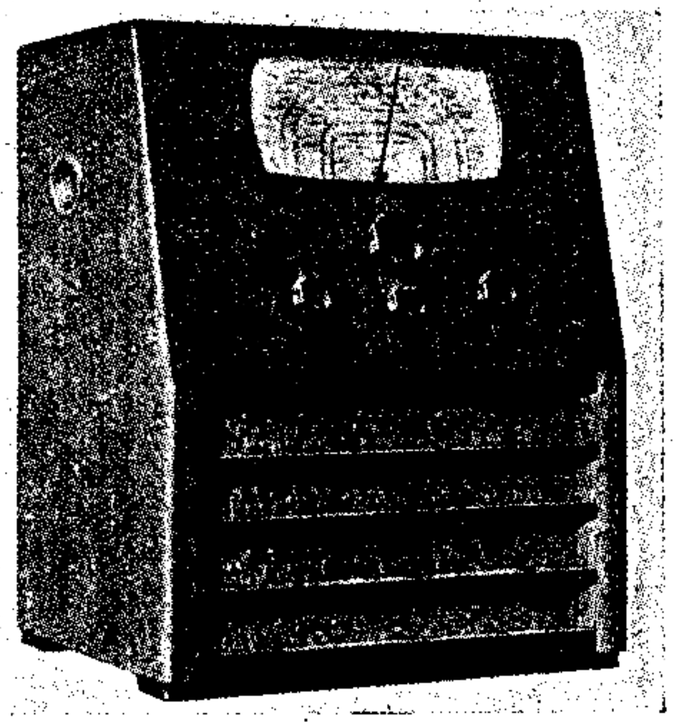
REVISED ISSUE OF
SERVICE SHEET No. 210

COSSOR 3864
AND 837, 3764, 6864



The Cossor 3864.

FOUR bands are covered by the Cossor 3864 5-valve (plus rectifier) AC superhet, the two short-wave ranges being 13-40 metres (referred to below as SW1) and 38-100 metres (SW2). The chassis has a signal frequency amplifier, provision for using a doublet aerial, and sockets for a gramophone pick-up and extension speaker. A jack switch permits the internal speaker to be disconnected.

An identical chassis is employed in the model 6864. This receiver is also of the table type, but its cabinet is different from that of the 3864.

Except for a small modification in the pick-up input circuit, the chassis of the 837 radiogram is the same as that in the 3864, while a third table model, 3764, employs a chassis like that in the 837. This *Service Sheet* was prepared from a 3864, but the differences in the last two models are explained overleaf.

Release dates and original prices: 3864, 1937, £14 14s.; 6864, 1937, £16 16s.; 837, 1936, £23 2s.; 3764, 1936, £15 15s.

CIRCUIT DESCRIPTION

Aerial input **(A1)** via coupling coils **L1** (SW1), **L3** (SW2), **L5** (MW) and **L7** (LW) to single-tuned circuits **L2** (SW1), **L4** (SW2), **L6** (MW), **L8** (LW) and **C36. A2** socket provided for use where a doublet aerial is employed; otherwise it is connected to the **E** socket.

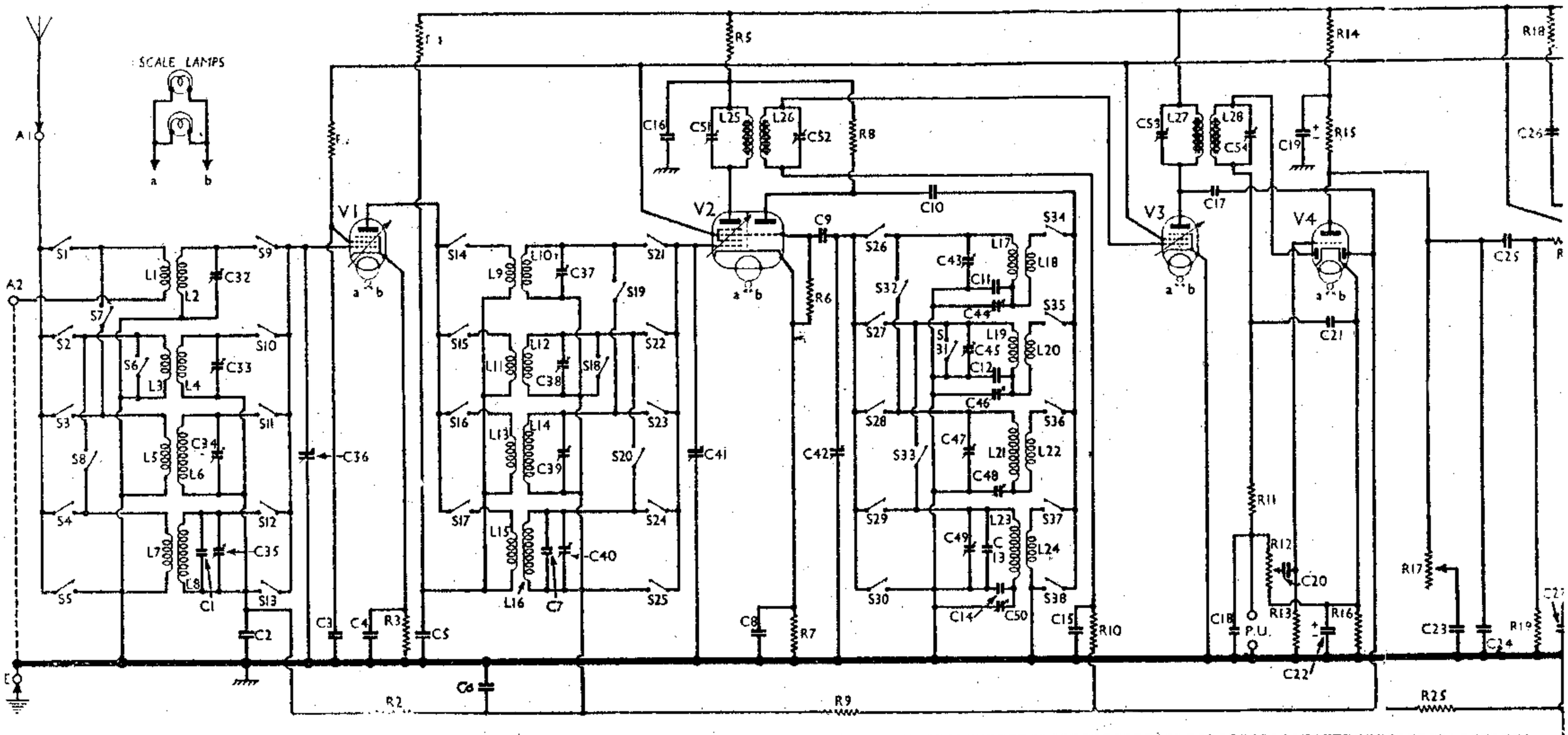
First valve **(V1, Cossor metallised MVS/Pen)** is a variable-mu RF pentode signal frequency amplifier, with tuned-secondary transformer couplings **L9, L10, C41** (SW1), **L11, L12, C41** (SW2), **L13, L14, C41** (MW) and **L15, L16, C41** (LW) to second valve **(V2, Cossor metallised 41STH)**, a triode-hexode operating as frequency changer with internal coupling.

