

NUMBER SEVENTY-SIX

'TRADER' SERVICE SHEETS

COSSOR 364 SUPERHET (AND 736 RADIO-GRAMOPHONE)

COSSOR'S 364 superhet receiver is a 4-valve (plus rectifier) model for A.C. mains of 200-250 V, 40-100 c.p.s. It employs a heptode frequency changer and a separate double diode as second detector, and sockets are provided for an extension speaker and a gramophone pick-up. A feature of the receiver is Cossor's "Thermometer" twin-scale tuning dial.

A similar chassis is embodied in the 736 table radio-gramophone, which, however, is fitted with a tone control on the motor board.

CIRCUIT DESCRIPTION

Aerial input via fixed series condenser **C1** to coupling coils **L1, L2**, and also via small fixed condenser **C2** to primary of inductively-coupled band-pass filter. Primary **L3, L4** tuned by **C23**; secondary **L5, L6** tuned by **C25**; coupling by coils **L7, L8**.

First valve (**V1, Cossor metallised 41MPG**) is a heptode (pentagrid) operating as frequency changer with electron

secondary transformer couplings **L14, L15** and **L16, L17**.

Intermediate frequency 128 KC/S.

Diode second detector forms part of double diode valve (**V3, Cossor DD4**). Second diode, fed from **V2** anode by condenser **C16**, provides D.C. potential which is developed across load resistance **R10** and fed back through decoupling circuit **R9, C6** as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along resistances **R14, R15, R16**.

Audio-frequency component in output from signal diode is developed across manual volume control **R8** and passed via coupling condenser **C17** to output pentode (**V4, Cossor 42MP-Pen**). I.F. filtering in grid circuit by stoppers **R11, R12** and by-pass **C18**. Fixed tone compensation in anode circuit by condenser **C19**. Provision for connection of high-impedance external speaker across primary of internal speaker transformer **T1**.

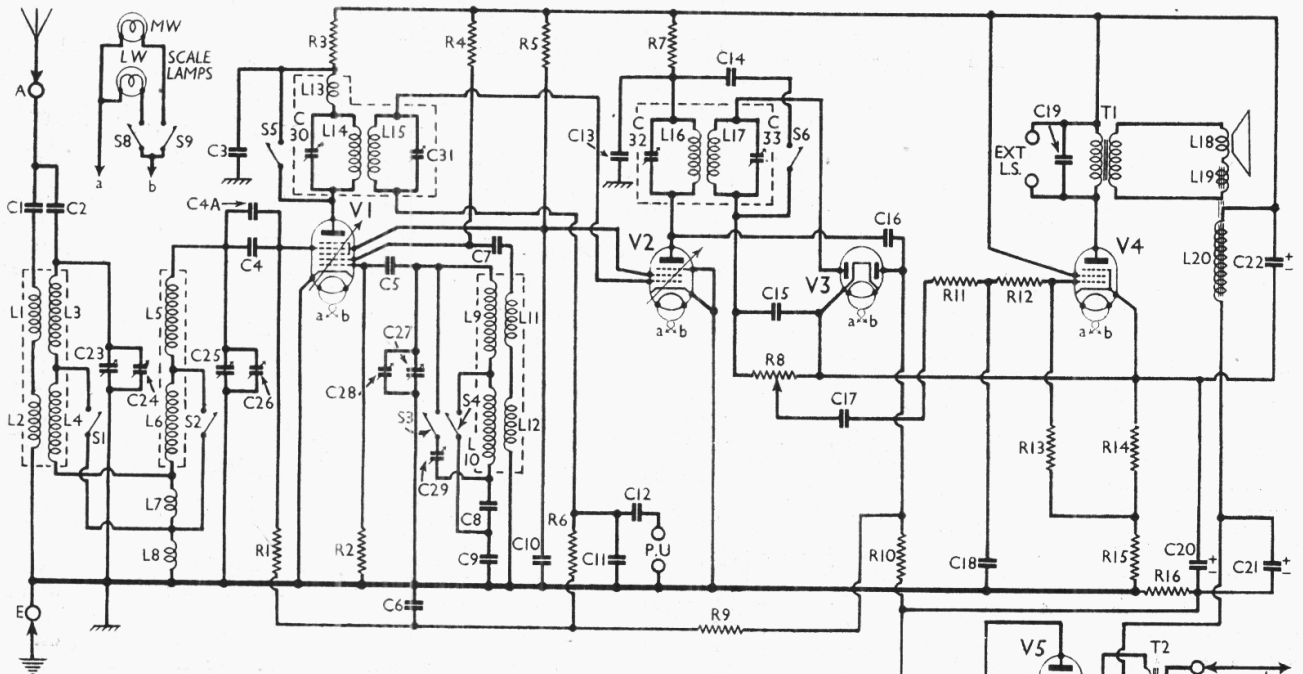
Provision is made for connection of gramophone pick-up in grid circuit of I.F. valve **V2** which, on gram., operates as L.F. amplifier. Switch **S8** closes and connects anode coupling condenser **C14** to top end of volume control **R8**, while switch **S5** short-circuits primary of first I.F. transformer and thus prevents radio break-through on gram.

