

'TRADER' SERVICE SHEETS

G.E.C. "FIDELITY FIVE" A.C. TABLE AND RADIOGRAM MODELS

THE G.E.C. Fidelity Five series of A.C. receivers and radiograms is made in several models. The table models are BC3650 (190/250V, 40/100 c.p.s.); BC3650L (110/130 and 210/230V, 40/100 c.p.s.); BC3651 (190/250V, 25/100 c.p.s.). The ordinary radiograms are BC3658 (190/250V, 40/60 c.p.s.) and BC3658L (100/130 and 210/230 V, 40/60 c.p.s.). The two corresponding record changer models are BC3659 and BC3659L.

Our circuit diagram is based on the radiogram models, but, except that one or two components are omitted, the table models are similar. The chassis pictures are of the table model used in preparing this sheet.

CIRCUIT DESCRIPTION

Aerial input to coils L1, L2 which are coupled to primary of inductively-coupled band-pass filter. Primary L4, L5 tuned by C28; secondary L7, L8 tuned by C30; coupling coil L6. First valve (V1, Osram MX40) is a heptode operating as frequency-changer with electron coupling. Oscillator grid coils L9, L10 tuned by C32; tracking by C3, C35 (L.W.) and C4, C36 (M.W.); oscillator anode coil L11. Image rejection by coil L3 in V1 cathode circuit.

Second valve, a variable-mu H.F.

Intermediate frequency 125 KC/S.

Tuneon neon tuning indicator in anode feed circuit to V2.

Diode second detector forms part of double diode triode (V3, Osram MHD4) which also provides a form of amplified delayed automatic volume control and audio-frequency amplification. The audio-frequency component in the output from the rectifier diode is developed across load resistance R18 and passed directly to the triode section control grid by way of I.F. stopper R17. G.B. for radio amplification is obtained from the D.C. potential present across R18 by reason of the carrier wave of a transmitter; on gramophone the necessary voltage is provided by cathode resistance R22. Resistances R35 and R36, also in cathode circuit, provide the high cathode to earth potential required for amplified delayed A.V.C. in conjunction with the second diode of V3, its load resistance R24, and potential divider R30, R31, R32, R33 and R34 across speaker field winding L20 in H.T. negative line. In addition to maximum sensitivity and high fidelity positions, the muting-fidelity control has three muting positions, giving increasing degrees of inter-station noise suppression. These are obtained by means of increases in the A.V.C. delay and V1

and V2 fixed G.B. voltages brought about by switches S14, S15 and S16.

I.F. by-passing in V3 grid circuit by filter L16, C10, and in anode circuit by condenser C14. Adjustable filter L17, C42, eliminates heterodyne whistles.

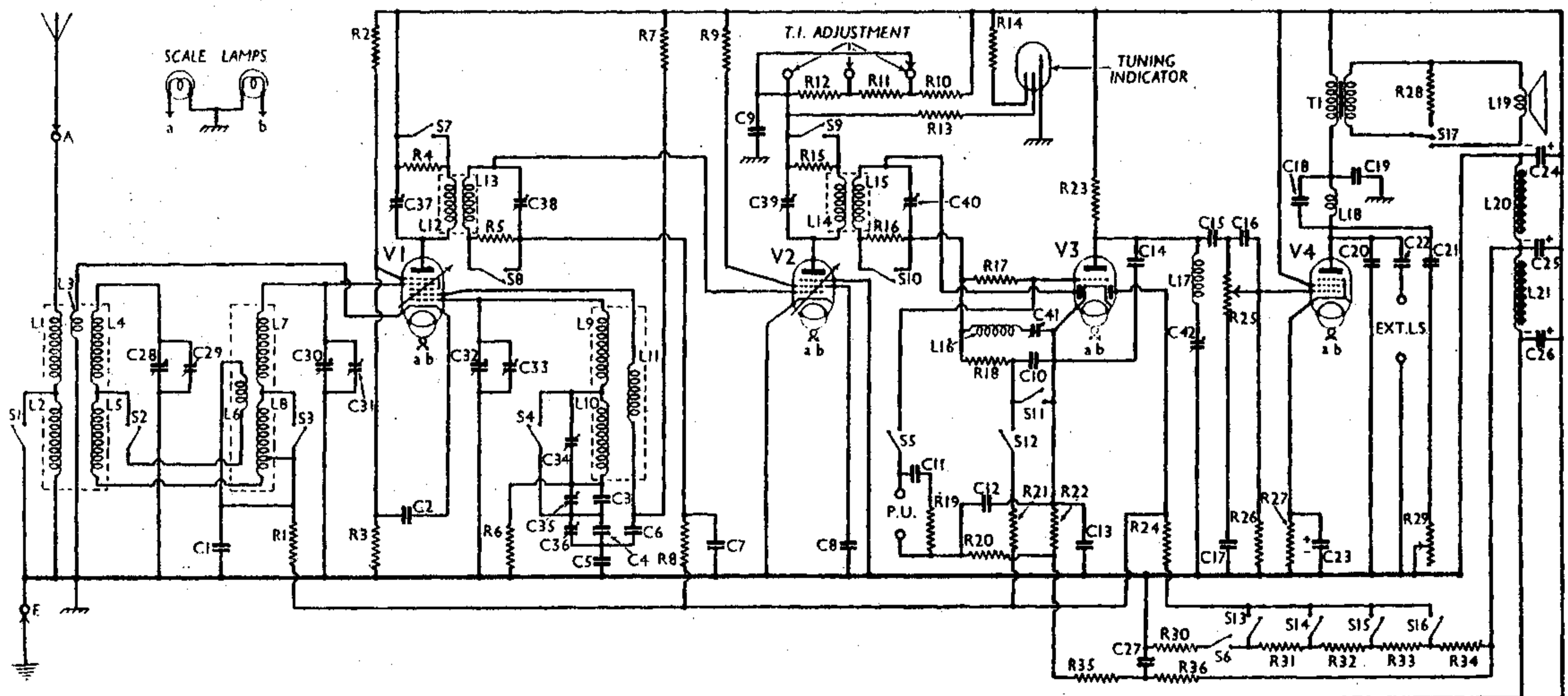
Resistance-capacity coupling by R23, C15, and volume control R25 to output pentode (V4 Osram Catkin MPT4). Tone compensation by special filter L18, C18, condensers C19, C20, and variable R.C. circuit R29, C21. Coupling to external high-resistance speaker by condenser C22. Switch S17 cuts out speech coil of internal speaker and connects artificial load R28.