Triode oscillator grid coils **L17** (SW1), **L19** (SW2), **L21** (MW) and **L23** (LW) are tuned by **C42.** Parallel trimming by **C43** (SW1), **C45** (SW2), **C47** (MW) and **C13, C49** (LW); series tracking by **C11, C44** (SW1), **C12, C46** (SW2), **C48** (MW) and **C14, C50** (LW). Reaction coupling from anode via coils **L18** (SW1), **L20** (SW2), **L22** (MW) and **L24** (LW), with additional coupling on the first three bands across the trackers, which are common to grid and anode circuits.

Third valve **(V3, Cossor metallised MVS/Pen)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary iron-cored transformer couplings **C51, L25, L26, C52** and **C53, L27, L28, C54.**

Intermediate frequency 465 KC/S.

Diode second detector forms part of double diode triode valve **(V4, Cossor metallised DDT).** Audio-frequency component in rectified output is developed across manual volume control **R12,** which also operates as load resistance, and



Circuit diagram of the Cossor 3864 four-band superhet. Aerial sockets **A1** and **A2** are provided for use with a doublet aerial. For use with an ordinary aerial, **A1** becomes the aerial socket, and **A2** is connected to socket **E** by means of a metal link which is represented in our diagram by a dotted line. The circuit diagram of model 6864 is identical with that above, but in the radiogram version 837 and in model 3764 the pick-up input circuit is modified. The differences are explained overleaf, where illustrations of these last three models are also shown.

passed via coupling condenser **C20** to CG of triode section, which operates as AF amplifier. Provision for gramophone pick-up across **R12, C22.** IF filtering by **C21, R11** and **C18** in diode circuit, and **C24** in triode anode circuit.

