"His Master's Voice"

SERVICE MANUAL

for

EIGHT-VALVE
DUAL-WAVE A.C. RECEIVER

Model 470

AND

DUAL-WAVE A.C. RADIOGRAMS

Models 509 and 519

TECHNICAL SPECIFICATION

VOLTAGE RANGE

200 to 250 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 470	105 watts	—
Model 509	105 ,,	165 watts
,, 519	105 ,,	180 ,,

WAVE-LENGTH RANGE

13.9 metres (21.58 megacycles) to 47 metres (6.38 megacycles).

187.4 metres (1,600 kc.) to 545 metres (550 kc.).

MAX. UNDISTORTED POWER OUTPUT

7 watts.

DIMENSIONS

	Height	Width	Depth
Model 470 ..	38¼"	27½"	13¾"
,, 509 ..	34"	34"	19¾"
,, 519 ..	34"	40¼"	20½"

WEIGHT

	Nett			Gross		
	cwt.	qr.	lb.	cwt.	qr.	lb.
Model 470 ..	—	2	18	—	3	10
,, 509 ..	1	0	6	2	0	0
,, 519 ..	1	2	13	2	2	20

LOUDSPEAKER

Models 470 and 509 use a 12" speaker, and Model 519 uses a 12" speaker of high fidelity type and very massive construction, the field winding in each case acting as filter choke.

D.C. resistance of field coil, cold	1,200 ohms
D.C. resistance of voice coil:	
Models 470 and 509 ..	2 ,,
Model 519	6.3 ,,
400 cycle impedance of voice coil:	
Models 470 and 509 ..	2.35 ,,
Model 519	8 ,,

VALVES

6U7G (2), 6J8G, 6G8G, 6B8G, 6L6G, 6H6, 5V4G, 6G5 (Tuning Indicator).

CIRCUIT DESCRIPTION

These models are superheterodynes incorporating a conventional frequency-changing circuit using a 6J8G triode-hexode converter valve. The oscillator circuit is designed to provide relatively constant oscillation amplitude over the very wide tuning range incorporated in the short-wave band. An R.F. stage using a 6U7G precedes the frequency changer on both bands. The I.F. amplifier has two stages, the first employing a 6U7G and the second a 6G8G, one diode of which provides AVC, which is applied to the R.F. converter, and 1st I.F. stages on both wave bands. A 6H6 duo-diode follows the I.F. amplifier, one diode providing signal rectification, while the other diode is used in the "Static Limiter." The demodulated signal passes through the Volume Control to a 6B8G diode-pentode used as an A.F. amplifier, which is resistance capacity coupled to a 6L6G beam-type output valve.

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 oxide fixed condensers, tuning being accomplished by axial adjustment of the iron cores.

I.F. coupling is through the medium of three I.F. transformers having a total of six tuned circuits, the first and the second transformers having tertiary windings which are coupled to the Tone Monitor switch to provide variable selectivity; broad tuning is provided in the "Wide Range" and "Overseas" positions of the Tone Monitor, and sharp tuning in the remaining three positions.

Inductance padding of the oscillator circuit is used on the broadcast band; on the short-wave band no padding adjustment is required. Special close tolerance fixed padding condensers are used.

Inverse feed-back is applied to the complete A.F. 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 providing control of tonal balance. Furthermore, the degree of feed-back varies with the setting of the Volume Control in such a way as to provide the best 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 type 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 protected against damage if the speaker plug is withdrawn while the receiver is in operation. Jacks are provided at the back of the chassis for the connection of an extension speaker. They are in the secondary circuit of the output transformer, and are suitable for connection to any loudspeaker having a voice-coil impedance between 2.5 and 4 ohms (Models 470 and 509 only). 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 H.M.V. Extension Speaker is very suitable, and has its own constant-impedance Volume Control.

Model 519 requires an extension speaker having a voice coil impedance of 8 ohms or more. Such speakers are not regularly carried in stock; if it is desired to fit extension speakers to Model 519, the H.M.V. Service Dept. should be consulted.

CIRCUITS

The circuit diagram of Models 470, 509 and 519, together with all component values, is shown on pages 4 and 5.

WAVE-BAND SWITCHING

This is carried out by means of a 3-deck switch. The oscillator primary coils are connected in series and not switched. Additional capacitive feed-back is applied across the padding condenser on the short-wave band, and this is switched by contacts on the wave-change switch.

In Models 509 and 519, the first position of the switch (extreme anti-clockwise) connects the short-wave coils and associated components, and the second position the broadcast circuits. In Model 470 the switch has a third position (extreme clockwise), in which the pick-up sockets are connected in circuit, and the radio circuits disconnected.

