'TRADER' SERVICE SHEET

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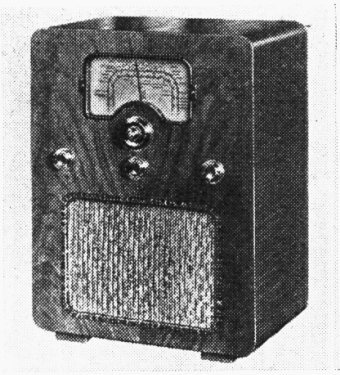
COSSOR 388

2-BAND AC RECEIVER



The Cossor Model 388

SUITABLE for mains of 200-250 V, 40-100 C/S, the Cossor 388 is a 3-valve (plus rectifier) AC 2-band receiver with provision for both a gramophone pick-up and an extension speaker.

CIRCUIT DESCRIPTION

Aerial is coupled via series condenser **C1,** switch **S1** and coupling condenser **C2** on MW, and via **C1** and coupling coil **L1** on LW, to aerial circuit tuning coils **L2** (MW), plus **L3** (LW) which are tuned by **C16.** A small variable condenser **C17** forming part of the gang assembly, but controlled by a small spindle concentrically disposed within the main gang spindle, operates as a manual trimmer.

First valve (**V1, Cossor metallised MVS/Pen**) is a variable-mu RF pentode operating as signal frequency amplifier with gain control by **R3.**

Tuned-primary RF transformer coupling by **L4, L5, C18, L8, L9** between **V1** and RF pentode valve (**V2, Cossor metallised MS/Pen**) operating as leaky grid detector with **C6** and **R8.** Reaction is applied from anode by coils **L6, L7** and controlled by variable condenser **C20.** Provision for connection of gramophone pick-up between low potential end of RF transformer secondary coils **L8, L9,** and chassis. When operating on radio, **L9** and **V2** cathode are connected to chassis via switches **S6, S7;** for use with a pick-up **S6** and **S7** open so that the pick-up sockets are in **V2** grid circuit and **R10, C8** are in the cathode circuit to provide GB.

Resistance-capacity coupling by **R11, C10, R12,** via RF filter **R13, C11,** between **V2** and triode output valve (**V3, Cossor 41MP**). Fixed tone correction in anode circuit by **C12.** Provision for connection of high impedance external speaker across leads to internal speaker input transformer **T1.**

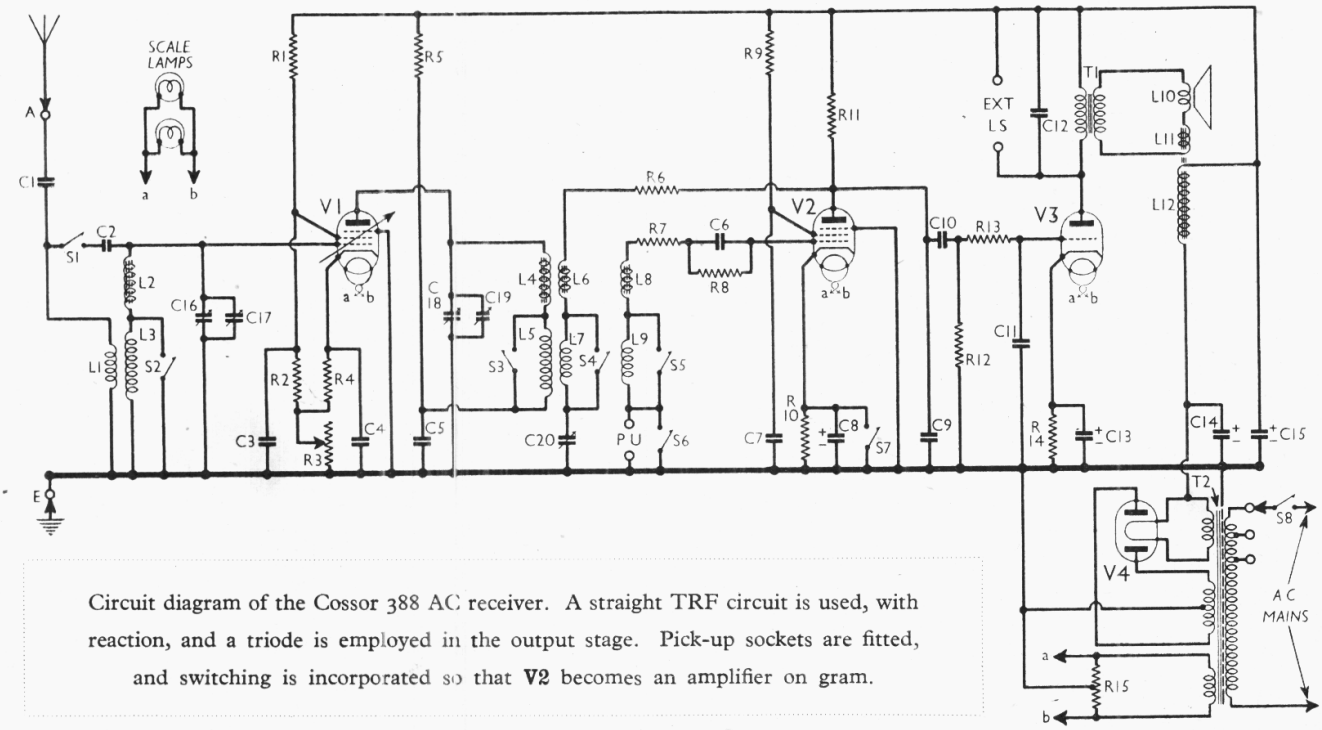
HT current is supplied by full-wave rectifying valve (**V4, Cossor 442BU**). Smoothing by speaker field **L12** and dry electrolytic condensers **C14, C15.**

