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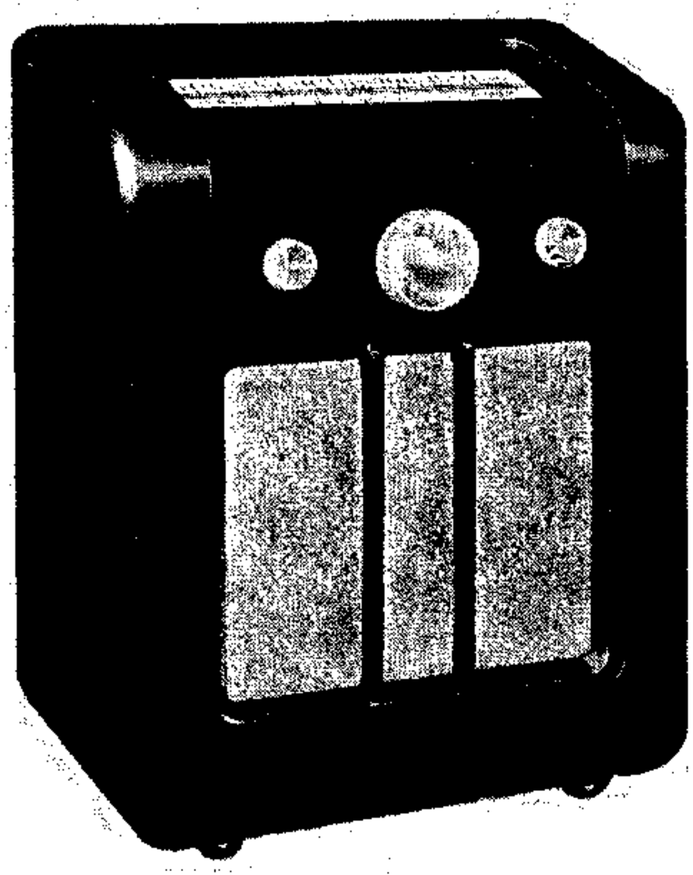
EKCO AC77
AND CT77 CONSOLE



The appearance of the Ekco AC77 in black and ivory finish.

SUITABLE for AC mains of 200-250V, 40-80 c/s, the Ekco AC77 is a 4-valve (plus rectifier) superhet in a moulded table-type cabinet, available in two finishes. The assembly comprises the main chassis, a separate power pack and the speaker assembly. There is provision for the connection of a gramophone pick-up and an external speaker, while a screw-type switch permits the internal speaker to be muted.

The CT77 is a console receiver employing an identical assembly. This *Service Sheet* covers both models, but it was prepared from the table version.

Release date and original prices: July, 1936 (*both models*); *AC77, walnut finish*, £10 10*s.*; *black and ivory finish*, £10 17*s.* 6*d.*; *CT77*, £13 13*s.*

CIRCUIT DESCRIPTION

Aerial input is via coupling condenser **C1** to tap on tuning coil (MW), or via coupling coil **L1** (LW) to inductively coupled band-pass filter. Primary coils **L2** (MW) and **L3** (LW) are tuned by **C21**; secondaries **L4, L5** by **C23.** Coupling by mutual inductance of primary and secondary windings. Image suppression by pre-set condenser **C20.**

First valve **(V1, Mullard metallised FC4)** is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L6** (MW) and **L7** (LW) are tuned by **C26.** Parallel trimming by **C25;** tracking by specially shaped vanes of **C26,** with series tracking condensers **C5, C27** on LW. Reaction coupling from anode by coils **L8** (MW) and **L9** (LW).

Second valve **(V2, Mullard metallised VP4B)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C28, L10, L11, C29** and **C30, L12, L13, C31.**

