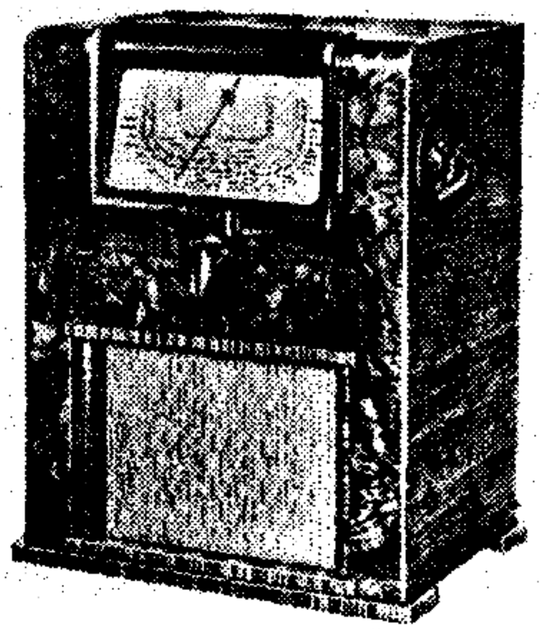
Supplement to The Wireless & Electrical Trader, January 14, 1939

COSSOR 485

3-BAND BATTERY SUPERHET



The Cossor 485 3-band battery superhet. Early models had battery bias, but automatic bias was substituted later.

COVERING a short-wave range of 10-57·5 m, the Cossor 485 is a 4-valve battery 3-band superhet with a valve arrangement comprising a heptode frequency changer, a variable-mu pentode IF amplifier, a double-diode triode and a double pentode QPP output valve. Provision is made for the connection of an extension speaker.

Early models, those issued before February, 1938, required a separate bias battery but later models, such as that on which this *Service Sheet* was prepared, have automatic bias.

Release date : July, 1937.

CIRCUIT DESCRIPTION

Aerial input via series condenser **C1** and, on SW, further series condenser **C2** and coupling coil **L1 ;** on MW, coupling coil **L2 ;** on LW, coupling coil **L3,** to single tuned circuits **L4, C29** (SW), **L5, C29** (MW) and **L6, C29** (LW) which precede a heptode valve (**V1, Cossor metallised 210PG**) operating as frequency changer with electron coupling. Oscillator grid coils **L7** (SW), **L8** (MW) and **L9** (LW) are tuned by **C30 ;** parallel trimming by **C31** (SW), **C32** (MW) and **C8, C33** (LW) ; series tracking by **C34** (MW) and **C35** (LW). Reaction by coils **L10** (SW), **L11** via coupling condenser **C9** (MW) and **L12** via coupling condenser **C10** (LW). On SW, the reaction coil is connected across the anode feed resistance **R5,** thus raising the anode volts.

Second valve (**V2, Cossor metallised 210VPT**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C5, L13, L14, C6** and **C15, L15, L16, C16.** The tuning condensers are fixed and tuning is effected by adjusting the iron cores.

Intermediate frequency 465 KC/S.

Diode second detector is part of double-diode triode valve (**V3, Cossor metallised 210DDT**). Audio frequency component in rectified output is developed across load resistances **R9** and **R10,** the latter of which also operates as manual volume control, and passed via AF coupling condenser **C19** to CG of triode section, which operates as AF amplifier. IF filtering by **C17** and **C20.**

Second diode of **V3,** fed from **V2** anode via **C18,** provides DC potentials which are developed across load resistance **R13** and passed back through decoupling circuits as GB to FC (except on SW) and IF valves, giving AVC.

