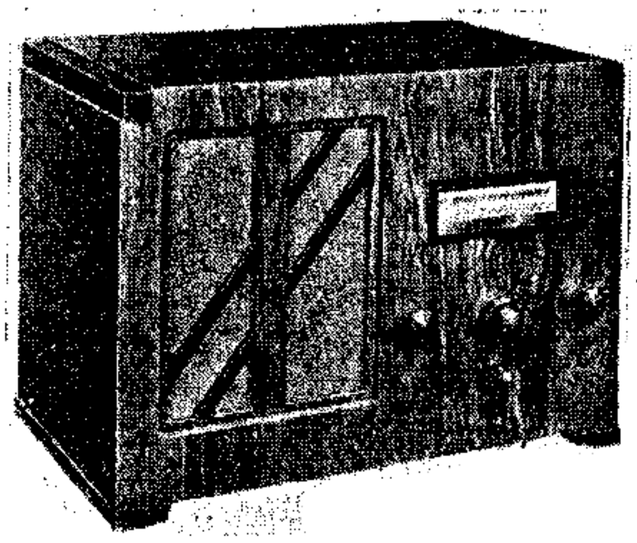
COSSOR 435

AC TRF RECEIVER



THE Cossor 435 is a 3-valve (plus rectifier) 2-band TRF receiver, suitable for AC mains of 200-250 V, 40-100 C/S.

There is provision for the connection of a gramophone pick-up and an external speaker. A switch on the pick-up jack causes both scale lamps to light when the plug is inserted in its socket.

Release date and original price: 1934; £9 15s.

CIRCUIT DESCRIPTION

On MW, switches **S1** and **S2** are closed; aerial input is then via series condenser **C1** to a tapping formed by the junction of **L2** and **L3**, the MW tuning coil, by **S1, S2.** On LW, input is via **C1** and series choke **L1** to tapping on LW tuning coil **L4, L5; S1, S2** being open. The circuit is tuned by **C14,** with manual trimming by **C15.**

First valve **(V1, Cossor metallised MVSG)** is a variable-mu RF tetrode operating as signal frequency amplifier with gain control by potentiometer **R3,** which forms part of potential divider with **R1, R2. R4** limits the minimum GB that may be applied to **V1. L12** is an anti-parasitic choke in the screen lead.

Tuned-anode coupling by **L8, L9** (MW) and **L10, L11** (LW) with **C17,** the coils being tapped like the aerial coils, between **V1** and an RF pentode valve **(V2, Cossor metallised MS/Pen)** which operates as grid leak detector with **C5** and **R6.** Reaction is applied from anode via coupling coils **L6** (MW) and **L7** (LW) and controlled by **C16.** RF filtering by **C8** in anode circuit. Provision by means of a switched jack for connection of gramophone pick-up in control grid circuit, and when it is in circuit, GB is obtained from drop along **R8** in cathode circuit.

Resistance-capacity coupling by **R7, C9** and **R9,** via grid stopper **R10,** between **V2** and pentode output valve **(V3, Cossor MP/Pen).** Fixed tone correction by **R11, C10** in anode circuit. Provision for connection of high-impedance external speaker, also in anode circuit.

