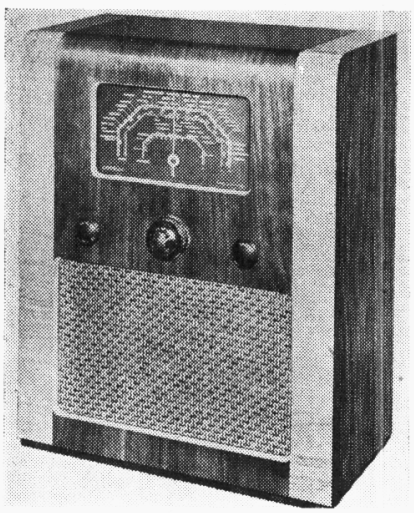
Supplement to The Wireless & Electrical Trader, Sept. 2, 1939

"TRADER" SERVICE SHEET

425

COSSOR 71

AC 3-BAND SUPERHET



THE Cossor model 71 receiver is a 4-valve (plus rectifier) 3-band AC superhet. The chassis is divided into two units: the main receiver chassis, and the power and output chassis.

There is provision for both a gramophone pick-up and a high impedance external speaker; a rejector circuit in series with the aerial lead is tuned to the intermediate frequency; and variable tone control is provided.

The short-wave range is 16-52 metres, and the receiver is suitable for mains of 200-250 V, 40-100 C/S.

Release date: December, 1938.

CIRCUIT DESCRIPTION

Aerial input is via intermediate frequency rejector circuit **L1, C2,** aerial series condenser **C1** and coupling coils **L2** (SW), **L3** (MW) and **L4** (LW) to single tuned circuits **L5, C33** (SW), **L6, C33** (MW) and **L7, C33** (LW). IF rejector tuning is effected by adjusting the variable iron core of **L1.**

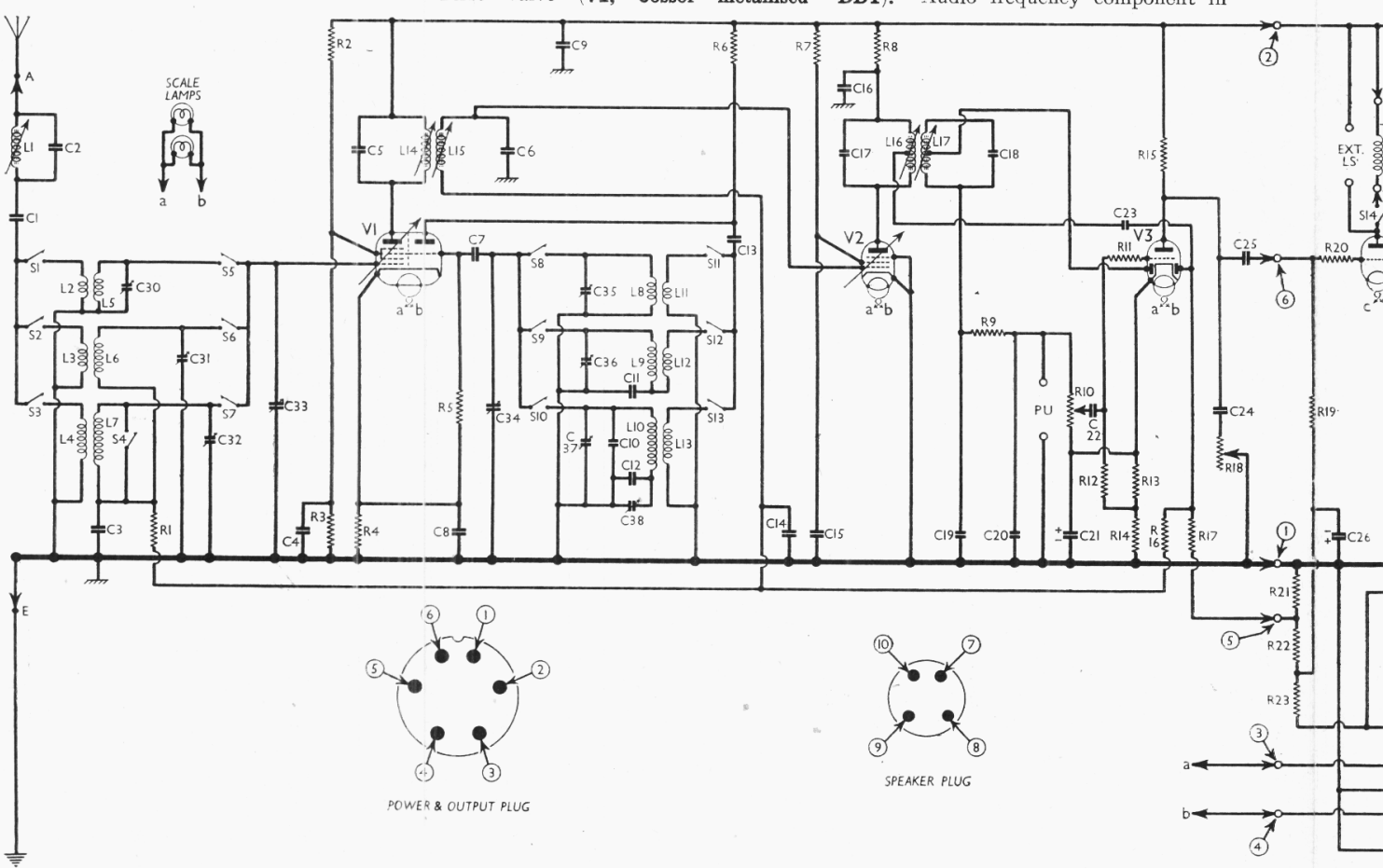
First valve (**V1, Cossor metallised 41STH**) is a triode hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L8** (SW), **L9** (MW) and **L10** (LW) are tuned by **C34;** parallel trimming by **C35** (SW), **C36** (MW) and **C10, C37** (LW); series tracking by **C11** (MW) and **C12, C38** (LW). There is no tracking condenser on the SW band.

