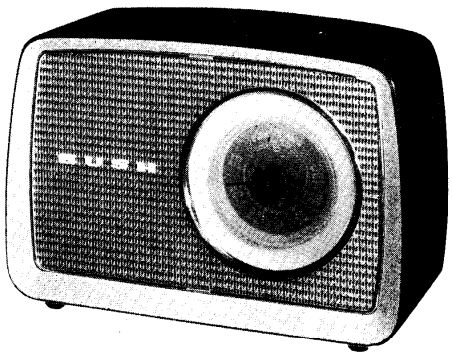
BUSH RADIO

Service Information

MODEL VHF.90A

A.C./D.C. Mains

VHF/FM Radio



V.H.F.90A

GENERAL DESCRIPTION

CABINET

Two-tone moulded plastic with large circular scale and gold trim. Speaker grill: gold coloured silk.

DIMENSIONS

Height, 9¼ in.
Width, 13¾ in.
Depth, 6⅝ in.

WEIGHT

8½ lb.

SPECIFICATION

CONTROLS

The Tuning control with the dial is on the front of the cabinet. The combined, Volume-control-and-On/Off switch is on the left-hand side of the cabinet.

MAINS SUPPLY

200–250V a.c. 40—100 c/s.
200–250V d.c.

POWER CONSUMPTION

60 watts.

INTERMEDIATE FREQUENCY

10·7 Mc/s.

POWER OUTPUT

2 watts.

LOUDSPEAKER

6 in. by 4 in. elliptical. Flux: 8,500 lines per sq. cm. There is no provision for an external speaker.

TUNING RANGE

87·5 Mc/s to 100 Mc/s.

AERIAL

There is an internal, loaded dipole and also provision for using an external aerial.

VALVES

V1	UCC85	26V, 0·1A grounded grid r.f. amplifier and mixer/oscillator.
V2	UF89	12·6V, 0·1A i.f. amplifier.
V3	UF89	12·6V, 0·1A i.f. amplifier.
V4	UF89	12·6V, 0·1A i.f. amplifier.
V5	UABC80	28V, 0·1A detector/a.g.c. diode/l.f. amplifier.
V6	UL84	45V, 0·1A output.
MR1	Metal rectifier	S.T.C. type C3D half-wave rectifier.

SCALE LAMP

15 watt, 230V, S.B.C. type.

FUSE LAMP

6V, 0·5A.

DISMANTLING

REMOVING CHASSIS FROM CABINET

1 Remove the large tuning knob and the pointer and the volume control knob.

2 Withdraw the five screws holding the chassis to the cabinet at the corners.

3 Withdraw the chassis.

NOTE: The leads to the speaker are long enough to allow the chassis to be removed.

REMOVING V.H.F. BOX FROM CHASSIS

1 Remove the two screws holding the scale and remove this.

2 Withdraw the six screws retaining the V.H.F. box.

3 Unsolder the five connections to the box. They are:—

1—C35.
2—FB1.
3—pin 4, V2.
4—pin 2, V2.
5—junction of R8 and C13.

4 Withdraw the two screws retaining the aerial brackets to the can of L2/3, unsolder C1 and C2 and withdraw the bracket.

ALIGNMENT PROCEDURE

GENERAL NOTES

a Remove the receiver from the cabinet.

b The receiver and signal generator should be switched on 15 minutes before alignment is commenced.

c For r.f. alignment it is necessary to use an auxiliary scale. There are four punch marks in the scale pan for this purpose. They represent the calibration points shown in Fig. 4. A piece of wire (about 18 S.W.G.) may be fixed to the tuning spindle as shown in the diagram and used as a pointer. With the tuning spindle fully anti-clockwise the pointer should be lined up with the DATUM mark on the scale pan.

TEST EQUIPMENT

1 Signal generator for 10·7 Mc/s (i.f.) and 87·5 to 100 Mc/s.

2 An Avometer model 8 or both a d.c. valve voltmeter and a micro-ammeter (50μA F.S.D.).

3 Two matched 47k $\frac{1}{4}$ watt resistors and a 1k $\frac{1}{4}$ watt resistor.

The two 47k resistors should be connected across the discriminator stabilizing capacitor C29 and the metres connected as shown in Fig. 3.

