Cossor MR133

AC Mains TRF

Manufactured 1930

Circuit diagram and servicing notes

Cossor MR133

1. General

The Cossor MR 133 is a 2 valve plus rectifier AC mains TRF, using a triode as a leaky grid detector and a directly heated pentode output valve. It tunes Long and Medium wavebands, and has provision for connecting an electric pick-up. An external high impedance loudspeaker is required. It was manufactured in 1930.

2. Circuit details

A diagram of the circuit is shown below. Two aerial inputs are available - one connects the aerial directly to a tapping on the single tuning coil (L1, L2), the other places a trimmer (VC1) in series with the aerial. The tuning capacitor is VC3. The leaky grid detector V1 (354V or equivalent) is entirely conventional; capacitative reaction is employed (L3, VC2).

A pick-up can be connected into the grid circuit of V1, which then operates as an LF amplifier with zero grid bias.

V1 is coupled to the output pentode V2 (PM24A or equivalent) using an intervalve transformer T1. V2 is biased by the voltage drop across R4 in the HT return line. There is an AF choke (L4) in the anode circuit of V2, and a high impedance loudspeaker is connected through a capacitor (C4).

HT is supplied from a 150 volt winding on the mains transformer T2; half-wave rectification is used, with the anodes of the full wave rectifier V3 (U10 or equivalent) being strapped together. Smoothing is by an LF choke (L5), C7 being the reservoir capacitor and C6 the smoothing capacitor.

3. Circuit variations

The set under examination had a resistor R3 in the screen grid circuit of V2; this appears to be an addition to the original set, but it has been left in place for the tests described later. It is also possible that V2 was originally an indirectly heated pentode, with the cathode connected to chassis and the screen grid connection by means of a terminal on the side of the valve base.

4. Servicing notes

Component values and functions are in Table 1 below. Voltages and currents measured on a working receiver are listed in Table 2. A Mullard range of valves was used.

The large value capacitors C3, C4, C5, C6 and C7 are contained in a single block, sealed with pitch. On the set examined they were electrically leaky. The old paper capacitors were melted out of the block. They were then replaced with modern units and the block re-sealed to preserve visual originality. There are actually seven 2 µF modules within the block, with C6 and C7 each being made up two modules connected in parallel. Figure 1 shows the external connections to the block.

The set is very dependent (not surprisingly) on good aerial and earth connections for satisfactory operation

Table 1 - component values and functions

Valves			
V1	354V	Detector	
V2	PM24A	Output	
V3	U10	Mains rectifier	
Capacitors			
C1	0.0003 µF	V1 grid coupling	
C2	0.0003 µF	V1 anode RF bypass	
C3	2 µF approx	V1 anode decoupling	} capacitor block
C4	2 µF approx	Loudspeaker coupling	} capacitor block
C5	2 µF approx	V2 bias decoupling	} capacitor block
C6	4 µF approx	HT smoothing	} capacitor block
C7	4 µF approx	HT reservoir	} capacitor block
Resistors			
R1	1.0 MΩ	V1 grid leak	
R2	20 kΩ	V1 anode decoupling	Wire-wound on bobbin
R3	1000 Ω	V2 screen decoupling.	See notes
R4	500 Ω	V2 automatic bias	Wire-wound on bobbin
Others			
VC1		Aerial trimmer	
VC2		Reaction control	
VC3		Tuning	
T1	Pri 1330 Ω	V1 - V2 coupling	DC resistance
	Sec 4100 Ω		DC resistance
T2	Pri 77 Ω	Mains transformer	DC resistance
	HT sec 77 Ω		DC resistance
	LT sec 0.2 Ω (*V1, V2 heaters)*		DC resistance
	LT sec 0.4 Ω *(V3 filament)*		DC resistance

Others - continued			
L1	2.0 Ω	MW tuning coil	DC resistance
L2	31 Ω	LW tuning coil	DC resistance
L3	34 Ω	Reaction coil	DC resistance
L4	300 Ω	V2 anode LF choke	DC resistance
L5	300 Ω	HT smoothing choke	DC resistance
S1		Wave-band change	Toggle switch
S2		Mains on-off switch	Toggle switch

Table 2 - voltages and currents

All voltages measured with respect to chassis, using a 20,000 Ω/V analogue multimeter

Valve	**V1 (354V)**	**V2 (PM24A)**	**V3 (U10)**
Anode voltage (V)	65	125	150 (AC)
Anode current (mA)	3	19	25 (total HT current)
Screen voltage (V)	-	127	-
Screen current (mA)	-	3	-
Bias voltage (across R4) (V)	-	- 11	-

Unsmoothed HT (at V3 filament) (V)	137
Smoothed HT (junction of L5 and C6) (V)	131

Note: as mentioned in (3) above, the resistor R4 is a later addition, but was left in place when the voltages and currents were measured.