Reaction is applied from anode via coupling condenser **C13** and coils **L11** (SW), **L12** (MW) and **L13** (LW).

Second valve (**V2, Cossor metallised MVSPenB**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary iron cored transformer couplings **C5, L14, L15, C6** and **C17, L16, L17, C18.** The tuning condensers are fixed, and alignment adjustments are effected by varying the positions of the iron cores.

Intermediate frequency 465 KC/S.

Diode second detector is part of double-diode triode valve (**V3, Cossor metallised DDT**). Audio frequency component in



rectified output is developed across manual volume control **R10,** which also operates as load resistance, and passed via AF coupling condenser **C22,** CG resistance **R12** and grid stopper **R11** to CG of triode section, which operates as AF amplifier.

IF filtering by **C19, R9** and **C20.** Provision for connection of gramophone pick-up by sockets across **R10, C21.** Variable tone control by **C24** and **R18,** which are connected in series between **V3** triode anode and chassis.

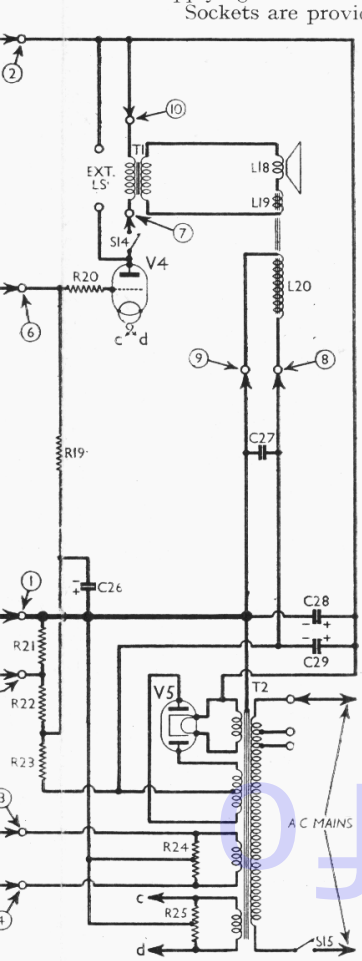
Second diode of **V3,** fed from tapping on **L16** via **C23,** provides DC potential which is developed across load resistance **R17** and fed back through decoupling circuits as GB to FC (except on SW band) and IF valves, giving automatic volume control. Delay voltage, together with GB for triode secton, is obtained from drop along resistances **R13** and **R14** which form a potential divider in cathode lead to chassis.

