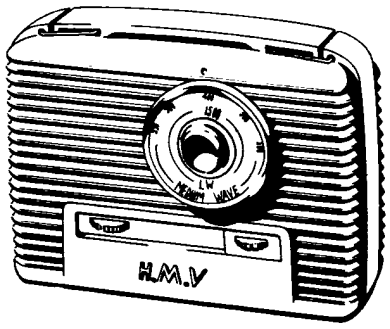
"HIS MASTER'S VOICE"

MODELS 1410B

1410G

SERVICE MANUAL

PORTABLE SUPERHET BATTERY RECEIVER



MODELS 1410B - BLUE

1410G - GREY

CONTENTS

Part No. 96321 Issue 1 June 1957

SPECIFICATION

Physical

Height 5¾ inches)
Width 7½ inches)Approx.
Depth 2⅝ inches)Overall.
Weight 2¼ lbs.(including Batteries)Approx.

Battery Supply

H.T. 67.5 volts (Ever Ready Type B139).
L.T. 4.5 volts (Three Ever Ready Type U11).

Consumption

H.T. 4.5 mA
L.T. 30 mA No Signal)Approx.
40 mA Average Signal)

Wave Ranges

M.W. 200-550 m (1500-545 kc/s)
L.W. 1000-2000 m (300-150 kc/s)

Intermediate Frequencies

470 kc/s

Valves

V1 DK96 Frequency Changer
V2 DF96 I.F. Amplifier
V3 DAF96 Detector A.G.C. and A.F. Amplifier

Transistors

TRA1 OC72)Push-Pull Output Stage
TRA2 OC72) (Matched Pair)

Aerial

Internal Ferrite Rod

Rated Output

215 mW

Loudspeakers

2½-inch High Flux Density,Permanent Magnet Type. The speech coil has a D.C. Resistance of 2½ Ω, and an impedance of 3 Ω at 1000 c/s.

CIRCUIT DESCRIPTION

The signals are fed via the Waveband switch (SW1) direct to the grid of V1. M.W. and L.W. coils are tuned by VC1 of the gang capacitor. The local oscillator section of V1 is grid tuned by L5 and VC2, and is inductively coupled by L6 to the oscillator anode. The resultant I.F. signal is inductively coupled to the grid of V2 (I.F. Amplifier) via IFT1.

Output from V2 (DF96) is coupled via IFT2 to the diode section of V3; the intermediate frequency is filtered by C12-R8-C13. The resultant filtered A.F. signal developed across RV1 is coupled via isolating capacitor (C14) to the grid of the pentode section of V3 (A.F. amplifier). A.G.C. is developed across R8-RV1 filtered by R7-C10 and is fed via aerial coils L1-L2 to the grid of V1.

V3 (DAF96) amplifies the A.F. signal which is fed via the interstage transformer (TR1) to the bases of TRA1 and TRA2; base bias is provided by the voltage drop across the Bias control (RV2).

Transistors TRA1 and TRA2 are used as a quiescent push-pull output stage. R11 provides emitter bias and increases the stability of the transistors. Output from this stage is fed via the output transformer (TR2) to the loudspeaker (LS1).

Battery Supplies

The H.T. supply is taken from one 67.5V battery and the L.T. from three 1.5V batteries.

The ON/OFF switch (SW2) disconnects the H.T. and L.T. negative supplies from the receiver.

DISMANTLING

Removal of Radio Chassis

1. To remove the tuning dial, place the thumb and fingers around the dial and carefully ease the dial off.
2. Hold the instrument firmly in the hand and release the back by way of the coin-slot provided on the underside of the cabinet, i.e. with the underside of the cabinet facing uppermost and the front facing away, insert coin into slot,gently press down and twist.
3. Disconnect the batteries.
4. Unsolder loudspeaker connection, and L.T. battery connection.
5. Loosen the screw securing the retaining plate located under the chassis in the centre of the cabinet, and slide the plate away from the chassis.
6. Withdraw the chassis from the cabinet.

NOTE: When replacing the chassis in the cabinet ensure that the wire link of the Wavechange switch sits in the "U" piece of the Wavechange knob assembly.

