



“His Master’s Voice”

SERVICE MANUAL

for

FIVE-VALVE

DUAL-WAVE A.C. RECEIVER

Model 661

AND

DUAL-WAVE A.C. RADIOGRAMS

Models 540 and 541

- (3) Rotate tuning knob until pointer is over 13.9 metres on dial and adjust S.W. oscillator trimmer until maximum output is obtained with pointer exactly on the 13.9 metre mark. Two settings will be found at which this trimmer will peak; care must be taken that the setting finally selected is that which gives the lower capacity, i.e., plunger further out. Failure to select the correct position of the two will cause serious tracking errors and loss of sensitivity.
- (4) Tune receiver and signal generator to 15 metres (20 mc.).

- (5) Adjust S.W. aerial trimmer for maximum output while "rocking" the ganged condenser slightly to obtain the true resonant point.
- (6) Retune receiver and signal generator to 13.9 metres, and note that signal is still tuned in correctly on dial; if not, readjust S.W. oscillator trimmer slightly until dial reads correctly and then repeat tests 4 to 6 inclusive.
- (7) Check foregoing adjustments carefully to ensure that correct settings have been obtained on all trimmers. Dial should now read correctly throughout.

Supplementary Service Information for Radiogram Models 541 and 540

TECHNICAL SPECIFICATION

PICK-UP

D.C. resistance, 7400 ohms.

Impedance at 1000 cycles, 19,000 ohms.

One of the pick-up leads, and also the screening over the leads, is to be connected to the black pick-up socket on the chassis. For service particulars of this pick-up, see below.

AUTO BRAKE (Type 324)

Standard friction type, see page 11.

DISMANTLING

REMOVAL OF CHASSIS

- (1) Remove knobs.
- (2) Disconnect loudspeaker plug, gramophone motor plug, and pick-up leads.
- (3) Unscrew volume control escutcheon from side of cabinet; withdraw sufficiently to allow insertion of a screwdriver through hole provided in side of escutcheon, loosen and remove control knob; the escutcheon should now be detached and the volume control pushed to the inside of the cabinet.

(On Model 540, unscrew volume control bracket from inside front of cabinet.)

- (4) Remove two nuts from chassis fixing bolts behind wooden chassis supports; the chassis is now free.

in the rubber. Carefully remove all dust or filings in and around the gap of the armature. A piece of "plasticine" will be found useful for this work.

THE MAGNET

Do not remove the magnet unless absolutely necessary.

If it is necessary to remove the magnet, first place a "keeper," consisting of a flat piece of iron, across the poles of the magnet. When replacing, the ground face of the magnet must be in contact with the poles.

THE PICK-UP AND MOTOR

To gain access to the pick-up movement remove the wax covering the two screw-heads in centre (underside) of pick-up head and remove the screws. The four wax-covered screws fixing the pole pieces of the pick-up must not be disturbed. These pole-fixing screws are situated at either side of, and in line with, the needle hole (Fig. 1).

ADJUSTING THE ARMATURE

The armature, which should be midway between the two poles of the magnet, may be adjusted by moving the clamp which holds the rubber damping pad.

See that the slit in the rubber is locating the end of the armature. When properly fitted, the flat end of the armature will be just visible through the slit

RENEWAL OF COILS

Be careful to connect and position the coils correctly (see Fig. 1) when renewing. These coils should be firmly held in position with beeswax.

THE MOTOR

To remove the motor on the radiogram: First disconnect leads, then remove the three fixing screws from the top of the motor-board (underneath turntable), taking care not to lose rubber washers between motor and board.

LUBRICATION

It is important that only good quality light machine oil and grease, free from acid, should be used for lubrication. It is advisable to lubricate the motor regularly on certain dates, depending on how much it is used; the oiling diagram will be found inside the cabinet.

TECHNICAL SPECIFICATION

VOLTAGE RANGE

200 to 260 volts, 40 to 60 cycles.

It is important that the receiver be operated at the correct voltage; the voltage taps on the mains transformer should be utilized as follows:

| Voltage of A.C. Supply | Use Tap Designated |
|------------------------|--------------------|
| 200-220 volts | 200 |
| 221-240 .. | 240 |
| 241-260 .. | 260 |

CONSUMPTION

| | Radio | Gram. |
|-------------------|----------|----------|
| Model 661 | 73 watts | — |
| .. 541 and 540 .. | 73 .. | 90 watts |

WAVE-LENGTH RANGE

13.9 metres (21.57 megacycles) to 47 metres (6.38 megacycles).

187 metres (1600 kc.) to 545 metres (550 kc.).

MAX. UNDISTORTED POWER OUTPUT

4.5 watts.

DIMENSIONS

| | Height | Width | Depth |
|--------------|--------------------|--------------------|--------------------|
| Model 661 .. | 35 $\frac{3}{8}$ " | 30 $\frac{1}{4}$ " | 13 $\frac{3}{4}$ " |
| .. 541 .. | 31 $\frac{1}{4}$ " | 35" | 17 $\frac{3}{4}$ " |

WEIGHT

| | Nett | Gross |
|-----------------|---------|---------|
| Model 661 | 62 lbs. | 73 lbs. |
| .. 541 | 91 .. | 108 .. |

LOUDSPEAKER

Models 661 and 541 use a 12" speaker, and Model 540 a 10" speaker, the field winding acting as filter choke.

D.C. resistance of field coil, cold 1800 ohms.

" " voice " 2 "

400 cycle impedance of voice coil 2.35 "

VALVES

Models 661 and 541 : 6K7GT, 6J8G, 6B8G, 6V6G, 5Y3G.

Model 540: 6J8G, 6U7G, 6B8G, 6V6G, 5Y3G.

CIRCUIT

These Models are Superheterodyne Receivers, employing five valves. The **oscillator circuit** is a little unusual, and is designed to provide relatively constant oscillation amplitude over the very wide tuning range employed in both wave bands. The **wave-band switching** has been simplified in Models 661 and 541 by the elimination of switching in the primary circuit of the aerial transformer. The **frequency changer** is followed by a single stage I.F. amplifier, using a 6K7GT valve in Models 661 and 541, operating at 457.6 kc. and feeding into a 6B8G duo-pentode, whose diodes are used as demodulator and A.V.C. rectifier respectively. The pentode section of this valve is resistance-capacity-coupled to a 6V6G output valve. In Model 540, the I.F. amplifier is a 6U7G valve, operating at 460 kc.

