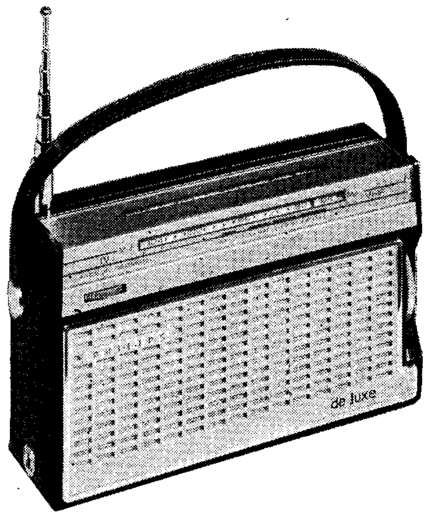
Supplement to Elec
Electronic Trader, 10

"TRADER" SERVICE SHEET

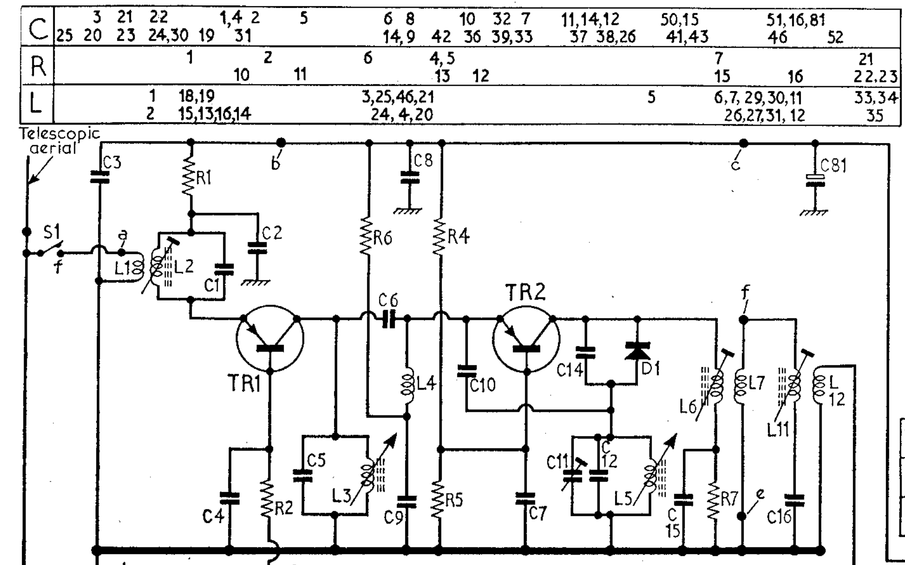
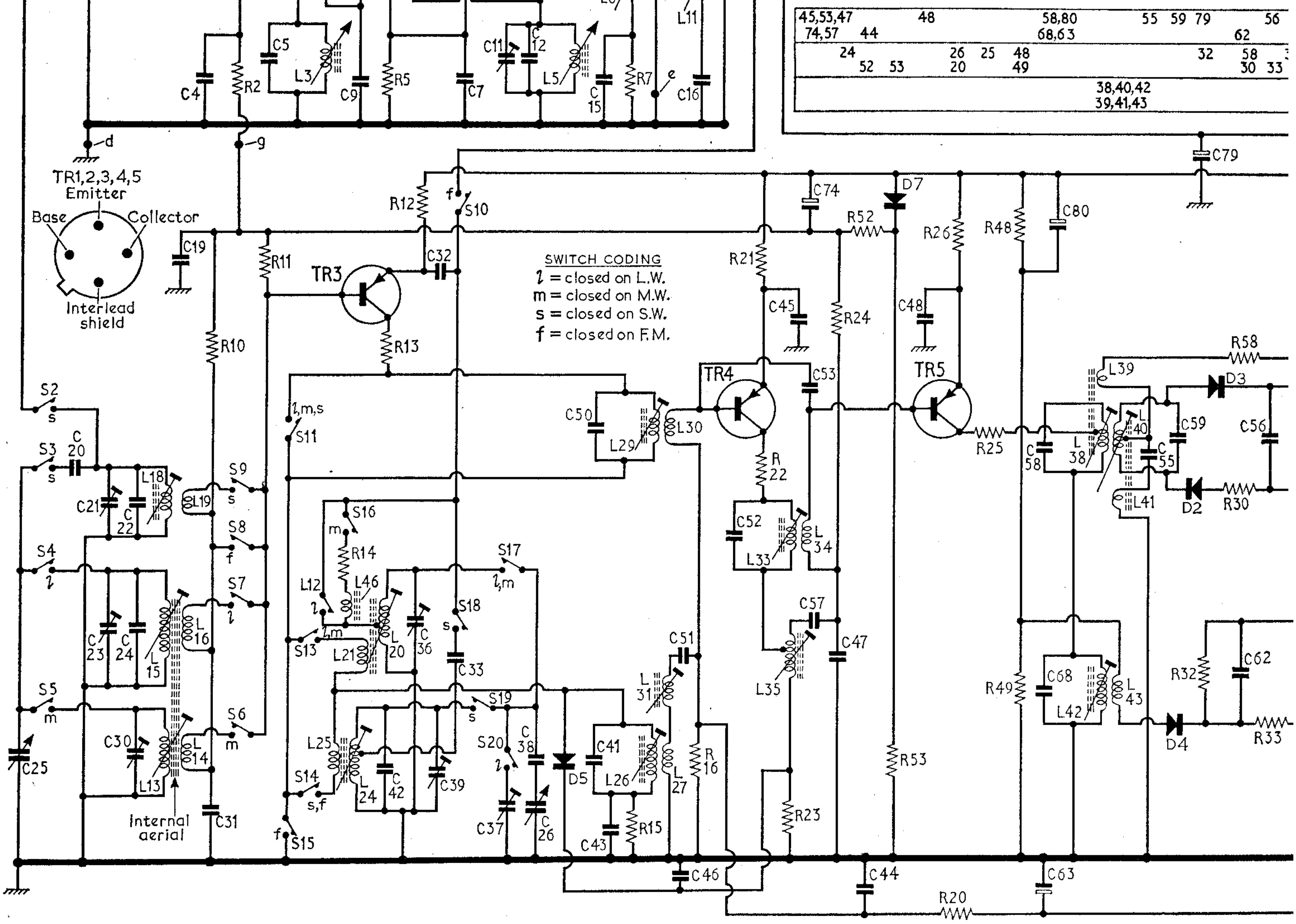
1794

