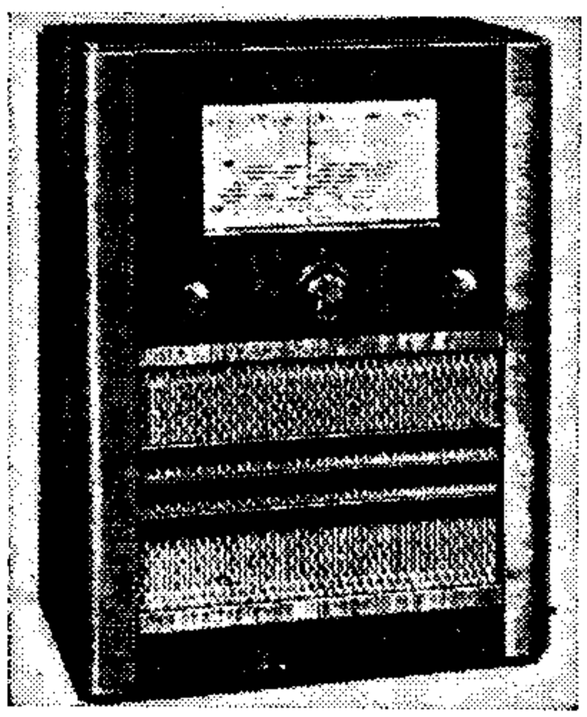
COSSOR 35, 37, 31, 32 & 439



The Cossor Model 35 Table Receiver.

THE Cossor 35 receiver is a 4-valve 3-band battery superhet. The SW range is 16.35 to 51.3 m.

A similar chassis is employed in the model 37, and, with modifications described after "General Notes" in models 31, 32 and 439. This *Service Sheet* was prepared on a model 35 receiver.

Release dates: Models 35, 37, *August*, 1940; 31, 32, *January*, 1939; 439, *July*, 1938.

CIRCUIT DESCRIPTION

Aerial input via series condenser **C1** and coupling coils **L1** (SW), **L2** (MW) and **L3** (LW) to single tuned circuits **L4, C31** (SW), **L5, C31** (MW) and **L6, C31** (LW), which precede triode-heptode valve **(V1, Cossor metallised 220TH)** operating as frequency changer with internal coupling.

Triode oscillator grid coils **L7** (SW), **L8** (MW) and **L9** (LW) are tuned by **C32.** Parallel trimming by **C33** (SW), **C34** (MW) and **C9, C35** (LW); series tracking by **C10** (MW) and **C11, C36** (LW) and specially shaped vanes of **C32.** Reaction coupling by **L10** (SW), **L11** and common impedance of **C10** (MW) and **L12** (LW).

Second valve **(V2, Cossor metallised 210 VPA)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary iron-cored transformer couplings **C6, L13, L14, C7** and **C15, L15, L16, C16,** in which alignment is effected by adjusting the movable iron-dust cores.

Intermediate frequency 465 KC/S.

Diode second detector is part of double diode triode valve **(V3, Cossor metallised 210 DDT).** Audio frequency component in rectified output is developed across manual volume control **R8,** which also operates as load resistance, and passed via AF coupling condenser **C19** to CG of triode section, which operates as AF amplifier. IF filtering by **C17, R7** in diode circuit, and **C20** in triode anode circuit. Provision for connection of gramophone pick-up across **R8.**

In some chassis, the lower pick-up socket may be taken to HT negative directly, at the junction of **R18** and **S17,** so that when the pick-up is connected, the signal diode is biased negatively, thus muting radio.

Second diode of **V8,** fed from **V2** anode via **C18,** provides DC potential which is developed across load resistance **R12** and fed back through decoupling circuits as GB to FC (except on SW) and IF valves, giving automatic volume control.

Resistance capacity coupling by **R10, C21** and **R13** between **V3** triode and tetrode output valve **(V4, Cossor, 220 OT or 220 HPT).** Variable tone control by **R14, C22** in CG circuit. Fixed tone correction by **C23, R16, C24** in anode circuit. Provision for connection of high impedance external speaker by sockets in anode circuit. Internal speaker may be muted by jack-type switch **S15** in anode circuit.

