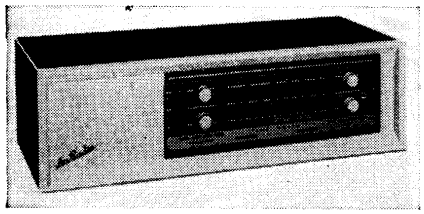
"TRADER" SERVICE SHEET

1518

ACE "CRESCEN

Also covering the radiogram "Balmor



Appearance of the Ace "Crescendo."

CONVENTIONAL wiring and metal chassis, except for the V.H.F. tuner, are employed in the Ace "Crescendo" A.M./F.M. table receiver. V.H.F. components are wired on a separate printed circuit panel which is mounted on the main chassis. Waveband ranges are 87-100Mc/s (F.M.), 180-555m (M.W.) and 1,000-2,000m (L.W.).

For local reception, internal aerials are provided comprising a metal foil dipole for F.M. and ferrite rod for A.M. The chassis is also equipped with sockets for the connection of both F.M. and A.M. external aerials. A further pair of sockets allows the connection of a gramophone pickup.

Employing five valves plus a full-wave valve rectifier, the receiver is designed for operation on A.C. mains supply only of 190-250V. Its cabinet is of contemporary design and is constructed of wood with a plastics fabric covering.

Ace "Balmoral" is a radiogram version which uses an identical type chassis and employes a four-speed automatic record player.

Release date (both models): November 1959. Original prices: Crescendo £21 10s 8d, Balmoral £45 10s 1d.

VALVE ANALYSIS

Valve voltages given in the table col. 3 are derived from information supplied by the manufacturer. The receiver was switched to F.M. and the mains voltage plug was correctly set for the mains supply at the time of test. The readings were measured on a model 7 Avometer.

CIRCUIT DESCRIPTION

On F.M. the heptode section of **V2** operates as an I.F. amplifier. **S1** is closed supplying H.T. current to the tuner valve **V1** and **S9** is open removing the H.T. supply from the oscillator **V2a.**

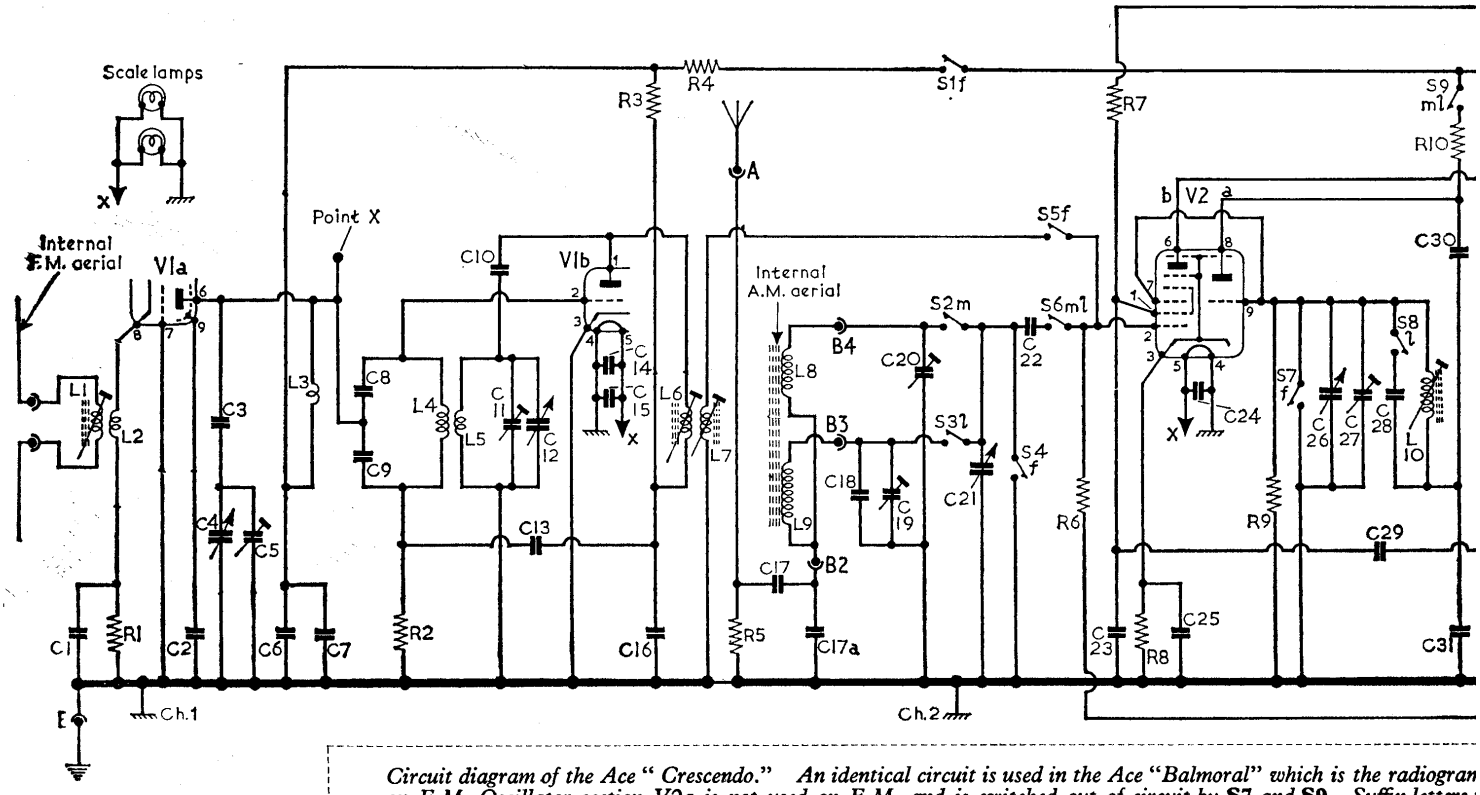
Coupling coil **L2** feeds the V.H.F. signal to the cathode of **V1a** and the output from **V1a** is applied to the grid of mixer **V1b.** The anode of **V1a** is tuned by **C3, C4** and **C5. L5, C11** and **C12** comprise the oscillator tuned circuit and **L5** is inductively coupled to the mixer grid coil **L4.** Regenerative feedback is provided by **C10** from anode to grid.