On Model 470 the Volume Control is mounted on the chassis, this being the right-hand control knob. On Models 509 and 519 the Volume Control is removed from the chassis and mounted for convenience on the front of the cabinet, its place on the chassis being taken by a "Radio-Gram" switch.

TONE MONITOR

This is a five-position two-deck switch. The following effects are secured in the various switch positions:

1st Position (Wide Range): Bass and treble boost, and broad tuning, for highest fidelity.

2nd Position (Normal): Bass and treble boost, and sharp tuning. For normal and distant reception.

3rd Position (Bass): Bass boost and treble cut, with sharp tuning. For deeper tone and reduction of static.

4th Position (Speech): Flat bass response and treble boost, with sharp tuning. For long-distance reception of speech, or reduced bass response.

5th Position (Overseas): Flat bass response, and treble cut, together with broad tuning. For easy short-wave tuning with reduced background noise and freedom from microphony.

The maximum bass and treble boost, obtained at low Volume Control settings, is approximately 6db, but, as previously explained, this is dependent on the Volume Control position being progressively reduced towards full volume position.

In Models 509 and 519 a bass boost circuit is switched into operation in the "Gram." position and is short-circuited in the "Radio" position.

STATIC LIMITER

This device is controlled by a switch located on the back of the chassis in the case of Model 470 and on the control panel in Models 509 and 519. It is intended to limit the peak level of static or electrical disturbances of peaky waveform to a value not greatly exceeding the level of the carrier of the station being received, thus preventing the drowning of the signal by very loud bursts of static. It is useful chiefly in long-distance reception of speech, and in short-wave reception where electrical interference is severe. It usually has a slightly detrimental effect on the tone of musical reception, and should therefore be switched off when not required. It has no effect on the sensitivity or selectivity of the receiver.

PRELIMINARY TESTS

(1) Switch on receiver and note that dial lights up and changes colour when wave-band switch is operated.

(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; this hum should also be heard with wave-change switch at "Gram" when the red 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 the 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 loudspeaker, 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, the primary of the output transformer, or in the field of the speaker. If the meter deflects but no sound is heard, the speaker voice coil circuit is at fault.

(5) If the fault is still undiscovered, remove chassis and speaker from cabinet and compare voltages with the table given below.

DISMANTLING

REMOVAL OF CHASSIS

(1) Remove knobs.

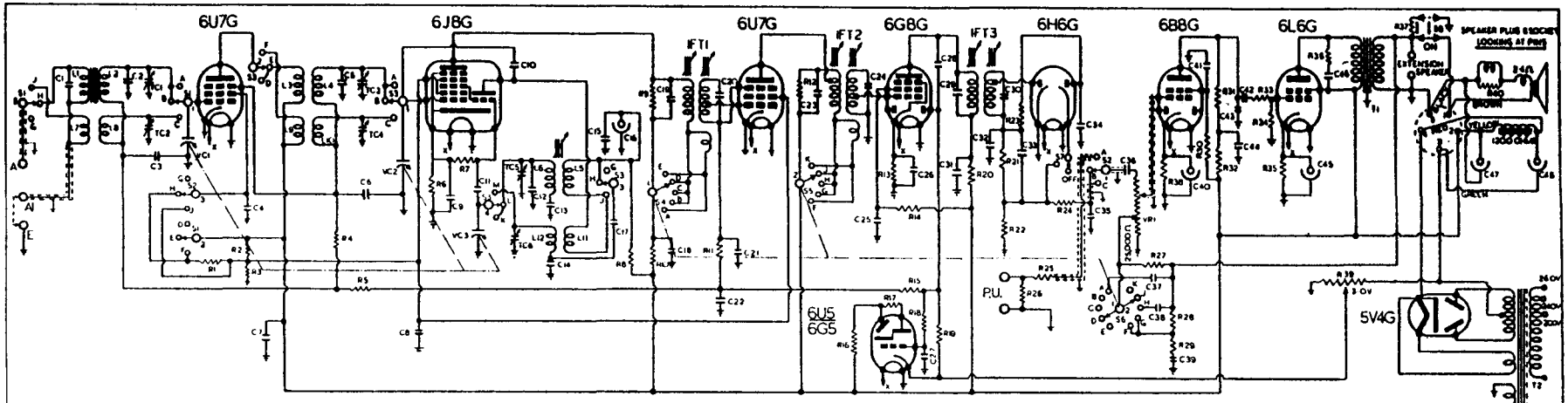
(2) Disconnect speaker plug and power plug.

(3) Remove nuts from two fixing bolts from underside of shelf; the chassis is now free.