Resistance-capacity coupling by **R15, C25** and **R19,** via grid stopper **R20,** between **V3** triode and directly-heated cathode triode output valve (**V4, Cossor 2XP**). It should be borne in mind that this valve has a two-volt filament, which is energised from a special two-volt heater secondary on the mains transformer **T2.** Across this heater circuit is connected a centre-tapped wire-wound resistance **R25** for purposes of earthing the filament and applying GB.

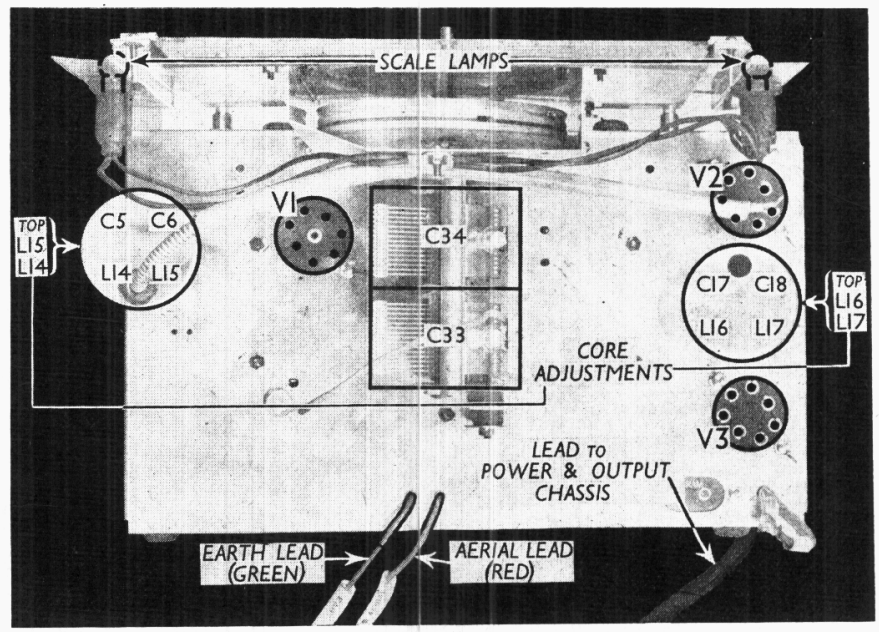
Sockets are provided on the power and output chassis for a high impedance external speaker. They are connected to **V4** anode and HT positive respectively and on one of them switch **S14** is so fitted that, if the connecting plug is partly inserted into them, both speakers are in circuit, while if the plug is pushed right home, **S14** opens automatically; the primary of the internal speaker input transformer **T1** is thus disconnected from **V4** anode, and the internal speaker is muted. It will be noted that HT current in the anode circuit must then flow via the external speaker circuit.

HT current is supplied by IHC full-wave rectifiying valve (**V5, Cossor 43IU**). Smoothing is effected by speaker field **L20** (which is connected in the HT negative lead to chassis) and dry electrolytic condensers **C28** and **C29.** HT circuit RF filtering by **C9.**

Fixed GB potential for **V1** (in addition to that developed across **R4**) and **V2,** and GB for **V4,** are obtained from the junctions of **R21, R22** and **R23** which form a potential divider across **L20** in the negative HT lead. The voltage developed across **R21** will, of course, form part of the AVC delay potential in addition to that which is developed across **R13** and **R14.**



Circuit diagram of the Cossor model 71 AC 3-band superhet. **L1, C2** is an IF rejector in the aerial circuit. Note the two plug connectors, diagrams of which, looking at the free ends of the pins, are inset beneath the circuit. The numbered arrows in the diagram indicate the various interconnections, the pins of the plugs being similarly numbered.