The coupling from **V1a** to **V1b** is made at a point which corresponds to the equi-

Valve Table

Valve		Anode (V)	Screen (V)	Cathode (V)
V1 6L12	a	130*	—	0·6
	b	95†	—	—
V2 6C12	a	80‡	—	—
	b	195	110	2.5
V3 6F19	..	193	65	1·5
V4d 6LD12	..	50	—	—
V5 6P15	..	187	170	5·0
V6 UU12	..	—	—	270·0

* *Measured at the junction of* **L3** *and* **R4.**
† *Measured at the junction of* **R3** *and* **L6**
‡ *Receiver switched to A.M. for this measurement only.*



Circuit diagram of the Ace "Crescendo." An identical circuit is used in the Ace "Balmoral" which is the radiogram on F.M. Oscillator section V2a is not used on F.M. and is switched out of circuit by **S7** *and* **S9.** *Suffix letters Notes" overleaf. Point* **X** *is located on the underside of the tuner unit printed circuit and is employed as the inp tuner panel.*

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potential point of a balanced bridge circuit formed by **C9** and **C13** on one side, and **C8** and the valve electrode capacitance on the other, to prevent the local oscillator from radiating through the aerial circuits.

Intermediate frequency in **V1b** anode is at 10.7Mc/s and is developed across transformer primary **L6** and passed via **L7** and **S5** to the control grid of **V2b.** Output from **V2b** is coupled via a second tuned I.F. transformer **L11** and **L12** to I.F. amplifier **V3.** From **V3** the signal is fed to the ratio detector diodes **V4a** and **V4b** via discriminator transformer **L15, L16** and **L17.**

Audio output from the detector is passed through the de-emphasis network **R17, C48** and developed across the volume control **R23.** Included in the coupling are the pick-up sockets and "gram" switch **S12.** **C51** corrects the frequency response at low settings of the volume control.