REMOVAL OF LOUDSPEAKER

(1) Remove 5-pin plug from back of chassis.

(2) Remove four screws holding speaker chassis to baffle and withdraw speaker.

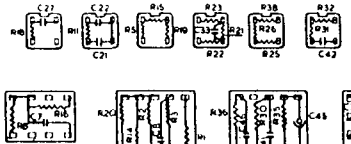


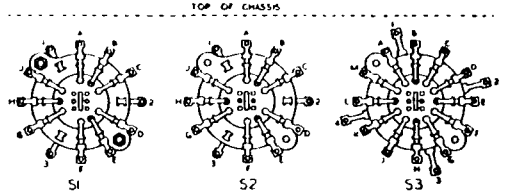
REF	PART NO.	DESCRIPTION
R 1	S3V	40000 OHMS 1 WATT
R 2	J3X	100000 OHMS 1 WATT
R 3	J3X	100000 OHMS 1 WATT
R 4	H1X	50000 OHMS 1/4 WATT
R 5	H1R	50000 OHMS 1/4 WATT
R 6	A1X	300 OHMS 1/4 WATT
R 7	H1R	50000 OHMS 1/4 WATT
R 8	V3X	20000 OHMS 1 WATT
R 9	L1X	200000 OHMS 1/4 WATT
R10	A1H	2000 OHMS 1/4 WATT
R11	H1R	500000 OHMS 1/4 WATT
R12	L1R	200000 OHMS 1/4 WATT
R13	G1X	400 OHMS 1/4 WATT
R14	J3X	100000 OHMS 1 WATT
R15	P1X	1 MEGOHM 1/4 WATT
R16	AN3X	75000 OHMS 1 WATT
R17	AC2X	75000 OHMS 1/2 WATT
R18	A A1X	2 MEGOHMS 1/4 WATT
R19	P1X	1 MEGOHM 1/4 WATT
R20	A1X	2000 OHMS 1/4 WATT
R21	H1X	50000 OHMS 1/4 WATT
R22	K1X	150000 OHMS 1/4 WATT
R23	P1X	1 MEGOHM 1/4 WATT
R24	H1X	50000 OHMS 1/4 WATT
R25	Q1X	1·5 MEGOHM 1/4 WATT
R26	J1X	100000 OHMS 1/4 WATT
R27	K1X	150000 OHMS 1/4 WATT
R28	V1X	20000 OHMS 1/4 WATT
R29	A1X	3000 OHMS 1/4 WATT
R30	AL3X	3 MEGOHMS 1 WATT
R31	O3X	500000 OHMS 1 WATT
R32	H3X	50000 OHMS 1 WATT
R33	H1X	50000 OHMS 1/4 WATT
R34	Q1X	500000 OHMS 1/4 WATT
R35	A4W	170 OHMS 3 WATT
R36	D3X	1000 OHMS 1 WATT
R37	H1H	33 OHMS INDUCTIVE RESIS
R38	X1X	5000 OHMS 1/4 WATT
R39	H4A	50 OHMS VOLT DIVIDER
R40		0·6 OHMS RESISTANCE

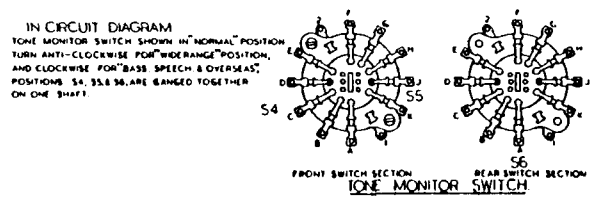
REF	PART NO.	DESCRIPTION
C 1	0243/AE	100 MMFD
C 2	0910	7 MMFD
C 3	0013/M	0·05MFD 200V
C 4	0013/E	0·1MFD 400V
C 5	0243/BB	15 MMFD
C 6	0013/M	0·05MFD 200V
C 7	0013/A	0·5MFD 400V
C 8	0013/E	0·1MFD 400V
C 9	0013/Q	0·1MFD 200V
C10	0974	1·3MMFD NEUTRALIZING CON
C11	0243/Q	50 MMFD
C12	0243/BF	15 MMFD
C13	0243/BC	460 MMFD
C14	0243/AJ	940 MMFD
C15	DUAL/N	0·01 MFD/.01 PV
C16	0014/J	16 MFD 450V WKG
C17	0013/N	0·01MFD 800V
C18	0013/G	0·05MFD 400V
C19	0243/BL	100 MMFD
C20	0243/BL	100 MMFD
C21	0013/N	0·01MFD 800V
C22	0013/E	0·1MFD 400V
C23	0243/BL	100 MMFD
C24	0243/BL	100 MMFD
C25	0013/E	0·1MFD 400V
C26	0013/M	0·05MFD 200V
C27	0013/R	0·04MFD 400V
C28	0243/Q	50 MMFD
C29	0243/BL	100 MMFD
C30	0243/BL	100 MMFD
C31	0013/G	0·05MFD 400V
C32	0243/Q	50 MMFD
C33	0243/L	500 MMFD
C34	0013/L	0·5MFD 200V
C35	0243/O	250 MMFD
C36	0013/I	0·02MFD 400V
C37	0013/I	0·02MFD 400V
C38	0243/AO	0·005MFD
C39	0013/Q	0·1MFD 200V
C40	0014/S	10 MFD 25V ELECTRO COND
C41	0013/I	0·02MFD 400V
C42	0013/S	0·02MFD 600V
C43	0243/AE	100 MMFD
C44	0013/A	0·5MFD 400V
C45	0014/R	50 MFD 25V ELECTRO COND
C46	0013/I	0·02MFD 400V
C47	0014/P	16 MFD 350 V REGULATING ELECTROLYTIC COND.
C48	0014/Q	16 MFD 500V ELECTRO COND