Plan view of the chassis. Note the positions of the core trimmers of the IF transformers.

DISMANTLING THE SET

Removing Chassis.—The receiver comprises two chassis units: the main chassis and the power and output chassis; both are independently mounted.

To remove the main chassis, first remove the four control knobs from the front of the cabinet (recessed grub screws), the batten from the rear (two bolts with washers), and the two small round-head wood screws holding the scale assembly to the front of the cabinet, and then withdraw the connecting plug from the side of the power and output chassis.

When replacing, see that the two chassis supporting pegs inside the front of the cabinet, and those on the batten at the rear, are located in the rubber grommets provided for them on the chassis.

Removing Power and Output Unit.—Withdraw the connecting plug from the side of the unit, and another plug from the panel on the speaker transformer; remove the fixing nut holding the toggle switch to the recessed cup on the side of the cabinet, and the four bolts (with large metal and rubber washers) holding the unit to the bottom of the cabinet.

When replacing, note that a rubber washer is fitted on each side of the base of the cabinet on each fixing bolt.

Removing Speaker.—Remove the connecting plug from the input transformer, slacken the four square clamping nuts and swivel the clamps. *When replacing,* the transformer should be at the bottom.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 hexode CG decoupling	500,000
R2	V1 SG HT feed potential divider resistances	20,000
R3		30,000
R4	Part V1 fixed GB resistance	130
R5	V1 osc. CG resistance	40,000
R6	V1 osc. anode HT feed	30,000
R7	V2 SG HT feed	100,000
R8	V2 anode HT feed	5,000
R9	IF stopper	50,000
R10	Manual volume control; V3 signal diode load	500,000
R11	V3 triode grid stopper	100,000
R12	V3 triode CG resistance	2,000,000
R13	V3 triode GB; AVC delay resistances	750
R14		1,000
R15	V3 triode anode load	50,000
R16	AVC line decoupling	3,000,000
R17	V3 AVC diode load	1,000,000
R18	Variable tone control	250,000
R19	V4 CG resistance	500,000
R20	V4 grid stopper	100,000
R21	V1, V2 fixed GB and V4 GB potential divider resistances	7,000
R22		90,000
R23		150,000
R24	V1-V3 heater circuit pot., total	25*
R25	V4 heater circuit pot., total	25*

* Centre-tapped.

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CONDENSERS		Values (μF)
C1	Aerial series condenser	0·0005
C2	Aerial IF rejector tuning	0·000225
C3	V1 hexode CG decoupling	0·5
C4	V1 SG decoupling	0·05
C5, C6	1st IF transformer fixed tuning condensers	0·000225, 0·000225
C7	V1 osc. CG condenser	0·0001
C8	V1 cathode by-pass	0·1
C9	HT circuit RF by-pass	0·1
C10	Osc. circuit LW fixed trimmer	0·00005
C11	Osc. circuit MW tracker	0·000638
C12	Osc. circuit LW fixed tracker	0·00014
C13	V1 osc. anode coupling	0·0005
C14	V2 CG decoupling	0·05
C15	V2 SG decoupling	0·05
C16	V2 anode decoupling	0·1
C17, C18	2nd IF transformer fixed tuning condensers	0·00006, 0·000075
C19, C20	IF by-pass condensers	0·00005, 0·00005
C21*	V3 cathode by-pass	50·0
C22	AF coupling to V3 triode	0·005
C23	Coupling to V3 AVC diode	0·00005
C24	Part of variable tone control	0·01
C25	V3 triode to V4 AF coupling	0·01
C26*	V4 CG decoupling	10·0
C27	Speaker field shunt	0·05
C28*, C29*	HT smoothing condensers	8·0, 8·0
C30‡	Aerial circuit SW trimmer	—
C31‡	Aerial circuit MW trimmer	—
C32‡	Aerial circuit LW trimmer	—
C33†	Aerial circuit tuning	—
C34†	Oscillator circuit tuning	—
C35‡	Osc. circuit SW trimmer	—
C36‡	Osc. circuit MW trimmer	—
C37‡	Osc. circuit LW trimmer	—
C38‡	Osc. circuit LW tracker	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. values (ohms)
L1	Aerial IF rejector coil	4·0
L2	Aerial SW coupling coil	0·5
L3	Aerial MW coupling coil	25·0
L4	Aerial LW coupling coil	150·0
L5	Aerial SW tuning coil	Very low
L6	Aerial MW tuning coil	2·0
L7	Aerial LW tuning coil	15·0
L8	Osc. circuit SW tuning coil	Very low
L9	Osc. circuit MW tuning coil	5·6
L10	Osc. circuit LW tuning coil	13·0
L11	Oscillator SW reaction	0·1
L12	Oscillator MW reaction	2·4

