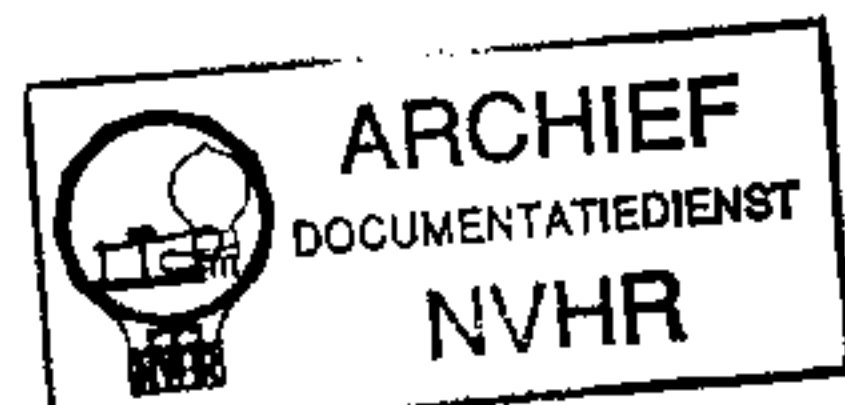
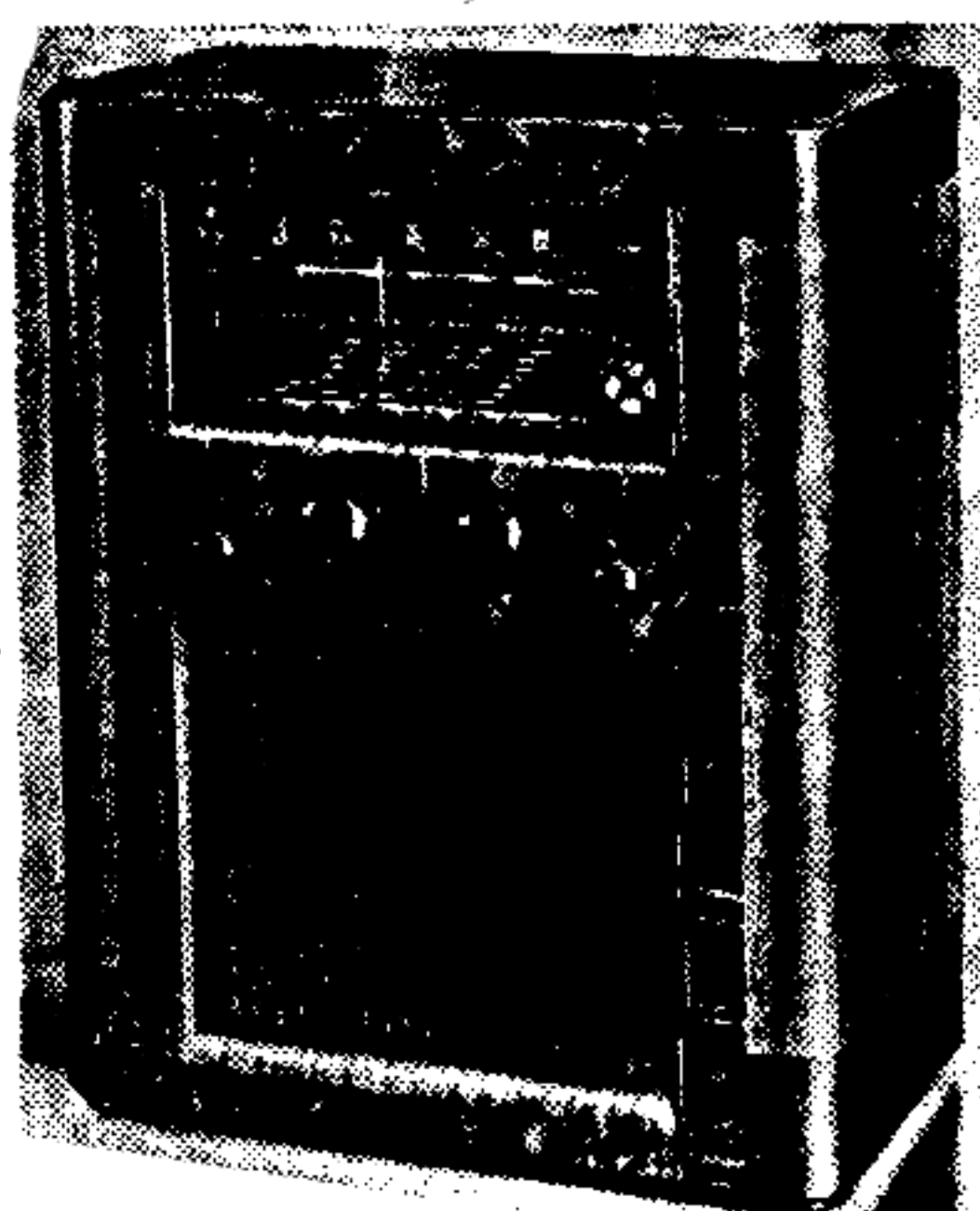


Ned. Ver. v. Historie v/d Radio



# COSSOR 74

## AC SUPERHET



### CIRCUIT DESCRIPTION

Aerial input via series condenser C1 and coupling coils L1 (SW), L2 (MW) and L3 (LW) to single tuned circuits L4, C34 (SW), L5, C34 (MW) and L6, C34 (LW) which precede variable-mu pentode RF amplifying valve (V1, Coscor metallised MVS/Pen).

Tuned-secondary RF transformer coupling by L7, L10, C38 (SW), L8, L11, C38 (MW) and L9, L12, C38 (LW) between V1 and triode hexode valve (V2, Coscor metallised 4THA), which operates as frequency changer with internal coupling. Triode oscillator grid coils L13 (SW), L14 (MW) and L15 (LW) are tuned by C39; parallel trimming by C40 (SW), C41 (MW) and C11, C42 (LW); series tracking by C12 (MW) and C13, C43 (LW). Reaction by coils L16 (SW), L17 (MW) and L18 (LW).

Third valve (V3, Coscor metallised MVS/Pen/B) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary iron-cored transformer couplings C7, L20, L21, C8 and C19, L22, L23, C20.

The band-width to which the first IF transformer will respond is modified by the effect of the coil L19, to whose centre is connected the low-potential end of L21. Thus variable selectivity is attained by

reversing the sense in which L19 is connected, according to whether S30 or S31 is closed.

Intermediate Frequency 465 KC/S.

Diode second detector is part of double diode triode valve (V4, Coscor metallised DDT). Audio frequency component in rectified output is developed across manual volume control R12, which also operates as load resistance, and passed via AF coupling condenser C24 and grid stopper R14 to CG of triode section, which operates as AF amplifier. IF filtering by C22, R10 and C23. Provision for connection of gramophone pick-up via S29 across R12. Radio muting by S28. Variable tone control by C25, R18 in triode anode circuit.