PHILIPS L2X42T (242T)

A.M./F.M. Portable Transistored Radio Receiver



Below: Circuit diagram of the Philips L2X42T radio receiver.

Resistors

R1	820Ω	D3
R2	5·6kΩ	D3
R4	3·9kΩ	D3
R5	18kΩ	D3
R6	470Ω	D3
R7	220Ω	D3
R10	1·5kΩ	A1
R11	10kΩ	B1
R12	1·8kΩ	B1
R13	330Ω	B1
R14	15Ω	B1
R15	1kΩ	B1
R16	82kΩ	B1
R20	1kΩ	A2
R21	1·2kΩ	B2
R22	220Ω	B2
R23	2·2kΩ	B2
R24	1·5kΩ	B2
R25	220Ω	B2
R26¶	1kΩ	B2
R28	1·5kΩ	B1
R30	220Ω	B2
R31	10kΩ	B2
R32	10kΩ	A2
R33	1·8kΩ	A2
R34	15kΩ	A2
R35	10kΩ	A1
R36	10kΩ	A1
R37	39kΩ	A1
R40	680Ω	A1
R41	1·5kΩ	A1
R42	4·7kΩ	A2
R43	22kΩ	A2
R44	56Ω	A2
R45	500Ω	A2
R46	2·7Ω	A2
R47	2·7Ω	A2
R48	470Ω	B2
R49	5·6kΩ	A2
R50*	250Ω	A2
R51‡	180Ω	A2
R52	220Ω	A1
R53	6·8kΩ	A1
R54	100Ω	A1
R55	120Ω	A2
R56	12Ω	E3
R57§	—	A2
R58*	51Ω	B2