Fixed GB potential for **V1** and **V2,** GB for **V2** triode and **V4,** and AVC delay

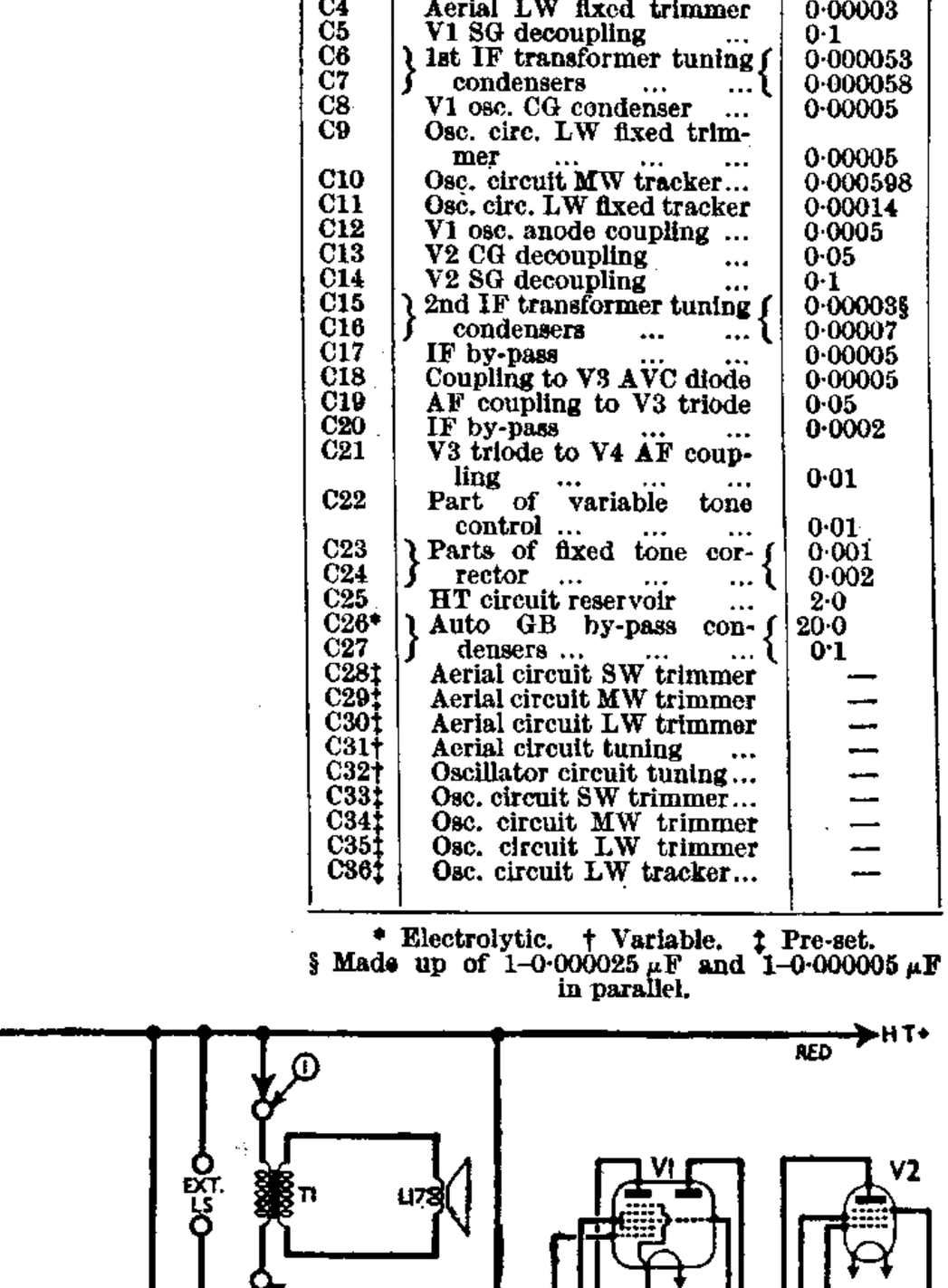
Circuit diagram of the Cossor 35 three-band battery superhet. Grid bias for all valves, and AVC delay, are automatic, and an HT circuit fuse is fitted. A similar chassis is employed in the model 37, and the differences in models 31, 32 and 439 are described under "Models 31, 32, 439." Speaker plug and valve base diagrams are inset to the right of the circuit diagram.