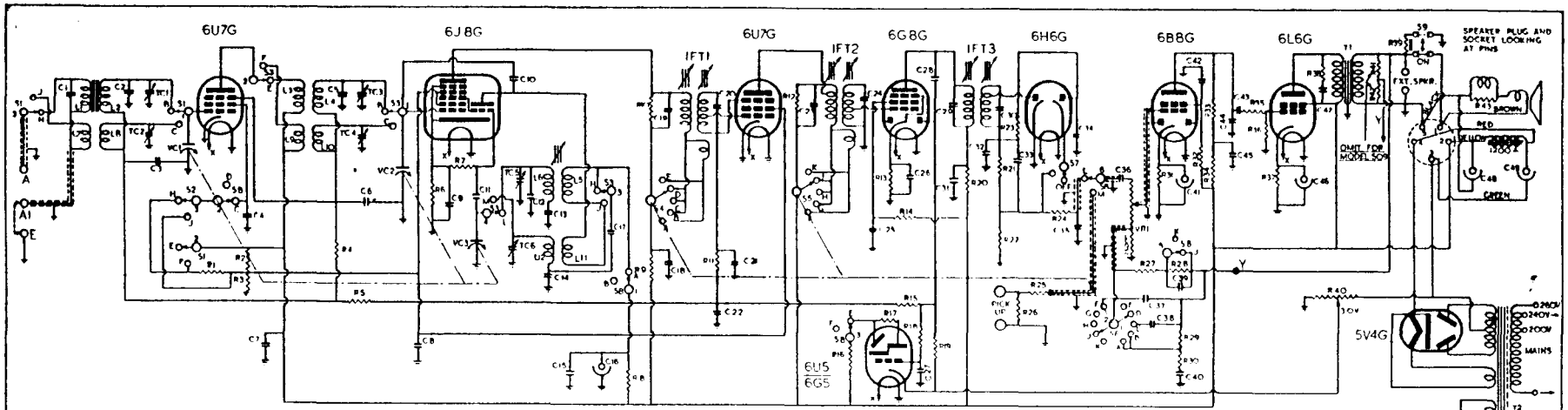
REF	PART NO.	DESCRIPTION
VC1,VC2, & VC3		12—417 MMFD 3 GANG CONDENSER
VR1		1 MEGOHM POTENTIOMETER
S1,S2,&S3		WAVE CHANGE SWITCH
S4,S5,&S6		TONE MONITOR SWITCH
S7		STATIC LIMITER SWITCH
S8		RECEIVER SPEAKER SWITCH
L1 & L2		B/C AERIAL COIL
L7 & L8		S/W AERIAL COIL
L3 & L4		B/C DETECTOR COIL
L9 & L10		S/W DETECTOR COIL
L5 & L6		B/C OSCILLATOR COIL
L11 & L12		S/W OSCILLATOR COIL
T1		OUTPUT TRANSFORMER
T2		MAINS TRANSFORMER
IFT1		1ST I.F. TRANSFORMER
IFT2		2ND I.F. TRANSFORMER
IFT3		3RD I.F. TRANSFORMER
		12" SPEAKER & ELECTROLYTICS
		DIAL LAMPS 6V 25AMP
TC1, TC2		AIR TRIMMER 5·5—18 MMFD
TC3, TC4, TC5, TC6		