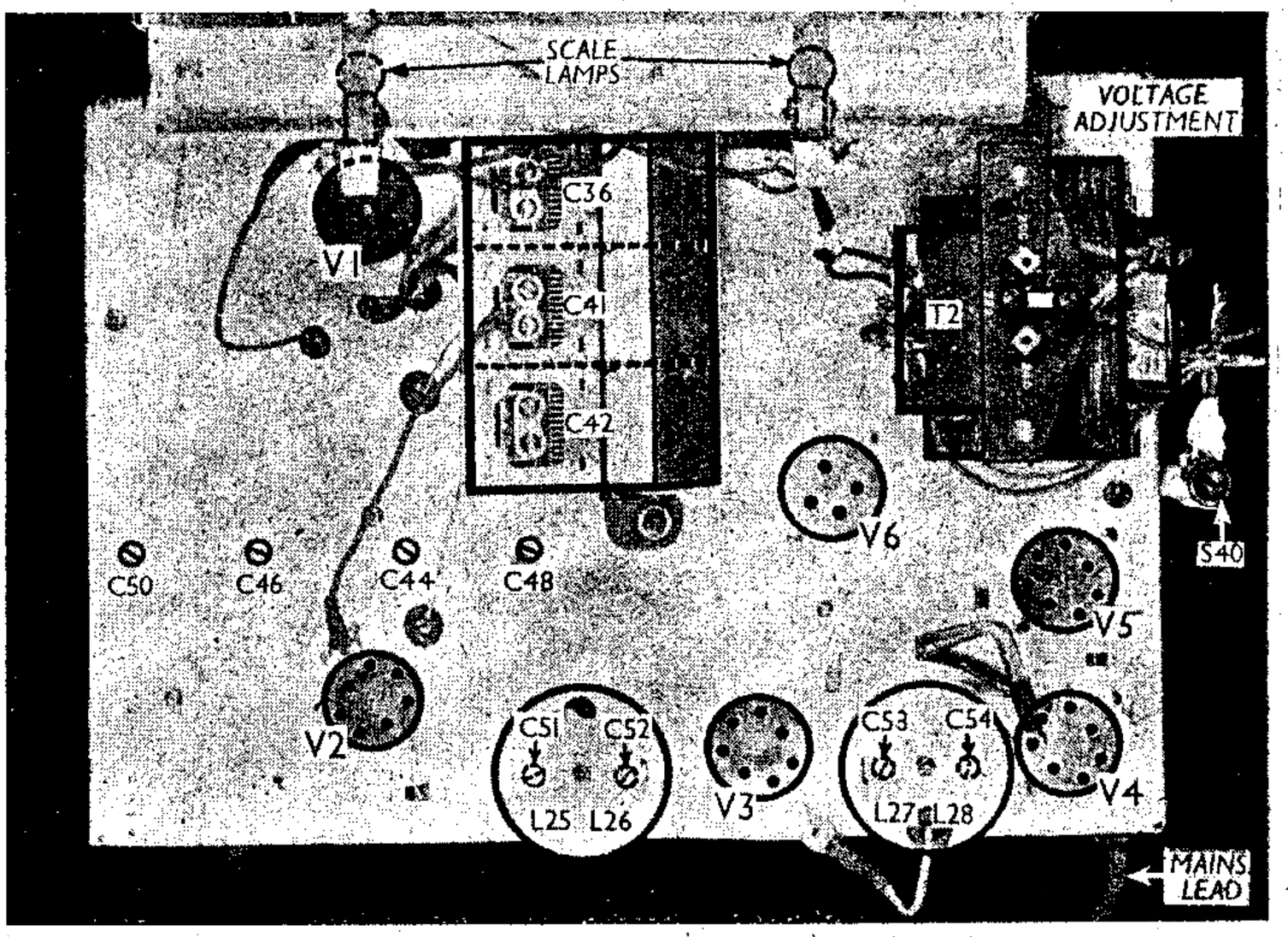
Second diode of **V4,** fed from **V3** anode via **C17,** provides DC potential which is developed across **R25** and fed back through decoupling circuits as GB to RF (except on SW1), FC and IF valves, giving automatic volume control. Delay voltage is obtained from drop across **R24** in HT negative line.

Resistance-capacity coupling by **R15, C25, R19,** via grid stopper **R20,** between **V4** triode and pentode output valve **(V5, Cossor 42 MP/Pen).** Fixed tone correction in anode circuit by **R18, C26, C28;** variable tone control in anode circuit of **V4** triode by **R17, C23.** Provision for connection of high impedance external speaker across primary of **T1. S39** is a jack for disconnecting the internal speaker if required. It opens when the external speaker plug is pushed right home.

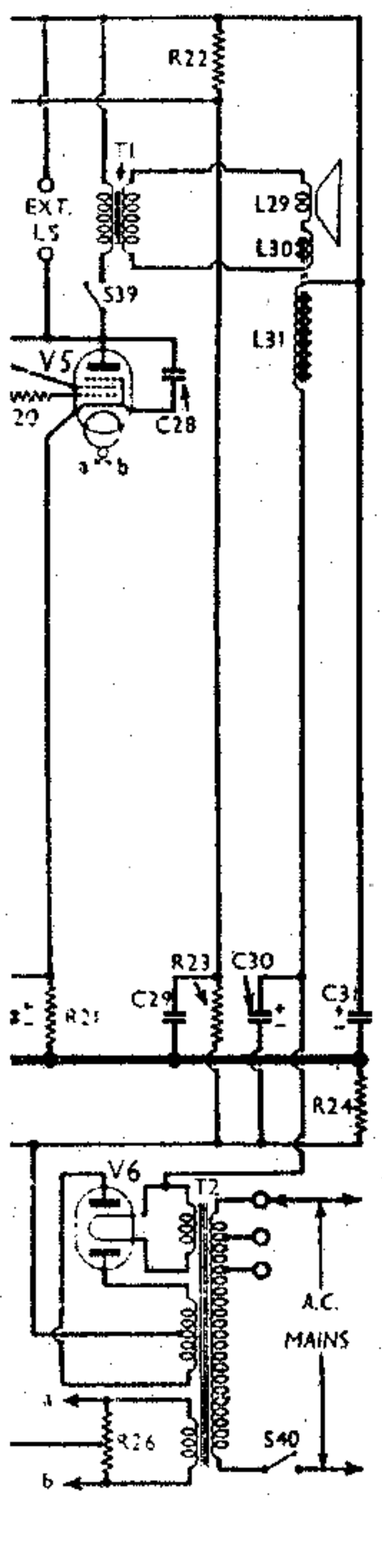
HT current is supplied by full wave rectifying valve **(V6, Cossor 442 BU).** Smoothing by speaker field **L31** and dry electrolytic condensers **C30, C31.**

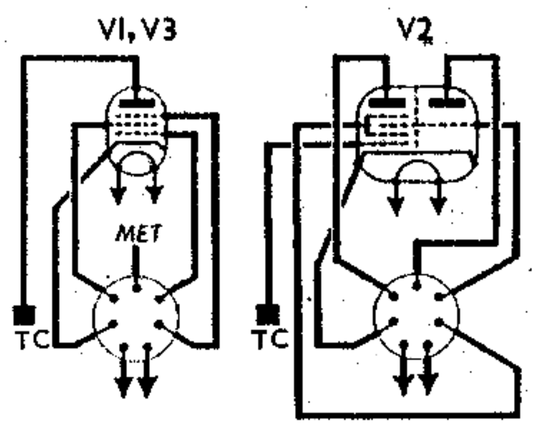
VALVE ANALYSIS

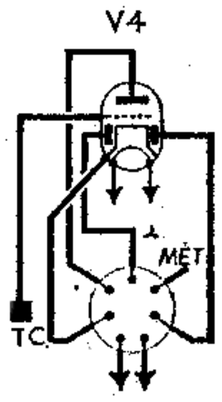
Valve voltages and currents in the table (col. 5) are those measured in our receiver when it was operating on mains of 230 V, using the 220 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

