COSSOR 584, 538 AND 598

SEVERAL interesting features are to be found in the Cossor 584 4-valve (plus rectifier) A.C. 3-band superhet, one of these being the tuning of the I.F. transformers by moving their iron cores. The receiver is suitable for mains of 200-250 V, 40-100 C/S, and has a short-wave range of 16 52·2 m.

An identical chassis is fitted in the 598 console and the chassis in the 538 radiogram is very similar, the differences being explained under "General Notes." This *Service Sheet* was prepared on a 584.

CIRCUIT DESCRIPTION

Aerial input on M.W. and L.W. via high impedance coils **L1, L2,** coupling coils **L3, L4** and coupling condensers **C1, C2** to mixed coupled band-pass filter. Primary coils **L5** and **L6** are tuned by **C36**; secondaries **L9, L10** by **C40.** Coupling by condenser **C4** and mutual inductance. On S.W. input is via coupling coil **L7** to single-tuned circuit **L8, C40.** Provision for connection of di-pole aerial at sockets **A1** and **A2** across **L7.** When used with ordinary aerial a special strap provided connects **A2** to **E** socket.

First valve (**V1, Cossor metallised 41STH**) is a triode hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L11** (S.W.), **L12** (M.W.) and **L13** (L.W.) are tuned by **C41**; parallel trimming by **C42** (S.W.), **C43** (M.W.) and **C10, C44** (L.W.); series tracking by **C11, C45** (S.W.), **C46** (M.W.) and **C47** (L.W.). Reaction by coils **L14** (S.W.), **L15** (M.W.) and **L16** (L.W.).

Second valve (**V2, Cossor metallised MVS/Pen**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C6, L17, L18, C7** and **C16, L19, L20, C17.** Tuning is effected by adjustment of iron cores and variable selectivity by varying the coupling between **L17** and **L18.**

Tuning indicator (T.I.) in **V2** anode circuit consists of a small M.E.S. lamp which is illuminated from the valve-heater circuit in series with secondary windings of the transformer **T1.** As **V2** anode current increases the inductance of **T1** falls, lowering its impedance, thus permitting an increased current to flow through the secondary windings so that the lamp glows brightly.

Intermediate frequency 465 KC/S.

Diode second detector is part of double diode triode valve (**V3, Cossor metallised DDT**). Audio frequency component in rectified output is developed across manual volume control **R11,** which also acts as signal diode load, and passed via A.F. coupling condenser **C22** and I.F. stopper **R12** to C.G. of triode section. I.F. filtering by **R10, C20, C23** and **C25.** Variable tone control in anode circuit by R.C. filter **R18, C26.**

Second diode of **V3,** fed from **V2** anode via **C19,** provides D.C. potential which is developed across load resistance **R17** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along **R14.**