COMPONENTS AND VALUES

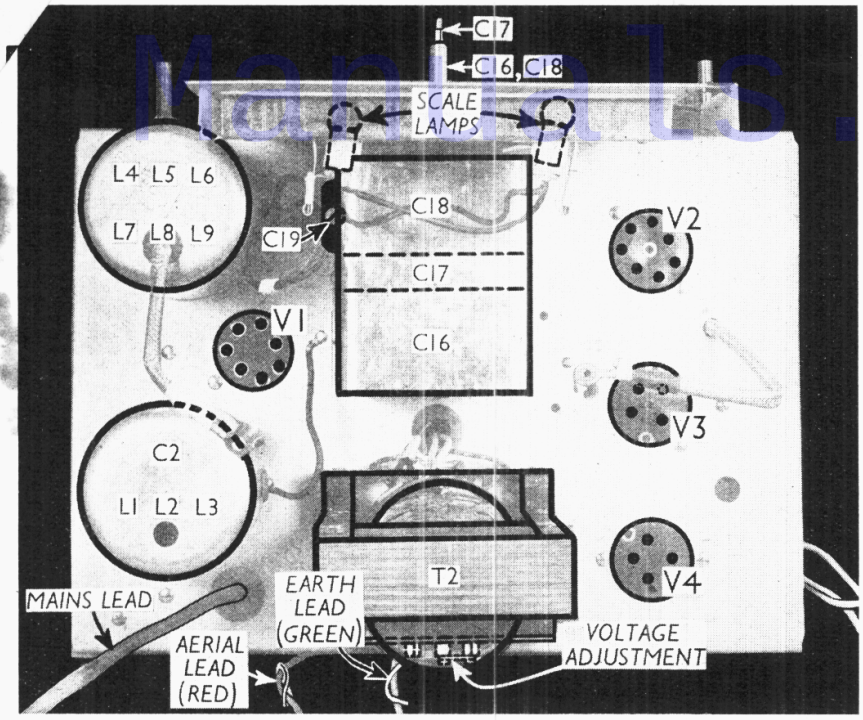
	RESISTANCES	Values (ohms)
R1	V1 SG HT potential divider resistances	30,000
R2	V1 SG HT potential divider resistances	40,000
R3	V1 gain control	12,000
R4	V1 fixed GB	500
R5	V1 anode HT feed	10,000
R6	V2 reaction circuit stabilising resistances	300
R7	V2 reaction circuit stabilising resistances	200
R8	V2 grid leak	1,000,000
R9	V2 SG HT feed	500,000
R10	V2 gram GB resistance	1,000
R11	V2 anode load	100,000
R12	V3 CG resistance	500,000
R13	V3 CG RF stopper	100,000
R14	V3 GB resistance	300
R15	V1, V2, V3 heater circuit pot., total	25§