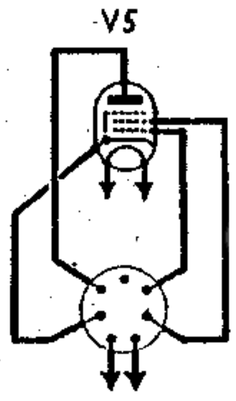


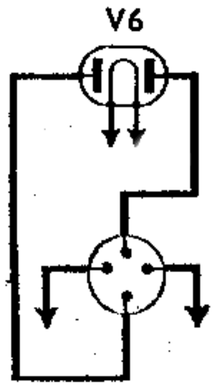
Plain view of the chassis. The mains switch **S40** is shown here, but actually it is fitted to the side of the cabinet. The four oscillator tracker adjustments are seen through holes in the chassis deck, just above **V2** holder.











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 MVS/Pen ...	260	1·5	90	0·7.
V2 41STH	240	1·5	100	3.2
	oscillator			
	80	5.7		
V3 MVS/Pen ...	270	4.6	100	1·0
V4 DDT	120	1·4	—	—
V5 42MP/Pen ...	250	35·0	270	6·5
V6 442BU	340†	—	—	—

† Each anode, A.C.

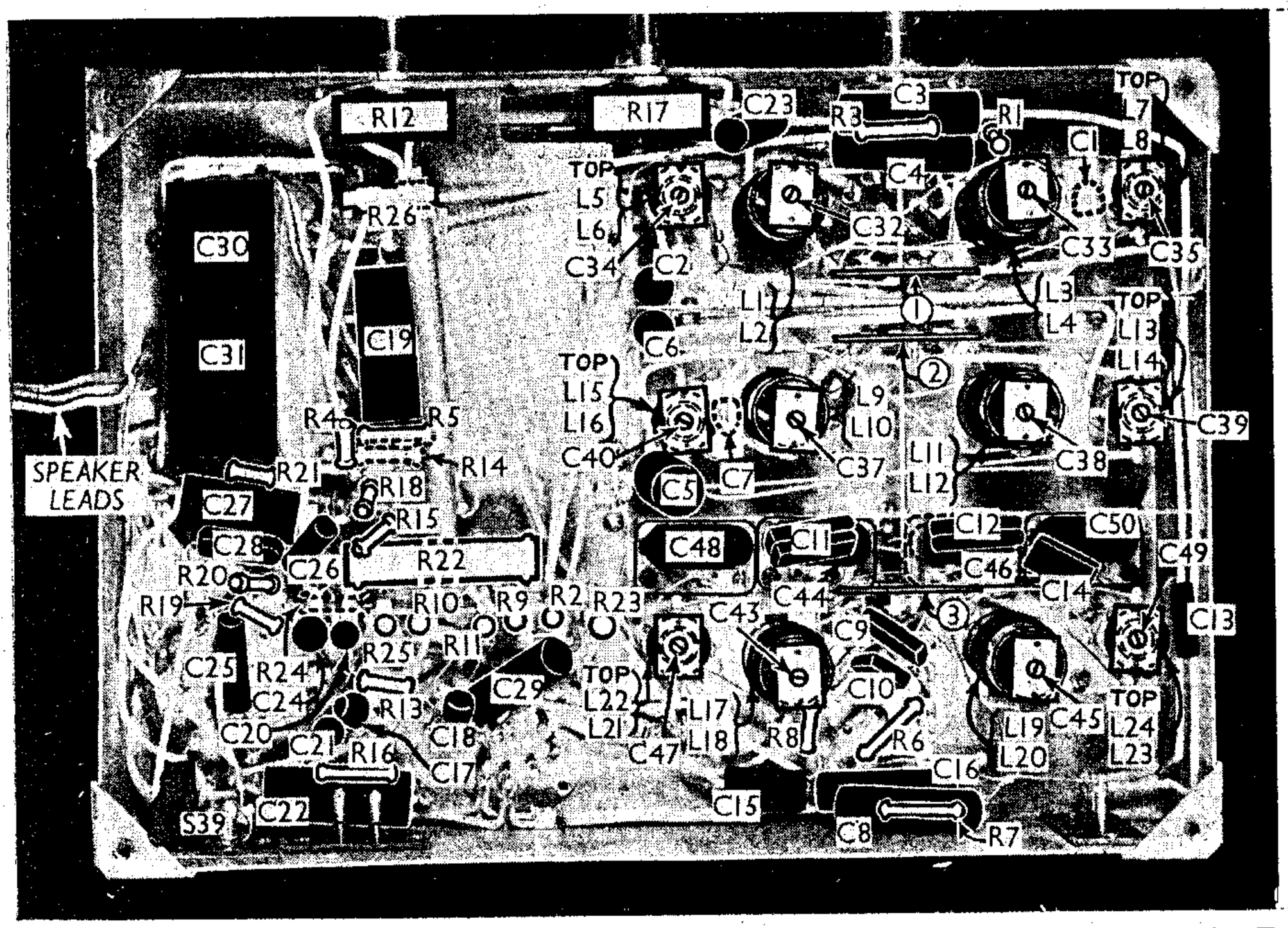
COMPONENTS AND VALUES

RESISTANCES		Values Ohms
R1	V1 SG and HT feed ...	4,000
R2	V1 CG decoupling	1,000,000
R3	V1 fixed GB resistance ...	750
R4	V1 anode decoupling ...	4,000
R5	V2 anodes decoupling ...	4,000
R6	V2 osc. CG resistance ...	25,000
R7	V2 fixed GB resistance ...	300
R8	V2 osc. anode HT feed ...	30,000
R9	AVC line decoupling ...	1,000,000
R10	V3 CG decoupling ...	2,000,000
R11	Part of IF filter	50,000
R12	Manual volume control; V4 signal diode load ...	500,000
R13	V4 triode CG resistance ...	1,000,000
R14	V4 triode anode decoupling	50,000
R15	V4 triode anode load ...	50,000
R16	V4 GB resistance	2,000
R17	Variable tone control ...	20,000
R18	Part tone corrector ...	10,000
R19	V5 CG resistance	250,000
R20	V5 grid stopper	100,000
R21	V5 GB resistance ...	150
R22	V1, V2, V3 SG's HT potential divider	10,000
R23		8,000
R24	AVC delay resistance ...	30
R25	V4 AVC diode load ...	1,000,000
R26	Hum neut. pot., total* ...	25

* Centre-tapped.

CONDENSERS		Values (μF)
C1	Aerial LW fixed trimmer	0·00004
C2	V1 CG decoupling ...	0·05
C3	V1 SG by-pass	0·1
C4	V1 cathode by-pass ...	0·1
C5	V1 anode RF by-pass ...	0·25
C6	AVC line decoupling ...	0·05
C7	RF trans. fixed trimmer	0·00005
C8	V2 cathode by-pass ...	0·1
