

TRADER SERVICE SHEETS

NUMBER THIRTY-FIVE
(VOLUME TWO)

COSSOR MODEL 535

A.C. SUPERHET

THE Cossor Model 535 A.C. receiver is a 4-valve (plus valve rectifier) table model superhet, incorporating A.V.C., and fitted with a neon tube type of tuning indicator. In the signal frequency circuits it has iron-cored coils for the M.W. range and air-cored types for the L.W. range. A double diode valve is used for the second detector and A.V.C. circuits.

The tuning indicator is mounted vertically behind an aperture at the left of the tuning scale, while at the right there is a vertical scale for indication of the position of the volume control. A removable plate carries the names of stations and their wavelengths, and the tuning scale itself is merely calibrated in wavelengths.

CIRCUIT DESCRIPTION

Aerial input by way of fixed series condenser **C1**, coupling coils **L1, L2** and M.W. coupling condenser **C2** to primary of inductively-coupled band-pass filter. Primary **L3, L4**, tuned by **C22**; secondary **L5, L6**, tuned by **C24**; coupling coils **L7, L8**.

First valve (**V1, Cossor metallised 41 MPG**) is a heptode functioning as frequency-changer with electron coupling.

Oscillator grid coils **L12, L13** tuned by **C26**; anode reaction coil **L11**. L.W. and M.W. padding by **C8** and **C9**.

One variable- μ pentode intermediate frequency amplifier (**V2, Cossor metallised MVS/Pen**) with tuned-primary tuned-secondary transformer couplings **L14, L15** and **L16, L17**. Special neon tuning indicator in anode circuit.

Intermediate frequency 128 KC/S.

Diode second detector forming part of double diode (**V3, Cossor DD4**). Second diode provides steady potential, developed across load resistance **R15**, which is fed back as G.B. by way of suitable decoupling circuits to control grids of frequency-changer and I.F. valves. Delay voltage obtained from drop across **R19** and **R20** in **V4** cathode circuit. Output from rectifier diode is developed across **R14** and the L.F. component is passed by way of coupling condenser **C16** and manual volume control **R16** to output pentode (**V4, Cossor 42 MP/Pen**), which has special H.F. filter **R21, R17, C33** in grid circuit. Provision for connection of gramophone pick-up across **R16** to feed directly into **V4**. **S6** switches pick-up into circuit, and **S3** incapacitates oscillator section of **V1** in order to prevent radio breakthrough.

Tone compensation in anode circuit of **V4** by fixed condenser **C32**; variable tone control by R.C. circuit **R18, C18**. Provision for connection of high-resistance external speaker.

H.T. current supplied by full-wave rectifying valve (**V5, Cossor 442 BU**). Smoothing by speaker field winding **L20** and aqueous electrolytic condensers **C20, C21**.