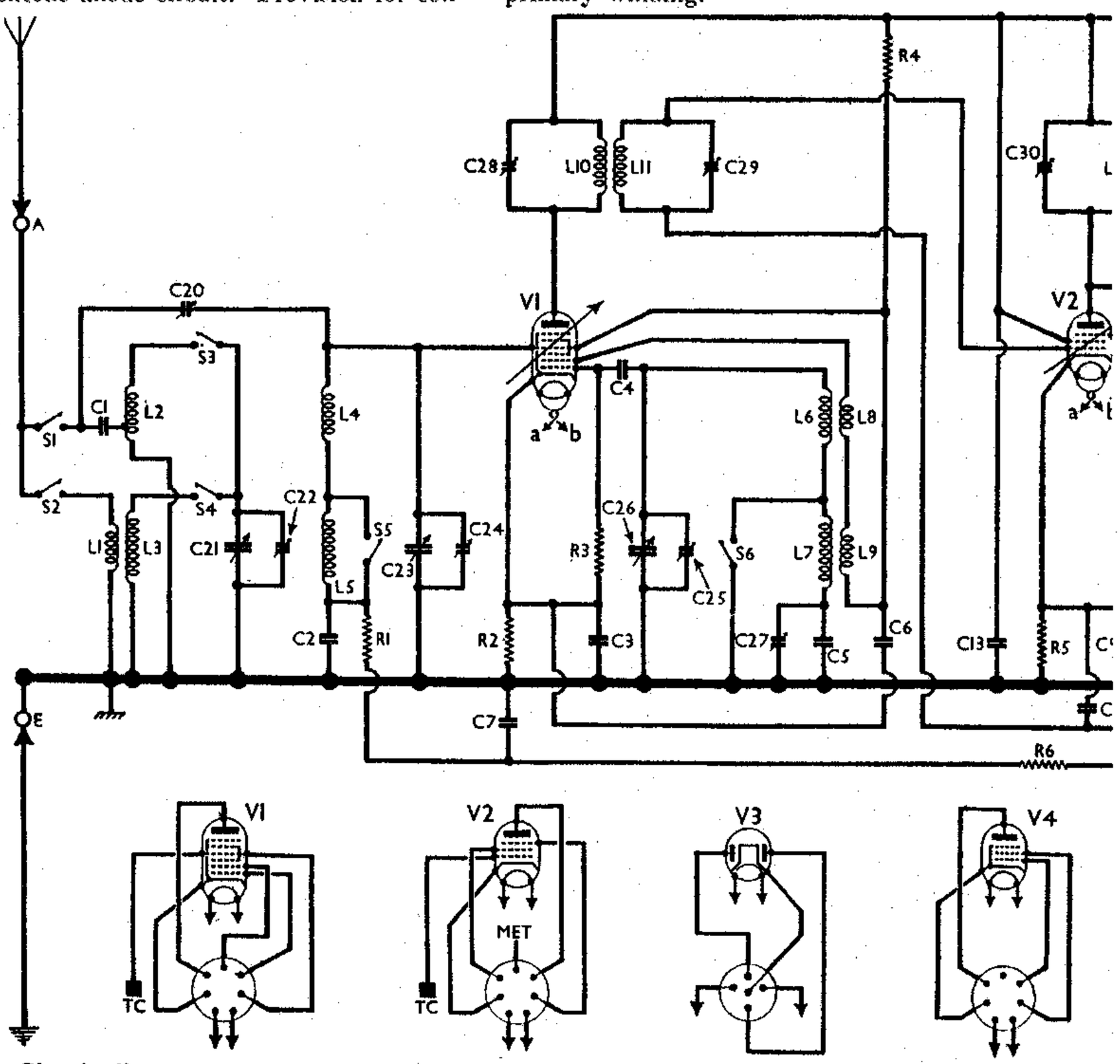
Intermediate frequency 126.5 kc/s.

Diode second detector is part of double diode valve **(V3, Mullard metallised 2D4A).** Audio frequency component in rectified output is developed across load resistor **R7** and passed via AF coupling condenser **C12** and manual volume control **R11** to control grid of pentode output valve **(V4, Mullard PenA4).** IF filtering by **C10, C11** and IF choke **L14** in diode circuit, and grid stopper **R13** in **V4** CG circuit. Provision for connection of gramophone pick-up by sockets across **C12, R11.**