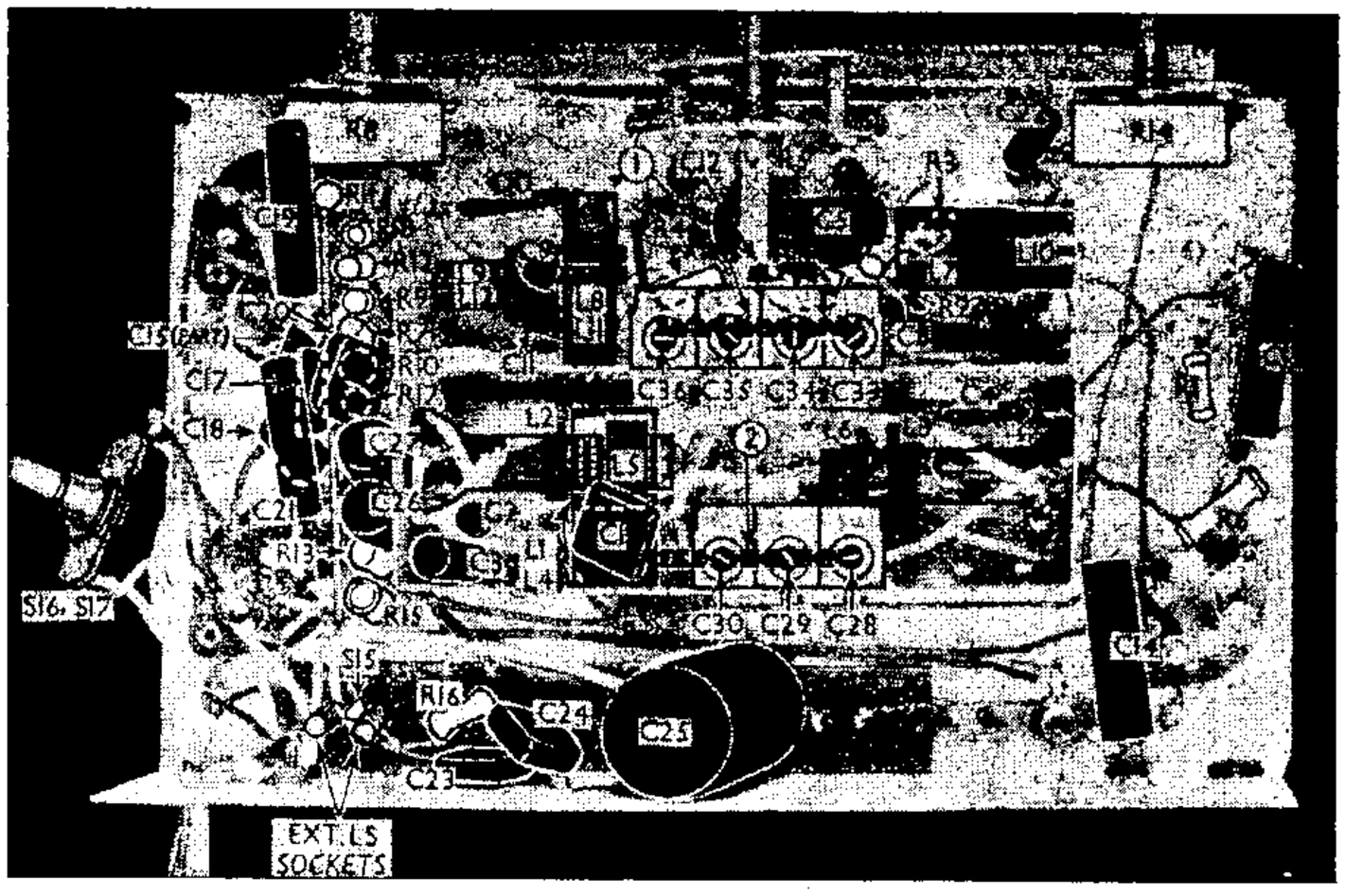
potential are obtained automatically from drop along resistances **R17, R18** in negative HT lead to chassis. **F1** is the HT circuit fuse lamp.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial series condenser ...	0·0005
C2	MW top coupling ...	0·00001
C3	V1 heptode CG decoupling	0·05
C4	Aerial LW fixed trimmer	0·00003
C5	V1 SG decoupling ...	0·1
C6	1st IF transformer tuning condensers	0·000053
C7		0·000058
C8	V1 osc. CG condenser ...	0·00005
C9	Osc. circ. LW fixed trimmer	0·00005
C10	Osc. circuit MW tracker...	0·000598
C11	Osc. circ. LW fixed tracker	0·00014
C12	V1 osc. anode coupling ...	0·0005
C13	V2 CG decoupling ...	0·05
C14	V2 SG decoupling ...	0·1
C15	2nd IF transformer tuning condensers	0·00003§
C16		0·00007
C17	IF by-pass	0·00005
C18	Coupling to V3 AVC diode	0·00005
C19	AF coupling to V3 triode	0·05
C20	IF by-pass	0·0002
C21	V3 triode to V4 AF coupling	0·01
C22	Part of variable tone control	0·01
C23	Parts of fixed tone corrector	0·001
C24		0·002
C25	HT circuit reservoir ...	2·0
C26*	Auto GB by-pass condensers	20·0
C27		0·1
C28‡	Aerial circuit SW trimmer	—
C29‡	Aerial circuit MW trimmer	—
C30‡	Aerial circuit LW trimmer	—
C31†	Aerial circuit tuning ...	—
C32†	Oscillator circuit tuning...	—
C33‡	Osc. circuit SW trimmer...	—
C34‡	Osc. circuit MW trimmer	—
C35‡	Osc. circuit LW trimmer	—
C36‡	Osc. circuit LW tracker...	—

