"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.

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 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.

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 turn-table), 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.

THE AUTOMATIC BRAKE

How It Works.—Read carefully before attempting adjustments (Fig. 3).

The pick-up arm travels across the record until the point is reached when lever L1 slowly commences to push lever L2 (rubber-covered arm). This slight movement is transmitted to the brake lever L3 by the friction bearing BR. Note the correct position of tone arm lever L1 in the fork of lever L2. So long as the needle progresses over the record at the normal rate (obtained only by the actual playing of a record) the movement of the pick-up arm is not enough to move L3 sufficiently for the pawl CW to engage fully with the tooth D on the frictional collar around the turntable bush. The tooth engages with the face A, thus pushing the pawl away at each revolution.

When, however, the end of the record is reached and the spiral "run-in" groove gives the pick-up arm rapid movement, the increase in speed of movement is sufficient to cause the pawl CW to move far enough towards the turntable spindle for the tooth D to strike the face B, thus actuating the brake and operating switch of the motor.

A faint regular click is normal with this type of brake.

ADJUSTMENT OF BRAKE

If at any time the spring SP1 on the hand brake is renewed or replaced, make sure that the axis of the spring lies as far distant as possible from the centre of the pivot of the HB lever, otherwise the friction brake may fail to operate in conjunction with the automatic stop. If auto brake does not function, increase the friction at BR by removing the Isle-o'-Man washer and bending the arms in order to increase the effective thickness. Too much friction at BR may cause a hollow knocking sound to be transmitted to the pick-up, and may also cause undue record wear. If a knocking sound is heard from speaker, slightly decrease the friction at BR, but do not apply oil.

ADDITIONAL DATA

Any further Service Information desired can be obtained by addressing an inquiry to The Service Department, The Gramophone Co. Ltd., 2 Parramatta Road, Homebush, N.S.W.

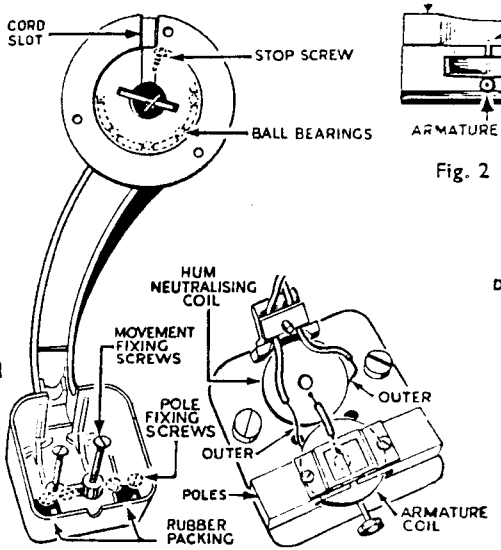


Fig. 1

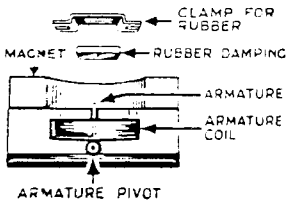
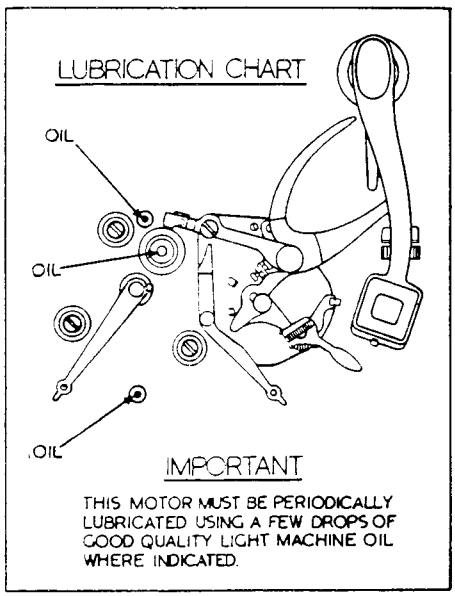


