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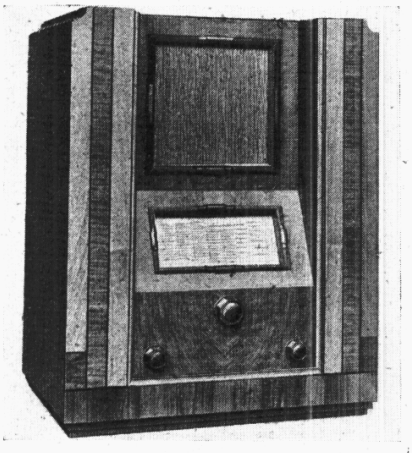
"TRADER" SERVICE SHEET 592

TELSEN 3435 AC SUPERHETS



The Telsen 3435 M/V.

THE Telsen 3435 receiver is a 5-valve (plus rectifier) 2-band superhet, designed to operate from AC mains of 200-250 V, 40-100 C/S.

The triode-pentode frequency changer is preceded by a signal frequency amplifier, in whose anode circuit is a meter-type tuning indicator. Provision is made for using a gramophone pick-up, in the course of which the oscillator triode section of **V2** operates as an AF amplifier, and provision is made for the connection of an external speaker.

The 3435 M/H is fitted in a walnut horizontal cabinet. The 3435 M/V uses a chassis that is identical with the M/H, but the cabinet is of the vertical type, of similar design to the M/H but with the speaker above the chassis instead of beside it.

The same type of chassis is used in the 3435 radiogram and auto-radiogram.

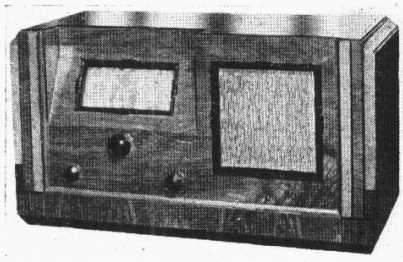
Release date, all models; 1934.

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L1** (MW) and **L2** (LW) to single tuned circuit comprising iron-cored coils **L3** (MW), plus **L4** (LW), and **C27,** which precedes a variable-mu RF pentode valve **(V1, Mazda metallised AC/VP1)** operating as signal frequency amplifier.

Tuned-secondary iron-cored RF transformer coupling by **L5, L7, C29** (MW) and **L6, L8, C29** (LW) between **V1** and triode-pentode valve **(V2, Mazda metallised AC/TP)** which operates as frequency changer with cathode injector coupling.

Triode oscillator anode coils **L11** (MW) and **L12** (LW) are tuned by **C32.** Parallel trimming by **C33** (MW); tracking by specially shaped vanes of **C32** on both wavebands, with additional series tracking by **C31** (LW). **C31** is short-circuited on MW by switch **S7.** Reaction coupling



