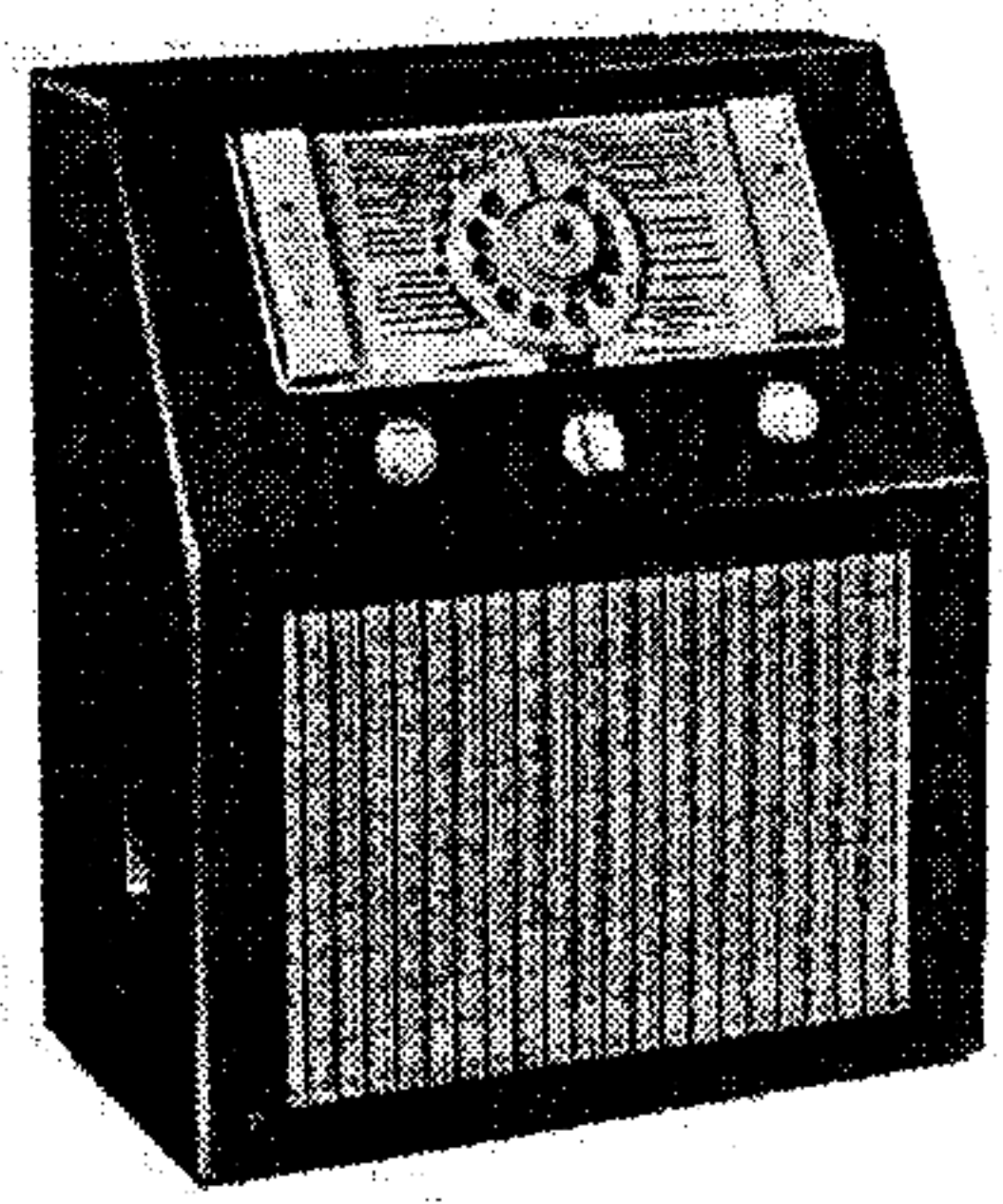


COSSOR 397 AND 396

Ned. Ver. v. Historie v/d Radio



The Cossor 397 Teledial model.

THE Cossor Teledial tuning system, by means of which tuning can be pre-set for ten stations, is fitted to the 397 5-valve (plus rectifier) AC 3-band superhet.
A very similar chassis is incorporated in the 396, but this does not include the Teledial, and the divergencies are given in General Notes. This *Service Sheet* was prepared on a 397.