Capacitors

C1	33pF	D3
C2	4,700pF	D3
C3	4,700pF	D3
C4	4,700pF	D3
C5	16pF	D3
C6	4pF	D3
C7	4,700pF	D3
C8	4,700pF	D3
C9	470pF	D3
C10	2·7pF	D3
C11	6pF	D3
C12	15pF	D3
C14	82pF	D3
C15	4,700pF	D3
C16	47pF	C1
C19††	1,000pF	C1
C20	330pF	B1
C21	40pF	B1
C22	150pF	B1
C23	40pF	C1
C24	68pF	B1
C25	—	B2
C26	—	B2
C30	20pF	A1
C31	0·047μF	B1
C32	0·022μF	B1
C33	3,000pF	B1
C36	20pF	B1
C37	300pF	B1
C38	300pF	B1
C39	20pF	B1
C41	3,000pF	B1
C42	150pF	B2
C43	0·047μF	B2
C44	4,700pF	B2
C45	0·047μF	B2
C46	0·047 μF	B2
C47	3,000pF	B2
C48	0·047μF	B2
C50	82pF	B1
C51	150pF	B2
C52	82pF	B2
C53	27pF	B2
C55†	39pF	B2
C56	4,700pF	B2
C57	150pF	B2
C58	82pF	B2
C59	82pF	B2
C60	2μF	A2
C61	4,700pF	B2
C62	4,700pF	A2
C63	2μF	A2
C64	4,700pF	A2
C65	0·1μF	B1
C66	25μF	A1
C67	100μF	A1
C68	3,000pF	B2
C69	1,500pF	A1
C70	25μF	A1
C71	100μF	A2
C72	640μF	E3
C73	100μF	C1
C74	25μF	A2
C75	0·047μF	B2
C76	200μF	A1
C77	200μF	A2
C78	200μF	A2
C79	100μF	C2
C80	2μF	A2
C81	640μF	C1