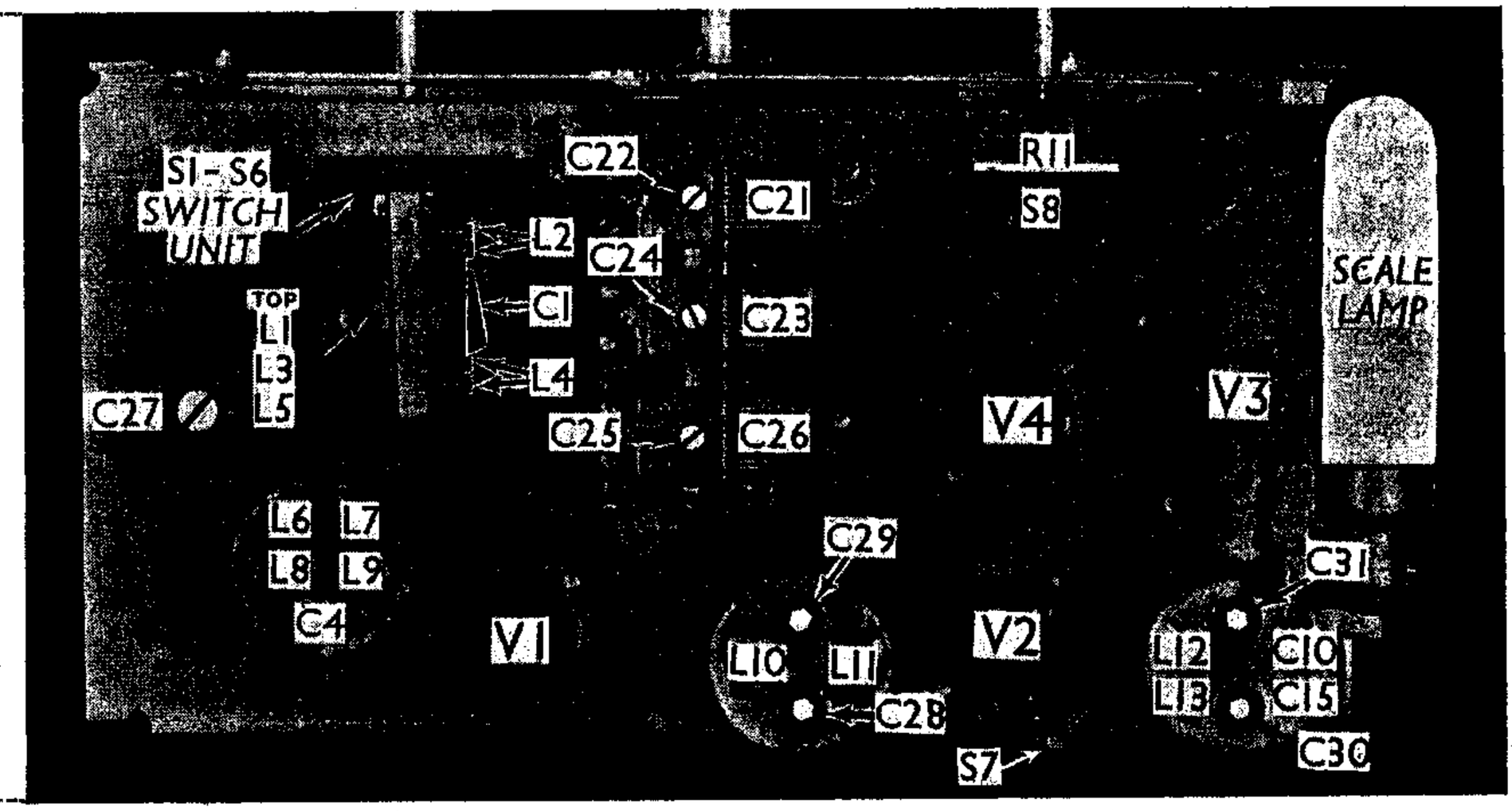
Variable tone control by **R12, C16** in pentode anode circuit. Provision for connection of low-impedance external speaker by sockets across secondary winding of output transformer **T1,** while switch **S7** permits internal speaker to be muted if desired.

Second diode of **V3,** fed from **V2** anode via **C15,** provides DC potentials which are developed across load resistors **R9, R10** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control. Delay voltage, together with GB for **V4,** is obtained from drop along resistors **R14, R15** which form a potential divider in the common lead from the cathodes of **V3** and **V4** down to chassis.

HT current is supplied by IHC full-wave rectifying valve **(V5, Mullard IW3** or **IW4/350).** Smoothing by speaker field **L17** and resistor **R8** in conjunction with electrolytic condensers **C14, C18, C19.** Scale lamp, which is of the high-voltage type, is connected across the 200-210V section of the mains transformer **T2** primary winding.



Circuit diagram of the Ekco AC77 AC superhet and the console model CT77. The separat by connections numbered 1 to 10. These numbers are repeated in our illustration of the u section of the mains transf



Plan view of the chassis. The metal plate beneath the scale pointer, one end of which forms a clip for the scale lamp, has been removed, but the scale lamp is shown roughly in position. The cover over the band-pass coil and switch unit has also been removed to show the positions of the components inside it.