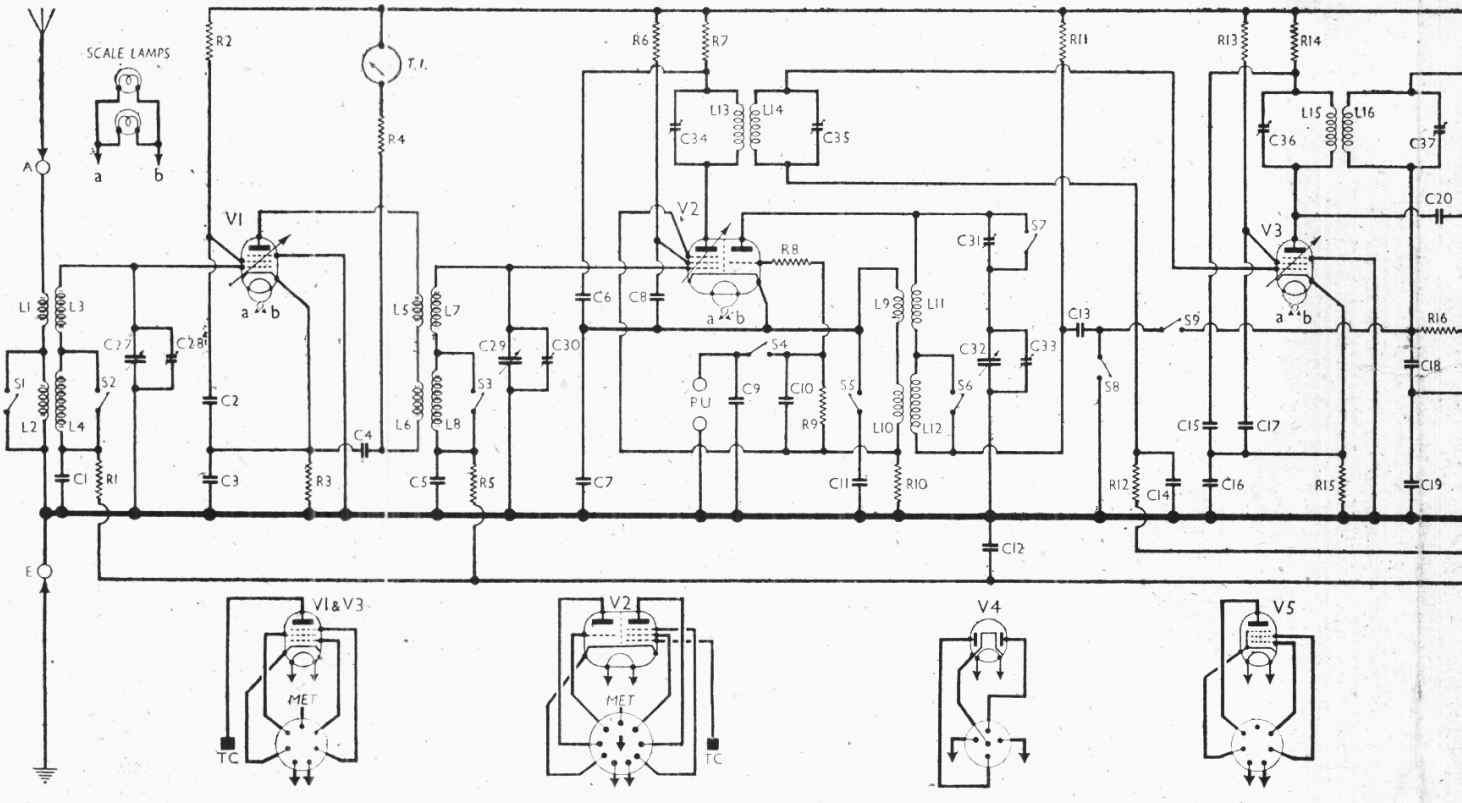
The Telsen 3435 M/H.

by coils **L9** (MW) and **L10** (LW) in cathode circuit, by means of which the oscillator frequency is introduced to the pentode mixer section of the valve. Triode control grid is maintained via stabilising resistance **R8** and resistance **R9** at cathode DC potential and by-passed by **C10. C13** returns the low potential end of **L11, L12** to chassis via **S8,** which is closed on radio.

Third valve **(V3, Mazda metallised AC/VP1)** is a second variable-mu RF pentode, operating this time as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C34, L13, L14, C35** and **C36, L15, L16, C37.**

Intermediate frequency 110 KC/S.

Diode second detector is part of separate double diode valve **(V4, Mullard metal-**



lised 2D4A or **Mazda V914).** Audio-frequency component in rectified output is developed across output limiting resistance **R16** and manual volume control **R20,** which also operate as load resistances, and passed via AF coupling condenser **C21** and IF filter **R22, C22** to control grid of pentode output valve **(V5, Mazda AC/2Pen).**

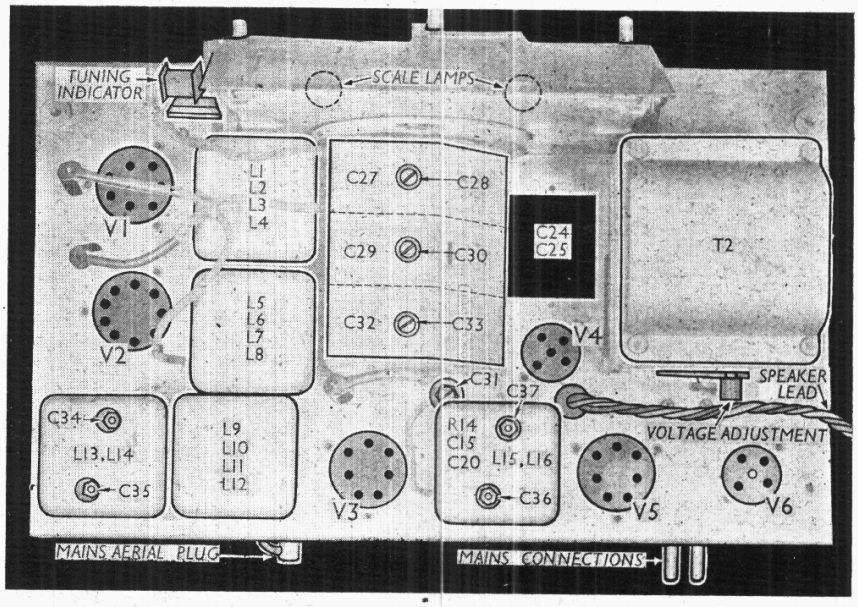
Provision for connection of high impedance external speaker in **V5** anode circuit. Fixed tone correction by **C23,** also in anode circuit but returned to the cathode. **R23,** connected between the anode and its associated circuits, prevents parasitic oscillation.