The broadcast band aerial coupling is through a Litz-wound iron-core coil of exceptionally high efficiency. All I.F. transformers also employ Litz-wound iron-core coils and silver-coated titanium dioxide fixed condensers—tuning being accomplished by axial adjustment of the iron cores. Inductive padding of the oscillator circuit is used on both wave bands, through the medium of adjustable iron cores; special close tolerance fixed padding condensers are used.

Models 661 and 541 incorporate the "His Master's Voice" Automatic Expanding Selector, which comprises a special form of I.F. amplifier, whose band width is directly controlled by the strength of the incoming signal, providing broad tuning and consequent high fidelity on powerful signals and giving progressively sharper tuning as signal strength is reduced. Normal 2-circuit input and output transformers are used, but they are more closely coupled than usual, thus giving a broad, flat-topped resonance curve of low selectivity, permitting faithful transmission of side bands up to about 5,000 cycles/sec. Feed-back is taken through the condenser CN from the un-by-passed I.F. cathode resistor to the plate of the converter valve; this feed-back is so adjusted that when the I.F. valve is operating at full sensitivity, the coupling between the first I.F. primary and secondary is electrically loosened sufficiently to provide a resonance curve, having a single sharp peak and giving very high selectivity. However, as the bias on the I.F. valve is increased by A.V.C. action on strong signals, its mutual conductance is reduced, allowing the first I.F. transformer to return to its normal broadly tuned condition. The condenser CN is precisely adjusted at the factory and sealed, and its adjustment should **under no circumstances** be interfered with.

A.V.C. voltage is applied to the converter and I.F. valves on both wave-bands; the maximum control voltage derived from the A.V.C. diode, which is fed from the I.F. plate, is applied to the converter, but the I.F. valve is controlled by the rectified signal voltage from the signal diode; this voltage simultaneously serving the purpose of A.V.C. voltage, is also applied to the 6B8G audio frequency valve. In Model 540, both stages derive A.V.C. from the A.V.C. diode.

Inverse feed-back is applied to the complete audio frequency system through the Tone Monitor Control, from the secondary of the output transformer to a tap on the Volume Control; in this way the whole of the A.F. circuits benefit from the distortion-reducing properties of such feed-back. In addition, the circuits associated with the Tone Monitor Switch provide varying degrees of feed-back differing with frequency, thus ensuring control of tonal balance. Furthermore, the degree of feed-back varies with the setting of the Volume Control in such a way as to automatically provide the best type of response for both local and distant reception and at all volume levels. The speaker field winding is used as a filter choke, in conjunction with two 16 mfd. wet electrolytic condensers, one of which is of the regulating type. It is essential that the positions of these condensers in the circuit shall **not** be interchanged. The condensers are mounted

on the speaker, and are thus isolated from the chassis heat and protected against damage.

Provision is made for the connection of a Gramophone Pick-up to Model 661 by means of two jacks at the back of the chassis. Insertion of the pick-up plugs automatically suppresses radio reception, and converts the diode filter resistor into a load for the pick-up.

DIAGRAMS

The circuit diagrams of Models 661 and 541, together with all component values, are shown on pages 4 and 6, and of Model 540 on page 5.

WAVE-BAND SWITCHING

This is carried out by a single-deck switch, having two positions—one for short-wave and one for the broadcast band. In Models 541 and 661 the primary windings of all coils are connected permanently in series and are not switched. Additional capacitive feed-back is applied across the padding condenser on the short-wave band, and this is controlled by the Wave-change Switch. Rotation of the switch to the left connects the short-wave circuits, and to the right the broadcast circuits.

tone MONITOR

This is a 4-position switch. In Model 661 the following effects are secured in the various switch positions:

1st Position (Wide Range): Normal bass and boosted treble, the latter partially compensating for side band cut. For local reception of high fidelity.

2nd Position (Normal): Normal bass and slight treble cut. For normal and distant reception.

3rd Position (Bass): Increased treble cut. For deeper tone and reduction of static and surface noise.

4th Position (Speech): Bass cut and treble boost. For long-distance reception of speech with good intelligibility, or reduced bass response.

In Models 540 and 541 additional bass boost is provided, which is cut in by the Radio-Gram. switch in the "Gram." position and removed in the "Radio" position.

EXTENSION SPEAKER

Pin-jacks are provided at the back of the chassis for the connection of an extension speaker. They are wired to the secondary of the output transformer and are suitable for connection to any loud-speaker having a voice coil impedance between 2.5 and 4 ohms. An impedance of 3 ohms at 400 cycles is recommended, and the speaker should preferably be of permanent magnet type and requires no transformer. The "His Master's Voice" Extension Speaker is very suitable, and is fitted with a constant impedance volume control.

PRELIMINARY TESTS

1. Switch on receiver and note that dial lights up.
2. If no signals can be tuned in, remove the shield from the 6B8G valve and with the volume control full on and earth wire disconnected, touch the finger to the grid cap of the valve, when a loud hum should be heard; a hum should also be heard when the bottom pick-up jack is touched. This indicates that the A.F. side of the receiver is working, and the fault probably lies in the R.F. or I.F. circuits. Should no hum be heard, a fault exists between first A.F. stage input and the speaker.
3. Check all valves for heater continuity and freedom from internal shorts.
4. To determine if the fault lies in the loud-speaker, connect a high impedance A.C. voltmeter or output meter, range 0-3 volts approx., to the voice coil terminals of the speaker. Switch on receiver, turn volume control fully on, and tune across the broadcast band when stations are known to be transmitting. If meter does not deflect, the fault lies in the receiver circuits or in the field circuit of the speaker. If the meter deflects but no sound is heard, the speaker voice coil is at fault.
5. If the fault is still undiscovered, remove chassis and speaker from cabinet and compare voltages with table given on page 7.