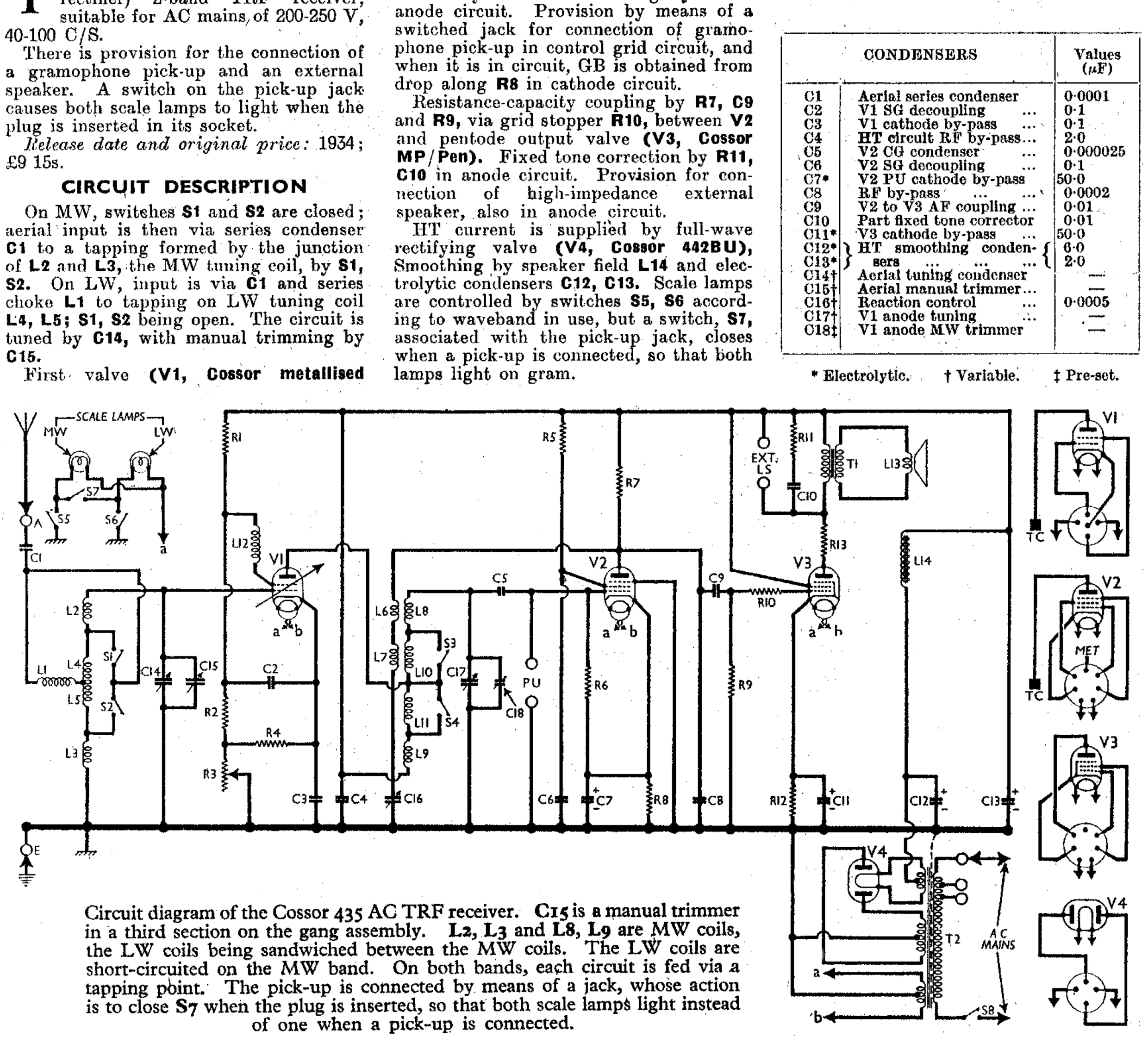
HT current is supplied by full-wave rectifying valve **(V4, Cossor 442BU),** Smoothing by speaker field **L14** and electrolytic condensers **C12, C13.** Scale lamps are controlled by switches **S5, S6** according to waveband in use, but a switch, **S7,** associated with the pick-up jack, closes when a pick-up is connected, so that both lamps light on gram.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 SG HT potential divider	40,000
R2	V1 SG HT potential divider	25,000
R3	V1 gain control	12,000
R4	V1 fixed GB resistance	100
R5	V2 SG HT feed	500,000
R6	V2 grid leak	500,000
R7	V2 anode load	100,000
R8	V2 PU GB resistance	1,000
R9	V3 CG resistance	500,000
R10	V3 grid stopper	100,000
R11	Part fixed tone corrector	10,000
R12	V3 GB resistance	350
R13	V3 anode stopper	100

	CONDENSERS	Values (μF)
C1	Aerial series condenser	0·0001
C2	V1 SG decoupling	0·1
C3	V1 cathode by-pass	0·1
C4	HT circuit RF by-pass	2·0
C5	V2 CG condenser	0·000025
C6	V2 SG decoupling	0·1
C7*	V2 PU cathode by-pass	50·0
C8	RF by-pass	0·0002
C9	V2 to V3 AF coupling	0·01
C10	Part fixed tone corrector	0·01
C11*	V3 cathode by-pass	50·0
C12*	HT smoothing condensers	6·0
C13*	HT smoothing condensers	2·0
C14†	Aerial tuning condenser	—
C15†	Aerial manual trimmer	—
C16†	Reaction control	0·0005
C17†	V1 anode tuning	—
C18‡	V1 anode MW trimmer	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Cossor 435 AC TRF receiver. **C15** is a manual trimmer in a third section on the gang assembly. **L2, L3** and **L8, L9** are MW coils, the LW coils being sandwiched between the MW coils. The LW coils are short-circuited on the MW band. On both bands, each circuit is fed via a tapping point. The pick-up is connected by means of a jack, whose action is to close **S7** when the plug is inserted, so that both scale lamps light instead of one when a pick-up is connected.

	OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial LW series choke ...		30·0
L2	Aerial MW tuning coil ...		1·5
L3			0·75
L4	Aerial LW tuning coil ...		12·0
L5			6·0
L6	Reaction coils		1·5
L7			1·7
L8	V1 anode circuit MW tuning coil		1·2
L9			1·0
L10	V1 anode circuit LW tuning coil		8·5
L11			8·5
L12	V1 SG stabilising choke...		Very low
L13	Speaker speech coil ...		5·5
L14	Speaker field coil ...		2,400·0
T1	Speaker input trans. ...	Pri.	950·0
		Sec.	0·4
T2	Mains trans.	Pri., total ...	80·0
		Heater sec. ...	0·1
		Rect. heat sec.	0·1
		HT sec., total	1,650·0
S1-S4	Waveband switches ...		—
S5–S7	Scale lamp switches ...		—
S8	Mains switch, ganged R3		—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted in the makers' manual. Voltages were measured with a 1,000 ohms-per-volt meter, chassis being the negative connection. The volume control was at maximum.

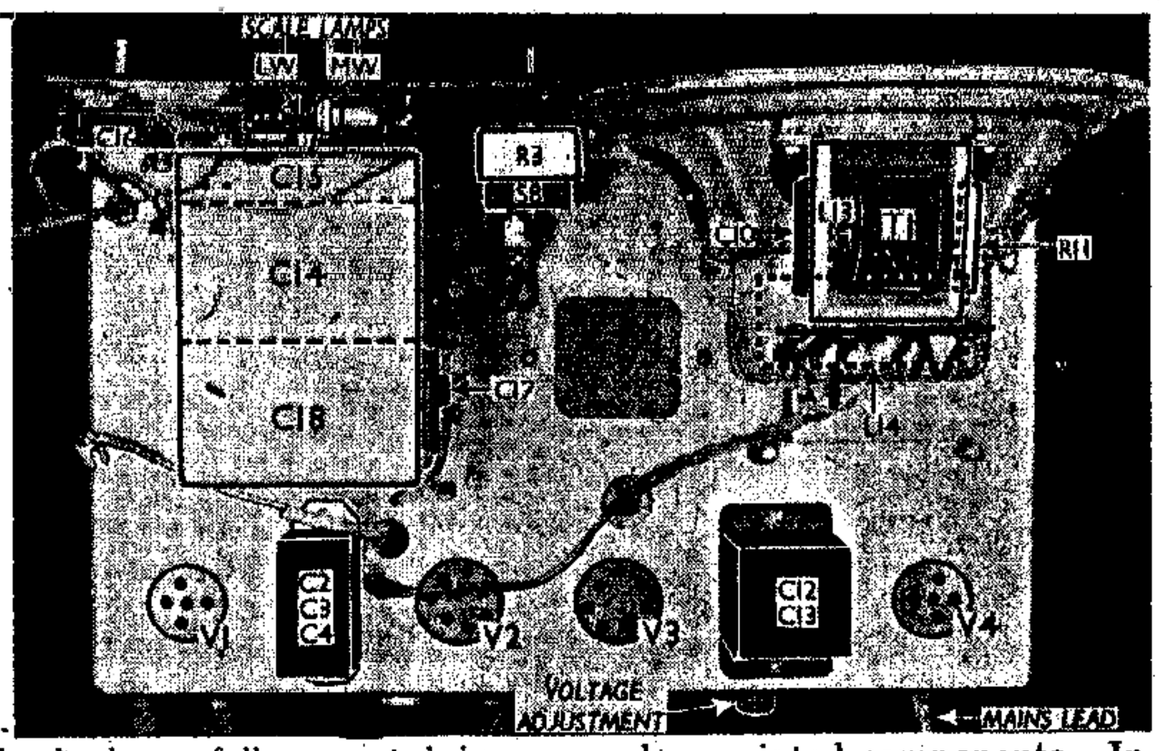
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 MVSG	190	4·0	60	0·75
V2 MS/Pen	85	2·5	30	0·75
V3 MP/Pen	190	24·0	206	4·5
V4 442BU	300†	—	—	—

† Cathode to chassis, DC.