C9	V2 osc. CG condenser ...	0·0001
C10	V2 osc. anode coupling ...	0·002
C11	Osc. SW1 fixed tracker ...	0·0032
C12	Osc. SW2 fixed tracker ...	0.001475
C13	Osc. LW fixed trimmer ...	0·00008
C14	Osc. LW fixed tracker ...	0·00008
C15	V3 CG decoupling ...	0·05
C16	V2 anodes decoupling ...	0·1
C17	Coupling to V4 AVC diode	0·00005
C18	IF by-pass	0·00005
C19*	V4 anode decoupling ...	2·0
C20	AF coupling to V4 triode	0·01
C21	IF by-pass	0·00005
C22*	V4 cathode by-pass ...	25·0
C23	Part variable tone control	0·03
C24	IF by-pass	0·001
C25	AF Coupling to V5 ...	0·01
C26	Part of tone corrector ...	0·01
C27*	V5 cathode by-pass ...	25·0
C28	V5 anode by-pass ...	0·0005
C29	V2, V3 SG's decoupling...	0·1
C30*	HT smoothing condensers	8·0
C31*		8·0
C32‡	Aerial SW1 trimmer ...	—
C33‡	Aerial SW2 trimmer ...	—
C34‡	Aerial MW trimmer ...	—
C35‡	Aerial LW trimmer ...	—
C36†	Aerial circuit tuning ...	—
C37‡	RF trans. SW1 trimmer	—
C38‡	RF trans SW2 trimmer.	—
C39‡	RF trans. MW trimmer	—
C40‡	RF trans. LW trimmer ...	—
C41†	RF transformer tuning ...	—
C42†	Osc. circuit tuning ...	—
C43‡	Osc. circ. SW1 trimmer ...	—
C44‡	Osc. circ. SW1 tracker ...	—
C45‡	Osc. circ. SW2 trimmer ...	—
C46‡	Osc. circ. SW2 tracker ...	—
C47‡	Osc. circ. MW trimmer ...	—
C48‡	Osc. circ. MW tracker ...	—
C49‡	Osc. circ. LW trimmer ...	—
C50‡	Osc. circ. LW tracker ...	—
C51‡	1st IF trans. pri. tuning...	—
C52‡	1st IF trans. sec. tuning	—
C53‡	2nd IF trans. pri. tuning	—
C54‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

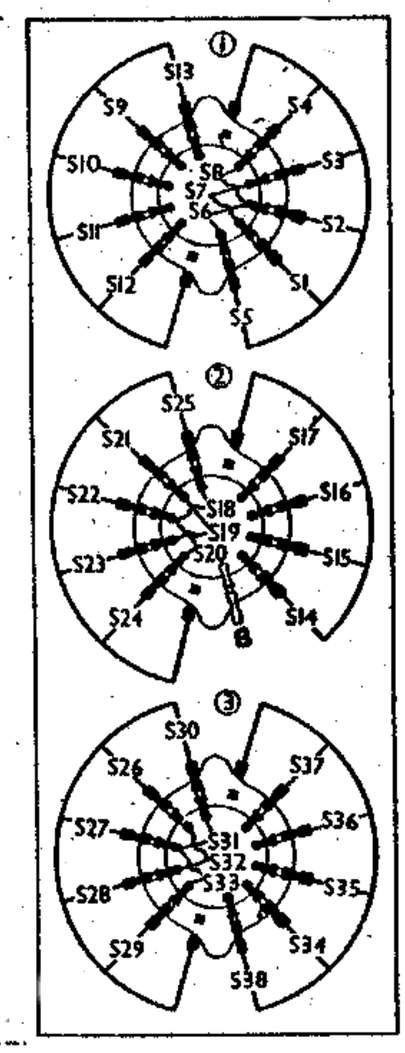


Under - chassis view. The components associated with the three variable-tuned circuits are seen grouped around their respective switch units, the groups being separated by metal screening partitions. The switch units are indicated by numbers in circles and arrows. C1 and C7 are shown dotted, as they are enclosed in insulating sleeving.