CIRCUIT DESCRIPTION

Aerial input via series condenser **C1** and coupling coils **L1** (SW), **L2** (MW) and **L3** (LW) to single-tuned circuits **L4**, **C38** (SW), **L5**, **C33** (MW) and **L6**, **C33** (LW), which precede variable-mu pentode valve (**V1**, Cossor metallised MVS/Pen) operating as RF amplifier.
Tuned-secondary RF transformer coupling by **L7**, **L10**, **C37** (SW), **L8**, **L11**, **C37** (MW) and **L9**, **L12**, **C37** (LW) between **V1** and triode-hexode valve (**V2**, Cossor metallised 41STH) operating as frequency changer with internal coupling. Triode oscillator grid

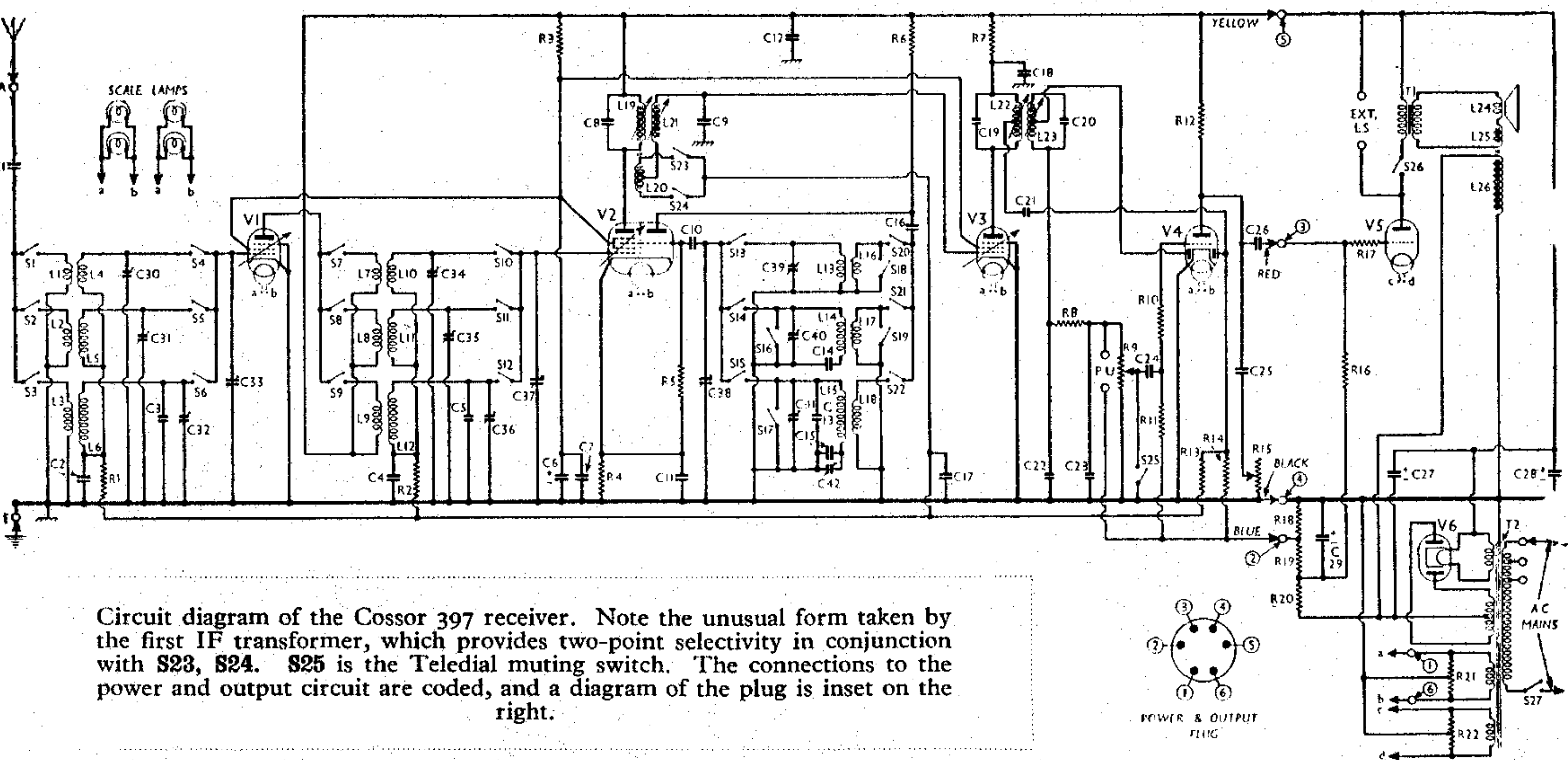
coils **L13** (SW), **L14** (MW) and **L15** (LW) are tuned by **C38**; parallel trimming by **C39** (SW), **C40** (MW) and **C13**, **C41** (LW); series tracking by **C14** (MW) and **C15**, **C42** (LW). Reaction by coils **L16** (SW), **L17** (MW) and **L18** (LW).
Third valve (**V3**, Cossor metallised MVS/PenB) is a variable-mu RF pentode operating as intermediate frequency amplifier with iron-core tuned primary and secondary couplings **C8**, **L19**, **L20**, **L21**, **C9** and **C19**, **L22**, **L23**, **C20**, the **L20** winding in conjunction with switches **S23**, **S24** providing a means for varying the coupling between **L19** and **L21** to obtain variable selectivity.