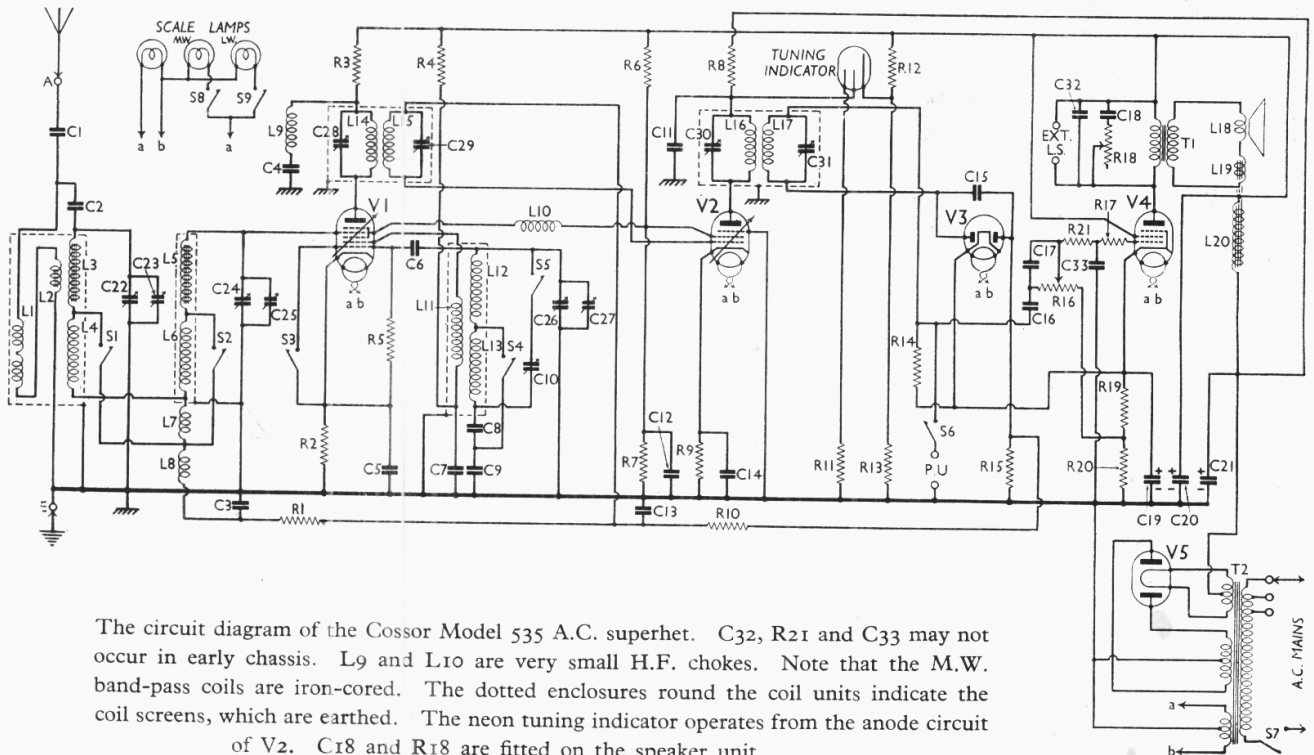
DISMANTLING THE SET

Removing Chassis.—Remove the knobs (with the exception of that of the tone control in the centre of speaker grille). These are held by grub screws, and in the case of the large tuning knob, two screws are fitted. Now remove the four screws (with large flat washers and spring washers) from the underside of the cabinet. Remove the two wood screws holding tuning scale to the inside of the front of the cabinet. Detach the three braided speaker leads from the speaker input transformer, and remove the two clips holding the leads to the cabinet. The chassis can now be withdrawn.

When replacing speaker leads, the following colour coding should be observed. Top terminal on speaker transformer, red; second from top, white with red tracer; second from bottom, green. The two leads from the variable tone control resistance **R18** go to the lower pair of terminals (one of which also carries the green speaker lead). The tone control condenser **C18** is connected between the second from top and the bottom terminal.

Removing Speaker.—It is best to remove the speaker on its sub-baffle, which is held to the front of the cabinet by six wood screws and washers. One of

(Continued overleaf)



The circuit diagram of the Cossor Model 535 A.C. superhet. C32, R21 and C33 may not occur in early chassis. L9 and L10 are very small H.F. chokes. Note that the M.W. band-pass coils are iron-cored. The dotted enclosures round the coil units indicate the coil screens, which are earthed. The neon tuning indicator operates from the anode circuit of V2. C18 and R18 are fitted on the speaker unit.

COSSOR 535 A.C. SUPERHET
(continued)

these also holds one of the speaker cable clips. The tone control resistance is mounted on the sub-baffle, and the hole in the front of the cabinet clears its knob when the speaker is withdrawn.

To remove the tone control, it is probably best first to remove the speaker chassis from the sub-baffle (4 nuts and bolts), to avoid risk of damaging the speaker diaphragm.