Second diode of **V4,** fed from **V3** anode via **C20,** provides DC potentials which are developed across load resistances **R17, R18** and **R19** and fed back through decoupling circuits as GB to RF, FC and IF stages, giving automatic volume control. **V4** cathode is joined to **V5** cathode, and delay voltage, together with GB for **V5,** is obtained from the drop along resistances **R24, R25** which form a potential divider in the common cathode lead to chassis.

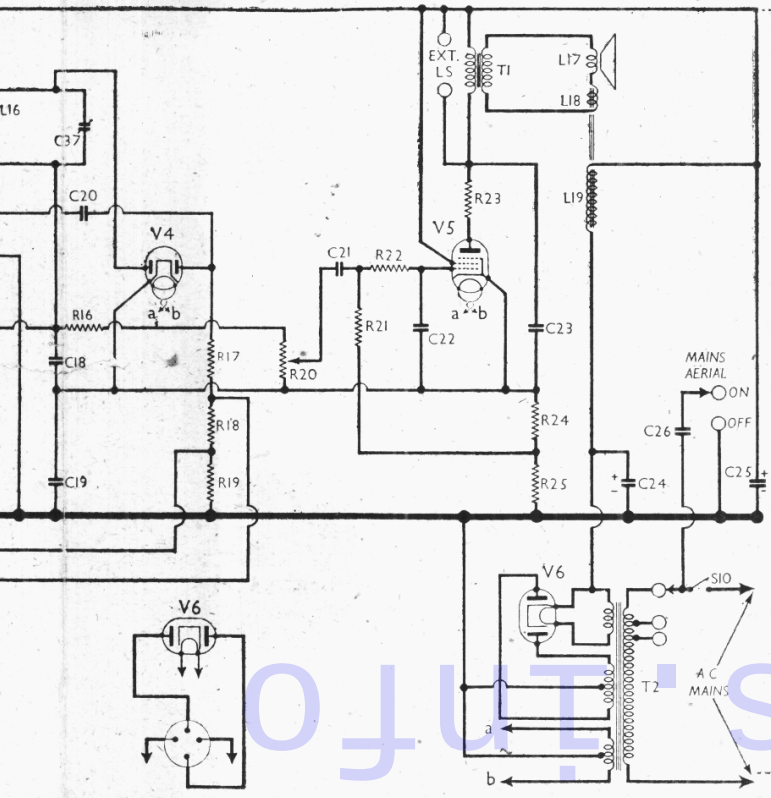
The change of AVC line potential, which varies in sympathy with the strength of the incoming signal, is reflected in the change of anode current in the controlled valves. The change in the anode current of **V1** is used to operate a meter-type tuning indicator **T.I.,** which is connected in its anode circuit.

For gramophone pick-up operation, the triode section of **V2** is converted by switching into an AF amplifier. **S4, S5** and **S9,** which are open on radio, close, while **S8** opens. The pick-up input, which is shunted by **C9,** is fed in via **S4** and **R8** to the control grid. **R11,** which operates on radio as the decoupling resistance, becomes the AF anode load, while **C13,** which was also part of the anode circuit decoupling, becomes the AF coupling condenser, and passes the signal via **S9** to **R16, R20** and so to **V5** control grid. The oscillator is muted by connecting a large condenser **C11** across the reaction coils.