Fig. 2

Fig. 3



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 ..	35⅜"	30¼"	13¾"
,, 541 ..	31¼"	35"	17¾"

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-dio-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

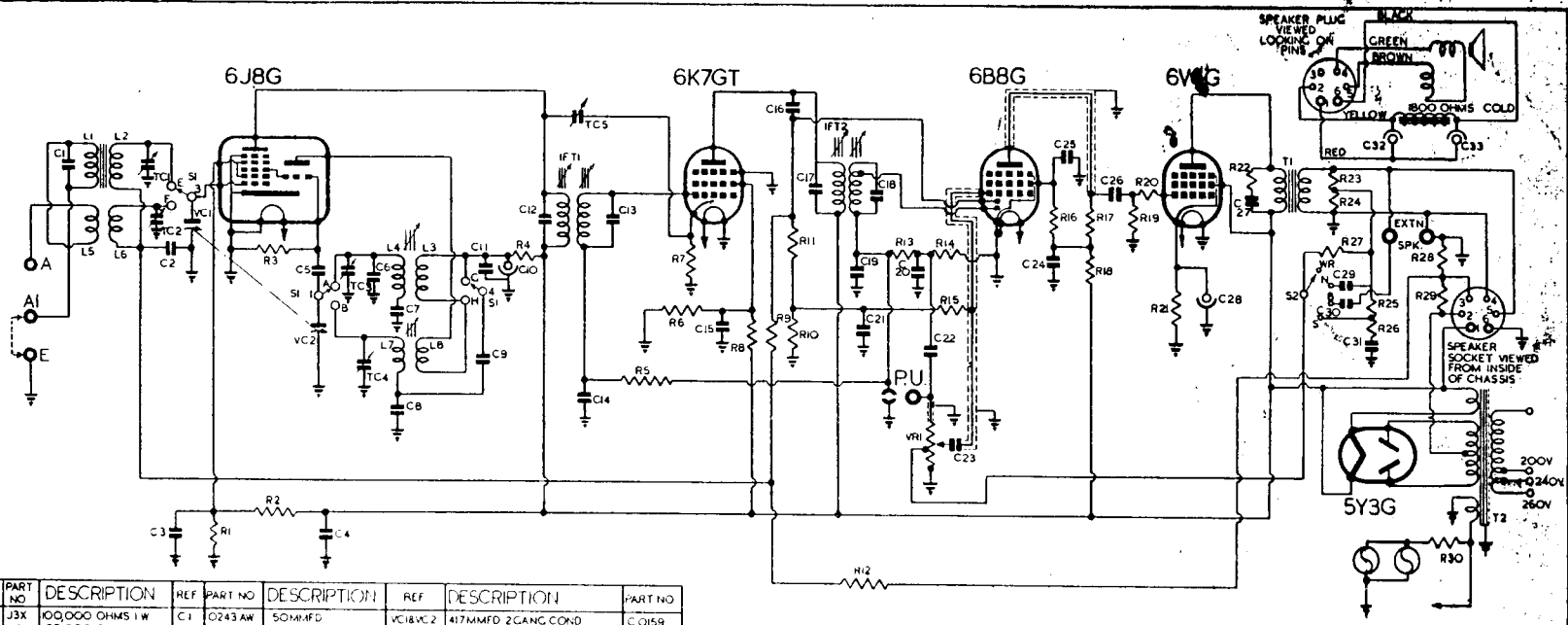
(**Model 661**)

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 underside of shelf; the chassis is now free.

