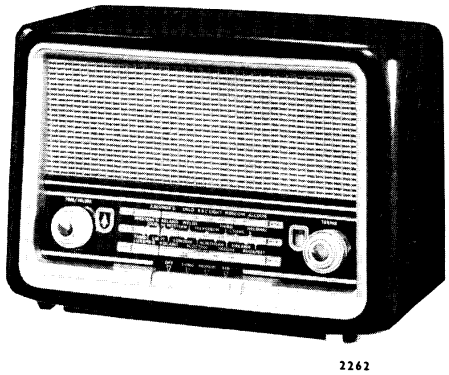
BUSH RADIO

Service Information

Models VHF.71 & VHF.72
3-waveband
(including VHF.)
A.C./D.C. Table Radio



2262

VHF.71

CONTENTS

List of Illustrations

GENERAL DESCRIPTION

GENERAL

This is a seven-valve (including rectifier) superheterodyne receiver for operation on mains of 200–250V d.c. or a.c. (40–100 c/s). There is coverage of the long, medium and v.h.f. bands.

CABINET

The VHF.71 has a moulded Bakelite cabinet in maroon with brass trim. The knobs are cream with brass trim.

The VHF.72 has a moulded walnut-veneer cabinet with brass trim.

	VHF.71	VHF.72
Width	$16\frac{3}{4}$ in.	$18\frac{3}{4}$ in.
Height	$11\frac{1}{4}$ in.	$11\frac{7}{8}$ in.
Depth	$7\frac{3}{4}$ in.	9 in.
Weight	$13\frac{3}{4}$ lb.	$15\frac{1}{4}$ lb.

SPECIFICATION

WAVEBANDS

Long waveband	1,050 to 1,935 metres (284 to 155 kc/s)
Medium waveband	187 to 560 metres (1,605 to 535 kc/s)
VHF band	87·5 to 100 Mc/s.

SCALE CALIBRATION

The long and medium wavebands are calibrated in metres and station names, and the VHF band in megacycles per second with blocks for the Home, Light and Third programmes marked on the scale.

INTERMEDIATE FREQUENCY

470 kc/s (L.W. and M.W.)
10·7 Mc/s (V.H.F.)

VOLTAGE RANGE

200–250 volts a.c. 40 to 100 cycles per second or d.c. There are two settings, viz. 200V–229V and 230V–250V adjustable by reversing the adjustment panel.

POWER CONSUMPTION

40 watts.

AERIAL AND EARTH

There is an internal ferrite-rod aerial for long and medium wavebands. It is mounted on a fibreboard cradle rotatable for optimum reception from the back of the receiver. For f.m. reception there is a balanced dipole fitted in the cabinet back. This is connected to the receiver by means of an 80-ohm line and a 2-pin plug. On both bands there is provision for using an external aerial.

LOUDSPEAKERS

VHF.71 6 in. × 4 in. elliptical, p.m. flux density 8,500 lines per sq. cm.

VHF.72 has, in addition, an electrostatic tweeter.

VALVES

V1	UCC85	r.f. amplifier and mixer for f.m.
V2	UCH81	mixer/oscillator for a.m. and i.f. amplifier for f.m.
V3	UF89	i.f. amplifier for a.m. and f.m.
V4	UABC80	detectors for a.m. and f.m., a.g.c. diode, audio amplifier.
V5	UL84	power output.
V6	UM80	tuning indicator.
V7	UY85	mains rectifier.

CONTROLS

In the centre below the scale, a 4-button piano-key switch, one key for selecting each of the three wavebands and one for switching off. On the right of the scale the Tuning control and on the left of the scale the concentric Volume (inner) and Tone (outer) controls.

AUDIO OUTPUT

2 watts.

DISMANTLING

REMOVING THE CHASSIS FROM THE CABINET

1 The chassis is held to the cabinet by four Phillips-head screws, two at the top corners of the chassis and two at the bottom corners removable from underneath the cabinet. Remove all four screws.

2 Remove the two screws retaining the ferrite rod aerial supporting bracket. Loosen the nut retaining the cleat holding the output-transformer leads.

The leads to the output transformer are long enough to permit the chassis to be removed.

REMOVING THE VHF BOX FROM THE CHASSIS

1 Unsolder the five connections to the box. They are (see Fig. 1).

tag 1 to S1f and via C18 to chassis.
tag 2 to HFC1.
tag 3 to pin 5, V2
tag 4 to S1a.
tag 5 to chassis.