H.T. current is supplied by full-wave rectifying valve (**V5, Cossor 442 BU**). Smoothing by speaker field winding **L20** and dry electrolytic condensers **C21, C22**.

COMPONENTS AND VALUES

Resistances		Values (ohms)	
R1	V1 tet. cont. grid resistance ..	1,000,000	
R2	V1 osc. grid resistance ..	50,000	
R3	V1 tet. anode decoupling ..	5,000	
R4	V1 osc. anode resistance ..	50,000	
R5	V1 and V2 S.G.'s H.T. feed ..	25,000	
R6	V2 cont. grid decoupling ..	1,000,000	
R7	V2 anode decoupling ..	5,000	
R8	Manual volume control ..	500,000*	
R9	A.V.C. line decoupling ..	1,000,000	
R10	V3 A.V.C. diode load ..	1,000,000	
R11	V4 grid I.F. stoppers ..	50,000	
R12			
R13	V4 grid resistance ..	2,000,000	
R14	V4 G.B. and A.V.C. delay voltage resistances	130	
R15			250
R16			25

* May be 1,000,000 Ω in some chassis.



coupling. Oscillator grid tuning coils **L9, L10** tuned by **C27**; anode reaction coils **L11, L12**; tracking by fixed condensers **C8** (L.W.) and **C9** (M.W.).

Second valve, a variable- μ H.F. pentode (**V2, Cossor metallised MVS-Pen**) operates as intermediate frequency amplifier with tuned-primary tuned-

Circuit diagram of the Cossor Model 364 A.C. superhet. In the radio-gram model (736), the only difference is that a variable tone control circuit, comprising a fixed condenser and a variable resistance in series, is connected across **C19**.

Condensers		Values (μ F)
C1	Aerial series condenser	0.0005
C2	Capacitative aerial coupling to B.P. pri.	0.1
C3	V1 tet. anode decoupling	0.000025
C4	V1 tet. cont. grid condensers	0.01
C4A		0.002
C5	V1 osc. grid condenser	0.0002
C6	A.V.C. line decoupling	0.005
C7	V1 osc. anode condenser	0.01
C8	Osc. L.W. tracker	0.001
C9	Osc. M.W. tracker	0.002
C10	V1 and V2 S.G.'s by-pass	0.1
C11	V2 cont. grid decoupling	0.001
C12	Gram. pick-up coupling	0.01
C13	V2 anode decoupling	0.01
C14	L.F. coupling to R8 (gram.)	0.01
C15	I.F. by-pass	0.0002†
C16	Coupling to V3 A.V.C. diode	0.0001
C17	L.F. coupling to V4	0.002
C18	V4 grid I.F. by-pass	0.0001
C19	Fixed tone compensator	0.005
C20*	V4 cathode by-pass	25.0
C21*	H.T. smoothing	8.0
C22*		8.0
C23	Band-pass primary tuning	—
C24‡	Band-pass primary trimmer	—
C25‡	Band-pass secondary tuning	—
C26‡	Band-pass secondary trimmer	—
C27	Oscillator tuning	—
C28‡	Oscillator main trimmer	—
C29‡	Oscillator L.W. trimmer	—
C30‡	1st I.F. trans. pri. tuning	—
C31‡	1st I.F. trans. sec. tuning	—
C32‡	2nd I.F. trans. pri. tuning	—
C33‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Pre-set. ‡ 0.0001 μ F when R8 is 1,000,000 Ω . § Two condensers in parallel.