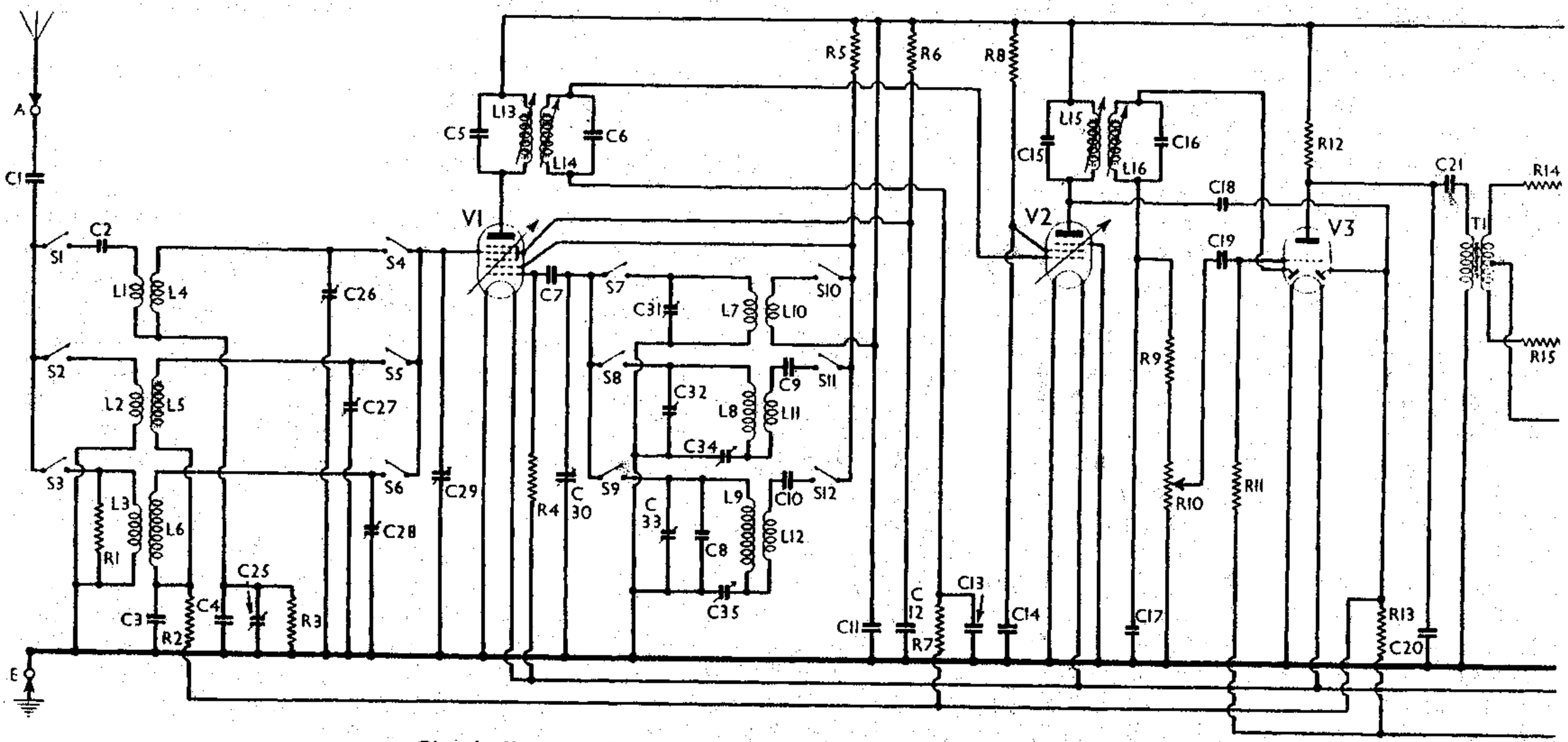
Parallel-fed transformer coupling by **R12, C21** and **T1,** via grid stoppers **R14, R15,** between **V3** triode and quiescent push-pull double-pentode output valve (**V4, Cossor 240QP**). Fixed tone correction by **R16, C22** between the two anodes.

Fixed GB potential for **V1** and **V2,** GB for **V3** triode and AVC delay potential are obtained from junction of resistances **R17** and **R18,** which form a potential divider in the negative HT lead to chassis. Total potential developed across **R17** and **R18** is applied as GB to control grids circuit of **V4.**

