EKCO AW 98

Four-valve, plus rectifier, four-waveband superhet. One waveband for television sound only. Cathode-ray tuning indicator and provision for pickup and external loudspeaker. Suitable for AC mains, 40–80 cycles, 200–250 volts. Made by E. K. Cole, Ltd., Southend-on-Sea, Essex.

ON MW and LW, aerial input is via coupling condenser C1 on MW and additional coupling L1 on LW to inductively-coupled bandpass filter. Primary coils L2 (MW), L3 (LW) are tuned via wavechange switch contacts by VC1. The BP grid coils L4 (MW) and L5 (LW) are tuned by VC2. The aerial circuit is shunted on LW by the IF filter L6, C2.

On TS (television sound) and SW bands, the aerial input is via the switch and coupling coils L7 (TS) and L8 (SW) to single tuned grid coils L9 (TS) and L10 (SW). Image rejection on the MW band is effected by T9, which feeds a small reversed signal from the primary to the grid BP coils. If desired, a dipole aerial may be connected to aerial socket, A, and the unmarked socket immediately below. Socket E is for the earth connection.

The signal from the tuned circuits is fed via the wavechange switch to the control grid of V1, the triode-hexode frequency-changer. AVC is applied to the grid circuit, and standing bias provided by a cathode resistance, R1, decoupled by C3. The screen is fed from a potential divider comprising R2, R3, decoupled by C4.

The oscillator grid coils, L11 (TS and SW), L12 (MW) and L13(LW) are tuned by VC3 and trimmed by T5 (SW), T8 (MW) and T12 shunted by C5 (LW). Series tracking is effected by C6 and adjustable iron core of L12 (MW) and C7 and core of L13 (LW). R27 and C33 are the grid leak and condenser.

The oscillator anode has a stabilising resistance, R4, between it and the reaction coils, L14 (TS and SW), L15 (MW) and L16 (LW), which are connected in series. The anode circuit is completed by a voltage dropper, R5, decoupled by C8, C21.

An IF transformer (L17, T2 primary ; L18, T1 secondary) couples the anode of V1 to the second valve, V2, which is a variable-mu HF pentode IF amplifier. AVC is applied to the grid through L18, and standing bias derived from a cathode resistance, R6, decoupled by C9.

There is no voltage dropper for the screen of V2, but a decoupling condenser, C10, is connected between screen and chassis.

A second IF transformer (L19, T4 primary : L20, T3 secondary) couples the anode output of V2 to the signal diode of V3, a double-diode-triode.

Four resistances—R7, R8, R9, R13—form a load and filter network from the "earthy" end of L14 to the cathodes of V3 and the "mystic eye" tuning indicator, with C11 as an HF by-pass across all the resistances.

From the junction of R7, R8 the LF signal is fed via C12 to the volume control, VR1, while the control grid of the tuning indicator is fed via R10 from the junction of R9 R13 with DC variations from which LF is filtered by C13.

The slider of VR1 feeds the grid of the triode section of V3, which is cathode biased by R11, decoupled by C14. A permanent degree of tone correction is effected by C15 between C12 and slider of VR1, while variable tone control is provided by C16 and VR2 between V3 grid and chassis.

The PU sockets are connected, one to chassis and the other to the junction of R7, R8, C12, so that VR1 also controls gram reproduction.

The AVC diode of V3 is fed from the anode of V2 via C17, the load resistance, R12, being connected to V3 cathode. The AVC line is fed via R14, C19 to V2, and R15, C20 to V1. No delay volts are applied to the AVC circuits.

The anode circuit of V3 has R17 and R18 in series, the latter decoupled by C32 in power pack. C22 is HF anode to chassis by-pass.

LF signals from R17 are fed via C23 to the grid of the output pentode, V4, via R19 and R20, with C24 across the latter. A small reversed signal (negative feedback) is applied on MW, LW and TS from a third winding, L23, on the output transformer and is applied via R21 across R20. The junction of R19 and R20 is connected to chassis through an LF potential divider R22, R23.

