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Trader
Service
Sheet

Bush VTR143

1875

A.M./F.M. transistored portable radio receiver

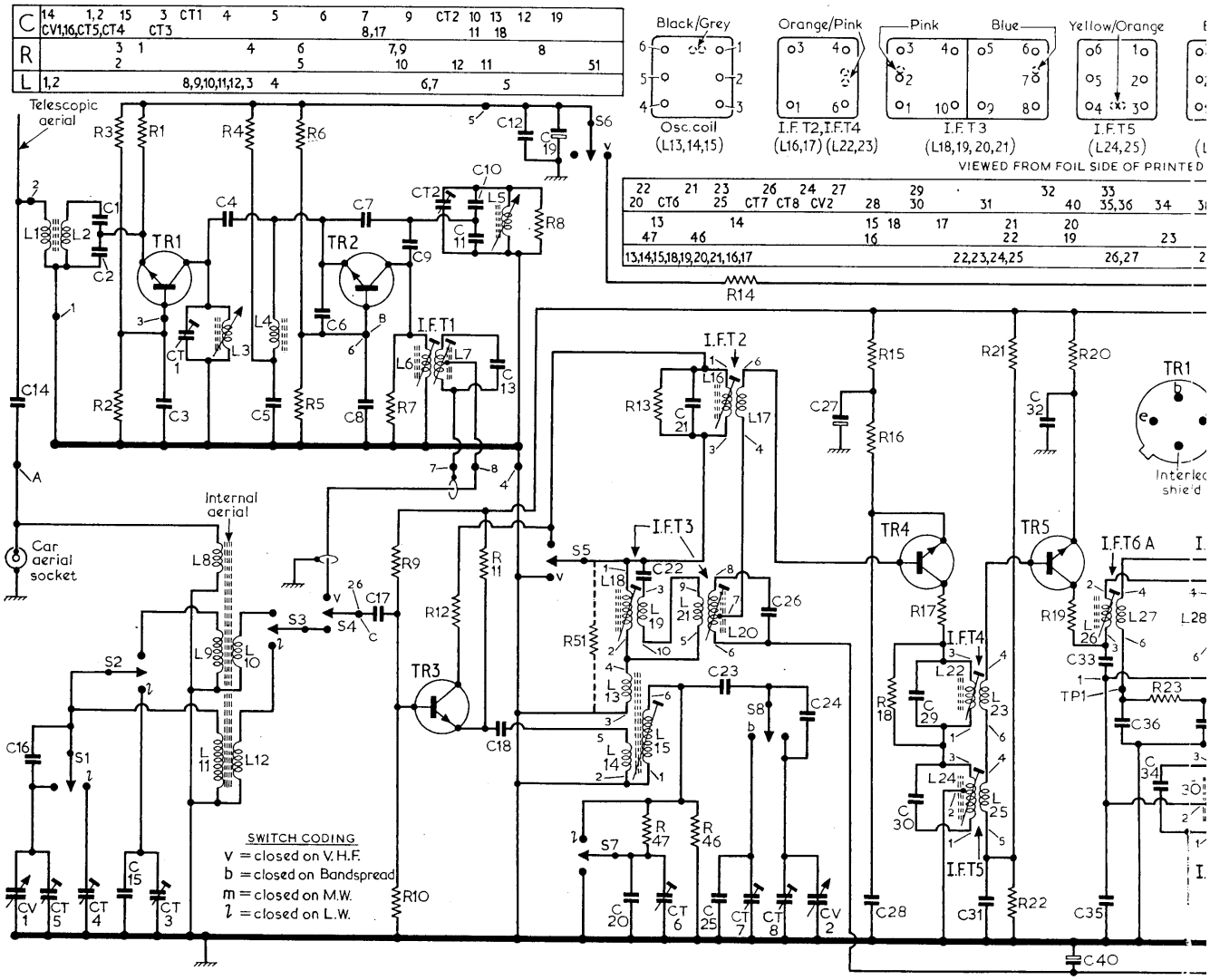
Introduction

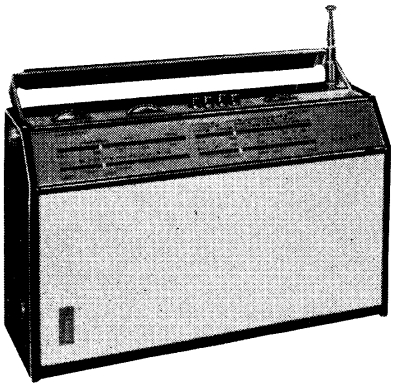
Bush model VTR143 is a battery operated a.m./f.m. portable radio receiver incorporating nine transistors and three semi-conductor diodes. There are three versions of this model, all are electrically identical differing only in their presentation.