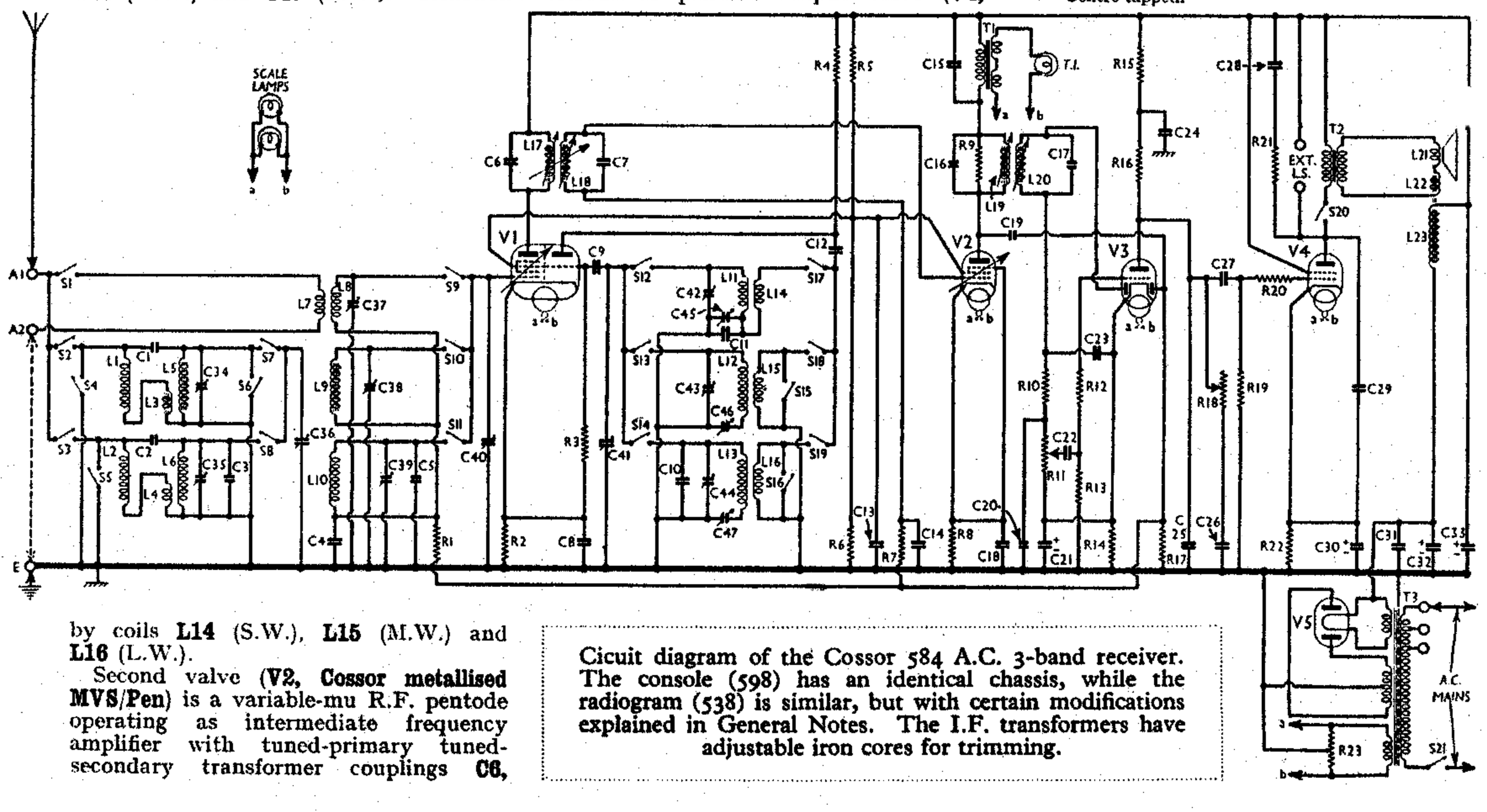
Resistance-capacity coupling by **R16 C27** and **R19** between **V3** triode and tetrode or pentode output valve (**V4, Cossor 42OT** or **42MP/Pen**). Fixed tone correction by R.C. filter **R21, C28** and **C29** in anode circuit. Provision for external speaker across primary of **T2** by means of plug and sockets. When plug is fully inserted **S20** opens and mutes internal speaker.

H.T. current is supplied by full-wave rectifying valve (**V5, Cossor 442BU**). Smoothing by speaker field **L23** and dry electrolytic condensers **C32** and **C33.**

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 hexode C.G. decoupling	1,000,000
R2	V1 fixed G.B. resistance ..	300
R3	V1 osc. C.G. resistance ..	25,000
R4	V1 osc. anode H.T. feed ..	30,000
R5	V1, V2 S.G.'s H.T. potential	15,000
R6	divider	15,000
R7	V2 C.G. decoupling	2,000,000
R8	V2 fixed G.B. resistance ..	300
R9	1st I.F. trans. pri. damping	250,000
R10	I.F. stopper	50,000
R11	V3 signal diode load and manual volume control ..	500,000
R12	I.F. stopper	100,000
R13	V3 triode C.G. resistance ..	2,000,000
R14	V3 triode G.B and A.V.C. delay resistance	2,000
R15	V3 triode anode decoupling ..	50,000
R16	V3 triode anode load	50,000
R17	V3 A.V.C diode load	1,000,000
R18	Variable tone control ..	20,000
R19	V4 C.G. resistance	500,000
R20	V4 grid stopper	50,000
R21	Part fixed tone corrector ..	10,000
R22	V4 G.B. resistance	150
R23	Heater circuit potentiometer, total	25*

* Centre tapped.