REMOVAL OF LOUDSPEAKER

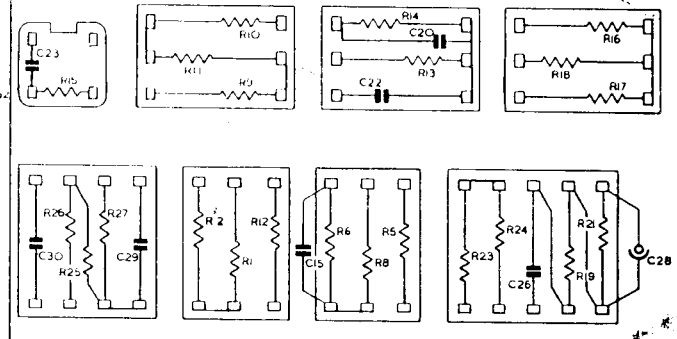
1. Remove 6-pin plug from back of chassis.
2. Remove screws holding speaker chassis to baffle and withdraw speaker.

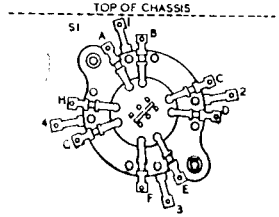


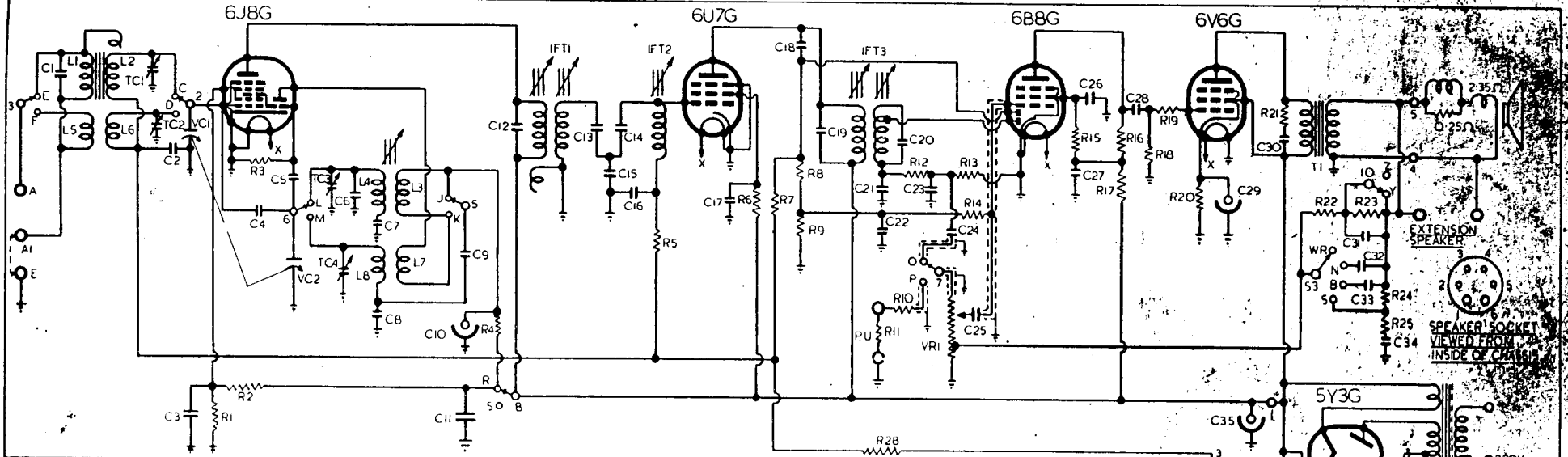
REF	PART NO	DESCRIPTION
R1	J3X	100,000 OHMS 1 W
R2	W4X	30 000 OHMS 2 W
R3	H1X	50 000 OHMS 1/4 W
R4	V3X	20,000 OHMS 1 W
R5	AA1X	2 MEGOHMS 1/4 W
R6	AN3X	75,000 OHMS 1 W
R7	D1X	1000 OHMS 1/4 W
R8	AN3X	75,000 OHMS 1 W
R9	P1X	1 MEGOHM 1/4 W
R10	O1X	500,000 OHMS 1/4 W
R11	O1X	500,000 OHMS 1/4 W
R12	AB3X	10 MEGOHMS 1 W
R13	H1X	50,000 OHMS 1/4 W
R14	N1X	250,000 OHMS 1/4 W
R15	AA1X	2 MEGOHMS 1/4 W
R16	AL3X	3 MEGOHMS 1 W
R17	O3X	500,000 OHMS 1 W
R18	H3X	50,000 OHMS 1 W
R19	O8X	500,000 OHMS 1/4 W
R20	H1X	50,000 OHMS 1/4 W
R21	ZW5V	25 0 OHMS 3 W
R22	T3X	100 OHMS 1 W
R23	T1X	100 OHMS 1/4 W
R24	T1X	100 OHMS 1/4 W
R25	V1X	20,000 OHMS 1/4 W
R26	AF1X	3 000 OHMS 1/4 W
R27	AN1X	75,000 OHMS 1/4 W
R28	V1X	200 000 OHMS 1/4 W
R29	K1X	150,000 OHMS 1/4 W
R30		2 OHM D 1763A