COMPONENTS AND VALUES

Resistances		Values (ohms)
R1	V1 cont. grid decoupling	100,000
R2	V1 fixed G.B. resistance	150
R3	V1 tetrode anode decoupling	5,000
R4	V1 osc. anode decoupling	100,000
R5	V1 osc. grid resistance	50,000
R6	V1 and V2 S.G.'s pot. divider	15,000
R7		20,000
R8	V2 anode decoupling	20,000
R9	V2 fixed G.B. resistance	250
R10	V2 cont. grid decoupling	100,000
R11	Tuning ind. primer resistance	250,000
R12	Tuning ind. cathode pot. divider	40,000
R13	V3 rectifier diode load	250,000
R14	V3 A.V.C. diode load	1,000,000
R15	Manual volume control	1,000,000
R16	Part of V4 grid H.F. filter	50,000
R17	Tone control resistance, variable	50,000
R18	V4 G.B. and A.V.C. delay voltage resistances	130
R19		100
R20	Part of V4 grid H.F. filter	50,000
R21*		50,000

* In our chassis.

Condensers		Values (μF)
C1	Aerial series condenser	0.0005
C2	M.W. coupling	0.000025
C3	V1 cont. grid decoupling	0.1
C4	V1 tetrode anode decoupling	0.1
C5	V1 cathode by-pass	0.1
C6	V1 osc. grid condenser	0.0002
C7	V1 osc. anode decoupling	0.1
C8*	Osc. L.W. padding	—
C9*	Osc. M.W. padding	—
C10	Osc. L.W. trimmer, pre-set	—
C11	V2 anode decoupling	0.1
C12	V1 and V2 S.G.'s by-pass	0.1
C13	V2 cont. grid decoupling	0.01
C14	V2 cathode by-pass	0.1
C15	V3 A.V.C. diode coupling	0.0001
C16	L.F. coupling to V4	0.006
C17	Volume control by-pass	0.0001
C18	Tone control condenser	0.05
C19	V4 cathode by-pass, electrolytic	25.0
C20	H.T. smoothing, electrolytics	8.0
C21		8.0
C22	Band-pass primary tuning	0.0005
C23	Band-pass pri. trimmer, pre-set	—
C24	Band-pass secondary tuning	0.0005
C25	Band-pass sec. trimmer, pre-set	—
C26	Oscillator tuning	0.0005
C27	Oscillator main trimmer, pre-set	—
C28	1st I.F. trans. pri. tuning	—
C29	1st I.F. trans. sec. tuning	—
C30	2nd I.F. trans. pri. tuning	—
C31	2nd I.F. trans. sec. tuning	—
C32†	Fixed tone compensator	0.002
C33†	Part of V4 grid H.F. filter	0.0001

* Values non-standard. † In our chassis.

Other Components		Values (ohms)
L1	Aerial L.W. coupling coil	13.0
L2	Aerial M.W. coupling coil	0.6
L3	Band-pass primary coils	1.5
L4		13.0
L5	Band-pass secondary coils	1.75
L6		13.0

Other Components (contd.)		Values (ohms)
L7	Band-pass coupling coils	0.7
L8		0.3
L9	Short-wave H.F. chokes	Very low
L10		Very low
L11	Osc. anode reaction coil	3.2
L12	Osc. grid tuning coils	4.0
L13		8.7
L14	1st I.F. transformer	Pri. ... 42.0
L15		Sec. ... 42.0
L16	2nd I.F. transformer	Pri. ... 48.0
L17		Sec. ... 48.0
L18	Speaker speech coil	2.0
L19	Speaker hum neutralising coil	0.2
L20	Speaker field winding	1,800*
T1	Speaker input trans.	Pri. ... 700
		Sec. ... 0.35
T2	Mains trans.	Pri. total ... 42.5
		Heater sec. ... 0.15
		Rect. fil. sec. ... 0.15
	H.T. sec. ... 1,100	
S1, S2	Waveband switches, ganged	—
S4, S5		—
S3, S6	Radio-gramophone switches	—
S7	Mains switch	—
S8, S9	Scale lamp switches	—

* In our receiver. May be 2,500 Ω in early chassis.