OTHER COMPONENTS (*Continued*)		Approx. Values (ohms)
L13	Oscillator LW reaction	6·0
L14	1st IF trans. Pri.	4·0
L15	1st IF trans. Sec.	4·0
L16	2nd IF trans. Pri., total	18·0
L17	2nd IF trans. Sec., total	18·0
L18	Speaker speech coil	2·0
L19	Hum neutralising coil	0·15
L20	Speaker field coil	1000·0
T1	Speaker input trans. Pri.	170·0
	Speaker input trans. Sec.	0·15
T2	Mains trans. Pri., total	27·0
	Mains trans. V1-V3 heat. sec.	0·1
	Mains trans. V4 heater sec.	0·1
	Mains trans. Rect. heat. sec.	0·2
	Mains trans. HT sec., total	240·0
S1-S13	Waveband switches	—
S14	Speaker switch	—
S15	Mains switch	—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 232 V, using the 240 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 negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 41STH	280	6·5	111	4·7
	Oscillator			
	105	2·7		
V2 MVSPenB	240	5·5	122	1·5
V3 DDT	146	2·5	—	—
V4 2XP	270	50	—	—
V5 43IU	320†	—	—	—

† Each anode, AC.

GENERAL NOTES

Switches.—**S1-S13** are the waveband switches, in two ganged rotary units beneath the chassis. These are indicated in our under-chassis view, and are shown in detail in the diagrams in col. 6, where they are drawn as seen looking from the underside of the chassis in the direction indicated by the arrows.

The table (col. 5) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates *open*, and **C**, *closed*.

S14 is the internal speaker muting switch, associated with one of the Ext. LS sockets, in the power and output unit. When the external speaker connecting plug is fully inserted in the sockets, **S14** opens and breaks the connection between **T1** primary winding and the anode of the output valve, thus muting the internal speaker.

S15 is the QMB mains switch, mounted in a cupped escutcheon on the side of the cabinet and wired to the power and output chassis.

Coils.—**L1** is the intermediate frequency rejector coil, mounted on the rear member of the chassis, and shown in our under-chassis view with its fixed tuning condenser. It has an adjustable iron-dust core, reached through a hole in the chassis, through which the moulded former protrudes.

The aerial and oscillator coils **L2, L5 ; L3, L6 ; L4, L7** and **L8, L11 ; L9, L12 ; L10, L13** are in six unscreened tubular units, mounted in two screened compartments beneath the chassis.