	CONDENSERS	Values (μF)
C1	Aerial series condenser	0·0005
C2	Aerial MW coupling	0·000015
C3	V1 SG decoupling	0·1
C4	V1 cathode by-pass	0·1
C5	V1 anode decoupling	0·1
C6	V2 CG condenser	0·0001
C7	V2 SG decoupling	0·1
C8*	V2 cathode (gram) by-pass	50·0
C9	V2 anode RF by-pass	0·0002
C10	V2 to V3 AF coupling	0·01
C11	V3 CG RF by-pass	0·0002
C12	Fixed tone corrector	0·005
C13*	V3 cathode by-pass	50·0
C14*	HT smoothing	6·0
C15*	HT smoothing	4·0
C16†	Aerial circuit tuning	—
C17†	Aerial manual trimmer	—
C18†	V1 anode circuit tuning	—
C19‡	V1 anode MW trimmer	—
C20†	Reaction control	—

§Centre-tapped. * Electrolytic. † Variable. ‡ Pre-set



Circuit diagram of the Cossor 388 AC receiver. A straight TRF circuit is used, with reaction, and a triode is employed in the output stage. Pick-up sockets are fitted, and switching is incorporated so that **V2** becomes an amplifier on gram.



Plan view of the chassis. Note that aerial and earth leads, instead of sockets, are provided. **C2** is included in the **L1-L3** unit. **C17** is a manually operated trimmer.

	OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial LW coupling coil		8·0
L2	Aerial MW tuning coil		1·5
L3	Aerial LW tuning coil		11·0
L4	RF trans. pri. MW tuning		1·5
L5	RF trans. pri. LW. tuning		11·0
L6	MW reaction coil		0·5
L7	LW reaction coil		3·5
L8	RF trans. MW sec. coil		1·5
L9	RF trans. LW sec. coil		11·0
L10	Speaker speech coil		2·0
L11	Hum neutralising coil.		0·15
L12	Speaker field coil		2,500·0
T1	Speaker input trans.	Pri.	175·0
		Sec.	0·19
T2	Mains trans.	Pri., total	67·0
		Heater sec.	0·1
		Rect. heat. sec.	0·1
		HT sec., total	1,500·0
S1-S5	Waveband switches		—
S6, S7	Gram and pick-up switches		—
S8	Mains switch		—

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the control knob from the trimmer (screw down the centre), the other four knobs (recessed screws) and the four bolts (with washers and lock washers) holding the chassis to the platform.

Now remove the two round-head wood screws holding the scale assembly to the front of the cabinet, when by tilting the back upwards, the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

When replacing, do not forget to replace the wire washer on the spindle of the trimmer before fixing the trimmer knob.

To free the chassis entirely, disconnect the speaker leads (screw terminals) and *when replacing*, connect them as follows, numbering the terminals from bottom to top:—1, yellow; 2, red; 3, blue.

Removing Speaker.—The speaker can be removed from the cabinet by slackening the four clamps (nuts and lock washers) and swivelling them out of the way. *When replacing*, see that the transformer is on the right and connect the leads as given in column two.

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 3) 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 the reaction control was at minimum. There was no signal input, as the aerial and earth leads were shorted.

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	185	3·9	105	1·4
V2 MS/Pen	90	1·1	25	0·4
V3 41MP	225	27·0	—	—
V4 442BU	318†	—	—	—

† Each anode, AC.

GENERAL NOTES

Switches.—**S1-S5** are the waveband switches, **S6, S7** the radio-gram. switches and **S8** the mains switch, ganged in a rotary barrel type of switch which extends across the chassis. The individual switches are indicated in our under-chassis view.

The table below gives the switch positions for the four control settings, starting from the "off" setting, and proceeding clockwise. A dash indicates open, and **C**, closed.