Control potential for cathode ray tuning indicator (T.I., Coscor 41ME) is obtained from junction of R10 and S28 and fed via decoupling circuit R11, C30 to T.I. CG.

Second diode of V4, fed from tapping on L22 via C21, provides DC potential which is developed across load resistance R17 and fed back through decoupling circuits as GB to RF, FC and IF valves, giving automatic volume control.

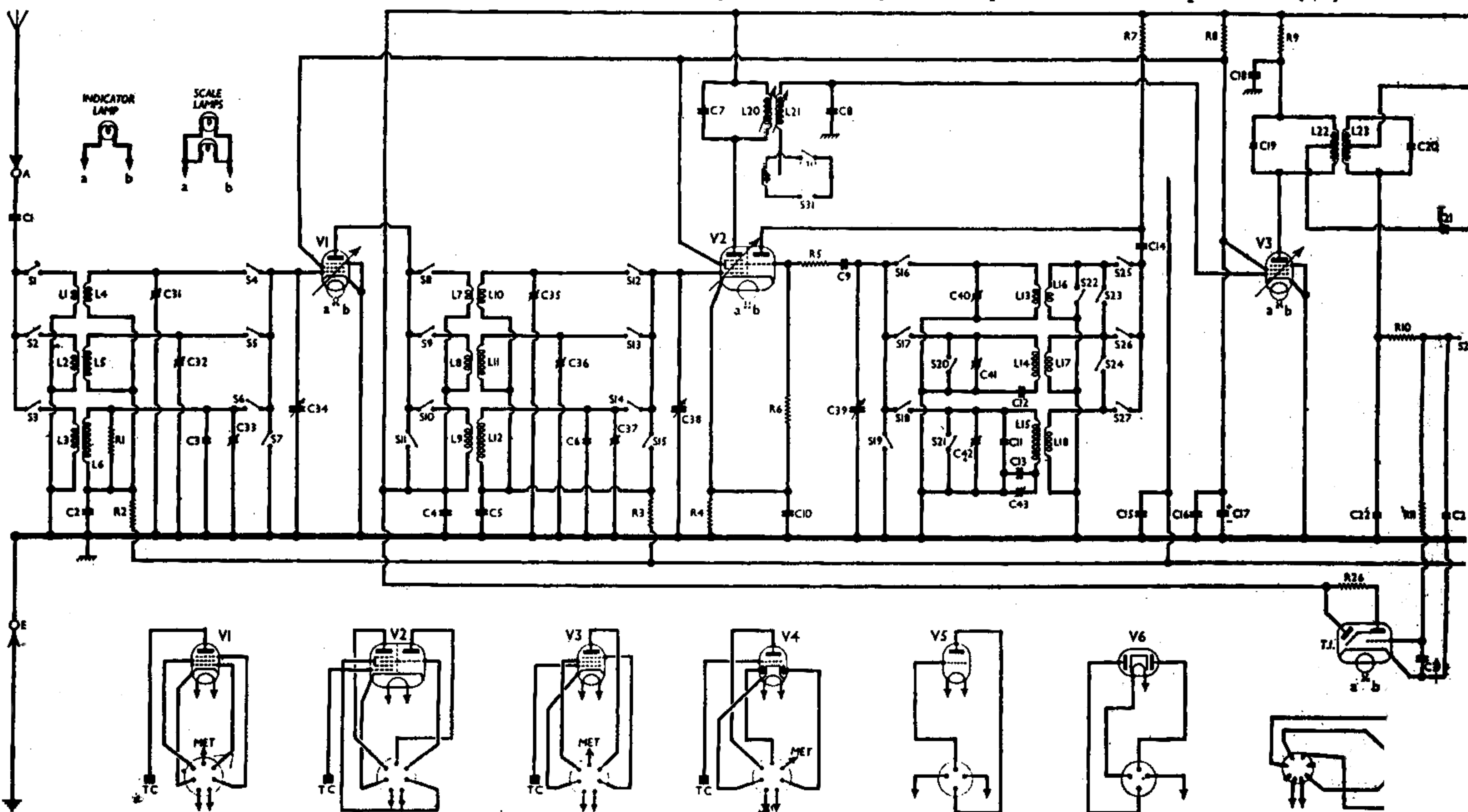
Resistance-capacity coupling by R15, C26 and R19 between V4 triode and directly heated triode output valve (V5,

**T**HE Coscor 74 receiver is a 5-valve (plus valve rectifier) 3-band AC superhet, for operation from mains of 200-250 V, 40-100 C/S. The SW range is 16-49 m.

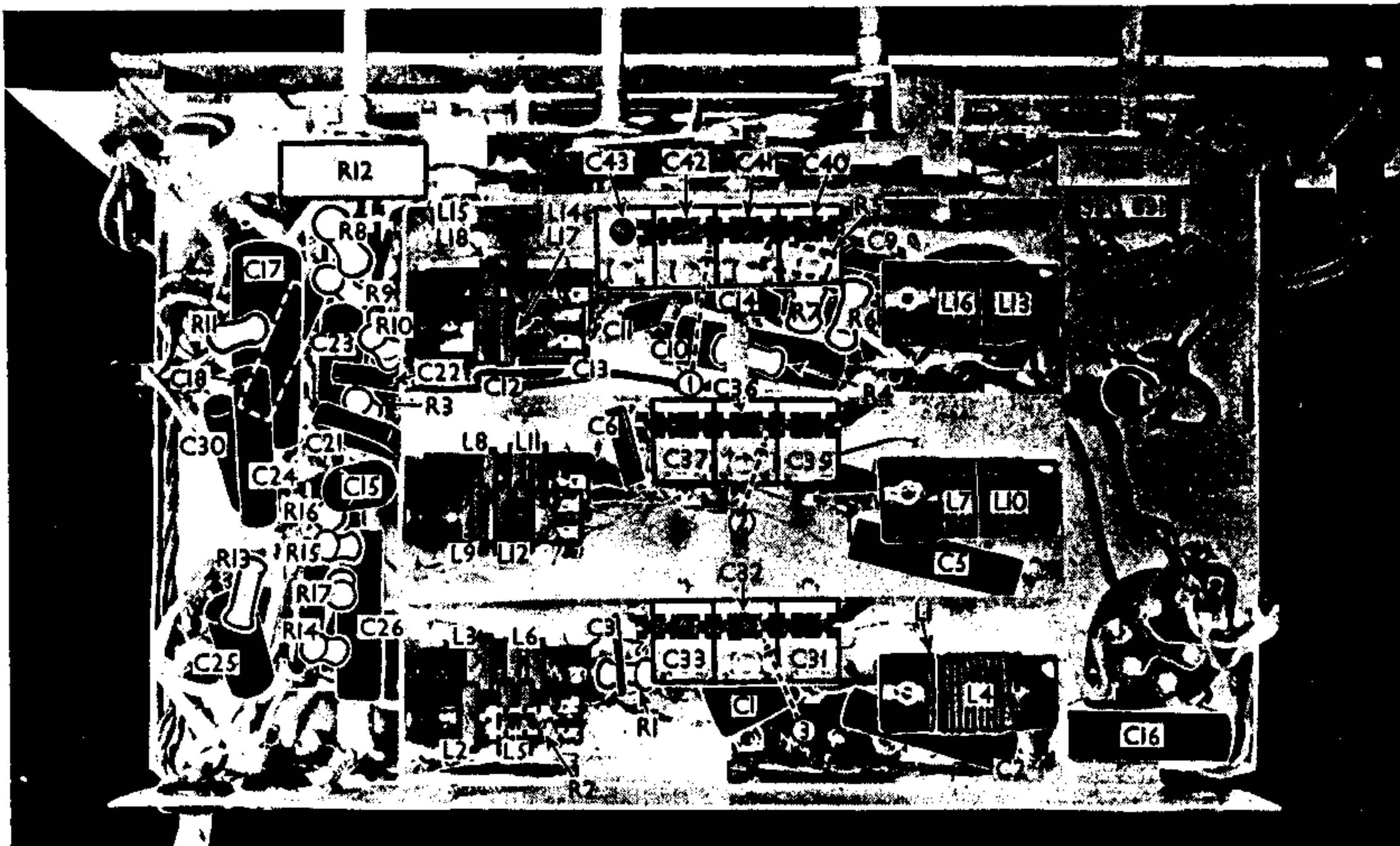
An RF amplifying stage is included, and there is provision for the connection of a gramophone pick-up and an external speaker.