REF	PART NO	DESCRIPTION
C1	0243 AW	50 MMFD
C2	0013 M	0 05 MFD 200V
C3	0013 C	0 05 MFD 400V
C4	0013 A	0 5 MFD 400V
C5	0243 BE	25 MMFD
C6	0243 BF	15 MMFD
C7	0243 BH	437 MMFD
C8	0243 AT	5400 MMFD
C9	0013 N	0 01 MFD 600V
C10	0014 AB	47 MFD 350 PV
C11	0013 H	0 01 MFD 600V
C12	0243 BL	160 MMFD
C13	0243 BL	100 MMFD
C14	0013 I	0 02 MFD 400V
C15	0013 E	0 1 MFD 400V
C16	0243 Q	50 MMFD
C17	0243 BS	200 MMFD
C18	0243 BS	200 MMFD
C19	0243 AE	100 MMFD
C 20	0243 AE	100 MMFD
C21	0013 P	0 25 MFD 200V
C22	0013 I	0 02 MFD 400V
C23	0013 E	0 1 MFD 400V
C24	0013 A	0 5 MFD 400V
C25	0013 E	0 1 MFD 400V
C26	0013 S	0 02 MFD 600V
C27	0013 S	0 02 MFD 600V
C28	0014 T	5 MFD 25 PV
C29	0013 O	0 002 MFD 600V
C30	0013 O	0 002 MFD 600V
C31	0013 Q	0 1 MFD 200V
C32	0014 Q	16 MFD 550 PV
C33	0014 P	16 MFD 350 PV
		REGULATING TYPE

REF	DESCRIPTION	PART NO
VC1&VC2	417 MMFD 2 GANG COND	C 0159
VR1	1 MEG POTENTIOMETER TAPPED	D 1038
S1	WAVE CHANGE SWITCH	D 1621
S2	TONE MONITOR SWITCH	D 1308
	DIAL LAMP 6 3 0 3 AMP	
IFT1	1 ST IF TRANSFORMER	D 1720
IFT2	2 ND IF TRANSFORMER	D 1721
	SPEAKER	D 1670
T1	OUTPUT TRANSFORMER	D 1263
T2	MAINS TRANSFORMER	D 1261
L1 & L2	B C AERIAL COIL	D 1614 grp 2
L3 & L4	B C OSCILLATOR COIL	C 0085 L2
L5 & L6	S W AERIAL COIL	C 0219 C
L7 & L8	S W OSCILLATOR COIL	C 0219 D
TC1&TC2	AIR TRIMMER 1 5-18 MMFD	D 0786
TC3&TC4		
TC5	VARIABLE NEUT COND	D 1762