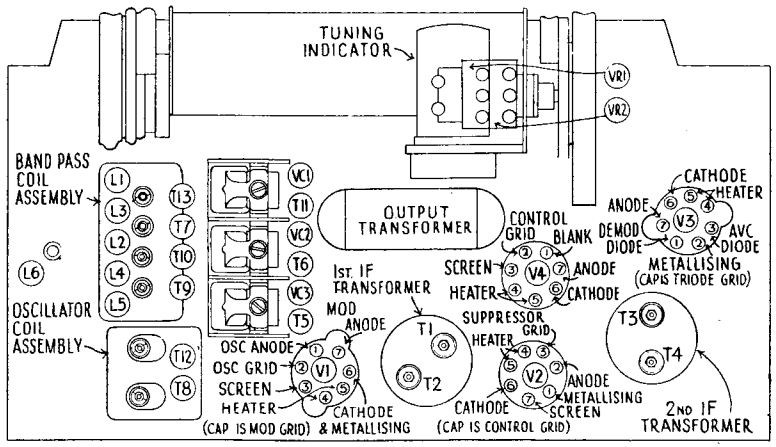
The wavechange switch shortcircuits R22 on TS, and R20 and C24 on SW, thus cutting out the negative feedback and adjusting the LF gain.

V4 is cathode biased by R24 decoupled by C25, and C26 is the anode to cathode tone corrector. The output transformer, L21, L22, couples V4 to the 24-ohm speaker with a whistle suppressor network L24, L25, L26, C27, C28, across the secondary L22. A tapping on the latter is connected to the external speaker sockets which are suitable for connection to a 4-ohm speaker. The internal speaker may be silenced by a switch.

HT is derived from a separate power pack comprising a mains transformer, the full-wave rectifying valve, V5, and smoothing condensers C29, C30. The speaker field, L27, is the smoothing choke in the HT negative lead. Also on the power pack are condensers C21, previously mentioned, C31, which decouples the main HT voltage droppers, R25 and R26 and C32, which provides additional decoupling across C8 (HF decoupler for R5).

CIRCUIT DIAGRAM

E. K. Cole, Ltd., do not permit the circuit diagram of this receiver to be published. This review has been specially written, however, to explain the circuit step by step, and engineers with some knowledge of the standard arrangements will have no difficulty in identifying the components in the set and understanding their duties.



Layout diagram of the underside of the Ekco chassis showing where the trimmers are to be found and identifying some of the coils and components.

RESISTANCES

R	Purpose	Ohms
1	V1 cathode bias	250
2	V1 screen pot	*12,500
3	" " "	25,000
4	Osc. anode stabiliser	200
5	Osc. anode dropper	†20,000
6	V2 cathode bias	300
7	IF stopper	100,000
8	Diode signal load	250,000
9	T1 pot. divider (with R13)	750,000
10	T1 grid decoupler	500,000
11	V3 cathode bias	2,000
12	AVC diode load	750,000
13	T1 pot. divider (with R9)	1 meg
14	AVC line decoupler	1 meg
15	" " "	250,000
16	T1 "anode feed"	2 meg
17	V3 anode load	100,000
18	V3 anode decoupling	10,000
19	(See R22, R23)	50,000
20	Negative feedback	20,000
21	resistances	4,000
22	LF pot. divider feeding	500,000
23	grid of V4 (with R19)	40,000
24	V4 cathode bias	200
25	HT feed except to	750
26	V4 anode circuit	750
27	V1 osc. grid leak	25,000
VR1	Volume control	1 meg
VR2	Tone control	1.5 meg

*In some models R2 comprises two 25,000 ohms in parallel.
†R5 sometimes two 40,000 ohms.