2 Set the tuning capacitor to minimum and unhook the spring (Fig. 5) from the drive drum.

3 Remove the cord drive from the drive drum.

4 Release and remove the screw and washer and the grub screws from the drum and remove this.

5 Remove the cord loop from the boss on the pivoted adjuster.

6 Remove the four screws holding the v.h.f. box retaining-bracket to the tuning capacitor.

7 Remove the three Phillips-head screws (see Fig. 2) from the front of the chassis.

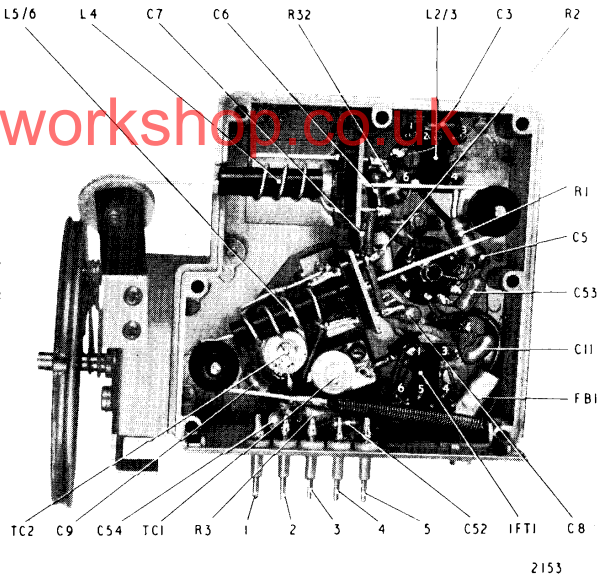


Fig. 1 *VHF box—Component layout*

ALIGNMENT PROCEDURE

WARNING

This is an a.c./d.c. receiver. It is best always, when servicing, to connect the receiver to the mains via an isolating transformer or at least to connect the chassis to the neutral side of the mains. No earth connection either direct or through earthed equipment should be made to the receiver.

GENERAL NOTES

1 The receiver must be aligned outside the cabinet (the method of removing the chassis is described on page 3). It and the generator should be switched on about 15 minutes before beginning the alignment.

2 The equipment required is:—

(i) A signal generator covering 200 kc/s to 1,500 kc/s, 10·7 Mc/s and 87·5 Mc/s to 100 Mc/s.
(ii) An output meter to match to 2·5 to 3 ohms impedance.
(iii) A non-metallic trimming tool.
(iv) An Avometer model 8 or both a d.c. valve voltmeter and a microammeter (50 μA f.s.d.).
(v) Two 47 k, 5%, ¼ watt resistors and a 1 k, ¼ watt resistor.

A.M. STAGES

I.F. Alignment

Notes: The primary of all IFT's is at the bottom of the can.

Switch the receiver to the M.W. band. Set the tuning pointer to 300 metres. Turn the Volume control to maximum and the Tone control to maximum top. The signal should be injected via a 0·1 μF capacitor.

1 Inject a signal of 470 kc/s, modulated 30 per cent. at 400 c/s to pin 2, V3 and adjust the cores of IFT5 for maximum output.

2 Transfer the signal to pin 2, V2 and adjust the cores of IFT2 to produce maximum output.

During this procedure the i.f. input should be adjusted so as to produce an output of 50 mW each time a final trimming adjustment is made to any core.

R.F. Alignment

Notes: For the alignment of the long and medium wavebands the signal should be applied to pin 2, V2. Turn the Volume control to maximum and the Tone control to maximum top.

