EKCO
AC 85

Five-valve (separate double-diode demodulator), plus rectifier, two waveband superhet. Most instruments suitable for 200–250-v. AC mains, but some are fitted with 100–134 v. transformers. Made by E. K. Cole Ltd., Service Department, Southend-on-Sea.

Circuit.—The aerial input is taken through C1 to a tapping on L2 for MW and through a choke L1 to a tapping on L3 for LW. L1 is for preventing break through of MW signals on LW.

L1 and L2 are the primaries (tuned by VC1) of an inductively coupled band-pass coil assembly, the secondaries being L4 (MW) and L5 (LW) tuned by VC2.

The top end of L4 feeds the grid of the frequency changer V1, while the lower end of L5 connects to the AVC line via decoupling components R8 and C2.

V1 is biased by a cathode resistance R1, decoupled by C3 and C4.

The oscillator anode has its reaction windings L6 (MW) and L7 (LW) coupled to L8 and L9 respectively, and then connects to R3 voltage dropper, which also feeds the screen of V1. C6 decouples R3.

The oscillator grid is connected to cathode via R2 and is coupled by C5 to its tuned circuit L8 (MW) and L9 (LW) across VC3 section of the gang. L9 is connected to chassis via a fixed tracker condenser C7, which has a trimmer T10 in parallel.

An IF transformer (L10, L11) couples the anode circuit of V1 to the grid circuit of V2. The primary L10 has a pair of switch contacts across it, which short out on gram.

The anode of V2 is coupled by the second IF transformer (L12, L13) to the signal diode of V3. The lower end of the secondary L13 has the LF load resistances R9 and R10 in series with it. R10 does not return to chassis, but is connected to the cathode end of R1.

Any signal rectified by the signal diode of V3 is fed to the volume control R12 via the coupling condenser C12, which is connected to the junction of R9 and R10 previously mentioned.

PU sockets in series with a pair of switch contacts, which close on gram., are in parallel with the element of the volume control. C14 is also across R2.

The slider of R12 feeds the grid of the LF triode amplifier V4, which is biased by its cathode resistance R13 decoupled by C15. C16 by-passes HF from V4 anode to earth.

V4's anode load is R14, which is coupled by C17 to the grid of the pentode output valve V5. Cathode biasing by R16 decoupled by C18 is provided, and a permanent amount of tone correction is obtained by C19 connected between anode and earth.

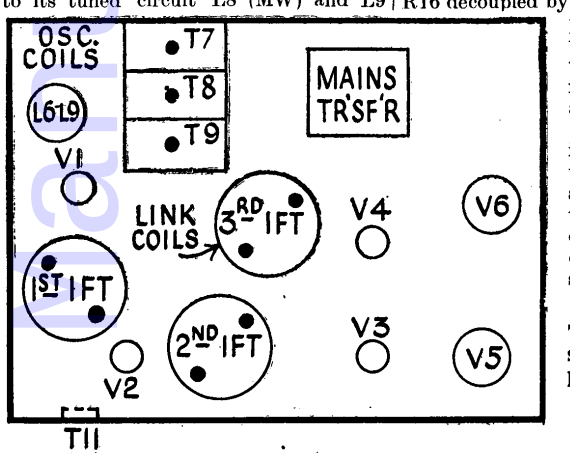
Variable tone control is effected by unit C20, which is connected from anode to one of the tone control sockets on the rear of the chassis. A second socket is joined to the first socket by R17. The third socket is not connected, and is a resting place for the tone control plug, which is connected to chassis.

Maximum top cut is with the plug in the first socket, less cut with the plug in the second socket and maximum brilliance with the third socket in use.

An output transformer L16, L17 matches V5 to the energised moving-coil loudspeaker. Extra loudspeaker sockets are provided and are in parallel with the primary L16 of the output transformer. Extra speakers must, therefore, be of a high impedance or incorporate a matching transformer suitable for pentode valves.

