2
Flywheel only	K-4109
Flywheel Shaft Assy. (less flywheel)	K-4226
Indicator Pulley (large)	K-4095
Bushing & Plate for large pulley	K-4105
Flexible Coupling	K-4098
Connecting Link Assy. (for "stop-go" tuning)	K-4321
Drive Cable (10½')	K-1694-9
Terminal Strips (6 plus 1)	K-2505
Terminal Strip (3)	K-3355
Terminal Strip	K-1683-1
Antenna (& Phono) Terminal Strip (with brackets)	K-4250
Circular Felt Strip (¼" broad) around dial	K-4381
Dial Light Sockets	K-2835-2
Main Dial Escutcheon	K-4160-2
Push-button Escutcheon	K-4162-1
Tuning Eye Escutcheons	K-4161
Push-button Knobs	K-4365-1
Knob—"Tuning"	K-4168
Knob—"Volume"	K-3961-11
Knob—"Fidelity"	K-3961-10
Knob—"Band"	K-3961-8
Knob—"Bass"	K-3961-9
Felt Washers (large behind tuning knob)	K-2491-5
Felt Washers for Knobs	K-2491-4
Cellulloid Windows	K-4270
Station Name Cards	K-4'56
Tuning Eye Scale Backing	K-4238-2
Six Prong Socket for Tuning Eye	K-3906
Tuning Eye Scale	K-4233
Tee Nuts Bottom Plate Mounting	K-3282
Mirrophonic Label	K-4165
Tuning Eye Lamp Sockets	K-2835-1
Stop & Go Tuning Lever (suppressor switch arm)	K-4311-1
Relay (only)	K-4283-1
Relay Can (only)	K-4285
Instruction Folder (English)	K-4163
Instruction Folder (French)	K-4164
Tuning Wrenches—all models	K-836

SOCKET VOLTAGE READINGS

These readings were taken with the gang capacitor all in, wave-change switch in the broadcast position, fidelity control switch in "normal" position (3rd position clockwise), bass control in "normal" position (centre position), "manual" tuning button depressed (except as noted below) and the line voltage 115 volts. Voltage readings can be duplicated using any good voltmeter having a resistance of 1000 ohms per volt, such as the Weston Model 663 Volt Ohmmeter or the Weston Model 772 having a resistance of 20,000 ohms per volt. Current readings may be duplicated with the Model 772 and a Model 666-1A Socket Selector. When taking readings using the selector attachment, connect a 0.1 mf. capacitor from the grid of the tube in the selector to the chassis, to prevent oscillation.

TUBE	VOLTAGES				CURRENTS—M.A.		
	Filament (A.C.)	Plate	Screen	Cathode	Screen	PLATE	
						Normal Bias	Bias Red. 4.5 V.
Type 6K7 R-F Amplifier	6.2	250	95	0③	1.2	5.5	10.0
Type 6A8—Manual Tuning, 1st Det.	6.2	247①	95	4.8③	8.0②	1.4	2.5
Type 6J5—Manual Tuning Osc.	6.2	125	—	0	—	6.0	6.5
Type 6K7—1st I.F. Amplifier	6.2	250	95	0③	1.2	5.0	10.0
Type 6K7—2nd I.F. Amplifier	6.2	250	95	0③	1.2	5.0	10.0
Type 6H6—2nd Detector & A.V.C.	6.2	—	—	0	—	—	—
Type 6J5—1st Audio Amplifier	6.2	120	—	4.0	—	2.5	3.7
Type 6J5—2nd Audio Amplifier	6.2	120	—	4.0	—	2.5	3.7
Type 6J5—Phase Inverter Amplifier	6.2	200	—	45.0④	—	2.8	3.7
Type 6F6G—Output Amplifier	6.2	280	285	0⑤	6.0	39	48
Type 6F6G—Output Amplifier	6.2	280	285	0⑥	6.0	39	48
Type 6K7—Limiter Amplifier	6.2	87	16	0	0.13	0.7	0.76
Type 6H6—Suppressor Rect.	6.2	—	—	4.0	—	—	—
Type 6V6G—Relay Amplifier	6.2	250	95	4.0	1.1	13.0	19.5
Type 6A8⑧—Auto-Tuning Osc. & 1st Det.	6.2	240⑥	95	0③	3.7	6.0⑦	13.0
Type 6U5—Tuning Eye	6.2	Target 95	Plate 15	0	Target 0.8	Plate 0.15	0.17
Type 5Y4G—Rectifier	5.05	—	—	350	Plate 40	40	—
Type 5Y4G—Rectifier	5.05	—	—	350	40	40	—