There are three versions of chassis in successive issues of the receiver, and the differences between them are explained under "Chassis Divergencies."

Release date: February, 1940.



Underside of the main chassis. All the pre-set trimmer and tracker adjustments are shown in this view. The three waveband switch units are indicated, and are shown again in detail in the diagrams in column 3 overleaf. S30 and S31 are the variable selectivity switches, ganged with the tone control R18.



**Cossor 2P).** Provision for connection of high impedance external speaker between V5 anode and HT positive line. Switch S32 between internal speaker input transformer T1 primary and V5 anode permits internal speaker to be muted.

It should be noted that, when S32 is open, HT current to V5 must flow via the external speaker circuit.

HT current is supplied by IHC full-wave rectifying valve (V6, Cossor 43 IU). Smoothing by speaker field L26 in HT

negative lead to chassis, and electrolytic condensers C28, C29.

Fixed GB potential for V1, V2 and V3, GB potentials for V4 triode and V5, and AVC delay potential are obtained automatically from potential divider comprising resistances R21, R22, R23 connected across L26.

**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 235 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.

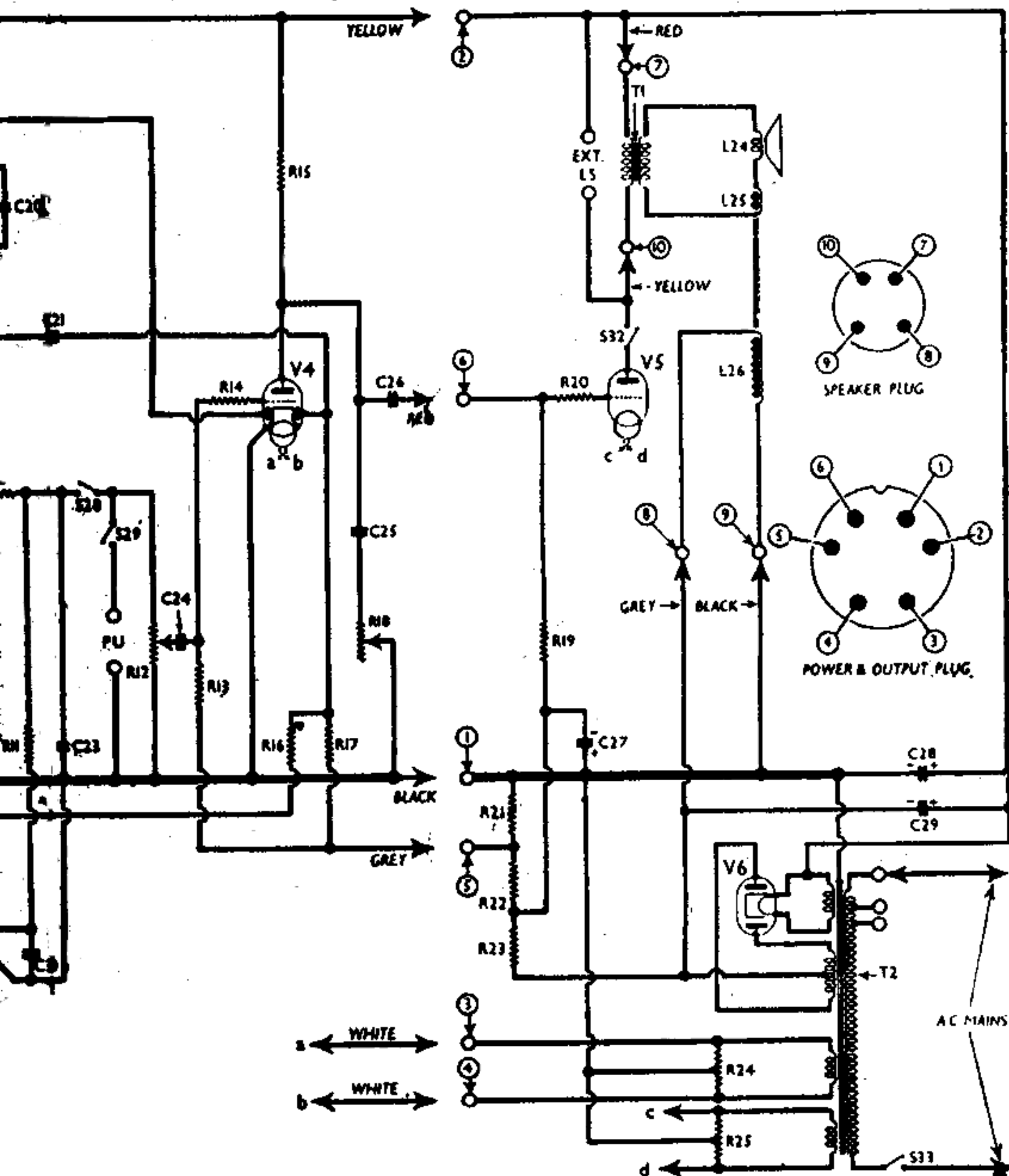
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 MVS/Pen	243	7.5	145	1.6
V2 4THA	243	3.6	145	3.4
	35	2.4		
V3 MVS/Pen/B	200	6.4	145	1.8
V4 DDT	135	1.7	—	—
V5 2P	234	42.0	—	—
V6 43IU	200†	—	—	—
	20	0.1		
T.I. 41MR	243	0.13	—	—

† Each anode, AC.