* Electrolytic. † Variable. ‡ Pre-set.
§ Made up of 1–0·000025 μF and 1–0·000005 μF in parallel.





Under-chassis view. Most of the resistances and condensers are mounted on an insulated panel on the left. **S15** is associated with the external speaker sockets. The two switch units are shown dotted through the two trimmer assemblies, while the diagrams in column 3 overleaf show the units in detail.

	RESISTANCES	Values (ohms)
R1	V1 heptode CG decoupling	1,000,000
R2	V1 SG HT feed	70,000
R3	V1 osc. CG resistance ...	40,000
R4	V1 osc. anode HT feed resistances.	50,000
R5		20,000
R6	V2 SG HT feed	150,000
R7	IF stopper	50,000
R8	Manual volume control; V3 signal diode load ...	500,000
R9	V3 triode CG resistance...	2,000,000
R10	V3 triode anode load ...	100,000
R11	AVC line decoupling ...	3,000,000
R12	V3 AVC diode load ...	2,000,000
R13	V4 CG resistance ...	1,000,000
R14	Variable tone control ...	250,000
R15	V4 grid stopper	100,000
R16	Part of fixed tone corrector	25,000
R17	Automatic GB resistances	150
R18		250

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial SW coupling coil	0·5
L2	Aerial MWcoupling coil	25·0
L3	Aerial LW coupling coil	140·0
L4	Aerial SW tuning coil...	Very low
L5	Aerial MW tuning coil	2·0
L6	Aerial LW tuning coil...	15·0
L7	Osc. circ. SW tuning ...	Very low
L8	Osc. circ. MW tuning...	5·5
L9	Osc. circ. LW tuning ...	13·0
L10	Oscillator SW reaction	0·15
L11	Oscillator MW reaction	2·4
L12	Oscillator LW reaction	6·0
L13	1st IF trans. Pri. ...	7·0
L14	1st IF trans. Sec. ...	7·0
L15	2nd IF trans. Pri. ...	18·0
L16	2nd IF trans. Sec. ...	18·0
L17	Speaker speech coil ...	2·0
T1	Speaker input trans. Pri. ...	1,200·0
	Speaker input trans. Sec. ...	0·1
S1-S14	Waveband switches ...	—
S15	Speaker switch... ...	—
S16	LT circuit switch ...	—
S17	HT circuit switch ...	—
F1	HT circuit fuse ...	—