HT current is supplied by IHC full-wave rectifying valve **(V6, Micromesh R3).** Smoothing by speaker field **L19** and dry electrolytic condensers **C24** and **C25.** Provision for mains aerial coupling by a plug on a flying lead via condenser **C26.** When out of use as a mains aerial connection, the plug is inserted in an "off" socket which is connected to chassis, so that **C26** then operates as a mains RF by-pass condenser.



Plan view of the chassis. All the trimmers are accessible from above the chassis, and are indicated here. **R14, C15, C20** are housed in the **L15, L16** unit.



Circuit diagram of the Telsen 3435 superhets. **T.I.** is the tuning indicator, in **V1** anode circuit. **V2** is an AC/TP, with cathode injector coupling as usual. Its cathode line is drawn more heavily than usual to emphasise it. Gramophone pick-up sockets are included in **V2** triode control grid circuit, the triode section then operating as an AF amplifier. **C13** operates as a decoupling condenser on radio, and a coupling condenser on gram.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	V1 CG decoupling ...	0·1
C2	V1 SG decoupling ...	0·1
C3	V1 cathode by-pass ...	0·1
C4	V1 anode decoupling ...	0·1
C5	V2 pent. CG decoupling	0·1
C6	V2 pent. anode decoupling	0·1
C7	V2 cathode by-pass ...	0·00085
C8	V2 SG decoupling ...	0·1
C9	Pick-up shunt	0·003
C10	V2 triode CG condenser...	0·0003
C11	Oscillator muting condenser	0·2§
C12	AVC line decoupling ...	0·0005
C13	V2 triode anode decoupling (radio) : AF coupling (gram)	0·1
C14	V3 CG decoupling ...	0·1
C15	V3 anode decoupling ...	0·1
C16	V3 cathode by-pass ...	0·1
C17	V3 SG decoupling ...	0·1
C18	IF by-pass	0·0002
C19	V4, V5 cathodes by-pass	2·0
C20	Coupling to V4 AVC diode	0·0001
C21	AF coupling to V5 ...	0·005
C22	Part of IF filter... ...	0·0002
C23	Fixed tone corrector ...	0·001
C24* C25*	HT smoothing condensers	8·0 8·0
C26	Mains aerial coupling ...	0·005
C27†	Aerial circuit tuning ...	—
C28‡	Aerial circ. MW trimmer	—
C29†	RF trans. sec. tuning ...	—
C30‡	RF trans. MW trimmer...	—
C31‡	Osc. circ. LW tracker ...	0·001
C32†	Oscillator circuit tuning	—
C33‡	Osc. circ. MW trimmer...	—
C34‡	1st IF trans. pri. tuning	—
C35‡	1st IF trans. sec. tuning	—
C36‡	2nd IF trans. pri. tuning	—
C37‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.
§ Made up of two 0·1 μF condensers connected in parallel.

	RESISTANCES	Values (ohms)
R1	V1 CG decoupling ...	1,000,000
R2	V1 SG HT feed	25,000
R3	V1 fixed GB	300
R4	V1 anode decoupling ...	10,000
R5	V2 pent. CG decoupling...	1,000,000
R6	V2 SG HT feed	25,000
R7	V2 pent. anode decoupling	5,000
R8	V2 triode grid stopper ...	2,000
R9	V2 triode CG resistance ...	50,000
R10	V2 pent. fixed GB ...	500
R11	V2 triode anode HT feed...	50,000
R12	V3 CG decoupling ...	1,000,000
R13	V3 SG decoupling ...	25,000
R14	V3 anode decoupling ...	5,000
R15	V3 fixed GB resistance ...	300
R16	V5 input limiter	100,000
R17	V4 AVC diode load resistances ...	200,000
R18		500,000
R19		1,000,000
R20	Manual volume control; V4 signal diode load ...	500,000
R21	V5 CG resistance ...	800,000
R22	Part of IF filter	200,000
R23	V5 anode stopper ...	150
R24	V5 GB and AVC delay potential divider. ...	150
R25		500