SWITCH	OFF	MW	LW	GRAM.
S1	C	C	—	—
S2	C	C	—	C
S3	—	C	—	C
S4	—	C	—	C
S5	—	C	—	C
S6	—	C	C	—
S7	—	C	C	—
S8	—	C	C	C

Coils.—**L1-L3** and **L4-L9** are in two screened units on the chassis deck. The former unit also contains **C2.**

Trimmers.—The only trimmers are associated with the gang condenser. **C19,** sealed with red wax, is mounted on the side of the **C18** unit, while **C17,** operated by a spindle concentric with the main

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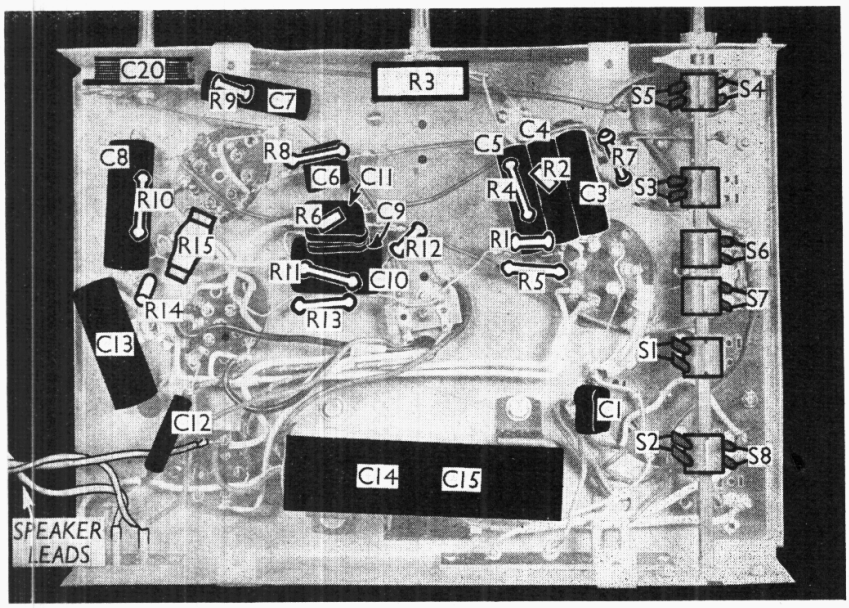

Under-chassis view. All the switches are included in the rotary barrel unit. **R15** is a wire-wound resistor, centre-tapped.

MAINTENANCE PROBLEMS

Contributed by Service Engineers

Loose Condenser Electrodes

A MARCONI 264 came in for service with the complaint of intermittent reception, which was eventually traced to a faulty rectifying valve.

The fitting of a new valve cured the trouble, but on testing the receiver, a new fault appeared in the form of a high-pitched rattle. As this did not appear to be due to any mechanical fault in the loudspeaker, the operating conditions of the AF and output valves were checked, but were found O.K.

The loudspeaker was now removed, and the noise was then found to be coming from the 0·0015 μF condenser which forms part of the whistle filter unit, apparently due to the electrodes being loose inside. On fitting a new condenser, the rattle disappeared entirely.—G. W. G.

Missing Decoupling Resistance

A K.B. 590 came in for service with the complaint of weak and noisy MW reception, long waves being O.K. This was confirmed on test, and it soon became evident that the alignment was incorrect. Sensitivity greatly improved on adjusting the aerial coil trimmer, but was still below normal. On examining the underside of the chassis, the AVC decoupling resistance to the frequency changer was seen to be completely missing, and on connecting a suitable resistance between the appropriate points, sensitivity became normal.

This resistance, which apparently had never been inserted during manufacture, forms, with its associated decoupling condenser of 0·0023 μF, part of the aerial input circuit. The effect of omitting the resistance would be to alter the matching of the aerial to the coil, quite apart from leaving the frequency changer grid "up in the air."—G. W. GREEN, IPSWICH.

Potentiometer Breakdown

A PHILIPS model 634A was returned to us for service recently, the complaint being "cutting out frequently." The set was tried out, and sure enough signals were completely cut off every few seconds. A new output valve was inserted, but the fault persisted, so voltage and current readings were taken. It was found that when the set cut out, output anode current dropped to zero, yet the anode voltage remained substantially unchanged.

The chassis was removed from the cabinet, and a search was made for dry soldered joints at the valve pins, but none could be found. Upon switching on the set again, a slight hissing noise was noticed, and there now was a complete lack of signals. Then the hissing was traced to a tiny arc which was forming at a break in the sensitivity potentiometer, which is mechanically ganged with the tuning condenser. Replacing the element cured the trouble.