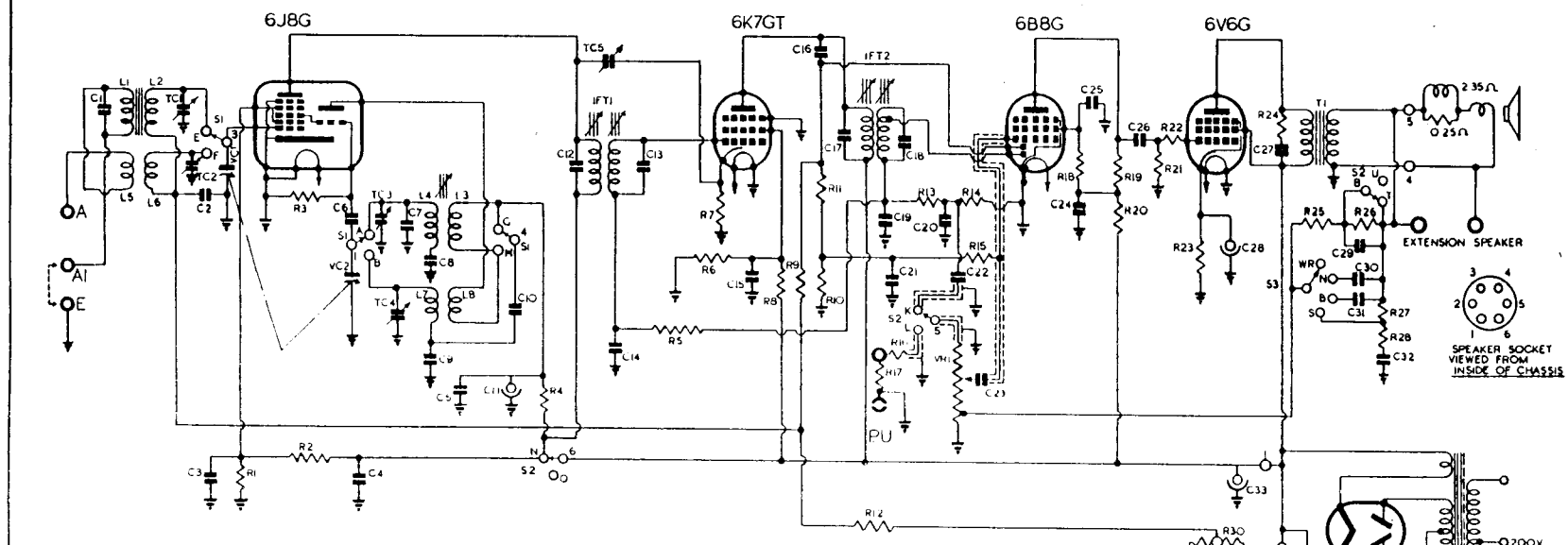




REF	PART Nº	DESCRIPTION
R 1	H3X	50000 OHMS 1 WATT
R 2	W3X	30000 OHMS 2 WATT
R 3	H1X	50000 OHMS 1/4 WATT
R 4	V3X	20000 OHMS 1 WATT
R 5	J1X	100000 OHMS 1/4 WATT
R 6	AN3X	75000 OHMS 1 WATT
R 7	P1X	1MEGOHM 1/4 WATT
R 8	O1X	500000 OHMS 1/4 WATT
R 9	O1X	500000 OHMS 1/4 WATT
R10	P1X	1MEGOHM 1/4 WATT
R11	J1X	100000 OHMS 1/4 WATT
R12	H1X	50000 OHMS 1/4 WATT
R13	N1X	250000 OHMS 1/4 WATT
R14	AA1X	2MEGOHMS 1/4 WATT
R15	AL3X	3MEGOHMS 1 WATT
R16	O3X	500000 OHMS 1 WATT
R17	H3X	50000 OHMS 1 WATT
R18	O1X	500000 OHMS 1/4 WATT
R19	H1X	50000 OHMS 1/4 WATT
R20	Z1W	250 OHMS 3 WATT
R21	B1X	500 OHMS 1/4 WATT
R22	K1X	150000 OHMS 1/4 WATT
R23	K1X	150000 OHMS 1/4 WATT
R24	V1X	20000 OHMS 1/4 WATT
R25	AF1X	3000 OHMS 1/4 WATT
R26	V1X	20000 OHMS 1/4 WATT
R27	K1X	150000 OHMS 1/4 WATT
R28	AB3X	10 MEGOHMS 1 WATT