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial coupling coils ...	1·25
L2		1·5
L3	Aerial tuning coils ...	2·5
L4		10·5
L5	RF trans. primary coils	1·25
L6		1·5
L7	RF trans. secondary coils	2·5
L8		10·5
L9	Oscillator circuit cathode	1·25
L10	reaction coils	1·5
L11	Osc. circ. MW tuning ...	6·0
L12	Osc. circ. LW tuning ...	23·0
L13	1st IF trans. Pri. ...	65·0
L14	Sec. ...	65·0
L15	2nd IF trans. Pri. ...	65·0
L16	Sec. ...	65·0
L17	Speaker speech coil ...	1·7
L18	Hum neutralising coil ...	0·2
L19	Speaker field coil ...	1,400·0
T1	Speaker input trans. Pri. ...	660·0
	Sec. ...	0·5
T2	Mains trans. Pri., total ...	25·0
	Heater sec. ...	0·1
	Rect. heat. sec.	0·1
	HT sec., total	320·0
T.I.	Tuning indicator winding	400·0
S1-S3	Waveband switches ...	—
S6, S7		
S4, S5	Radio/gram change-over switches	—
S8, S9		—
S10	Mains switch, ganged R20	—

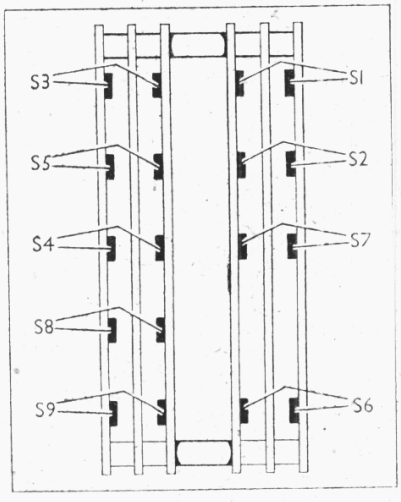


Diagram of connections to **S1-S9** switch unit, viewed from the left rear of the underside of the chassis.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 234 V, using the 240-250 V tapping on the mains transformer.

The receiver was tuned to the lowest wavelength on the MW 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 the negative connection. Values quoted for voltages and currents must be taken to represent conditions in a used receiver, as our model was some years old.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 AC/VP1	160	11·0	181	2·9
V2 AC/TP	228	6·2	178	2·9
	Oscillator			
	102	2·3		
V3 AC/VP1	209	9·5	184	2·7
V4 2D4A	25*	—	—	—
V5 AC/2Pen	230	32·5	257	6·4
V6 R3	335†	—	—	—

† Each anode, AC.
* Cathode to chassis, DC.

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (recessed grub screws) from the front of the cabinet;
remove the four cheese-head bolts (with washers and lock-washers) holding the chassis to the bottom of the cabinet.
Chassis may now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.
To free chassis entirely, unsolder from the speaker assembly the five leads connecting it to chassis.
When replacing, connect the speaker leads as follows:
green (from cable) to right-hand (black) wire of field winding on top of speaker;
red from cable to left-hand (red) field wire;
short separate green lead from red field wire to left-hand tag on rear of speaker transformer bobbin;
white to right-hand tag on speaker transformer;
black (earthing lead) to tag under speaker transformer fixing bolt.

Removing Speaker.—Remove the four nuts (with washers and lock-washers) holding the speaker to the sub-baffle.
When replacing, the transformer should be at the bottom. If the leads have been unsoldered, they should be connected as described above. See also reference under "Chassis Divergencies."

GENERAL NOTES

Switches.—**S1, S2, S3, S6** and **S7** are the waveband switches, and **S4, S5, S8** and **S9** the radio-gramophone change-over switches, ganged in a leaf-type unit beneath the chassis. The unit is indicated in our under-chassis view, and its connecting tags are shown in detail in the diagram in col. 1, where they are drawn as seen when viewed from the centre of the rear of the underside of the chassis. The switch positions for the three control settings are given in the table (col. 3), starting from the fully anti-clockwise position of the control. A dash indicates open, and **C**, closed.

S10 is the QMB mains switch, ganged with the volume control **R20.**

Coils.—The aerial coils **L1-L4**; the RF transformer **L5-L8**; and the oscillator circuit coils **L9-L12** are in three screened units running from front to rear across the chassis deck. The aerial and RF transformer units are iron-cored. The IF transformers **L13 L14,** and **L15, L16** are in two further screened units, at the rear of the chassis deck, with their associated trimmers. In all five units, the screens are a sliding fit and can be withdrawn. In the **L15, L16** unit are also components **R14, C15** and **C20** housed.

Scale Lamps.—These are two MES type lamps, with large spherical bulbs, rated at 6.2 V, 0.3 A. They are mounted in holders on a U-shaped bracket which is fitted beneath the chassis, the lamps projecting through holes in the chassis deck. The bracket is mounted on a stand which is attached inside the front chassis member and extends to the bottom of the member.