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws) from the front of the cabinet, and one from the side;
remove the fixing nut (with lock-washer) from the bush of the battery switch, on a recessed panel at the side of the cabinet, and push the spindle into the cabinet;
withdraw the speaker plug from its socket on the speaker input transformer;
loosen the wood screws holding the two metal clamps to the top of the scale assembly inside the cabinet;
remove the two cheese-head set screws (with brass washers) holding the channelled metal batten to the rear of the cabinet, taking the weight of the chassis with one hand while removing the screws with the other.
When replacing, see that the chassis supporting pegs inside the front of the cabinet, and those on the batten at the rear, are located in the grommets provided for them on the chassis.
The metal screening cap should be securely fitted over the top of **V2** after its connector has been attached.
Removing Speaker.—Withdraw the plug from the socket on the speaker transformer;
remove the four cheese-head set screws (with brass washers) holding the speaker to the sub-baffle.
When replacing, the transformer should be on the right.

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 220TH	116	0·4	55	0·9
	Oscillator			
	30	1·2		
V1 210VPA	116	1·2	43	0·4
V3 210DDT	74	0·3	—	—
V4 220OT	109	4·7	116	1·0

Valve voltages and currents given in the table above are those measured in our receiver when it was operating with a new HT battery reading 120 V on load.
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.

GENERAL NOTES

Switches.—S1-S14 are the waveband switches, in two ganged rotary units beneath the chassis. The positions of the units are indicated in the under-chassis view and shown in detail in the diagrams in col. 3, where they are drawn as seen when viewed from the front of the underside of the chassis. The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

Switch Table

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 is the internal speaker switch, associated with the external speaker sockets. When the external speaker plugs are fully inserted, **S15** opens and disconnects **T1** primary from **V4** anode circuit.

S16, S17 are respectively the LT and HT circuit switches, in a single rotary unit mounted on the side of the cabinet. The unit is seen in our under-chassis view, where it is attached only by its connecting leads.

Coils.—All the RF and oscillator coils **L1-L5** and **L7-L12** are contained in pairs on unscreened tubular moulded formers mounted in two screened compartments beneath the chassis.

The IF transformers **L13, L14** and **L15, L16** are mounted in screening cans on the chassis deck with their associated trimmers. They are shown in our plan view, where the positions of the coil core adjustments are approximately indicated.

Speaker Plug.—The speaker is connected to the chassis by means of a four-pin plug. A diagram of the plug, viewed from the free ends of the pins, is inset to the right of the circuit diagram. Two of the pins are numbered to agree with the numbers in circles associated with the sockets at either end of **T1** primary. The other two pins are blank.

External Speaker.—Two sockets are provided on the chassis deck for a high impedance (20,000 O) external speaker. Switch **S15** is associated with one of the sockets.

Fuse F1.—This is an ordinary MES-type flash lamp bulb, rated at 3.5 V, 0.15 A..