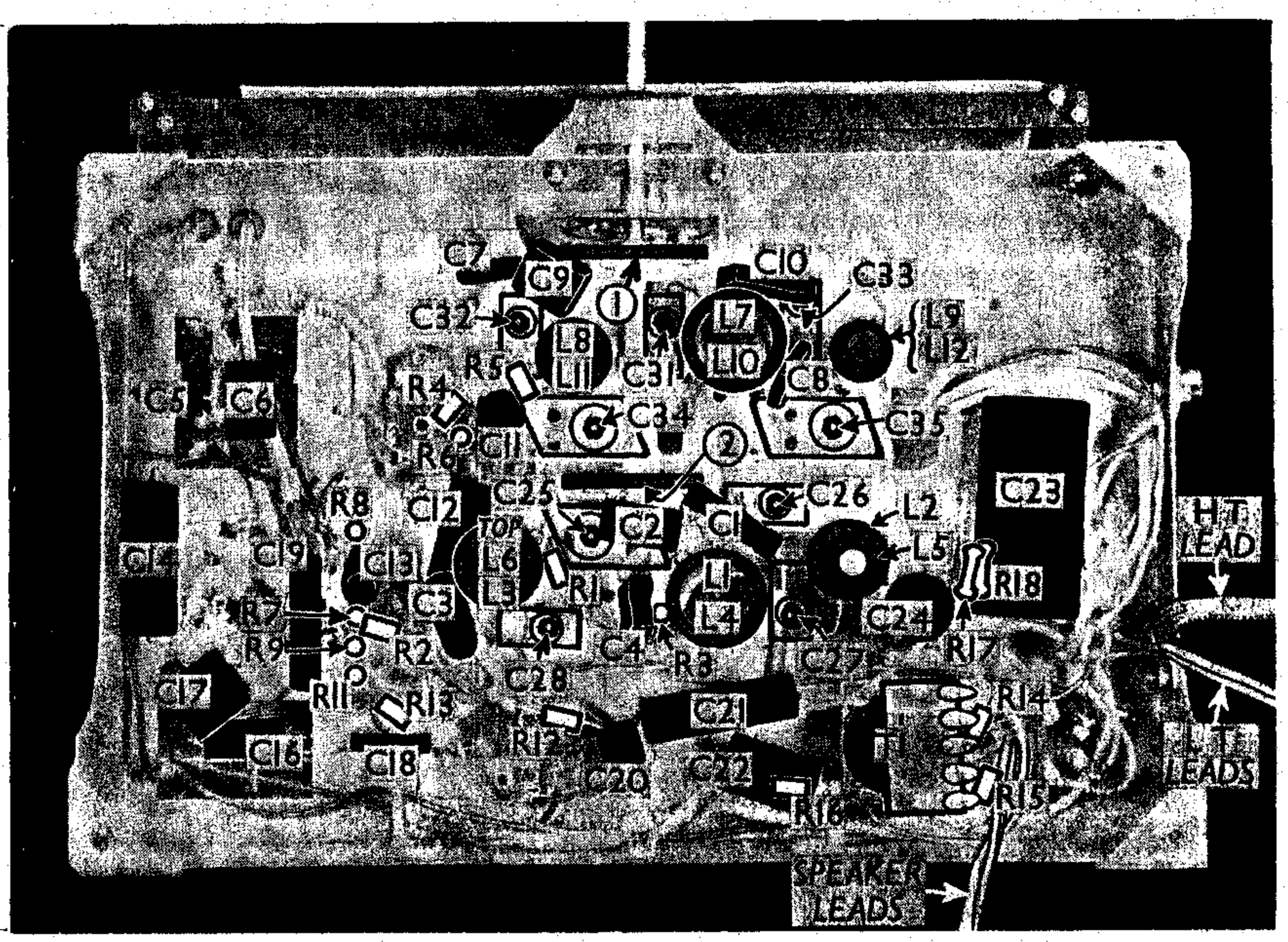
DISMANTLING THE SET

Removing Chassis.—A steel transit bar is fitted to the inside of the top of the cabinet and if this has not been taken out, remove the round-head wood screw at the back and push the bar away from you and to the left until the bar is free. Now remove the control knob at the front of the set (recessed grub screw) and the three knobs at the sides with their extensions (screws accessible from the inside of the cabinet).