Other Components		Values (ohms)
L1	Aerial coupling coils	6.0
L2		7.0
L3		6.8
L4	Band-pass primary coils	14.0
L5		6.8
L6		14.0
L7	Band-pass secondary coils	0.2
L8		0.8
L9		4.0
L10	Oscillator tuning coils	9.0
L11		—
L12	Oscillator anode coils	8.5
L13	V1 anode S.W. choke	Very low
L14	1st I.F. trans.	Pri. 43.0
L15		Sec. 47.0
L16	2nd I.F. trans.	Pri. 43.0
L17		Sec. 47.0
L18	Speaker speech coil	1.8
L19	Hum neutralising coil	0.1
L20	Speaker field winding	2,000.0
T1	Speaker input trans.	Pri. 800.0
		Sec. 0.35
		Pri. total 45.0
T2	Mains trans.	Heater sec. 0.1
		Rect. fil. sec. 0.15
		H.T. sec. 1,100.0
Sr-S4	Waveband switches	—
S5	Radio muting switch (gram.)	—
S6	Radio-gram. change-over	—
S7	Mains switch	—
S8	L.W. scale lamp switch	—
S9	M.W. scale lamp switch	—

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and when removed (four bolts and washers), gives access to most of the under-chassis components.

Removing Chassis.—If it is necessary to remove the chassis from the cabinet,

remove the three control knobs (recessed grub-screws, two in the tuning knob), the back (five cheese-head screws and washers), the detachable bottom and the four cheese-head bolts with large washers and lock washers holding the chassis to the cabinet bottom.

Remove the two cleats holding the speaker leads to the sub-baffle (two large round-head wood screws) and the two cleats holding the dial lamp leads (two small round-head wood screws). Remove the scale lamps from their clips and the rectifier valve from its holder.

Remove the four large round-head wood screws holding the sub-baffle to the cabinet front and withdraw the baffle. The chassis can now be withdrawn by tilting it forward at an angle of about 45 degrees.

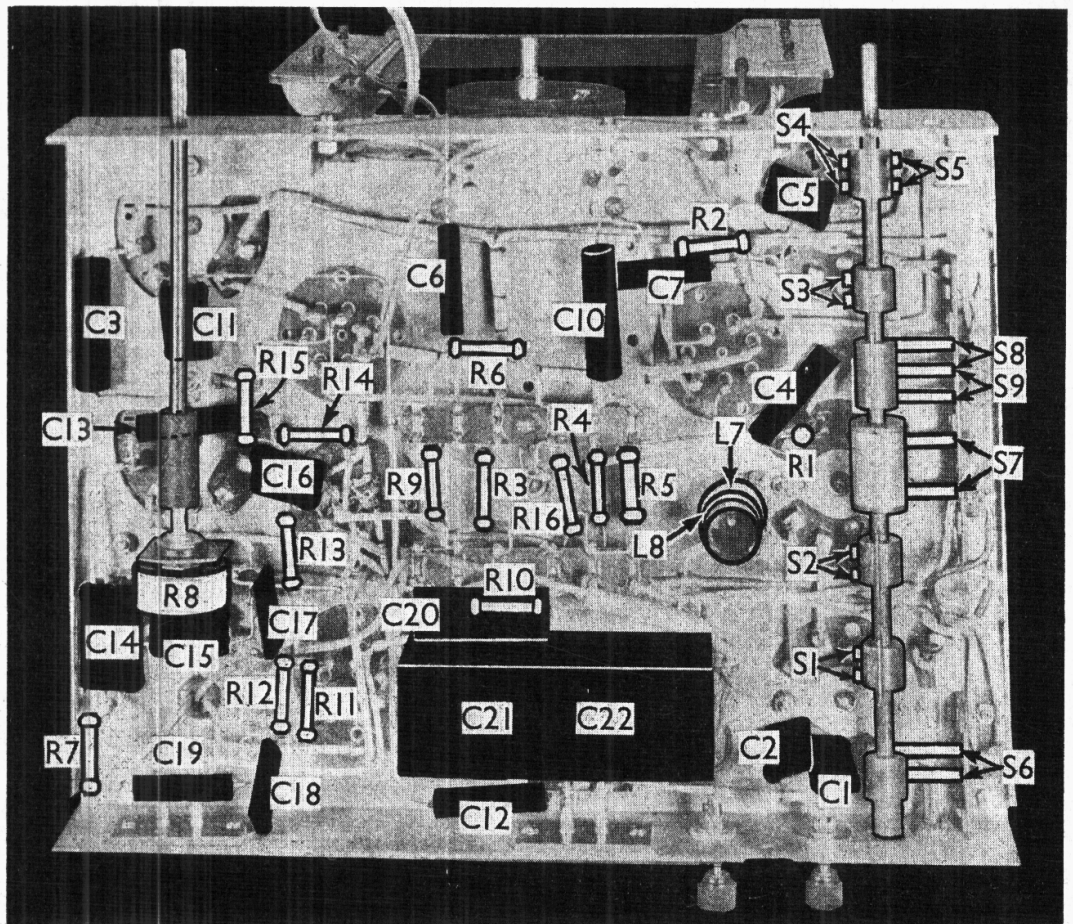
Removing Speaker.—To remove the speaker disconnect the leads (terminals). The speaker is fixed to the sub-baffle by rivets and Cossor suggest that if it is to be returned for service, it should be sent attached to the sub-baffle. When replacing, note that three of the terminals on the speaker are marked Y, B and R. The yellow, black and red leads should be connected to these respectively. The fourth terminal is blank.