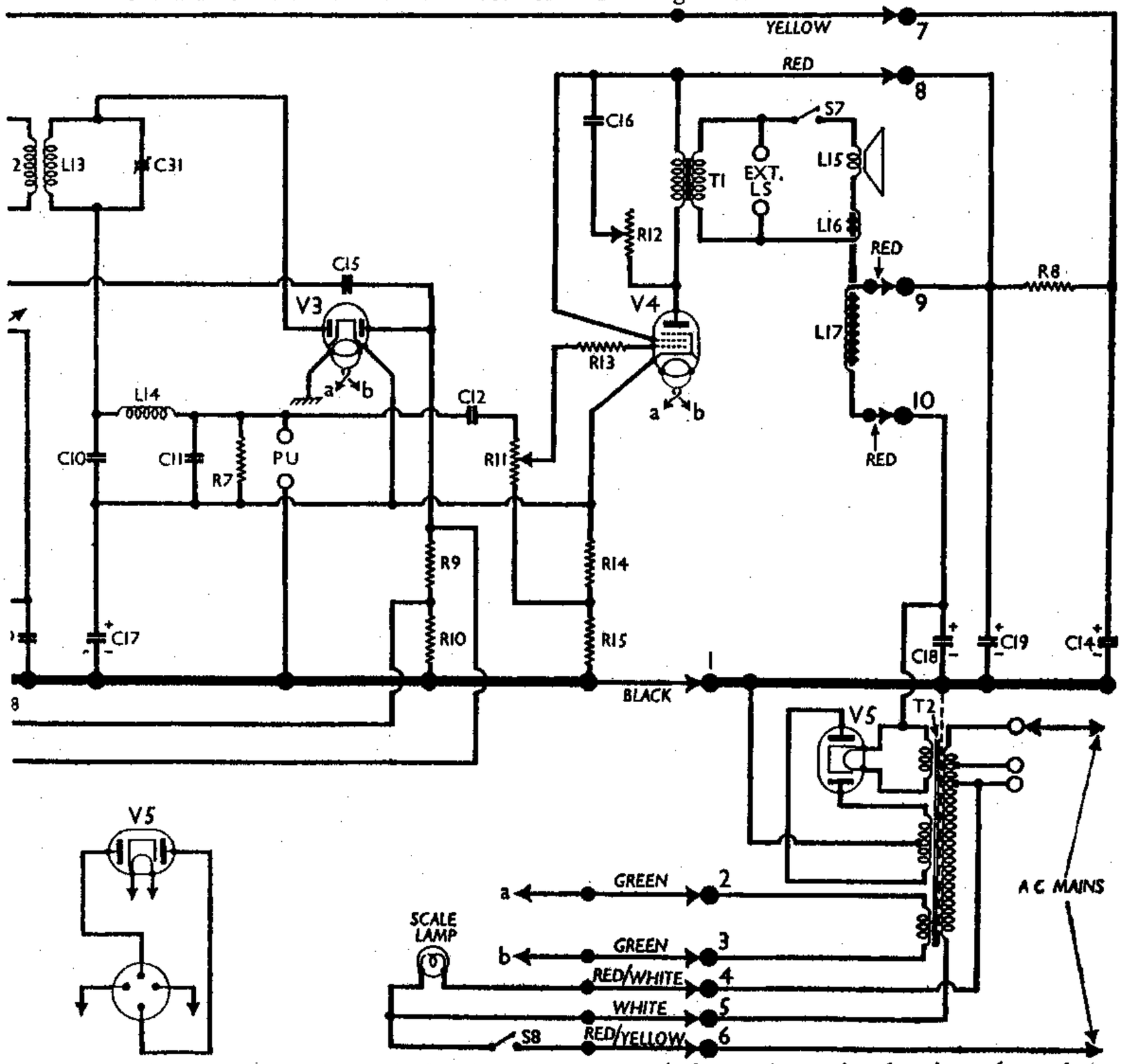
VALVE ANALYSIS

Valve voltages and currents given in the table (col. 6) are those measured in our receiver when it was operating on mains of 220 V, using the 220-230 V tapping on the mains transformer. 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 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 FC4	235 / Oscillator / 90	1·4 / 2·2	90	4·1
V2 YP4B	235	8·8	235	3·3
V3 2D4A	—	—	—	—
V4 PenA4	240	36·0	256	4·6
V5 IW4/350	295†	—	—	—

† Each anode, AC.



power unit is seen at the right-hand end, separated from the main chassis and speaker it overleaf. The scale lamp is of the high voltage type, and is connected across the 200 V ormer primary winding.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial MW coupling ...	0·0008
C2	V1 pent. CG decoupling	0·1
C3	V1 cathode by-pass ...	0·1
C4	V1 osc. CG condenser ...	0·0001
C5	Osc. LW tracker ...	0·0008
C6	V1 HT decoupling ...	0·1
C7	AVC line decoupling ...	0·01
C8	V2 CG decoupling ...	0·05
C9	V2 cathode by-pass ...	0·1
C10	IF by-pass condensers ...	0·0002
C11		0·0002
C12	AF coupling to V4 ...	0·01
C13	HT circuit RF by-pass ...	0·1
C14*	HT smoothing condenser	6·0
C15	Coupling to V3 AVC diode	0·000015
C16	Part of TC filter ...	0·02
C17*	V4 cathode by-pass ...	50·0
C18*	HT smoothing condensers	8·0
C19*		8·0
C20‡	Image rejector tuning ...	—
C21†	Band-pass pri. tuning ...	—
C22‡	Band-pass pri. trimmer ...	—
C23†	Band-pass sec. tuning ...	—
C24‡	Band-pass sec. trimmer ...	—
C25‡	Osc. circuit MW trimmer	—
C26‡	Oscillator circuit tuning	—
C27‡	Osc. LW tracker	—
C28‡	1st IF trans. pri. tuning	—
C29‡	1st IF trans. sec. tuning	—
C30‡	2nd IF trans. pri. tuning	—
C31‡	2nd IF trans. sec. tuning...	—

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)
R1	V1 pent. CG decoupling	100,000
R2	V1 fixed GB resistor ...	250
R3	V1 osc. CG resistor ...	100,000
R4	V1 HT feed	25,000
R5	V2 fixed GB resistor ...	300
R6	AVC line decoupling ...	1,000,000

(*Continued overleaf*)

	RESISTORS (*Continued*)	Values (ohms)
R7	V3 signal diode load ...	500,000
R8	Part HT smoothing ...	1,500
R9	V3 AVC diode load resistors	500,000
R10		500,000
R11	Manual volume control	850,000
R12	Variable tone control ...	60,000
R13	V4 grid stopper	100,000
R14	V4 GB and AVC delay resistances	140
R15		300