Wavebands covered using press-button operated switches for selection, are v.h.f./f.m. 87·5-100Mc/s, reception via a telescopic aerial, and l.w. 1,070-1,900m (280-158kc/s), m.w. 187-570m (1,605-525kc/s) plus electrical bandspread of the high frequency end of the medium waveband b.s. 187-210m (1,605-1,430kc/s) via an internal ferrite rod aerial assembly. An external aerial socket is fitted which is suitable for the connection of a car type aerial and is operative on all wavebands.

An audio output power of 1W for 10 per cent total distortion is handled by a 15Ω 6in by 4in loudspeaker which is muted when an earphone jack plug is inserted in closed jack provided for the connection of an earphone of 20-1,000Ω impedance. An external loudspeaker of 15Ω impedance or tape recorder terminated in 15Ω may also be connected via this source if so desired.

Operating power is supplied by a 9V Ever Ready type PP9 battery or its equivalent.





Component values and locations

Resistors			R21	5·6kΩ	D4	R42	6·8kΩ	E3
R1	680Ω	C4	R22	15kΩ	D4	R43	150Ω	E3
R2	12kΩ	C4	R23	3·9kΩ	D3	R44	150Ω	E3
R3	4·7kΩ	C4	R24	560Ω	E3	R45	3·3Ω	E3
R4	560Ω	C3	R25	18kΩ	D3	R46	120kΩ	C3
R5	4·7kΩ	C4	R26	56kΩ	C3	R47	220kΩ	C3
R6	1·5kΩ	C4	R27	330Ω	E4	R48	330Ω	E4
R7	12kΩ	C3	R28	1·5kΩ	E2	R49†	3·3kΩ	D3
R8	12kΩ	C3	R29	18kΩ	E4	R50†	2·7kΩ	D2
R9	12kΩ	D2	R30	18kΩ	E2	R51†	12kΩ	—
R10	27kΩ	D2	R31	82kΩ	E2	RV1	2·2kΩ	E4
R11	1kΩ	D3	R32	1kΩ	E2	RV2†	4·7kΩ	D2
R12	680Ω	D3	R33†	39Ω	E2	RV3	10kΩ	E2
R13	6·8kΩ	D3	R34	5·6kΩ	E3	RV4	2·2kΩ	E3
R14	150Ω	D2	R35	18kΩ	D2			
R15	330Ω	D3	R36	10kΩ	D3	**Capacitors**		
R16	330Ω	D3	R37†	39Ω	—	C1	82pF	C4
R17	680Ω	D3	R38	27Ω	D3	C2	33pF	C4
R18	6·8kΩ	D3	R39	390Ω	D2	C3	1,000pF	C4
R19	270Ω	D4	R40	330Ω	E3	C4	4·7pF	C4
R20	680Ω	D4	R41	6·8kΩ	E3	C5	470pF	C4
						C6†	39pF	C4
						C7†	3·9pF	C4
						C8	1000pF	C4
						C9	270pF	C4
						C10	47pF	C4
						C11	47pF	C4
						C12	0·05μF	C4
						C13	70pF	C3
						C14	10pF	C4
						C15	56pF	C2
						C16	22pF	D2
						C17	0·01μF	D2
						C18	0·02μF	D3
						C19	100μF	C3
						C20	200pF	C2
						C21	150pF	D3
						C22§	250pF	D3
						C23	300pF	D3
						C24	22pF	D2
						C25	4·7pF	D3
						C26§	250pF	D3

C27	100μF	D3	
C28	0·05μF	D3	
C29	150pF	D4	
C30	200pF	D4	
C31	0·05μF	D4	
C32	0·05μF	D4	
C33†	270pF	D3	
C34†	165pF	E3	
C35	500pF	E3	
C36	330pF	E4	
C37	0·01μF	E3	
C38	0·01μF	E3	
C39	0·01μF	E3	
C40	10μF	C3	
C41†	47pF	D4	
C42	5μF	D3	
C43	1,000pF	E4	
C44	500μF	E3	
C45	5μF	E4	
C46†	0·2μF	D2	
C47	0·02μF	E2	
C48	10μF	E2	
C49	100μF	E3	
C50	10μF	D2	
C51	100μF	D3	
C52	0·1μF	E3	
C53	200μF	E3	
C54	0·1μF	E3	
CT1	25pF	C4	
CT2	10pF	C4	
CT3	80pF	C2	
CT4	16pF	C2	
CT5	25pF	C3	
CT6	80pF	C2	
CT7	16pF	D3	
CT8	25pF	C3	
CV1	300pF	C2	
CV2	300pF	C3	