Triode section **V4d** operates as audio amplifier and is coupled to the output valve **V5** via **C54.** The output from **V5** drives the loudspeaker via step-down

(Continued col. 1 overleaf)

Resistors

R1	150Ω	D2
R2	470kΩ	D2
R3	10kΩ	D2
R4	4·7kΩ	C2
R5	2·2kΩ	F4
R6	1MΩ	F3
R7	15kΩ	F4
R8	220Ω	F3
R9	47kΩ	F3
R10	22kΩ	F3
R11	1kΩ	F4
R12	100kΩ	F3
R13	220Ω	G3
R14	1kΩ	F4
R15	100kΩ	G3
R16	47Ω	G4
R17	47kΩ	G4
R18	100kΩ	G4
R19	1MΩ	G4
R20	4·7MΩ	F4
R21	33kΩ	G4
R22	2·2MΩ	E4
R23	1MΩ	D1
R24	10MΩ	G3
R25	220kΩ	G3
R26	500kΩ	A1
R27	22kΩ	A1
R28	2·2kΩ	G4
R29	47kΩ	G4
R30	150Ω	G4
R31	4·7kΩ	F4
R32	2·2kΩ	F4
R33	220Ω	D1
R34	1kΩ	H3

Capacitors

C1	0·001μF	D2
C2	0·01μF	D2
C3	100pF	D2
C4	—	D2
C5	—	C2
C6	0·01μF	D2
C7	0·01μF	D2
C8	20pF	D2
C9	10pF	D2
C10	20pF	D2
C11	—	D2
C12	—	D2
C13	5pF	D2
C14	0·001μF	D2
C15	0·001μF	C2
C16	65pF	D2
C17	0·001μF	F3
C17a	0·003μF	E3
C18	140pF	F3
C19	30pF	E3
C20	30pF	E3
C21	528pF	C2
C22	100pF	D1
C23	0·002μF	F3
C24	0·01μF	F4
C25	0·01μF	F3
C26	528pF	D2
C27	30pF	E3
C28	490pF	F3
C29	0·01μF	F3
C30	100pF	F4
C31	500pF	F4
C32	15pF	C1
C33	15pF	C1
C34	250pF	C2
C35	250pF	C2
C36	0·002μF	G3
C37	0·01μF	G3
C38	0·01μF	F3
C39	0·02μF	F4
C40	36pF	B1
C41	200pF	G4
C42	250pF	B2
C43	500pF	B2
C44	100pF	G3
C45	4,700pF	F4
C46	200pF	G4
C47	5μF	G4
C48	0·001μF	F4
C49	100pF	F4
C50	65pF	E4
C51	140pF	D1
C52	3,300pF	G4
C53	0·01μF	G3
C54	0·01μF	G3
C55	8μF	A1
C56	220pF	G4
C57	50μF	G4
C58	0·22μF	F4
C59	32μF	A1
C60	32μF	A1

Coils*

L1	—	C2
L2	—	C2
L3	—	†E4
L4	—	†E4
L5	—	†E4
L6	—	D2
L7	—	D2
L8	—	D1
L9	11·0	C1
L10	—	F3
L11	—	C1
L12	—	C1
L13	5·0	C2
L14	5·0	C2
L15	—	B1
L16	—	B1
L17	—	B1
L18	7·5	B2
L19	3·5	B2
L20	3·0	—