H.T. current is supplied by full-wave rectifying valve (V5, Osram U12). Smoothing by speaker field winding L20, extra choke L21, and electrolytic condensers C24, C25, C26.

DISMANTLING THE SET

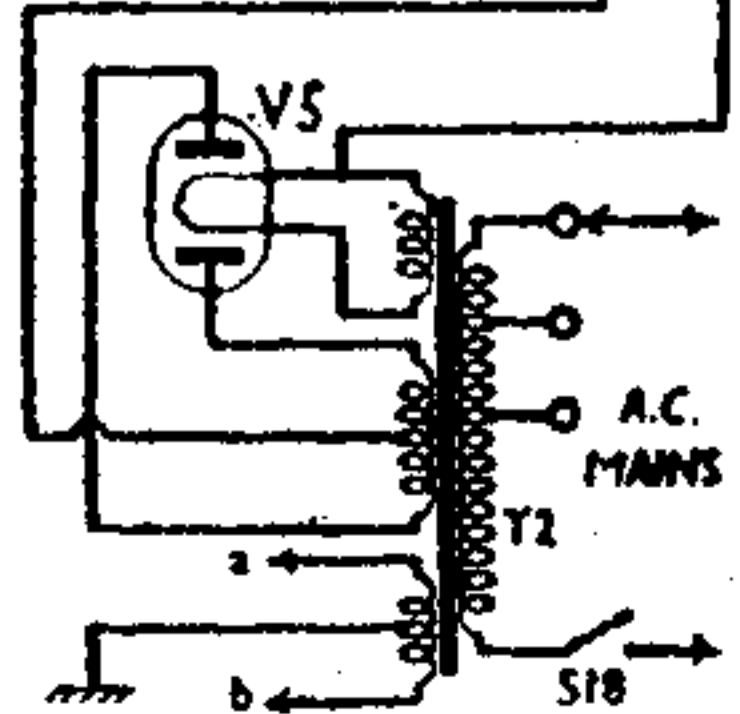
Removing Chassis.—Before removing back, withdraw small knob from tone control (pull off) and screw from Tuneon adjustment panel, both at back. Back can then be freed. Remove the four control knobs from front and withdraw Tuneon from clips above tuning dial escutcheon. Remove four bolts holding chassis, heads on underside of cabinet. Chassis can then be withdrawn sufficiently for normal repairs.

To remove chassis entirely, unsolder the three leads on the speaker input transformer and the long orange lead from filter circuit. While the chassis will



pentode (V2, Osram metallised VMP4G) operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings L12, L13 and L14, L15. When the muting and fidelity control is set to "high fidelity," switches S7-S10 open and connect in circuit damping resistances R4, R5 and R15, R16.