Coils and transformers*

L1	—	C4
L2	—	C4
L3	—	**
L4	—	C4
L5	—	**
L6	—	C3
L7	—	C3
L8	1·0Ω	D4
L9	—	E4
L10	—	E4
L11	11·5Ω	D4
L12	1·5Ω	D4
L13	—	C3
L14	—	C3
L15	2·5Ω	C3
L16	—	D3
L17	—	D3
L18	2·0Ω	D3
L19	4·0Ω	D3
L20	6·5Ω	D3
L21	—	D3
L22	—	D3
L23	—	D4
L24	6·5Ω	D4
L25	—	D4
L26	—	D3
L27	—	D3
L28	—	D4
L29	—	D4
L30	4·5Ω	E3
L31	—	E3
L32	15·0Ω	††
T1 1-2	120Ω	E3
T1 3-5	100Ω	
T2 1-2	5Ω	E4
T2 4-5	1·5Ω	

Miscellaneous

CD1	OA79	E4
CD2	OA79	E4
CD3	OA90	E3
S1-S10	—	C2
S11	—	E2

**Approximate d.c. resistance in ohms.*
† See under "Modifications"
§ 200pF in some receivers.
†† Loudspeaker.
*** V.h.f. tuner unit.*

Transistor analysis

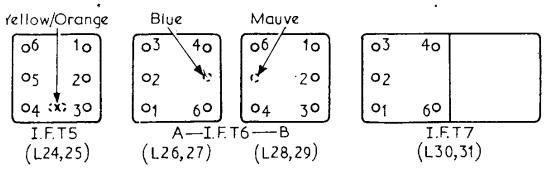
Transistor voltages quoted in the table col. 5 were obtained from information supplied by the manufacturers. They are negative with respect to chassis and were measured with the volume control at minimum, under no signal conditions on v.h.f./f.m. with a model 8 Avometer

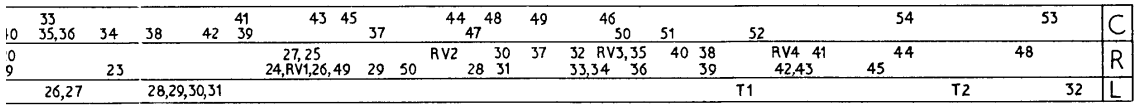
(Continued overleaf col. 1)