**COMPONENTS AND VALUES**

RESISTANCES		Values (ohms)
R1	Aerial circ. LW damping	30,000
R2	V1 CG decoupling	500,000
R3	V2 hexode CG decoupling	500,000
R4	V2 fixed GB resistance	300
R5	V2 osc. CG stabiliser	15
R6	V2 osc. CG resistance	25,000
R7	V2 osc. anode HT feed	80,000
R8	V1, V2, V3 SG's HT feed	15,000
R9	V3 anode HT feed	5,000
R10	IF stopper	50,000
R11	T.I. CG decoupling	2,000,000
R12	Manual volume control; V4 signal diode load	500,000
R13	V4 triode CG resistance	2,000,000
R14	V4 triode grid stopper	100,000
R15	V4 triode anode load	50,000
R16	AVC line decoupling	2,000,000
R17	V4 AVC diode load	1,000,000
R18	Variable tone control	100,000
R19	V5 CG resistance	500,000
R20	V5 grid stopper	100,000
R21	V1, V2, V3 fixed GB; V4, V5 GB; and AVC delay potential divider	6,000
R22		60,000
R23		200,000
R24	V1-V4 heater pot., total	25*
R25	V5 heater pot., total	25*
R26	T.I. anode HT feed	2,000,000

\* Centre-tapped.



Circuit diagram of the Cossor 74 AC superhet. An RF amplifying stage, variable selectivity and a tuning indicator are provided. Some versions of the chassis differ in several ways from ours, and the differences are described under "Chassis Divergencies." The two connecting plug diagrams, which are viewed from the free ends of the pins, are those of the power and output plug (below) and the speaker plug (above). Valve base diagrams are shown beneath the circuit diagram.

CONDENSERS		Values (μF)
C1	Aerial series condenser ...	0-0005
C2	V1 CG decoupling ...	0-05
C3	Aerial LW fixed trimmer ...	0-000015
C4	HT circuit RF by-pass ...	0-1
C5	V2 hexode CG decoupling ...	0-05
C6	RF trans. LW fixed trimmer ...	0-000015
C7	1st IF transformer tuning condensers ...	0-000225
C8		0-000225
C9	V2 osc. CG condenser ...	0-0001
C10	V2 cathode by-pass ...	0-1
C11	Osc. circ. LW fixed trimmer ...	0-00004
C12	Osc. circuit MW tracker ...	0-00057
C13	Osc. circ. LW fixed tracker ...	0-00012
C14	V1 osc. anode coupling ...	0-0002
C15	V3 CG decoupling ...	0-05
C16	V1, V2, V3 SG's decoupling condensers ...	0-1
C17		2-0
C18	V3 anode decoupling ...	0-1
C19	2nd IF transformer tuning condensers ...	0-00006
C20		0-000075
C21	Coupling to V4 AVC diode ...	0-00005
C22	IF by-pass condensers ...	0-00005
C23		0-00005
C24	AF coupling to V4 triode ...	0-01
C25	Part variable tone control ...	0-03
C26	V4 triode to V5 coupling ...	0-01
C27*	V5 CG decoupling ...	10-0
C28*	HT smoothing condensers {	16-0
C29*		16-0
C30		0-01
C31†	T.I. CG decoupling ...	—
C32†	Aerial circuit SW trimmer ...	—
C33†	Aerial circuit MW trimmer ...	—
C34†	Aerial circuit LW trimmer ...	—
C35†	RF trans. sec. SW trimmer ...	—
C36†	RF trans. sec. MW trimmer ...	—
C37†	RF trans. sec. LW trimmer ...	—
C38†	RF trans. sec. tuning ...	—
C39†	Oscillator circuit tuning ...	—
C40†	Osc. circuit SW trimmer ...	—
C41†	Osc. circuit MW trimmer ...	—
C42†	Osc. circuit LW trimmer ...	—
C43†	Osc. circuit LW tracker ...	—

\*Electrolytic. †Variable. ‡Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial SW coupling coil ...	0-6
L2	Aerial MW coupling coil ...	19-0
L3	Aerial LW coupling coil ...	100-0
L4	Aerial SW tuning coil ...	Very low
L5	Aerial MW tuning coil ...	2-7
L6	Aerial LW tuning coil ...	36-0
L7	RF trans. SW pri. ...	0-5
L8	RF trans. MW pri. ...	5-0
L9	RF trans. LW pri. ...	13-0
L10	RF trans. SW sec. ...	Very low
L11	RF trans. MW sec. ...	2-7
L12	RF trans. LW sec. ...	31-0
L13	Osc. circuit SW tuning ...	Very low
L14	Osc. circuit MW tuning ...	3-6
L15	Osc. circuit LW tuning ...	8-6
L16	Oscillator SW reaction ...	0-3
L17	Oscillator MW reaction ...	1-4
L18	Oscillator LW reaction ...	2-8
L19	Variable selectivity coil, total ...	0-2
L20	1st IF trans. { Pri. ...	3-5
L21		Sec. ...
L22	2nd IF trans. { Pri., total ...	18-0
L23		Sec., total ...
L24	Speaker speech coil ...	2-4
L25	Hum neutralising coil ...	0-1
L26	Speaker field coil ...	1,250-0
T1	Speaker input trans. { Pri. ...	240-0
	Sec. ...	0-3
	Pri., total ...	27-0
	V1-V4 heat sec. ...	0-05
	V5 heater sec. ...	0-05
	Rect. heat. sec. ...	0-1
	HT sec., total ...	210-0
S1-S27	Waveband switches ...	—
S28, S29	Radio/gram change switches ...	—
S30, S31	Variable selectivity switches, gauged R18. ...	—
S32	Internal speaker switch ...	—
S33	Mains switch ...	—

**DISMANTLING THE SET**

**Removing Chassis.**—The receiver comprises two chassis units: the main

**Switch Table**

Switch	SW	MW	LW	Gram
S1	○	—	—	—
S2	—	○	—	—
S3	—	—	○	—
S4	○	—	—	—
S5	—	○	—	—
S6	—	—	○	—
S7	—	—	—	○
S8	○	—	—	—
S9	—	○	—	—
S10	—	—	○	—
S11	—	—	—	○
S12	○	—	—	—
S13	—	○	—	—
S14	—	—	○	—
S15	—	—	—	○
S16	○	—	—	—
S17	—	○	—	—
S18	—	—	○	—
S19	—	—	—	○
S20	○	—	—	—
S21	○	○	—	—
S22	—	—	○	—
S23	—	—	—	○
S24	—	—	—	○
S25	○	—	—	—
S26	—	○	—	—
S27	—	—	○	—
S28	○	—	—	—
S29	—	—	—	○

chassis and the power and output unit. To remove the main chassis, remove the four control knobs (recessed grub screws) from the front of the cabinet; loosen the two round-head wood screws holding the metal clamps to the top of the scale assembly inside the cabinet; withdraw from the side of the power and output unit the plug connecting it to chassis; remove the wooden batten supporting the rear of the chassis (one cheese-head screw and washer at each end), taking the weight of the chassis with one hand while removing the screws with the other.