Then remove the four bolts (with

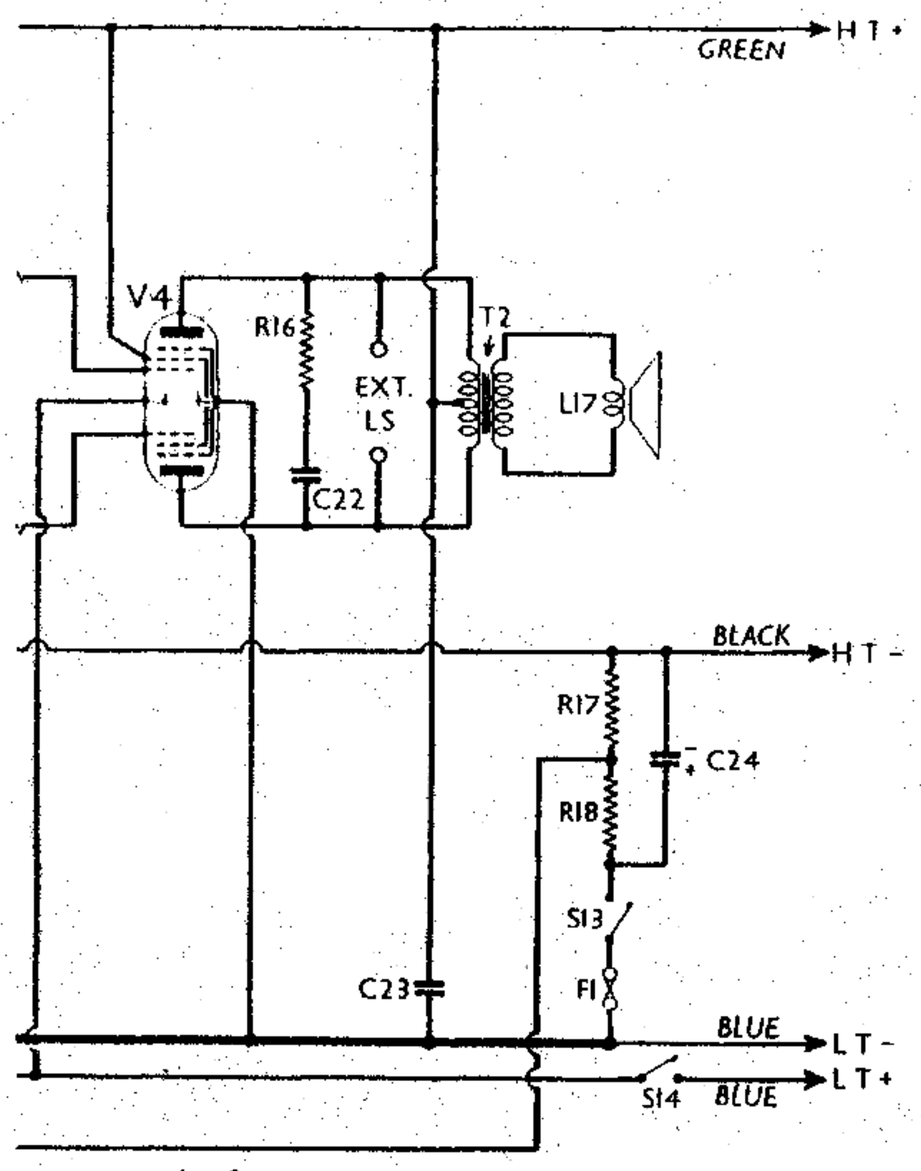


Circuit diagram of the latest version of the Cossor 485. The divergencies in early models are in cols. 2 ?



Under - chassis view. Diagrams of the two switch units are in col. 3 overleaf. All the trimmers are built on to the chassis. In early models **R17, R18** and **C24** were omitted, as battery bias was used.

washers and lock washers) holding the chassis to the platform and disconnect the speaker leads (screw terminals) when by lifting the back upwards, the chassis can be withdrawn from the cabinet. *When replacing*, connect the speaker leads as follows, numbering the terminals from bottom to top:—1, black; 2, red; 3, black. If the valves have been removed note that the screening cap goes on **V2.**



nd 3 overleaf.