To remove the lamps, it is only necessary to remove the fixing screw at the bottom of the stand, when the bracket stem, which runs in a pair of slides, can be withdrawn downwards, together with the lamps. A hole in the bottom of the cabinet permits removal of the lamps without first removing the chassis from the cabinet.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a high impedance (about 7,000 Ω) external speaker.

Mains Aerial.—A plug on a flying lead emerges from a hole on aerial socket panel at the rear of the chassis for mains aerial coupling. Two sockets are provided at the bottom of the panel, marked "On" and "Off." The "Off" socket is connected to chassis, so that the coupling condenser **C26** acts as a mains RF bypass when the mains aerial is not used. Replacements for **C26** should be of high voltage rating, at least 1,000 V.

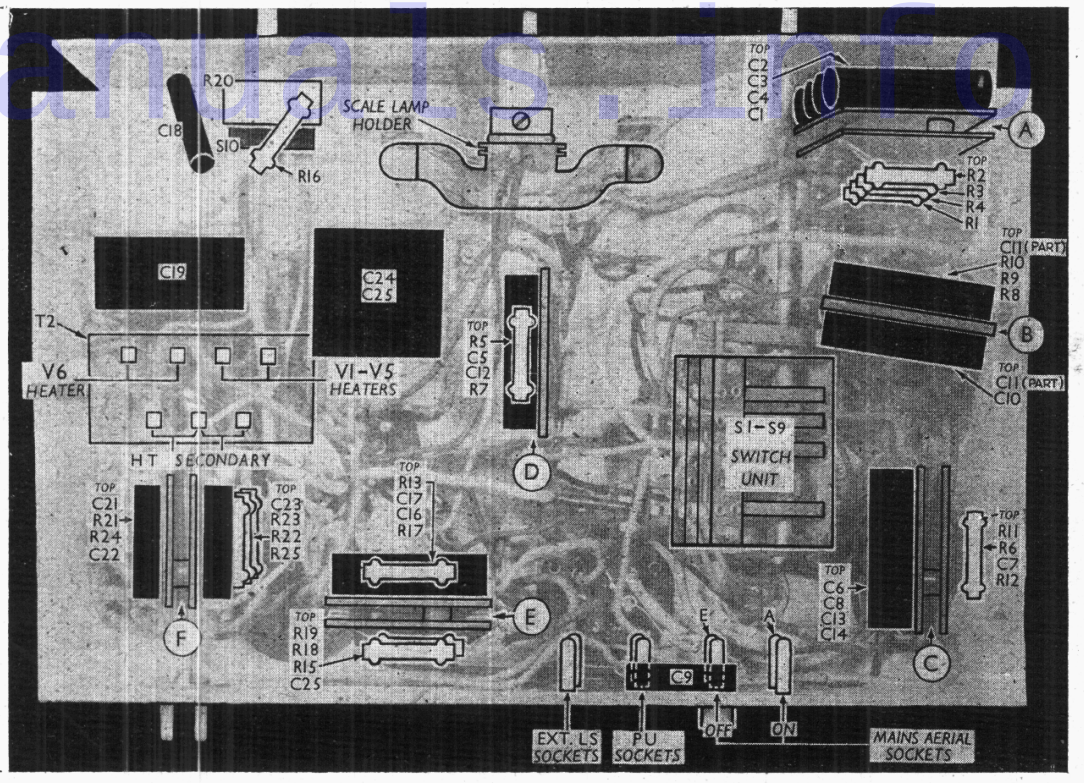
Condensers C24, C25.—These are two 8 μF electrolytics in a single container, vertically mounted by a clip on the chassis deck but protruding through a hole into the under-chassis compartment. They are rated at 500 V.

Switch Table

Switch	Gram	LW	MW
S1	C	—	C
S2	—	—	C
S3	C	—	C
S4	C	—	—
S5	C	—	—
S6	—	—	C
S7	—	—	C
S8	—	C	C
S9	C	—	—

Mains Transformer Connections.—**T2** is mounted on the chassis deck, but its connecting panel projects through a hole into the under-chassis compartment. On it are seven connecting tags, which are indicated and identified in our under-chassis view.