① Anode Grid Volts—95 V.
② Anode Grid Current and Screen Current Combined
③ Grid Bias—3.4 (across R-257).
④ Grid Bias—5.8 (across R-230).
⑤ Grid Bias—19 V. (across R-256 and R-257).
⑥ Anode Plate Volts—140 V.
⑦ Anode Plate Current—5.5 ma.
⑧ No. 2 Button Depressed for these readings.

SOCKET RESISTANCE READINGS

—(OHMS TO GROUND)

TUBE	Top Cap. (Cont. Grid)	Pin No. 1 (Shell)	Pin No. 2 (Heater)	Pin No. 3 (Plate)	Pin No. 4 (Screen)	Pin No. 5	Pin No. 6 (Suppressor)	Pin No. 7 (Heater)	Pin No. 8 (Cathode)
Type 6K7 R-F Amplifier	2.15 meg.	0	Below 0.5	11,500	6,500	0	—	0	0
Type 6A8—Manual Tuning, 1st Det.	2.15 meg.	0	Below 0.5	12,500	6,500	No. 1 Grid 50,500	No. 2 Grid 6,500	0	500
Type 6J5—Manual Tuning Osc.	—	0	Below 0.5	31,500	—	Cont. Grid 50,000	—	0	0
Type 6K7—1st I.F. Amplifier	3 meg.	0	Below 0.5	12,500	5,000	No. 1 Grid 50,000	No. 2 Grid 31,500	0	0
Type 6K7—2nd I.F. Amplifier	2 meg.	0	Below 0.5	11,500	6,500	0	—	0	0
Type 6H6—2nd Detector & A.V.C.	1 meg.	0	Below 0,5	11,500	6,500	0	—	0	0
Type 6J5—1st Audio Amplifier	1 meg.	0	Below 0.5	15,000	20,000	0	—	0	0
Type 6J5—2nd Audio Amplifier	—	0	Below 0.5	Diode Plate .5 meg.	Cathode 300	Diode Plate 0	—	0	0
Type 6J5—Phase Inverter Amplifier	—	0	Below 0.5	13,500	—	Cont. Grid 1.5 meg.	—	0	300
Type 6F6G—Output Amplifier	—	0	Below 0.5	Diode Plate 1 meg.	Cathode 0	Diode Plate .55 meg.	—	0	0
Type 6F6G—Output Amplifier	—	0	Below 0.5	61,500	0	Cont. Grid 0	—	0	450
Type 6K7—Limiter Amplifier	—	0	Below 0.5	61,500	—	Cont. Grid 10,000	—	0	450
Type 6H6—Suppressor Rect.	—	0	Below 0.5	26,500	—	Cont. Grid 1.15 meg.	—	0	17,500
Type 6V6G—Relay Amplifier	—	0	Below 0.5	12,200	12,000	Cont. Grid .1 meg.	—	0	0
Type 6A8⑧—Auto-Tuning Osc. & 1st Det.	—	0	Below 0.5	12,200	12,000	Cont. Grid .1 meg.	—	0	0
Type 6U5—Tuning Eye	—	Heater Below 0.5	Plate .5 meg.	Cont. Grid 1.5 meg.	Target 6,300	Cathode 0	Heater 0	X	X
Type 5Y4G—Rectifier	—	—	—	180	—	Plate 180	—	Filament 12,140	Filament 12,400
Type 5Y4G—Rectifier	—	—	—	180	—	Plate 180	—	Filament 12,140	Filament 12,400

The above readings except as noted are taken with attachment plug disconnected, gang capacitor all in, wave-change switch in the broadcast position, fidelity control switch in "normal" position (3rd position clockwise), bass control in "normal" position (centre position), "manual tuning" button depressed (except as noted below), volume control in extreme counter-clockwise position, silent tuning switch in off position.