The circuit of the G.E.C. Fidelity Five models. This is actually the radiogram circuit, but the table model is similar, except for slight omissions in the pick-up circuit, and the exclusion of S6, R30 being permanently joined to R31.



now be free, the tone control, speaker switch and filter circuit will remain in the cabinet. When replacing, the colour code shown in our illustration of the rear of the speaker should be followed.

Removing Speaker.—The speaker is held to the cabinet front by three bolts with ornamental heads. When removing them take care not to scratch the cabinet. If it is desired to remove the speaker entirely, the leads to the tone control, switch and filter circuit will have to be unsoldered or the components unscrewed from their fixings. The latter is probably the easier.

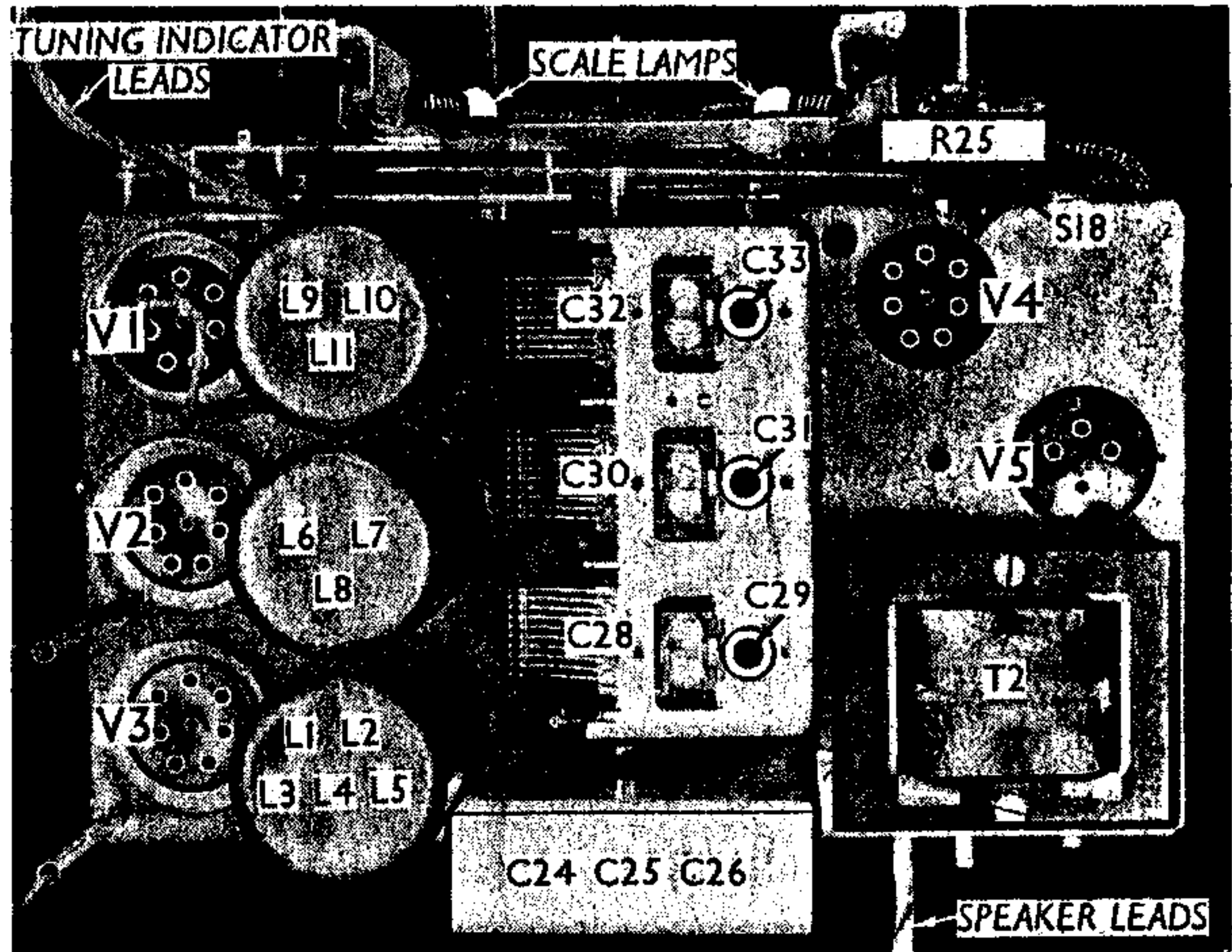
COMPONENTS AND VALUES

Resistances		Values (ohms)
R1	V1 cont. grid decoupling ..	99,000
R2	V1 S.G.'s pot. divider ..	50,000
R3		30,000
R4		
R5	1st I.F. trans. damping ..	990
R6		990
R7	V1 osc. grid resistance ..	99,000
R8	V1 osc. anode decoupling ..	44,000
R9	V2 cont. grid decoupling ..	99,000
R10	V2 S.G. H.T. feed ..	77,000
R11	Neon tuning indicator feed resistances ..	15,000
R12		5,500
R13		5,500
R14		20,000
R15	2nd I.F. trans. damping ..	1,000,000
R16		990
R17	V3 triode grid I.F. stopper ..	99,000
R18	V3 rectifier diode load ..	440,000
R19*	Part of pick-up shunt circuit	22,000
R20*	Gram pick-up decoupling ..	220,000
R21	Part of muting circuit	220,000
R22	V3 G.B. resistance (gram. only)	990
R23	V3 anode resistance ..	77,000
R24	V3 A.V.C. diode load ..	440,000
R25	Manual volume control ..	500,000
R26	V4 grid resistance ..	330,000
R27	V4 G.B. resistance ..	300
R28	Artificial output load ..	8
R29	Variable tone control ..	50,000
R30	Potential divider across speaker field winding ..	5,000
R31		1,500
R32		3,000
R33		4,000
R34	Amplified A.V.C. circuit voltage-dropping resistances	99,000
R35		20,000
R36		33,000

* Not in our chassis.

Condensers		Values (μF)
C1	V1 cont. grid decoupling ..	0.05
C2	V1 S.G.'s by-pass ..	0.05
C3	Osc. L.W. tracker, fixed ..	0.0005
C4	Osc. M.W. tracker, fixed ..	0.00175
C5	Osc. grid condenser ..	0.005
C6	V1 osc. anode decoupling ..	0.1
C7	V2 cont. grid decoupling ..	0.05
C8	V2 S.G. by-pass ..	0.05
C9	V2 anode decoupling ..	0.25