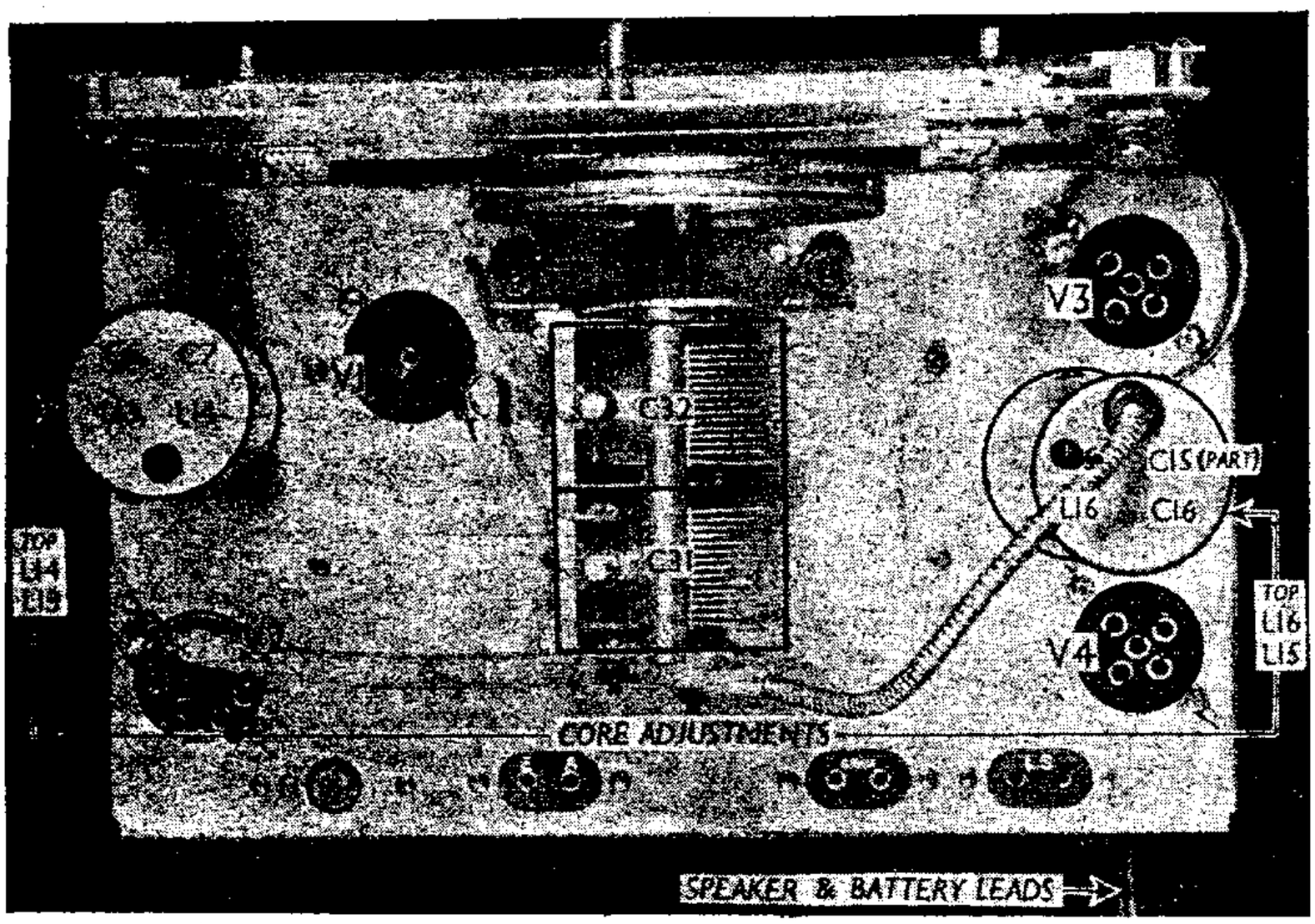
Batteries.—Those recommended by the makers are : HT, Cossor 1120, standard capacity; or Cossor 2120, double capacity. LT, Cossor E.245, standard capacity; or Cossor E.370, large capacity.

Battery Leads and Voltages.—Black lead, black spade tag, LT−; yellow lead, red spade tag, LT+ 2 V; black lead, yellow plug, HT−; red lead, black plug, HT+ 120 V. Grid bias is automatic.