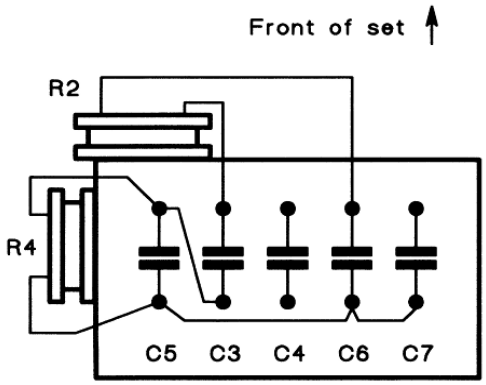


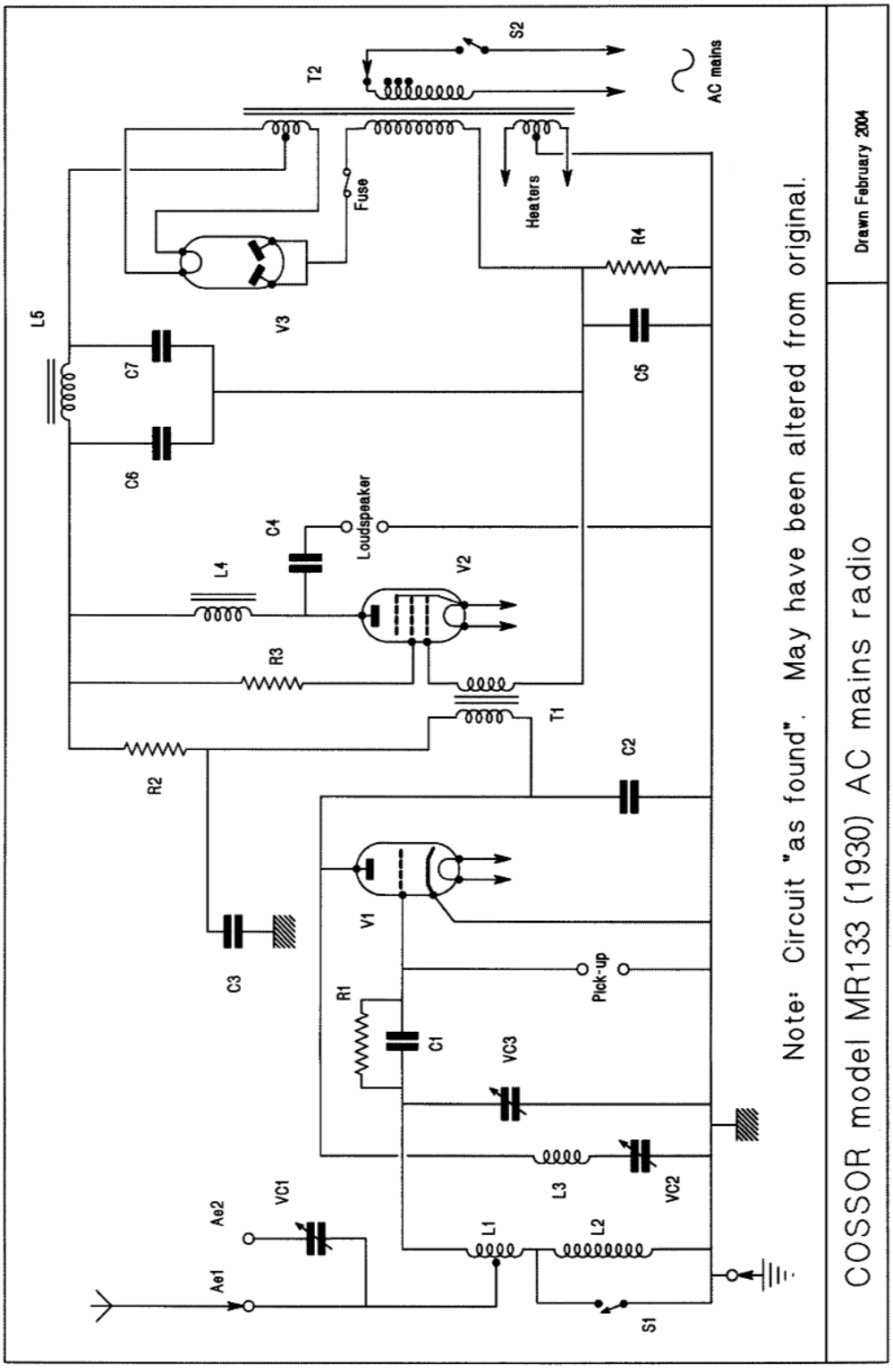
Figure 1

Capacitor block - viewed from underneath the set.

Note wiring between block and the bobbin-wound resistors R2, R4 which are attached to the capacitor block by metal lugs.

In the original unit there are 7 x 2 µF modules which make up this block. C6 and C7 are each two modules connected internally in parallel.

The pairs of solder tags are labelled A - E (from left to right in Figure 1), but the labelling may not be visible as it is obscured by the solder and attached wires.


COSSOR model MR133 (1930) AC mains radio
Note: Circuit "as found". May have been altered from original.
Drawn February 2004
AC mains
S2
T2
Fuse
Heaters
V3
R4
C5
L5
C7
C6
C4
Loudspeaker
L4
V2
R3
T1
C2
R2
V1
C3
Pick-up
R1
C1
VC3
L3
VC2
VC1
Ae2
Ae1
L1
L2
S1