The internal speaker may be silenced by turning the switch at the rear of the chassis. This disconnects the putput transformer from the anode of V5. HT is derived from a conventional full-wave rectifier V6, whose output is smoothed by the loudspeaker field winding L19 and condensers C21, C22 and C23.

The valves V1 to V5 have their heaters supplied by the secondary winding L22 of the mains transformer. The pilot lamp is also fed from this 4-v circuit.



Top of chassis layout showing trimmer positions and main components.

CIRCUIT DIAGRAM

E. K. COLE, LTD., do not permit us to publish the circuit diagram of this receiver. The review below, however, has been specially prepared so that few difficulties should arise on this account.

The circuit description and tables give the purpose and values of practically all components.

AVC Circuits.

A third IF transformer, or pair of link coils, as the manufacturer terms them, has its primary L14 fed by C10 from the signal diode circuit of V3. The secondary winding L15 is coupled by C11 to the AVC diode of V3 and R11 is also connected to the same diode.

The other end of R11 connects to the "earthy" end of L11, the first IF transformer secondary, which is not taken to chassis except in the HF sense through C8. The grid of V2, therefore, receives AVC bias.

The grid of V2 is connected to the grid of V1 via R4, R8, L5 and L4, so that V1 is also controlled; but the junction of R4 and R8 is connected to the junction of R5 and R6 in the cathode circuit of V2. The bias voltage across R5, therefore, provides the AVC delay voltage of about 2-v as the cathode of V2 is joined to the cathode of V3.

This method of connection also provides amplified AVC for V1 because the voltage variations brought about by anode current changes across V2 cathode resistances R5, R6, R7 due to AVC changes of voltage on the grid are much greater than the latter due to the amplification of the value. This amplified voltage variation is applied to the grid of V1 via R8, L5 and L4, R8, as has already been stated, being connected to the junction of R4, R5 and R6.

Noise Suppression Circuit

On the front of the receiver is a continuously variable control with three graduations: "All stations," "Medium," "Strong." This is the Noise Suppression control, and is R7 in this circuit description. It is connected in the cathode circuit of V2 in series with R5 and R6. The slider is taken to chassis.

R7, therefore, can vary the cathode potential of V2 and in the "Strong" position (control rotated fully clockwise and maximum resistance in circuit) a voltage of about 95-v exists between chassis and cathode and 65-v between V1 cathode and chassis. A positive bias is thus applied to V1 grid, which is connected to the junction of R5 and R6. V1, therefore, operates very inefficiently.

The cathode of the double-diode valve V3 is common to the cathode of V2, while the signal diode is connected via its IF winding and load resistances to the cathode of V1, so that the diode has a delay bias of about 30 v applied to it.

Only a strong signal can cause V1 to operate and to pass a weak IF signal to V3, but if the signal is sufficient to overcome the delay volts on the AVC diode, then the latter's action will reduce the positive bias on V1 grid so that the valve operates more efficiently and the IF signal increases until it overcomes the signal diode delay voltage and rectification occurs.

Reducing the value of R7 improves the standing efficiency of V1 so that medium and weak signals can pass through to V3.

GANGING

IF Circuits.—The chassis does not have to be removed from the cabinet for the following method.

Connect output meter to ext. LS sockets (high impedance). Turn R7 to "All Stations" position.

Adjust switch to LW and gang to maximum capacity.

Inject 110 kc. signal between grid of V1 and chassis.

Adjust T1, T2, T3, T4 in that order for maximum output.

Screw in T1 slightly and peak T5. Adjust T6 carefully as a slight double peak will be evident. The correct adjustment is the lowest output between these two peaks.

Readjust T1 for maximum output.

A more accurate method is to break the connection of R5 to the cathode of V2 and to insert a 0–10 ma meter in the circuit.

Then adjust T4, T2, T3, T1, T5, T6 in that order for *minimum* meter reading.

MW Band.—Switch set to MW. Adjust gang to 200 m, mark on scale and inject 200 m signal.