PART NO.
AP CO 44B
AP DI 03 1/8
AP CO 10B
AP DI 38
AP DI 09
AP DI 10 8
AP DI 61 4/2
AP CO 21 S/6
AP CO 21 B/M
AP CO 21 B/F
AP CO 08 S/L 2
AP CO 08 S/O
AP DI 03 6
AP CO 19 0 5
AP DI 03 8
AP DI 11 0
AP DI 11 4 1
AP DI 07 1/1
AP DO 78 6





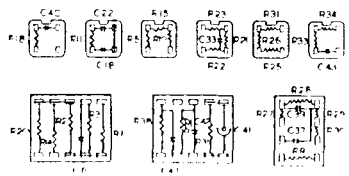


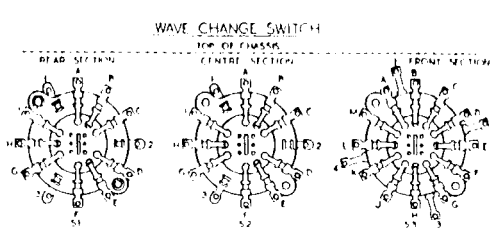


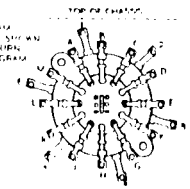
REF.	PART No.	DESCRIPTION
R1	53V	40000 OHMS 1 WATT
R2	J3X	100000 OHMS 1 WATT
R3	J3X	100000 OHMS 1 WATT
R4	H9X	50000 OHMS ½W WATT
R5	H9X	50000 OHMS ½W WATT
R6	AIX	300 OHMS ½W WATT
R7	H9X	50000 OHMS ½W WATT
R8	V3X	20000 OHMS 1 WATT
R9	AJ3X	2000 OHMS ½W WATT
R10	L3X	200000 OHMS ½W WATT
R11	H9X	50000 OHMS ½ WATT
R12	L3X	200000 OHMS ½W WATT
R13	U3X	400 OHMS ½ WATT
R14	J3X	100000 OHMS 1 WATT
R15	P9X	1 MEGOHM ½W WATT
R16	AM3X	75000 OHMS 1 WATT
R17	AC2X	750000 OHMS ½WATT
R18	AA8	2 MEGOHMS ½W WATT
R19	P9X	1 MEGOHM ½W WATT
R20	AJ9X	2000 OHMS ½W WATT
R21	H9X	50000 OHMS ½W WATT
R22	X1X	15 0000 OHMS 3W WATT
R23	P9X	1 MEGOHM ½W
R24	H9X	50000 OHMS ½W WATT
R25	Q9X	1·5 MEGOHMS ½W WATT
R26	J9X	100 0000 OHMS ½W WATT
R27	H9X	15 0000 OHMS ½W WATT
R28	R9X	15 0000 OHMS ½W WATT
R29	V9X	20 000 OHMS ½W WATT
R30	AF9X	3,000 OHMS ½W WATT
R31	X1X	8,000 OHMS ½W WATT
R32	AL3X	3 MEGOHMS 1W WATT
R33	D3X	500000 OHMS 1 WATT
R34	H3X	50000 OHMS 1 WATT
R35	H9X	50000 OHMS ½W WATT
R36	D9X	500000 OHMS ½W WATT
R37	AM9X	170 OHMS 3 WATT
R38	D3X	1,000 OHMS 1 WATT
R39	1411	33 OHMS (INDUCTIVE)
R40	1144	150 OHMS VOLT DIVIDER
R41	AP9X	270 OHMS 3 WATT
R42	AO9X	230 OHMS 3 WATT
R43		0·6 OHMS MODEL 519
		0·5 OHMS MODEL 509