Component Assemblies.—Most of the small components such as resistances and condensers are mounted on six vertical



Under - chassis view. Most of the components are mounted in six vertical assemblies. The positions of the individual components are indicated approximately here, but they are shown more clearly in the sketch below, where they are viewed in the directions of the arrows in this chassis view. The assemblies are identified here by letters in circles, the letters being repeated in the sketch below. A diagram of the **S1-S9** switch unit appears in col. 1 opposite.

panels beneath the chassis. The panels, five of which are double-sided, are indicated in our under-chassis view, where the components on each side are indicated respectively. Since there may be some uncertainty as to which is the required component on a given assembly, they are shown in detail in the sketches in cols. 5 and 6, as seen when viewed from their ends. A letter and an arrow in the under-chassis view identify the assembly and indicate from which end it is viewed in the sketch. Actually, each unit is viewed from the right or rear in our under-chassis view.

Chassis Divergencies.—In some chassis, **L15** may be connected directly to the HT positive line, **R14, C15** being omitted.

Also, in our sample, the speaker had no makers' label, and the transformer had a single-loop core; that is, with only a single opening in the core for the winding bobbin which was wound round one limb of the core and formed a projection below it. In other samples, a Celestion speaker may be fitted, with a transformer of the normal type having a closed "H"-shaped core, with the bobbin on the centre limb.

Where this type of speaker is found, the connections to the speaker, which in our dismantling instructions apply to the speaker in our sample, are different. There are only three connections, which are as follows, numbering the tags from left to right as seen from the rear: 1, grey lead, with red and yellow tracers, from rectifier heater to speaker field; 2, yellow lead, from **V5** anode (via **R23**); 3 and 4 (joined together), red lead, from HT positive line to speaker transformer and field winding. In both speakers the transformer is fitted *beneath* the speaker.

CIRCUIT ALIGNMENT

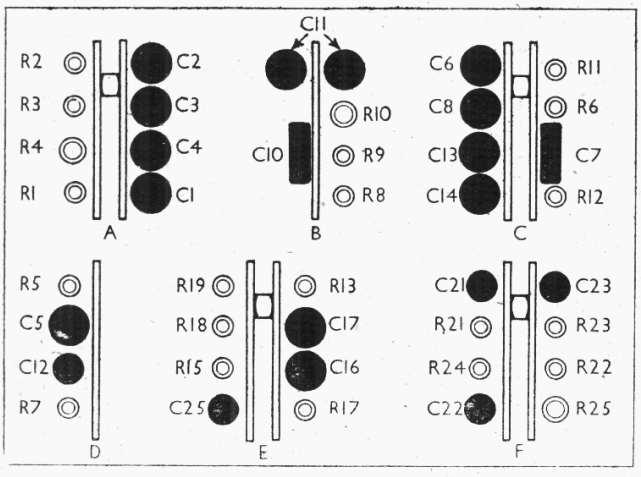
IF Stages.—Connect a 0.25 μF condenser between **V2** oscillator anode and chassis to mute the oscillator. Connect signal generator leads via a 0.0002 μF condenser to **V2** pentode control grid (top cap), and connect a 250,000 Ω resistance between the cap and chassis. Feed in a 110 KC/S (2,728 m) signal, and adjust **C37, C36, C35** and **C34** for maximum output. Repeat these adjustments, then remove the 0.25 μF and 0.0002 μF condensers and the resistance.

RF and Oscillator Stages.—With the gang at maximum, the short vertical line on the cursor should be level with the left-hand edge of the tuning indicator aperture. If it is not, it can be adjusted if the solder holding the carrier claw to the drive wire is softened with a soldering iron. Connect signal generator leads via a suitable dummy aerial (the 0.0002 μF condenser could be used) to **A** and **E** sockets.

MW.—Switch set to MW, tune to 200 m on scale, feed in a 200 m (1,500 KC/S) signal, and adjust **C33,** then **C30** and **C28** for maximum output. Check calibration at 500 m (600 KC/S), and readjust trimmers if necessary, returning to 200 m to recheck. There is no variable tracking for the MW band.

LW.—Switch set to LW, tune to 950 m on scale, feed in a 950 m (316 KC/S) signal, and adjust **C31** approximately for maximum output. Feed in a 2,000 m (150 KC/S) signal, tune it in, and readjust **C31** for maximum output while rocking the gang.

Sketch showing the end-on views of the six assemblies lettered A to F in the under chassis view above, where arrows indicate the directions in which the assemblies are viewed in this sketch.



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