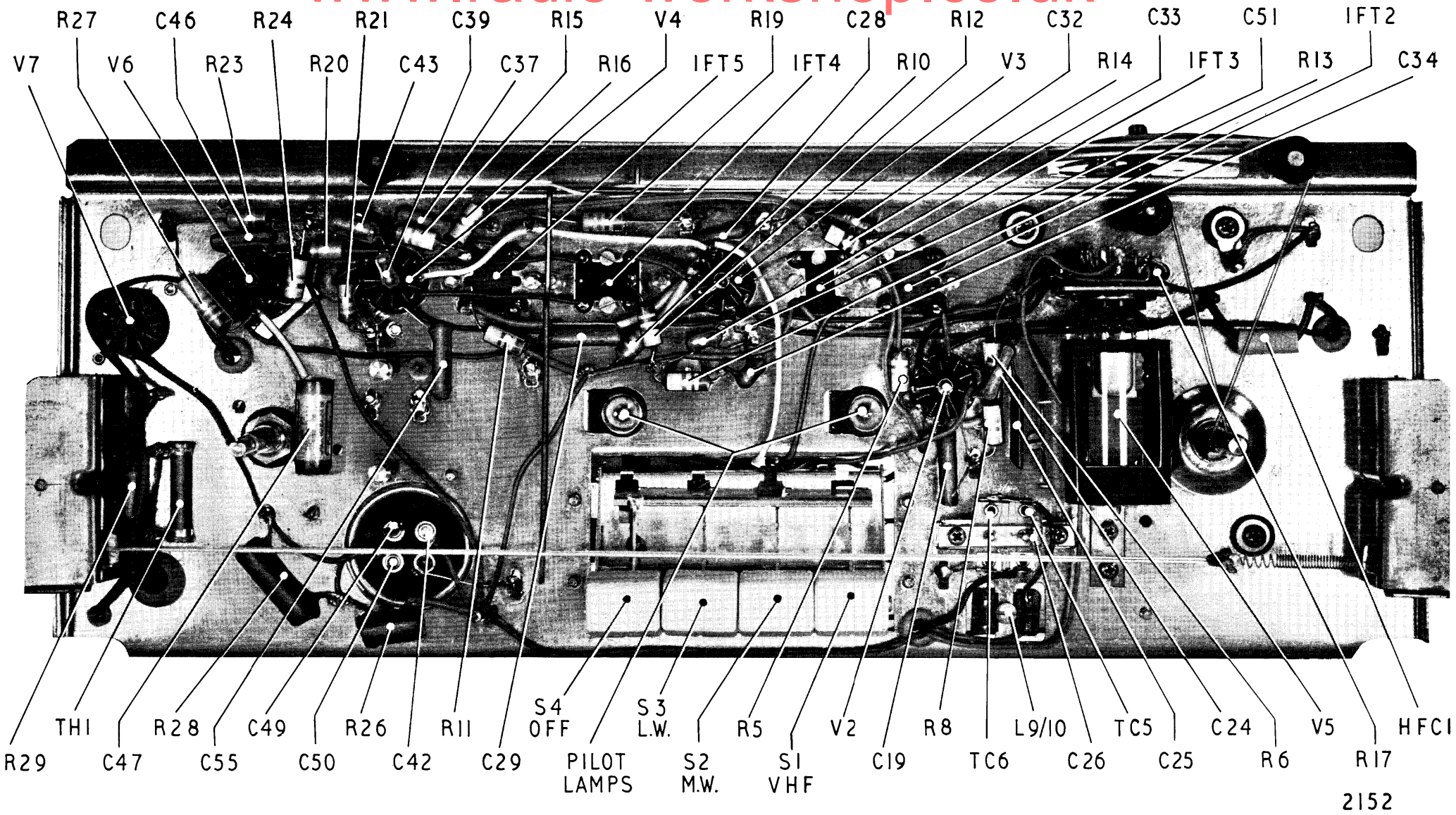


Fig. 2 *Front view of chassis*

Alignment Procedure continued

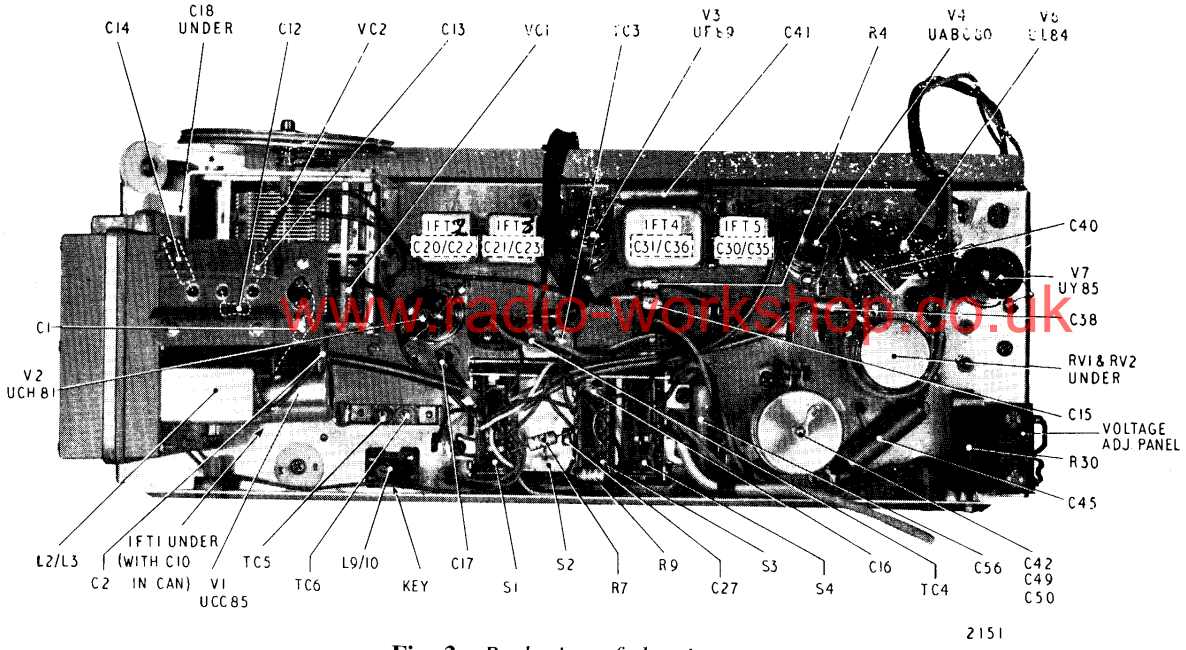


Fig. 3 *Back view of chassis*

Operation	*Waveband*	*Signal Generator Frequency*	*Receiver Calibration*	*Adjust for Maximum*
1	M.W.	600 kc/s	500 metres	L9/L10 (Osc.)
2	M.W.	1,500 kc/s	200 metres	TC6 (Osc.)
3	Repeat operations 1 and 2 and check calibration.			
4	L.W.	214 kc/s	1,400 metres	TC5 (Osc.)