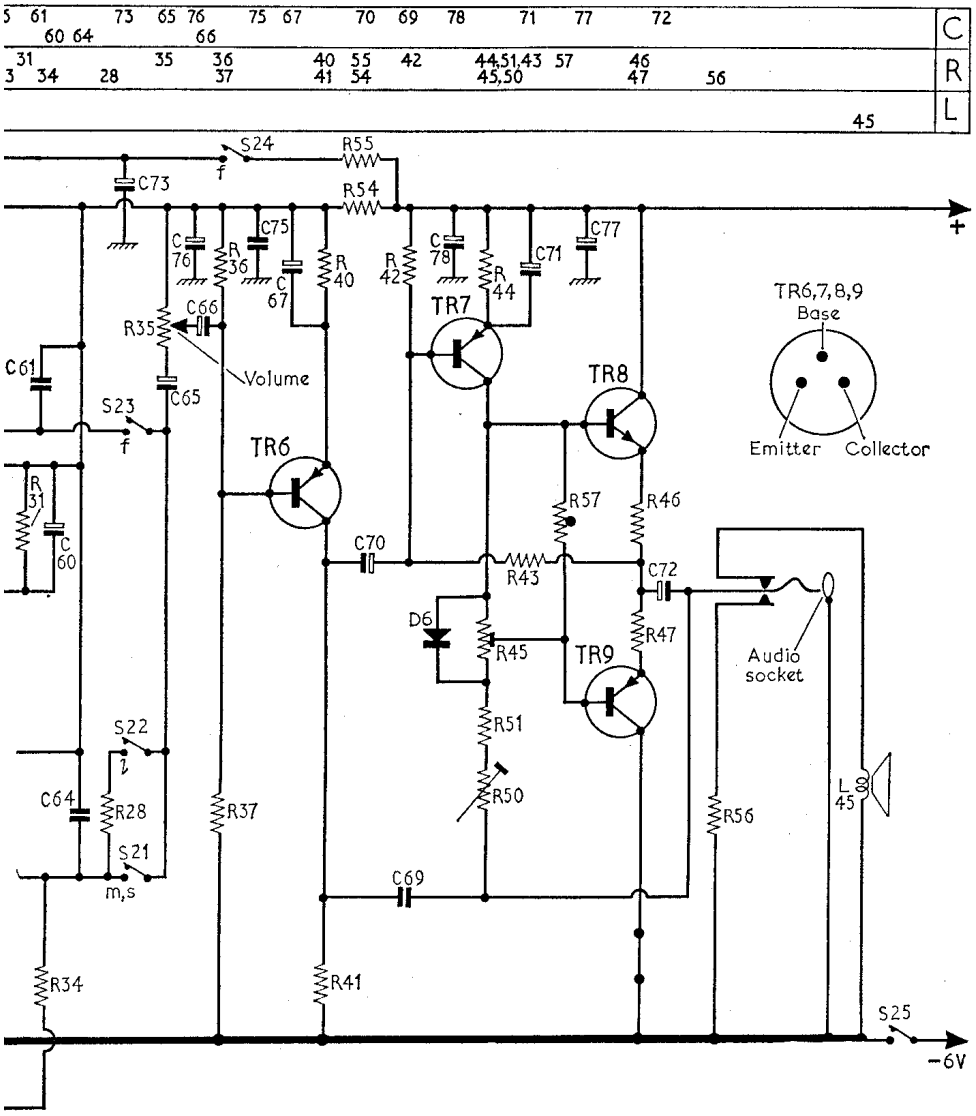
Coils

L1	—	D3
L2	—	D3
L3	—	D3
L4	—	D3
L5	—	D3
L6	—	D3
L7	—	D3
L11	—	C1
L12	—	C1
L13	—	A1
L14	—	A1
L15	—	C1
L16	—	C1
L18	—	B1
L19	—	B1
L20	—	B2
L21	—	B2
L24	—	B2
L25	—	B2
L26	—	B2
L27	—	B2
L29	—	B1
L30	—	B1
L31	—	B2
L33	—	B2
L34	—	B2
L35	—	B2
L38	—	B2
L39	—	B2
L40	—	B2
L41	—	B2
L42	—	B2
L43	—	B2
L45	—	E3
L46	—	B1

Miscellaneous

D1	AA119	D3
D2	AA119	B2
D3	AA119	B2
D4	OA90	A2
D5	OA90	B2
D6	BA100	B2
D7	**	A1
S1–S24	—	B2
S25	—	A1

* *May not be fitted.*
‡ 330Ω *when* R50 *not fitted.*
† *May be* 33*pF.*
¶ *May be* 680Ω.
** *Philips part no.* 211/00953.
§ *Philips part no.* 071/00639.
†† *May be* 1,500*pF.*



Transistor Table

Transistor		Emitter (V)	Base (V)	Collector (V)
TR1	AF121	1·4	1·7	6·0
TR2	AF124	1·3	1·35	5·7
TR3	AF126	1·5	1·8	5·8
TR4	AF126	1·3	1·5	4·6
TR5	AF121	1·5	1·8	5·9
TR6	AC125	1·4	1·5	3·9
TR7	AC126	0·3	0·45	3·2
TR8	AC127	3·35	3·2	—
TR9	AC128	3·35	3·5	6·0

GENERAL DESCRIPTION

HOUSED in a padded leathercloth plastics case of "pocket-portable" dimensions, Philips L2X42T (242T) is an a.m./f.m. 6V battery operated nine transistor radio receiver.

Waveband ranges are 1,150–2,000m (l.w.), 184.9–580m (m.w.), 40.54–50.8m (s.w.) and 87.5–104Mc/s (f.m.), with waveband selection by means of a slider switch operated by a lever located at the rear of the receiver.

A telescopic aerial is fitted for f.m. and s.w. reception while an internal ferrite rod aerial provides reception on m.w. and l.w.

A socket is provided for the connection of an external loudspeaker or earphone, the internal loudspeaker being muted automatically on insertion of a jack plug into this socket.