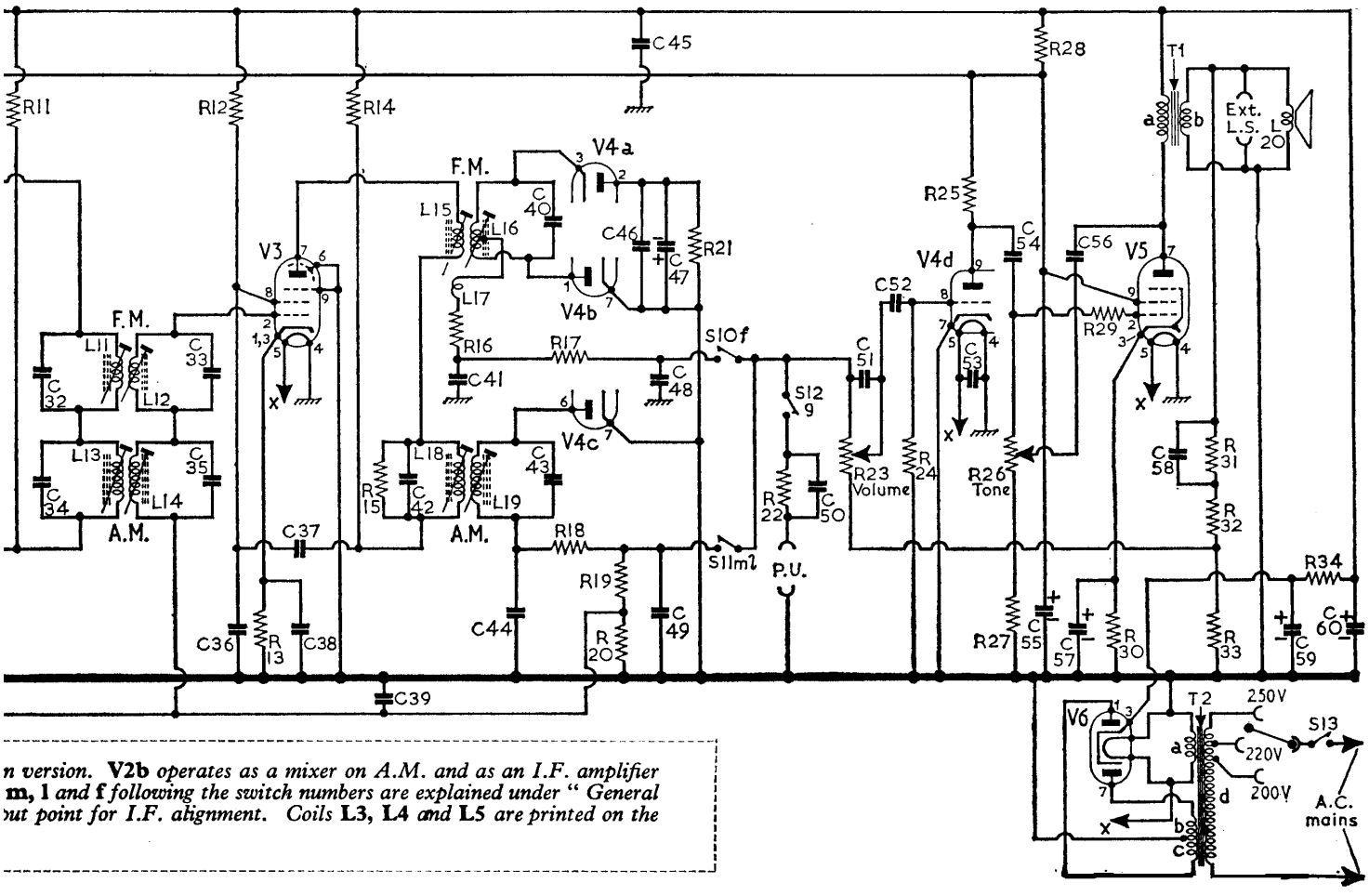
Miscellaneous*

T1	a	500·0	B2
	b	—	
T2	a	180·0	A2
	b	180·0	
	c	—	
	d	40·0	
S1-S12		—	D1
S13		—	A1