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial LW coupling coil	30·0
L2	B-P MW pri. coil	3·5
L3	B-P LW pri. coil	30·0
L4	Band-pass secondary coils	3·5
L5		30·0
L6	Oscillator tuning coils ...	5·0
L7		10·0
L8	Oscillator reaction coils,	5·0
L9		
L10	1st IF trans. Pri. ...	90·0
L11	Sec. ...	90·0
L12	2nd IF trans. Pri. ...	90·0
L13	Sec. ...	90·0
L14	IF filter choke	260·0
L15	Speaker speech coil ...	1·6
L16	Hum neutralising coil ...	0·1
L17	Speaker field coil ...	2,000·0
T1	Output trans. Pri.	650·0
	Sec.	0·2
T2	Mains trans. Pri. total ...	35·0
	Heater sec. ...	0·1
	Rect. heat. sec.	0·15
	H.T. sec., total	600·0
S1-S6	Waveband switches ...	—
S7	Internal speaker switch	—
S8	Mains switch, ganged R11	—

DISMANTLING THE SET

Removing Chassis.—Remove the three knobs on the front and the tone control knob at the side of the cabinet (recessed grub screws);

remove the two screws (with lock washers) holding the front of the chassis to the cabinet, and the two screws (with lock washers and washers) holding the back of the chassis to the cabinet.

The chassis can now be withdrawn to the extent of the leads connected to the speaker silencing device, which in most cases is sufficient for normal purposes. In some early chassis these leads are short and will have to be unsoldered from the silencing device, and as the chassis must not be operated with these leads disconnected, they will have to be extended. The black lead should be taken to the pick-up socket connected to pin 1 of **V2** and the blue lead should be taken to the tag in contact with the screw of the silencing device. The chassis may now be withdrawn to the extent of the leads to the power pack.

If it is desired to free the chassis from the speaker and power pack, unsolder the leads to the speaker silencing device and unsolder the connecting strip from the power pack.

The work of unsoldering the tags on the strips connecting together the power pack and chassis can be considerably simplified with the aid of a strip of aluminium about 8 by ¼in. As each pair of tags is unsoldered the strip may be inserted between them, thus preventing them from adhering again as the solder cools.

Removing Power Pack.—Unsolder the connecting leads and then remove the screw (with lock washer) holding the supporting bracket to the speaker;

remove the four screws (with washers) holding the pack to the bottom of the cabinet.

When replacing, note that the two red leads from the speaker go direct to tags 9 and 10 (numbered from the left) on the power pack connecting strip.

Removing Speaker.—Remove the chassis and power pack as previously described;

unsolder from the connecting panel on the speaker the leads connecting it to the receiver;

remove the four self-tapping bolts (with washers) holding the sub-baffle to the front of the cabinet. If it can be avoided, do not remove the speaker from the sub-baffle, as the bolt heads are free and are covered by the silk aperture cover, and it will be necessary to pierce the silk to reach the heads when refixing. This would render the replacement of the silk necessary, as the holes would be visible from the front of the cabinet.

When replacing, do not omit to replace the two cardboard washers on the two top bolts, between the cabinet and sub-baffle;

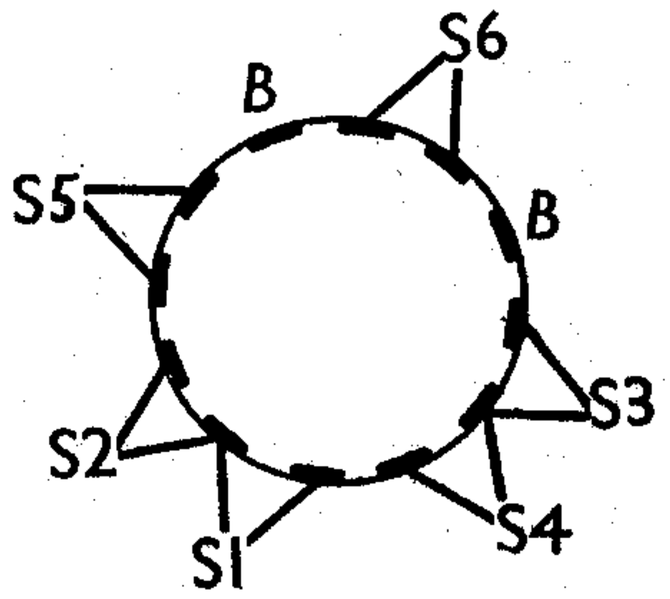


Diagram of the waveband switch unit, viewed in the direction of the arrow in the plan view.

connect the leads as follows, numbering the tags from left to right: 1, red; 2, black; 3, blue; 4, blank; 5, red.