DISMANTLING

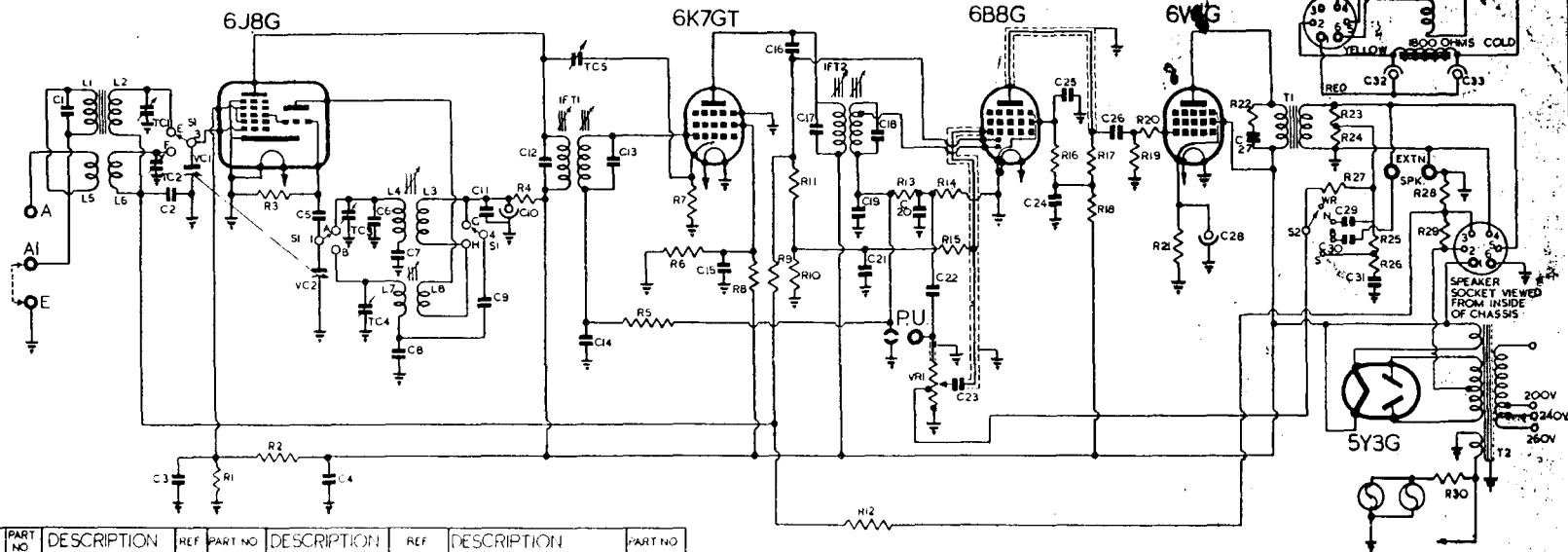
(Model 661)

REMOVAL OF CHASSIS

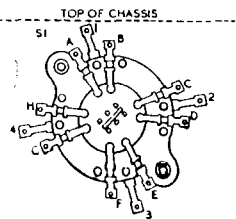
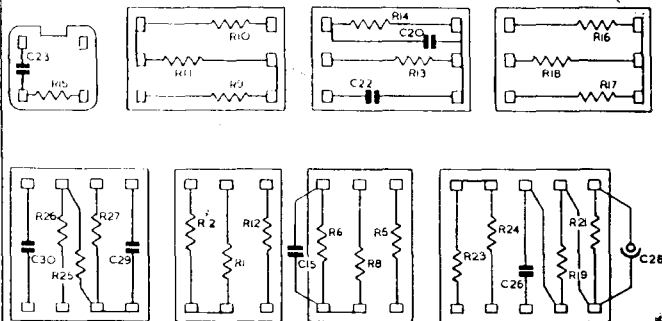
1. Remove knobs. (Knobs without screws pull straight off shaft.)
2. Disconnect speaker plug and power plug.
3. Remove nuts from four fixing bolts from under-side of shelf; the chassis is now free.