Removal of Loudspeaker

1. Remove radio chassis, operations 1,2,3, and 6 under "Dismantling".
2. Unsolder loudspeaker connections.
3. Carefully lever up in turn each centre piece of the spire nuts retaining the loudspeaker.
4. Withdraw loudspeaker assembly.

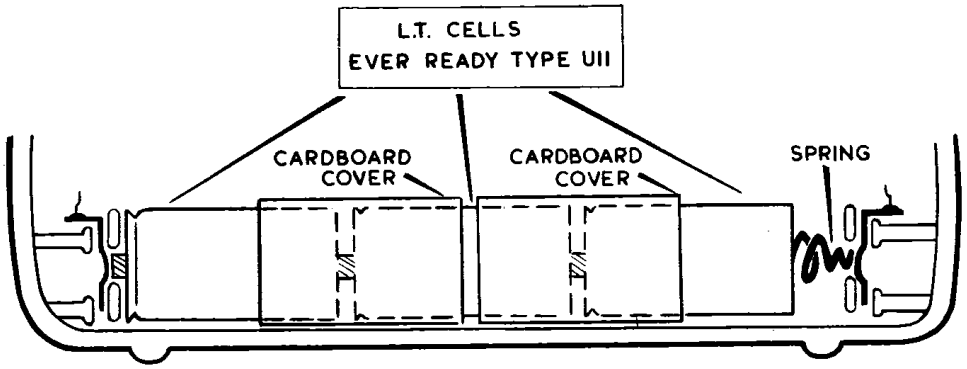
NOTE: Press the spire nuts flat before refitting.

REPLACING BATTERIES

L.T. Cells

Remove the back of the cabinet (see under "Dismantling" para.2). Depress the spring and remove L.T. cells and replace with three new 1.5V Ever Ready cells type U11 as follows.

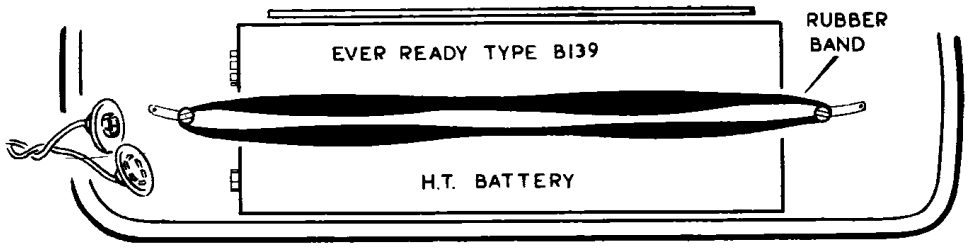
Remove and discard the cardboard cover of one of the cells. Position the cells as shown in the diagram below and then slide the cardboard covers of the other two cells over the gap in order to form a 'tube'. Fit this 'tube' into the receiver cabinet so that the outer case of the end cell is in contact with the terminal spring and that the brass terminal of the top cell is in contact with the other terminal. See diagram below.