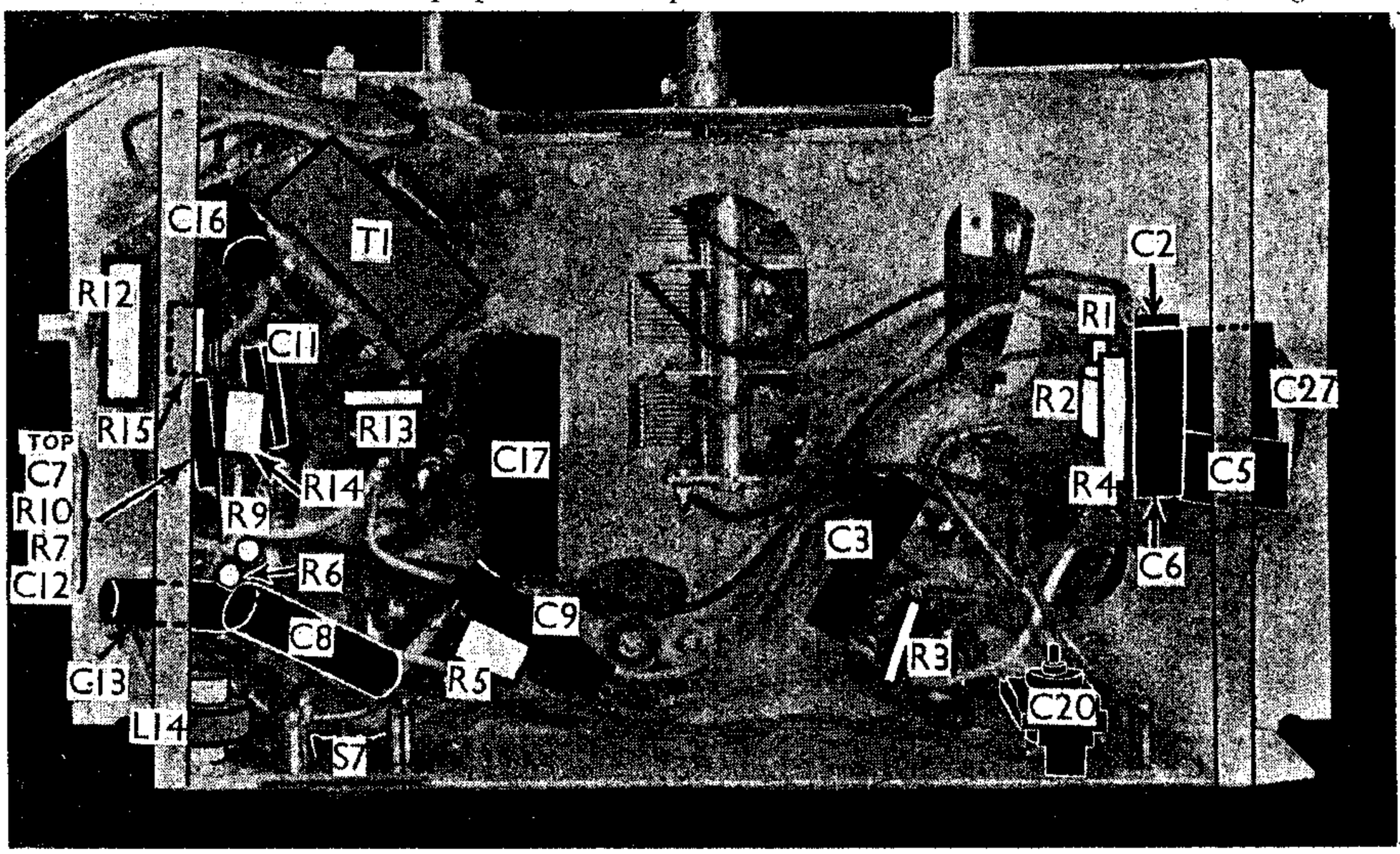
If it is necessary to remove the speaker from the sub-baffle, remove the nuts, lock nuts and washers from the four screws holding it in place.

When replacing, see that the terminal panel is at the bottom.

GENERAL NOTES

Construction.—The complete receiver comprises three units: the main chassis, the speaker assembly and the power unit. Connections between the chassis and the power unit are effected via a row of tags on the power unit, numbered 1 to 10, and a row of tags numbered 1 to 8, attached to the chassis by flexible leads. Connections from the speaker are taken to chassis and the power unit.