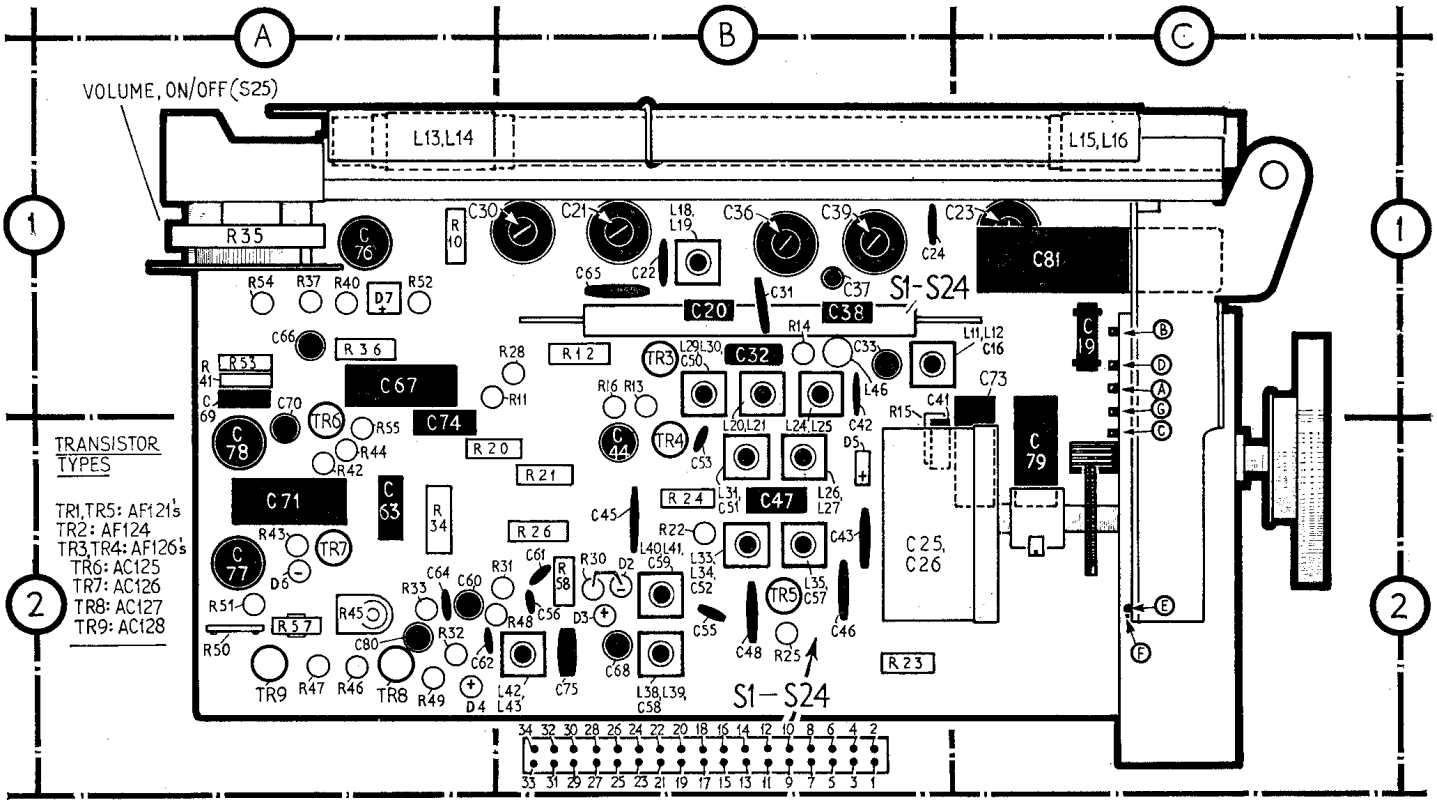
200mW audio output is available which is handled by the internal 3in loudspeaker.

Four 1.5V U12 batteries supply operating power and are fitted in a separate compartment in the bottom of the case.

TRANSISTOR ANALYSIS

Transistor voltages quoted in the table above were taken from data supplied by the manufacturers and were measured on a 40,000Ω/V test meter. All readings are negative with respect to battery positive.

(*Continued overleaf col.*1)



General view of chassis as seen from the front when removed from the case. The numbers on the waveband switch (location ref. B2) agree with those in the sketch below.