VALVE ANALYSIS

The voltage and current readings listed in the table below are those given by Cossor for a representative chassis working with no aerial or earth connected, and with the master switch set for M.W. reception. Slightly different figures will be obtained with the switch set at "Gram."

All voltages were measured with a high-resistance voltmeter (400 V, 1,000 Ω per volt) and the current readings were taken, where necessary, with a milliammeter inserted in the low H.F. potential ends of the circuits. Alternatively V1 and V2 may be stabilised by means of condensers (0.1 μF or larger) connected between their respective anodes and cathodes.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 41MPG*	205	3.9	90	2.9
V2 MVS/Pen	230	4.6	90	1.2
V3 DD4	—	—	—	—
V4 42MP/Pen	215	28.0	230	6.0
V5 442BU	315†	—	—	—

* Osc. anode (G2) 80 V r-25 mA.
† A.C., each anode.

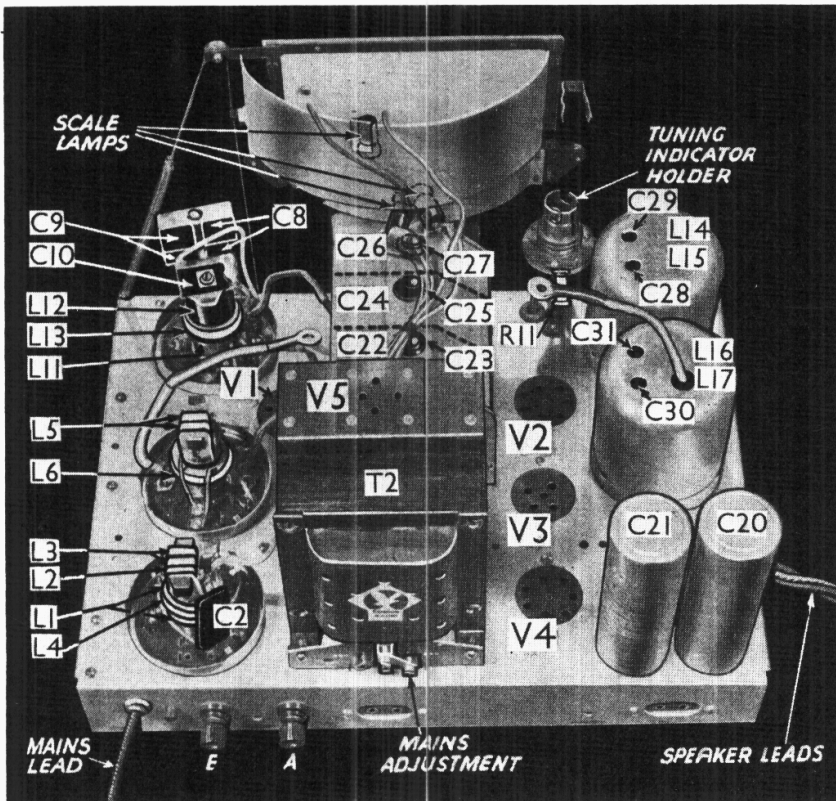
GENERAL NOTES

Switches.—All the switches, S1-S9, are in a single assembly seen at the right-hand side of our under-chassis view. The contacts of each switch are clearly indicated.

S1, S2, S4, S5 are the waveband switches, S3 and S6 are for gramophone switching, S7 is the mains switch and S8, S9 are for scale lamp switching.

The following table shows the switches which are open (O) and closed (C) in the various positions.

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



View of the upper deck of the chassis. The screens of the signal frequency coils have been removed. Note R11 beneath the tuning indicator holder. L11 is on a former inside L12 and L13.