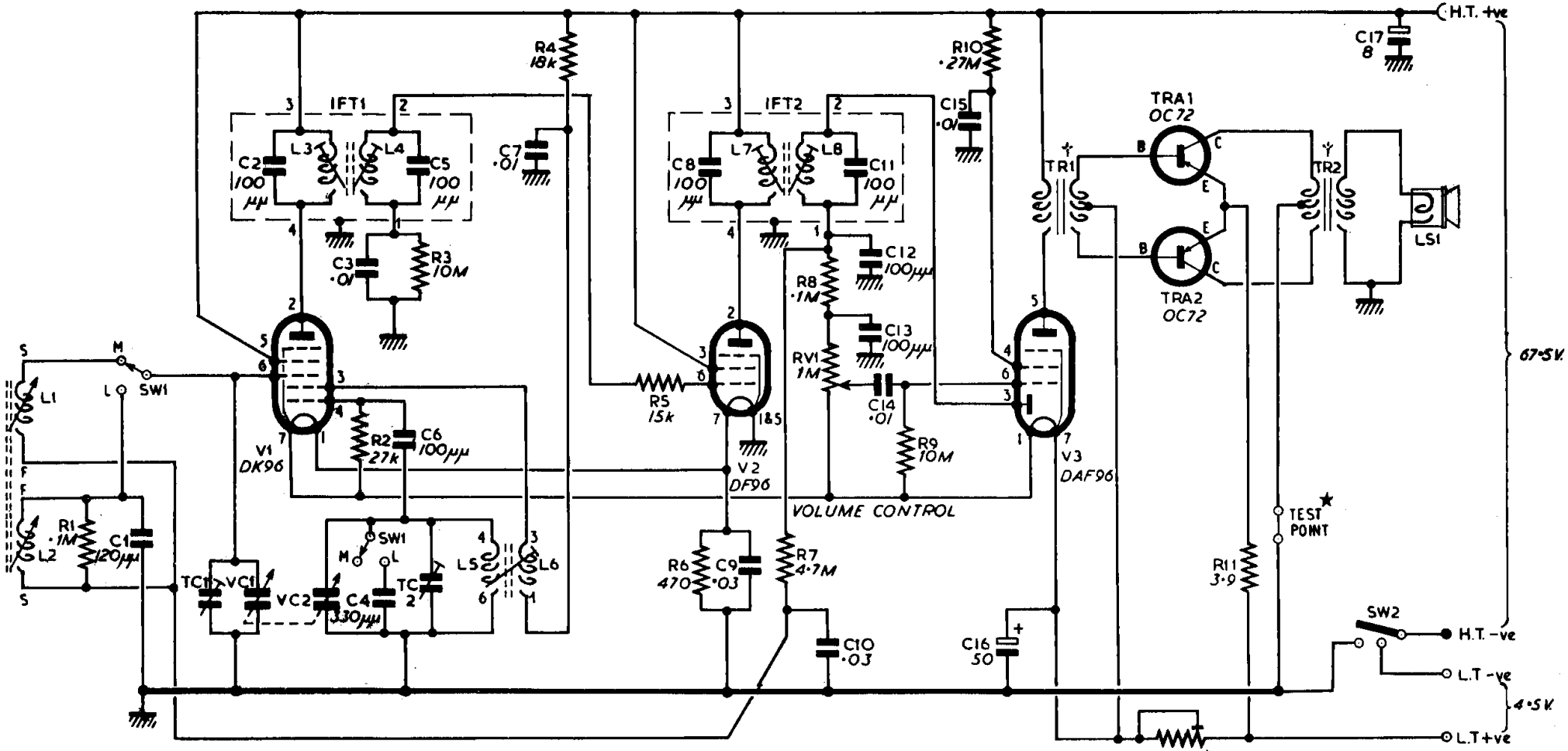


H.T. Cells

Withdraw battery from beneath rubber retaining band.
Remove stud and socket from battery terminals.

Replace with one Ever Ready type B139 67.5V battery and clip on the terminal stud and socket. To replace the back, hold the cabinet firmly and locate the upper edges together. Press on the lower edge.





NOTE: RV1 SHOWN IN MAX. LEFT HAND POSITION OF KNOB.