F.M. STAGES

I.F. Alignment

Notes: IFT3 has the primary at the bottom of the can and IFT4 has the primary at the top.

Before commencing alignment check the position of the iron-dust cores as follows:—IFT3: primary core to be flush with the former and secondary core to be $\frac{1}{8}$ in. inside the coil former. IFT4: primary core to be $\frac{3}{4}$ in. inside the coil former, secondary core to be $\frac{3}{8}$ in. inside the coil former.

The correct peak for all the cores except that of the discriminator primary is the first one reached entering the winding from either the base or the top of the former.

During alignment the signal input must always be maintained at a level just sufficient to produce an output of 4V d.c. each time an adjustment is made to any core.

The two 47 k resistors and the meters should be connected as shown in Fig. 4.

The signal should be applied via a 0·1 μF capacitor.

Set the Volume control to minimum.

1 Inject an i.f. signal of 10·7 Mc/s to pin 2, V2, and adjust the primary core of IFT4 to produce maximum d.c. output.

2 Adjust the secondary core of IFT4 to produce zero on the d.c. balance meter.

3 Connect the 1 k damping resistor across the secondary of IFT3 and adjust the primary core for maximum d.c. output.

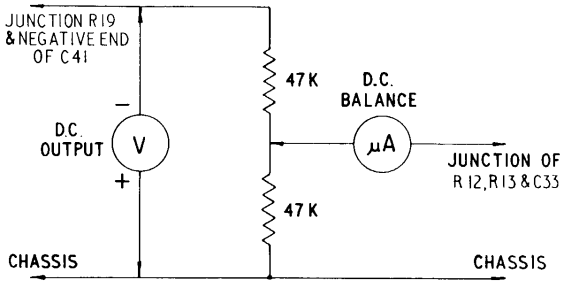


Fig. 4 *Connection of meters*

4 Transfer the damping to the primary and adjust the secondary core for maximum d.c. output. Remove the damping.

5 Readjust the primary core of IFT4 for maximum d.c. output.

6 Readjust the secondary core of IFT4 for zero on the d.c. balance meter.

R.F. Alignment

Inject an 87·5 Mc/s signal at the aerial sockets and set the pointer to 87·5 Mc/s (this corresponds with the third programme block on M.W.) then,

1 Slacken the locking screw (see Fig. 5) on the pivoted adjuster and rotate the arm, thus adjusting the cores of L4 (r.f.) and L5/6 (oscillator) for maximum d.c. output. Then retighten the locking screw.

2 Set the generator and the pointer to 94 Mc/s and adjust the core of L2/3 for maximum d.c. output.

3 Check calibration.

Note: TC1 (the oscillator-bridge balancing trimmer) has been pre-set at the factory to produce minimum oscillator radiation and TC2 has been pre-set in conjunction with the mechanical adjustment of L4 and L5/L6 for optimum calibration. It is extremely unlikely that these settings will subsequently vary and therefore no data are given for them.

Replacement of V1 may cause slight changes in oscillator calibration. Resetting the core as in 1 above will correct this.

MAINTENANCE

REPLACEMENT OF A.M. TUNING CORD DRIVE

To replace the cord drive, the knobs and tuning scale must first be removed. The left-hand knob is a dual concentric control in two parts and the grubscrew holding the inner part is accessible through a hole in the outer part. The outer part is a push fit. The right-hand knob is held by a grubscrew. Once the knobs have been removed the scale may be removed by unscrewing the retaining clamps at each end and tilting it forward to clear the control spindles and piano keys.

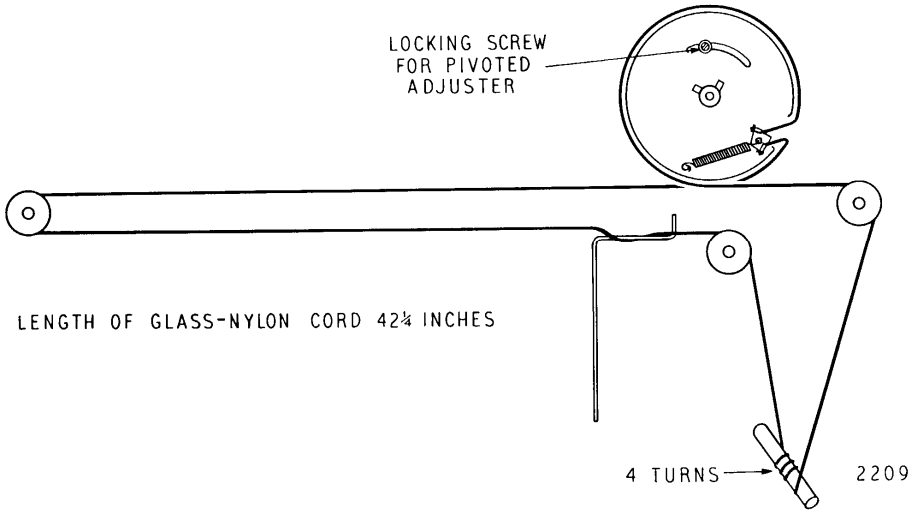


Fig. 5 *Cord drive—A.M.*

Fig. 5 shows the method of assembling the cord drive. With the tuning capacitor set to maximum the pointer should be set to line up with the dots on the right-hand end of the scale.