REF	PART Nº	DESCRIPTION
C 1	0243/AE	100 MMFD
C 2	0013/M	0·05MFD 200V
C 3	0013/G	0·05MFD 400V
C 4	1307	0·3MMFD NEUTRALIZING
C 5	0243/BE	25 MMFD
C 6	0243/BF	15 MMFD
C 7	0243/BH	437 MMFD
C 8	0243/AT	5400MMFD
C 9	0013/N	0·01MFD 600V
C10	0014/AB	4MFD 350PV ELECTRO CON
C11	0013/A	0·5MFD 400V
C12	0243/BL	100MMFD
C13	0243/AZ	50MMFD
C14	0243/AZ	50MMFD
C15	0243/C	5000MMFD
C16	0013/M	0·05MFD 200V
C17	0013/E	0·1MFD 400V
C18	0243/Q	50MMFD
C19	0243/BL	100MMFD
C20	0243/BL	100MMFD
C21	0243/AE	100MMFD
C22	0013/Q	0·1MFD 200V
C23	0243/AE	100MMFD
C24	0013/K	0·02MFD 300V
C25	0013/E	0·1MFD 400V
C26	0013/E	0·1MFD 400V
C27	0013/A	0·5MFD 400V
C28	0013/S	0·02MFD 600V
C29	0014/T	5 MFD 25V ELECTROCOND
C30	0013/S	0·02MFD 600V
C31	0013/N	0·01 MFD 600V
C32	0243/L	500MMFD
C33	0243/H	2000MMFD
C34	0013/Q	0·1MFD 200V
C35	0014/P	16MFD 350V REGULATING TYPE
C36	0014/Q	16MFD 550V ELECTRO COND

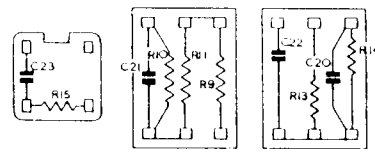
REF	DESCRIPTION	PART Nº
VC1&VC2	417MMFD 2 GANG CONDENSER	APC0159
VR1	1MEG POTENTIOMETER TAPPED	APD1031/B
S3	TONE MONITOR SWITCH	APD1238
IFT1	DIAL LAMP 6·3V 0·3AMP	
IFT2	1ST IF TRANSFORMER	APD1296
IFT3	2ND IF TRANSFORMER	APD1297
	3RD IF TRANSFORMER	APD1298
	10" SPEAKER	APD1310
T1	OUTPUT TRANSFORMER	APD1263
T2	MAINS TRANSFORMER	APD1261
L1 & L2	B/C AERIAL COIL	APD1233
L3 & L4	B/C OSCILLATOR COIL	APC0085/L
L5 & L6	S/W AERIAL COIL	APC0085/J
L7 & L8	S/W OSCILLATOR COIL	APC0085/D
TC1&TC2 TC3&TC4	AIR TRIMMER 1·5--18MMFD	APD0786