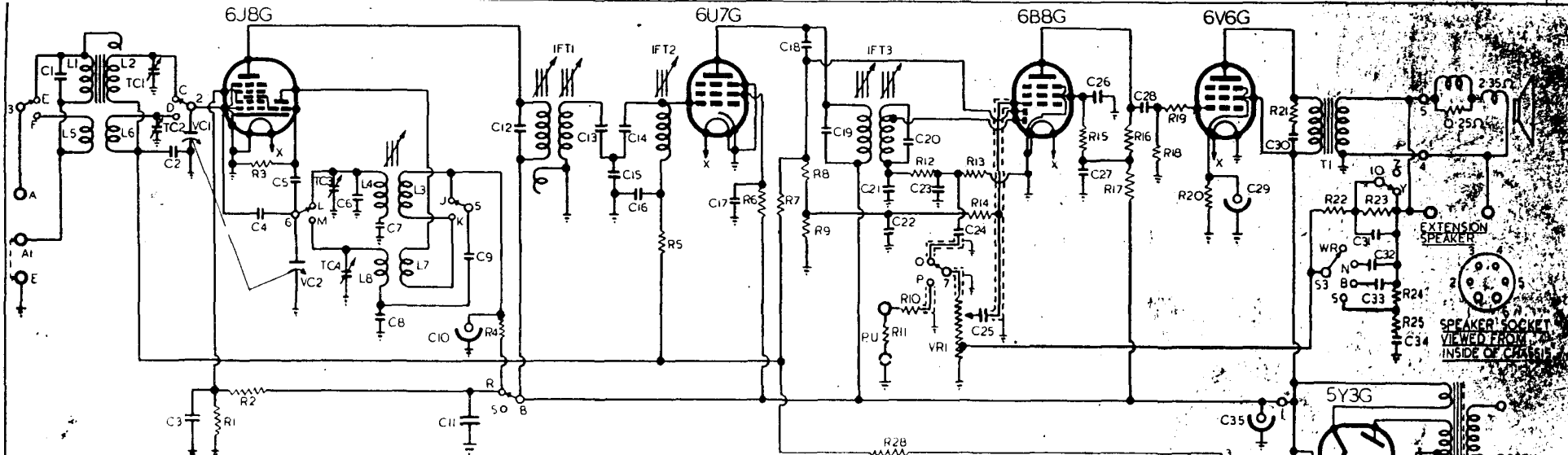
REMOVAL OF LOUDSPEAKER

1. Remove 6-pin plug from back of chassis.
2. Remove screws holding speaker chassis to baffle and withdraw speaker.

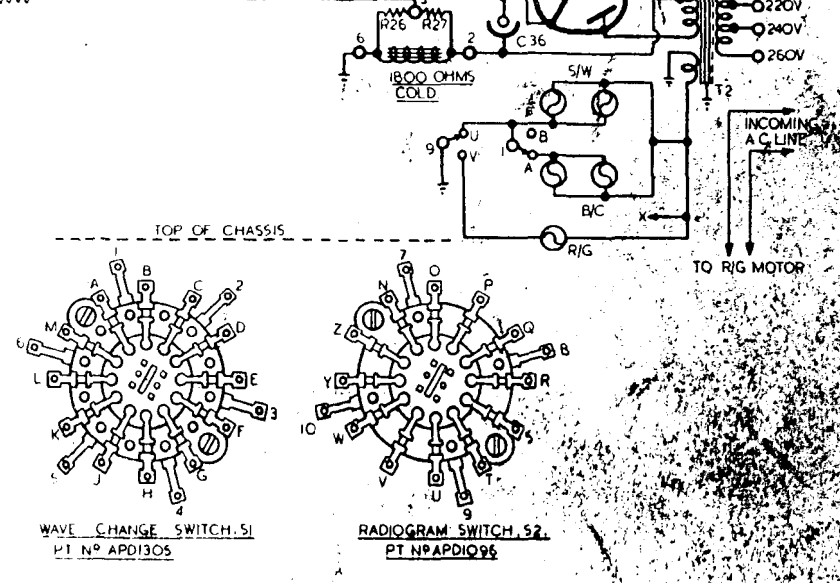


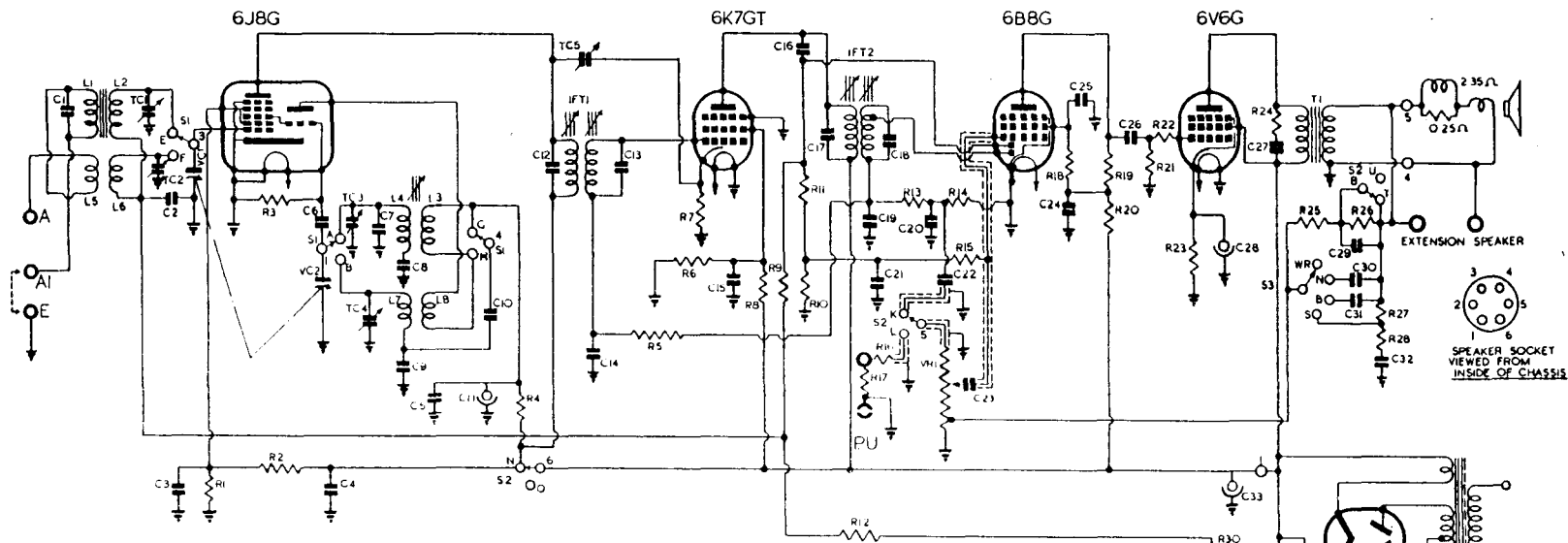
| REF | PART NO | DESCRIPTION | REF | PART NO | DESCRIPTION | REF | PART NO | DESCRIPTION | PART NO |
|-----|---------|-------------------|-----|---------|-----------------|-----------|----------------------------|--------------|---------|
| R1 | J3X | 100,000 OHMS 1W | C1 | 0243 AW | 50MMFD | VC18VC2 | 417MMFD 2GANG COND | C0159 | |
| R2 | W4X | 30,000 OHMS 2W | C2 | 0013 M | 0.05 MFD 200V | VRI | 1MEG. POTENTIOMETER TAPPED | D 103B | |
| R3 | H1X | 50,000 OHMS 1/4W | C3 | 0013 C | 0.05 MFD 400V | S1 | WAVE CHANGE SWITCH | D 1621 | |
| R4 | V3X | 20,000 OHMS 1W | C4 | 0013 A | 0.5 MFD 400V | S2 | TOUCH MONITOR SWITCH | D 130B | |
| R5 | AX1X | 2MEG OHMS 1/4W | C5 | 0243 BL | 25 MMFD | T1 | DIAL 1 AMP 6.3 0.3 AMP | | |
| R6 | AX3X | 75,000 OHMS 1W | C6 | 0243 BF | 15 MMFD | IF T1 | 1ST IF TRANSFORMER | D 1720 | |
| R7 | D1X | 1,000 OHMS 1/4W | C7 | 0243 BH | 437 MMFD | IF T2 | 2ND IF TRANSFORMER | D 1721 | |
| R8 | AX3X | 75,000 OHMS 1W | C8 | 0243 AT | 5400 MMFD | | SPEAKER | D 1676 | |
| R9 | H1X | 1MEG OHMS 1/4W | C9 | 0013N | 0.01MFD 600V | T1 | 1-110V TRANSFORMER | D 1263 | |
| R10 | OX | 500,000 OHMS 1/4W | C10 | 0014 AB | 418U 350V | T2 | MAIN S. TRANSFORMER | D 1241 | |
| R11 | OX | 500,000 OHMS 1/4W | C11 | 0013T | 0.01MFD 600V | V1 & L2 | B.C. AERIAL COIL | D 1614 g p 4 | |