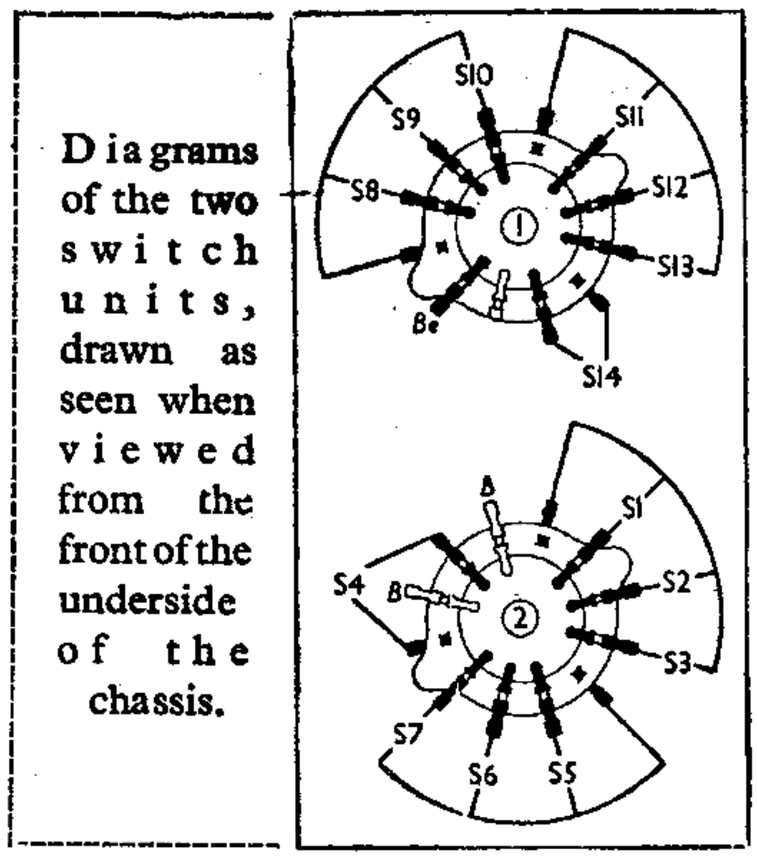
Chassis Divergencies.—In the makers' diagram, **C15** is shown as a single 53 $\mu\mu$F (0.000053 μF) condenser, whereas in our chassis this was made up of two condensers connected in parallel; one was 25 $\mu\mu$F (0.000025 μF), and the other 5 $\mu\mu$F (0.000005 μF). The former was fitted inside the screened unit, while the second was fitted beneath the chassis.

R6 in our chassis was 150,000 O, instead of 100,000 O as marked on the makers' diagram. Also the makers' diagram shows the free end of **R14** connected to the slider.

In some chassis, the lower pick-up socket may go to the junction of **R18** and **S17.**



Plan view of the chassis. The HT fuse **F1** and the three pairs of sockets can be seen in a line near the rear of the chassis deck. The positions of the IF core adjustments are approximately indicated.



Diagrams of the two switch units, drawn as seen when viewed from the front of the underside of the chassis.

MODELS 31, 32, 439

Models 31 and 32 employ a chassis electrically similar to that used in the 35 and 37, except that the pick-up sockets are omitted in the 31 and 32. The chassis layout is different, the tuning compartments being moved over to one side of the chassis, and the valve positions being different.

Model 439 is similar electrically and physically to the 31, 32, except that the switches **S16, S17** are ganged with the volume control **R8.**

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator to control grid (top cap) of **V1** and chassis. Switch set to MW, and volume control to maximum if an output meter is to be used; the Cossor ganging oscillator and oscilloscope are recommended, and if they are used, volume control should be turned to minimum. The live oscilloscope lead should be connected to the junction of **R7** and **R8.**

Feed in a 465 KC/S (645.2 m) signal, and adjust the cores of **L16, L15, L14** then **L13,** in that order, endeavouring to achieve a flat-topped, steep-sided response.

RF and Oscillator Stages.—With the gang at maximum pointer should coincide with lines at right-hand ends of the three scales. Transfer signal generator leads to **A** and **E** sockets, via a suitable dummy aerial.

MW.—Switch set to MW, tune to 214 m on scale, feed in a 214 m (1,400 KC/S) signal, and adjust **C34,** then **C29,** for maximum output. Tracking is fixed, but the setting should be checked at various parts of the scale, and the pointer adjusted if necessary.

LW.—Switch set to LW, tune to 1,200 m on scale, feed in a 1,200 m (250 KC/S) signal, and adjust **C35,** then **C30,** for maximum output. Feed in a 1,875 m (160 KC/S) signal, tune it in, and adjust **C36** while rocking the gang slightly for optimum results. Repeat the whole LW alignment until no improvement results.

SW.—Switch set to SW, tune to 18 MC/S on scale, feed in an 18 MC/S (16.65 m) signal, and adjust **C33** for maximum output, using the setting involving the lesser trimmer capacity; then adjust **C28** for maximum output. The gang should be rocked slightly for optimum results.