I.F. ALIGNMENT

NOTES: 1 Before commencing i.f. alignment check the position of the iron-dust cores in the i.f. transformers and adjust, if necessary, as follows:—IFT2 and 3: primary and secondary cores to be $\frac{1}{8}$ in. inside the coil former; IFT4: primary core to be $\frac{3}{4}$ in. inside the former, secondary core to be $\frac{3}{8}$ in. inside the coil former.

2 With the exception of the discriminator primary the correct peak associated with all the threaded iron-dust cores is the first one reached entering the winding from either the base or the top of the former.

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

1 Inject an i.f. signal of 10·7 Mc/s to the grid of V2 (pin 2).

2 Adjust the primary core of IFT4 to produce maximum d.c. output.

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

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

5 Transfer the damping to the primary and adjust the secondary core to produce maximum d.c. output.

6 Transfer the damping to the secondary of IFT2 and adjust the primary core to produce maximum d.c. output.

7 Transfer the damping to the primary and adjust the secondary core to produce maximum d.c. output. Remove the damping.

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

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

10 Transfer the signal input to the aerial sockets and adjust the primary and secondary of IFT1 for maximum d.c. output.

R.F. ALIGNMENT

1 Inject an 87·5 Mc/s signal at the aerial sockets and set the auxiliary pointer to the corresponding calibration point on the scale pan (see Fig. 4). Adjust the cores of L4 (r.f.), L5 and L6 (oscillator) by adjusting the special nut (see Fig. 6) to produce maximum d.c. output.

2 Set the generator and the auxiliary pointer to 94 Mc/s and adjust the core of L2/L3 (aerial) 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 L5/6 for optimum calibration. It is extremely unlikely that these settings will subsequently vary and no data have been given for them since it is not envisaged that any adjustment will be necessary.

Replacement of V1 may cause slight changes in oscillator calibration. Resetting the cores as in **1** above should correct this.