| R12 | AB3X | 10MEG OHMS 1W | C12 | 0243 BL | 100 MMFD | L3 & L4 | B.C. OSCILLATOR COIL | C 0005 | |
| R13 | H1X | 50,000 OHMS 1/4W | C13 | 0243 BL | 100 MMFD | L5 & L6 | SW AERIAL COIL | C 0219 C | |
| R14 | N1X | 250,000 OHMS 1/4W | C14 | 00131 | 0.02MFD 400V | L7 & L8 | SW OSCILLATOR COIL | C 0019 D | |
| R15 | AX1X | 2MEG OHMS 1/4W | C15 | 0013E | 0.01MFD 400V | TC1 & TC2 | AIR TRIMMER 15-18MMFD | D 0786 | |
| R16 | AL3X | 3MEG OHMS 1W | C16 | 0243 Q | 50MMFD | TC3 & TC4 | VARIABLE NEUT COND | D 1762 | |
| R17 | OX3 | 500,000 OHMS 1W | C17 | 0243 BS | 200 MMFD | | | | |
| R18 | H3X | 50,000 OHMS 1W | C18 | 0243 BS | 200 MMFD | | | | |
| R19 | OX | 500,000 OHMS 1/4W | C19 | 0243 AE | 100 MMFD | | | | |
| R20 | HUX | 50,000 OHMS 1/4W | C20 | 0243 AL | 100 MMFD | | | | |
| R21 | ZW5V | 250 OHMS 3W | C21 | 0013P | 0.25 MFD 200V | | | | |
| R22 | T3X | 100 OHMS 1W | C22 | 00131 | 0.02 MFD 400V | | | | |
| R23 | T1X | 100 OHMS 1/4W | C23 | 0013E | 0.01 MFD 400V | | | | |
| R24 | T1X | 100 OHMS 1/4W | C24 | 0013A | 0.5 MFD 400V | | | | |
| R25 | V1X | 200,000 OHMS 1/4W | C25 | 0013E | 0.01 MFD 400V | | | | |
| R26 | AF1X | 3,000 OHMS 1/4W | C26 | 0013S | 0.02 MFD 600V | | | | |
| R27 | AN1X | 75,000 OHMS 1/4W | C27 | 0013S | 0.02 MFD 600V | | | | |
| R28 | V1X | 200,000 OHMS 1/4W | C28 | 0014T | 5 MFD 25V | | | | |
| R29 | K1X | 150,000 OHMS 1/4W | C29 | 00130 | 0.002 MFD 600V | | | | |
| R30 | | 2 OHM D 1763A | C30 | 00130 | 0.002 MFD 600V | | | | |
| | | | C31 | 0013Q | 0.01 MFD 200V | | | | |
| | | | C32 | 0014Q | 16 MFD 550PV | | | | |
| | | | C33 | 0014P | 16 MFD 350PV | | | | |
| | | | | | REGULATING TYPE | | | | |