All switches are open in the "off" position.

It should be noted that **S8** and **S9** each have one common contact. Both lamps behind the tuning scale are alight in the "Gram" position (**S8** and **S9** closed). The third dial lamp is alight in all the "on" positions. **S7**, the mains switch, is not of the true Q.M.B. type. If it has been allowed to arc, the metal band forming the moving contact should be cleaned.

Normally, the switches should be self cleaning, but should they become dirty, it is possible to remove the switch spindle quite easily. First of all, remove the flat metal spring located just behind the front of the chassis. Do this by depressing each end, and sliding sideways until free. When replacing, note that the hole in the spring fits over a peg on one of the projections carrying the spring.

Having removed the spring, the switch spindle can be taken out by dropping the front of it down the slot in the front of the chassis, and then pulling it forward.

Coils.—All the coils, with the exception of **L7**, **L8**, used for band-pass coupling, are in screening cans on the top of the chassis. Our upper chassis view is taken slightly from the back, to show the various coils more clearly, and the screens of the band-pass and oscillator units have been removed.

In the first unit, **L1** is in two sections, one each side of **L4**. **L2** and **L3** are iron-cored, **L3** being wound into two grooves in the former. This unit also contains **C2**.

The second unit contains **L5** (iron-cored) and **L6** only.

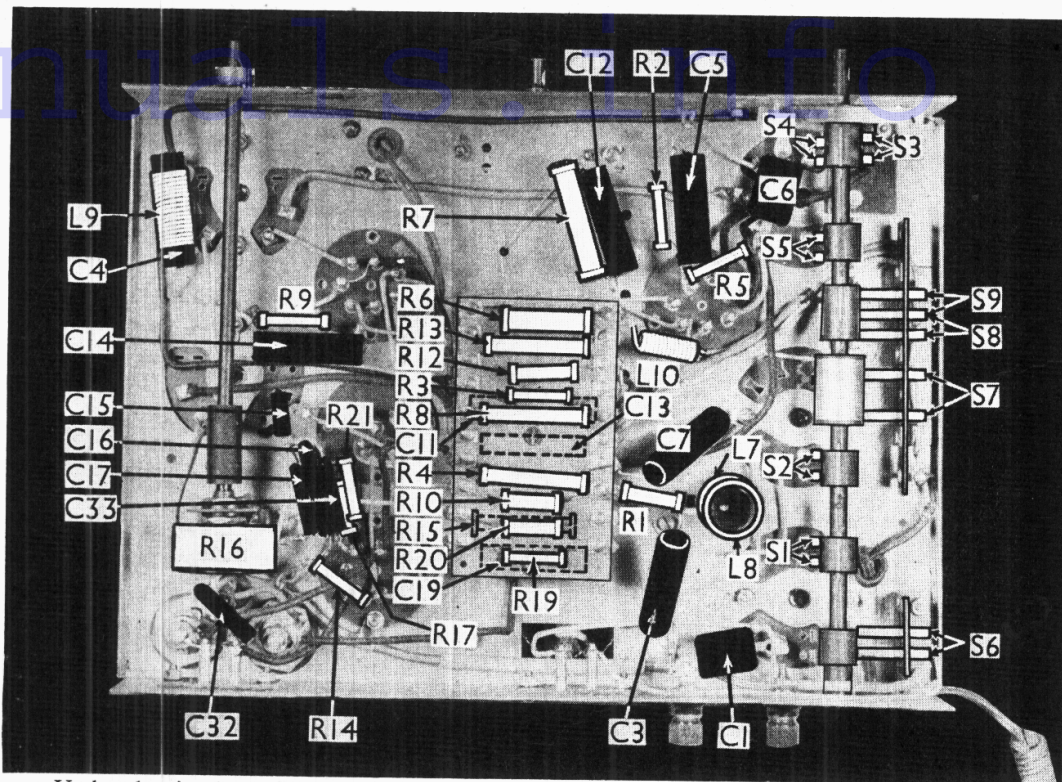
In the third unit, **L12** and **L13** (both air-cored) are on a former which is slipped over a second smaller former on which **L11**, the oscillator reaction coil, is wound. It is impossible to indicate this clearly in the chassis view. The third unit also contains **C8**, **C9** and **C10**. **C8** and **C9** each comprise two moulded cased mica condensers of special values, which are not marked. **C10**, the oscillator L.W. trimmer, is adjustable through a hole in the screen.

