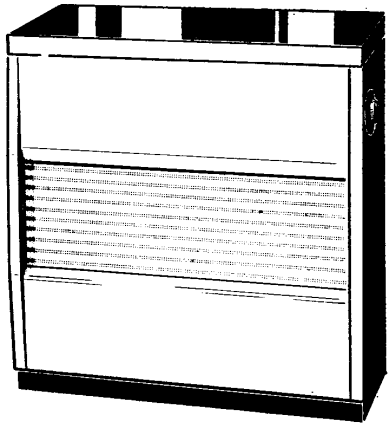
"HIS MASTER'S VOICE"

SERVICE MANUAL

7 VALVE A.M.-F.M. CONSOLE 3-SPEED AUTO-RADIOGRAM FOR A.C. MAINS



MODEL 1622

MADE IN ENGLAND

INDEX

Part No. 95060 Issue 1 June, 1956

MODEL 1622

SPECIFICATION

Physical

Height	28 inches
Width	26½ inches
Depth	16 inches

Mains Supply

195—215, 216—235, 236—255 volts.
50 cycles A.C. only.

Consumption

Radio	65 watts.
Gram	85 watts.

Rated Output

5 watts.

Intermediate Frequency

470 kc/s.

Wave Ranges

F.M. ..	87·5—100 Mc/s.
M.W. ..	187·5—574·6 metres (1,602—522 kc/s).
L.W. ..	901—2,026 metres (333—148 kc/s).

Scale Lamps and Fuses

Two scale lamps—6·8 volts 0·3 amps.
Two mains fuses—1·5 amps (cartridge type).

Valves

V1	B719/ECC85	F.M. and R.F. amplifier/ frequency changer.
V2	X719/ECH81	Frequency Changer.
V3	W719/EF85	I.F. amplifier.
V4	DH719/EABC80	F.M. and A.M. rectifier and A.V.C. diode.
V5A/B	HN309	Paraphase driver and output stage.
V6A/B	HN309	Paraphase driver and output stage.
V7	U709	Full Wave H.T. rectifier.

Loudspeaker

10½-inch elliptical high flux permanent magnet type. The speech coil has a D.C. resistance of 4 ohms and an impedance of 5 ohms at 1,000 cycles.

External Loudspeaker

An external loudspeaker may be connected to the external loudspeaker sockets at the rear of the instrument. The speaker should have an impedance of 5 ohms approximately.

Auto-Mechanism

Three-speed Auto-Mechanism type 92010E. For full information see separate Service Manual (Part No. 93369).

Pick-Up

High impedance crystal type reversible head.

Styli

Type A4 78 for 78 r.p.m. records.
Type A4 33/45 for 33⅓ or 45 r.p.m. records.

Motor

Shaded pole induction type.

INSTALLING

A.M. Aerial

This instrument is fitted with a Ferrite Rod aerial for the reception of a selection of stations in the medium and long wavebands.

In difficult reception areas an external aerial is essential to obtain the maximum sensitivity from this receiver. The aerial should be fitted with a lightning arrester or switch and well insulated from grounded objects.

F.M. Aerial

General—In the majority of cases for the best possible performance from this instrument either an indoor or outdoor dipole or multi array with co-axial feeder should be installed, depending upon reflected signal interference if received. In areas of very high signal strength satisfactory results may be obtained by utilising a simple dipole. This can be made from a length of twin moulded mains lead, with one end opened apart so that 2-feet 6-inch lengths are formed. This T-shaped arrangement must be fixed horizontally at right angles to direction of the transmitter.

Local conditions greatly affect VHF/FM reception, local screening and height of aerial also affects reception. Reflected signal interference can in some cases cause distortion.

Earth

An earth terminal is fitted, adjacent to the aerial socket, at the rear of the instrument. This should be connected to an efficient earth. A copper plate or rod buried 3 feet in moist ground provides the best earth. Do not use a gas pipe, a telephone earth or hot water pipe as an earth.

Transit Packing

Remove the tapes and corrugated wrapping securing the record steady arm and pick-up arm.

Remove the back panel (6 screws) and from underneath the auto-mechanism inside the cabinet, unscrew to their fullest extent the four wing nuts securing the auto-mechanism to the wooden motor board. This allows the auto-mechanism to float on its spring mountings.

Circlips prevent the wing nuts from screwing off their respective screws.

Withdraw the cardboard strips from underneath the metal plate of the auto-mechanism.

Mains Supply

The receiver may be adjusted to operate on A.C. mains supplies of 195—215, 216—235, and 236—255 volts at 50 cycles only. To adjust the mains input disconnect the instrument from the mains and proceed as follows:—

A.—Remove the cardboard back (6 screws).

B.—Connect the voltage adjustment lead to the terminal with markings which includes the voltage of the mains supply.

Final Connection

Ensure that the loudspeaker plug is in the internal position. Connect a suitable plug to the mains lead.

DISMANTLING

Before attempting any dismantling, ensure that the instrument is completely disconnected from the mains supply.

Removal of Power/Output Chassis

1. Remove the cardboard back panel.
2. Slacken screws on the mains transformer panel terminals and disconnect the leads (4).
3. Remove the two loudspeaker plugs and the seven-pin plug from the output/power chassis.
4. Unplug aerial and earth leads, pick-up leads and F.M. feeder from the R.F. chassis.
5. Remove the four securing screws and withdraw chassis.

Removal of R.F. Chassis

1. Remove the top control knobs and the side control knob.
2. Remove the four woodscrews securing top panel and lift out the panel.
3. Unplug the aerial and earth, pick-up leads and the F.M. feeder from the chassis.
4. Remove the four screws securing chassis and withdraw chassis.

Removal of Sub-Chassis

The sub-chassis can be raised to an upright position as shown in the illustration of underside view.