Cicuit diagram of the Cossor 584 A.C. 3-band receiver. The console (598) has an identical chassis, while the radiogram (538) is similar, but with certain modifications explained in General Notes. The I.F. transformers have adjustable iron cores for trimming.

CONDENSERS		Values (μF)
C1	Part M.W. aerial coupling ..	0·00001
C2	Part L.W. aerial coupling ..	0·00001
C3	Band-pass pri. L.W. fixed trimmer	0·00008
C4	Band-pass bottom coupling ..	0·05
C5	Band-pass sec. L.W. fixed trimmer	0·00008
C6	1st I.F. trans. pri. trimmer ..	0·00025
C7	1st I.F. trans. sec. trimmer ..	0·00025
C8	V1 cathode by-pass	0·1
C9	V1 osc. C.G. condenser ..	0·0001
C10	Osc. circuit L.W. fixed trimmer	0·0001
C11	Osc. circuit S.W. fixed tracker	0·002
C12	V1 osc. anode coupling ..	0·002
C13	V1, V2 S.G.'s decoupling ..	0·1
C14	V2 C.G. decoupling	0·05
C15	T.I. trans. pri. shunt	0·5
C16	2nd I.F. trans. pri. trimmer ..	0·00006
C17	2nd I.F. trans. sec. trimmer ..	0·00008
C18	V2 cathode by-pass	0·1
C19	Coupling to V3 A.V.C. diode	0·00005
C20	I.F. by-pass	0·00005
C21*	V3 cathode by-pass	50·0
C22	A.F. coupling to V3 triode ..	0·01
C23	I.F. by-pass	0·00005
C24	V3 triode anode decoupling ..	0·25
C25	I.F. by-pass	0·0002
C26	Part of tone control circuit	0·03
C27	V3 triode to V4 A.F. coupling	0·01
C28, C29	Parts fixed tone corrector circuit	0·01, 0·0005
C30*	V4 cathode by-pass	50·0
C31	Rectifier filament R.F. by-pass	0·0002
C32*, C33*	H.T. smoothing ..	8·0, 8·0
C34‡	Band-pass pri. M.W. trimmer	—
C35‡	Band-pass pri. L.W. trimmer	—
C36†	Band-pass pri. tuning ..	—
C37‡	Aerial circuit S.W. trimmer	—
C38‡	Band-pass sec. M.W. trimmer	—
C39‡	Band-pass sec. L.W. trimmer	—
C40†	Aerial S.W. and band-pass sec. tuning	—
C41†	Oscillator circuit tuning ..	—
C42‡	Osc. circuit S.W. trimmer ..	—
C43‡	Osc. circuit M.W. trimmer ..	—
C44‡	Osc. circuit L.W. trimmer ..	—
C45‡	Osc. circuit S.W. tracker ..	—
C46‡	Osc. circuit M.W. tracker ..	—
C47‡	Osc. circuit L.W. tracker ..	—

OTHER COMPONENTS		Approx. Values (ohms)
L1, L2	High impedance aerial coils	9·0, 84·0
L3, L4	Band-pass primary aerial coupling coils ..	0·4, 8·0
L5, L6	Band-pass primary coils	2·1, 24·0
L7	Aerial S.W. coupling coil ..	0·25
L8	Aerial S.W. tuning coil ..	Very low
L9, L10	Band-pass secondary coils	1·5, 18·0
L11	Osc. circuit S.W. tuning coil	Very low
L12	Osc. circuit M.W. tuning coil	1·0
L13	Osc. circuit L.W. tuning coil..	9·0
L14	Oscillator S.W. reaction ..	0·1
L15	Oscillator M.W. reaction ..	0·2
L16	Oscillator L.W. reaction ..	4·0
L17	1st I.F. trans. Pri.	3·0
L18	1st I.F. trans. Sec. ..	4·0
L19	2nd I.F. trans. Pri. ..	6·5
L20	2nd I.F. trans. Sec. ..	6·5
L21	Speaker speech coil	1·8
L22	Hum neutralising coil.. ..	0·1
L23	Speaker field coil	1,500·0
T1	Tuning indicator trans. Pri. ..	750·0
	Tuning indicator trans. Secs., total	1·5
T2	Speaker input trans. Pri. ..	850·0
	Speaker input trans. Sec. ..	0·2
T3	Mains trans. Pri., total ..	22·0
	Mains trans. Heater sec. ..	0·1
	Mains trans. Rect. heat. sec.	0·2
	Mains trans. H.T. sec., total	370·0
S1-S19	Waveband switches	—
S20	Internal speaker switch ..	—
S21	Mains switch	—