In the case of the I.F. transformers, the primary in each instance is the lower of the two coils.

The coupling coils **L7**, **L8**, are wound on a small former mounted beneath the chassis, and seen in our under-chassis view, where **L7** is the lower of the two.

Scale Lamps.—All three are of the Osram M.E.S. type, rated at 3.5 V, 0.15 A.

Tone Control Circuit.—The fixed condenser **C18** and the variable resistance



Under-chassis view. The two cross-bars have been removed. All the switch contacts are indicated. **L9** is wound over **C4**, while **L10** is self-supporting. **C32**, **C33** and **R21** may not occur in early chassis.

R18 are mounted above the chassis, on the loud-speaker unit. The connections of **C18** are given in the paragraph "Removing Chassis." In our chassis there is an additional fixed condenser, **C32**, which does not appear in the makers' circuit diagram, and may not therefore be included in early chassis.

Grid Circuit of V4.—In the makers' circuit diagram, **R17** and **C17** (with **C16** and **R16**) are shown in the grid circuit of **V4**. In our chassis, an additional resistance, **R21**, and an extra condenser, **C33**, are included, as shown in our circuit diagram. These two components may not occur in early chassis, the end of **R17** being joined direct to **C17**, and **C33** being omitted.

C19, **R15**, **C13**, **C11.**—Note that these are mounted beneath the resistance panel.

Neon Tuning Indicator.—This is of Cossor manufacture, Cat. No. 3180. It is fitted with a double contact small bayonet cap, and a suitable holder is fitted, seen on the right of the tuning scale in our upper chassis view. There is also a metal clip to support the top of the bulb.

There are three electrodes in the tube, the cathode, the anode, and the "primer." The cathode, in the form of a long tube extending up the bulb, is connected to the metal cap of the tube base. The anode and the "primer," both in the form of metal rings round the bottom of the cathode, are connected to the two contacts in the base.

The voltage of the cathode to earth should be about 110 V, with 1 mA current passing. The "primer" (connected to **R11**) should have a voltage of 220 V to

earth, with 2 mA current passing. The anode is connected to **R8**, **C11** and the top of **L16**. Note that **R11** is above the chassis, just below the indicator holder.

If the indicator does not show a long column of light when the set is tuned to a powerful station, try reversing it in its holder. If the light will not vary, though the A.V.C. circuits are O.K., change the tube for a new one.

CIRCUIT ALIGNMENT

The following instructions are issued by the makers for the procedure where no oscillator is available.

First, earth the end of **R10** which is joined to one anode of **V3**. Adjust I.F. trimmers **C28-C31** to about the centre of their movement, if the seals have been broken, and tampering is suspected. Tune receiver to a station at the lower end of the M.W. band. Adjust I.F. trimmers for maximum response.

Now adjust oscillator tuning condenser trimmer **C27** for maximum response. Rock the main tuning knob slightly each way as this is being done, to obtain the best results. Adjust **C23**, **C25** similarly.

Now tune in a station at the top of the M.W. band and re-adjust **C27** if necessary. Re-tune to the lower position and once more adjust the I.F. trimmers **C28-C31**.

Set the receiver for the L.W. band and tune in a station at about the middle of the range. Now adjust **C10** (through the hole in the oscillator coil screen), rocking the main tuning knob meanwhile until best results are obtained.

Finally, remove the earthing wire from the end of **R10**.