The tag numbers are shown in the circuit diagram overleaf, where the division



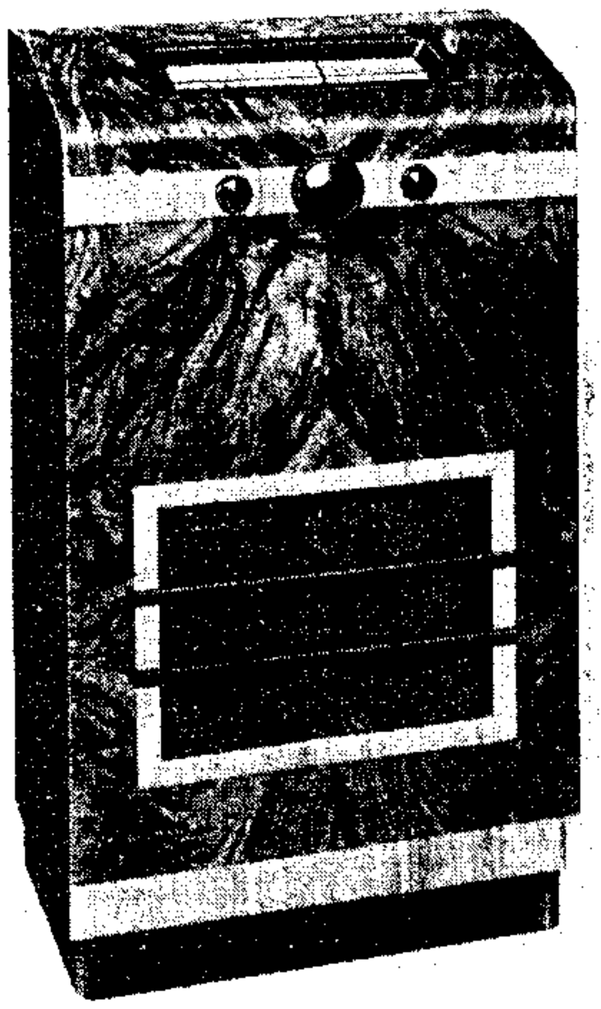
Under-chassis view. Most of the components are grouped near the ends of the chassis. **S7** is a screw-type switch for muting the internal speaker. The waveband switch unit is in the coil assembly on the chassis deck.

between the main chassis and the power unit is obvious from the positions of the two rows of arrowheads and large circular dots, which indicate the connecting tags. They could have been arranged in a single straight line, but that would have absorbed unnecessary space, and in any case the numbers would not have followed the correct sequence throughout. The colour coding of the leads is also shown in the diagram, but it is repeated under "Power Unit Construction." The connections to the speaker are described under "Dismantling the Set."

Switches.—S1-S6 are the waveband switches, in a single rotary unit indicated in the plan chassis view. The arrow shows the direction in which the unit is viewed, from above the chassis, in the diagram in col. 3. Actually, the switch unit is inside the screening cover over the coil unit **L1-L5,** but the cover has been removed in our chassis illustration.

The table below gives the switch positions for the two control settings, the anti-clockwise setting being LW and the clockwise MW. A dash indicates open, and **C,** closed.

SWITCH	LW	MW
S1	—	C
S2	C	—
S3	—	C
S4	C	—
S5	—	C
S6	—	C



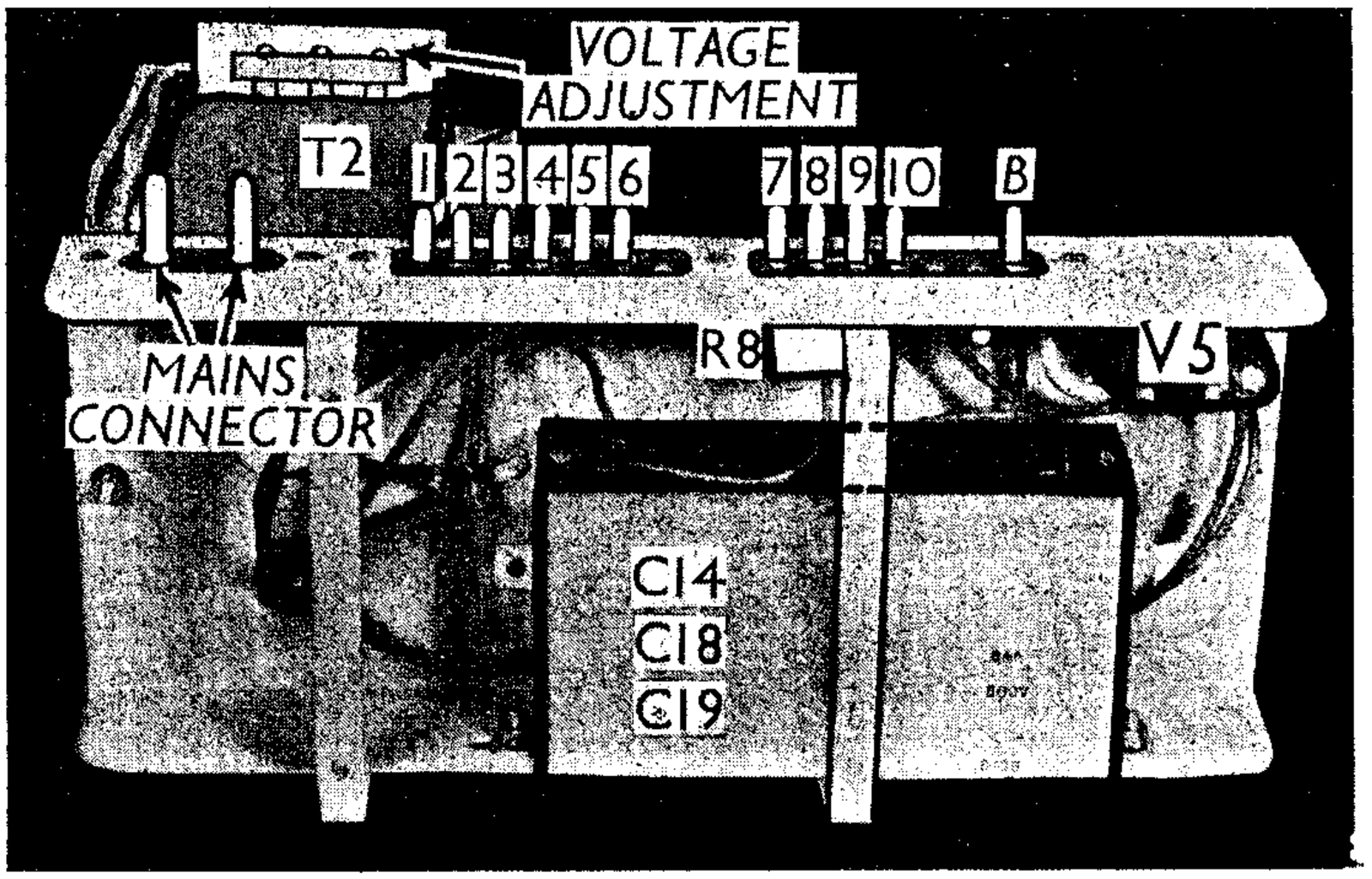
The console version, CT77.