C10	Part of muting circuit	0.1
C11†	Part of pick-up shunt circuit	0.002
C12†	Pick-up circuit decoupling ..	0.05
C13	V3 cathode by-pass ..	0.5
C14	V3 anode I.F. by-pass ..	0.0005
C15	L.F. coupling to V4 ..	0.02
C16	Manual volume control shunt	0.0002
C17	R25 blocking condenser ..	0.05
C18	Parts of V4 anode filter circuit	0.00065
C19		0.003
C20		0.003
C21*		0.05
C22	Tone control condenser ..	0.05
C23*	Coupling to ext. speaker ..	0.2
C24*	V4 cathode by-pass ..	50.0
C25*	H.T. smoothing	6.0
C26*		6.0
C27		6.0
C28		6.0
C29†	Part of amp. A.V.C. circuit ..	0.5
C30	Band-pass primary tuning ..	—
C31†	Band-pass primary trimmer ..	—
C32	Band-pass secondary tuning ..	—
C33†	Band-pass secondary trimmer ..	—
C34	Oscillator tuning ..	—

Plan view of the chassis. The valve screens have been removed. C24, C25, C26 are dry electrolytics in a metal-cased block with the connecting leads passing through the chassis deck.



Condensers (contd.)		Values (μF)
C33†	Oscillator main trimmer ..	—
C34†	Oscillator L.W. trimmer ..	—
C35†	Oscillator L.W. tracker ..	—
C36†	Oscillator M.W. tracker ..	—
C37†	1st I.F. trans. pri. tuning ..	—
C38†	1st I.F. trans. sec. tuning ..	—
C39†	2nd I.F. trans. pri. tuning ..	—
C40†	2nd I.F. trans. sec. tuning ..	—
C41†	Part of I.F. filter ..	—
C42†	Part of V3 anode whistle filter ..	—

† Not in our chassis * Electrolytics
‡ Pre-set condensers x May be 0.02 μF

Other Components		Values (ohms)	
L1	Aerial coupling coils ..	6.0	
L2		100.5	
L3	Image rejection coil ..	0.27	
L4		5.3	
L5	Band-pass primary coils ..	49.3	
L6		0.08	
L7	Band-pass coupling coil ..	5.2	
L8		49.5	
L9	Band-pass secondary coils ..	4.3	
L10		27.0	
L11	Oscillator grid coils ..	2.2	
L12		82.5	
L13	1st I.F. transformer { Pri. ..	82.5	
L14		82.5	
L15	2nd I.F. transformer { Pri. ..	82.5	
L16		82.5	
L17	I.F. filter coil ..	38.0	
L18	Whistle filter coil ..	36.0	
L19	V4 anode filter coil ..	400.0	
L20	Speaker speech coil ..	1.9	
L21	Speaker field winding ..	1,400	
T1	Speaker input trans. { Pri. ..	300.0	
		Sec. ..	0.35
T2	Mains trans. { Pri. total ..	41.0	
		Heater sec. ..	0.08
		Rect. fil. sec. ..	0.12
S1-S4	Waveband switches, ganged	540.0	
S5	Gram. pick-up switch	—	
S6*	Radio muting switch on gram.	—	
S7-S16	Muting and fidelity switches	—	
S17	Internal speaker switch	—	
S18	Mains switch, ganged R25 ..	—	

* Not in our chassis.