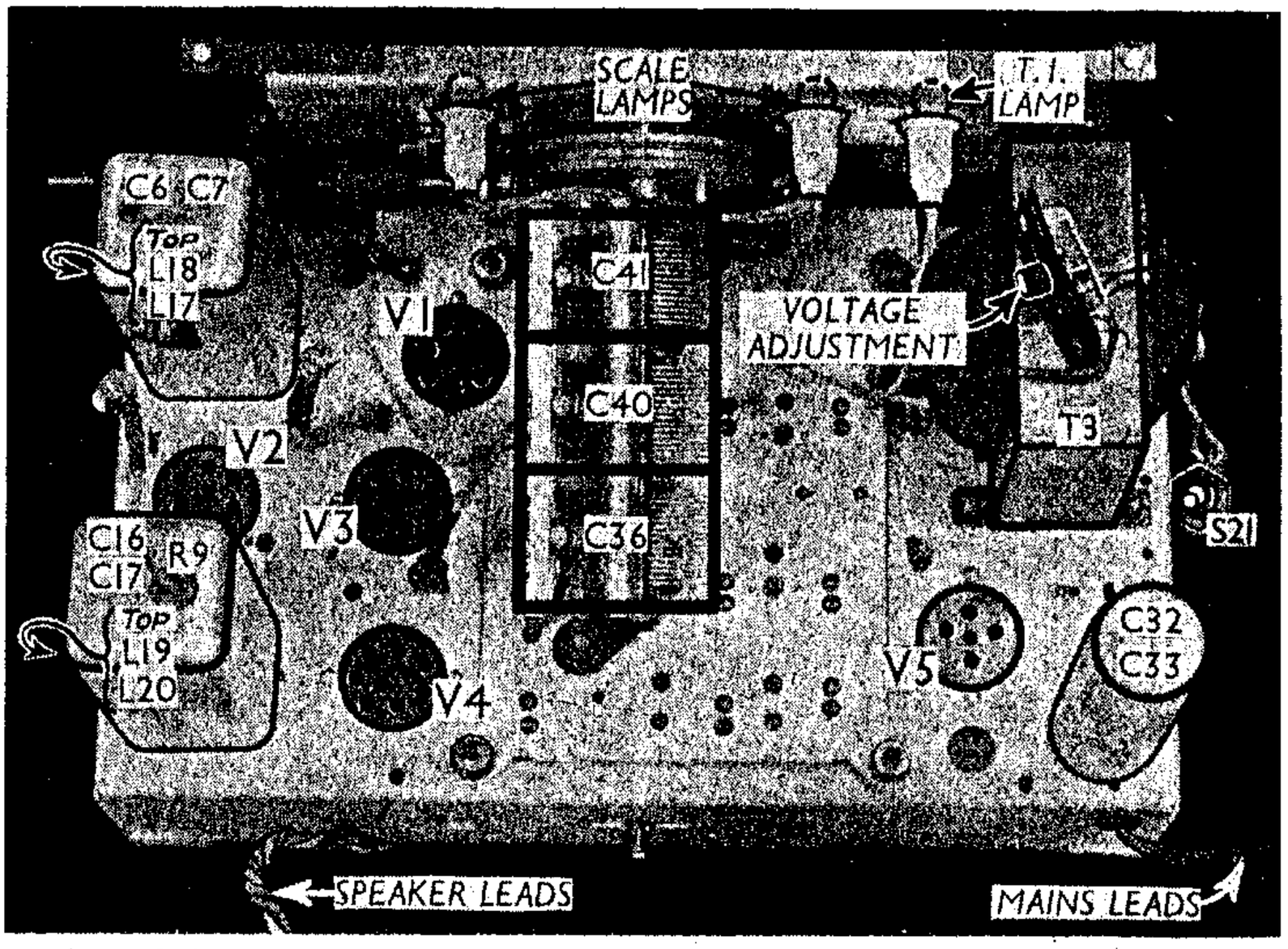
DISMANTLING THE SET

Removing Chassis.—Remove the knobs from the volume and tone controls (recessed screws) and that from the wave-change switch (two recessed grub screws). Now remove the tuning knob and its extension by slightly slackening the two round-head screws accessible from the inside of the cabinet, and remove the switch (large nut).