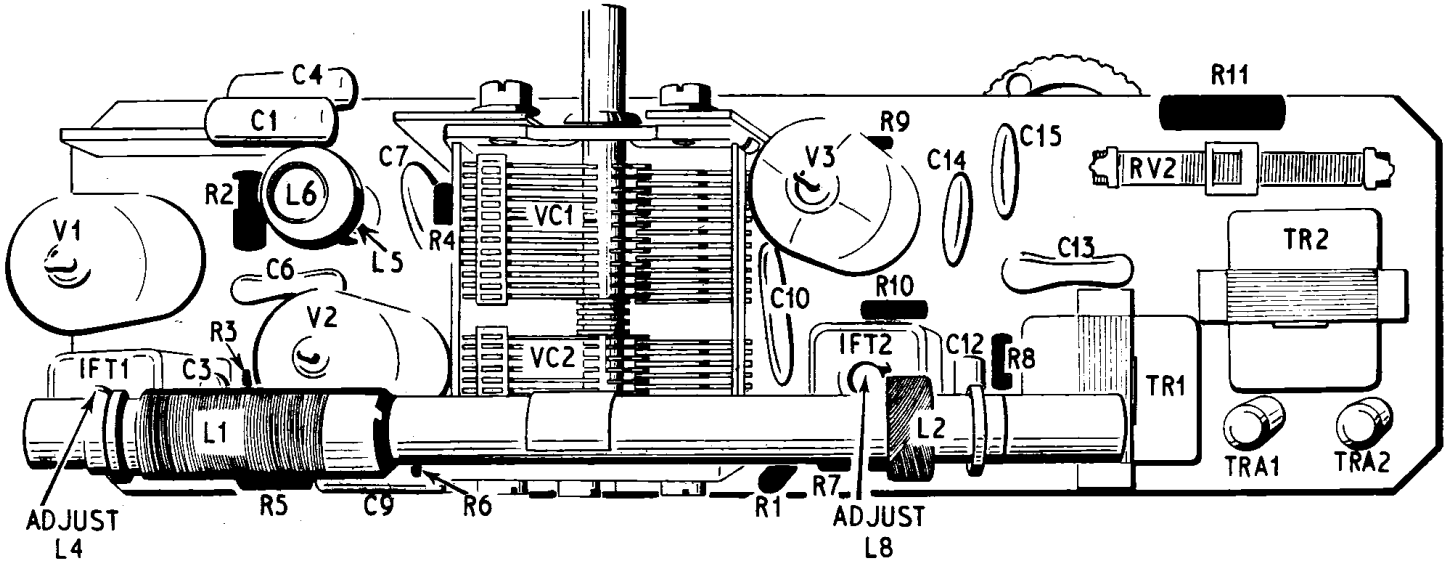
*TEST POINT MAY BE REMOVED FOR CURRENT MEASUREMENT DURING TRANSISTOR CHECKS.

†DO NOT USE A CONTINUITY TESTING DEVICE ON THE WINDINGS OF THESE TRANSFORMERS WITH THE TRANSISTORS IN CIRCUIT.

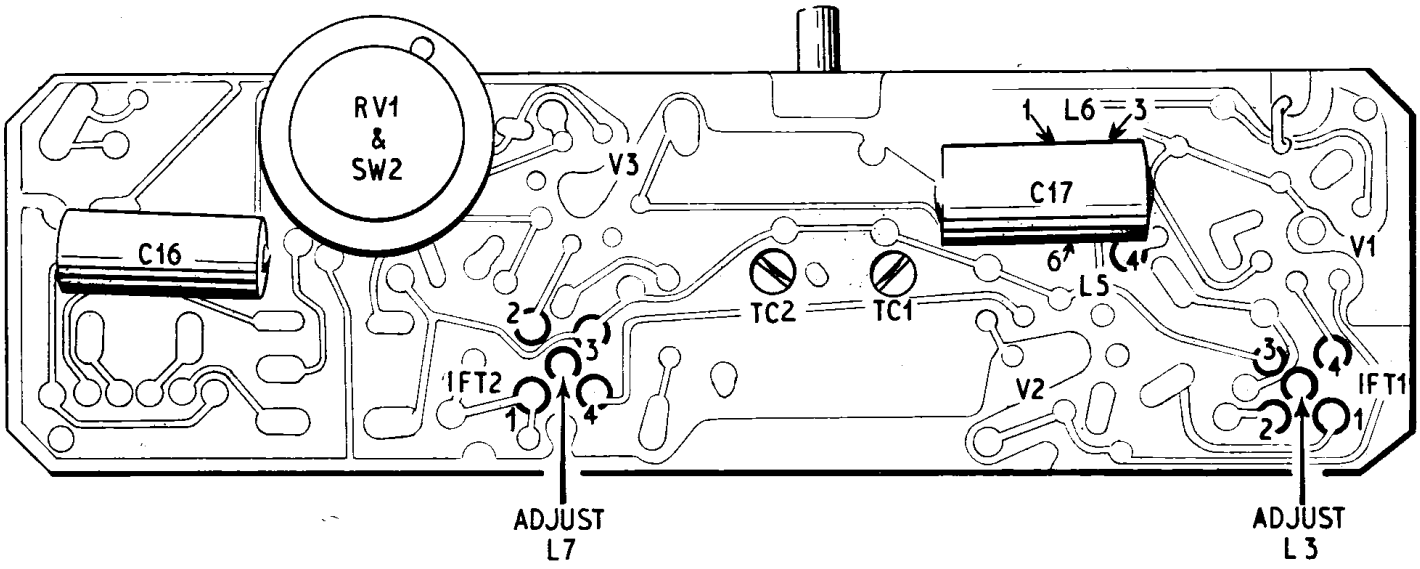
‡ON EARLIER MODELS THE RESISTANCE OF RV2 IS 12Ω