VALVE ANALYSIS

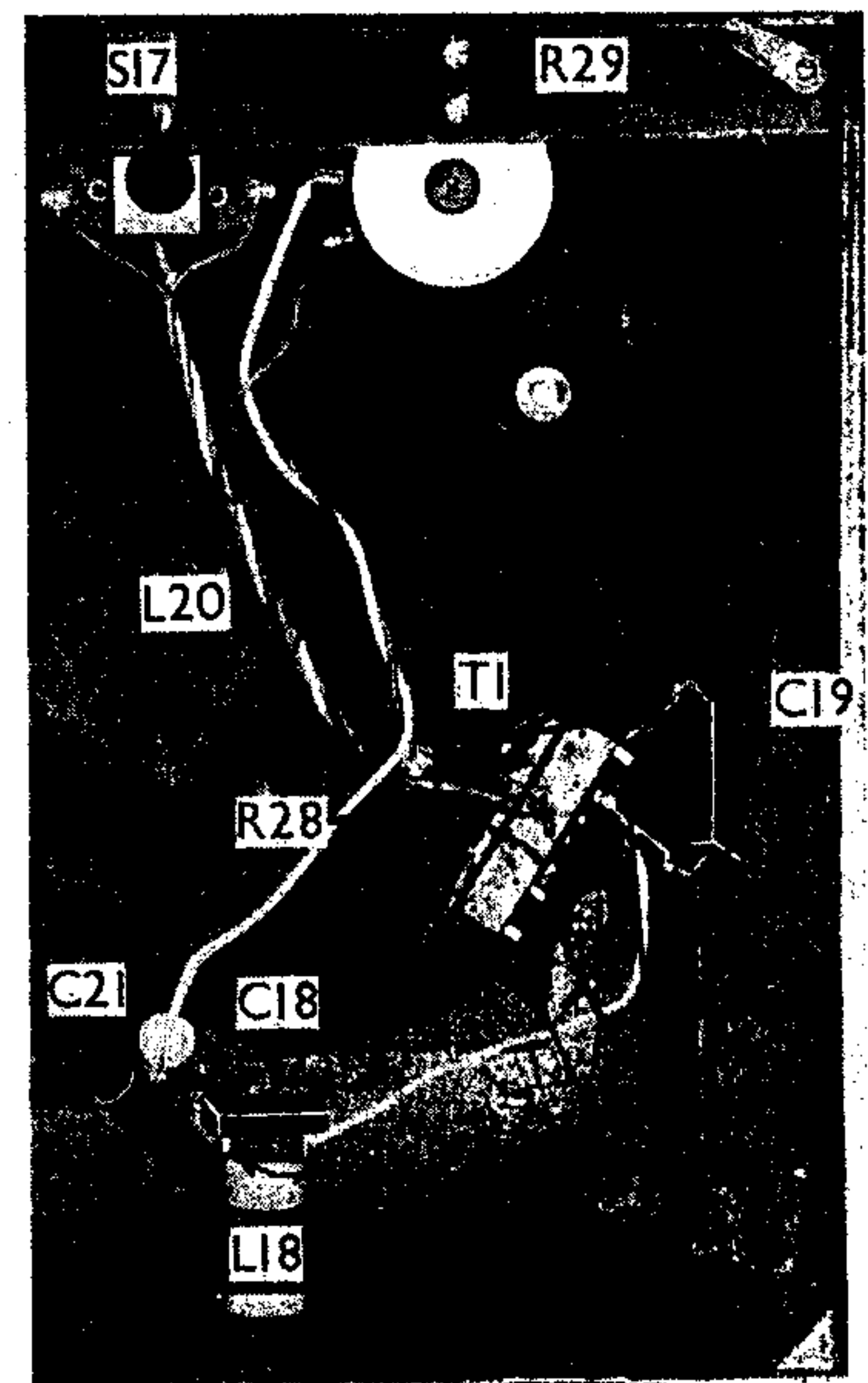
Valve voltage and current readings given in the table below were taken with the aerial disconnected and with the muting-fidelity switch set at "normal." Voltage readings were taken with the chassis as negative, and since the voltmeter used was an electrostatic type, slightly lower readings may be obtained on other types of instruments. The figures are those given by the manufacturers.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 MX40*	235	3.0	70	1.3
V2 VMP4G	175	3.5	65	2.0
V3 MHD4	100	2.0	—	—
V4 MPT4	210	32.0	235	6.0
V5 U12†	320†	—	—	—

* Osc. anode (G2) 150V, 2mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—There are no fewer than 18 switches in this set, of which S17 is the internal speaker switch, at the top back of the cabinet, and S18 is the mains switch ganged with the volume control. S1-S5 are in one unit operated by a (Continued overleaf)



View showing speaker and associated components in situ. The colour coding of the leads from the chassis is indicated.