Continued from overleaf—

CIRCUIT DESCRIPTION

Operation on A.M.—On m.w. and l.w., signals induced into the ferrite rod aerial coils **L13** (m.w.) and **L15** (l.w.), are tuned by **C30** and **C25** on m.w. and by **C23, C24** and **C25** on l.w. They are coupled by **L14** and **L16** respectively to the base of **TR3** via the appropriate switch contacts.

On s.w. a separate aerial coil (**L18**) is used in conjunction with the telescopic aerial. **L18** is tuned by **C20, C21, C22** and **C25.** Signals are coupled to the base of **TR3** by **L19.**

TR3 and **TR5** derive their base bias from a stabilised bias line fed from the potential divider **R53/D7** and filtered by **R52/C74. TR4** is a.g.c. controlled.

TR3 functions as a self-oscillating mixer on a.m. and an i.f. amplifier on f.m.

On m.w., **L20** is the oscillator coil, tuned by **C36, C38** and **C26** while on l.w. the same coil is used but **C37** is switched in parallel with **C36** and **C38/C26.**

On s.w. **L24** is the oscillator coil, tuned by **C39, C42, C38** and **C26.**

The a.m. i.f. component appears across the first a.m. i.f. transformer **L26** and is coupled to the base of **TR4** by **L27, L31** and **C51. D5** is effectively connected across **L26** and damps **L26** progressively as the voltage across **R23** varies due to a.g.c. action on **TR4.**

After amplification by **TR4** i.f. signals appear across **L35,** the second a.m. i.f. transformer, and are bottom-coupled by **C57** to the base of **TR5.** After further amplification signals appear across the final a.m. i.f. transformer **L42** and are coupled, via **L43,** to the a.m. demodulator diode **D4.**

Audio output from the demodulator is filtered by **C62, R33** and **C64** and passed, via the appropriate switch contacts and **C65** to the volume control **R35.**

Signals coupled from the volume control via **C66** to the base of the a.f. amplifier **TR6** appear across **TR6** collector load **R41,** are passed to the driver transistor **TR7** and, after amplification, appear in the base circuits of the complementary output transistors **TR8** and **TR9.** Output from these is fed via **C72** to the 8Ω loudspeaker **L45.**

Operation on F.M.—On f.m. the a.m. aerial and oscillator circuits are disconnected and **TR3** becomes an f.m. i.f. amplifier. The i.f. output of the f.m. tuner unit being fed into the emitter of **TR3** by **S10, C32.**

Signals from the telescopic aerial are coupled via **L1/L2** to the base of **TR1** which operates as an r.f. amplifier. Base bias for **TR1** is derived from the stabilised bias line mentioned in "A.M. operation".

After amplification the signal appears across the permeability tuned r.f. coil **L3** and are coupled to the emitter of **TR2** via **C6.**

TR2 operates as a self-oscillating mixer. **L5** is the permeability tuned oscillator coil tuned by **C11** and **C12.** F.m. i.f. output appears across **L6** and is coupled via **L7, L11** and **L12** to the emitter of **TR3.**

TR4 and **TR5** function as f.m. i.f. amplifiers and the signal after amplification by **TR4** and **TR5** appears across the primary of the discriminator transformer which employs two separate transformers coupled together by **L39** and **L41.**

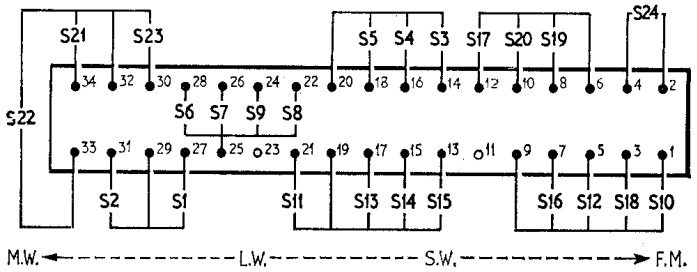
Audio output from the discriminator is fed via **S23** to the audio amplifier stages.