Intermediate frequency 465 KC/S.
Diode second detector is part of double diode triode valve (**V4**, Cossor metallised DDT). Audio frequency component in rectified output is developed across manual volume control **R9**, which also operates as load resistance, and passed via AF coupling condenser **C24** and CG resistance **R11** to CG of triode section, which operates as AF amplifier. IF filtering by **C22**, **R8**, **C23** and **R10**. Variable tone control in triode anode circuit by **C25**, **R15**, the latter being ganged with **S23**, **S24**. Provision for connection of gramophone pick-up across **R9**; introduction of the pick-up applies a negative potential to signal diode to mute radio. The muting switch **S25** closes during the operation of station selection by the Teledial method.
Second diode of **V4**, fed from tapping on **L22** via **C21**, provides DC potential which is developed across load resistance **R14** and fed back through decoupling circuits as GB to RF, FC and IF valves, giving automatic volume control.
Resistance-capacity coupling by **R12**, **C26**, **R16**, via grid stopper **R17**, between **V4** triode and directly heated cathode triode output valve (**V5**, Cossor 2XP). Provision for connection of high impedance external speaker between anode and HT positive line, while switch **S26** between anode and primary of internal speaker input transformer **T1** permits internal speaker to be muted.
Fixed GB potential for **V1**, **V2** and **V3**, GB for **V4** triode and **V5**, AVC delay voltage and radio muting on gramophone, are obtained from potential divider formed by resistances **R18**, **R19**, **R20** connected across speaker field coil in HT negative lead to chassis.
HT current is supplied by IHC full-wave rectifying valve (**V6**, Cossor 431U). Smoothing by speaker field and dry electrolytic condensers **C27**, **C28**. HT circuit RF filtering by **C12**.

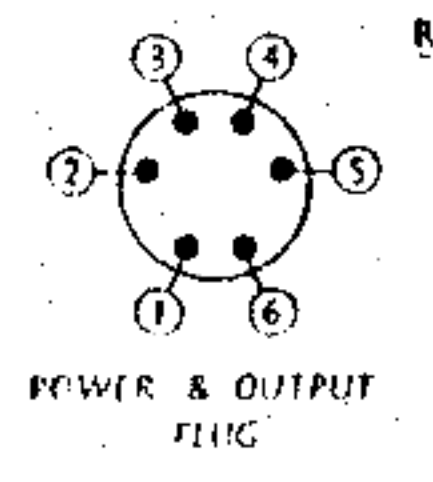
COMPONENTS AND VALUES

CONDENSERS		Values (μF)
C1	Aerial series condenser	0.0005
C2	V1 CG decoupling	0.05
C3	Aerial LW fixed trimmer	0.000015
C4	V2 hexode CG decoupling	0.05
C5	RF trans. LW fixed trimmer	0.000015
C6*	V1, V2, V3 SG's decoupling	2.0
C7	V1, V2, V3 SG's RF by-pass	0.1
C8	1st IF trans. pri. trimmer	0.000225
C9	1st IF trans. sec. trimmer	0.000225
C10	V2 osc. CG condenser	0.0001
C11	V2 cathode by-pass	0.1
C12	HT circuit RF by-pass	0.1
C13	Osc. circuit LW fixed trimmer	0.00004
C14	Osc. circuit MW tracker	0.00057
C15	Osc. circuit LW tracker	0.00012
C16	V1 osc. anode coupling	0.0002
C17	V3 CG decoupling	0.05
C18	V3 anode decoupling	0.1
C19	2nd IF trans. pri. trimmer	0.00006
C20	2nd IF trans. sec. trimmer	0.000075
C21	Coupling to V4 AVC diode	0.00005
C22	IF by-pass condensers	0.00005
C23		0.00005
C24		AF coupling to V4 triode
C25	Part of variable tone control	0.03
C26	V4 triode to V5 AF coupling	0.01
C27*	HT smoothing	16.0
C28*		16.0
C29*	Auto GB by-pass	10.0
C30†	Aerial circuit SW trimmer	—
C31†	Aerial circuit MW trimmer	—
C32†	Aerial circuit LW trimmer	—
C33†	Aerial circuit tuning	—
C34†	RF trans. sec. SW trimmer	—
C35†	RF trans. sec. MW trimmer	—
C36†	RF trans. sec. LW trimmer	—
C37†	RF trans. sec. tuning	—
C38†	Oscillator circuit tuning	—
C39†	Osc. circuit SW trimmer	—
C40†	Osc. circuit MW trimmer	—
C41†	Osc. circuit LW trimmer	—
C42†	Osc. circuit LW tracker	—

* Electrolytic. † Variable. ‡ Pre-set.