G.E.C. FIDELITY FIVE (Contd.)

spindle mounted from front to back of the chassis, and indicated in our under-chassis view. Of these, **S1-S4** are the waveband switches, and **S5** the radiogram switch. Radiogram models also contain an additional switch **S6**, operated by the same spindle, and mounted between **S3** and **S4**. This switch is not seen in our chassis views.

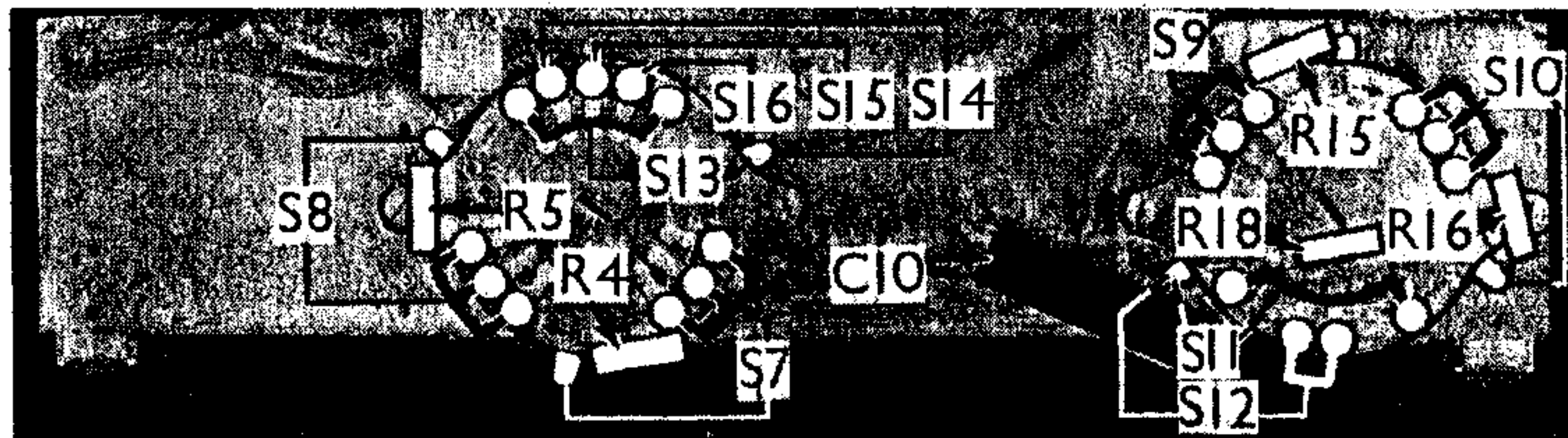
The following table gives the positions for **S1-S6**, O indicates open, and C, closed.

Switch	M.W.	L.W.	Gram
S1	C	O	O
S2	C	O	O
S3	C	O	C
S4	C	O	C
S5	O	O	C
S6*	C	C	O

*Not included in table models.

S7-S16 perform the muting and high fidelity switching. They are in two rotary units, mounted between the front of the main chassis and an extra front plate. They can only be reached effectively by removing the front plate, which has been done in our front chassis view. This shows the various switches and the resistances associated with them.

If it is necessary to remove the front plate the procedure is as follows. Remove indicating pointer (1 screw with lock washer). Remove 2 spring clips holding glass scale plate, freeing the plate. Remove the bolt and nut holding indicator operating bracket to main switch spindle, and free the indicator mechanism, carefully noting the positions of the coil springs and other parts. Remove three



Front of chassis with plate removed to show the muting-fidelity switches and associated components.

bolts passing through the pillars holding the front plate to the main chassis. Plate can now be removed, together with parts of indicating mechanism. The two switch units are now exposed, but remain in situ.

It will be seen from our front chassis view that in some cases two or more tags are used for one pole of certain of the switches. These are clearly indicated. The switches are formed of rotating metal studs making contact between metal back plates and the fixed contacts in front.