① Readings for this tube were taken with push button No. 2 depressed.

REALIGNING INSTRUCTIONS

To secure full advantage of the performance characteristics of this receiver, any realignment found necessary should be carried out carefully. A reliable oscillator or signal generator covering the entire frequency range, and an output meter should be employed.

I-F ALIGNMENT:

(*a*) Set wave change switch in broadcast position, the tuning capacitor gang in closed position, the fidelity control on the third position from maximum counter-clockwise (this is "contracted selectivity" position) press in the "manual" push button. Turn the silent tuning control crank to the "off" position. Accuracy in setting the signal generator to 470 kc. is essential to ensure good tracking of the I-F and R-F circuits. Couple the output of the signal generator through 0.1 mf. capacitor to the grid cap of the converter tube (6A8) on the turret assembly.

(*b*) Align the trimmers, items 155, 156, 168, 169, 180 and 181 for maximum response on the output meter connected across the speaker voice coil.

NOTE:—Do not use the tuning eye to indicate alignment when aligning the I.F. amplifier as this will not function properly for trimmer, item 181, and also the suppressor transformer may not be properly aligned to 470 kc.

(*c*) Reduce the output of the signal generator to the lowest value that will produce an output reading and check all the adjustments. All trimmers should peak properly.

(*d*) Turn the fidelity control one step counter-clockwise. Swing the generator frequency above and below 470 kc. A single peak at 470 kc. should be observed, but the drop in output on each side of 470 kc. should be considerably less than when on the step in (*b*) above.

(*e*) Turn the fidelity control to the maximum counter-clockwise. Swing the generator frequency above and below 470 kc. The output should remain nearly constant or rise slightly from 470 kc. to plus or minus 10 kc. and then fall rapidly for frequencies further off tune. If the response is not symmetrical, adjust the diode trimmers, items 180 and 181, very slightly to obtain symmetry.

(*f*) Transfer the 0.1 mf. capacitor from the 6A8 on the turret to the grid cap of the 6A8 on the chassis. Press in one of the automatic tuning buttons. With the fidelity switch in the maximum counter-clockwise position, the same flat-top response as in (*c*) above should be obtained. On the second step, the response should be as in (*d*) above. The response on the third step is the same as on the second, as these positions are automatically connected together by operation of the automatic station selector push buttons.

WARNING:—Under no circumstances must the I-F trimmers be touched while one of the automatic station selector push buttons is depressed, as this automatically over-couples the first I-F transformer and makes proper aligning impossible. Align the I-F amplifier *only* with *Manual tuning* button depressed and the input on the 6A8 grid cap on the turret.

R-F ALIGNMENT—BROADCAST BAND:

(*a*) Close the gang capacitor and check that the pointer is lined up with the end of the scale. Check also that the stop on the dial pulley allows the gang to completely close. Connect the output of the generator to the antenna terminal through 100 mmf. capacitor. Ground the receiver ground terminal. For the R-F alignment of this and the other five bands the fidelity switch should be on the third step from maximum counter-clockwise and the "manual" tune button should be depressed.

(*b*) Set the signal generator and receiver to 1600 kc. Adjust trimmer, Item 70, to tune in signal. Then adjust trimmers, items 26 and 47, for maximum output.

(*c*) Set generator and receiver to 600 kc. Adjust trimmer, item 66, to tune in signal. Adjust the iron cores, items 271 and 272, for maximum output.

(*d*) Recheck at 1600 kc.

R-F ALIGNMENT—POLICE BAND:

(*a*) Use same connections from the generator as for broadcast band alignment.