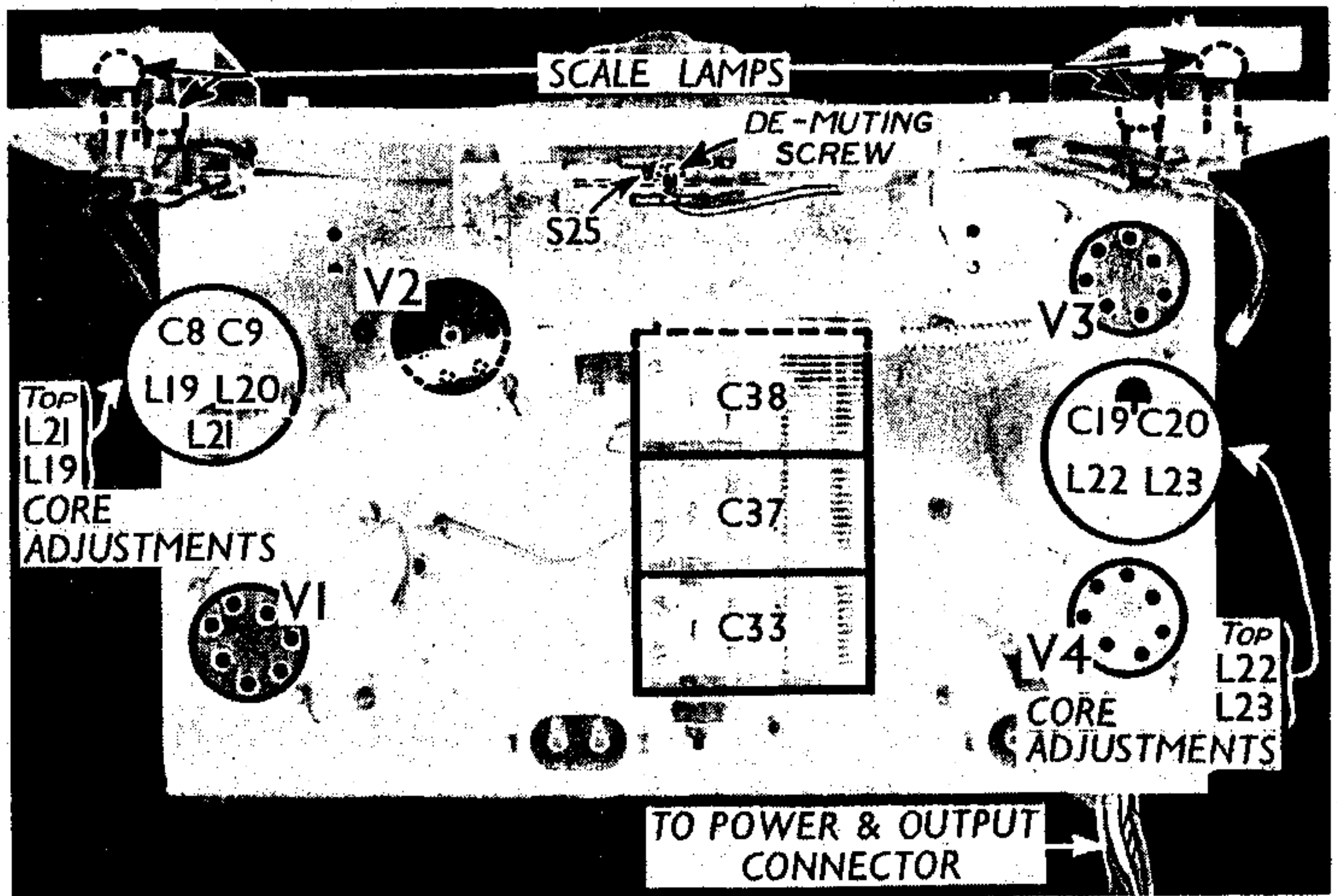


Circuit diagram of the Cossor 397 receiver. Note the unusual form taken by the first IF transformer, which provides two-point selectivity in conjunction with **S23**, **S24**. **S25** is the Teledial muting switch. The connections to the power and output circuit are coded, and a diagram of the plug is inset on the right.



RESISTANCES		Values (ohms)
R1	V1 CG decoupling ..	500,000
R2	V2 hexode CG decoupling ..	500,000
R3	V1, V2, V3 SG's HT feed ..	10,000
R4	V2 fixed GB resistance ..	300
R5	V2 osc. CG resistance ..	25,000
R6	V2 osc. anode HT feed ..	30,000
R7	V3 anode HT feed ..	5,000
R8	IF stopper ..	50,000
R9	Manual volume control; V3 signal diode load ..	500,000
R10	IF stopper ..	100,000
R11	V4 triode CG resistance ..	2,000,000
R12	V4 triode anode load ..	50,000
R13	AVC line decoupling ..	2,000,000
R14	V4 AVC diode load ..	1,000,000
R15	Variable tone control ..	100,000
R16	V5 CG resistance ..	500,000
R17	V5 grid stopper ..	100,000
R18	V1, V2, V3 fixed; V4 triode, V5; auto GB and AVC delay voltage potential divider resistances ..	20,000
R19		300,000
R20		750,000
R21	V1, V2, V3, V4 heater circuit pot. ..	25*
R22	V5 heater circuit pot. ..	25*

* Centre-tapped.