1. Remove the valves on the sub-chassis.
2. Unsolder the red lead from R36 at the stand-off insulator (underside chassis).
3. Unsolder the screened lead at socket No. 3 of the seven-pin socket on power/output chassis.
4. Remove the four fixing screws and lift up chassis.

Auto-Mechanism

1. Disconnect motor leads from mains transformer.
2. Unplug pick-up leads from R.F. chassis.
3. Remove circlips and unscrew wing nuts securing the auto-mechanism base plate to the motor board.
4. Lift out auto-mechanism.

F.M. AND A.M. ALIGNMENT

F.M. ALIGNMENT

IMPORTANT NOTE.—Distortion can result from mis-alignment, especially in the discriminator transformer.

General

When distortion is thought to be due to mis-alignment the I.F. stages should be checked for symmetrical response of the band width, but care should be taken first to ensure that the fault does not lie in the A.F. stages.

Before commencing re-alignment always allow approximately 10 minutes warming up period. Screen leads must always be used for connecting test equipment.

If it is found that the cores in the R.F. and I.F. coils have become locked and are unadjustable, they should be freed by the careful application of one or two drops of high grade penetrating oil. The use of a small pointed brush to direct the oil on to the cores will prevent the oil from spreading. If on the other hand the cores are excessively free a length of cotton thread can be screwed into the former with the cores to prevent any movement after adjustment.

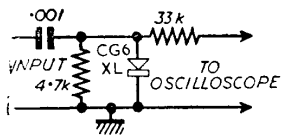
When the F.M. I.F. circuits have been aligned it is recommended that strips of adhesive tape be placed over the top and bottom of the F.M. I.F. transformers. This will eliminate the possibility of mis-adjustment when re-aligning the A.M. I.F. circuits.

I.F. and Ratio Detector Alignment (F.M.)

Apparatus Required

Oscilloscope (sensitivity 1 cm. for ·1 volt input).

Sweep Generator covering 10·7 Mc/s with ± 300 kc/s deviation.



Operation

1. Screw out core of L20 until it is just protruding from the former.
2. Screw in core of L19 about 10 turns.

3. Set volume control at maximum clockwise and tone control maximum clockwise.

4. Connect oscilloscope (with gain at maximum) to test point " B " via a suitable diode probe illustrated above.

5. Inject 10·7 Mc/s deviated by ± 300 kc/s into the grid of V2 (pin 2).

6. Adjust L14 and L13 (IFT2) until double humped response curve similar to Fig. 1 is obtained. Separation between the two peaks should be approximately 200 kc/s.

Note—An accurate marker pip at 10·7 Mc/s should be injected at the appropriate sweep generator terminals.

7. Screw out core of L19 (IFT5) until waveform similar to Fig. 2 which is symmetrical around 10·7 Mc/s is obtained.

8. Connect oscilloscope to the tag 3 and earth end of tone control.

9. Screw in core of L20 until a waveform similar to Fig. 3 which is symmetrical around 10·7 Mc/s is obtained ± 300 kc/s. It may be necessary to reduce the sensitivity of the oscilloscope when making this adjustment.

Transfer input of oscilloscope to the diode probe.

Note—L19 (operation 7) may need slight re-adjustment.

10. Connect sweep generator to test point " A ", the input may have to be increased at this point.

11. Adjust L6 and L7 to give a symmetrical response similar to Fig. 4. This should be not less than 180 kc/s wide, 3 dbs down.

Repeat operation 7 to 9.

R.F. Alignment (F.M.)

Apparatus Required

F.M. Generator covering 80—100 Mc/s, ± 300 kc/s deviation.

Valve Voltmeter or Microameter, 0—500 μA.

Output Meter, 0—10 volts, A.C. type.

Note—Where a valve voltmeter is not available the microammeter can be connected in series with R3 at the earthy end (disconnecting earth end of R3 from chassis).

Connect output meter across speech coil.

1. Set cores of permeability tuner assembly by adjusting the brass studding so that the tops of the studs for the oscillator (L4) are 11/32 inch and the H.F. (L3) are 9/32 inch from the bar.

2. Adjust TC2 so that it is one turn from maximum capacity. Set gang to minimum capacity.

3. Connect valve voltmeter lead to test point " A ", connect earthy end of probe to earth end of R3.

4. Adjust TC3 for minimum reading with valve voltmeter. If a microammeter is used short test point " A " and adjust TC3 for minimum grid current.

5. Set gang to maximum and set pointer to zero. Turn tuning control so that pointer is 11/32 from zero. Set F.M. Generator to 88 Mc/s and adjust TC2 for maximum reading.

6. Set Generator to 94·5 Mc/s, tune in signal and adjust TC1 for maximum reading. Calibration to be within + 500 kc/s to 250 kc/s.

7. Check sensitivity at 98 and 88 Mc/s. Reposition H.F. core (L3) and then retune TC1 at 94·5 Mc/s if the sensitivity is greater than 3 dbs down relative to sensitivity at 94·5 Mc/s.

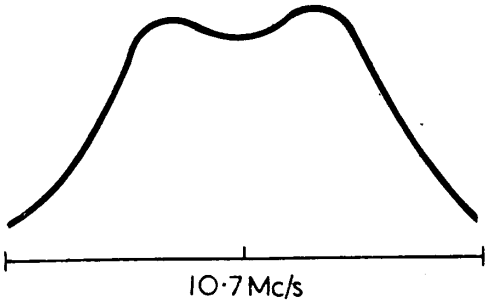


FIG 1.

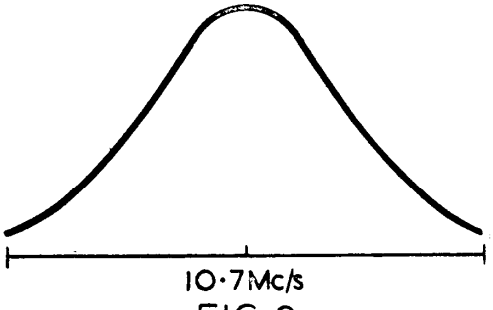


FIG 2.