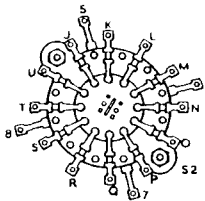
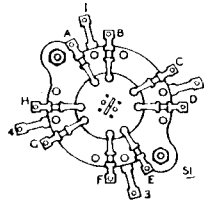
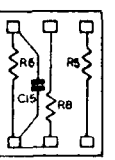
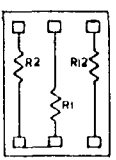
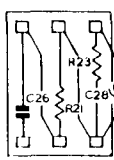
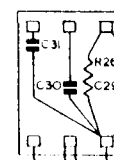
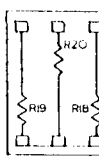
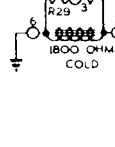
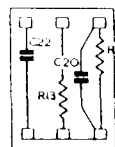
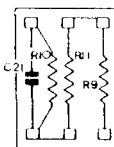
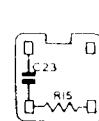


| REF | PART NO | DESCRIPTION | REF | PART NO | DESCRIPTION | REF | PART NO | DESCRIPTION | REF | PART NO | DESCRIPTION |
|------|---------|----------------------|------|---------|-----------------------------|---------|---------------------------|-------------|-----|---------|-------------|
| R 1 | H3X | 50000 OHMS 1 WATT | C 1 | 0243/AE | 100MMFD | VC1&VC2 | 417MMFD 2 GANG CONDENSER | APCO159 | | | |
| R 2 | W3X | 30000 OHMS 2 WATT | C 2 | 0003/M | 0.05MFD 200V | VR1 | 1MEG POTENTIOMETER TAPPED | APDIO31/B | | | |
| R 3 | H1X | 50000 OHMS 1/4 WATT | C 3 | 0013/G | 0.05MFD 400V | S3 | 10NE MONITOR SWITCH | APD123B | | | |
| R 4 | V3X | 20000 OHMS 1 WATT | C 4 | 1307 | 0.3MMFD NEUTRALIZING | | DIAL LAMP 6.3V 0.3AMP | | | | |
| R 5 | J1X | 100000 OHMS 1/4 WATT | C 5 | 0243/BE | 25MMFD | IFT1 | 1ST IF TRANSFORMER | APD129G | | | |
| R 6 | AN3X | 75000 OHMS 1 WATT | C 6 | 0243/BF | 15MMFD | IFT2 | 2ND IF TRANSFORMER | APD129B | | | |
| R 7 | PIX | 1MEGOHM 1/4 WATT | C 7 | 0243/BH | 437MMFD | IFT3 | 3RD IF TRANSFORMER | APD1310 | | | |
| R 8 | Q1X | 500000 OHMS 1/4 WATT | C 8 | 0243/AT | 5400MMFD | T1 | 10" SPEAKER | APD1263 | | | |
| R 9 | O1X | 500000 OHMS 1/4 WATT | C 9 | 0013/N | 0.01MFD 600V | T2 | OUTPUT TRANSFORMER | APD1261 | | | |
| R 10 | PIX | 1MEGOHM 1/4 WATT | C 10 | 0014/AB | 4MFD 350V ELECTRO COND | | MAINS TRANSFORMER | APD1233 | | | |
| R 11 | J1X | 100000 OHMS 1/4 WATT | C 11 | 0013/A | 0.5MFD 400V | L1&L2 | B/C AERIAL COIL | APC00B5/L | | | |
| R 12 | H1X | 50000 OHMS 1/4 WATT | C 12 | 0243/BL | 100MMFD | L3&L4 | B/C OSCILLATOR COIL | APC00B5/L | | | |
| R 13 | N1X | 250000 OHMS 1/4 WATT | C 13 | 0243/AZ | 50MMFD | L5&L6 | S/W AERIAL COIL | APC00B5/D | | | |
| R 14 | AA1X | 2MEGOHMS 1/4 WATT | C 14 | 0243/AZ | 50MMFD | L7&L8 | S/W OSCILLATOR COIL | APC00B5/D | | | |
| R 15 | AL3X | 3MEGOHMS 1 WATT | C 15 | 0243/C | 5000MMFD | TC1&TC2 | AIR TRIMMER 1.5-18MMFD | APD0786 | | | |
| R 16 | O3X | 500000 OHMS 1 WATT | C 16 | 0013/M | 0.05MFD 200V | | | | | | |
| R 17 | H3X | 50000 OHMS 1 WATT | C 17 | 0013/E | 0.1MFD 400V | | | | | | |
| R 18 | O1X | 500000 OHMS 1/4 WATT | C 18 | 0243/Q | 50MMFD | | | | | | |
| R 19 | H1X | 50000 OHMS 1/4 WATT | C 19 | 0243/BL | 100MMFD | | | | | | |
| R 20 | Z W | 250 OHMS 3 WATT | C 20 | 0243/BL | 100MMFD | | | | | | |
| R 21 | B1X | 500 OHMS 1/4 WATT | C 21 | 0243/AE | 100MMFD | | | | | | |
| R 22 | K1X | 150000 OHMS 1/4 WATT | C 22 | 0013/Q | 0.1MFD 200V | | | | | | |
| R 23 | K1X | 150000 OHMS 1/4 WATT | C 23 | 0243/AE | 100MMFD | | | | | | |
| R 24 | V1X | 20000 OHMS 1/4 WATT | C 24 | 0013/K | 0.02MFD 300V | | | | | | |
| R 25 | AF1X | 3000 OHMS 1/4 WATT | C 25 | 0013/E | 0.1MFD 400V | | | | | | |
| R 26 | V1X | 20000 OHMS 1/4 WATT | C 26 | 0013/E | 0.1MFD 400V | | | | | | |
| R 27 | K1X | 150000 OHMS 1/4 WATT | C 27 | 0013/A | 0.5MFD 400V | | | | | | |
| R 28 | AB3X | 10MEGOHMS 1 WATT | C 28 | 0013/S | 0.02MFD 600V | | | | | | |
| | | | C 29 | 0014/T | 5 MFD 25V ELECTROCOND | | | | | | |
| | | | C 30 | 0013/S | 0.02MFD 600V | | | | | | |
| | | | C 31 | 0013/N | 0.01MFD 600V | | | | | | |
| | | | C 32 | 0243/L | 500MMFD | | | | | | |
| | | | C 33 | 0243/H | 2000MMFD | | | | | | |
| | | | C 34 | 0013/Q | 0.1MFD 200V | | | | | | |
| | | | C 35 | 0041/P | 16 MFD 350V REGULATING TYPE | | | | | | |
| | | | C 36 | 0041/Q | 16 MFD 550V ELECTRO COND | | | | | | |





| REF | PART No | DESCRIPTION | REF | PART No | DESCRIPTION | REF | DESCRIPTION | PART No |
|-----|---------|--------------------|-----|---------|-----------------|-----------|---------------------------|-----------|
| R1 | J3X | 100,000 OHMS 1W | C1 | 0243AW | 50 MMFD | VC1 & VC2 | 417 MMFD 2 GANG COND | C 0159 |
| R2 | W4X | 30,000 OHMS 2W | C2 | 0013M | 0.05 MFD 200V | VR1 | 1MEG POTENTIOMETER TAPPED | D 1031B |
| R3 | W4X | 50,000 OHMS 1/4W | C3 | 0013C | 0.05 MFD 400V | IFT1 | 1ST IF TRANSFORMER | D 1720 |
| R4 | V3X | 20,000 OHMS 1W | C4 | 0013A | 0.05 MFD 400V | IFT2 | 2ND IF TRANSFORMER | D 1263 |
| R5 | AA1X | 2 MEG OHMS 1/4 W | C5 | 0013 | 0.01 MFD 600V | T1 | OUTPUT TRANSFORMER | D 1261 |
| R6 | AN3X | 75,000 OHMS 1W | C6 | 0243BE | 25 MMFD | T2 | MAINS TRANSFORMER | D 1261 |
| R7 | D1X | 1,000 OHMS 1/4W | C7 | 0243BF | 15 MMFD | L1 & L2 | BC AERIAL COIL | D 1614 |
| R8 | AN3X | 75,000 OHMS 1W | C8 | 0243BH | 437 MMFD | L3 & L4 | BC OSCILLATOR COIL | C 00085L2 |
| R9 | PIX | 1 MEG OHMS 1/4 W | C9 | 0243AT | 5400 MMFD | L5 & L6 | 5W AERIAL COIL | C 0219 C |
| R10 | OX | 500,000 OHMS 1/4W | C10 | 0013N | 0.01 MFD 600V | L7 & L8 | 5W OSCILLATOR COIL | C 0219 D |
| R11 | OX | 500,000 OHMS 1/4W | C11 | 0044AB | 4 MFD 350 PV | TC1 & TC2 | AIR TRIMMER (15-18 MMFD) | D 0786 |
| R12 | AB3X | 10 MEG OHMS 1W | C12 | 0243BL | 100 MMFD | TC3 & TC4 | | |
| R13 | H1X | 50,000 OHMS 1/4 W | C13 | 0243BL | 100 MMFD | TC5 | VARIABLE NEUT COND | U 1762 |
| R14 | N1X | 250,000 OHMS 1/4 W | C14 | 00131 | 0.01 MFD 400V | | | U 1676 |
| R15 | AA1X | 2 MEG OHMS 1/4 W | C15 | 0013E | 0.01 MFD 400V | S1 | WAVE CHANGE SWITCH | U 1621 |
| R16 | PIX | 1 MEG OHMS 1/4 W | C16 | 0243Q | 50 MMFD | S2 | RADIOGRAM SWITCH | D 1096 |
| R17 | J1X | 100,000 OHMS 1/4W | C17 | 0243B5 | 200 MMFD | S3 | TO NE MOTOR | D 1308 |
| R18 | AL3X | 3 MEG OHMS 1W | C18 | 0243B5 | 200 MMFD | | | |
| R19 | OX | 500,000 OHMS 1W | C19 | 0243AE | 100 MMFD | | | |
| R20 | H3X | 50,000 OHMS 1W | C20 | 0243AE | 100 MMFD | | | |
| R21 | OX | 500,000 OHMS 1/4W | C21 | 0013P | 0.25 MFD 200V | | | |
| R22 | K1X | 15,000 OHMS 1/4W | C22 | 00131 | 0.02 MFD 400V | | | |
| R23 | ZW5V | 250 OHMS 3W | C23 | 0013L | 0.1 MFD 400V | | | |
| R24 | B3X | 5,000 OHMS 1W | C24 | 0013A | 0.01 MFD 400V | | | |
| R25 | K1X | 15,000 OHMS 1/4W | C25 | 0013E | 0.01 MFD 400V | | | |
| R26 | K1X | 20,000 OHMS 1/4W | C26 | 0013S | 0.02 MFD 600V | | | |
| R27 | V1X | 3,000 OHMS 1/4W | C27 | 0013S | 0.02 MFD 600V | | | |
| R28 | AF1X | 20,000 OHMS 1/4W | C28 | 001AT | 5 MFD 25 PV | | | |
| R29 | V1X | 20,000 OHMS 1/4W | C29 | 0013N | 0.01 MFD 600V | | | |
| R30 | K1X | 15,000 OHMS 1/4W | C30 | 0243L | 500 MMFD | | | |
| R31 | | 2 OHMS D1763A | C31 | 0243H | 2000 MMFD | | | |
| | | | C32 | 0013Q | 0.1 MFD 200V | | | |
| | | | C33 | 0014P | 16 MFD 350PV | | | |
| | | | C34 | 0014Q | 16 MFD 550PV | | | |
| | | | | | REGULATING TYPE | | | |