REF.	PART No.	DESCRIPTION
C1	0243AE	100 MMFD CONDENSER
C2	0910	7 MMFD CONDENSER
C3	0003/M	0·05 MFD 200V
C4	0003/E	0·1 MFD 400V
C5	0243BR	35 MMFD
C6	0013/M	0·05 MFD 200V
C7	0013/A	0·5 MFD 400V
C8	0003/E	0·1 MFD 400V
C9	0013/D	0·1 MFD 200V
C10	0974	13 MMFD NEUTRALISING
C11	0243/Q	50 MMFD
C12	0243/BF	1·5 MMFD
C13	0243/BC	480 MMFD
C14	0243/BJ	5400 MMFD
C15	0003/N	0·01 MFD 600V
C16	0014/J	16 MFD 500V WKG
C17	0003/N	0·01 MFD 600V
C18	0003/A	0·05 MFD 400V
C19	0243/BH	100 MMFD
C20	0243/BL	100 MMFD
C21	0003/N	0·01 MFD 600V
C22	0003/B	0·02 MFD 400V
C23	0243/BL	100 MMFD
C24	0243/BL	100 MMFD
C25	0013/E	0·1 MFD 400V
C26	0013/M	0·05 MFD 200V
C27	0013/P	0·04 MFD 400V
C28	0243/Q	50 MMFD
C29	0243/BL	100 MMFD
C30	0243/BL	100 MMFD
C31	0013/G	0·04 MFD 400V
C32	0243/Q	50 MMFD
C33	0243/L	500 MMFD
C34	0013/L	0·5 MFD 200V
C35	0243/Q	250 MMFD
C36	0013/B	0·02 MFD 400V
C37	0013/N	0·01 MFD 600V
C38	0243/K	1000 MMFD
C39	0013/N	0·01 MFD 600V
C40	0013/D	0·1 MFD 200V
C41	0014/S	10 MFD 25V ELECTRO
C42	0013/I	0·02 MFD 400V
C43	0013/S	0·02 MFD 600V
C44	0243/AF	100 MMFD
C45	0013/A	0·5 MFD 400V
C46	0014/P	50 MFD 25V ELECTROLYTIC
C47	0013/I	0·02 MFD 400V
C48	0014/P	16 MFD 350V REGULATING CONDENSER
C49	0014/G	16 MFD 500V ELECTROLYTIC

REF.	DESCRIPTION	PART No.
VC1 VC2 VC3	12-417 MMFD 3 GANG COND.	APC 0148
S1 S2 S3	WAVE CHANGE SWITCH	APC 0432
S4 S5 & S6	TONE MONITOR SWITCH	AFD 1134
L1 & L2	B/C AERIAL COIL	AFD 1614/2
L7 & L8	S/W AERIAL COIL	APC 0219/G
L3 & L4	B/C DETECTOR COIL	APC 0219/H
L9 & L10	S/W DETECTOR COIL	APC 0219/F
L5 & L6	B/C OSCILLATOR COIL	APC 0089/AJ
L11 & L12	S/W OSCILLATOR COIL	APC 0089/AD
IFT1	1ST I.F. TRANSFORMER	AFD 1139
IFT2	2ND I.F. TRANSFORMER	AFD 1140
IFT3	3RD I.F. TRANSFORMER	AFD 1141
T1	OUTPUT TRANSFORMER B/C & S/W	AFD 1136
	OUTPUT TRANSFORMER PUSH-PULL	AFD 1185
T2	MAINS TRANSFORMER	AFD 0995
S7	STATIC LIMITER SWITCH	AFD 1109
S8	RADIOGRAM SWITCH	AFD 1104
S9	MOVING SPEAKER	AFD 1109
	12" SPEAKER ELECTROLYTICS FOR MODEL 509	AFD 1075/1
	8" SPEAKER ELECTROLYTICS FOR MODEL 519	AFD 1212
	DIAL LAMPS 6V 2½AMP	
VC1 TC5 TC6		
VC2 TC1 TC2 TC3 TC4	·48 TRIMMER 1·5 - 18 MMFD	AFD 0788
VR1	1 MEG. POTENTIOMETER TAPPED	AFD 1010/B





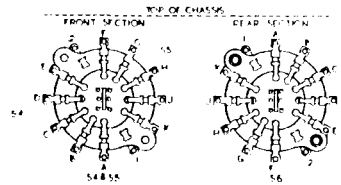


RADIOGRAM SWITCH

IN CIRCUIT DIAGRAM

ALL WAVE CHANGE SWITCHES SHOWN IN BROADCAST POSITION TURN ANTI-CLOCKWISE FOR SHORT WAVE POSITION

NOTE - S1 S2 & S3 ARE GANGED TOGETHER ON ONE SHAFT.

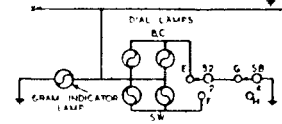


TONE MONITOR SWITCH

IN CIRCUIT DIAGRAM

TONE MONITOR SWITCH SHOWN IN NORMAL POSITION. TURN ANTI-CLOCKWISE FOR WIDE RANGE POSITION AND CLOCKWISE FOR BASS, SPEECH & OVERSEAS POSITIONS.

NOTE - S4 S5 & S6 ARE GANGED TOGETHER ON ONE SHAFT.



NOTE

ARMATURE AFD 1166 MODEL 519
SPEAKER AFD 1075/1 MODEL 509

VOICE COIL RESISTANCE .6 OHMS MODEL 519
VOICE COIL RESISTANCE .4 OHMS MODEL 509

VOLTAGE TABLE

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 a resistance of less than 1000 ohms per volt is used, allowance must be made for the voltage drop caused by the voltmeter.