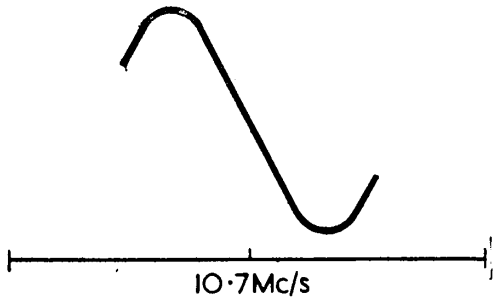


FIG 3

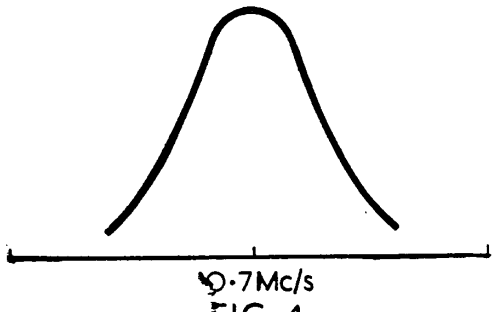


FIG 4.

A.M. ALIGNMENT

General

If the I.F. or R.F. circuits have been disturbed then complete alignment must follow.

Whilst ganging, the input to the receiver must be progressively reduced as the circuits are brought into line so that the output does not exceed 500 m.w. (1·45 volts across the speech coil). An A.C. Voltmeter (rectifier type) connected across the speech coil may be used as an output meter.

I.F. Alignment

Set the waveband switch to M.W., the Volume and Tone controls to maximum (fully clockwise) and the gang capacitor to minimum capacity (plates fully disengaged).

1. Inject a modulated signal of 470 kc/s into the grid of V2 (pin 2).

2. Adjust cores of L15, 16, 17 and 18, in that order, for maximum output.

R.F. Alignment

Medium Wave

Set Volume and Tone controls to maximum (fully clockwise), and waveband switch to M.W. Inject test signal into aerial and earth sockets via a M.W. dummy aerial.

Op. No.	Set Gang		Tune Test Oscillator to	Operation
	kc/s	Metres	kc/s	
1	522	575	588	Adjust L11 for maximum output.
2	1,602	185	1,602	Adjust TC6 for maximum output.
3	588	505	588	Adjust L8 for maximum output.
4	1,427	210	1,427	Adjust TC4 for maximum output.
5	—	—	—	Repeat operation 1 to 4.

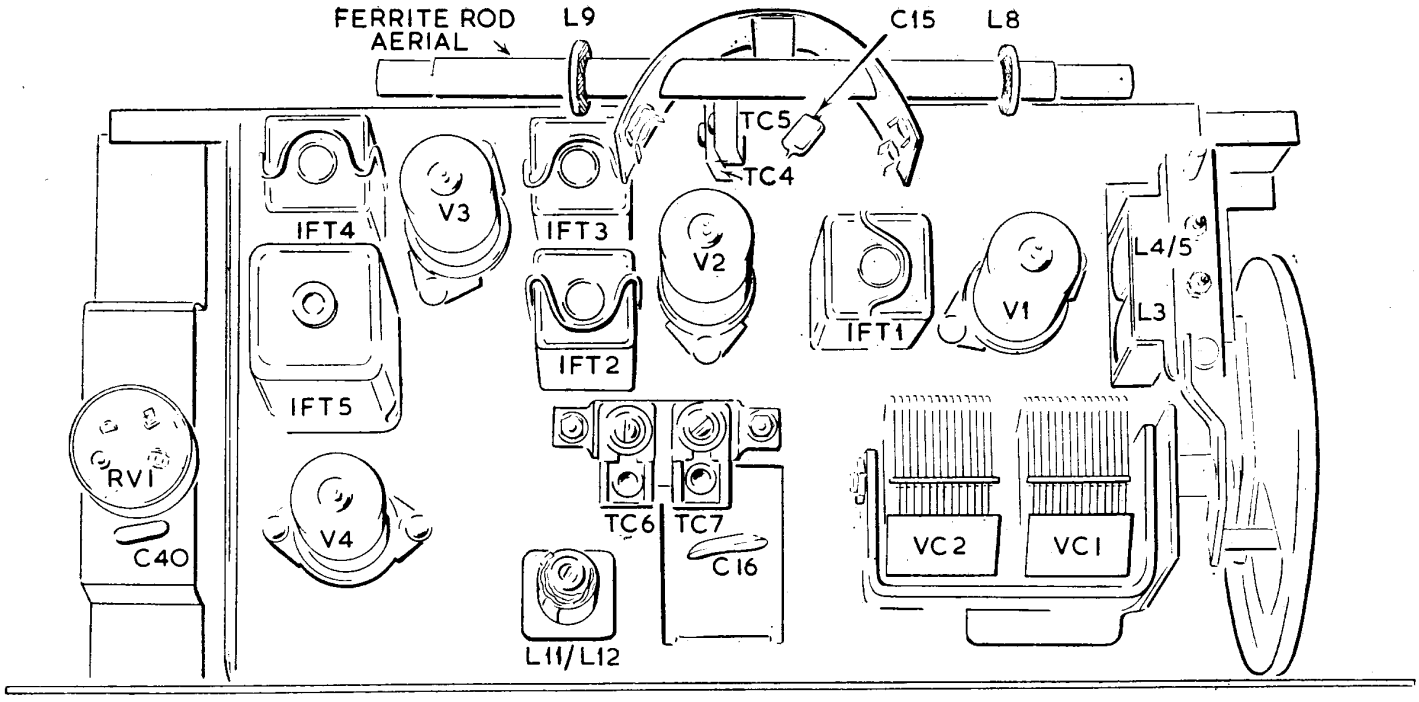
Note—L8 is adjusted by sliding coil along Ferrite rod, the position of this coil being approximately ¾ inch from end of rod.