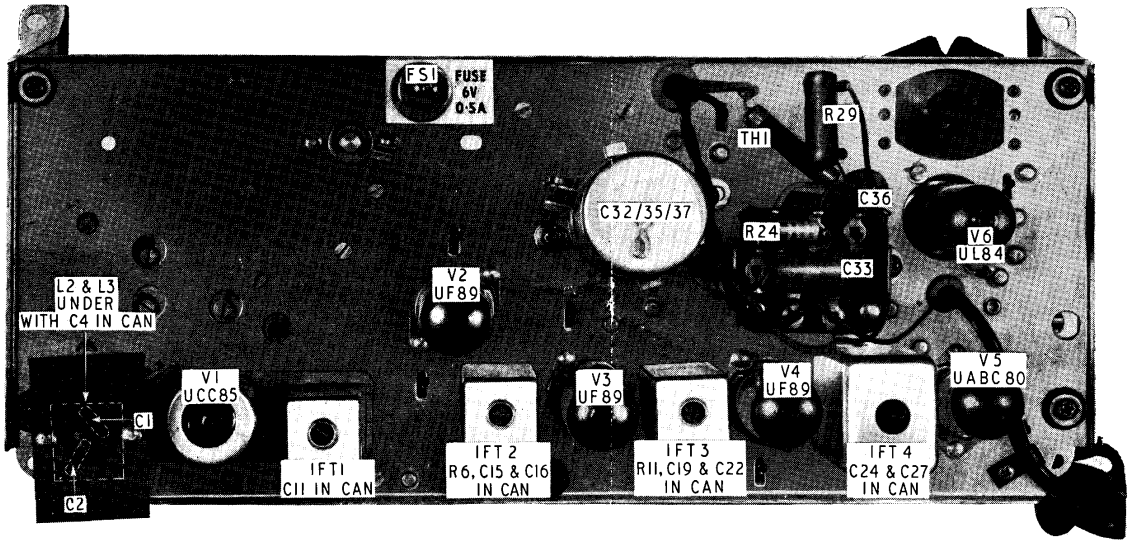


Fig. 1. *Chassis viewed from back of receiver.*

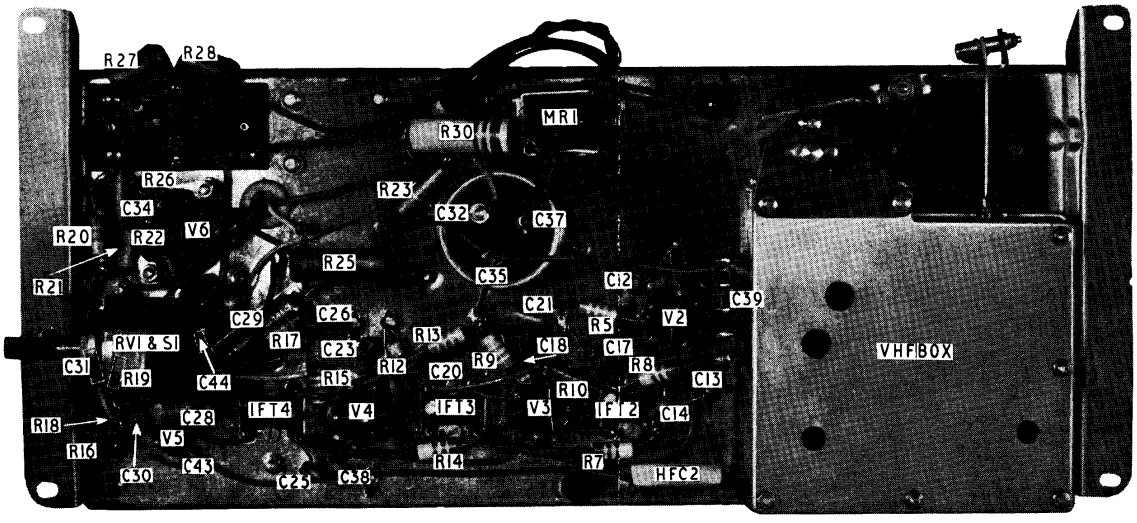
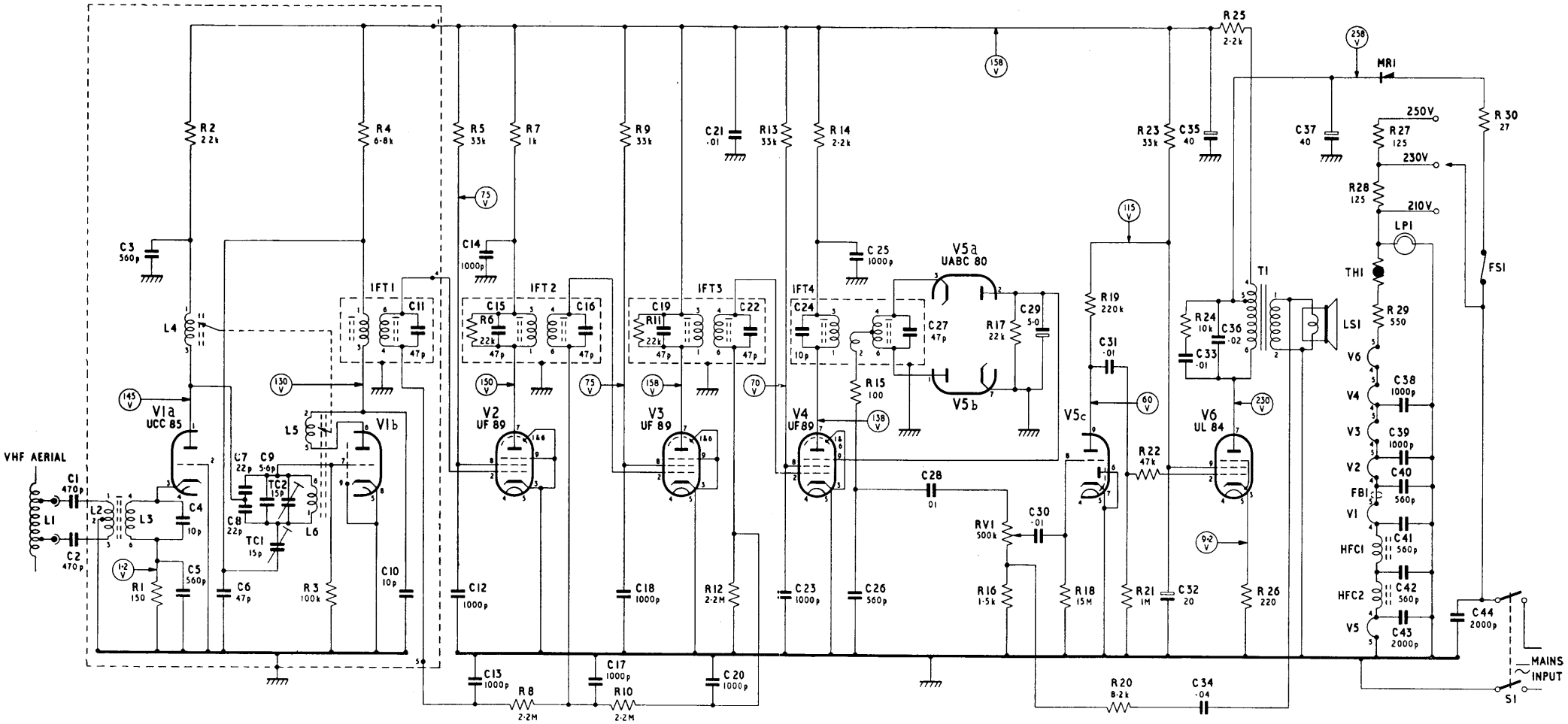