Radiogram Model 541

VOLTAGE TABLE

(Models 661 and 541)

Values given are $\pm 10\%$ with receiver tuned to point of no reception, broadcast band, with line voltage of 240 volts (mains transformer primary tap set for 240 volts). If a voltmeter having less than 1000 ohms per volt is used, allowance must be made for the voltage drop caused by the voltmeter.

| | 6J8G | | 6K7GT | 6B8G | 6V6G |
|----------------------------------|------|------|-------|------|------|
| | Amp. | Osc. | | | |
| Plate to Chassis Volts | 275 | 158 | 275 | 48 | 262 |
| Plate Current (ma) | 1.9 | 6.0 | 4.2 | 0.4 | 45 |
| Screen to Chassis Volts | 118 | — | 100 | 11 | 275 |
| Screen Current (ma) | 4.3 | — | 1.1 | 0.07 | 3.0 |
| Cathode to Chassis Volts | — | — | 5.0 | — | 13 |

| | |
|---|-----------|
| Rectifier Filament | 5.0 volts |
| Heaters | 6.3 " |
| H.T. Input to Filter | 428 " |
| H.T. Output from Filter | 275 " |
| Total H.T. Current (Measured at Terminal 6 of Speaker Socket) | 68 ma. |
| Pilot Lamps | 5.5 volts |

RADIO FREQUENCY TESTS AND ADJUSTMENTS

(Models 661 and 541)

Instability, insensitivity or poor selectivity indicate that the alignment of the tuned circuits is not correct. If a coil or other component associated with the R.F. or I.F. circuits of the receiver has been replaced or repaired, or if the wiring has been disarranged, all circuits must be realigned.

To do this, the following apparatus is required:

1. An oscillator or signal generator capable of tuning to 457.5 kc., 1500 kc., 600 kc., 13.9 metres (21.57 mc.), 15 metres (20 mc.), and 25 metres (12 mc.), suitably screened and having an attenuator.
2. An output meter having a range of 0.2 volts A.C. approximately.

I.F. alignment should always precede R.F. alignment, and even if only one coil or one range of coils has been serviced, the whole of the realignment should be done in the order given, i.e., broadcast band first, followed by short-wave band.

In carrying out the following operations, it is important that the input to the receiver from the oscillator should be kept low and progressively reduced as the circuits are brought into line, so that the reading on the output meter does not exceed about 1.0 volt.

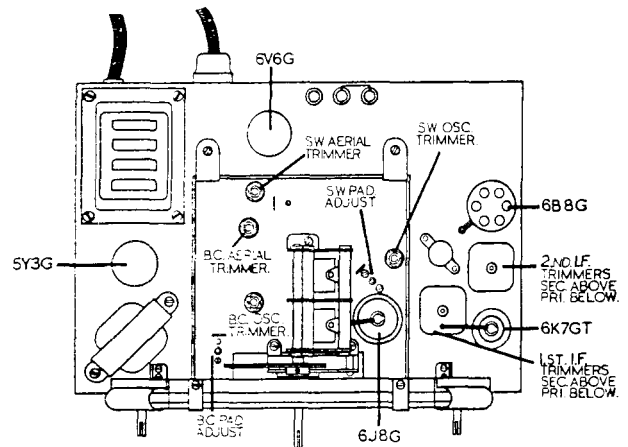
For all alignment operations, the output meter should be connected directly across the voice coil terminals of the speaker.

I.F. ALIGNMENT

The sketch alongside shows the layout of all principal components and adjustments referred to in the following procedure.

Before commencing alignment, it is essential to allow the receiver to warm up for at least 15 minutes.

Rotate volume control fully clockwise and set wave-change switch to broadcast position; rotate tuning control till dial pointer indicates 550 kc., i.e., condenser vanes fully meshed.



Models 661 and 541

1. Connect output leads of signal generator to the grid cap of the 6K7GT I.F. valve through a 0.1 mfd. condenser and to the receiver chassis or earth terminal. (Note: Do not disconnect the clip and lead from the valve grid.)
2. Tune signal generator to exactly 457.5 kc.
3. Adjust the trimmer screws of the second I.F. transformer for maximum deflection of the output meter, keeping the meter reading at about 1 volt or less. This alignment must be done **very** accurately.
4. Transfer the signal generator lead to the 6J8G grid, leaving the existing clip and lead connected to the valve.
5. Align the trimmer screws of the **1st I.F. Transformer only** for maximum output. On no account touch the 2nd I.F. screws during this process.
6. **Screw out** (i.e., anti-clockwise) the secondary trimmer screw of the 2nd I.F. transformer by $\frac{1}{8}$ turn (the top screw is the secondary). This completes the I.F. alignment process; it must be

carried out strictly as outlined above, and, when this has been done, the trimmer screws must on no account be interfered with further.