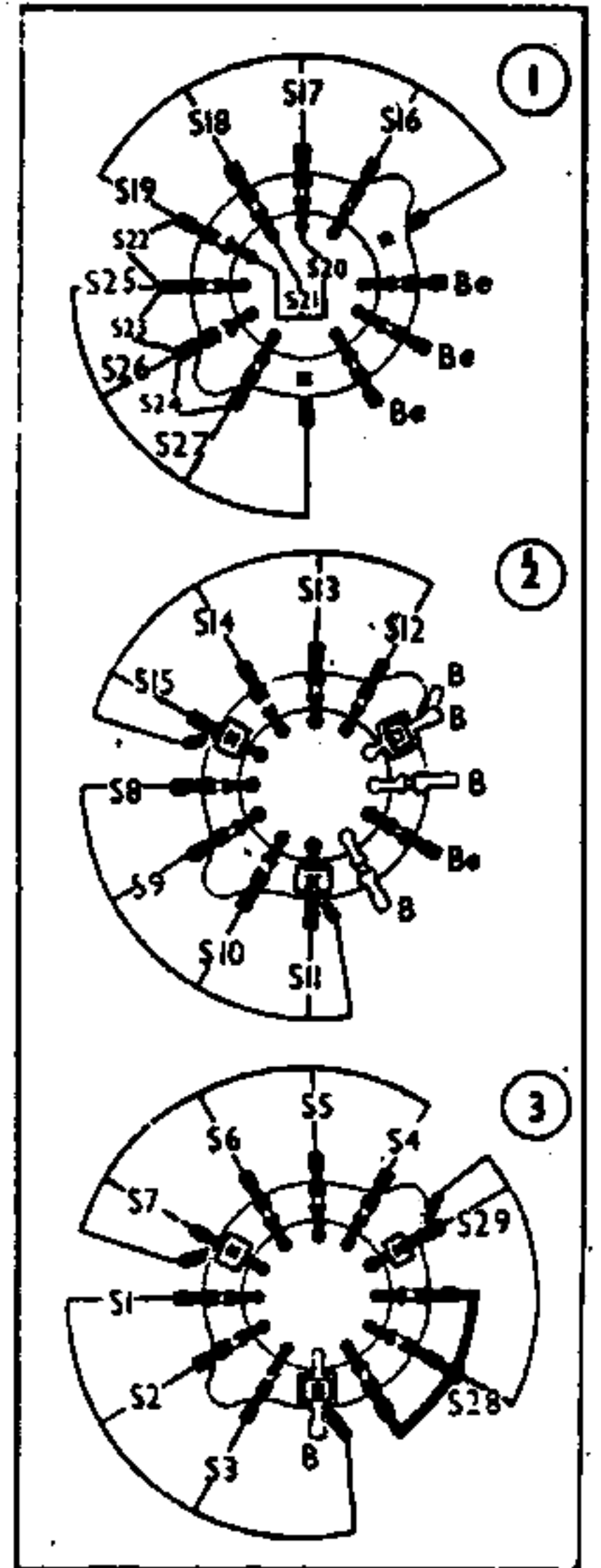
**When replacing,** see that the chassis supporting pegs inside the front of the cabinet, and those on the batten at the rear, are located in the grommets provided for them on the chassis.

**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 cupped escutcheon on the

underside view of the power and output unit. The electrolytic condenser block C28, C29 (shown dotted) and the mains transformer T2 are mounted on the deck of the unit. S33 is not mounted on the unit, but is attached to it by its connecting leads.

Diagrams of the three switch units, drawn as seen when viewed from the rear of the underside of the chassis, as indicated by the arrows in the underside view of the main chassis.



side of the cabinet (this is best done by first loosening the stop nut inside the cabinet); remove the four cheese-head fixing screws (with large metal and rubber washers) holding the unit to the bottom of the cabinet.

**When replacing,** note that two large rubber washers are fitted to each fixing bolt, one going either side of the bottom of the cabinet.

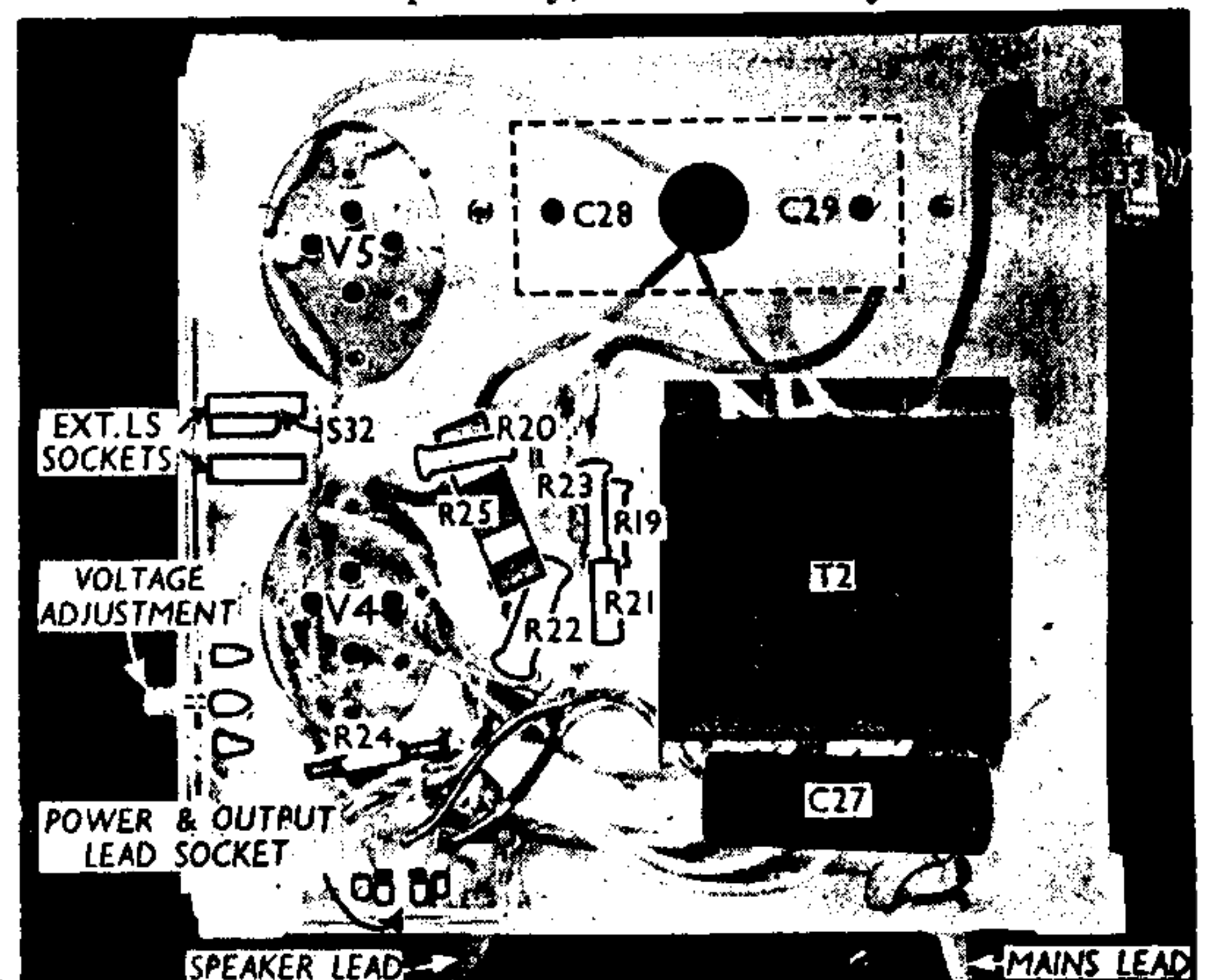
**Removing Speaker.**—Withdraw the connecting plug from the speaker transformer;