Valves were checked, and as the output valve (PM24A) was causing distortion, it was replaced by a PM24M. Upon fitting the new output valve, the set showed an inclination towards motor-boating, a form of instability quite frequently met with in this particular set.

The cure is simple, as a 1,000 O resistor inserted in series with the PM24M grid lead will stop the oscillation. If this model is found to be unstable at about 1,200 metres, a 0·002 μF condenser shunted across the primary of the output transformer will cure the trouble.—F. R. BAILLIE, GLASGOW.

Internal Valve Short

AN Ekco AD65 was brought in with the complaint that signals would occasionally cease, and it was suspected that a smell of burning could be detected when this occurred; switching off for a short time would invariably rectify matters.

There was also a long-standing fault of intermittent distortion which could often be cured by operating the wave-change switch. The set had been returned some months previously to the dealers who supplied it because of this trouble, and they had fitted and charged for a new FC13 valve and condenser block without making the slightest difference to the performance of the set.

The set functioned O.K. on the bench, and the valves were tested and appeared to be in good condition. The chassis was then removed, and the customary voltage and current tests made without revealing anything abnormal; it was, however, noticed that the FC13 bias resistor bore signs of over-heating. Extended soak tests with the chassis outside the cabinet failed to produce the distortion and cessation of signals did not occur for some hours. When it did, the HT volts dropped by some 50 per cent. and the FC13 bias resistor started to smoke.

The set was immediately switched off and tests made for the leakage, but without result; and, sure enough, when switched on again the set functioned normally.

All components associated with the FC13 tested O.K., so it was decided to man-handle the valve while it was working. This caused it to fail, but it was normal again after being allowed to cool.

Further extensive testing of this valve on the Mullard test board revealed an intermittent short between the suppressor grid and anode, thus accounting for the heavy current passed by the bias resistor.

A new valve was fitted, the chassis replaced, and it was then that I got my first introduction to the distortion. Operating the wave-change switch certainly cured it temporarily, and eventually the control grid of the Mazda Pen/DD/4020 came under suspicion. The connection here was apparently dry jointed, and re-soldering finally cleared the trouble.

Apparently the fault would only occur in the higher temperature of the cabinet, and the temporary cures were effected by the surges created on switching.—C. E. MEOPHAM, HIGHAMS PARK.

Effect of Special Aerial

THE following description of an obscure fault might prove interesting to others. An Ever Ready 5001 receiver was brought in for test and was found to be very weak. An emission test proved the IF valve to be down. A new valve was inserted and the set was connected to the A and E, which consists of an "Eliminoise" installation, owing to the interference in the locality.

Sensitivity was much improved, but the reproduction was terribly distorted. The output stage (Class B) was examined, but proved O.K.

Everything was proved to be perfect, until, upon examination of the service sheet, it was found that the aerial terminal made contact via the aerial coil to the AVC line.

The "Eliminoise" aerial has a transformer at the receiver end, and the receiver aerial and earth leads are connected across the secondary of this transformer, which constitutes an almost dead short to DC. Consequently, the AVC was shorted, via the top of the coil, through the "Eliminoise" transformer, to earth. Inclusion of a condenser in the aerial lead proved that the set was perfect.—R. J. CANAWAY, BASINGSTOKE.

COSSOR 388—*Continued*

tuning spindle, is of the air-dielectric type, situated between **C16** and **C18**.

Scale Lamps.—These are two Osram MES types, with small bulbs sprayed yellow. They are rated at 6·5 V, 0·3 A.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (3,000 O) external speaker.

Condensers C14, C15.—These are two dry electrolytics in a single carton beneath the chassis having a common negative (black) lead. The red lead is the positive of **C14** (6μF) and the yellow lead is the positive of **C15** (4μF).

Resistance R15.—This is a 25 O wire-wound resistance which is centre-tapped.

CIRCUIT ALIGNMENT

Strictly speaking there are no actual alignment operations applicable to this receiver. **C19** is adjusted and sealed at the works, while **C17** is adjusted by the user.

The makers' instructions are to tune in a station on the MW band below 250 m, and manipulate **C17** and the reaction condenser **C20** to obtain optimum results. After this, the knob of **C17** should not need touching unless critical reaction is being used on a weak station.