Plan view of the main chassis. S25 is the Teledial muting switch, formed by any of the contact fingers and the metal back plate. Near it is the screw for cutting out the muting circuit when setting up new stations.

OTHER COMPONENTS		Approx. Values (ohms)	
L.1	Aerial SW coupling coil ..	0.7	
L.2	Aerial MW coupling coil ..	14.0	
L.3	Aerial LW coupling coil ..	110.0	
L.4	Aerial SW tuning coil ..	Very low	
L.5	Aerial MW tuning coil ..	3.25	
L.6	Aerial LW tuning coil ..	35.0	
L.7	RF trans. SW pri. ..	0.4	
L.8	RF trans. MW pri. ..	4.75	
L.9	RF trans. LW pri. ..	12.0	
L.10	RF trans. SW sec. ..	0.05	
L.11	RF trans. MW sec. ..	3.2	
L.12	RF trans. LW sec. ..	31.0	
L.13	Osc. circuit SW tuning coil ..	0.05	
L.14	Osc. circuit MW tuning coil ..	3.75	
L.15	Osc. circuit LW tuning coil ..	9.0	
L.16	Oscillator SW reaction ..	0.4	
L.17	Oscillator MW reaction ..	1.6	
L.18	Oscillator LW reaction ..	3.25	
L.19	1st IF trans. pri. ..	4.0	
L.20	Variable selectivity coil ..	0.25	
L.21	1st IF trans. sec. ..	3.5	
L.22	2nd IF trans. { Pri. ..	17.5	
L.23		{ Sec. ..	17.5
L.24	Speaker speech coil ..	4.75	
L.25	Hum neutralising coil ..	0.5	
L.26	Speaker field coil ..	1,200.0	
T.1	Speaker input { Pri. ..	320.0	
		{ Sec. ..	0.8
	trans. { Pri., total ..	27.0	
		{ V1-V4 heater sec. ..	0.05
		{ V5 heater sec. ..	0.05
T.2	Mains trans. { Rect. heat. sec. ..	0.2	
		{ HT sec., total ..	260.0

OTHER COMPONENTS (Continued)		Approx. Values (ohms)
S1-S22	Waveband switches ..	—
S23, 24	Variable selectivity switches, ganged R15 ..	—
S25	Teledial muting switch ..	—
S26	Internal speaker switch ..	—
S27	Mains switch ..	—

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the three small control knobs (recessed screws) and the two brackets holding the tuning scale to the front of the cabinet (four round-head wood screws). Now unplug the chassis leads from the socket on the power pack and remove the batten at the back of the chassis (two bolts with washers), taking care that the chassis does not fall. The chassis can now be withdrawn from the cabinet.

Removing Power Pack.—To remove the power pack from the cabinet, unplug the chassis leads and

disconnect the speaker leads, then remove the four bolts (with washers and rubber washers) holding the pack to the bottom of the cabinet, and remove the mains switch from the side of the cabinet (nut and lock nut). The pack can now be withdrawn, and when replacing, connect the speaker leads as follows, numbering the terminals from left to right:—1, blue; 2, yellow; 3, red; 4, black.

Removing Speaker.—Should it be necessary to remove the speaker from the cabinet, slacken the four clamps holding it to the sub-baffle (nuts) and swivel the clamps out of the way. When replacing, see that the transformer is at the bottom and connect the leads as follows, numbering the terminals from left to right:—1, blue; 2, yellow; 3, red; 4, black.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 226 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 MVS/Pen	270	6.0	130	1.5	
V2 41STH	270	2.9	130	4.7	
	Oscillator	94			6.5
	94	6.5			
V3 MVS/Pen/B	240	5.9	130	2.8	
V4 DDT	130	2.6	—	—	
V5 2XP	255	50.0	—	—	
V6 431U	338†	—	—	—	

† Each anode, AC.