Fig. 2. *Chassis viewed from front of receiver.*



CIRCUIT DIAGRAM

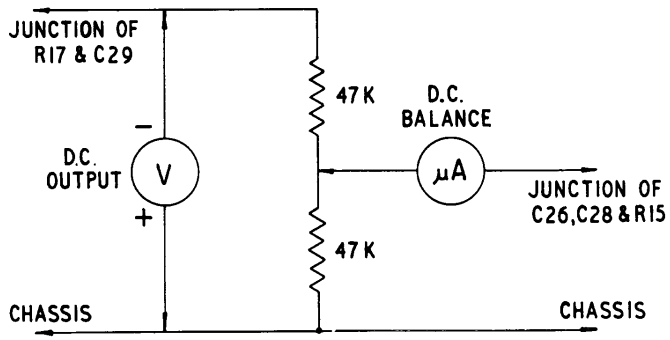


Fig 3.
Connection of meters

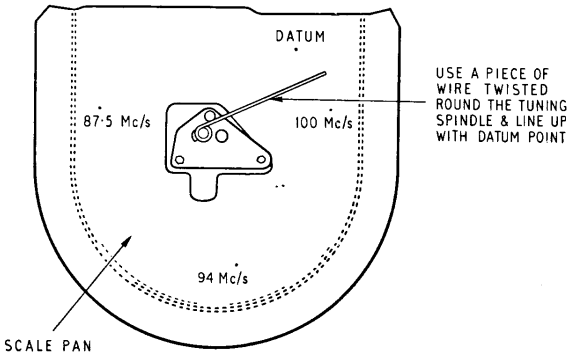
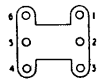
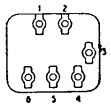


Fig. 4.
Alignment calibration points



IFT. BASE VIEWED FROM UNDERNEATH.



OUTPUT TRANSFORMER.

VALVE BASE B9A.

NOTES:

All values of resistance in ohms.
All values of capacitance in μF unless otherwise stated.
All voltages measured with Avo Model 8, chassis negative, on 1000V., or 10V. ranges.

SPECIAL CAPACITORS.

Temperature coefficient:-
P.100 positive 70-130 parts per million per degree C.
N.750 negative 670-830 parts per million per degree C.