TECHNICAL PUBLICATIONS DIVN. TP7328/1

CIRCUIT DIAGRAM - MODEL 1410 B & G



TOP VIEW OF CHASSIS



UNDERSIDE VIEW OF CHASSIS

ALIGNMENT

I.F. Alignment

1. Set the Waveband Switch to M.W., the Volume control fully clockwise and the Gang Capacitor to minimum capacity.

2. Inject a 470 kc/s modulated signal into the grid of V1 (Pin 6) and chassis.

3. Adjust cores of L8, L7, L4 and L3 consecutively for maximum output.

R.F. Alignment

Connect a few turns of wire to the output leads of the signal generator and inductively couple the turns to the M.W. or L.W. coils (L1 or L2) on the Ferrite Rod.

Medium Wave

Set Volume Control to Maximum and Waveband Switch to M.W.

Operation No.	Set Signal Generator. metres	kc/s	Set Gang Capacitors.	Operation.
1	574	522	Maximum	Adjust core of L5 for maximum output
2	187	1602	Minimum	Adjust TC2 for maximum output Repeat operations 1 & 2.
3	510	588	Tune in	Adjust L1 for maximum output
4	210	1427	Tune in	Adjust TC1 for maximum output Repeat operations 3 and 4

Long Wave

Set Volume Control to Maximum and Waveband Switch to L.W.

Operation No.	Set Signal Generator. metres	kc/s	Set Gang Capacitors.	Operation
1	1852	162	Tune in	Adjust L2 for maximum output

N.B. L1 and L2 are adjusted in the factory and do not require re-adjustment, but if it found necessary to re-adjust these, they should be loosened with cellulose thinners.

VOLTAGE TABLE

The following table indicates the approximate static voltage and current readings obtained on each valve. Variations of ±15% may be anticipated between models.
A meter having a resistance of 20,000 Ω per volt should be used to measure voltages.

VALVE	ANODE Volts to Chassis		SCREEN Volts to Chassis
	MX. (Pin 2)	OSC. (Pin 3)	
V1 (DK96)	67	30	67.5
V2 (DF96)	67		67.5
V3 (DAF96)	65		50

Transistors

TRA1, TRA2 } See Transistor Bias Chart for current check.