DISMANTLING THE SET

Removing Chassis.—Remove the four rotary control knobs (recessed screws), and the wave-change lever knob;
remove the wave-change lever escutcheon (two set-screws);
remove the three cheese-head bolts (with washers) holding chassis to bottom of cabinet.
The chassis and speaker can now be withdrawn as a single unit.

Removing Speaker.—Remove the chassis as described above;
unsolder the three leads from the panel on the speaker transformer;
remove the two bolts and nuts (with lock-washers), holding the speaker rim to the brackets attached to front of chassis deck, and the large nut (with lock-washer) holding the magnet to the bracket on the mains transformer cover.



Plan view of the chassis. The scale lamps are mounted in swivelled holders, which can be pulled rearwards to give access to the lamps. The narrow section in front of the gang is the manual trimmer **C15**. Its control knob is concentric with the tuning knob.

When replacing, connect the leads as follows (according to the makers' instructions), numbering the tags on the transformer from left to right when viewed from the rear: 1, pink; 2, green; 3, yellow. Our connections were: yellow, red and white/red respectively. Tag 4 was joined to tag 3. Our speaker was type No. 825.

GENERAL NOTES

Switches. — S1-S4 are the waveband switches in two leaf-type assemblies, each in its respective coil unit, operated by a cam roller on the front chassis member. The operating lever, which projects through the front of the cabinet, is raised for MW, when **S1-S4** close, and lowered for LW, when the switches open. The switch leaves are indicated in our under-chassis view, protruding from their units.

S5, S6 are the scale lamp switches in a separate unit, mounted behind the **S1-S4** switch lever and controlled by it. Each lamp lights on one waveband only, except when a pick-up is in circuit, when **S7**, which forms part of the pick-up jack, closes so that the two lamps are connected in parallel and both light. The connecting tags of **S7**, the only tags visible in our under-chassis view, showing the jack, are indicated there.

S8 is the QMB mains switch, ganged with the gain control **R3.**

Coils.—The aerial and RF tuning coils **L2-L5** and **L8-L11** are in two screened units beneath the chassis, each unit containing several associated components. In our under-chassis view, the rectangular screens are indicated, and their contents have been sketched in as they appear when the cans are removed. The coils are each tapped near the centre, four coil sections being connected in series, as shown in the circuit diagram overleaf, in each unit. The tapped LW coil is between the two sections of the MW coil in each case, so that when the LW sections are short-circuited by the switches, the latter act as the tapping point for the MW coils.

In the **L2-L5** former, the LW choke **L1** is wound on a small bobbin mounted at the LW end. On the **L8-11** former are wound also the reaction coils **L6, L7.**

The screens can be removed if the leads emerging from the *rear* ends are freed from their external connections, after first coding them, and the three easily accessible nuts (for each unit) on the chassis deck are removed; the units can then be tilted, so that the two nuts at the rear end of each unit can be reached easily and removed, after which they, and the main body of the casing, can be withdrawn, leaving the coil unit exposed and still attached to the front end-plate. Before lifting the **L6-L9** unit, one lead must be freed from its terminal on the gang.