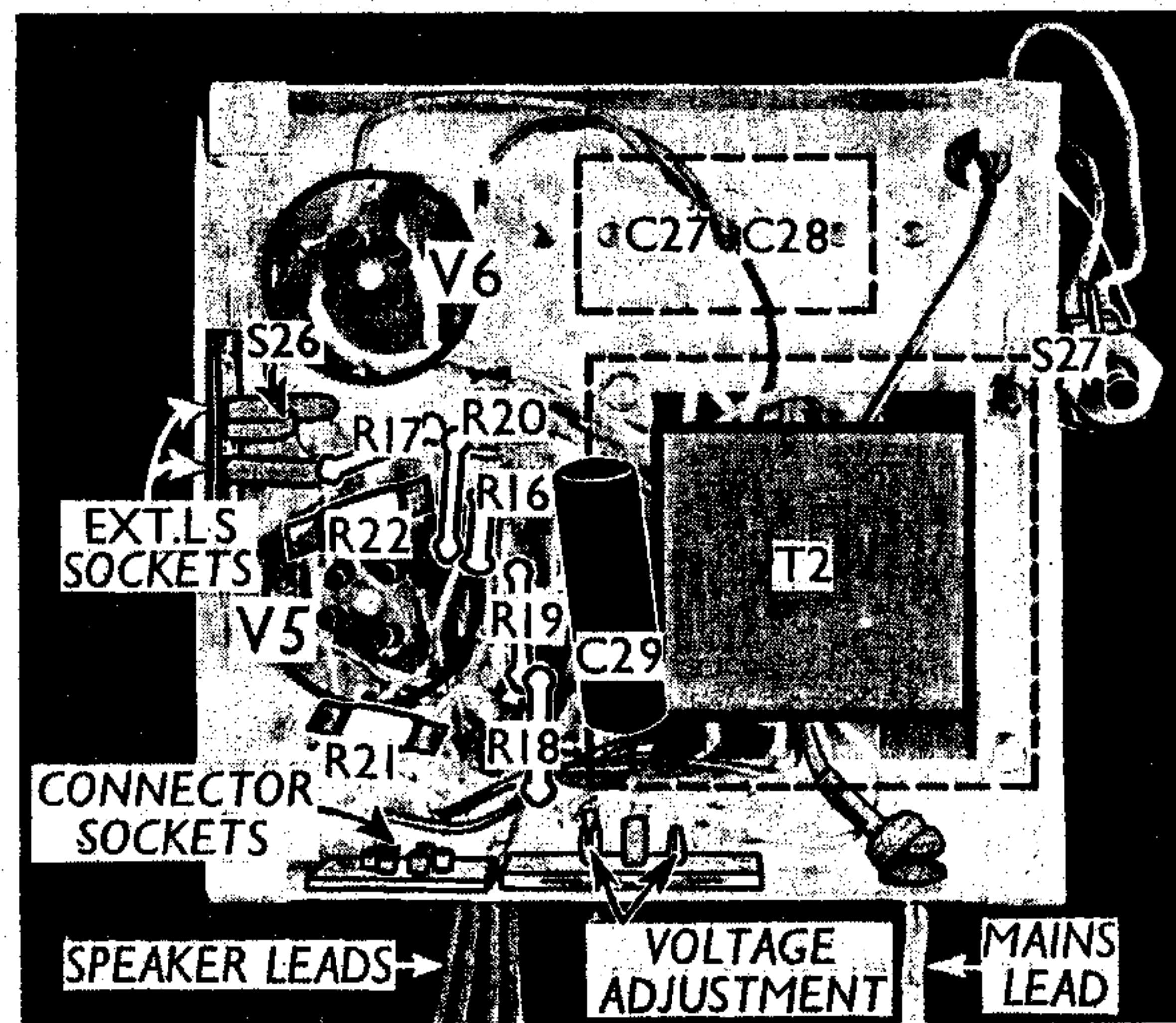
GENERAL NOTES

Switches.—S1-S22 are the waveband switches, in three rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams on page VIII. 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.

S23 and S24 are two QMB switches, ganged in a single unit with the variable tone control R15. In the fully clockwise position of R15 the ganged switch operates and one switch opens, while the other closes. In all other positions of the knob, the first switch closes and the second opens. The centre contact of the unit is common to both switches.

S25 is the Teledial muting switch, formed by the contact between any of the selector fingers and the

Continued overleaf



Underneath view of the power and output chassis. S26 is associated with one of the external speaker sockets. R21 and R22 are centre-tapped.

COSSOR 397 (and 396)

Continued

metal back plate. The back plate is connected via a screw to a metal strip and lead to the slider of R9. When the screw is unscrewed, this contact is broken, and the muting no longer operates. Hence the screw is designated "de-muting."

S26 is the internal speaker muting switch, associated with one of the external speaker sockets on the power and output unit.

S27 is the QMB mains switch, normally fitted at one side of the cabinet, but shown in our view of the power and output unit.

Coils.—All the RF and oscillator coils are in pairs in nine tubular units beneath the chassis. They are in three screened compartments, together with their trimmers and associated components.

The IF transformers L19-L21 and L22, L23 are in two screened units on the chassis deck, together with their fixed trimmers. The adjustments for the iron cores are made through holes in the sides of the cans, as indicated in our plan chassis view.

Scale Lamps.—These are four Osram MES types, rated at 6.5 V 0.3 A.

External Speaker.—Two sockets are provided on the power and output unit for a high impedance (3,000 Ω) external speaker. On fully inserting the plug, S26 opens and mutes the internal speaker.

Power and Output Unit.—This is connected to the main chassis by a 6-pin plug and socket device. The leads to it consist of two, systollex covered, for the heater supply a, b, and four rubber covered wires for the other connections. The latter are colour-coded in our circuit diagram, while all the plugs and sockets are indicated by arrows and numbered circles. A diagram of the plug, looking from the free ends of the pins, is inset in the circuit diagram.