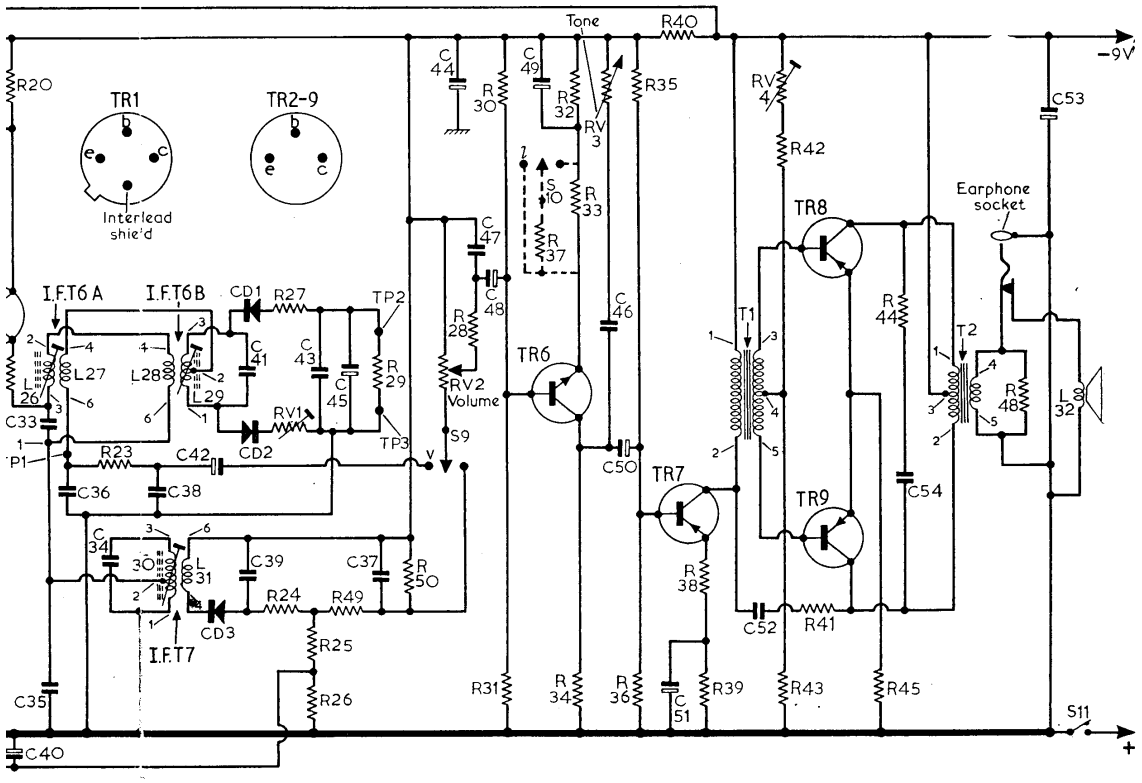
Transistor table

Transistor		Emitter (V)	Base (V)	Collector (V)
TR1	BF166	6·7	5·85	—
TR2	BF152	6·65	6·05	—
TR3	BF160	5·5	4·8	0·9
TR4	BF160	6·15	5·0	0·8
TR5	BF160	5·95	5·1	0·45
TR6	BC108	6·45	5·35	2·85
TR7	BC116A	1·8	2·38	8·5
TR8	AC128	0·03	0·17	9·0
TR9	AC128	0·03	0·17	9·0

Quiescent current when switched to v.h.f./f.m. 25mA.







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Continued from overleaf—

Circuit alignment

Equipment required. – An r.f. signal generator covering the range 150kc/s-2Mc/s, with an output at 10·7Mc/s, amplitude modulated 30 per cent; three matching pads A, B and C as illustrated on the alignment plan; an audio output meter of 15Ω impedance (terminated in a miniature jack plug) for use as an indicator during a.m. alignment; a 0·50μA meter and a matched pair of 220kΩ resistors connected as D, and a 0-10V d.c. meter connected as F for use as indicators during f.m. alignment (see layout below).

Preset volume and tone controls to maximum, check that the battery supply is 9V on load and attenuate input signal such that the a.m. alignment output indicator does not exceed 50mW or the f.m. alignment indicator F reads between 0·5V and 1V. *Note: During manufacture adjustments to the v.h.f. tuner unit are made at 94Mc/s (and 10·7Mc/s) using special sweep equipment and further adjustment should not be made unless components are known to have been disturbed.*

1. – Connect audio output meter via earphone socket, switch receiver to m.w. and tube to 300m on scale plate. Feed in a 470kc/s a.m. signal via pad C to test point C. Adjust **L30, L24, L20** and **L18** in that order for maximum output.

2. – Tune receiver to 500m on scale plate and feed in a 600kc/s a.m. signal via pad A to test point A. Adjust **L15** for maximum output.

3. – Tune receiver to 200m on scale plate and feed in a 1,500kc/s a.m. signal. Adjust **CT8** for maximum output.

4. – Repeat operations 2 and 3 for optimum tracking.

5. – Tune receiver to 500m on scale plate and feed in a 600kc/s a.m. signal. Adjust **L9** by sliding adjustment ring along ferrite rod.