Long Wave

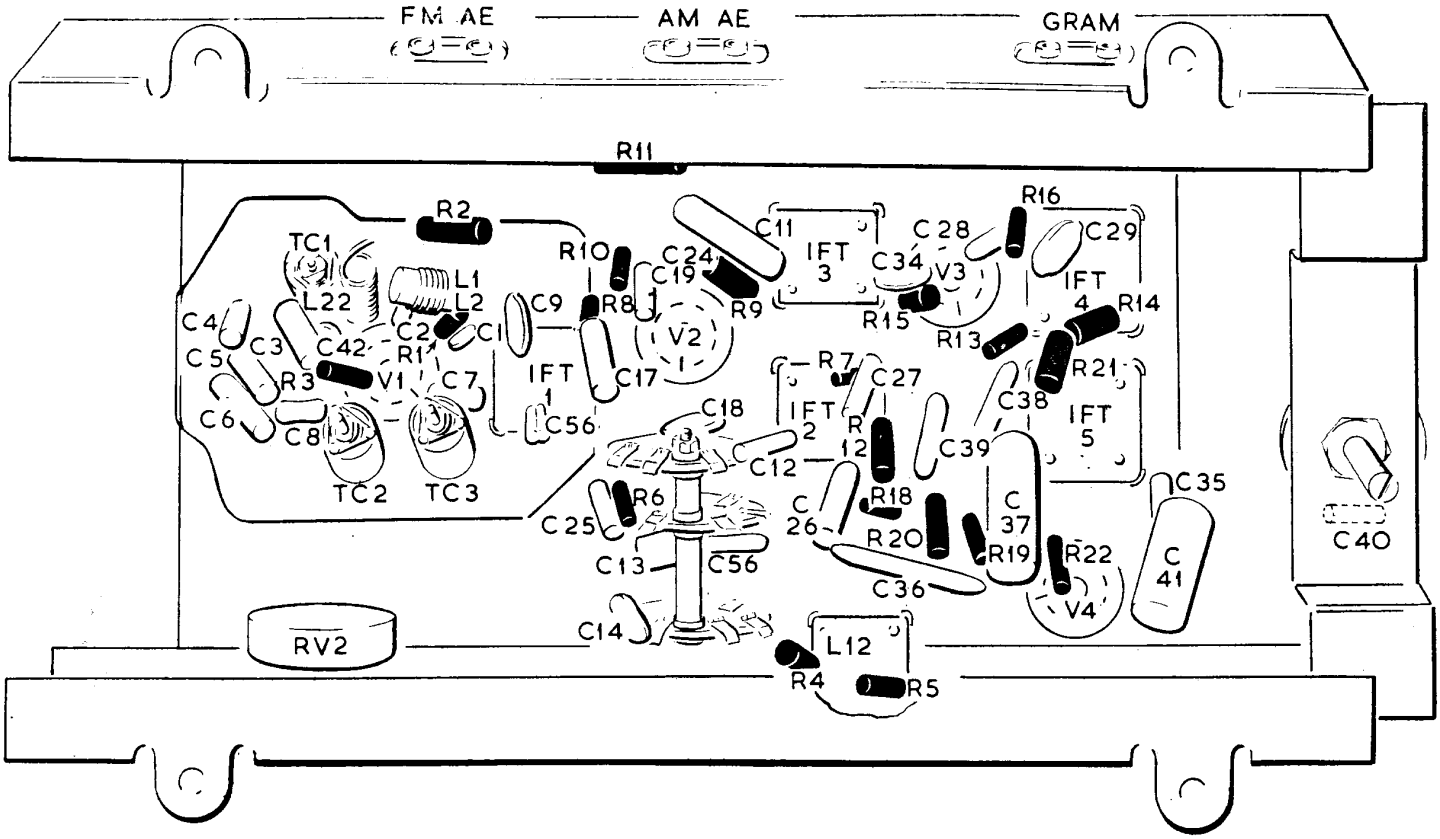
Set controls as before but waveband switch to L.W. and test signal via L.W. dummy aerial.

Op. No.	Set Gang		Tune Test Oscillator to	Operation
	kc/s	Metres	kc/s	
1	148	2,027	162	Adjust L12 for maximum output.
2	333	901	300	Adjust TC7 for maximum output.
3	162	1,854	162	Adjust L9 for maximum output.
4	300	1,000	300	Adjust TC5 for maximum output.
5	—	—	—	Repeat operations 1 to 4.

Note—Adjustment of L9 is similar to L8.