	6U7G		6J8G				6U7G						
			Amp.		Osc.								
	BC	SW	BC	SW	BC	SW	BC	SW	6G8G	6H6	6B8G	6L6G	5V4G
Plate to chassis volts	268	252	268	252	162	150	268	252	258	—	35	250	—
Screen to chassis volts ..	50	100	67	100	—		67	100	108	—	20	268	—
Cathode to chassis volts ..	—		1.7	2.0	—		—		—	—	1.5	13.0	—
Heaters volts	6.0		6.0		—		6.0		6.0	6.0	6.0	6.0	4.9
Plate current MA	1.5	7.0	0.1	0.5	5.5	5.3	2.6	6.5	5.5	—	0.3	72	—
Screen current MA	0.3	1.7	0.3	0.9	—		0.6	1.8	1.5	—	0.1	4.8	—
Total cathode current MA ..	1.8	8.7	6.1	6.9	—		3.2	8.3	7.0	—	0.4	77	—

Input to filter (volts to chassis): 432.
Output from filter (volts to chassis): 268.
Volts drop across 50 ohm bias resistor: BC 4.8, SW 5.1.
HT current (measured at centre tap): BC 98 ma., SW 105 ma.

RADIO FREQUENCY TESTS AND ADJUSTMENTS

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., 1400 kc., 600 kc., and 13.9 metres (21.58 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.

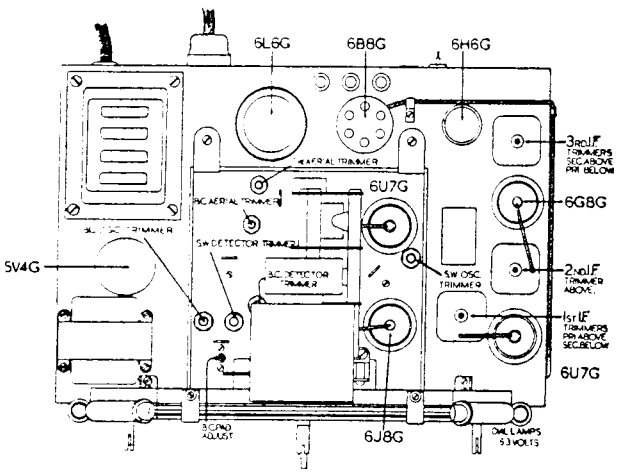
Before commencing alignment, it is essential to set the Tone Monitor switch to the "normal" position.

Rotate Volume Control fully clockwise and set wave-change switch to "Broadcast" position; rotate tuning control till dial pointer indicates 550 kc., i.e., condenser vanes 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 457.5 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 sometimes possible to obtain a false peak due to coupling effects between the moveable iron cores. Commence aligning each circuit by first screwing its trimmer right out and then advance screw till peak is found. Do not screw all trimmers out at once, but do each individually.

R.F. ALIGNMENT—BROADCAST BAND

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 (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 kc. line.
(5) Adjust B/c aerial and R.F. trimmers for maximum output on 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 to aerial terminals as previously.
(2) Tune signal generator to 13.9 metres (21.58 mc.).
(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) Adjust S.W. aerial and R.F. trimmers for maximum output while "rocking" the ganged condenser slightly to obtain the true resonant point.
(5) Note that signal is still tuned in correctly at 13.9 metres. If not, readjust S.W. oscillator trimmer slightly until dial reads correctly, and then repeat tests 4 and 5.
(6) Check foregoing adjustments carefully to ensure that correct settings have been obtained on all trimmers. Dial should now read correctly throughout.

NOTE.—The trimmer condensers on these models are of a new 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 locknut and an adjusting hook for the plunger. After loosening the locknut 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 locknut securely.

Supplementary Service Information for Radiogram Models 509 and 519

TECHNICAL SPECIFICATION

PICK-UP

DC resistance, 7,400 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 feed type, see page 8.

DISMANTLING

REMOVAL OF CHASSIS

(1) Remove knobs.
(2) Disconnect loudspeaker plug, gramophone motor plug, tuning indicator socket, and pick-up leads. (Socket pulls straight off base of tuning indicator tube.)
(3) Unscrew Volume Control bracket from inside front of cabinet.
(4) Remove nut from Static Limiter switch on top of control panel and withdraw switch, noting position so that it may be replaced right way round.
(5) Remove two nuts from chassis fixing bolts behind wooden chassis supports; the chassis is now free.