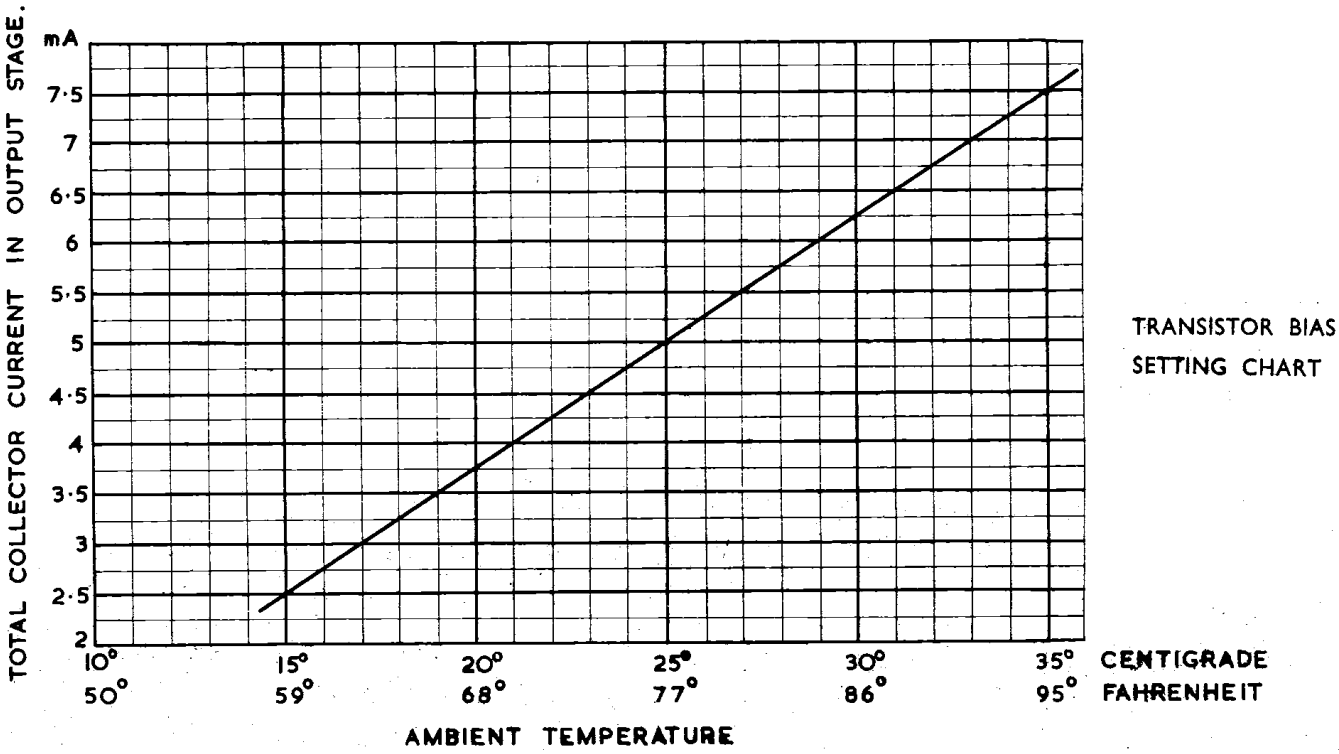
TOTAL H.T. CURRENT. 4.5 mA.
TOTAL L.T. CURRENT. 40 mA.

TRANSISTORS BIAS ADJUSTMENT

The preset Bias control (RV2) is adjusted at the factory and should not require further adjustment. If, however, replacement of the transistors becomesnecessary, RV2 should be adjusted in accordance with the Transistor Bias Setting Chart. The adjustment should be carried out as follows :-

Remove the radio chassis as described under "Dismantling". Unsolder one side of the test point link and connect in series a 0-10 mA meter. Switch the receiver on and position the tuner to a no-signal condition and volume control to minimum. The ambient temperature should now be taken.

Adjust sliding resistor RV2 for a current reading to correspond with the Bias Chart, e.g., if the ambient temperature is 20° centigrade the corresponding current reading for correct quiescent transistor bias should be 3.75 mA.



TRANSISTOR BIAS SETTING CHART

HINTS ON SERVICING TRANSISTORS

Normal methods may be used for checking the part of the circuit incorporating thermionic valves. Care should, however, be taken not to short circuit L.T. or H.T. with the meter probe.

The output stage should preferably be tested under dynamic conditions. If this is not possible, the stage may be checked under static conditions, i.e., with no signal.

A faulty transistor will result in bad distortion of the output, in which case a current check is permissible and if the current is approximately equal to half of the total current through the collectors, then it is most probable that one of the transistors is faulty. As already mentioned in the"Specification", the transistors are of matched pairs, therefore, it is suggested that both transistors should be replaced with a new matched pair.

It is not recommended to use any continuity test meter on circuits incorporating transistors.

Excessive heating either by a soldering iron or due to excess current can cause a transistor to become faulty.