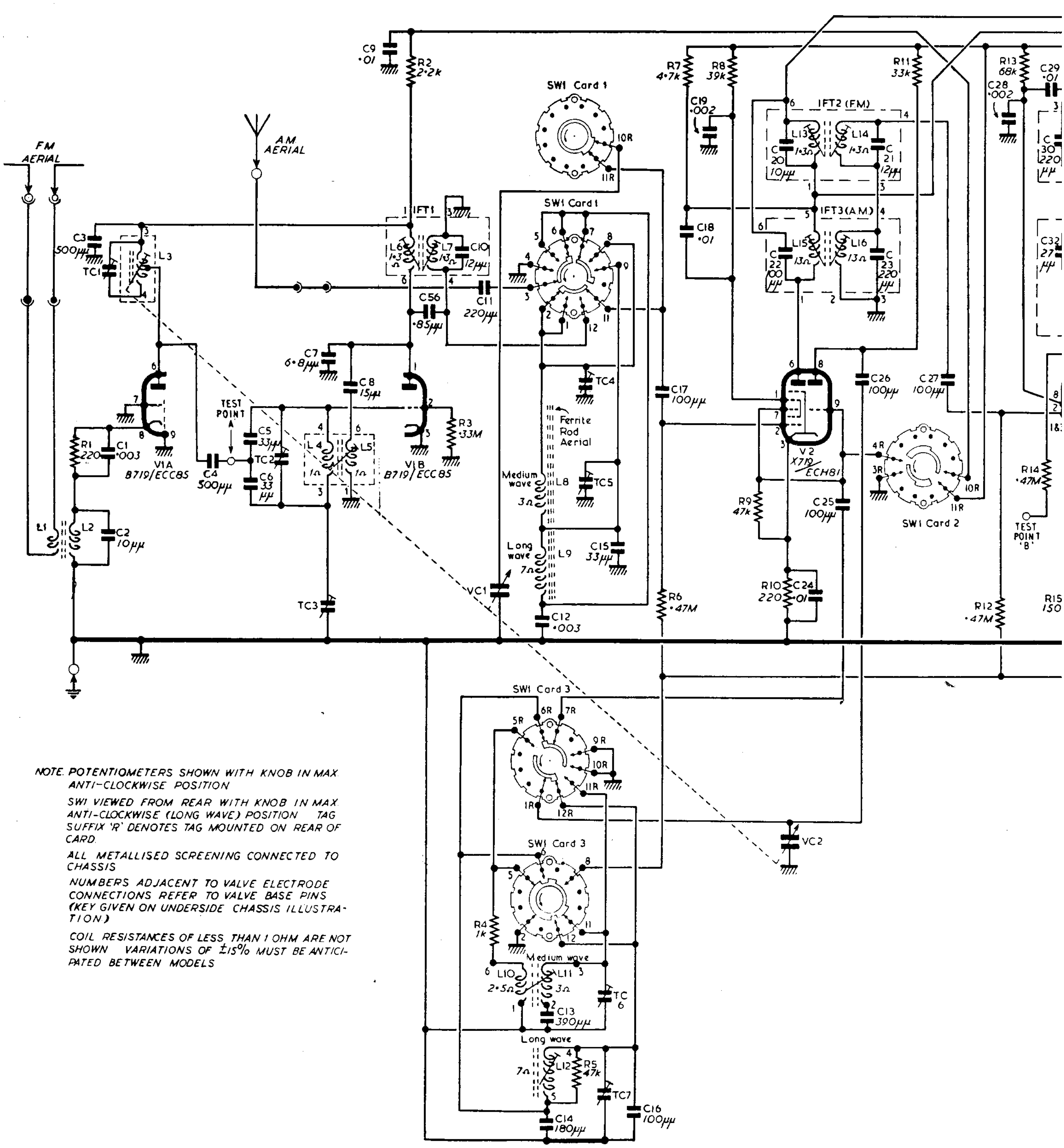


TOPSIDE CHASSIS VIEW



UNDERSIDE CHASSIS VIEW

C	3 1,2 4 5,6 7 8 9 56 10,11 12,13,14 15 16 17 18,19 20,22 24 25 26,21,23 27 28 29,3
R	1 2 3 4 5 6,7 8 9 10 11 12 13 14 1
L	1 2 3 4 5 6 7 10 8,9,11,12 13,15 14,16
MISC.	TC1 V1A TC2 TC3 V1B,IFT1 VC1 SW1 Cards 1&3 TC4 to 7 V2,VC2 IFT2&3 SW1 Card 2



NOTE. POTENTIOMETERS SHOWN WITH KNOB IN MAX. ANTI-CLOCKWISE POSITION.

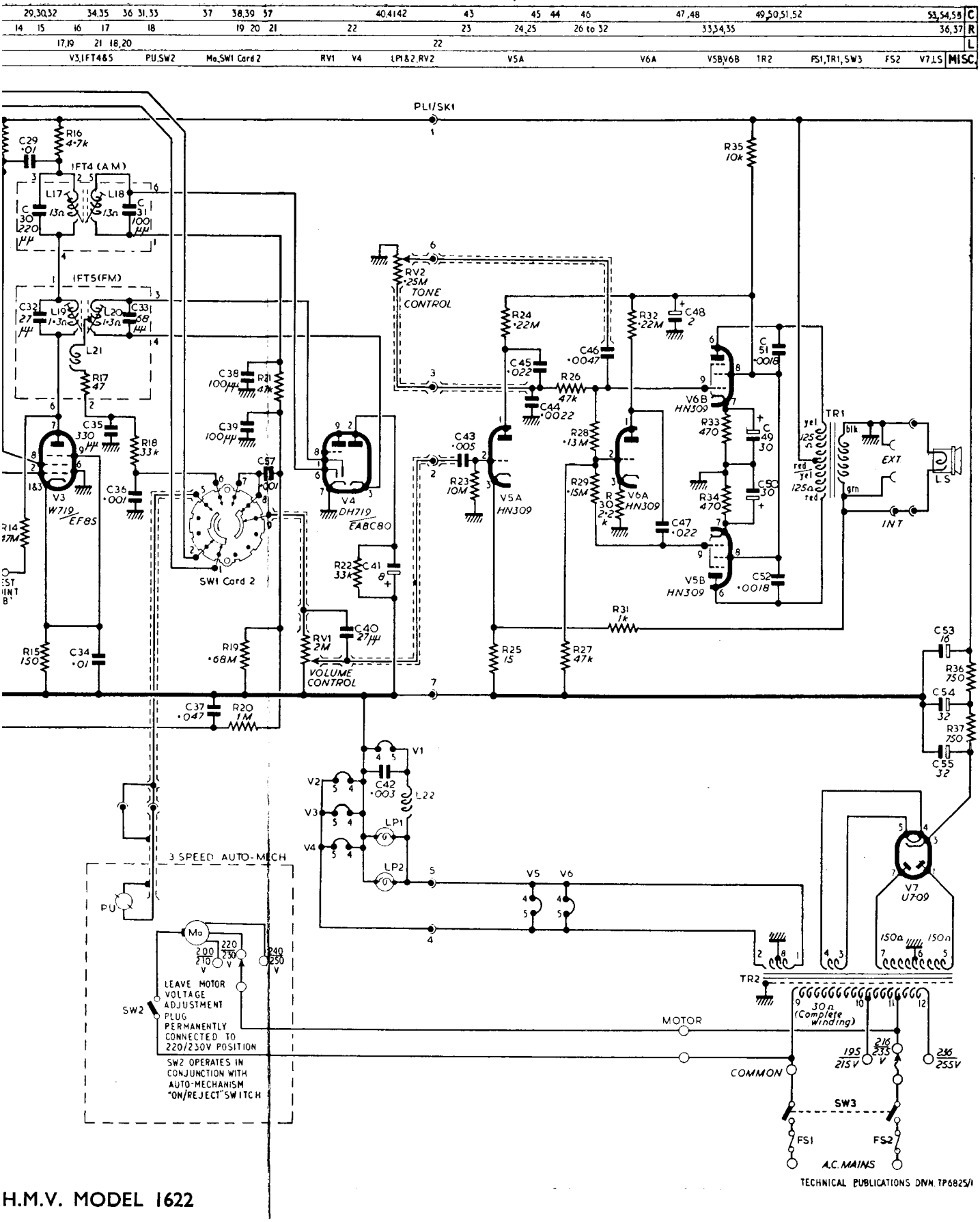
SW1 VIEWED FROM REAR WITH KNOB IN MAX. ANTI-CLOCKWISE (LONG WAVE) POSITION. TAG SUFFIX 'R' DENOTES TAG MOUNTED ON REAR OF CARD.