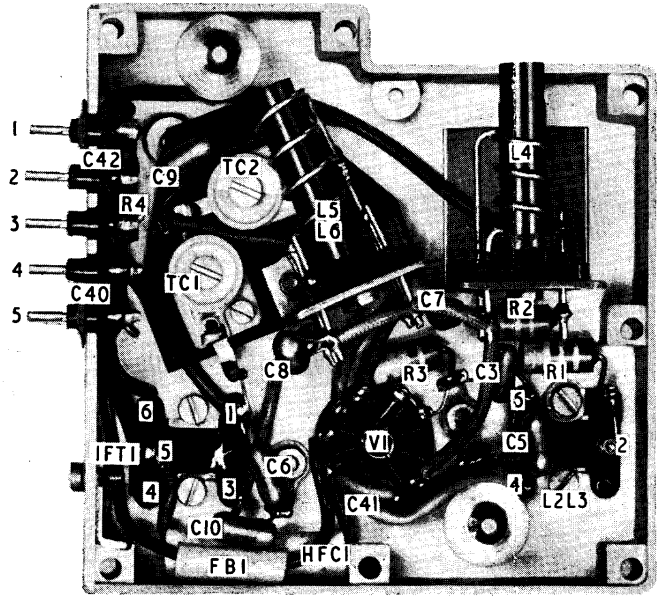


Fig. 5. *V.H.F. box—component layout*

PARTS LIST

RESISTORS

Reference	Value (ohms)	Tolerance (±%)	Rating (watts)	Part Number
R1	150	10	¼	P6155
R2	2·2k	10	¼	P6449
R3	100k	10	¼	P6869
R4	6·8k	10	½	P6574
R5	33k	10	¼	P6743
R6	22k	10	¼	P6701
R7	1k	20	¼	P6359
R8	2·2M	20	¼	P7199
R9	33k	10	¼	P6743
R10	2·2M	20	¼	P7199
R11	22k	10	¼	P6701
R12	2·2M	20	¼	P7199
R13	33k	10	¼	P6743
R14	2·2k	20	¼	P6443
R15	100	20	¼	P6107
R16	1·5k	10	¼	P6407
R17	22k	10	¼	P6701
R18	15M	33⅓	¼	P14548
R19	220k	10	¼	P6953
R20	8·2k	10	¼	P6593
R21	1M	20	¼	P7115
R22	47k	20	¼	P6779
R23	33k	10	½	P6742
R24	10k	10	¼	P6617
R25	2·2k	5	6	P60083
R26	220	5	½	P6202
R27	125	5	4	AP61040
R28	125	5	4	AP61040
R29	550	5	6	AP61041
R30	27	20	1	P14556
RV1	500k	—	—	BP61042

CAPACITORS

Reference	Value pF	Value µF	Tolerance (±%)	Rating (volts)	Part Number
C1	470	—	20	3k	AP61234
C2	470	—	20	3k	AP61234
C3	560	—	20	750	AP23405
C4	10	—	5	350	AP18211
C5	560	—	20	750	AP23405
C6	47 (N.750)	—	5	750	AP24630
C7	22 (P.100)	—	2	750	AP24626
C8	22 (P.100)	—	2	750	AP24626
C9	5·6 (N.750)	—	±·5pF	750	AP24628
C10	10 (N.750)	—	5	750	AP24629
C11	47	—	5	350	AP24848
C12	1000	—	+75—0	750	AP22746
C13	1000	—	+75—0	750	AP22746
C14	1000	—	+75—0	750	AP22746
C15	47	—	5	350	AP24848
C16	47	—	5	350	AP24848
C17	1000	—	+75—0	750	AP22746
C18	1000	—	+75—0	750	AP22746
C19	47	—	5	350	AP24848
C20	1000	—	+75—0	750	AP22746
C21	—	·01	20	350	AP24117
C22	47	—	5	350	AP24848
C23	1000	—	+75—0	750	AP22746
C24	10	—	5	350	AP24847
C25	1000	—	+75—0	750	AP22746
C26	560	—	20	750	AP23405
C27	47	—	5	350	AP24848
C28	—	·01	20	350	AP24117
C29	—	5·0	+50—20	50	AP61043

Reference	Value		Tolerance	Rating	Part Number
	pF	μF	(±%)	(volts)	
C30	—	·01	20	350	AP24117
C31	—	·01	20	350	AP24117
C32	—	20	+50—20	350	AP22257
C33	—	·01	25	500	P3769
C34	—	·04	20	150	AP61237
C35	—	40	+50—20	350	With C32
C36	—	·02	20	500	P8996
C37	—	40	+50—20	350	With C32
C38	1000	—	+75—0	750	AP22746
C39	1000	—	+75—0	750	AP22746
C40	560	—	20	750	AP23405
C41	560	—	20	750	AP23405
C42	560	—	20	750	AP23405
C43	2000	—	+50—25	750	AP23407
C44	2000	—	+50—25	750	AP23407
TC1	3–15	—	—	250	AP24623
TC2	3–15	—	—	250	AP24623

COILS AND TRANSFORMERS

Reference	Description	D.C. Resistance	Part Number	Iron dust core
L1	Aerial-loading coil	less than 0·5	AS24894	
L2, L3	Aerial coils	,, ,, ,,	CS24884	AP17109
L4	Anode coil	,, ,, ,,	BS24885	
L5, L6	V.H.F. oscillator coil	,, ,, ,,	BS24883	
HFC1	Heater choke	,, ,, ,,	AS24886	
HFC2	Heater choke	,, ,, ,,	AS24886	
IFT1	I.F. transformer	primary ,, ,, ,,	BS24879	AP17109
		secondary ,, ,, ,,		
IFT2	I.F. transformer	primary ,, ,, ,,	BS24878	AP17109
		secondary ,, ,, ,,		
IFT3	I.F. transformer	primary ,, ,, ,,	BS24878	AP17109
		secondary ,, ,, ,,		
IFT4	Discriminator transformer	primary ,, ,, ,,	CS24882	AP17109
		secondary 1 ,, ,, ,,		
		secondary 2 ,, ,, ,,		
T1	Output transformer	primary 600	BS61200	
		(Bucking tap 16·5)	(or AS61198	
		secondary 0·46	with R & C's)	