Removing Speaker.—To remove the speaker from the cabinet, disconnect the leads (screw terminals) and slacken the four clamps holding the speaker to the sub-baffle. *When replacing*, see that the transformer is on the right and connect the leads as follows, numbering the terminals from bottom to top:—1, black; 2, red; 3, black.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial series condenser	0·0005
C2	Aerial SW series condenser	0·00005
C3	V1 tetrode CG MW and LW decoupling	0·05
C4	Aerial circ. SW fixed tracker	0·00175
C5, C6	1st IF transformer fixed tuning condensers	0·00015, 0·00016
C7	V1 osc. CG condenser	0·0002
C8	Osc. circuit LW fixed trimmer	0·00005
C9	V1 osc. anode MW coupling	0·0003
C10	V1 osc. anode LW coupling	0·0005
C11	HT circuit RF by-pass	0·01
C12	V1 SG decoupling	0·1
C13	V2 CG decoupling	0·01
C14	V2 SG decoupling	0·1
C15, C16	2nd IF transformer fixed tuning condensers	0·00005, 0·00007
C17	IF by-pass	0·00005
C18	Coupling to V3 AVC diode	0·00005
C19	AF coupling to V3 triode	0·01
C20	IF by-pass	0·0002
C21	AF coupling to T1	0·1
C22	Part of fixed tone corrector	0·001
C23	HT reservoir condenser	2·0
C24*	Auto GB by-pass	50·0
C25‡	Aerial circuit SW tracker	0·0021
C26‡	Aerial circuit SW trimmer	—
C27‡	Aerial circuit MW trimmer	—
C28‡	Aerial circuit LW trimmer	—
C29†	Aerial circuit tuning	—
C30†	Oscillator circuit tuning	—
C31‡	Osc. circuit SW trimmer	—
C32‡	Osc. circuit MW trimmer	—
C33‡	Osc. circuit LW trimmer	—
C34‡	Osc. circuit MW tracker	0·00075
C35‡	Osc. circuit LW tracker	0·0003

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTANCES	Values (ohms)
R1	Aerial circuit LW damping	50,000
R2	V1 tetrode CG MW and LW decoupling	3,000,000
R3	Aerial SW trackers shunt	10,000
R4	V1 osc. CG resistance	100,000
R5	V1 osc. anode HT feed	25,000
R6	V1 SG HT feed	100,000
R7	V2 CG decoupling	3,000,000
R8	V2 SG HT feed	100,000
R9	Part of V3 signal diode load	100,000
R10	Part of V3 signal diode load: manual volume control	500,000
R11	V3 triode CG resistance	2,000,000
R12	V3 triode anode load	100,000
R13	V3 AVC diode load	2,000,000
R14, R15	V4 grids stopper resistances	100,000
R16	Part of fixed tone corrector	10,000
R17, R18	V1 and V2 fixed, V3 and V4 automatic GB resistances	500, 150

	OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial SW coupling coil		0·2
L2	Aerial MW coupling coil		6·5
L3	Aerial LW coupling coil		43·0
L4	Aerial SW tuning coil		Very low
L5	Aerial MW tuning coil		1·5
L6	Aerial LW tuning coil		17·0
L7	Osc. circuit SW tuning coil		0·05
L8	Osc. circuit MW tuning coil		1·0
L9	Osc. circuit LW tuning coil		9·0
L10	Oscillator SW reaction		1·0
L11	Oscillator MW reaction		0·4
L12	Oscillator LW reaction		4·0
L13	1st IF trans.	Pri.	3·0
L14		Sec.	3·0
L15	2nd IF trans.	Pri.	5·5
L16		Sec.	5·5
L17	Speaker speech coil		1·8
T1	Intervalve trans.	Pri.	900·0
		Sec., total	2,100·0
T2	Speaker input trans.	Pri., total	1,100·0
		Sec.	0·17
S1-S12	Waveband switches		—
S13	HT circuit switch		—
S14	LT circuit switch		—
F1	HT circuit fuse		—

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VALVE ANALYSIS

Valve voltages and currents given in the table below 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.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 210PG	113	0·1	33	0·7
	Oscillator			
	78	1·0		
V2 210VPT	113	2·0	56	0·5
V3 210DDT	68	0·3	—	—
V4 240QP	112†	2·3†	113	0·9

† Each anode.

GENERAL NOTES

Switches.—**S1-S12** are the waveband switches, in two rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 3. The table (col. 2) gives the switch positions for the three settings, starting from fully anti-clockwise.

S13 and **S14** are the HT and LT circuit switches, in a rotary unit, mounted on a raised bracket at one side of the chassis deck. The diagram of this unit is inset on the plan chassis view, and shows the contacts, looking towards the back of the unit from the gang condenser. It will be noted that there are several blank tags (B), while two others are marked "Not Used."

These two tags are connected up, in our chassis, to two leads, one of which enters the HT cable, but is cut off at the far end. In early models, the two tags were the connections of an extra GB switch from the top of **F1** to GB+. In later models this switch is not required as GB is automatic.

TABLE AND DIAGRAMS OF THE SWITCH UNITS

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 and **S14** are closed when the switch spindle is rotated clockwise.