VALVE ANALYSIS

Readings of valve voltages and currents given in the table overleaf were measured

(Continued overleaf)

Under-chassis view. The switches are in a unit extending from front to back of the chassis. S7 is the mains switch, not of the Q.M.B. type. S8 and S9 each have one common contact, and they control the scale lamps. L7 and L8, the band-pass coupling coils, are unscreened, and are wound on a tubular former. C20, C21 and C22 are all dry electrolytic condensers, the last two being in a single unit, but with completely separate connections.



COSSOR 364 (Continued)

with the receiver operating on A.C. mains of 225 V, with the transformer adjusted to the 220 V tap, in accordance with the manufacturers' instructions. The volume control was at maximum and there was no signal input, while the receiver was, tuned to the bottom of the M.W. band. Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 41MPG*	230	0.9	100	4.2
V2 MVS/Pen	200	5.7	100	1.4
V3 DD4	—	—	—	—
V4 42MP/Pen	210	32.0	230	5.7
V5 442BU	330†	—	—	—

* Osc. anode (G2) 140 V, 2.6 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—There are nine switches, ganged together in a single unit. **S1-S4** are for waveband switching, **S5** for radio

Switch	M.W.	L.W.	Gram.
S1	C	O	O
S2	C	O	O
S3	O	C	O
S4	C	O	O
S5	O	O	C
S6	O	O	C
S7	C	C	C
S8	O	C	C
S9	C	O	C

muting on gramophone, **S6** for radio to gram. changeover, **S7** the mains switch, and **S8, S9** for scale lamp switching. The table (col. 1) gives the switch positions for the various settings of the knob. O indicates open, and C closed.

Naturally, **S7**, the mains switch, is only open in the "off" position. The complete rotor of the switch unit can be taken out for cleaning as in most Cossor models. Remove the flat retaining spring behind the front of the chassis by depressing one end, and lifting it clear of the lug which holds it in position. The spindle can then be lifted out of the slot in the chassis.

Coils.—The signal frequency and oscillator coils are in three screened units on the chassis deck, and one un-screened unit (**L7, L8**) beneath the chassis. The screens are easily removable.

The band-pass secondary unit, **L5, L6**, also contains **C4A**, a .002 μ F condenser in parallel with **C4** (.01 μ F), which is beneath the chassis.

The oscillator unit, **L9-L12**, also contains **C8, C9** and **C29**, the latter being adjustable through a hole in the screen.

The I.F. units are also in similar screens on top of the chassis, and it should be noted that the first of these (**L14, L15**), also contains the S.W. choke, **L13**.

Scale Lamps.—There are two of these, one for the M.W. and one for the L.W. scale. They are Oram M.E.S. types, rated at 6.5 V, 0.3 A. The switches **S8, S9** control these lamps, and both are illuminated when the set is switched to "Gram."

External Speaker.—There is provision for this at the rear of the chassis. It should be of the high resistance type (8,000 Ω).