MISCELLANEOUS PART NUMBERS

Description	Part Number
Back	DS61297
Back (with dipole aerial)	DS61186
Cabinet	FP60939
Core, ferroxcube (F.B.1)	AP22966
Dial (with diffusion window)	CS61290
Knob, On/Off and Volume	BS61187
Knob, Tuning	BS61185
Plug, 2-pin, aerial	AP20161
Plug, 2-pin, voltage adjustment	AP61192
Pointer	AP61140
Reflector, scale	CS61196
Rectifier	BP61120
Speaker, P.M. oval, Rola Celestion type, S46 K.Q., spec. No. 3438	BP60301
Window, diffusion	DP61058
Valveholder, B9A	AP22419
Valveholder, B9A, with skirt and screening can	AP22841

REPLACING TUNING CORD DRIVE

If the cord with the cores should break, it is advisable to replace the complete cord assembly (Part Number AP24888).

1 Remove the chassis from the cabinet (see page 2).

2 Withdraw the two screws retaining the scale pan and remove this.

3 Unbolt and remove the cover of the V.H.F. box.

4 Remove the broken cord.

5 Turn the tuning spindle to maximum clockwise so that the retaining spring will be at minimum tension when the cord is attached.

6 Thread the assembly of tuning cores through to the coil formers, hook the spring to its anchorage and attach the other end of the cord to the adjusting screw.

7 Reset the adjusting nut as detailed in the alignment procedure.

If it becomes necessary to replace the other piece of cord, adjust the anchoring spring so that the lever swings equally about the horizontal for the full tuning range. A length of cord of about 6 inches is suitable. Readjust the cores by resetting the adjusting nut, if necessary.

PART NUMBERS ASSOCIATED WITH THE TUNING

Description	Part Number
Lever	AP61153
Pivot	AP61154
Pointer	AP61140
Pulley	AP24684
Screw, adjusting	AP61155
Spring, cord tension	AP24740
Spring, anchor	AP61102
Tuning-core assembly	AP24888

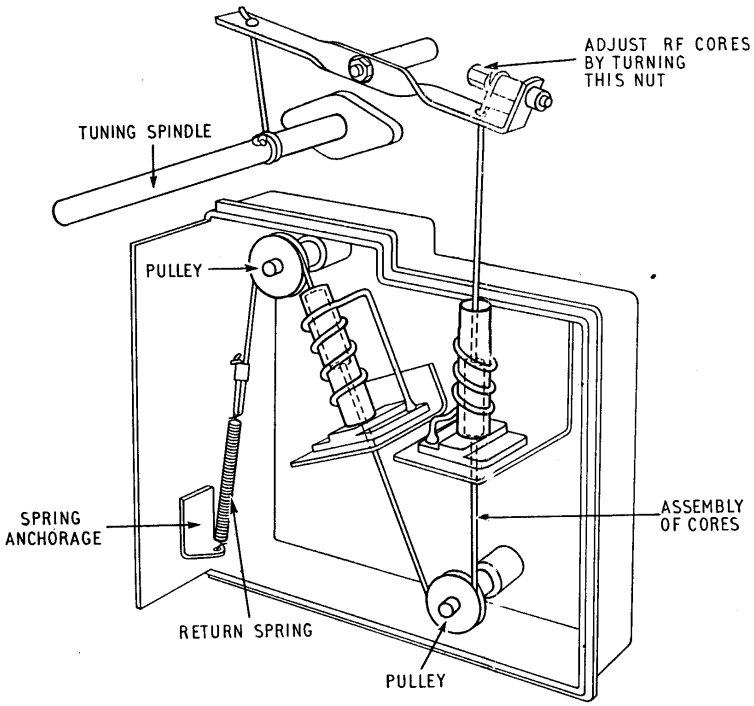


Fig. 6. *Tuning cord drive*

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