Next remove the screen from **V1** and the four bolts (with washers, lock washers and fibre washers) holding the chassis to the chassis platform. Free the speaker leads from the cleat on the side of the cabinet (brad), disconnect them from the speaker (screw terminals) and push them up through the hole in the chassis platform.

The chassis can now be withdrawn from the cabinet by tilting the back upwards. *When replacing*, do not forget to fit the fibre washers on each of the chassis fixing bolts, and connect the speaker leads as follows, numbering the terminals from bottom to top :—1, blue ; 2, red ; 3, yellow.

Removing Speaker.—If it is necessary to remove the speaker from the cabinet, slacken the four clamps holding it to the sub-baffle and *when replacing*, see that the transformer is on the left.



Plan view of the chassis. The I.F. transformer windings have adjustable iron cores reached through holes in the sides of the cans.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 223 V, using the 220 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 41STH	265	2·2	100	3·9
	Oscillator			
	82	6·0		
V2 MVS/Pen	258	4·3	100	0·9
V3 DDT	102	1·2	—	—
V4 42oT	233	37·0	265	8·0
V5 442BU	342†	—	—	—

† Each anode, A.C.

GENERAL NOTES

Switches.—S1-S19 are the waveband switches, in two rotary units beneath the chassis. They are indicated in our underchassis view, and are shown in detail in the diagrams on page VIII, where they are as seen looking from the front of the underside of the chassis.

The table (p. VIII) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

S20 is the internal speaker jack switch, incorporated in one of the external speaker sockets, which opens when the external speaker plug is pushed fully home, and so mutes the internal speaker.

S21 is the Q.M.B. mains switch, which is fitted on a sunk escutcheon at the left-hand side of the cabinet.

Coils.—L1-L10 are in six unscreened units beneath the R.F. sub-chassis, between the rear main chassis member and a vertical screening plate. **L11-L16** are in three further units between the screening plate and the front main chassis member.

The I.F. transformers **L17, L18** and **L19, L20** are in two screened units on the chassis deck. The cans also contain the fixed trimmers, while the **L19, L20** unit also contains **R9.** Variable trimming is accomplished by adjusting the iron cores. Their ends are slotted, and are reached through holes in the sides of the cans.

In the case of the **L17, L18** unit, **L18** is mounted on a spring hinge device, linked up with the tone control **R18,** and on adjusting this, the coupling between **L17** and **L18** is altered, thus giving variable selectivity.

Trimmers and Trackers.—There are eleven of these, and all are mounted beneath the R.F. sub-chassis, the chassis forming one of the electrodes in each case. The adjusting screws are beneath the chassis.

Scale Lamps.—These are two Osram

Continued overleaf

COSSOR 584—*Continued*

M.E.S. types, rated at 6·5 V, 0·3 A. They have small bulbs, sprayed yellow.

T.I. Lamp.—This is an Osram M.E.S. type, rated at 2·5 V, 0·2 A, and having a small bulb.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (8,000 O) external speaker. When the plugs are partly inserted, both internal and external speakers operate. When they are fully inserted, **S20** opens and mutes the internal speaker.

Aerial Connections.—With a normal aerial, use socket **A1,** and see that **A2** is connected to **E** by the metal strap provided. When using a di-pole aerial, use sockets **A1** and **A2,** with the metal strap removed.