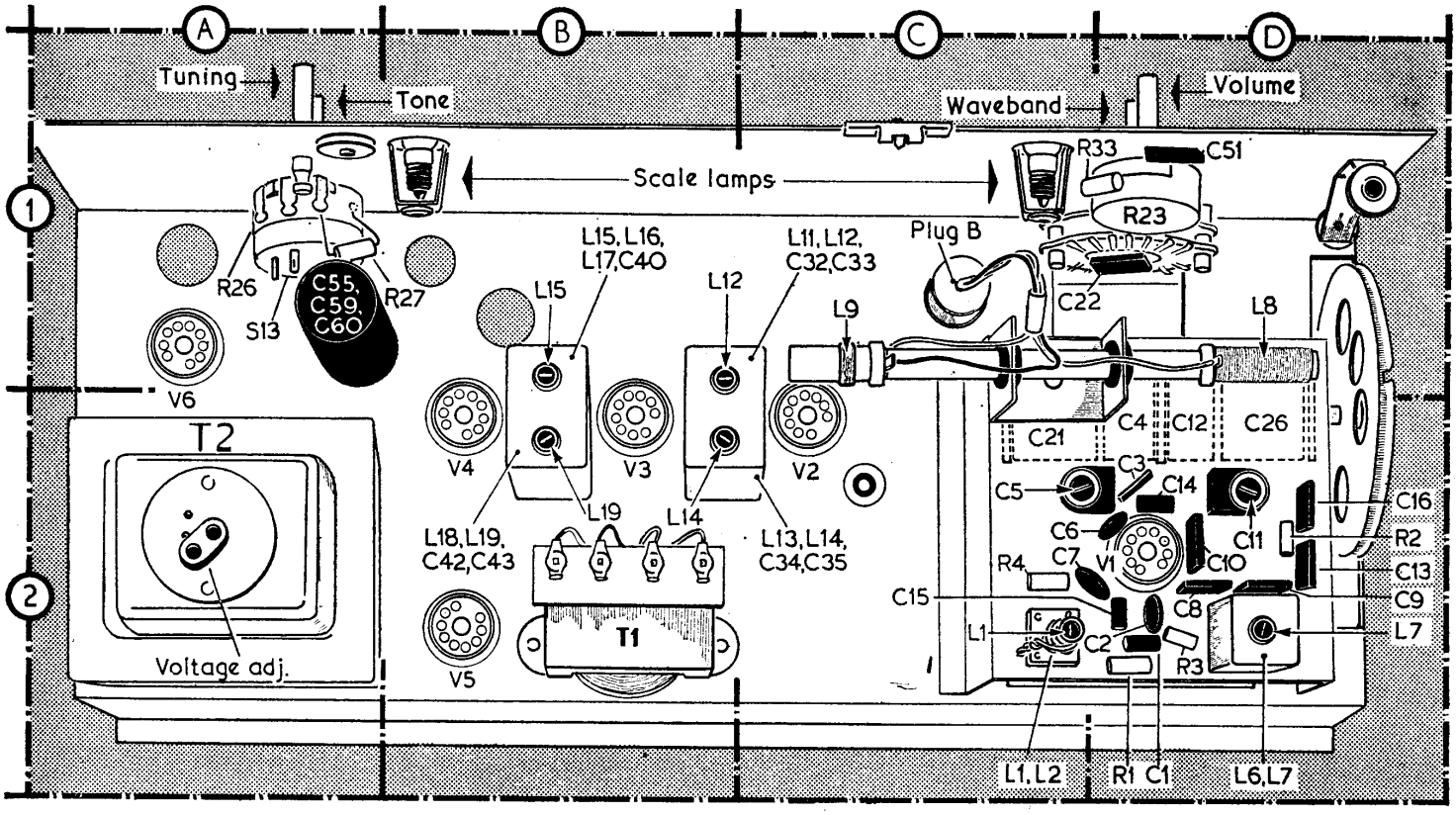
*Approximate D.C. resistance in ohms.

†Printed on panel.

If these "Trader" component numbers are used when ordering spares, the fact should be stated.



n version. **V2b** *operates as a mixer on A.M. and as an I.F. amplifier* **m, l** *and* **f** *following the switch numbers are explained under "General ...ut point for I.F. alignment. Coils* **L3, L4** *and* **L5** *are printed on the*



Plan view of the receiver chassis showing the F.M. tuner unit on the right-hand side in location reference D2.

Circuit Description—*continued*

transformer **T1**. **R26** in conjunction with **C56** provides variable tone control while negative feedback to **V4d** is obtained by connecting the "earthy" end of the volume control to the junction of **R32** and **R33** which are part of a potential divider across the output.

On A.M., **S1** is open removing the H.T. supply from the tuner, **S5** is open disconnecting the tuner I.F. transformer secondary and **S9** is closed to supply **V2a** with H.T. current. Signal input on A.M. is from internal aerial coils **L8** and **L9** or from an external aerial via bottom coupling capacitor **C17.** Tuning of the aerial circuits is by **C20** and **C21** (M.W.) and **C18** and **19** (L.W.).

L10 is the oscillator coil and is common to both A.M. wavebands. It is tuned by **C26** and **C27** on M.W. with the addition of **C28** on L.W. Feedback coupling is via **C30.** The heterodyne voltage is directly coupled to **G3** of the mixer and the resultant intermediate frequency developed in **L13** tuned primary winding is at 462kc/s. After amplification by common I.F. amplifier **V3** the signal is coupled via tuned transformer **L18** and **L19** to **V4c** for detection. The rectified audio signal is passed via **R18** and **S11** to the volume control and from there onwards the operation is the same as for F.M.