REPLACEMENT OF F.M. TUNING CORD DRIVE

If a breakage occurs in either the cord or the cores the complete assembly should be replaced. A recommended procedure for replacement is as follows:—

Remove the chassis from the cabinet. Unscrew and remove the top cover of the VHF box. Set the tuning capacitor to minimum. Unhook the spring (Fig. 5) from the drive drum and remove the screw and washer then remove the drive drum.

Replace the cord as shown in the diagram.

After reassembly check that the dial pointer coincides with the datum line dots at the right-hand end of the scale when the tuning capacitor is at maximum capacity and reset the pivoted adjuster as described in the alignment procedure.

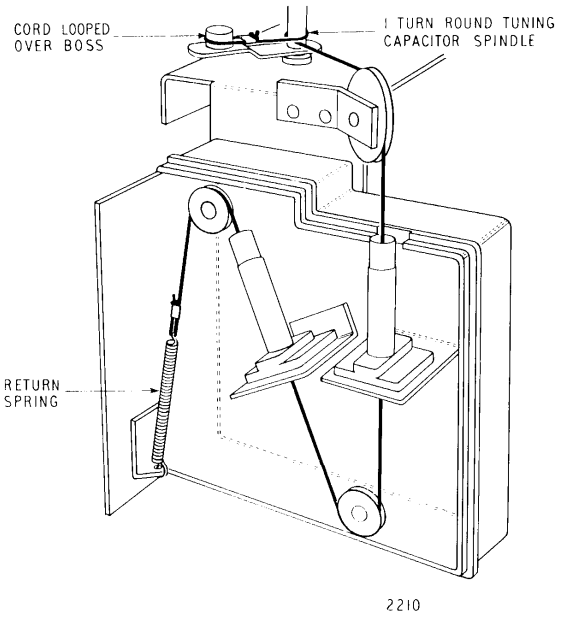
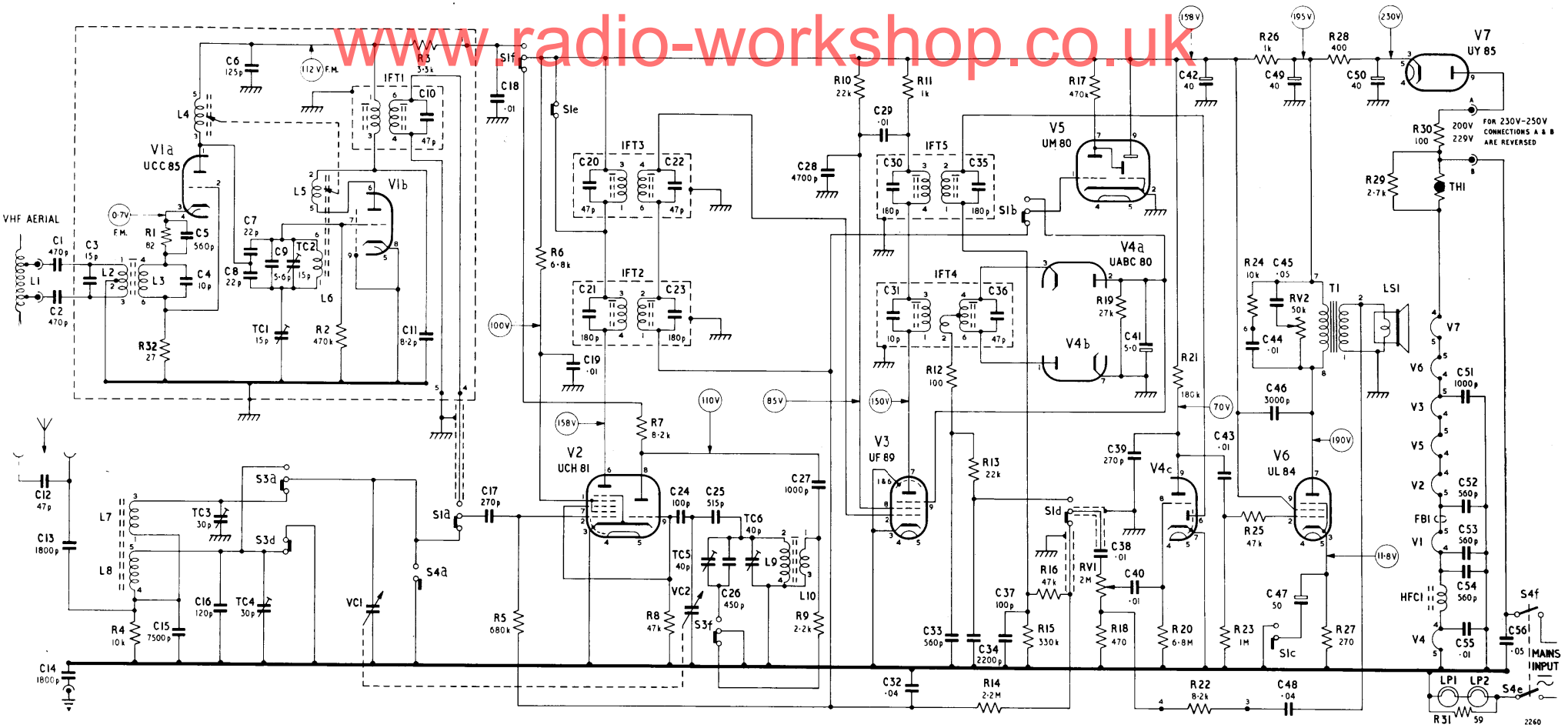
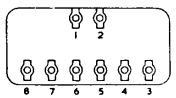