Condensers C21, C30.—These are two 50 μF 12 V working dry electrolytics in a single carton beneath the chassis, having a common negative (black) lead. The red lead to **V3** valveholder is the positive of **C21** and the red lead to the **V4** holder the positive of **C30.**

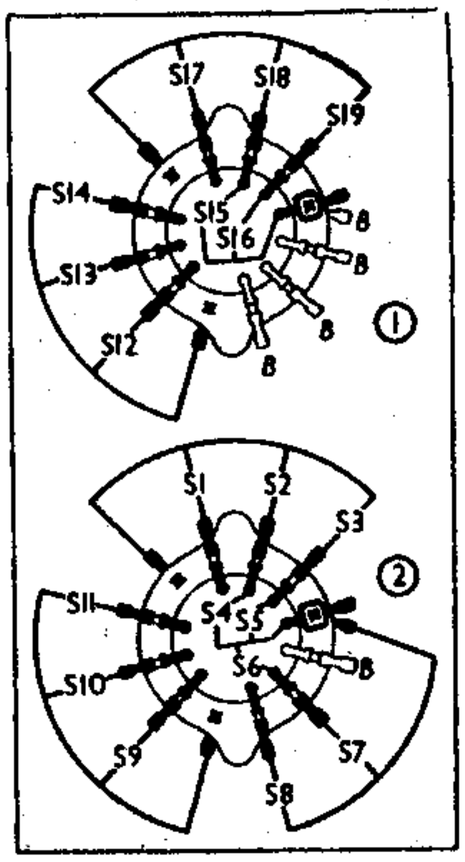
Condensers C32, C33.—These are two dry electrolytics in a single metal can on the chassis deck. The black lead emerging beneath the chassis is the common negative; the red lead to **V5** holder is the positive of **C32,** and the other red lead is the positive of **C33.**

Resistance R23.—This is a 25 O centre-tapped wire-wound resistor.

Radiogram Modifications.—In the Model 538 radiogram a very similar chassis is used. The wavechange switch has an extra position for gram., following the L.W. position, but **S1-S19** are apparently not altered. There is, however, an extra switch unit ganged with the other two, which performs the radio to gram. switching.

DIAGRAMS AND TABLE OF SWITCH UNITS

Switch diagrams, looking from the front of the underside of the chassis. Note the various blank tags, marked B.



Switch	S.W.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	C	—	—
S5	C	C	—
S6	—	—	C
S7	—	C	—
S8	—	—	C
S9	C	—	—
S10	—	C	—
S11	—	—	C
S12	C	—	—
S13	—	C	—
S14	—	—	C
S15	C	—	—
S16	C	C	—
S17	C	—	—
S18	—	C	—
S19	—	—	C

In the radio positions, the bottom of **R10** is connected to the top of the volume control **R11** (as in the table model), but on gram. this connection is broken, and one side of the pick-up goes, via part of a filter, to the top of **R11,** the other side going to chassis.

The filter consists of a 100,000 O resistance and a 0·0005 μF condenser in parallel, connected between the unearthed side of the pick-up, and a tag on the switch unit, and a 30,000 O resistance and 0·015 μF condenser in series between the same switch tag and chassis. In addition there is a 0·0007 μF condenser directly across the pick-up.

CIRCUIT ALIGNMENT

I.F. Stages.—The I.F. transformers are of the variable permeability type. The windings are partially tuned by fixed condensers, final trimming being by screwing the iron cores in or out. They are reached through holes in the sides of the I.F. cans.

The cores are sealed with wax, and this must be softened before making adjustments. The best way to do this is to heat a small stout screwdriver with a soldering iron, push through the wax, find the slot in the core and then screw in and out for several turns. Actual alignment should be carried out with a non-metallic screwdriver.

Set the variable selectivity control for maximum selectivity (i.e., coils furthest apart). Swamp the oscillator circuit by shorting **C41.** Connect signal generator to top cap of **V1** and chassis, and feed in a 465 KC/S signal. Adjust **L17, L18, L19** and **L20** in turn for maximum output, keeping the input low.