Condensers C27, C28.—These are two 16 μF dry electrolytics in a single carton on the deck of the power and output chassis, having a common positive (red) lead. The blue lead is the negative of C27 and the black lead the negative of C28.

Resistances R21, R22.—These are two centre-tapped 25 Ω wire-wound resistors.

Teledial Adjustments.—For full information on the adjustment of this for different stations, see *Service Sheet No. 320 in Radio Maintenance*, dated May 28, 1938, or page iv of *Radio Maintenance*, dated March 19, 1938.

Chassis Divergencies.—Minor modifications have been made to the chassis during the run. Certain models may have a 0.05 μF condenser across the speaker field L26.

TABLE AND DIAGRAMS OF SWITCH UNITS

Model 396 Modifications.—In the model 396, no Teledial is fitted, but otherwise the chassis is very similar. The variable selectivity feature is not included, so that L20, S23 and S24 are omitted and the bottom end of L21 goes direct to the AVC line.

SWITCH	SW	MW	LW
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	C	—	—
S5	—	C	—
S6	—	—	C
S7	C	—	—
S8	—	C	—
S9	—	—	C
S10	C	—	—
S11	—	C	—
S12	—	—	C
S13	C	—	—
S14	—	C	—
S15	—	—	C
S16	C	—	—
S17	C	C	C
S18	—	C	—
S19	—	—	C
S20	C	—	—
S21	—	C	—
S22	—	—	C

CIRCUIT ALIGNMENT

Alignment should be carried out with the selectivity switches in the maximum selectivity position.

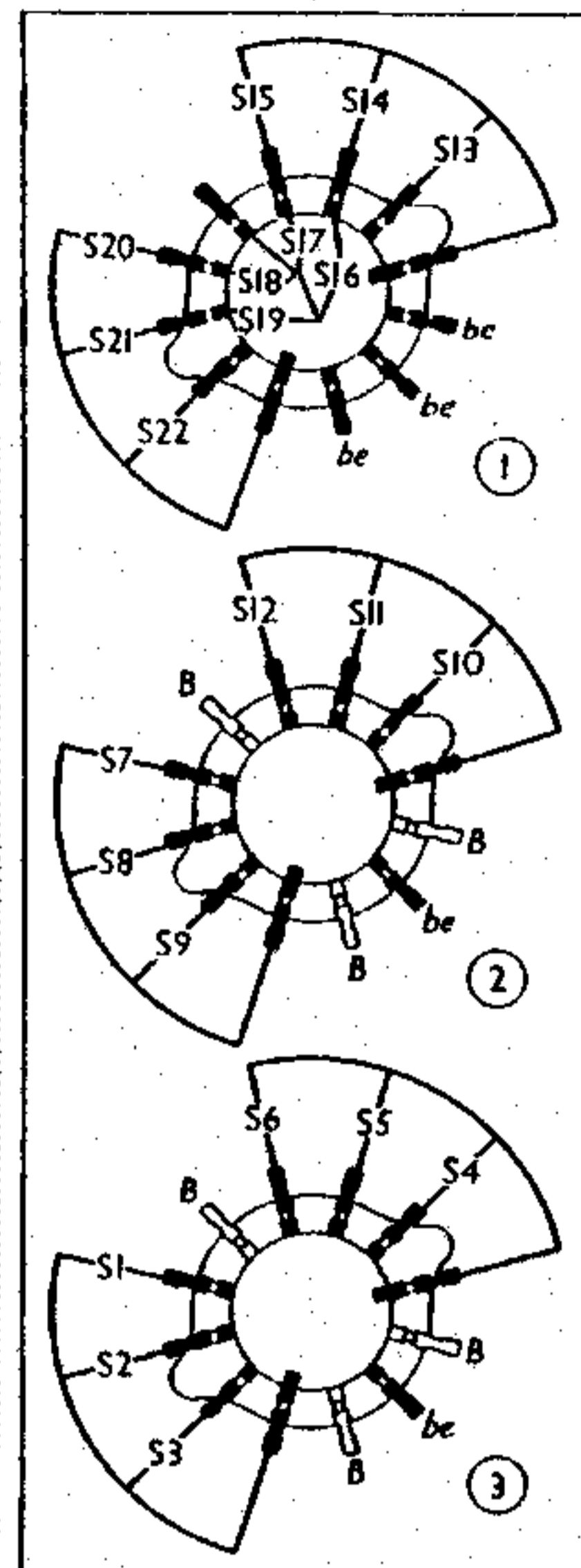
IF Stages.—Connect signal generator to control grid (top cap) of V2 and chassis. Feed in a 465 KC/S signal, and adjust the moveable cores of the IF coils in the following order, for maximum output: L23, L22, L21 and L19, endeavouring also to secure a satisfactory response curve.

RF and Oscillator Stages.—Each waveband can be aligned separately. Connect signal generator to A and E sockets.