It is not recommended to disconnect the transistor leads for checking, but points which can be broken for test purposes are incorporated in the circuitry.

Should occasion arise for replacement of a transistor, heat shunts must be used, i.e., the leads of the transistor must be held with a pair of pliers and after soldering, the pliers must still be held in position until there is no danger of heat transference to the junction of the transistor and its leads (these junctions have extremely low temperature melting point).

In general, transistors are more rugged than normal thermionic valves but can be more prone to damage if handled carelessly. It can be emphasised however, that transistors be regarded as a reliable component and when a faulty receiver is being examined, the transistors should not be unduly suspected.

SPARE PARTS LIST

PART No.	DESCRIPTION	No. PER INST.	FIN-ISH
	INSTRUCTIONS		
96317	Instruction Card	1	00
96314	Cabinet Label	1	00
96360	Guarantee Card	1	00
96098A	Serial No. Label	1	00
	CABINET AND FITTINGS		
96048A	Cabinet Body) Model 1410B	1	00
96049A	Cabinet Back) only	1	00
96048B	Cabinet Body)Model 1410G	1	00
96049B	Cabinet Back) only	1	00
96067A	Handle Model 1410B only	1	00
96067B	Handle Model 1410G only	1	00
96068	Spring Clips on Handle	2	00
96069A	Wavechange Slider Knob	1	00
96070	Metal Slider Link	1	689
92362	Spire Nut securing Knob to Slider Link	1	00
93991	Rubber Band on Cabinet Back	1	00
15159	Tags retaining Rubber Band	2	104
96076	PK Screws securing Tags	2	689
95896	HMV Emblem	1	00
	CONTROL KNOBS		
See RV1 Assy.	"Volume" Knob	1	00
96077A	"Tune" "	1	00
96069A	"Wavechange" Knob	1	00
96079	Pin)securing Tuning	1	689
96080	Spring) Knob	1	00
92362	Spire Nut securing Wavechange Knob	1	00
96229	Felt Washers on Tuning Spindle	2	00
	LOUDSPEAKER		
96072A	Loudspeaker complete - 2½" Round	1	00
96073	Spire Nuts securing loudspeaker	4	00
	CHASSIS ASSEMBLIES		
96050B	Radio Unit complete	1	00
96074	Clamp)securing Radio	1	689
96075	PK Screw)Unit in Cabinet	1	689
	SWITCHES		
96059A	SW1 - Wavechange Switch	1	00
37465	PK Screw securing SW1	2	00
See RV1	SW2 - ON/OFF Switch	-	-
96057	Wire Switch - operating link for S.W.1	1	689
96058	Washer on Switch - operating link for S.W.1	1	689
10048	Eyelet on Switch - operating link for S.W.1	1	00
	VALVES, VALVEHOLDERS & TRANSISTORS		
DK96	V1 - Frequency Changer	1	00
DF96	V2 - IF Amplifier	1	00
DAF96	V3 - Detector, AGC & LF Amplifier	1	00
96065A	(TRA1 (TRA2 (Matched pair Transistors OC72)	1	00
96051A	Valveholders for V1,2 & 3.	3	00
	BATTERIES		
Ever Ready	B139 67.5v HT Battery	1	00
" "	U11 1.5v LT Cells	3	00
	BATTERY CONNECTORS, WIRING Etc.		
96064	LT + Battery Contact	1	454
96064A	LT - Battery Contact Spring Assembly	1	00
41232A	HT + Battery Connector Socket	1	00
41229A	HT - Battery Connector Stud	1	00
143/404/230 - 9	PVC covered connecting wire 1/024	-	-
144/401/040 - 9	Flexible PVC covered connecting wire 14/.0048 (Battery Leads, etc.)	-	-
	NB. For colour required change last figure as per Standard Colour Code.		
143/051/240	24 SWG Tinned Copper Wire		
141/401/024	1 mm Yellow PVC Sleeving	-	-
141/403/508	4 mm Clear Sleeving	-	-
	INDUCTORS		
92780B	L1 - MW Aerial Coil	1	00
92770D	L2 - LW Aerial Coil	1	00
92690B	L3) L4) 1st. IF Transformer	1	00