loosen the four cheese-head screws (with lock-washers) holding the clamps to the rim of the speaker, swivel two of the clamps, and lift out the speaker.

**When replacing,** the transformer should be on the left.

**GENERAL NOTES**

**Switches.**—S1-S27 and S28, S29 are the waveband and radio/gram switches respectively, in three rotary units beneath



the chassis. They are indicated in our under-chassis view, and shown in detail in the diagrams in col. 3, where they are drawn as seen looking from the rear of the underside of the chassis. The table (col. 2) gives the switch positions for the four control settings, starting from fully anti-clockwise. A dash indicates open, and C, closed.

**S30, S31** are the variable selectivity switches, ganged with the tone control **R18**. They are of the QMB type, and have a common tag (which is connected to **C15**). The other two tags are the other connections of the two switches, and have leads running into the first IF unit. One of the switches closes when the tone control knob is turned fully clockwise (minimum selectivity) while the other closes when the knob is turned anti-clockwise.

**S32** is the internal speaker switch, associated with one of the external speaker sockets in the power and output unit. When an external speaker is fully plugged in, **S32** opens and mutes the internal speaker.

**S33** is the QMB mains switch, mounted at the side of the cabinet, and shown in our underneath view of the power and output unit.

**Coils.**—**L1-L18** are in pairs in nine unscreened tubular units beneath the chassis. They are all indicated in our under-chassis view. The IF transformers **L19-L21** and **L22, L23** are in two screened units on the chassis deck. These units also contain their associated fixed trimmers. The positions of the core adjustments are indicated in our plan chassis view.

**External Speaker.**—Two sockets are provided on the side of the power and output unit for a high impedance (3,000  $\Omega$ ) external speaker. If the plug is pushed fully home, **S32** opens and mutes the internal speaker.

**Scale and Indicator Lamps.**—These are three Osram MES types, rated at 6.5V, 0.3A, and having large clear bulbs.

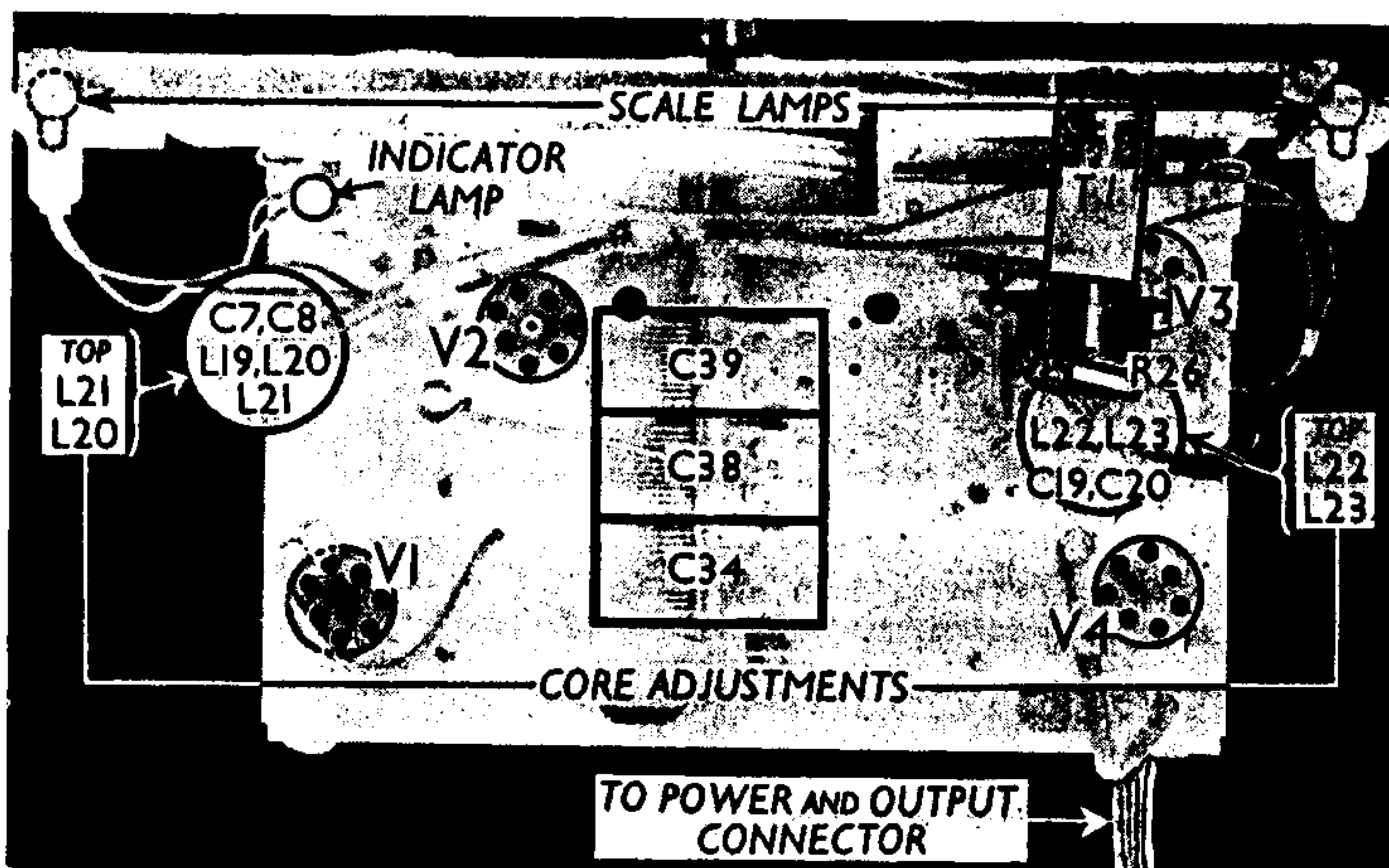
**Condensers C28, C29.**—These are two 16 $\mu$ F dry electrolytics in a single carton on the deck of the power and output unit, having a common positive (red) lead. The black lead is the negative of **C28**, and the blue lead is the negative of **C29**.