Fig. 6 *Cord drive—F.M.*



NOTES

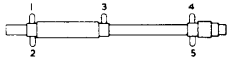
1. ALL VALUES OF RESISTANCE IN OHMS & ALL VALUES OF CAPACITANCE IN µF UNLESS OTHERWISE STATED.
2. ALL VOLTAGES MEASURED WITH AVO MODEL 8, CHASSIS NEGATIVE, ON 1000V., OR 10V. RANGES. READINGS MARKED F.M. WILL BE OBTAINED WITH WAVE CHANGE SWITCH IN F.M. POSITION. ALL OTHER READINGS TAKEN WITH SWITCH IN M.W. POSITION.


OUTPUT TRANSFORMER

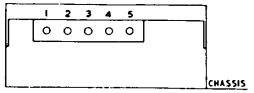

COIL FORMER VIEWED FROM ABOVE


IFT BASE VIEWED FROM UNDERNEATH (IFT 2 & 5)

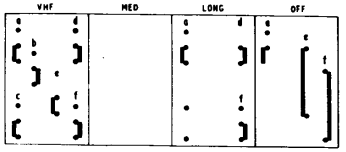

VALVE BASE B9A VIEWED FROM UNDERNEATH


FERRITE AERIAL


IFT BASE VIEWED FROM UNDERNEATH (IFT 1, 3 & 4)



CONNECTIONS TO VHF. HEAD



PIANO KEY SWITCH POSITIONS (IN M.W. POSITION)

Fig. 7 *Circuit diagram— VHF 71 (see under "Modifications" page 12)*

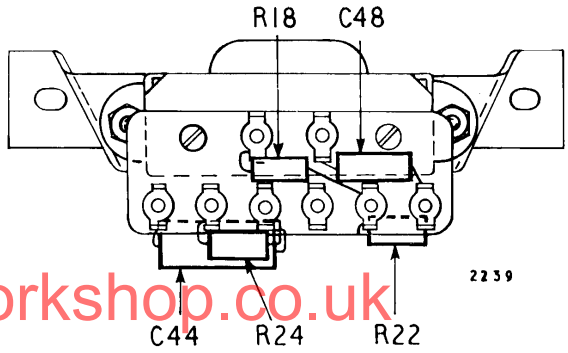


Fig. 9 *Output-transformer component layout—VHF. 71*

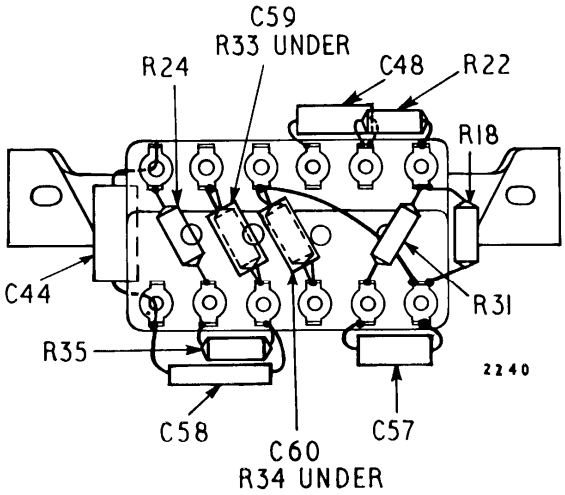


Fig. 10 *Output-transformer component layout—VHF.72*

PARTS LISTS

Note: Ordering to these part numbers will give the right type and rating of component. When fitting replacements from stock always use the same type as that of the component being replaced.