OTHER COMPONENTS			Approx. Values (Ohms)
L1	Aerial SW1 coupling	...	0·05
L2	Aerial SW1 tuning	...	0·05
L3	Aerial SW2 coupling	...	0·1
L4	Aerial SW2 tuning	...	0·075
L5	Aerial MW coupling	...	28·0
L6	Aerial MW tuning	...	4·5
L7	Aerial LW coupling	...	140·0
L8	Aerial LW tuning	...	19·5
L9	RF trans. SW1 pri.	...	0·1
L10	RF trans. SW1 sec.	...	Very low
L11	RF trans. SW2 pri.	...	0·2
L12	RF trans. SW2 sec.	...	0·05
L13	RF trans. MW pri.	...	2·0
L14	RF trans. MW sec.	...	2·75
L15	RF trans. LW pri.	...	7·5
L16	RF trans. LW sec.	...	19·0
L17	Osc. SW1 tuning	...	Very low
L18	Osc. SW1 reaction	...	0·05
L19	Osc. SW 2 tuning	...	0·05
L20	Osc. SW2 reaction	...	0·1
L21	Osc. MW tuning	...	1·0
L22	Osc. MW reaction	...	0·4
L23	Osc. LW tuning	...	8·5
L24	Osc. LW reaction	...	3·0
L25	1st IF trans. Pri.	...	2·5
L26	1st IF trans. Sec.	...	2·5
L27	2nd IF trans. Pri.	...	2·5
L28	2nd IF trans. Sec.	...	2·5
L29	Speaker speech coil	...	2·0
L30	Hum neutralising coil	...	0·05
L31	Speaker field coil	...	1500·0
T1	Speaker input trans. Pri.		650·0
	Speaker input trans. Sec.		0·4
T2	Mains trans. Pri. (total)		20·0
	Mains trans. Heater sec.		0·1
	Mains trans. Rect. heat. sec.		0.2
	Mains trans. HT sec. (total)		350·0
S1-S38	Waveband switches	...	—
S39	Internal speaker switch	...	—
S40	Mains switch	...	—

Switch Diagrams and Table

Switch diagrams as seen from the rear of the underside of the chassis. The switches marked at the centre of each unit are formed by flat contacts on the rotors which short certain of the fixed contacts.



Switch	Gram.	SW1	SW2	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	—	—	—	—
S14	—	C	—	—	—
S15	—	—	C	—	—
S16	—	—	—	C	—
S17	—	—	—	—	C
S18	—	C	—	—	—
S19	—	—	C	—	—
S20	—	—	—	C	—
S21	—	C	—	—	—
S22	—	—	C	—	—
S23	—	—	—	C	—
S24	—	—	—	—	C
S25	C	—	—	—	—
S26	—	C	—	—	—
S27	—	—	C	—	—
S28	—	—	—	C	—
S29	—	—	—	—	C
S30	C	—	—	—	—
S31	—	C	—	—	—
S32	—	—	C	—	—
S33	—	—	—	C	—
S34	—	C	—	—	—
S35	—	—	C	—	—
S36	—	—	—	C	—
S37	—	—	—	—	C
S38	C	—	—	—	—

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws);

remove the mains switch (nut and locknut) from the cupped escutcheon on the side of the cabinet;

remove the two bolts (with nuts and washers) holding the chassis platform to the wooden batten across the back of the cabinet;

disconnect from the screw terminals on the speaker unit the leads connecting it to chassis.

If the chassis is tilted upwards at the rear, it can now be withdrawn.

To remove the platform from the chassis, remove the four fixing bolts (with metal and rubber washers) holding it to the chassis.

When replacing, note that there is a hole drilled in one side of the platform which should be positioned over the trimmer **C49,** and do not forget to replace the large rubber washers between the chassis and the platform.

Connect the speaker leads as follows, numbering the terminals on the speaker unit from top to bottom: 1, red; 2, blue; 3, yellow.

Removing Speaker.—Disconnect the leads, and slacken the nuts holding the four clamps to the rim of the speaker.

When replacing, see that the transformer is on the right, and connect the leads as previously described.

GENERAL NOTES

Switches.—S1-S38 are the waveband switches, in three ganged rotary units beneath the chassis. They are indicated in our under-chassis view, and shown in detail in the diagrams in col. 2. The table (col. 3) gives the switch positions for the five control settings, starting from the fully anti-clockwise position. A dash indicates open, and **C,** closed.

S39 is the internal speaker switch, of the jack type, which opens when an external speaker is plugged fully into the sockets provided at the rear of the chassis.

S40 is the QMB mains switch, which is mounted at the left-hand side of the cabinet.

Coils.—All the RF and oscillator coils are in pairs on tubular formers in screened compartments beneath the chassis, with their parallel pre-set trimmers mounted above them. There is one trimmer to each pair of coils. The coils are all indicated in the under-chassis view. In the case of the SW1 and SW2 bands, the two coils on each former are inter-wound, but in all cases the tuned coil is of thick bare copper wire.