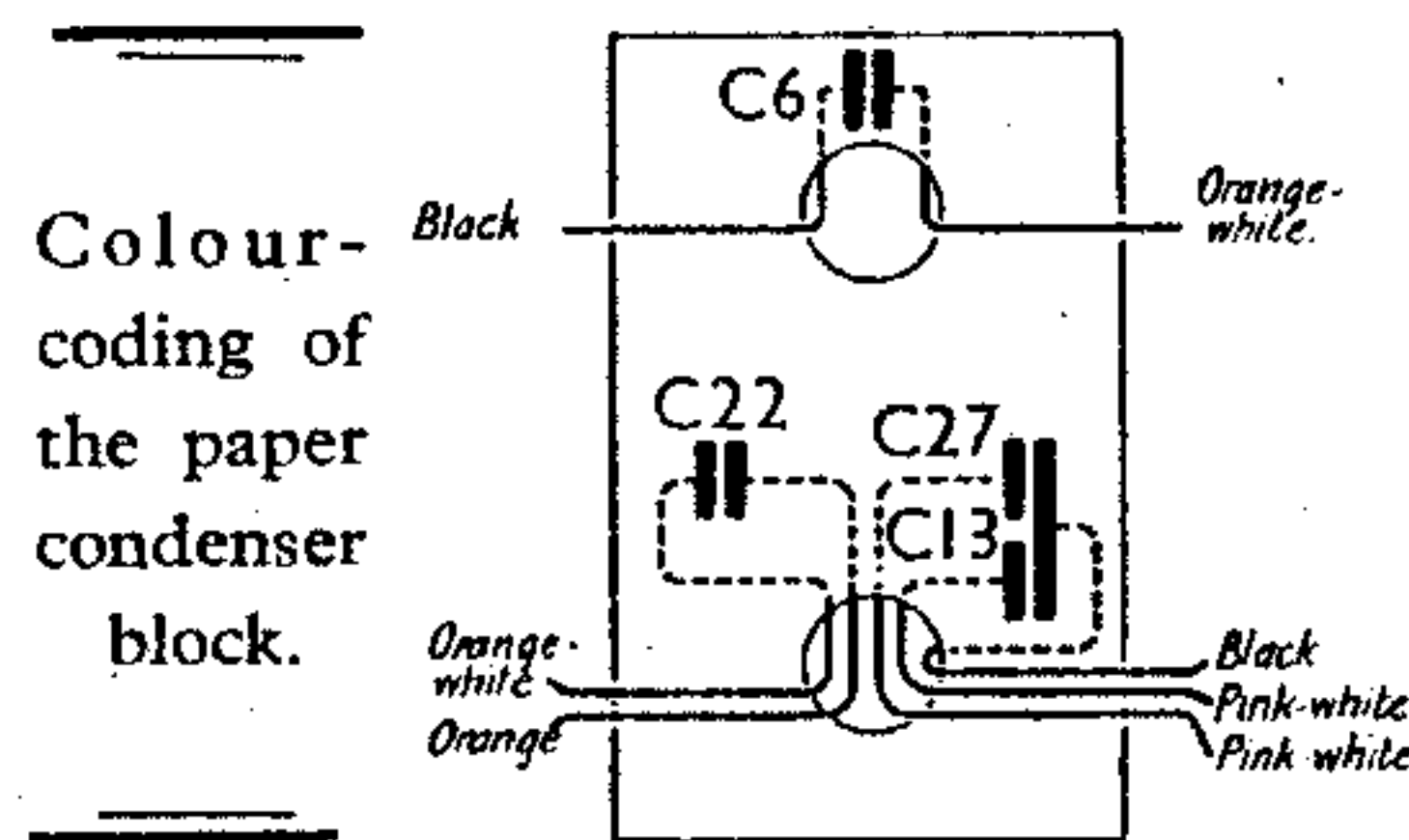
The various switch positions are indicated in the table below, where O is open, and C closed.

Switch	Norm.	Mutg. 1	Mutg. 2	Mutg. 3	High Fid.
S7	C	C	C	C	O
S8					
S9					
S10					
S11	C	O	O	O	C
S12	O	C	C	C	O
S13	C	O	O	O	C
S14	O	C	O	O	O
S15	O	O	C	O	O
S16	O	O	O	C	O

Condensers C6, C13, C22, C27.—These are in a single block beneath the chassis, with colour coded leads. A diagram on this page shows the various connections.

Radiogram Models.—These include the extra switch **S6** and the extra resistances **R19, R20**. **R19** may be 99,000Ω in auto-record changer models. The ordinary radiograms also include condenser **C11**.

Condenser C12.—This is shown in our



circuit, but does not occur in our chassis.

Alignment of Circuits.—The procedure adopted and described in Sheet No. 31 may be followed.