Adjust T7 for maximum reading of output meter.

Inject and tune to 250 m.

Adjust T8 and T9 for maximum output.

LW Band.—Switch set to LW.

Inject and tune to 1,600 m signal.

Adjust T10, rocking gang.

Image Reflection.—A trimmer, T11, is accessible from the rear of the chassis.

If a strong transmission causes an image, this should be accurately tuned in and T11 adjusted until the output is minimised.

WINDINGS

L	*Purpose*	*Ohms*
1	LW aerial coupling choke	–
2	MW aerial coil	2.8
3	LW aerial coil	27.7
4	MW grid coil	2.8
5	LW grid coil	27.7
6	MW osc. anode coil	Total approx. 1
7	LW osc. anode coil	
8	MW osc. grid coil	4.7
9	LW osc. grid coil	13.7
10	1st IFT primary	110
11	1st IFT secondary	110
12	2nd IFT primary	110
13	2nd IFT secondary	110
14	Primary of link coils	110
15	Secondary of link coils	110
16	Output trans. primary	620
17	Output trans. secondary	1.7
18	Speech coil	—
19	LS field	2,150
20	M/trans. HT secondary	609
21	Rectifier heater secondary	.22
22	Heater secondary	.09
23	Primary	36.5

VALVE READINGS

V	*Type*	*Electrode*	*Volts*	*Ma*
1	FC4	Anode	260	3.4
		Screen	95	4.0
		Osc. anode	154	2.8
		Cathode	54	—
2	AC/VP1	Anode	260	2.2
		Screen	260	9.0
		Cathode	54	—
	(at min. noise suppression)			
3	2D4A or V914	AVC anode	2 to 4v. lower than cathode of V1 to E	
		Demod. anode	38 (no signal)	
		Cathode	54	—
	(at min. noise suppression)			
4	354V (met)	Anode	133	1.2
		Cathode	2.5	—
5	AC/PEN	Anode	238	28
		Screen	260	5.4
		Cathode	15	—
6	IW3 or UU3	Cathode	387	—

Pilot lamp 6v. .3a.

RESISTANCES

R	*Purpose*	*Ohms*
1	V1 cathode biasing	6,000
2	V1 osc. grid-cathode return	50,000
3	V1 screen voltage dropper	15,000
4	Part of AVC load to grid of V2 (see R11)	250,000
5	Part of V2 cathode biasing	300
6	,, ,, ,, ,,	5,000
7	Noise suppression control in V2 cathode network	10,000
8	AVC decoupler to V1 grid	500,000
9	Part of signal diode load	100,000
10	,, ,, ,, ,,	100,000
11	Part of AVC diode load (see R4)	250,000
12	Volume control	250,000
13	V4 cathode biasing	1,600
14	V4 anode load	50,000
15	V4 grid/chassis return	250,000
16	V5 cathode biasing	375
17	V5 anode/chassis tone control (with C20)	9,000

CONDENSERS

C	*Purpose*	*Mfd*
1	Aerial series feed	.001
2	V1 AVC decoupler	.1
3	V1 cathode decoupler	10
4	In parallel with C3	.1
5	V1 osc. grid condenser	.001
6	V1 screen decoupler	.1
7	Fixed LW tracker (in parallel with T10)	.0008
8	AVC decoupler to R11	.01
9	HF by-pass for signal diode load	.0003
10	Coupling condenser to primary of AVC link coils	.0001
11	AVC diode coupling from secondary of link coils	.0001
12	LF coupling to vc	.01
13	V3 cathode decoupler	.1
14	Volume control HF by-pass	.0005
15	V4 cathode decoupler	25
16	V4 anode by-pass	.002
17	V4–V5 LF coupling	.1
18	V5 cathode decoupler	25
19	V5 anode corrector tone	.0025
20	Tone control (with R17)	.01
21	HF by-pass for C22	.1
22	HT smoothing	12
23	,, ,,	8