Part of the negative D.C. carrier component, developed across **R19, R20,** is returned to **V2** and **V3** as A.G.C. bias.

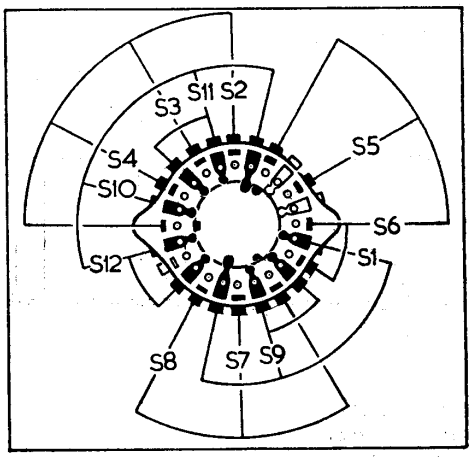
CIRCUIT ALIGNMENT

Alignment of the F.M./I.F. circuits should be carried out with the use of a wobbulator for preference. If a wobbulator is not available, an A.M. signal generator may be used. Both methods are described. During alignment the input should be as low as possible to prevent A.G.C. action.

Equipment Required.—A wobbulator; an A.M. signal generator modulated 30 per cent; an output meter with an impedance of 3 ohms, or an A.C. voltmeter; a high resistance D.C. voltmeter; an oscilloscope; a 0.1μF capacitor and insulated screwdriver-type trimming tool.

A.M./I.F. Circuits.—Switch to M.W. and rotate tuning capacitor to maximum capacitance. Connect the output meter in place of the speech coil or, if an A.C. voltmeter is used as an output indicator, connect it across the speech coil. Connect the signal generator to **V2b** control grid (pin 2), via the 0.1μF capacitor.

1.—Feed in a 462 kc/s signal and adjust the cores of **L19** (location reference B2), **L18** (G3), **L14** (B2) and **L13** (F3) for maximum output.



The waveband switch wafer as seen from the rear of an upright chassis

F.M./I.F. Wobbulator Method.—Switch to F.M. and disconnect **C47** (G4). Unscrew the core of **L16** (G3) until it protrudes from the base of the former. Connect the oscilloscope between the top end of the volume control **R23** (D1) and chassis. Connect the wobbulator to point **X** on the underside of the tuner unit printed panel (E4).

Note: point **X** is at H.T. potential and an isolating capacitor should be included in the wobbulator "live" output lead.

2.—Feed in a 10.7 Mc/s wobbulator signal and adjust **L15** (B1), **L12** (B1), **L11** (F3), **L7** (D2) and **L6** (E4) for maximum amplitude with a symmetrically shaped trace on the oscilloscope.