THE PICK-UP

To gain access to the pick-up movement, remove the wax covering the two screwheads 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 Fig. 2.)

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, place a "keeper," consisting of a flat piece of iron, across the poles of the magnet before the magnet fully leaves the pole pieces. When replacing, the ground face of the magnet must be in contact with the pole pieces before withdrawing the "keeper."

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.

THE AUTOMATIC BRAKE

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 the 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 the 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 a more 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 the speaker, slightly decrease the friction at BR, but do not apply oil.

AUTO RECORD-CHANGING MECHANISM ON MODEL 519

A special service manual covering the testing and adjusting of this mechanism is published by the Gramophone Co. Ltd., and can be obtained on application to the Service Dept. No attempt should be made to adjust or service this mechanism until the service manual has been carefully studied. Trouble should not arise, provided attention is paid to the operating instructions given in the Installation Manual accompanying each receiver.

It is essential to observe the following points:

(1) Records which are warped or which have rough or chipped edges must never be used.

(2) The instrument must be installed so that the turntable is absolutely level, the instrument being packed up to secure this result should the floor be uneven.

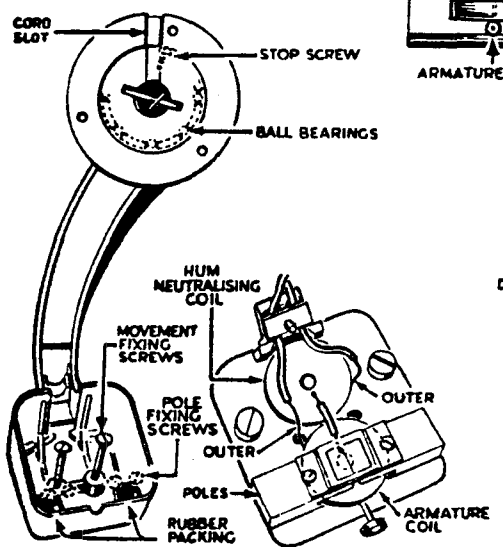


Fig. 1

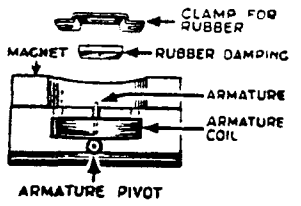


Fig. 2

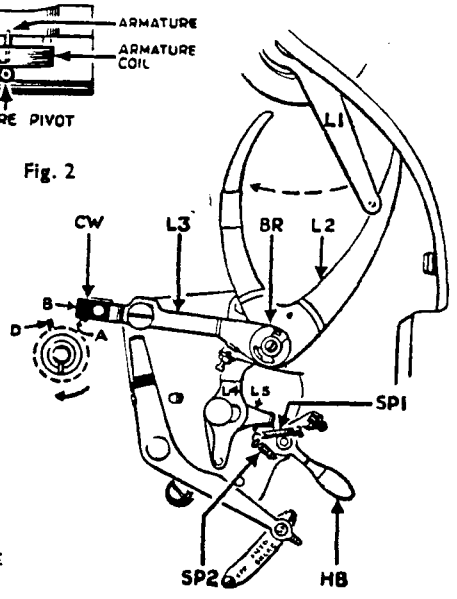
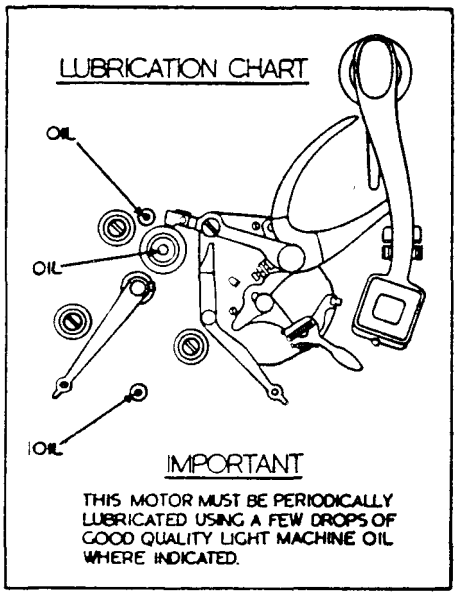


Fig. 3



TONE MONITOR

On Models 509 and 519, when in use as an Electric Gramophone, the Tone Monitor is effective only in the three middle positions, i.e., "NORMAL," "BASS," and "SPEECH." The "Speech" position may be found useful when playing at great volume records which have very heavy bass passages, such as certain organ recordings. The "Bass" position will reduce surface noise on old or worn recordings.

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.

(The Company reserves the right to make any modifications without notice.)