(*b*) Turn the wave change switch to the Police band. Set both generator and receiver to 4.8 mc. Adjust trimmer, item 71, to tune in signal. To ensure having the right peak, check for the image at 5.74 mc. (940 kc. above the signal) by increasing the output of the generator and changing its frequency to 5.74 mc., at which frequency a signal should be heard. Adjust trimmers, items 25 and 46, for maximum output.

(*c*) Set generator to 1.8 mc. and tune receiver to signal. While rocking the gang, adjust the trimmer, item 69, for maximum output.

(*d*) Recheck at 4.8 mc.

R-F ALIGNMENT—SPREAD BAND COILS:

(*a*) Substitute a 400 ohm resistor in place of the capacitor in the lead from the signal generator.

(*b*) The order of the spread band alignment must be as follows:—19-Meter; 49-Meter; recheck 19-Meter; 25-Meter and 31-Meter. Since such a small frequency range is covered on each band, there is considerable interaction between the oscillator parallel and series trimmers. Hence it will be necessary to recheck each end of the band several times to obtain correct alignment.

19-Meter Alignment:

(*c*) Set the wave-change switch on the 19-Meter band. Set generator and receiver to 15.8 mc. (The generator must be accurately calibrated or stations of known frequency should be used to correctly calibrate the dial.) Adjust trimmer, item 75, to tune in signal. Check for image at 16.74 mc. Adjust trimmers, items 24 and 45, for maximum output while rocking gang slightly.

(*d*) Set generator and receiver at 15.0 mc. Adjust trimmer, item 81, to tune in signal. Use bakelite screwdriver. Check for image at 15.94 mc.

(*e*) Recheck at 15.8 mc.

49-Meter Alignment:

(*f*) Turn wave change switch to 49-Meter band. Set generator and receiver to 6.6 mc. Adjust trimmer, item 79, to tune in signal. Check for image at 7.54 mc. Adjust trimmers, items 32 and 53, for maximum output.

(*g*) Set generator and receiver to 5.8 mc. Adjust trimmer, item 87, to tune in signal. (Use bakelite screwdriver). Check for image at 6.74 mc.

(*h*) Recheck at 6.6 mc.

Recheck on 19-Meter Alignment:

(*i*) Since the trimmers, items 32 and 53, have some effect on the 19-Meter R-F and antenna alignment, it is necessary to recheck the 19-Meter alignment at this point. Set generator and receiver to 15.8 mc. Readjust trimmers, items 24 and 45, for maximum output. If there is very much adjustment necessary recheck again at 6.6 mc. This alignment should be carried out until no increase in output is obtained by adjusting the trimmers, items 24 and 45, on the 19-Meter band or trimmers, items 32 and 53, on the 49-Meter band.

25-Meter Band Alignment:

(*j*) Turn wave change switch to the 25-Meter band. Set generator and receiver to 12.2 mc. Adjust trimmer, item 77, to tune in signal. Check for image at 13.14 mc.

(*k*) Set generator and receiver to 11.4 mc. Adjust trimmer, item 83, to tune in signal. (Use bakelite screwdriver). Check for image at 12.34 mc.

(*l*) Recheck at 12.2 mc.

31-Meter Alignment:

(*m*) Turn wave change switch to the 31-Meter band. Set generator and receiver to 10.1 mc. Adjust trimmer, item 78, to tune in signal. Check for image at 11.04.

(*n*) Set generator and receiver to 9.0 mc. Adjust trimmer, item 85, to tune in signal. (Use bakelite screwdriver). Check for image at 9.94 mc.

(*o*) Recheck at 10.1 mc.

STOP AND GO TUNING AND TUNING EYE ALIGNMENT:—The need for realignment is indicated if the minimum opening on the 6U5 tuning eye does not coincide exactly with the correct tuning of a station. Also, failure of the relay to function may be due to misalignment. Very bad misalignment will render both the relay and the tuning eye inoperative.

Procedure for Alignment

(*a*) Use same control settings and generator connections as for broadcast band alignment above.