CAPACITORS

Reference	*Value*		*Tolerance*	*Rating*	*Part Number*
	µF	pF	(±%)	*(volts)*	
C1	—	470 (BS415)	20	750	AP61234
C2	—	470 (BS415)	20	750	AP61234
C3	—	15 (N750)	10	750	AP24519
C4	—	10	5	350	AP18211
C5	—	560	20	750	AP23405
C6	—	125 (N750)	2	750	AP61526
C7	—	22 (P100)	2	750	AP24626
C8	—	22 (P100)	2	750	AP24626
C9	—	5·6 (N750)	·5p	750	AP24628
C10	—	47	5	350	AP24848
C11	—	8·2 (N750)	5	750	AP61525
C12	—	47 (N750)	20	750	AP17338
C13	—	1800 (BS415)	+50—20	750	AP61170
C14	—	1800 (BS415)	+50—20	750	AP61170

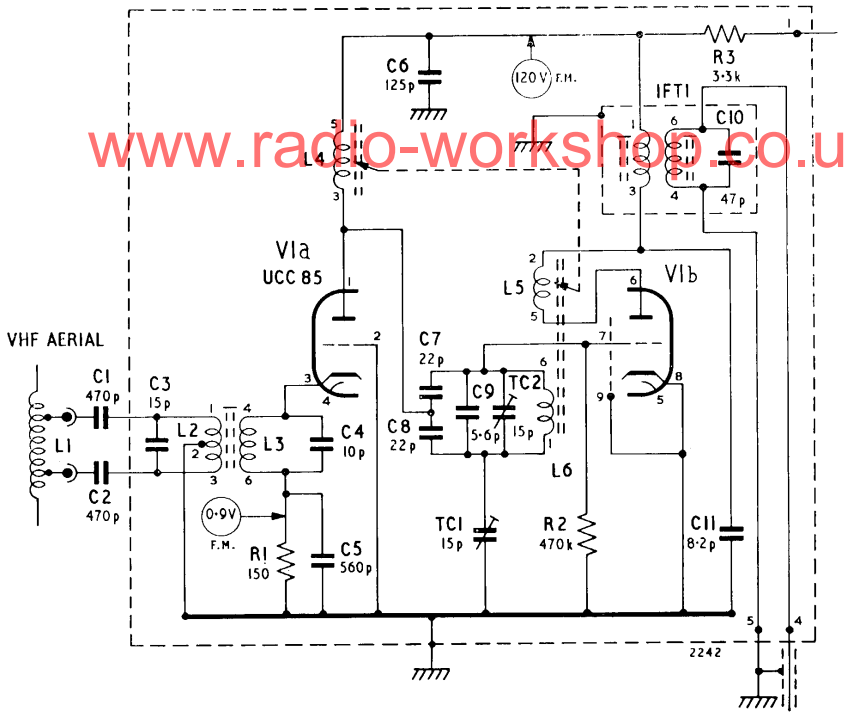
Reference	*Value*		*Tolerance*	*Rating*	*Part Number*
	μF	pF	(±%)	*(volts)*	
C15	—	7500	5	125	AP61529
C16	—	120	2	125	AP60753
C17	—	270	20	500	AP21906
C18	0·01	—	20	750	AP24640
C19	0·01	—	20	750	AP24640
C20	—	47	5	350	AP24848
C21	—	180	2	125	AP61925
C22	—	47	5	350	AP24848
C23	—	180	2	125	AP61925
C24	—	100 (N750)	20	750	AP17336
C25	—	515	1	350	AP17175
C26	—	450	2	125	AP61527
C27	—	1000	+75—0	750	AP27601 or AP22746
C28	—	4700	10	750	AP61528
C29	0·01	—	20	750	AP24640
C30	—	180	2	125	AP61925
C31	—	10	5	350	AP24847
C32	0·04	—	20	200	AP24028
C33	—	560	20	750	AP23405
C34	—	2200	10	750	AP24717
C35	—	180	2	125	AP61925
C36	—	47	5	350	AP24848
C37	—	100	20	750	AP17336
C38	0·01	—	25	350	AP24117
C39	—	270	20	500	AP21906
C40	0·01	—	25	350	AP24117
C41	5	—	+50—20	50	AP61921
C42	40	—	+50—20	275	AP61530
C43	0·01	—	25	350	AP24117
C44	0·01	—	25	500	P3769
C45	0·05	—	20	500	P8997
C46	—	3000	20	750	AP61595
C47	50	—	+50—20	12	AP61531
C48	0·04	—	20	200	AP24028
C49	40	—	+50—20	275—	In same can
C50	40	—	+50—20	275—	with C42
C51	—	1000	+75—0	750	AP27601 or AP22746
C52	—	560	20	750	AP23405
C53	—	560	20	750	AP23405
C54	—	560	20	750	AP23405
C55	0·01	—	20	750	AP24640
C56	0·05	—	20	500	P8997
C57†	0·02	—	20	150	AP22251
C58†	0·002	—	25	500	P8995
C59†	0·01	—	25	500	P3769
C60†	0·01	—	25	500	P3769
VC1	—	528 Ganged	—	—	AP19830
VC2	—	528 Ganged	—	—	AP19830
TC1	—	3–15	—	—	AP24623
TC2	—	3–15	—	—	AP24623
TC3	—	3–30	—	—	AP21918
TC4	—	3–30	—	—	AP21918
TC5	—	3–40	—	—	AP24820
TC6	—	3–40	—	—	AP24820

† Used on VHF.72 only.