6. – Tune receiver to 200m on scale plate and

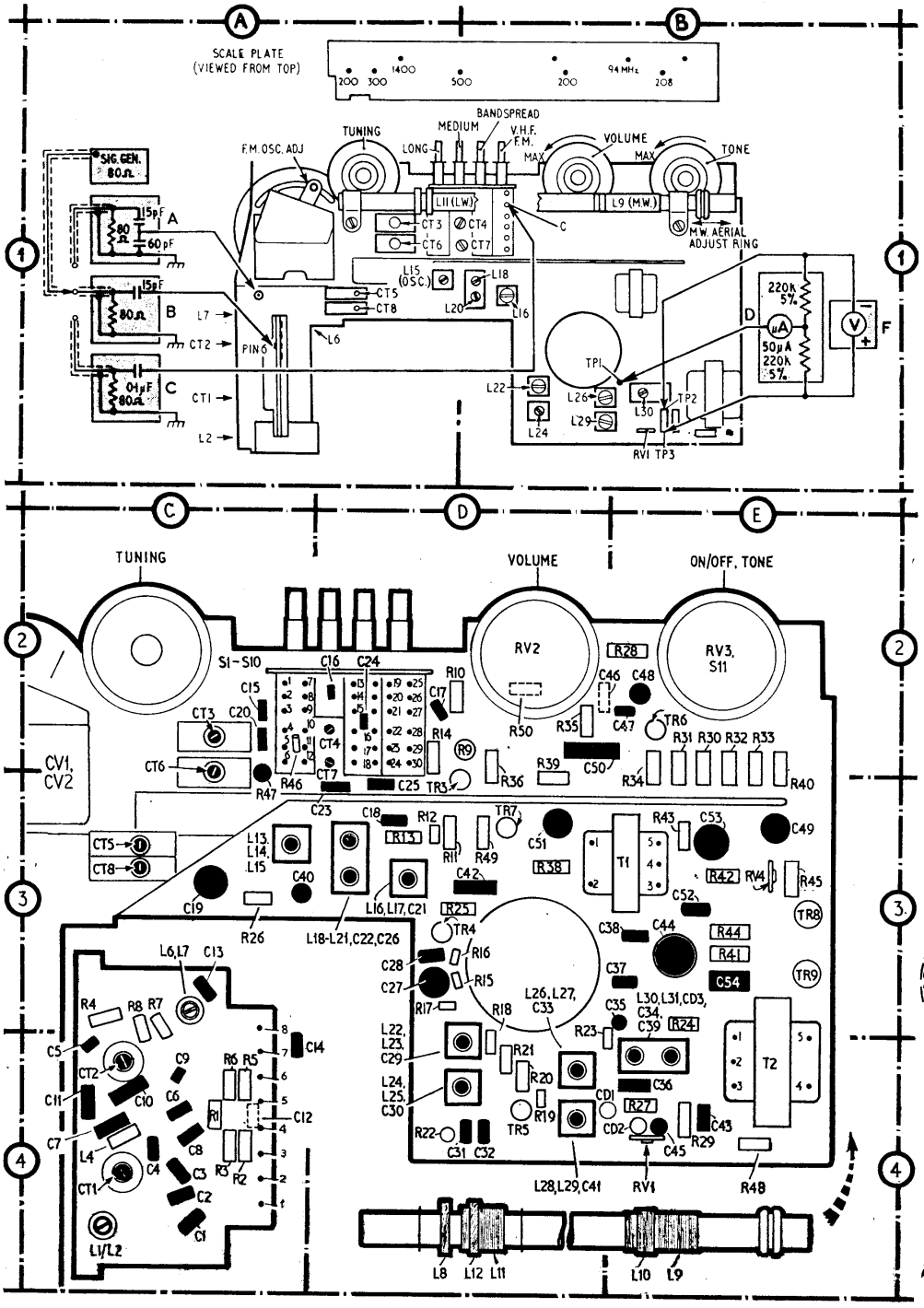
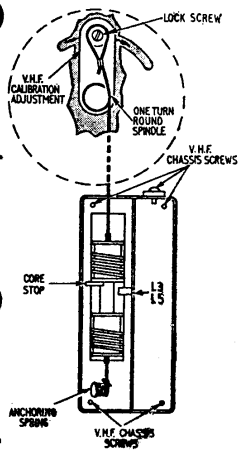
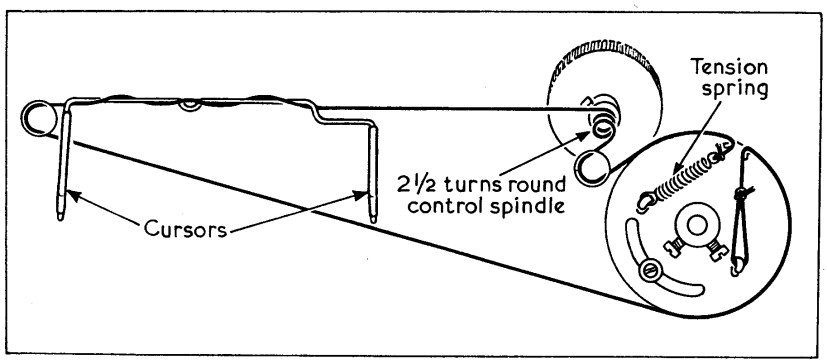


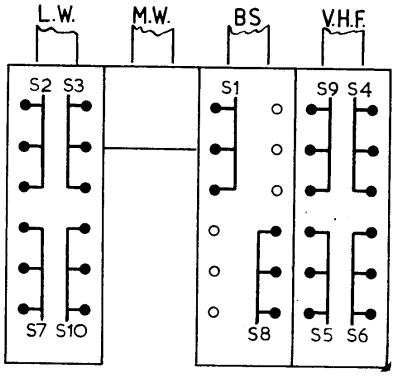
Illustration of chassis from the rear showing alignment points.