CIRCUIT ALIGNMENT

Equipment Required.—An a.m. signal generator covering the range 150kc/s–104Mc/s; an audio output meter with an impedance to match 8Ω and a valve voltmeter. Also required are: two matched 220kΩ resistors connected in series, with a crocodile clip at the free end of each resistor; a 10kΩ resistor with crocodile clips at each end; one 0·033μF capacitor; one 1,500pF capacitor; a length of insulated wire with which to form an r.f. coupling loop around the ferrite rod aerial and suitable non-ferrous trimming tools.

A.M. CIRCUITS

1.—Connect the audio output meter in place of the loudspeaker. Connect the output of the signal generator to the base



Left: Waveband switch (S1-S24.) as viewed from the component side of the panel as in the above illustration.

of **TR3** via a 0·033μF capacitor. Switch to m.w.

2.—Turn the volume control to maximum and the tuning gang to minimum capacitance. Feed in a 470Kc/s signal 30 per cent modulated.

3.—Adjust the cores of **L42, L35, L31** and **L26** for maximum output, adjusting the input level to maintain an output of approximately 50mW.

4.—Disconnect the 0·033μF capacitor and connect the output of the signal generator to a few turns of insulated wire wound round the ferrite rod aerial.

5.—With the receiver still switched to m.w., turn the tuning gang to maximum capacitance and feed in a 510kc/s signal.

6.—Adjust **L20** for maximum output.

7.—Turn gang to minimum capacitance and feed in a 1,650kc/s signal.

8.—Adjust **C36** for maximum output.

9.—Tune receiver to 517m. and feed in a 550kc/s signal, adjust **L13** for maximum output.

10.—Tune to 222m and feed in a 1,350kc/s signal. Adjust **C30** for maximum output.

11.—Switch to l.w., turn tuning gang to maximum and feed in a 147kc/s signal.

12.—Adjust **C37** for maximum output.

13.—Tune to 1,765m and feed in a 170kc/s signal.

14.—Adjust **L15** for maximum output.

15.—Tune to 1,200m and feed in a 250kc/s signal.

16.—Adjust **C23** for maximum output.

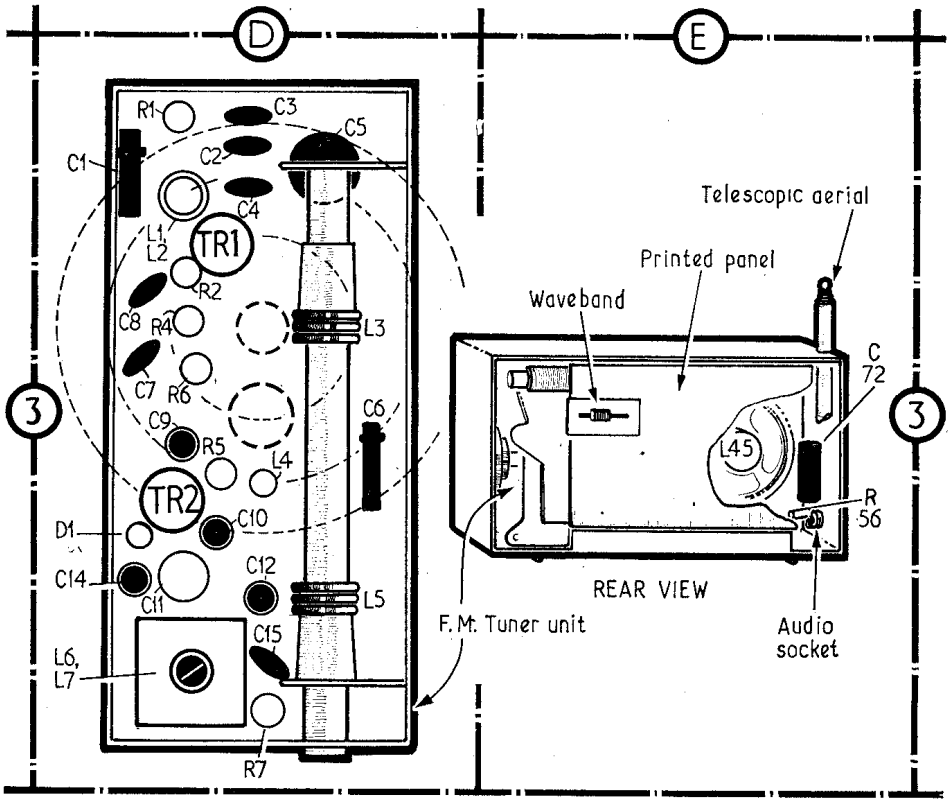
17.—Switch to s.w., turn gang to maximum capacitance. Extend the telescopic aerial and slide the r.f. coupling loop off the ferrite aerial and down over the telescopic aerial.