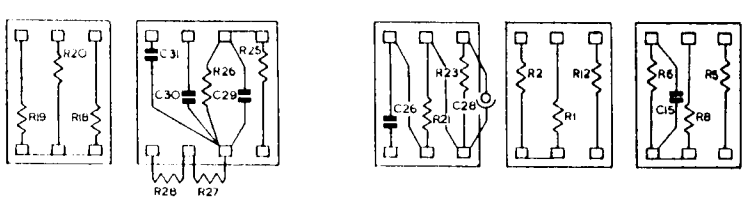


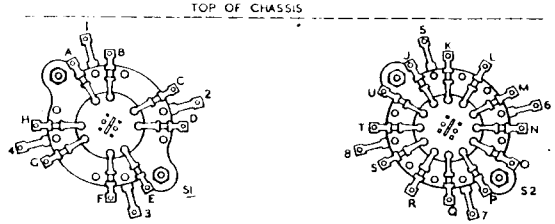
REF	PART No	DESCRIPTION
R1	J3X	100,000 OHMS 1W
R2	W4X	30,000 OHMS 2W
R3	H1X	50,000 OHMS 1/4W
R4	V3X	20,000 OHMS 1W
R5	A4IX	2 MEGOHMS 1/4 W
R6	AN3X	75,000 OHMS 1W
R7	D1X	1,000 OHMS 1/4W
R8	AN3X	75,000 OHMS 1W
R9	P1X	1 MEGOHM 1/4W
R10	O1X	500,000 OHMS 1/4W
R11	O1X	500,000 OHMS 1/4W
R12	AB3X	10 MEGOHMS 1W
R13	H1X	50,000 OHMS 1/4W
R14	N1X	250,000 OHMS 1/4W
R15	A4IX	2MEGOHMS 1/4W
R16	P1X	1MEGOHM 1/4W
R17	J1X	100,000 OHMS 1/4W
R18	AL3X	3 MEGOHMS 1W
R19	O3X	500,000 OHMS 1W
R20	H3X	50,000 OHMS 1W
R21	O1X	500,000 OHMS 1/4W
R22	H1X	500,000 OHMS 1/4W
R23	ZW5V	250 OHMS 3W
R24	B3X	500 OHMS 1W
R25	K1X	150,000 OHMS 1/4W
R26	K1X	150,000 OHMS 1/4W
R27	V1X	20,000 OHMS 1/4W
R28	AF1X	3,000 OHMS 1/4W
R29	V1X	20,000 OHMS 1/4W
R30	K1X	150,000 OHMS 1/4W.
R31		2 OHMS D1763A

REF	PART No	DESCRIPTION
C1	0243AW	50 MMFD
C2	0013M	0.05MFD 200V.
C3	0013G	0.05MFD 400V
C4	0013A	0.5MFD 400V
C5	0013	0.01 MFD 600V
C6	0243BE	25 MMFD.
C7	0243BF	15 MMFD
C8	0243BH	437 MMFD
C9	0243AT	5400 MMFD
C10	0013N	0.01MFD 600V.
C11	0014B	4 MFD 350 PV
C12	0243BL	100 MMFD
C13	0243BL	100 MMFD
C14	0013 I	0.02 MFD 400V
C15	0013E	0.1 MFD 400V
C16	0243Q	50MMFD
C17	0243BS	200 MMFD
C18	0243BS	200 MMFD
C19	0243AE	100 MMFD
C20	0243AE	100 MMFD.
C21	0013P	0.25MFD 200V
C22	0013 I	0.02 MFD 400V
C23	0013E	0.1MFD 400V
C24	0013A	0.5MFD 400V
C25	0013E	0.1 MFD 400V
C26	0013S	0.02 MFD 600V
C27	0013S	0.02 MFD 600V
C28	0014T	5 MFD 25 PV
C29	0013N	0.01 MFD 600V
C30	0243L	500 MMFD
C31	0243H	2000 MMFD
C32	0013Q	0.1MFD 200V
C33	0014P	16 MFD 350PV
C34	0014Q	16 MFD 550PV REGULATING TYPE

REF	DESCRIPTION	PART No
VC1 & VC2	417 MMFD 2 GANG COND	C.0159
VR1	1MEG POTENTIOMETER TAPPED	D.1038
IFT1	1ST IF TRANSFORMER	D.1720
IFT2	2ND IF TRANSFORMER	D.1721
T1	OUTPUT TRANSFORMER	D.1263
T2	MAINS TRANSFORMER	D.1261
L1 & L2	BC AERIAL COIL	D.1614 grp2
L3 & L4	BC OSCILLATOR COIL	C.0085 L2
L5 & L6	SW AERIAL COIL	C.0219 C
L7 & L8	SW OSCILLATOR COIL	C.0219 D
TC1 & TC2	AIR TRIMMER 15 – 18 MMFD	D.0786
TC3 & TC4		
TC5	VARIABLE NEUT COND	D.1762
	SPEAKER	D.1676
S1	WAVE CHANGE SWITCH	D.1621
S2	RADIOGRAM SWITCH	D.1096
S3	TONE MONITOR SWITCH	D.1308
	DIAL LAMP 6.3V 0.3 AMP	