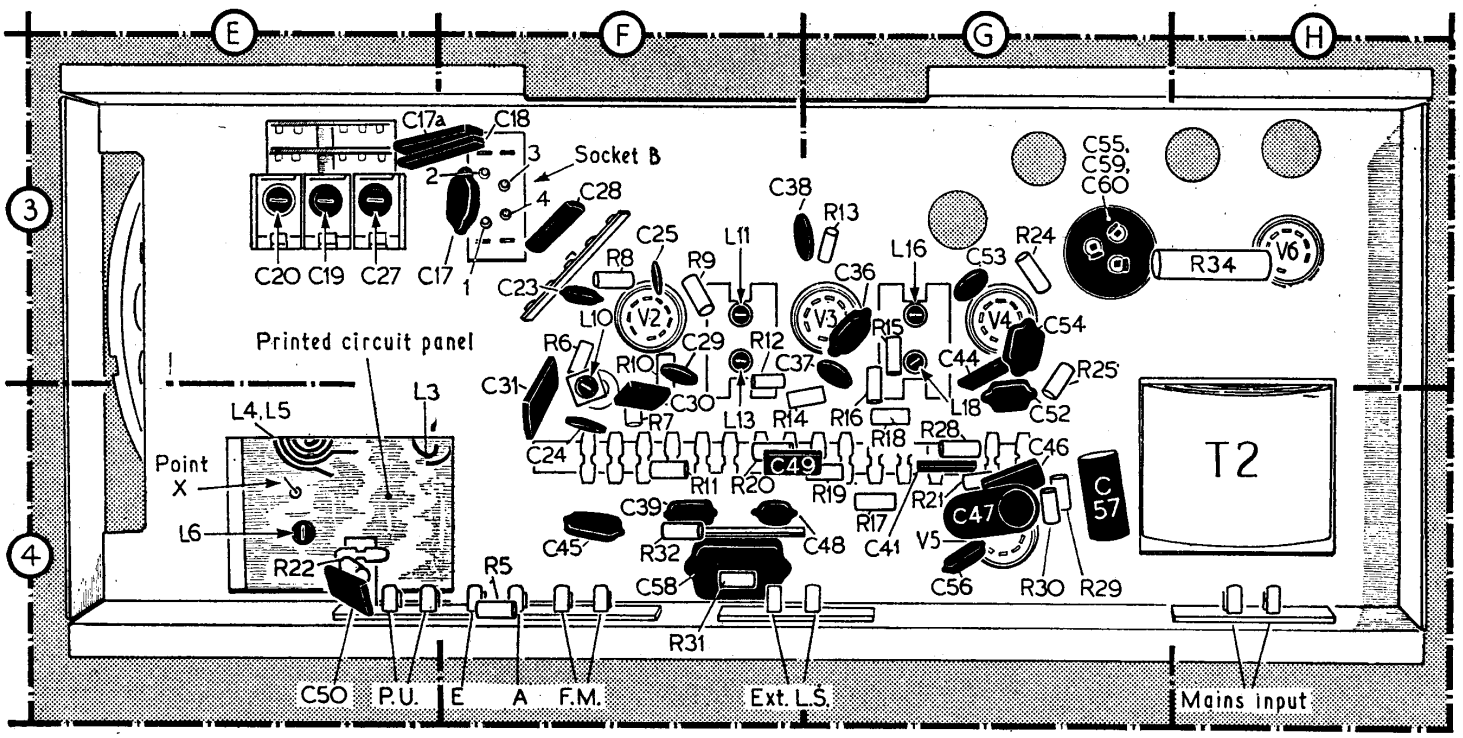
3.—Reconnect **C47** and screw in the core of **L16** (G3) for the normal discriminator "S" curve with a straight centre line.

F.M./I.F. Signal Generator Method.—Connect the high resistance D.C. voltmeter across **C47** (G4), observing correct polarity. Connect the A.M. signal generator to point **X** (E4) via an isolating capacitor as in the "Wobbulator Method."

4.—Feed in a 10.7 Mc/s modulated signal and adjust **L15** (B1), **L12** (B1), **L11** (F3), **L7** (D2) and **L6** (E4) for maximum reading on the D.C. voltmeter, adjusting the input to maintain the meter reading at about 4V.

5.—Move the signal generator frequency to each side of 10.7 Mc/s to ensure there is no double-humping, then adjust the signal generator tuning for maximum output on the meter. This may be slightly off 10.7 Mc/s.

Adjust **L16** (G3) for minimum modulation output on the output meter across the speaker terminals. This should be a sharp null point. **L16** may require



Underside view of the chassis. Point X in E4 is terminated in a short length of wire for easy connection of test equipment.

slight re-adjustment on a station for best quality reception.

F.M./R.F. Circuits.—Rotate the tuning gang to maximum capacitance and check that the cursor lines up with the end of the scale, then tune the receiver to 95 Mc/s.

6.—Connect the signal generator to the F.M. aerial sockets, feed in a 95 Mc/s signal and adjust **C11** (D2), **C5** (C2) and **L1** (C2) for maximum output on the D.C. voltmeter.

A.M./R.F. Circuits.—Switch to M.W. and tune to 500 m. Connect the signal generator to the A.M. aerial and earth sockets via a standard dummy aerial.

7.—Feed in a 600 kc/s signal and adjust **L10** (F3) and **L8** (D1) for maximum output.

8.—Tune to 200 m, feed in a 1,500 kc/s signal and adjust **C27** and **C20** (E3) for maximum output.

9.—Repeat operations 7 and 8 until no further improvement can be obtained.

10.—Switch to L.W. and feed in a 167 kc/s signal. Tune in this signal on the receiver (about 1,800 m). Then adjust **L9** (C1) for maximum output.