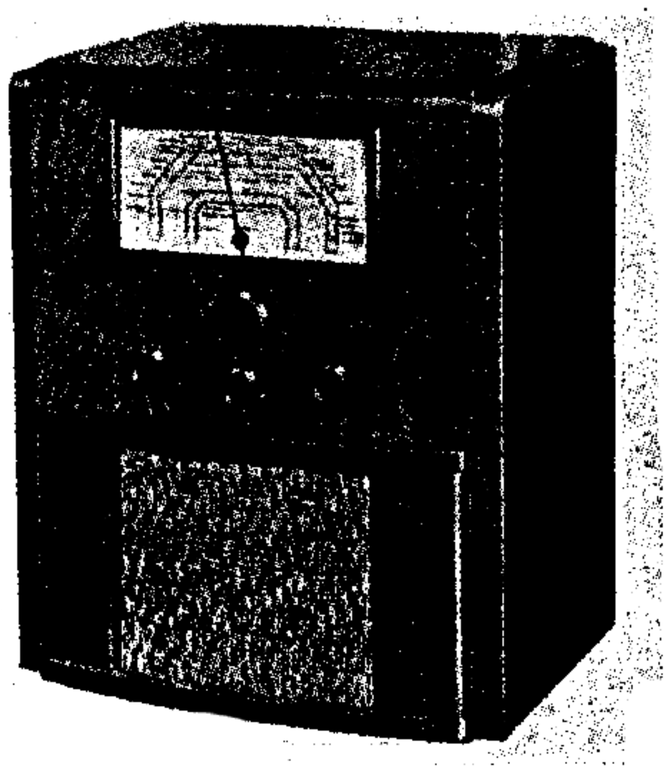
The IF transformers, **L25, L26** and **L27, L28** are in two screened units on the chassis deck, with their trimmers.

Scale Lamps.—These are two Osram MES types, rated at 6.2 V, 0.3 A. They are sprayed white in our chassis.

External Speaker.—Provision is made at the rear of the chassis for a high impedance (8,000 O) external speaker. By pushing its plug fully home, **S39** opens and disconnects the primary of **T1,** thus muting the internal speaker.

Osc. Trackers.—The variable trackers for the four bands are mounted beneath the chassis, but are adjustable from above through holes in the chassis deck. The fixed trackers, **C11, C12, C14,** are beneath the chassis, and, in the case of **C11** and **C12,** consist of two condensers in parallel to make up the required capacity.

Condensers C30, C31.—These are two 8 μF dry electrolytics in a single carton beneath the chassis, but they do not use a common connection. **C30** has a black negative and red positive lead and **C31** a blue negative and yellow positive lead.



The appearance of model 6864.

Resistance R20.—This may not occur in early chassis, where it is omitted.

Aerial Arrangements.—Socket **A1** is for use with a normal aerial, and in this case **A2** *must* be connected to **E.** A metal strap is provided for this purpose.

A2 is only in use when a doublet aerial is employed, the connections from this going to **A1** and **A2,** and the metal strap being removed. The dotted connection in our circuit represents the strap in use.

837, 3764 MODIFICATIONS

Model 837 is the radiogram version of the 3864, while the 3764 employs the same chassis as is used in the 837. The differences between the 3864 and the 837, 3764 versions are confined to the cabinet design and the pick-up input circuit.

The differences in the cabinets can be seen from the illustrations of the 837 and 3764, which, with the 6864, are reproduced on this page, and can be compared with that of the 3864 overleaf.

Electrically, the differences are very small : **R12** is replaced by a 1,000,000 O centre-tapped potentiometer, the "radio" half of which is connected exactly as is