ALL METALLISED SCREENING CONNECTED TO CHASSIS.

NUMBERS ADJACENT TO VALVE ELECTRODE CONNECTIONS REFER TO VALVE BASE PINS (KEY GIVEN ON UNDERSIDE CHASSIS ILLUSTRATION)

COIL RESISTANCES OF LESS THAN 1 OHM ARE NOT SHOWN. VARIATIONS OF ±15% MUST BE ANTICIPATED BETWEEN MODELS.

CIRCUIT DIAGRAM H.M



H.M.V. MODEL 1622

TECHNICAL PUBLICATIONS DWN. TP6825/1

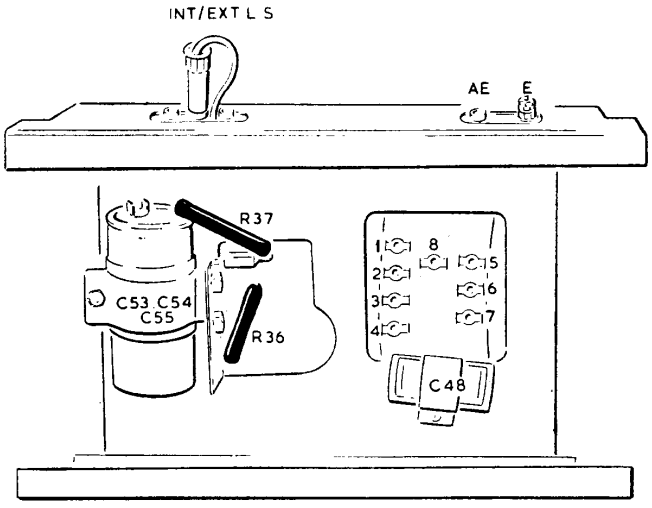
VALVE VOLTAGES

VALVE		ANODE	SCREEN	CATHODE
V1A	F.M.	180	—	1·8
V1B	F.M.	180	—	—
V2P	F.M.	190	90	2·5
	A.M.	220	85	2V
V2T	F.M.	90	—	2·5
	A.M.	95	—	2V
V3	F.M.	165	85	1·5
	A.M.	185	105	1·5
V5A	F.M.	70	—	—
	A.M.	75	—	—
V5B	F.M.	210	150	9
	A.M.	230	165	10
V6B	F.M.	210	150	9
	A.M.	230	165	10
V7		Pins 1 & 7, 280 A.C.	—	330

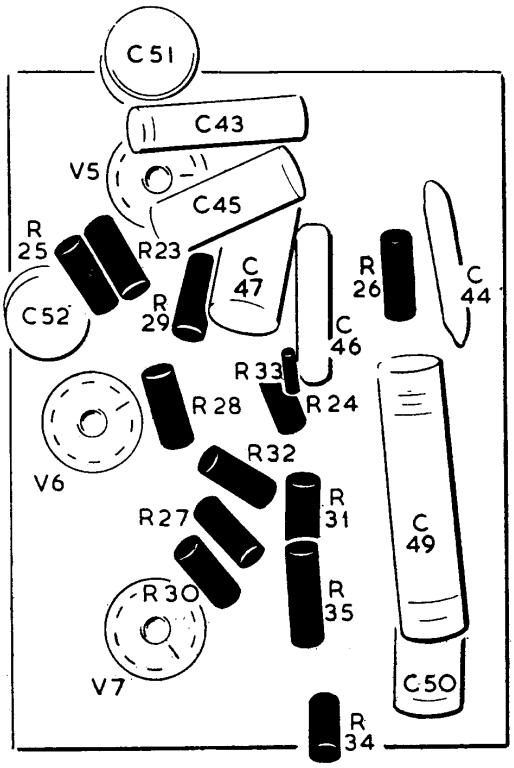
Smoothed H.T. { F.M. 210V. / A.M. 230V.

H.T. Current { F.M. 75 mA. / A.M. 65 mA.