Left: Rear view of chassis showing the component side of main printed panel and v.h.f. tuner. Below: F.M. tuning cord.

FIG 1.







Sketch of the drive cord assembly shown with the tuning gang at maximum capacitance. Right: Waveband switches **(S1—S10)** *viewed from the rear of receiver (component side of printed panel)*

feed in a 1,500kc/s a.m. signal. Adjust **CT5** for maximum output.

7. – Repeat operations 5 and 6 for optimum tracking then seal adjustment ring on ferrite rod.

8. – Switch receiver to b.s., tune to 208m on scale plate and feed in a 1,439kc/s a.m. signal. Adjust **CT7** for maximum output.

9. – Tune receiver to 200m on scale plate and feed in a 1,500kc/s a.m. signal. Adjust **CT4** for maximum output.

10. – Switch receiver to l.w., tune to 1,400m on scale plate and feed in a 214kc/s a.m. signal. Adjust **CT6** and **CT3** for maximum output. Check that **L11** on ferrite rod is sealed in position.

11. – Switch receiver to v.h.f., tune to 94Mc/s on scale plate and pre-set balance control **RV1** to its mid-position. Feed in a 10·7Mc/s a.m. signal via pad C to test point C.

12. – Connect indicator F between TP2 and TP3 adjust **L26** for maximum output.

13. – Connect indicator assembly D as illustrated on alignment plan and adjust **L29** for zero reading on micrometer.

14. – Adjust **L22** and **L16** for maximum output as indicated on meter F.

15. – Adjust signal generator attenuator for a 1mV output and adjust **RV1** for minimum on audio output meter.

16. – Adjust **L26** for maximum output as indicated on meter F (do not exceed 1V).

17. – Adjust **L29** for zero reading on microammeter D.

18. – Feed in a 10·7Mc/s a.m. signal via pad B to pin 6 on v.h.f. tuner panel and adjust **L6** and **L7** then **L6** again for maximum output on meter F (the outer peak in each case is the correct tuning position for core).

19. – Feed in a 94Mc/s a.m. signal via pad A to test point A and adjust **L3** for maximum output on meter F. *Note:* **L3** *is adjusted in the following manner. Slacken locking screw securing lever to drive cord drum, adjust position of lever on drive cord drum, then tighten locking screw (see Fig 1.).*

20 – Adjust **L2** for maximum output on meter F.

General notes

Dismantling. – To gain access to foil side of printed panel, first remove back of case (two screws), disconnect and remove battery and disconnect leads to external aerial socket. Unplug lead at bottom of telescopic aerial, unscrew and remove telescopic aerial retaining screw and remove aerial by sliding the bottom of the aerial out of the case first. Unscrew and remove three screws and one nut securing the chassis to the case. The chassis may now be removed to the extent of the loudspeaker leads by sliding the bottom of the chassis out of the case first in order to clear the control knobs from the top of the case.

Removing the v.h.f. tuner unit from main chassis. – Disconnect the leads to pins 1, 2, 5, 7 and 8, set the tuning capacitor to minimum capacity and unscrew and remove the locking screw on on the v.h.f. calibration adjuster. Strip the loop of the v.h.f. tuning cord from the boss of the calibration adjuster, then unscrew and remove five screws securing the unit to the main chassis.

Modifications

In early models, **C6** (39pF) was 33pF, **C7** (3·9pF) was 3·3pF, **C33** (270pF) was 260pF, **C34** (165pF) was 180pF and **C41** (47pF) was 60pF.

In models with early types of i.f transformers, a 12kΩ resistor (**R51**) which improves stability was connected as shown dotted on circuit diagram. If i.f.t. 3 **L18-L21** is replaced, this resistor should be removed.

C46 (0·2μF, now connected to **TR6** collector) was connected to top of volume control, junction **RV2/S9.**

Two types of volume control circuit have been used. In early models **RV2** is 5kΩ, **R33** is 150Ω and **R37** (39Ω) is switched by **S10.** In later models **RV2** is either 5kΩ or 4·7kΩ, **R33** is 39Ω, **R37** is removed, switch **S10** is not used and **R49** and **R50** are added. If a replacement volume control is required for an early model, order the complete kit of parts as follows: Kit 91 for black knob; Kit 92 white knob. For later models, only the volume control will be required.

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