(*b*) Set generator to 1600 kc. and set output to about 1000 microvolts. Carefully tune receiver to obtain maximum output. Adjust trimmers, items 199 and 200, to obtain minimum opening on tuning eye.

NOTE:—If the trimmers, items 199 and 200, have been badly mistuned, it will be easier to find the peak on each trimmer if the 6V6G tube is removed from its socket. After the peak has been found, replace the 6V6G and do the final adjustment. This circuit is very sharp and careful work is necessary.

(*c*) To check relay operation, insert a milliammeter to read the plate current of the 6V6G tube. Turn the control crank to the silent tuning position as shown in fig. 1. Slowly tune in the signal from the generator. The plate current should drop and the relay should open, allowing the signal to be heard when the current is between 6.5 and 7.5 ma. Slowly detune from the signal. The plate current should now rise and the relay should close causing the set output to stop, when the current is between 8.0 and 10.0 ma. The maximum plate current with no signal applied to the set should be between 12.0 and 15.0 ma. The minimum plate current obtained when tuned to a strong signal should be between 3.0 and 5.0 ma.

ADJUSTMENT AND ALIGNMENT OF AUTOMATIC TUNING SWITCH:

(*a*) **Ranges of Coil Tuning:**—When a station selector button is depressed, the gang capacitor is automatically disconnected and an iron cored oscillator and antenna coil mounted on the switch are connected in the circuit. The iron cores are ganged together and are adjusted by means of the single screw (per button) which is reached by inserting a screwdriver through the hole under the station call letters in the escutcheon. The frequency range of each coil is as listed below (refer to fig. 1 for button numbers.)

Trimmer Item No.	*Station Selector Button*	*Tuning Range*	*Coil Part No.*
89 and 91	2	530– 930 kc.	K-4141
93 and 95	3	530– 930 kc.	
97 and 99	4	750–1370 kc.	K-4142
101 and 103	5	750–1370 kc.	
105 and 107	6	950–1715 kc.	K-4143
109 and 111	7	950–1715 kc.	

(*b*) **Adjustment for Preset Stations:**—After ascertaining what stations are desired, determine from the table which button includes the required frequency. Depress the proper button and turn the adjusting screw until the desired station is heard. Turn carefully for the minimum aperture of the tuning eye. After setting the six stations, select the proper call letters from the card supplied and insert them in the escutcheon window. The cards are fastened in by means of the celluloid cover.

(*c*) **Realignment of Automatic Tuning Switch:—**

(1) Connect the signal generator to the antenna terminal of the receiver through 100 mmf. capacitor. Set the generator to 1400 kc. Set the fidelity switch in the second position from maximum counter-clockwise. Set the silent tuning switch to the "off" position. Press in the second button from the right-hand side.

(2) Turn the adjusting screw (number 5 location) over this button with a screwdriver until the signal is heard. Adjust the trimmer, item 132, for maximum output. This is the only alignment operation necessary as the other coils are thus automatically aligned.

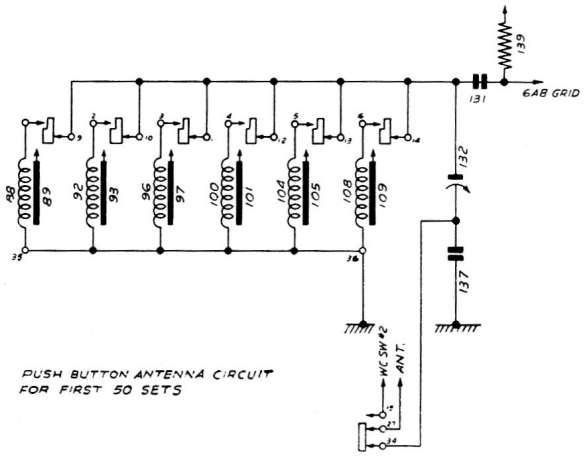


Figure 7.—Alternate Push Button Antenna Circuit—(First 50 Sets)