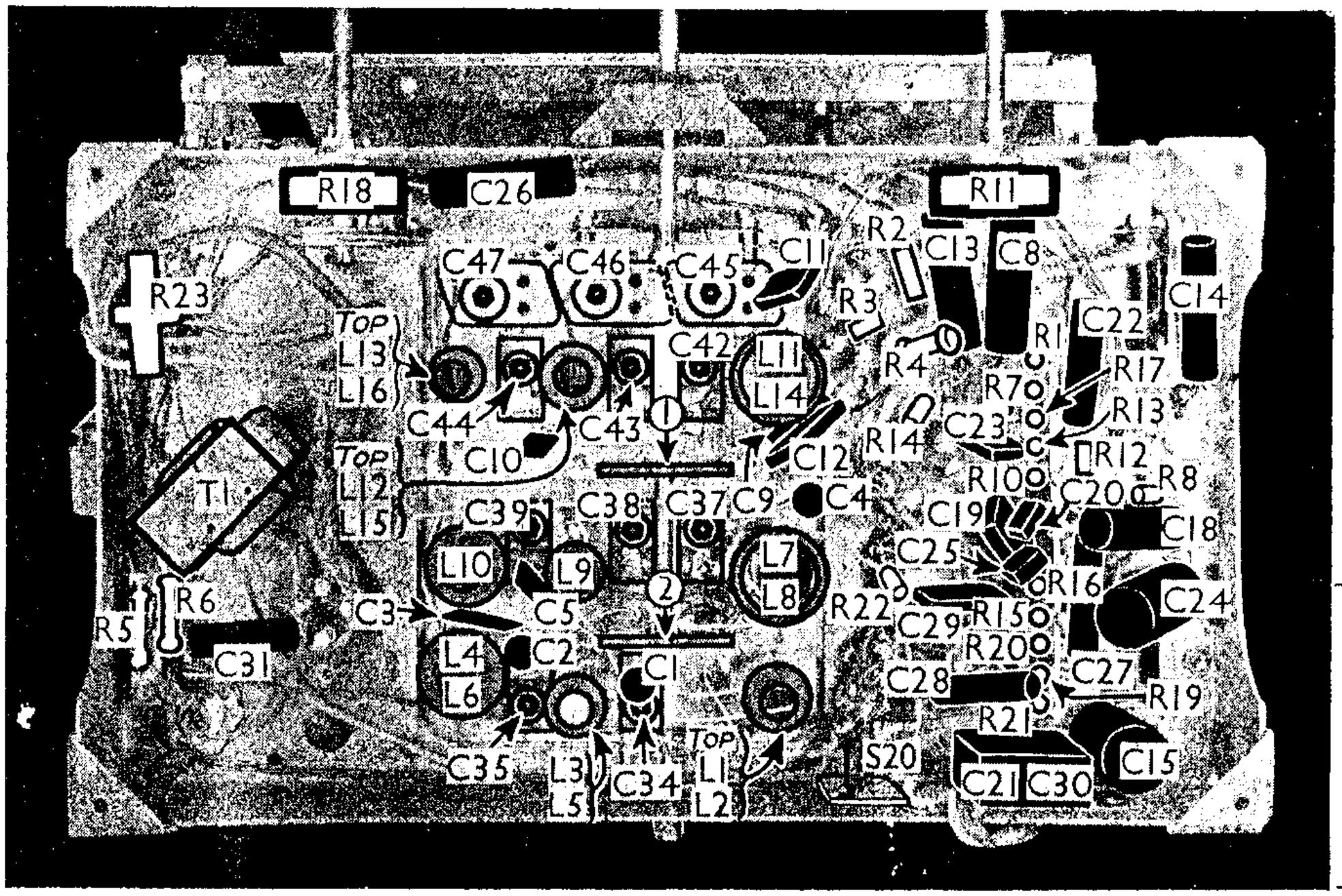
R.F. and Oscillator Stages.—Connect signal generator to **A** and **E** sockets, and adjust the following condensers, in the order given, and at the frequencies specified.

L.W.—300 KC/S (1,000 m.), **C44, C39, C35**; 160 KC/S (1,875 m.), **C47.**

M.W.—1,400 KC/S (214 m.), **C43, C38, C34**; 575 KC/S (522 m.), **C46.**

S.W.—18MC/S (16·7 m.), **C42, C37**; 6MC/S (50 m.), **C45.**

When adjusting at the high frequency (low wavelength) end of each scale, tune receiver to wavelength of the test signal as marked on the scale. At the low frequency (high wavelength) end, tune in the signal, irrespective of exact scale setting, and rock the gang slightly when adjusting the trackers, for optimum results.



Under-chassis view. All the capacitative trimmers are to be seen on the R.F. sub-chassis. **R23** is centre-tapped.

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