Coils.—**L1, L4**; **L2, L5**; **L3, L6**; **L7, L10**; **L8, L11** and **L9, L12** are in six unscreened units beneath the chassis.

The IF transformers **L13, L14** and **L15, L16** are in two screened units on the chassis deck. Their core adjustments are reached through holes in the sides of the cans.

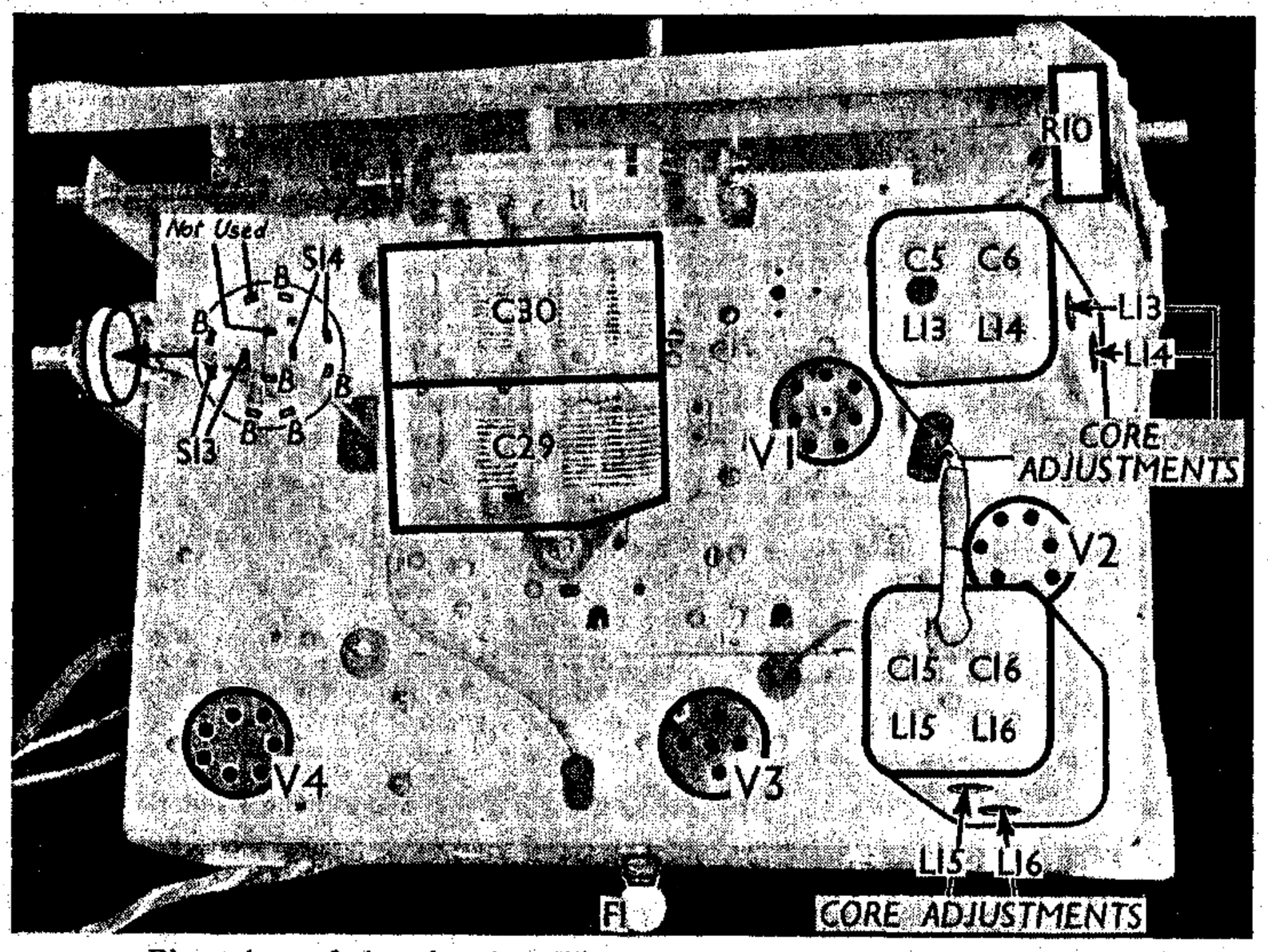
Fuse F1.—This is an Osram MES bulb, rated at 3·5 V, 0·15 A. It screws into a holder at the rear of the chassis.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (24,000 Ω) external speaker.