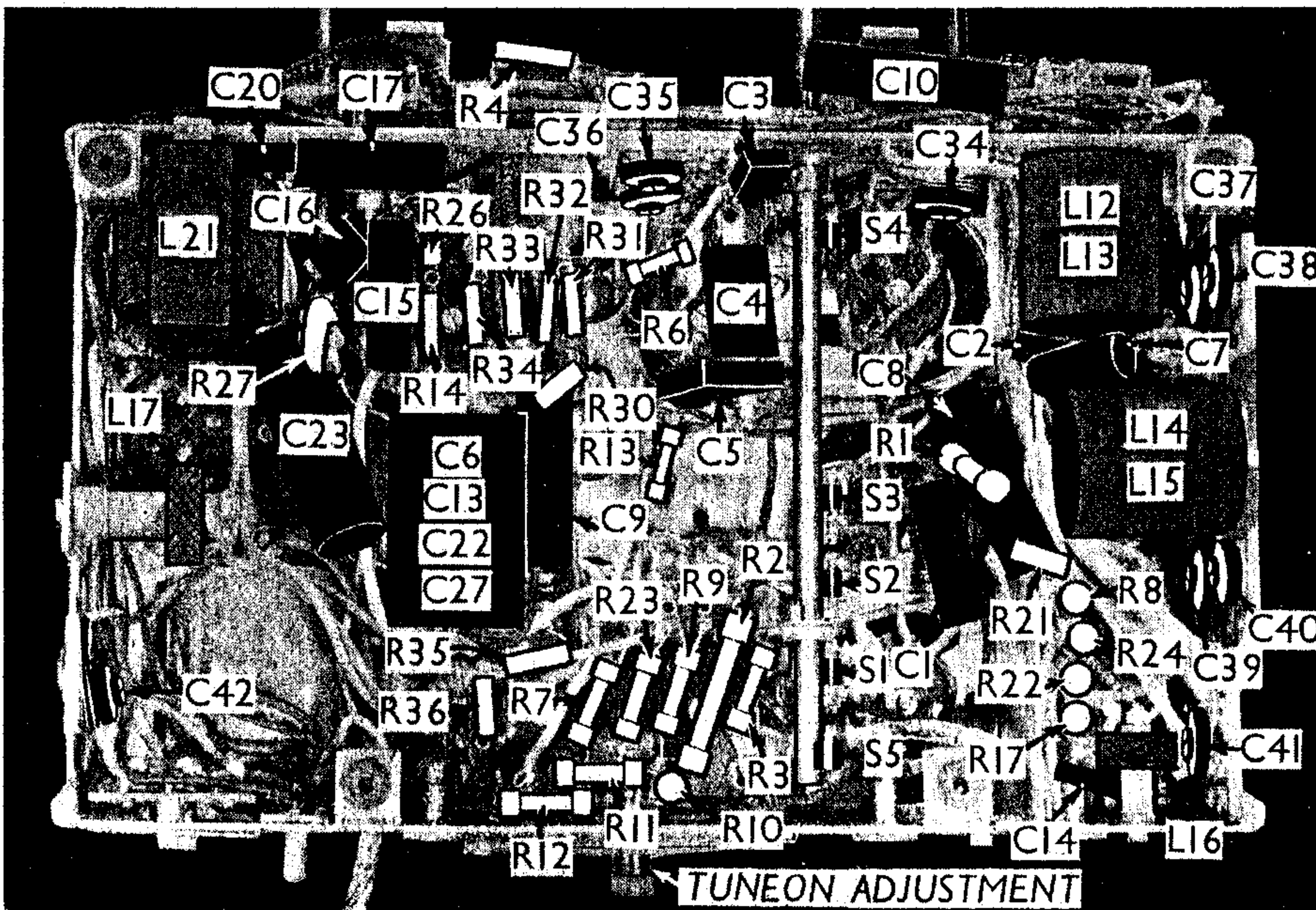
Coils—The three signal frequency and oscillator units are seen in our plan chassis view. The cans are spun on to the chassis and cannot be removed.

The two I.F. transformers are underneath the chassis, in a compartment covered by a screening plate. This has been removed in our under-chassis view. It is held by four screws and washers, of which the front one (hexagonal head) should be loosened by a spanner.

Scale Lamps.—Two Osram 12 mm. M.E.S. types, rated at 3.5V, 0.3 A, are employed.

Trimmers.—The various trimmers are operated from the sides and front of the chassis.

Condensers C24, C25, C26.—These are three 6μF dry electrolytics mounted in a single unit on top of the chassis. They have a common positive lead (red), and three separate negatives (black).



Under-chassis view of the table model. Radiograms include several additional condensers and resistances, and also **S6**, between **S3** and **S4**. The screening plate over the right-hand section has been removed.