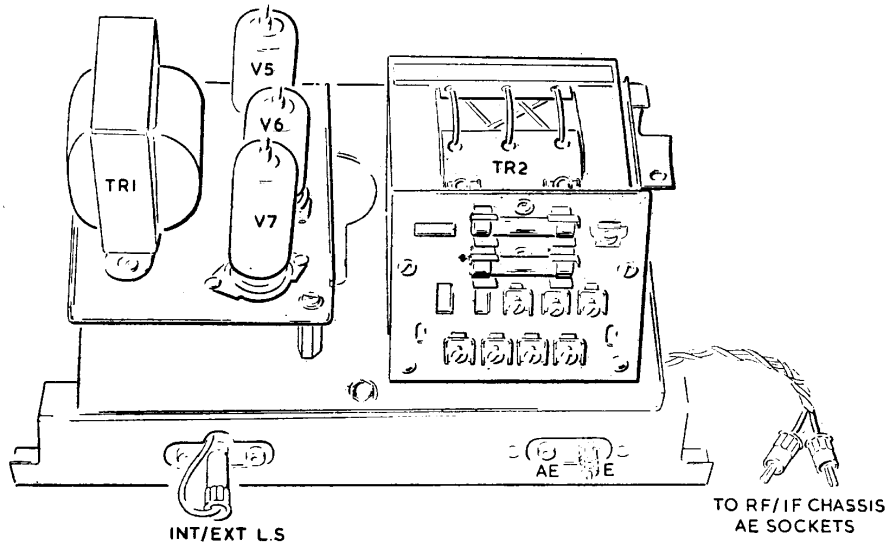
The above voltages were taken with a 20,000 ohms per volt meter on appropriate ranges under conditions of no signal input to the receiver. Variations of ± 15 per cent. should be expected between individual models; and due allowance should be made for the resistance of the meter used under servicing conditions.



A.F. UNIT—UNDERSIDE VIEW



A.F. SUB-CHASSIS—UNDERSIDE VIEW



A.F. UNIT—TOPSIDE VIEW

CORD DRIVE

Use only the specified nylon cord 0370x0012. Length 52 inches. Gang capacitor at maximum (plates fully engaged).

1. Make a small loop in one end of the nylon cord about $\frac{1}{8}$ inch dia. and shellac the knot to stop slipping.

2. Slip loop over anchor pin on drive drum.

3. Pass cord through hole in drive drum rim to the right hand (front view).

4. Pass cord around groove and take around perspex pulley at the bottom.

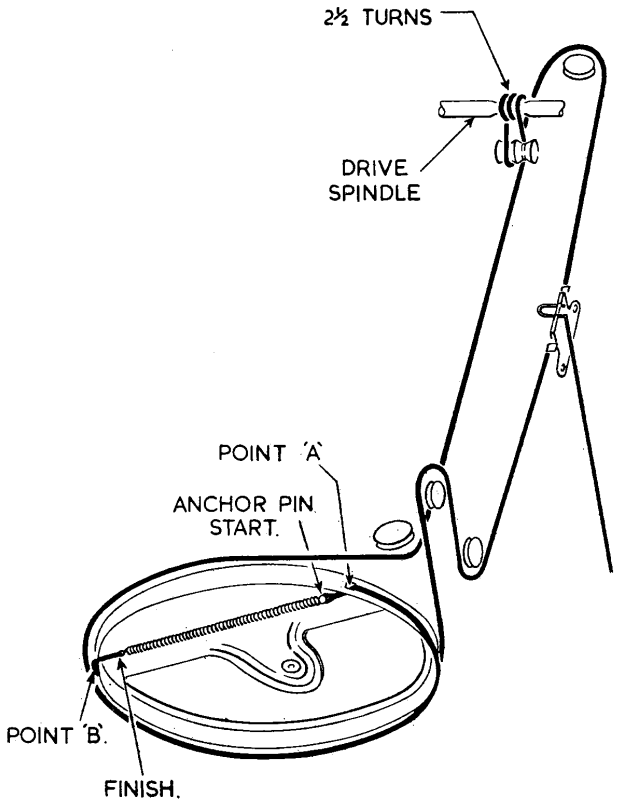
5. Take cord to and around drive spindle by $2\frac{1}{2}$ turns.

6. Pass cord to left-hand top pulley and then parallel with cursor bar to the other end and around pulley.

7. Take cord around drive drum groove and pass through hole at the top.

8. Make a small loop in end of cord and attach to spring. Hook loop of spring over anchor tag (spring being under tension).

9. Shellac knot in cord to stop slipping.



SPARE PARTS LIST

Ref. No.	*Description*	*Part No.*
	CAPACITORS	
C1	3,000 μμF, −20% + 50%, 500 v.	38125A
C2	10 μμF, ± 10%, 300 v.	38133A
C3	500 μμF, ± 5%, 500 v.	38475C
C4	500 μμF, + 50%−25%, 500 v...	38130G
C5	33 μμF, ± 5%, 750 v.	38133D
C6	33 μμF, ± 5%, 750 v.	38117D
C7	6·8 μμF, ± 10%, 500 v. ..	38133XZ
C8	15 μμF, ± 5%, 750 v.	38133B
C9	0·01 μF, ± 20%, 500 v.	38109B
C10	12 μμF, ± 5%, 750 v.	See IFT1
C11	220 μμF, ± 20%, 750 v. ..	38117DJ
C12	0·003 μF, ± 20%, 750 v. ..	38125A
C13	390 μμF, ± 2%, 350 v.	38001VM
C14	180 μμF, ± 2%, 350 v.	38000VE
C15	33 μμF, ± 5%, 750 v.	38133D
C16	100 μμF, ± 20%, 350 v. ..	38117DG
C17	100 μμF, ± 20%, 350 v. ..	38117DG
C18	0·01 μF, ± 20%, 500 v.	38109B
C19	0·002 μF, + 20%, 350 v. ..	38122A
C20	10 μμF, ± 5%, 750 v.	See IFT2
C21	12 μμF	See IFT2
C22	100 μμF	See IFT3
C23	220 μμF	See IFT3
C24	0·01 μF, −20% + 80%, 500 v...	38109B
C25	100 μμF. + 20 % 500 v, ..	38117DG
C26	100 μμF, ± 20%, 750 v. ..	38117DG
C27	100 μμF, ± 20%, 750 v. ..	38117DG
C28	0·002 μF, ± 20%, 350 v. ..	38122A
C29	0·01 μF,−20% + 80%, 500 v. ..	38109B
C30	220 μμF	See IFT4
C31	100 μμF	See IFT4
C32	27 μμF	See IFT5
C33	68 μμF	See IFT5
C34	0·01 μF, −20%+80%, 350 v. ..	38109B
C35	330 μμF, ± 20%, 750 v. ..	38117DK
C36	0·001 μF, ± 20%, 350 v. ..	38216DN
C37	0·047 μF, ± 20%, 450 v. ..	38210DY
C38	100 μμF, ± 20%, 750 v. ..	38117DG
C39	100 μμF, ± 20%, 750 v. ..	38117DG
C40	27 μμF, ± 20%, 750 v.	38117ABT
C41	8 μF, 50 v.	38406A
C42	0·003 μF, + 50%−25%, 350 v.	38130C
C43	0·005 μF, ± 25%, 350 v. ..	38267B
C44	0·0022 μF, ± 20%, 350 v. ..	38216DQ
C45	0·022 μF, ± 20%, 350 v. ..	38217DW
C46	0·0047 μF, ± 20%, 350 v. ..	38216DS
C47	0·022 μF, ± 20%, 350 v. ..	38217DW
C48	2·0 μF, ± 350 v.	38151B
C49	30 μF, 15 v.	38175C
C50	30 μF, 15 v.	38175C
C51	0·0018 μF, −20%+80%, 350 v.	38128A
C52	0·0018 μF, —20%+80%, 350 v.	38128A