MODIFICATIONS

VHF.71

Models of VHF.71 with serial numbers below 800 had a slightly different circuit in the VHF tuner. This was as shown in Fig. 11. R1 was 150Ω, ±10%, ¼W. Pt. No. P6155.



Circuit (Fig. 7)

This has been modified from that shown in the manual as follows:—

R19 is now 39k

R33, 68k is now fitted between junction of RV1 and R18 and pin 9, V6 (i.e. h.t. line).

VHF.72

Circuit (Fig. 8)

This has been modified from that shown in the manual as follows:—

R18 is now 820Ω

R19 is now 39 k

R37, 150k is now fitted between junction of RV1 and R18 and pin 9, V6 (i.e. h.t. line).

The resistor across the pilot lamps labelled R31 should be R36.

Both Models

Component Layout (Fig. 3).

R33 (R37 on VHF.72) is now connected between RV1 and the h.t. point near IFT4.

The parts lists have been modified to incorporate all these changes.

SPARES AND SERVICE

When ordering replacement components, dealers are requested to give the following information:—

1 The model number of the receiver.
2 The serial number of the receiver (located on the bottom rear edge of the cabinet).
3 Description of the components.
4 Part numbers of the components.
5 Quantity required.

To avoid unnecessary delay, orders for replacement parts and requests for technical information should be addressed to:—

THE SERVICE DEPARTMENT

BUSH RADIO LIMITED

KEW WORKS . MORTLAKE ROAD . KEW . RICHMOND . SURREY

Telephone: PROspect 8271/4

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RADIO

PILOT LAMPS—HIGH FAILURE RATE—VHF 71/72

All cases that The Service Department have investigated have been proved to be caused by flash-over in the rectifier Valve (UY85). Replacement of this valve has always provided a cure. It is important that the correct lamp (6·3 volts, 0·115A) be used as a replacement and that the 0·15A lamp should not be fitted.

N.B. In current production the pilot lamps (shunted by a 400-ohm 6-watt resistor) are connected between TH.1 and V.7. While a small amount of light is lost when lamps are wired in this way, flashing in the rectifier valve cannot damage them. The modification was introduced at serial No. 279/8274 for VHF.71 and 305/2978 for VHF.72.

VHF.71/72 FLS18/9.

VHF. 71 & VHF. 72

SERVICE INFORMATION

MODIFICATIONS

On later models the wiring of the pilot lamps has been modified to avoid pilot lamp failure.

VHF. 71

R31 is now 400 ohms ±5%, 6W part number AP60746. It is connected in series with the heater chain between V7, pin 4 and the junction of R29 and TH1. The pilot lamps are removed from the earthy side of S4 circuit and are now wired in series across R31 in its new position.

VHF. 72

On the VHF. 72 the same change applies but the resistor circuit reference should be R36. On early circuit diagrams of the VHF.72, the resistor associated with the pilot lamps when they are wired in the earthy side of S4 was incorrectly given the circuit reference R31, it should be R36.

BUSH RADIO LIMITED, LONDON

TP1318/1/11/60/4·5 *Printed in England*

VHF.71 & 72

SERVICE INFORMATION

MODIFICATIONS

A. M. Alignment

No reference is made in the alignment instructions to adjustment of the aerial trimmers. The alignment procedure should be amended to add the following operations.

Operation	*Waveband*	*Signal Generator Frequency*	*Receiver Calibration*	*Adjust for Maximum*
5	M.W.	1,500 kc/s	200 metres	TC3 (aerial)
6	L.W.	214 kc/s	1,400 metres	TC4 (aerial)

The signal should be coupled to the receiver by a loop of insulated wire placed about 3 feet from the receiver.

A.M. I.F. Transformers

Earlier models used an i. f. transformer manufactured by the Wireless Telephone Co. Ltd. This is the one shown on the circuit and the part number is CP61464. On later production the a.m. i.f. transformers are of Bush manufacture and have the part number BS61924.

The CP61464 has the primary at the bottom of the can and the connections as shown on the circuit.

The BS61924 has the primary at the bottom of the can and the connections are :—

Primary, Pins 1 and 3; Pin 1 is anode connection.
Secondary, Pins 4 and 6; Pin 6 is grid connection.

Capacitors C21, C23, C30 and C35 are 150pF in BS61924.

Parts List — Resistors

R6 is now 15k, ±10%, ¼ watt, Pt. No. P6659
R7 is now 12k, ±10%, ¼ watt, Pt. No. P6635

BUSH RADIO LTD., LONDON

TP1191/1/7/59/4.5 *Printed in England.*