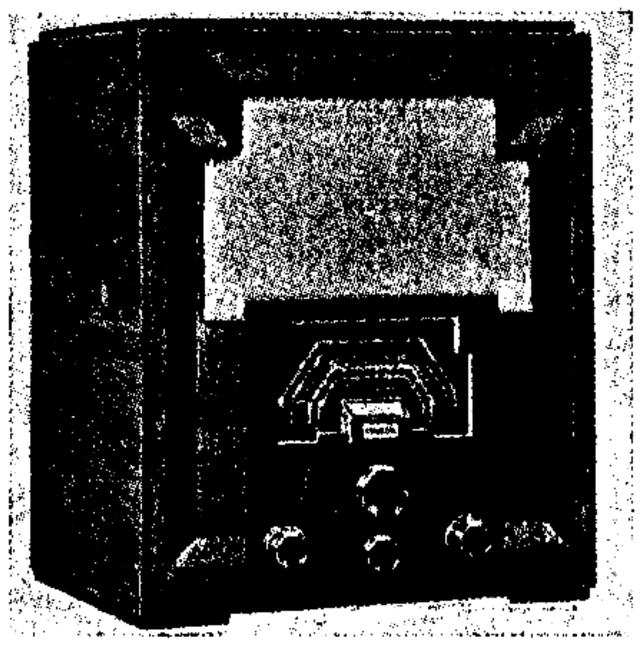


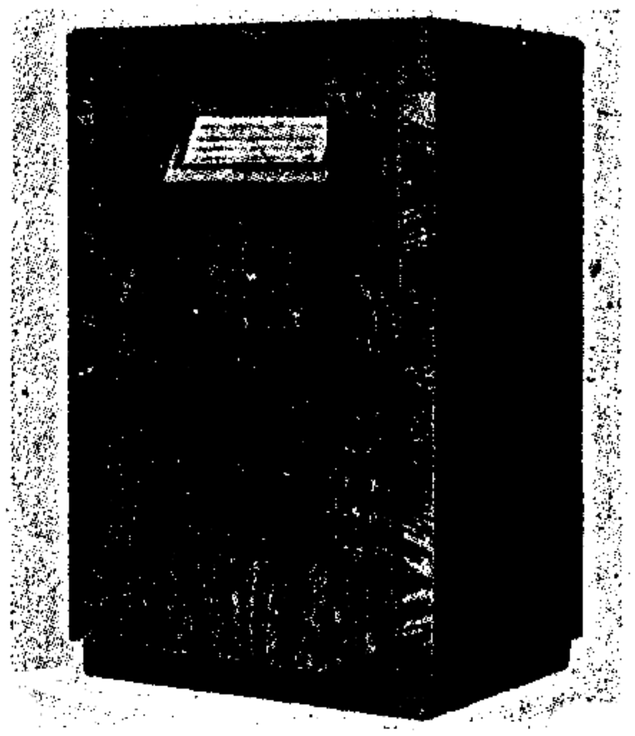
Table model 3764.

R12 in our diagram, the slider still going to **C20.** The pick-up sockets, however, are now connected directly across the "gram" half of the potentiometer, which thus becomes a "fader," and the change-over from radio to gram is accomplished as the slider of **R12** passes the centre-tap, although the control switch should still be turned to the "gram" position to mute radio for pick-up operation.

REPLACING DRIVE CORD ON 837

The length of cord required is approximately 6ft. 6in., which allows about 1½in. for the loop and knot at each end. Attach the two springs to the cord ends. Pass one spring up behind the front bar and slip on to the hook A on the drive disc (see sketch in col. 6). Slip the cord under the friction drive, behind the dial frame, and on to the narrow drum forming part of the drive disc. Hold the cord very lightly and allow it to slip through the fingers while passing round the pulleys in the direction of the arrows shown in the diagram. After passing the last pulley, pass the second spring behind the friction drive, up behind the front bar, slip on to the narrow drum, and finally slip the spring on to the hook B on the drive disc. It is important to note that the tension on the cord must be very light. If there is too much tension it may be found that some back-lash is noticeable.

To fit the pointer, rotate the tuning condenser fully in an anti-clockwise direction



The 837 radiogram.

and clip the pointer on to the cord so that it coincides with the lowest wavelength end of the tuning scale. Squeeze the pointer clips firmly on the cord with small pliers.

NOTE.—On some drives there is only one tension spring. In these cases the cord is fitted as shown above, only it must be about ¾in. longer.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator to hexode control grid (top cap) of **V2** and chassis, feed in a 465 KC/S (645.16 m) signal and adjust **C54, C53, C52** and **C51** for maximum output in each case, reducing input, if necessary, to avoid AVC action.

RF and Oscillator Stages.—First see that scale pointer is horizontal when gang is at maximum or minimum.

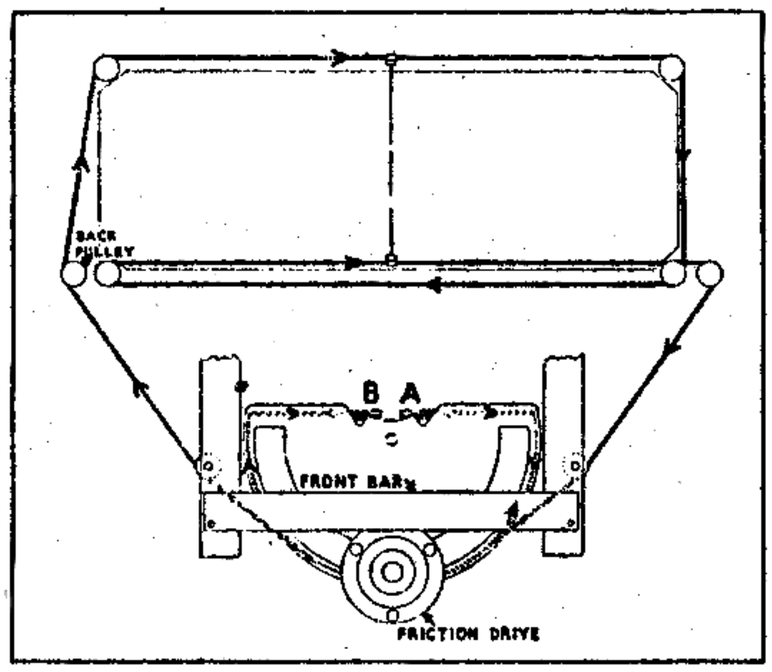
Connect signal generator to **A1** and **E** sockets (**A2** being connected to **E**).

SW1.—Feed in a 20 MC/S (15 m) signal, tune to 20 MC/S on scale, and adjust **C43, C37** and **C32** for maximum output. Feed in a 9 MC/S (33 m) signal, tune to 9 MC/S on scale, and adjust **C44** for maximum output, rocking the gang slightly if necessary for optimum output.

SW2.—Proceed as above, but adjust **C45, C38** and **C33** at 7 MC/S (43 m), and **C46** at 3 MC/S (100 m).

MW.—Proceed as above, but adjust **C47, C39** and **C34** at 1,400 KC/S (214 m), and **C48** at 575 KC/S (522 m).

LW.—Proceed as above, but adjust **C49, C40** and **C35** at 300 KC/S (1,000 m), and **C50** at 160 KC/S (1,875 m).



Sketch showing the method of replacing the drive cord in the 837 radiogram.

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