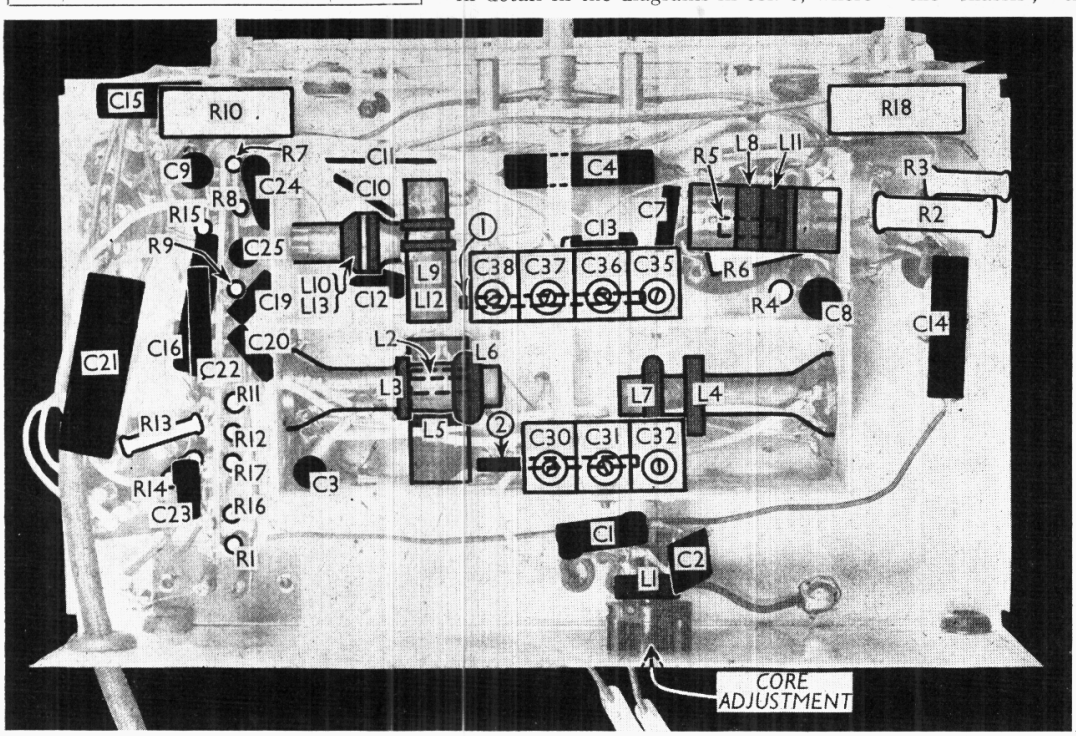
The IF transformers **L14, L15** and **L16, L17** are in two screened units on the chassis deck with their associated fixed tuning condensers. The screw core adjustments of the variable iron-dust cores are reached through holes in the sides of the cans ; their positions are indicated approximately in our plan chassis view.

Pre-set Condensers.—All the aerial trimmers and the oscillator trimmers and trackers are mounted in the screened compartments with their coils beneath the chassis ; they are shown in our under-chassis view.

Scale lamps.—These are two Osram MES type lamps, rated at 6·5 V, 0·3 A. They have small bulbs.

External Speaker.—Two sockets are provided on the power and output chassis for connection of a high impedance (3,000 Ω) external speaker. **S14** is associated with one of these sockets for muting the internal speaker.

Condensers C28, C29.—These are two 8μF (450 V working) dry electrolytic condensers in a cardboard container, mounted beneath the power and output chassis. The red lead is the positive of



Under-chassis view. The two switch units are indicated, and are shown in detail in col. 6.

C28, whose negative (black) lead is connected to chassis. The yellow lead is the positive of **C29,** its negative lead being blue.

Inter-Chassis Connections.—The connections between the two chassis are by a 6-way cable, with a 6-pin plug and socket. The connections are numbered 1 to 6, and indicated by arrows in the circuit diagram, while inset beneath it is a diagram of the plug, looking at the free ends of the pins. The colour-coding of the connections to the plug is: 1, black; 2, yellow; 3 and 4, white; 5, blue; 6, red.

A small 4-pin plug and socket at the end of a 4-way lead provide the connections between the power and output unit and the speaker. These connections are numbered 7 to 10 in the circuit diagram, and a diagram of the plug, looking at the free ends of the pins, is inset below it. The colour-coding of the plug connections is: 7, red; 8, blue; 9, black; 10, yellow.

Resistances R24, R25.—These are two wire-wound 25 O centre-tapped fixed potentiometers, situated beneath the power and output unit.

Valve V4.—This is a 2 V Cossor 2XP directly-heated triode, which derives its heater supply from a separate secondary winding (c, d) of the mains transformer **T2.**

A and E Leads.—Although sockets are mentioned in the instruction leaflet, our chassis was actually fitted with short aerial and earth leads, the red lead being the aerial, and the green the earth.