Batteries.—LT, 2V 70 AH accumulator cell, such as Cossor type E370. HT, 120 V HT dry battery, such as Cossor Double Capacity Type 2120. GB is automatic in late models. In early models a 9 V GB battery is necessary.

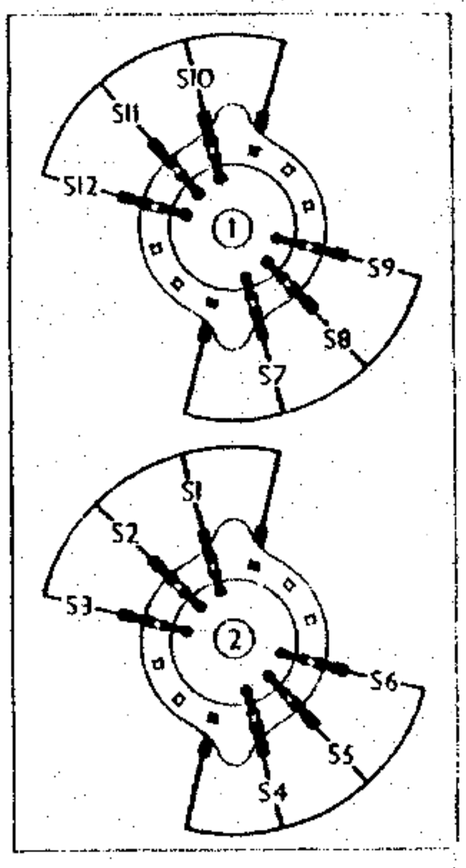
Battery Leads and Voltages.—Blue lead, black spade tag, LT negative; blue lead, red spade tag, LT positive 2 V; black lead and plug, HT negative; green lead and plug, HT positive 120 V. In early models, there were GB positive, GB negative 1 (—1·5 V) and GB negative 2 (—9 V) plugs.

Chassis Divergencies.—The main divergencies likely to be found will be in sets issued prior to February, 1938, where the GB arrangements were different.



Plan view of the chassis. The **S13, S14** switch diagram is inset.

Diagrams of the two switch units, as seen from the rear of the underside of the chassis.



Battery GB, instead of automatic GB, was used. **R17, R18** and **C24** were not used. The top of **S13** was connected to HT negative. The GB positive connection went, via an extra battery switch in the **S13, S14** unit, to the top of **F1.** The lead at present connected to the junction of **R17, R18** was the GB negative 1 (—1·5 V) lead, while the lead from the centre tap of the secondary of **T1** was the GB negative 2 (—9 V) lead.

Other possible divergencies are as follows. In our chassis **C35** is a single 300 $\mu\mu$F maximum pre-set condenser, but in other models there may be a pre-set 800 $\mu\mu$F maximum type, in series with a 270 $\mu\mu$F fixed condenser.

C4 may be 0·0015 μF, not 0·00175 μF. The makers' diagram shows the positive side of **C24** to chassis.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator to control grid (top cap) of **V1** and chassis. Short-circuit **C30** to stop **V1** oscillating, then feed in a 465 KC/S signal. Adjust the cores of **L13, L14, L15** and **L16** for maximum output, by screwing them in or out. Re-check, and then remove the short from **C30.**

RF and Oscillator Stages.—Connect signal generator to **A** and **E** sockets.

LW.—Switch set to LW, tune to 1,000 m on scale, feed in a 1,000 m (300 KC/S) signal, and adjust **C33,** then **C28** for maximum output. Feed in a 1,875 m (160 KC/S) signal, tune it in, and adjust **C35** for maximum output, while rocking the gang slightly for optimum results.

MW.—Switch set to MW, tune to 214 m on scale, feed in a 214 m (1,400 KC/S) signal, and adjust **C32,** then **C27,** for maximum output. Feed in a 522 m (575 KC/S) signal, tune it in, and adjust **C34** for maximum output, while rocking the gang slightly for optimum results.

SW.—Switch set to SW, tune to 14 MC/S on scale, feed in a 14 MC/S (21·4 m) signal, and adjust **C31,** then **C26,** for maximum output. Feed in a 7 MC/S (42·9 m) signal, tune it in, and adjust **C25** for maximum output, while rocking the gang for optimum results. Return to 14 MC/S, and re-adjust **C31** and **C26** if necessary.

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