Ref. No.	*Description*	*Part No.*
C53	16 μF, 350 v.	38150N
C54	32 μF, 350 v.	
C55	32 μF, 350 v.	
C56	0·85 μμF, ± 500 v.	92057A
C57	0·001 μF, ± 25%, 500 v.	38529ACM
	TRIMMERS	
TC1	3–30 μμF	30480A
TC2	3–30 μμF	30480A
TC3	3–30 μμF	30480A
TC4	4–30 μμF	37245B
TC5	4–30 μμF	37245B
TC6	4–30 μμF	32668A
TC7	4–30 μμF	
	RESISTORS	
R1	220 Ω, ± 20%	33362DJ
R2	2·2 KΩ, ± 10%	33362BQ
R3	0·33 MΩ, ± 20%	33362ED
R4	1 KΩ, ± 20%	33362DN
R5	0·47 KΩ, ± 20%	33362DY
R6	0·47 MΩ, ± 20%	33362EE
R7	4·7 KΩ, ± 20%	33362DS
R8	39 KΩ, ± 10%	33362QC
R9	47 KΩ, ± 20%	33362DY
R10	220 Ω, ± 10%	33362BJ
R11	33 KΩ, ± 20%	33362DX
R12	0·47 MΩ, ± 20%	33362EE
R13	68 KΩ, ± 10%	33362BZ
R14	0·47 MΩ, ± 20%	33362EE
R15	150 Ω, ± 10%	33362BH
R16	4·7 KΩ, ± 20%	33362DS
R17	47 Ω	See IFT5
R18	33 KΩ, ± 20%	33362DX
R19	0·68 MΩ, ± 10%	33362BZ
R20	0·1 MΩ, ± 20%	33362FG
R21	47 KΩ, ± 20%	33362DY
R22	33 KΩ, ± 20%	33362DX
R23	10 MΩ, ± 20%	33362DU
R24	0·22 MΩ, ± 20%	33360EC
R25	15 Ω, ± 20%	33360DB
R26	47 KΩ, ± 20%	33360DY
R27	47 KΩ, ± 20%	33360Y
R28	0·13 MΩ, ± 5%	33360NZ
R29	0·15 MΩ, ± 5%	33360AB
R30	2·2 KΩ, ± 10%	33360BQ
R31	1·0 KΩ, ± 20%	33360DN
R32	0·22 MΩ, ± 20%	33360EC
R33	470 Ω, ± 5%	33360L
R34	470 Ω, ± 5%	
R35	10 KΩ, ± 5%	33363U
R36	750 Ω, ± 5%	37873FG
R37	750 Ω, ± 5%	
VR1	2·0 MΩ, Volume	37940MM
VR2	0·25 MΩ, Tone	37963K
	INDUCTANCES	
L1, L2	Aerial Coil	94457A
L3	H.F. Coil	93010D
L4, L5	Osc. Coil	93010C
L6	Primary	See IFT1
L7	Secondary	
L8	M.W. AE Coil	92770B
L9	L.W. AE Coil	92770D
L10, L11	M.W. Osc. Coil	93004K
L12	L.W. Osc. Coil	93004K
L13	Primary	See IFT2
L14	Secondary	
L15	Primary	See IFT3
L16	Secondary	
L17	Primary	See IFT4
L18	Secondary	
L19	Primary	See IFT5
L20	Secondary	
L21	Tertiary	—
L22	Heater Choke	92645A
	TRANSFORMERS	
IFT1	I.F. Transformer	93004F
IFT2	I.F. Transformer	93004G
IFT3	I.F. Transformer	93004N
IFT4	I.F. Transformer	93004N
IFT5	I.F. Transformer	46551AM
TR1	Output Transformer	40435R
TR2	Mains Transformer	49760J
	SWITCHES	
SW1	W/C Switch	94296A
SW2	Mains ON/OFF Switch	See VR2
F1	Fuse, 1 amp	38825D
F2	Fuse, 1 amp	
VC1	Gang Capacitor	94295A
VC2		
	PILOT LAMPS	
PL1	Lamp, 6·8 v., 0·3 amp	35421D
PL2	Lamp, 6·8 v., 0·3 amp	

Note—In certain later models it may be found that C42 has been omitted to give improved I.F. stability.