18.—Feed in a 5·85Mc/s signal and adjust **L24** and then **L18,** both for maximum output.

19.—Turn gang to minimum capacitance and feed in a 7·6Mc/s signal.

20.—Adjust **C39** and then **C21,** both for maximum output.

21.—Repeat all operations until no further improvement can be obtained.



The component side of the f.m. tuner unit. Right: General view of the receiver with the back cover removed.

F.M. CIRCUITS

1.—Disconnect the audio output meter and remove the r.f. coupling loop.

2.—Connect the output of the signal generator to the telescopic aerial via a 1,500pF capacitor.

3.—Connect the valve voltmeter across **C60** and switch to its 5V range.

4.—Tune to the low frequency end of the scale and switch to f.m. Turn the volume control to minimum.

5.—Unscrew the cores of all f.m. i.f. transformers until they protrude from the formers.

6.—Feed in a 10·7Mc/s a.m. signal and adjust **L38** for maximum d.c. output on the valve voltmeter.

7.—Connect a 10kΩ damping resistor across **L38** and the two 220kΩ resistors across **C60,** connect the valve voltmeter between the junction of the 220kΩ resistors and the junction of **R58/C61.**

8.—Adjust the core of **L40** for *zero* reading on the valve voltmeter.

9.—Remove the 220kΩ resistors and reconnect the valve voltmeter, as before, across **C60.**

10.—Adjust the cores of **L33, L29, L11** and **L6** for maximum d.c. output on the valve voltmeter.

11.—Repeat operations 6–10.

12.—Tune receiver to 88·2Mc/s and feed an 88·2Mc/s a.m. signal into the telescopic aerial.

13.—Adjust **L5** for maximum d.c. output on the valve voltmeter.

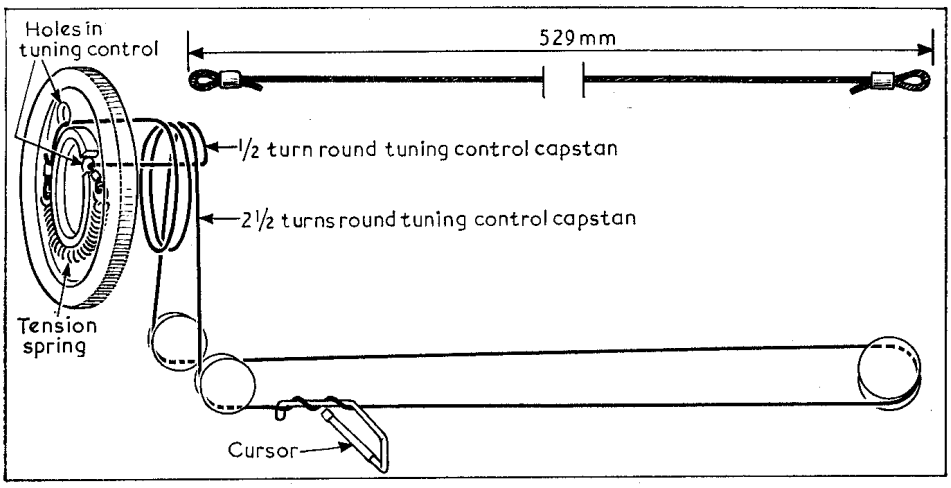
14.—Tune receiver to 102·6Mc/s and feed in a 102·6Mc/s signal.

15.—Adjust **C11** for maximum output.

16.—Tune receiver to 95Mc/s and feed in a 95Mc/s signal.

17.—Adjust **L3** for maximum output.

18.—Repeat operations 12–17.



Sketch of the tuning drive cord assembly with the gang at maximum, as seen from the component side with the chassis inverted.

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