11.—Feed in a 230 kc/s signal and tune receiver to this signal (about 1,300 m). Then adjust **C19** (E3) for maximum output.

12.—Repeat operations 10 and 11 until no further improvement can be obtained.

GENERAL NOTES

Switches.—S1-S12 are the waveband and A.M./F.M. changeover switches. They are mounted in a four position rotary unit shown in location reference D1. The diagram in Col. 2 shows the individual switch contacts as they appear when viewed from the rear of an upright chassis. A suffix letter "m," "l" or "f" following the switch number on the circuit diagram denotes that the switch closes on either the M.W., L.W. or F.M. band. **S13** is the receiver on/off switch which is ganged with the tone control.

Scale Bulbs.—These are 6.3V, 0.15A round, M.E.S. fitting.

Dismantling.—To remove the chassis, take off back cover (five screws).

Pull out internal F.M. aerial plugs.

Undo two 4B.A. nuts and bolts securing chassis on rear flange.

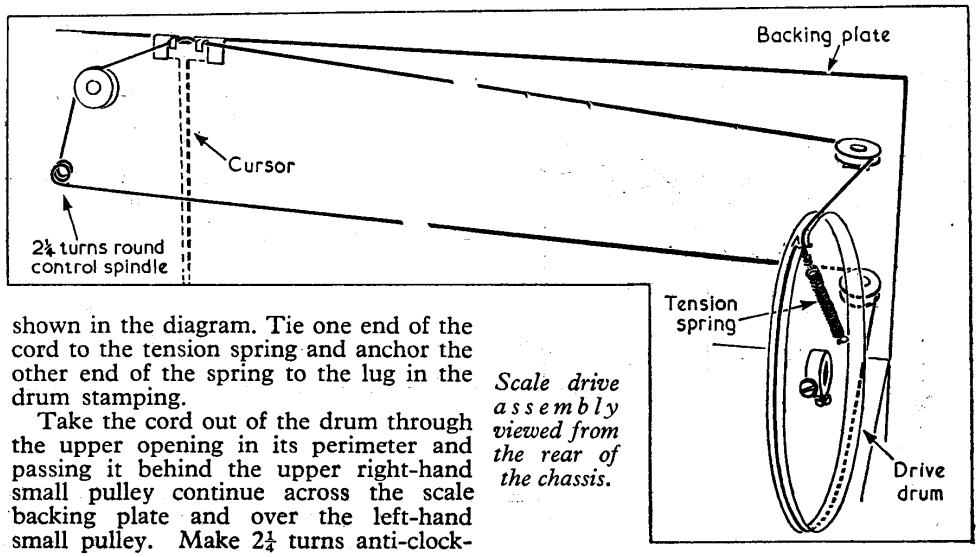
Withdraw chassis complete with knobs and tuning scale, and unsolder speaker leads.

Drive Cord Replacement.—About 44 ins of cord is required. The diagram below shows the tuning drive fully assembled as it appears when viewed from the rear of the chassis.

Turn the tuning gang to maximum capacitance (fully meshed) and observe that the drive drum takes up the position shown in the diagram. Tie one end of the cord to the tension spring and anchor the other end of the spring to the lug in the drum stamping.

Take the cord out of the drum through the upper opening in its perimeter and passing it behind the upper right-hand small pulley continue across the scale backing plate and over the left-hand small pulley. Make 2¼ turns anti-clockwise round the tuning knob spindle and return the free end of the cord to the right-hand lower small pulley.

Pass the cord over the small pulley and clockwise round the drive drum perimeter and complete by tying the end to the tension spring. Attach the cursor to line up with the edge of the scale at the L.F end.



Scale drive assembly viewed from the rear of the chassis.

MODIFICATIONS

Some receivers may be fitted with Brimar valves instead of Mazda. The Brimar equivalents are as follows: **V1** ECC85; **V2**, 20D4; **V3**, 9D7; **V4**, EABC80; **V5**, EL84; **V6**, EZ80. Where the Brimar range is fitted **R7** becomes 47 kΩ not 15 kΩ, and **C23** becomes 400pF. not 0.002μF. In some earlier production models **R20** may be 1 MΩ not 4.7 MΩ. It is recommended by the manufacturers that the 1 MΩ resistor should be replaced by a 4.7 MΩ resistor in all such cases to improve the quality of output.

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