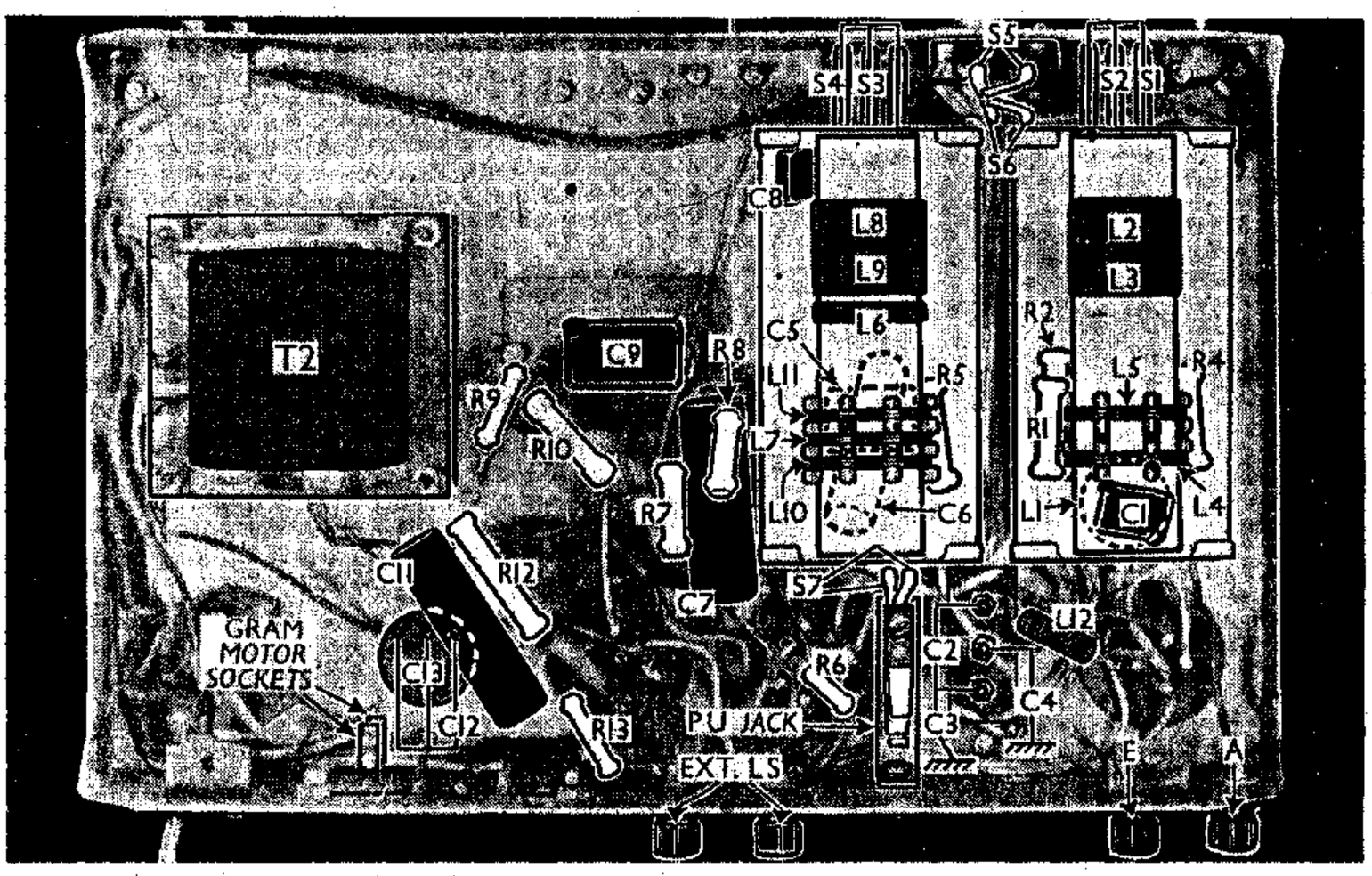
Scale Lamps.—The original types were specified in the makers' information as 2.5 V, 0.2 A, but any MES type lamp with a clear bulb, rated between 2.5 and 5 V, could be used. The lamps are connected across one section of the tapped heater secondary winding on **T2** only.

Gramophone Pick-up.—A switched jack is provided at the rear of the chassis for the connection of a gramophone pick-up. An external volume control is required. When the plug is inserted, **S7**, the switch on the jack, closes, and both scale lamps light.

External Speaker.—Two terminals are provided at the rear of the chassis for a high impedance (about 8,000 Ω) speaker.

Condensers C2, C3, C4.—These are three paper insulated condensers in a single unit mounted on the chassis deck. Three terminals project from its underside into the under-chassis compartment, and their internal connections are indicated in our under-chassis view.

Condensers C12, C13.—These are two dry electrolytics, in a single TCC metal cased unit mounted on the chassis deck, rated at 320 V DC working, 450 V peak. The rubber-covered leads emerge from below, and are indicated in our under-chassis view. The black lead is the common negative, and the two red leads the positives. The capacity associated with each red lead is stamped on the base of the unit near the lead-out holes.



Under-chassis view. The interiors of the two coil units have been sketched into the photograph, as seen when the screens are removed.

CIRCUIT ALIGNMENT

Since there is only a single pre-set trimmer, **C18**, located on the gang assembly, alignment is simply a matter of a single adjustment, preferably near the low wavelength end of the MW band, while the manual trimmer **C15** is set about half-way in and reaction is adjusted to be just short of oscillation. The calibration should be checked at several points on each band, and the pointer suitably adjusted if necessary. Calibration will be satisfactory if adjustment of **C15** corrects any apparent error.

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