PART No.	DESCRIPTION	No. PER INST.	FIN-ISH
Inductors (Continued)			
92760B	L5, L6 Oscillator Coil (MW)	1	00
92690B	L7, L8 2nd. IF Transformer	1	00
92693	Dust Iron Cores for IFT1 & 2	4	00
92695A	Screening Can only for IFTS	2	00
40907	Dust Iron Core for L5/6	1	00
96056	Ferrite Rod for L1 & L2	1	00
12613	Cleat securing Ferrite Rod to Paxolin Panel	1	689
200040G	Screw securing Cleat	1	689
201804	SP Washer to Panel	1	00
200404	Nut	1	689
96055A	Paxolin Panel Assy. - supporting Ferrite Rod	1	00
200040D	Screws securing Panel to Gang Capacitor	2	689
49825	Solder Tags only on Paxolin Panel	4	00
92800D	TR1 Interstage Transformer	1	513A
92800B	TR2 Output Transformer	1	513A
RESISTORS			
33362EA	R1 - 100 kΩ 20% ¼w	1	00
33362ND	R2 - 27 kΩ 10% ¼w	1	00
33362EN	R3 - 10 MΩ 20% ¼w	1	00
33362KG	R4 - 18 kΩ 10% ¼w	1	00
33362BV	R5 - 15 kΩ 10% ¼w	1	00
33362BL	R6 - 470 Ω 10% ¼w	1	00
33362EL	R7 - 4.7 MΩ 20% ¼w	1	00
33362EA	R8 - 0.1 MΩ 20% ¼w	1	00
33362EN	R9 - 10 MΩ 20% ¼w	1	00
33362NE	R10 - 0.27MΩ 10% ¼w	1	00
37860LT	R11 - 3.9 Ω 10% ¼w	1	00
96061A	RV1 - 1 MΩ volume control assembly complete with knob and ON/OFF switch	1	00

PART No	DESCRIPTION	No. PER INST.	FIN-ISH
96062	Spacers	2	689
200100N	Screws securing RV1	2	689
200410	Nuts Assembly to	4	689
96063	Wiring Tags printed Panel	2	00
210310	Washers	2	689
96060B	RV2 - Preset Bias control (15 Ω)	1	00
CAPACITORS			
38117TH	C1 - 120 μμF 2% 750v	1	00
38014TF	C2 - 100 μμF 2% (See IFT1)	1	00
38109B	C3 -0.01 μF -20%+80% 500v	1	00
38492VK	C4 - 330 μμF 2% 250v	1	00
38014TF	C5 - 100 μμF 2% (See IFT1)	1	00
38117DG	C6 - 100 μμF 20% 750v	1	00
38109B	C7 - 0.01 μF -20%+80% 500v	1	00
38014TF	C8 - 100 μμF 2% (See IFT2)	1	00
38137A	C9 - 0.03 μF -20%+80% 500v	1	00
38137A	C10 - 0.03 μF -20%+80% 500v	1	00
38014TF	C11 - 100 μμF 2% (See IFT2)	1	00
38117DG	C12 - 100 μμF 20% 750v	1	00
38117DG	C13 - 100 μμF 20% 750v	1	00
38109B	C14 - 0.01 μF -20%+80% 500v	1	00
38109B	C15 - 0.01 μF -20%+80% 500v	1	00
38420G	C16 - 50 μF Electrolytic 12v	1	00
38420F	C17 - 8 μF Electrolytic 100v	1	00
See VC1 & 2	TC1, TC2 Part of Twin Gang Tuning Capacitor Assy.	-	-
96052A	VC1 Twin Gang Tuning, VC2 Capacitor Assembly	1	00
96053	Front Metal End Plate supporting Gang Capacitor and Switch Assembly	1	689
96054	Rear Metal End Plate supporting Gang Capaciter	1	689
200040D	Screws securing Front	4	689
201804	SP Washers & Rear Plates	4	00