Radiogram Model 541

VOLTAGE TABLE

(Models 661 and 541)

Values given are ± 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.

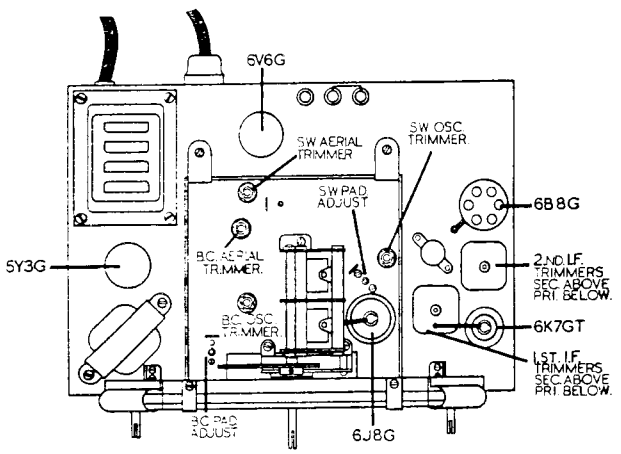
For all alignment operations, the output meter should be connected directly across the voice coil terminals of the speaker.

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 and 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 ± 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

RADIO FREQUENCY TESTS AND ADJUSTMENTS

(Model 540)

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.R. 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 460 kc., 1600 kc., 1500 kc., 600 kc., 13.9 metres (21.57 mc.) and 15 metres (20 mc.), suitably screened and having an attenuator.

(2) An output meter having a range of 0-2 volts A.C. approximately.

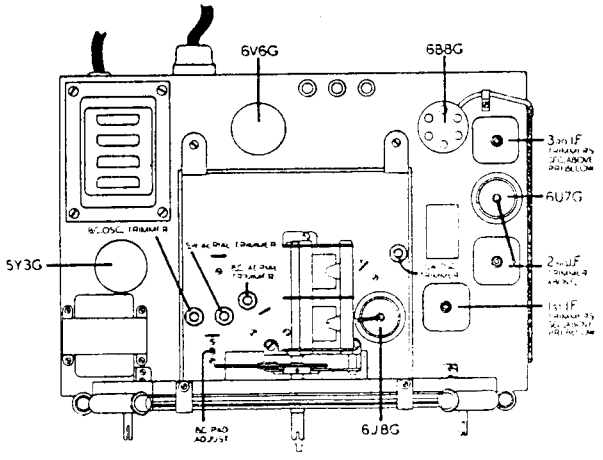
I.F. alignment should always precede R.F. alignment, and even if only one coil or one range of coils has been serviced, the whole of the realignment should be done in the order given, i.e., broadcast band first, followed by short-wave band.

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



Model 540

Before commencing alignment, it is advisable to set the Tone Monitor switch to the "Normal" position.

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.)

(1) Tune signal generator to exactly 460 kc.

(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.

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 mmF. 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 (trimming 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 1600 kc.

(4) Set pointer exactly over 1600 kc. mark on dial and adjust B/C oscillator trimmer until the signal is tuned in with the pointer on the 1600 kc. line.

(5) Tune signal generator and receiver to 1500 kc.

(6) Adjust B/C aerial trimmer for maximum output on output meter, "rocking" ganged condenser slightly during adjustment if necessary.

(7) Repeat operations 1 to 6 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 to aerial terminal as previously.

(2) Tune signal generator to 13.9 metres (21.57 mc.).