(Note: If trimmer screws are screwed too far in, it is possible to obtain a false peak due to coupling effects between the moveable iron cores. Any trimmer which appears to require screwing too far in should be screwed out considerably and the true peak will then be found.)

R.F. ALIGNMENT

With controls set as for I.F. alignment, connect the signal generator output leads through a standard dummy aerial of 200 mfd. capacity to the aerial and earth terminals.

Check that when the ganged condenser is fully meshed, the pointer falls directly over the setting line, marked "S" at the extreme bottom right of the scale; the pointer is a friction fit on the condenser spindle, and can be rotated to bring it to the correct setting.

1. Tune signal generator to 600 kc.
2. Rotate tuning knob until dial pointer is exactly over 600 kc. mark on scale, and by means of padding adjustment (brass screw to left of ganged condenser) align receiver so that the 600 kc. signal is tuned in exactly on 600 kc. dial calibration.
3. Tune signal generator to 1500 kc.
4. Set pointer exactly over 1500 kc. mark on dial and adjust B/c oscillator trimmer until the signal is tuned in with the pointer on the 1500 line.
5. Adjust broadcast aerial trimmer for maximum output meter, "rocking" ganged condenser slightly during adjustment if necessary.
6. Repeat operations 1 to 5 inclusive. **This is important.** Note that any stations receivable are tuned in correctly on calibration. (Discrepancies of two or three kilocycles can be tolerated.)

SHORT-WAVE ALIGNMENT

1. Set wave-change switch to S.W. range (fully anti-clockwise). Remove the standard dummy aerial from the output lead of the signal generator and substitute a 400-ohm non-inductive resistor; connect the aerial terminal as previously.

2. Tune signal generator to 25 metres (12 mc.), setting dial pointer accurately to 25 metres on dial.
3. Adjust short-wave padding screw until generator signal is tuned in to maximum output.
4. Tune signal generator to 13.9 metres (21.57 mc.).
5. Set pointer to 13.9 metres on dial and adjust S.W. oscillator trimmer for maximum output. Two settings will be found at which this trimmer will peak; care must be taken that the setting finally selected is that which gives the **lower** capacity, i.e., plunger further out. Failure to select the correct position of the two will cause serious tracking errors and loss of sensitivity.
6. Tune receiver and signal generator to 15 metres (20 mc.).
7. Adjust S.W. aerial trimmer for maximum output, while "rocking" the ganged condenser slightly to obtain the true resonant point.
8. Re-tune receiver and signal generator to 13.9 metres and note that signal is still tuned in correctly on dial; if not, readjust S.W. oscillator trimmer slightly until dial reads correctly and then repeat tests 6 to 8 inclusive.
9. Tune receiver and signal generator to 25 metres (12 mc.), and, if necessary, slightly re-adjust short-wave padding screw for maximum output while "rocking" ganged condenser slightly. This adjustment must be kept small.
10. Check foregoing adjustments carefully to ensure that correct settings have been obtained on all trimmers. Dial should now read correctly throughout.

Note.—The R.F. trimmers on these models are of the plunger type, with air dielectric, and possess exceptionally high stability and efficiency. A special adjusting tool can be obtained from the factory, incorporating a box spanner for the condenser lock-nut, and an adjusting hook for the plunger. After loosening the lock-nut at the top of the condenser, the adjusting hook is inserted in the hole which will be found in the top of the plunger, which can then be easily adjusted by moving up or down as required, with a slight rotary movement. When adjustment is completed, tighten the lock-nut securely.

VOLTAGE TABLE (Model 540)

Values given are $\pm 10\%$ with receiver tuned to point of no reception, broadcast band, with line voltage of 240 volts (mains transformer primary tap set for 240 volts). If a voltmeter having less than 1000 ohms per volt is used, allowance must be made for the voltage drop caused by the voltmeter.

| | 6J8G | 6U7G | 6B8G | 6V6G |
|--|------|------|-----------|------|
| Plate to Chassis Volts | 258 | 258 | 35 | 248 |
| Screen to Chassis Volts—B/C Band | 90 | 84 | 10 | 258 |
| Screen to Chassis Volts—S/W Band | 100 | 92 | — | — |
| Cathode to Chassis Volts | — | — | — | 13.0 |
| Plate Currents M/A | 1.5 | 9.1 | 0.3 | 46 |
| Screen Current M/A | 3.5 | 2.2 | 0.1 | 4.8 |
| Rectifier Filament | .. | .. | 5.2 volts | .. |
| Heater | .. | .. | 6.5 .. | .. |
| Input to filter | .. | .. | 418 .. | .. |
| Output from Filter | .. | .. | 260 .. | .. |
| Total HT Current in Speaker Field (Measured at Socket) | .. | .. | 75 M/A | .. |

(Model 540)

To do this, the following apparatus is required:

- I.F. alignment should always precede R.F. alignment, and even if only one coil or one range of coils has been serviced, the whole of the realignment should be done in the order given, i.e., broadcast band first, followed by short-wave band.

For all alignment operations the output meter should be connected directly across the voice coil terminals of the speaker.

The sketch below shows the layout of all principal components and adjustments referred to in the following procedure.



Rotate volume control fully clockwise, and set wave-change switch to "Broadcast" position; rotate tuning control till dial pointer indicates 600 kc., i.e., condenser vanes nearly fully meshed. Connect output leads of signal generator to the grid cap of the 6J8G through a 0.1 mfd. condenser, and to the receiver chassis or earth terminal. (**Note:** Do not disconnect the clip and lead from the 6J8G grid.)

- (2) Adjust the trimmer screws of the I.F. transformers for maximum deflection of the output meter, commencing with the third I.F. transformer, and following with the second and first in turn. Reduce the input from the signal generator as the work proceeds, to keep the output meter reading at about 1 volt or less.
- (3) Continue this alignment very carefully on each transformer in turn until no greater output can be obtained. It is necessary to completely align all transformers at least twice, preferably three times.

Check that when the ganged condenser is fully meshed, the pointer falls directly over the setting line, marked "S" at the extreme bottom right of the scale; the pointer is a friction fit on the condenser spindle, and can be rotated to bring it to the correct setting.

- (1) Set wave-change switch to S.W. range (fully anti-clockwise). Remove the standard dummy aerial from the output lead of the signal generator and substitute a 400-ohm non-inductive resistor; connect to aerial terminal as previously.
- (2) Tune signal generator to 13.9 metres (21.57 mc.).