Radio-gram Modification.—The Model 736 table radio-gram has a similar chassis, but with the addition of a variable tone control circuit. The control is mounted on the motor board, and operates on radio and gramophone. In the radio-gram chassis, **C19**, across the primary of **T1**, becomes 0.002 μ F, and across this are connected in series a fixed condenser (0.05 μ F) and a variable resistance (50,000 Ω), which is the tone control. Otherwise, the two chassis are identical.

Condensers C4, C4A.—These are two condensers in parallel in our chassis, **C4A** being in one of the coil units, and **C4** beneath the chassis.

Condensers C21, C22.—These are two 8 μ F dry electrolytic condensers in a single unit. The green and yellow leads are the negative and positive connections of **C21**, and the black and red, the negative and positive connections of **C22**.

HINTS AND PROBLEMS

(Continued from page 14)

More Intermittent Trouble

This is another example of the intermittent type of fault which is often so difficult to discover. A complaint was made that a superhet receiver had a habit of stopping occasionally for no apparent reason. The trouble did not seem to be due to any external agency, such as an intermittent break in the aerial wire. The service engineer called twice, but each time the set was working perfectly.

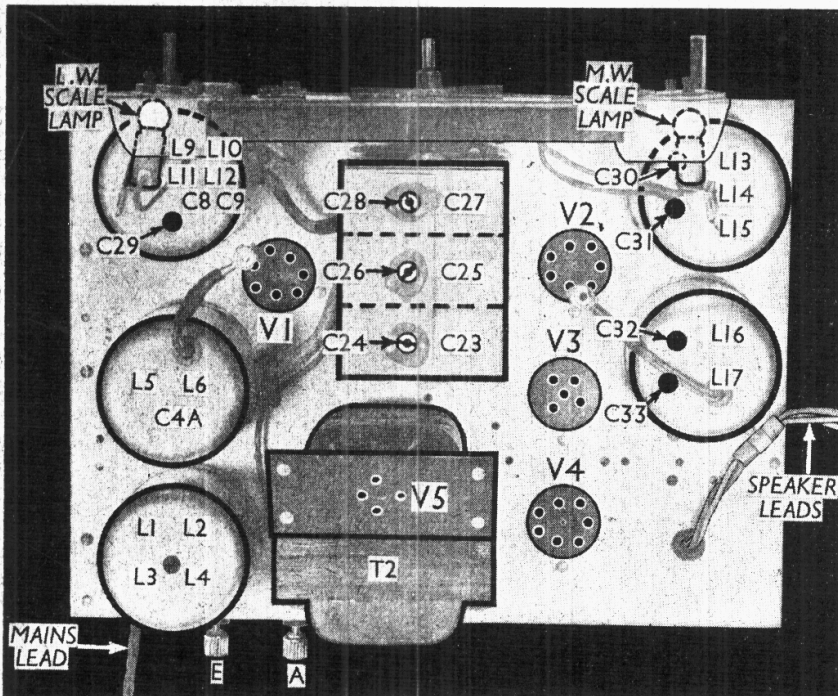
In the end, the set was removed and thoroughly tested. All valves, components, joints in the wiring, etc., were perfectly satisfactory, and the only clue was that the trouble occurred when the set was tapped or jarred.

In the end, the coil units were examined, and in one of the I.F. units was found a short piece of loose wire, which, under certain conditions, shorted one of the I.F. coils to chassis. When the set was normally in use, it is suspected that the vibrations produced by the speaker in the coil screen must occasionally have had an effect similar to that of tapping the chassis during the test.—W. P.

NOTE.—We have recently encountered a similar fault, but in our case the piece of wire shorted the H.T. supply through a small resistance, which heated up considerably. The wire was actually a piece of about 36 gauge, enamelled, and it was necessary therefore for the extreme ends to make contact with the coil tag and chassis, which one would imagine to be almost impossible to occur fortuitously!—TECH. EDITOR.

For the Tool Kit

A recent addition to the tool kit which has been found exceedingly useful is a manicure file, about 8 or 9 ins. long. Since this is thin and flexible, one is able to reach out of the way switch contacts, etc., quite easily for cleaning purposes. A magneto contact file might also be of similar use.—J. T. R.



Plan view of the chassis. Note that the L5, L6 coil unit also contains C4A, which is in parallel with C4 beneath the chassis. The oscillator unit, L9-L12, also contains C8, C9 and the L.W. trimmer C29.