SW.—Switch set to SW, tune so that the SW indicator is at the centre of the 16 m band, and feed in a 16.7 m (18 MC/S) signal. Adjust C39, then C34 and C30, for maximum output.

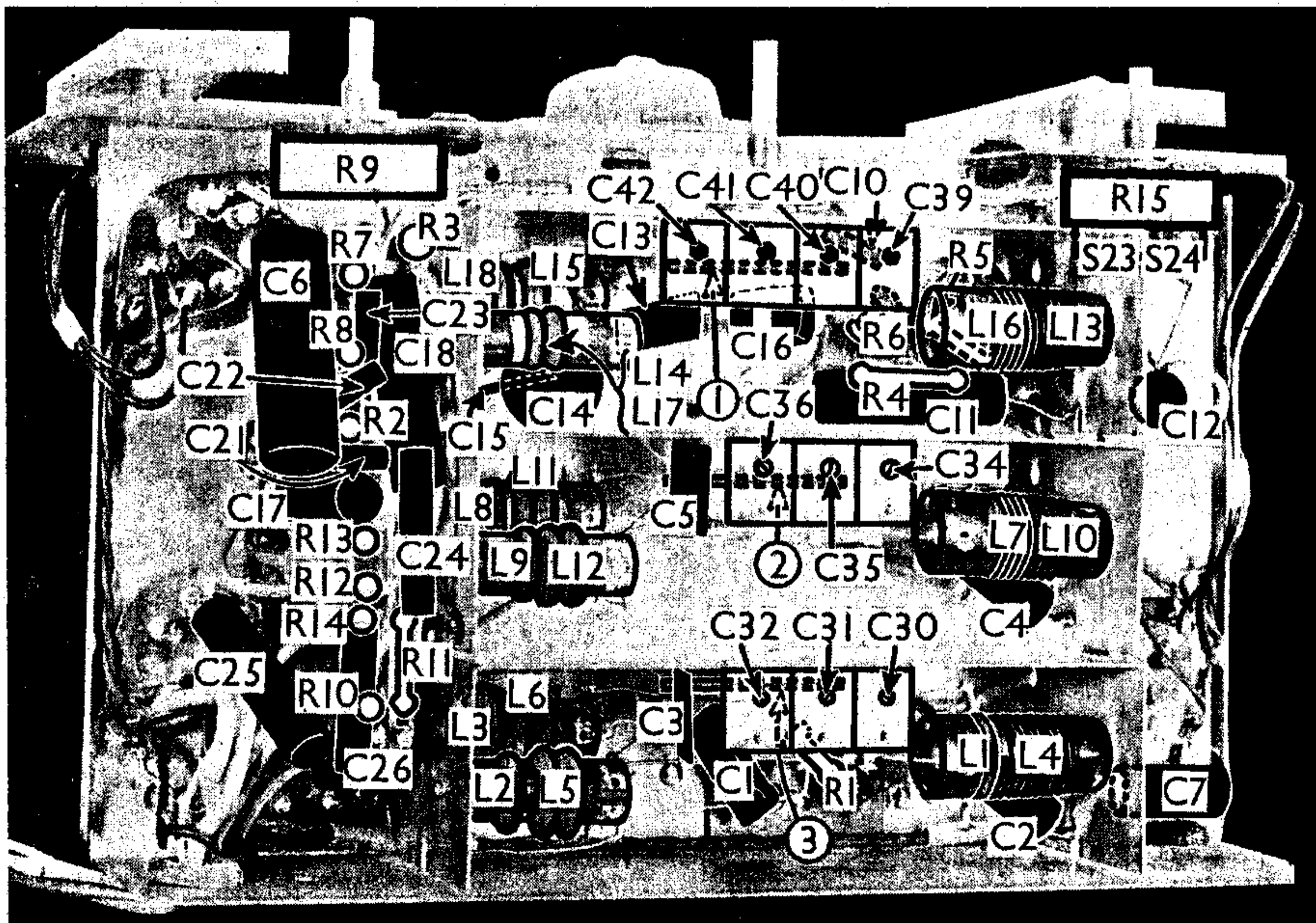
MW.—Switch set to MW, tune to 214 m on scale

Diagrams of the three switch units, looking from the rear of the underside of the main chassis. Note the various blank and bearer tags.



(bottom edge of "Radio Lyons" indicator), and feed in a 214 m (1,400 KC/S) signal. Adjust C40, then C35 and C31, for maximum output.

LW.—Switch set to LW, tune to 1,200 m on scale (half-way between Oslo and Kalundborg settings), and feed in a 1,200 m (250 KC/S) signal. Adjust C41, then C36 and C32, for maximum output. Feed in an 1,875 m (160 KC/S) signal, tune it in, and adjust C42 for maximum output while rocking the gang. Repeat the 1,200 m and 1,875 m adjustments until no further improvement results.



Underneath view of the main chassis. The various trimmers are mounted in banks above their associated switch units. Note the nine coil units, each containing two coils. S23 and S24 are QMB switches, ganged with R15.