Chassis Divergencies.—**R4** was 139 O in our chassis, but is given as 130 O by the makers. The makers' diagram shows **R18** with its ends connected between **C24** and chassis, and the slider connected to the **C24** end, short-circuiting the portion of the resistance not in use. **R15** may be 30,000 O in early chassis.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator via a 0·1 μF condenser to control grid (top cap) of **V2** and chassis, feed in a 465 KC/S signal, and adjust the cores of **L16** and **L17,** having first softened the wax by the application of a warm screwdriver. Transfer signal generator to top cap of **V1,** and similarly adjust cores of **L14, L15.** The existing lead to each top cap should be left in position, and the response curve of the IF stages should be symmetrical, with a perceptible flat top when viewed on an oscilloscope.

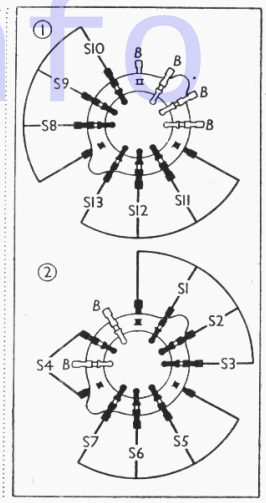
IF Rejector.—Connect signal generator to **A** and **E** leads, tune to top of MW band, feed in a strong 465 KC/S signal, and adjust core of **L1** for *minimum* output.

RF and Oscillator Stages.—With gang at maximum, pointer should cover the short horizontal lines at the extreme right-hand ends of the scales. Connect signal generator to **A** and **E** leads, via a suitable dummy aerial.

LW.—Switch set to LW, and tune to 1,200 m on scale. Feed in a 1,200 m (250 KC/S) signal, and adjust **C37,** then **C32,** for maximum output. Feed in a 1,875 m (160 KC/S) signal, tune it in, and adjust **C38** for maximum output, while rocking the gang for optimum results. Repeat the LW adjustments.

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	—	—	C

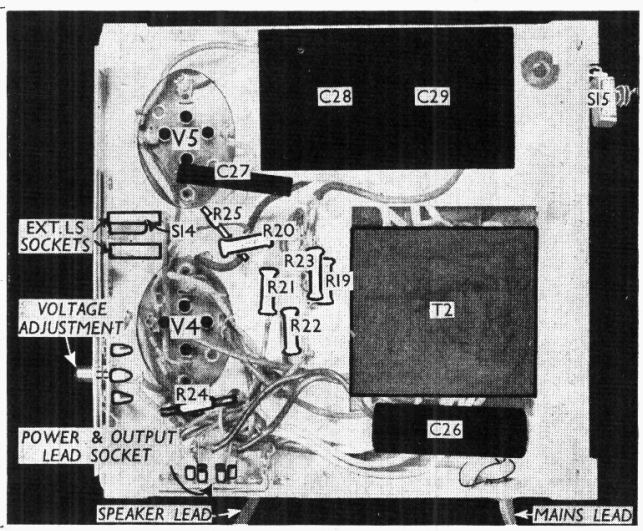


Diagrams of the switch units, as seen looking from the front of the underside of the chassis.

MW.—Switch set to MW, and tune to 214 m on scale. Feed in a 214 m (1,400 KC/S) signal, and adjust **C36,** then **C31,** for maximum output. Tracking is fixed.

SW.—Switch set to SW, tune to 18 MC/S on scale, and feed in an 18 MC/S (16·67 m) signal. Adjust **C35,** then **C30** for maximum output. **C35** must be adjusted to the peak involving the smaller trimmer capacity.

Underneath view of the power and output unit. **R24** and **R25** are centre-tapped wire-wound resistors. **S14** is associated with the external speaker sockets. **S15,** the mains switch, is connected to the unit by wires.



Printed in Great Britain by Sanders Phillips & Co., Ltd., The Baynard Press, Chryssell Road, London, S.W.9.