**Chassis Interconnections.**—The main chassis is connected to the power and output unit by a 6-pin plug and socket. A diagram of the plug, looking at the free ends of the pins, is right of the circuit diagram. The pins are numbered to agree with the corresponding arrows and circles in the circuit diagram. The coding of the leads to the plug is: 1, black; 2, yellow; 3, and 4, yellow systoflex; 5, grey; 6, red.

**Speaker Plug.**—A second plug, whose diagram is shown above that of the power and output connector, is used to connect the power and output unit to the speaker. Its pins are numbered to follow those of the first plug. The coding of the leads is: 7, red; 8, grey; 9, black; 10, yellow.

**Resistances R24, R25.**—These are two centre-tapped wire-wound resistors located in the power and output unit.

**Valve V5.**—Note that the 2P triode output valve is directly-heated, and is run from a separate winding on **T2**.



Plan view of the main chassis. **R26** is mounted directly on the tuning indicator holder. The positions of the IF transformer core adjustments are approximately indicated.

**Condenser C27.**—The positive side of this electrolytic is connected to chassis.

**Chassis Divergencies.**—There are three versions of the model 74 chassis, all of which follow generally similar lines, with modifications. If we refer to our chassis as (a), the other two versions can conveniently be (b) and (c).

In the (b) version, switches **S7, S11, S15, S19** and **S23** are omitted, while **S24** is directly across **L17**. The radio/gram switching is omitted, and the circuit is as it would be if **S28** and **S29** were permanently closed.

**R1** is omitted, and **R7** is 30,000  $\Omega$ , while the top of **R6** may be connected to the opposite end of **R5**.

In the (c) version, the circuit is the same as that given in this *Service Sheet*, except that the variable selectivity device is omitted. Therefore, the coil **L19** and the switches **S30, S31**, which are ganged with the tone control **R18** in our chassis, are omitted, and a standard type of IF transformer replaces our **L20, L21**.

Mechanically, the (c) version is similar to our chassis, but in the (b) version the wavechange control and tuning spindle are concentric and appear in the centre of a line beneath the tuning scale, with the remaining pair of controls disposed on either side.

The chassis bear no distinguishing marks, but the (a) can be easily identified by the presence of variable selectivity and radio/gram switching; the (b) by the absence of radio/gram switching; and the (c) by the absence of variable selectivity.

### CIRCUIT ALIGNMENT

**IF Stages.**—A Cossor ganging oscillator and double-beam oscilloscope are recommended. Switch set to MW, turn tone control anti-clockwise until selectivity switch operates and set volume control to minimum (maximum if alignment is carried out with an ordinary signal generator and output meter). To connect up the oscilloscope, connect amplifier terminal for one Y plate to the junction of **R16, R17** and the terminal for the other Y plate to the junction of **R10, R11, S28**. A

2M $\Omega$  resistance can be connected in series with either lead to act as an RF stopper. Feed in a 465 KC/S (645.2 m) signal via a 0.01  $\mu$ F condenser to control grid (top cap) of **V3**, and chassis leaving existing connection in place. Detune **L22**, and align **L23** for maximum output. Then adjust **L22** until the middle points of the two curves coincide and the peaks of the primary are symmetrical.

Transfer ganging oscillator to control grid (top cap) of **V2**, and adjust **L20** and **L21** so that the curves coincide with the position on the screen of the **L22, L23** curves.

When the tone control is turned fully clockwise so that the selectivity switches operate, the secondary curve should have a reasonably flat top, and the primary a wide peaked curve whose trough should coincide with the middle of the secondary curve, and should have symmetrical peaks.

If no oscilloscope is available, the usual method of alignment should be followed, attempting to secure a flat-topped response curve.

**RF and Oscillator Stages.**—An ordinary signal generator can be used for this, connecting it to the **A** and **E** sockets, via a suitable dummy aerial. With gang at maximum, pointer should cover sloping lines at right hand ends of scales. Tone control should be turned anti-clockwise.

**MW.**—Switch set to MW, and tune to 214 m on scale. Feed in a 214 m (1,400 KC/S) signal, and adjust **C41, C36** and **C32** for maximum output.

**LW.**—Switch set to LW, tune to 1,200 m on scale, feed in a 1,200 m (250 KC/S) signal and adjust **C42, C37** and **C33** for maximum output. Feed in a 1,875 m (160 KC/S) signal, tune it in, and adjust **C43** for maximum output, while rocking the gang for optimum results.

**SW.**—Switch set to SW, tune to 18 MC/S on scale, feed in an 18 MC/S (16.67 m) signal and adjust **C40** for maximum output, using the peak involving the lesser trimmer capacity. Then adjust **C35** and **C31** for maximum output. Re-check all these settings.

# COSSOR 67, 67A RADIOGRAMS

## SUPPLEMENT TO SERVICE SHEET 506

THE Cossor model 67 radiogram employs a chassis in which the RF, oscillator and IF circuits are practically similar to that used in the model 74 table receiver, which was fully dealt with in our *Service Sheet No. 506*, which can be used for servicing those parts of the receiver.

The AF and output circuits, however, are different in many ways, and the information given on this sheet explains the differences. It should be used in conjunction with *Service Sheet No. 506*, to which it is supplementary.

The Cossor 67 is a 5-valve (plus rectifier) 3-band AC superhet radiogram, suitable for use with 200-250 V, 50-60 C/S mains.

The model 67A is similar, but is equipped with an automatic record-changer.

Release date: January, 1940.

### CIRCUIT DESCRIPTION

Audio frequency component in rectified output from V4 signal diode is developed across manual volume control R12 and passed via AF coupling condenser C24 and stopper R14 to CG of V4 triode section, which operates as AF amplifier.

Pick-up input is fed via scratch filter circuit R28, C44, R29, C45 and switch S29, and is developed across R12.

The variable tone control circuit R18, C25, which operates on radio and gramophone, is connected across R12.

Resistance-capacity coupling by R15, C26 and R19, via grid stopper R20, between V4 triode and pentode output valve (V5, Cossor PT10), which is indirectly heated. Provision for connection of high impedance external speaker between V5 anode and HT positive line, while jack type switch S32 opens automatically and mutes the internal speaker by disconnecting T1 primary from V5 anode when the external speaker plug is fully inserted in its sockets. It should be noted that the HT current to V5 anode must then flow via the external speaker.

Signal voltages developed across T1 secondary appear also across the negative feed-back circuit R31, R32, C47, and that portion of them which appears across R32 is thus coupled back to V4 cathode circuit.

HT current is supplied by IHC full-wave rectifying valve (V6, Cossor 43 IU). Smoothing by speaker field L26, iron-cored choke L27 and electrolytic condensers C49, C50, C51.

### COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R11	T.I. CG decoupling ...	2,000,000
R12	Manual volume control; V4 signal diode load ...	500,000
R13	V4 triode CG resistance ...	2,000,000
R14	V4 triode grid stopper ...	100,000
R15	V4 triode anode load ...	30,000
R16	AVC line decoupling ...	2,000,000
R17	V4 AVC diode load ...	1,000,000
R18	Variable tone control ...	2,000,000
R19	V5 CG resistance ...	500,000
R20	V5 grid stopper ...	100,000
R24	Heater circuit pot., total	25*
R27	Additional IF stopper ...	50,000
R28	Parts of pick-up scratch filter ...	30,000
R29		
R30	V4 triode anode decoupling ...	20,000
R31	Negative feed-back feed resistances ...	450
R32		
R33	V5 GB resistance ...	140
R34	Auto GB resistance ...	15

\* Centre-tapped.

CONDENSERS		Values (μF)
C21	Coupling to V4 AVC diode	0.00005
C23	IF by-pass condenser ...	0.00005
C24	AF coupling to V4 triode ...	0.01
C25	Part variable tone control	0.003
C26	V4 triode to V5 coupling ...	0.01
C44	Parts of pick-up scratch filter ...	0.001
C45		
C46*	V4 triode anode decoupling	2.0
C47	Part of negative feed-back	0.02
C48*	V5 cathode by-pass ...	50.0
C49*	HT smoothing condensers	16.0
C50*		
C51*		

\* Electrolytic

OTHER COMPONENTS		Approx. Values (ohms)
L24	Speaker speech coil ...	2.5
L25	Hum neutralising coil ...	0.1
L26	Speaker field coil ...	800.0
L27	HT smoothing choke ...	100.0
T1	Speaker input trans. { Pri. ...	450.0
	{ Sec. ...	0.5
T2	Mains trans. { Heater sec. .	27.0
	{ Rect. heat. sec. ...	0.05
	{ HT sec. total	257.0
S28, S29	Radio/gram switches .	—
S32	Speaker muting switch	—
S33	Mains switch ...	—
S34	Gram motor switch ...	—

### GENERAL NOTES

This supplement deals with the model 67 and 67A radiograms only in so far as they differ from the 74 table model.

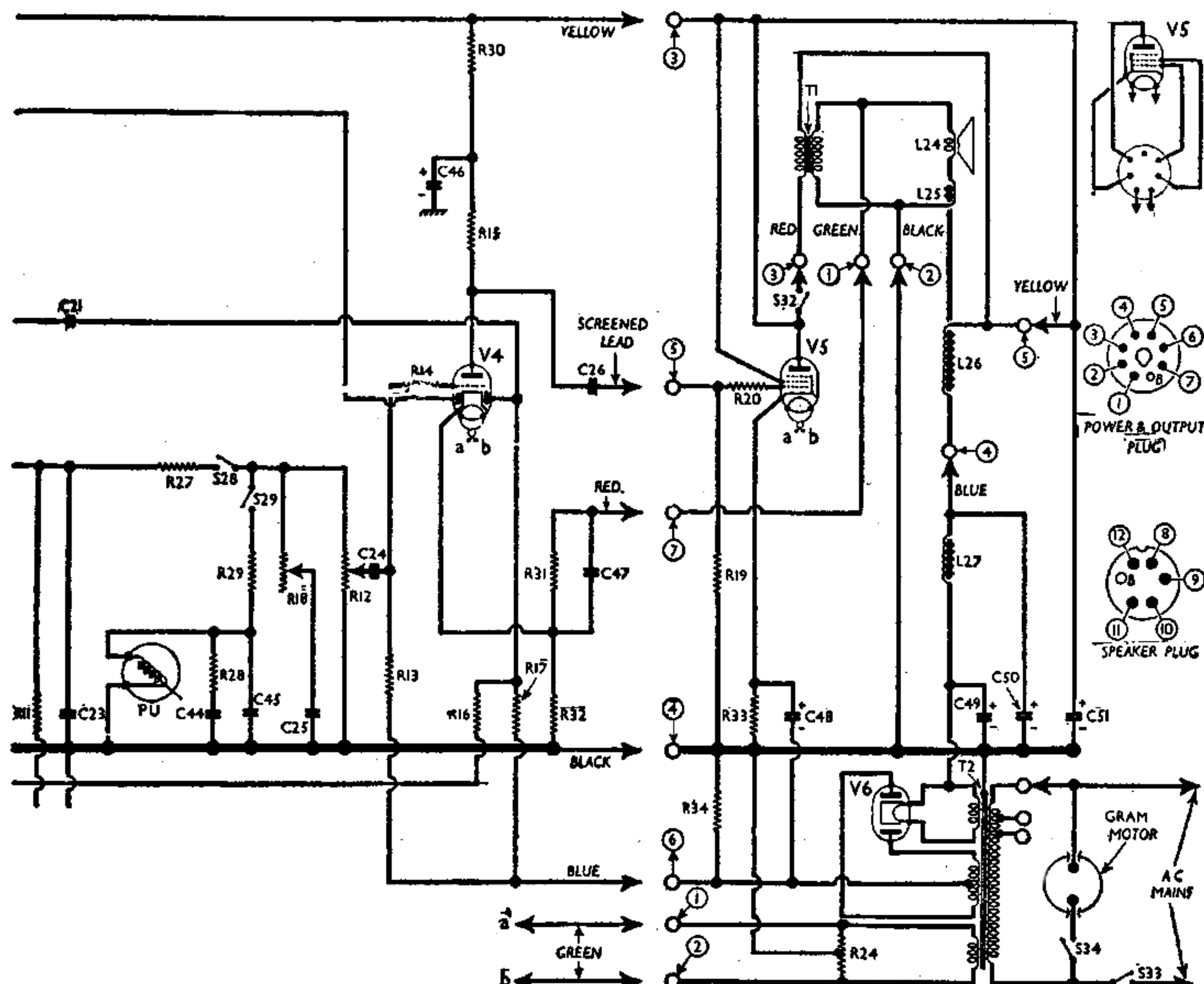
The main circuit differences are that the pick-up is fed in via a scratch filter, the tone control is across the volume control, a decoupling circuit is added to V4 anode circuit, negative feed-back is introduced, an IHC pentode output valve replaces the directly heated triode, the smoothing circuit is augmented by the addition of a choke and a condenser, and the speaker field is in the HT positive circuit.

Physically, a different speaker, output transformer and mains transformer are used, and the chassis are differently disposed. The main chassis is mounted vertically in the radiogram cabinet, while the power unit is mounted on the floor of the cabinet. A lead with a two-pin plug connector carries the mains switch S33 to the control panel at the top of the cabinet.

Since V5 is now a 4 V IHC valve, its heaters are connected across the a, b heater secondary, and the 2 V c, d secondary is dispensed with.

**Chassis Divergencies.**—Some model 67 receivers employ variable selectivity, as shown in the model 74, while in others this is omitted.

**Resistance R4.**—This component is not shown in the accompanying circuit diagram, but in the model 74 its value was 300 Ω. In the model 67 its value is 200 Ω.



Circuit diagram of the AF and power circuit of the Cossor 67 and 67A radiograms.