S7 is the internal speaker switch, opened by unscrewing the small knob beneath the EXT.LS sockets.

S8 is the QMB mains switch, ganged with the volume control **R11.**

Coils.—L1-L5 are inside the horizontally mounted unit containing also the switch unit. Its cover has been removed in our plan chassis view. This unit also contains **C1. L6-L9** is in a screened unit on the chassis deck, containing also **C4.**

Scale Lamp.—This is a special Ensign tubular type, with a centre contact SB



Underside view of the power unit, containing **T2, V5, R8** and the electrolytic condenser block. The connecting tags are numbered to agree with those in the circuit diagram overleaf.

cap. It is rated at 200V, 12W, and is so connected across the primary of **T2** that it always receives the correct voltage when the voltage adjustment of the receiver is correct for the mains in use.

Condensers C14, C18, C19.—These are three dry electrolytics in a metal case underneath the power supply unit. The black lead is the common negative, the green the positive of **C14** (6 μF), the red lead to the **V5** valveholder the positive of **C18** (8 μF), and the red lead to the eighth connection tag of the unit the positive of **C19** (8 μF).

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (about 3 O) external speaker. The internal speaker may be silenced by unscrewing **S7.**

Power Unit Connections.—There are ten tags for the connections from the power unit, which correspond with ten tags on the paxolin strip at the end of the power unit cable from the main chassis. These are soldered tag to tag when connecting the power unit to the chassis. Note that there is a blank tag on the power unit, and a corresponding one on the cable terminal strip, which are soldered together to form an additional support for the strip.

The ten tags are numbered on our illustration of the power unit, and the coding of the wires to the corresponding tags on the cable terminal strip is as follows: 1, black; 2, green; 3, green; 4, red/white; 5, white (may be red/black in some chassis); 6, red/yellow; 7, yellow; 8, red. Tags 9 and 10 take the two red leads from the speaker. This colour coding will be useful in the event of the leads from the chassis being accidentally disconnected from the tags on the paxolin strip. Note that tags 8 and 9 on the power unit are interconnected.

CIRCUIT ALIGNMENT

IF Stages.—Connect a 0-15 mA meter between the bottom of **R5** and chassis to act as an indicator. Connect signal generator between grid (top cap) of **V1** and chassis. Feed in a 126.5 kc/s signal, and adjust **C28, C29** and **C30** for *minimum* deflection on meter.

Then adjust **C31** for *maximum* meter deflection.

RF and Oscillator Stages.—Check that when disc drive is fully clockwise, gang condenser is at maximum. If not, the necessary adjustment can be carried out by loosening the two grub screws in the drive boss. With the gang condenser at maximum, check that pointer slider is 1/32 in. from the limit to its travel on the right. To adjust, loosen small clip holding slider to the cord.

Detach reflector plate beneath pointer and remove. Connect a 0-15 mA meter between the bottom of **R5** and chassis. Transfer signal generator leads to **A** and **E** sockets via a suitable dummy aerial.

MW.—Switch set to MW, and turn the gang to minimum. Feed in a 194.5 m (1,540 kc/s) signal, fully unscrew **C25,** then screw up slowly until *minimum* deflection on milliammeter is registered.

Feed in a 250 m (1,200 kc/s) signal, tune it in to obtain *minimum* meter deflection, then adjust **C24** and **C22** in turn for *minimum* deflection.

LW.—Switch set to LW, and feed in a 1,500 m (200 kc/s) signal. Check that minimum deflection is obtained when scale pointer is exactly 3 in. from right-hand slider stop. If not, adjust **C27** until it is.

Image Rejector.—This should be adjuster on the most powerful MW station, usually the local Regional. Look up the frequency of this station and subtract from it 253 kc/s (twice the intermediate frequency). The result is the frequency on which second channel interference may be caused. Tune to the station operating on or near this frequency, and adjust **C20** (rear of chassis), by means of a non-metallic screwdriver, until the interference whistle is at zero or minimum intensity.

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