CONDENSERS

C	Purpose	Mfds
1	Aerial coupling (MW)	.001
1A	In series with T6	.001
2	IF filter with L6	150 mmfds
3	V1 cathode decoupler	.1
4	V1 screen decoupler	.1
5	In parallel with T12	60 mmfds
6	MW osc. tracker	.002
7	LW " "	.0008
8	Osc.anode decoupler(withC21)	.1
9	V2 cathode decoupler	.1
10	V2 screen decoupler	.1
11	IF filter by-pass	.0002
12	LF coupling to V3 triode	.01
13	TI grid decoupler	.1
14	V3 cathode decoupler	*25
15	Tone corrector	60 mmfds
16	Tone control (with VR2)	.002
17	AVC coupling	15 mmfds
18	IF filter by-pass	.0002
19	AVC line decoupler	.04
20	" " "	.04
21	Osc. anode decoupler	*2
22	V3 anode HF by-pass	.0003
23	V3–V4 LF coupling	.01
24	Negative feedback (part)	.02
25	V4 cathode decoupler	*50
26	V4 tone corrector	.004
27	Whistle filters	.2
28		.2
29	HT smoothing	*8
30		*8
31	R25, R26 decoupler	*4
32	V3 anode decoupler	*2
33	V1 osc. grid condenser	5 mmfds

*Electrolytics.

GANGING

Check that cursor line covers the 550m mark when gang is at maximum. If necessary adjust cursor carriage on cord. Volume control should be at maximum.

Continued on page vii

VALVE READINGS

230v mains. *Vol. control at max. Tuning at* 200m. *No signal input.*

V	Type	Electrode	Volts	Ma
1	TH4A	Anode	233	3.8
		Osc. anode	95	7.0
		Screen	101	7.1
		Cathode	4.3	—
2	VP41	Anode	233	12
		Screen	233	5.2
		Cathode	4.8	—
3	DT41	Anode	100	1.1
		Cathode	2.8	—
4	OP41	Anode	295	59
		Screen	233	6.6
		Cathode	13	
5	IW4/350	Anodes	268 (AC)	
		Cathode	375	

Pilot lamps, 6.2v, .3 amp, MES, CR tuning indicator, Mullard TV4.

WINDINGS

L	Purpose	Ohms
1	LW coupling coil (and part of L3)	40
2	MW primary coil	2.5
3	LW primary coil	30
4	MW secondary coil	2.5
5	LW secondary coil	27
6	IF aerial filter	40
7	TS aerial coil	Very low
8	SW aerial coil	.4
9	TS grid coil	Very low
10	SW grid coil	Very low
11	TS and SW osc. coil	Very low
12	MW osc. coil	3
13	LW osc. coil	9
14	TS and SW osc. react.	.4
15	MW osc. react.	.6
16	LW osc. react.	2
17	1st IFT primary	80
18	1st IFT secondary	80
19	2nd IFT primary	80
20	2nd IFT secondary	80
21	Output trsfr. primary	170
22	Output trsfr. secondary	2.6
23	Negative feedback coil	48
24	Part of whistle filter	2.5
25	" " "	5.5
26	" " "	2.5
27	Field coil	750
28	Hum bucking coil	7
29	Speech coil	24
30	Mains trsfr. heater sec.	Very low
31	Mains trsfr. HT secondary	375 (total)
32	Mains trsfr. rect. secondary	Very low
33	Mains trsfr. primary	23 (total)

BURNDEPT 252

Three-valve, plus rectifier, four-waveband TRF receiver suitable for operation from AC or DC mains, 200–260 volts. Made by Burndept, Ltd., Erith, Kent.

ALTERNATIVE aerial taps are provided, A1 through the condenser, C1, and A2 which provides an aerial trimming capacity, T5.

On the short and ultra-short wavebands the grid of the HF pentode amplifying valve, V1, is connected across the aperiodic coil, L1. On medium and long waves the bandpass tuning unit comprising the coupling coil, L1, and the tuning coils L2, L4 (MW), L3 and L5 (LW), are brought into circuit tuned by VC1 and VC2 sections of the ganged condenser.

V1, which has variable-mu characteristics, has a fixed bias resistance, R2, and this is connected to the volume control, R4. R3 feeds R4 with current from the HT line so that the potentials developed across R4 may be used to increase the biasing of the cathode of V1 as the volume control is rotated. R2 and R4 are decoupled by C3.

V1 is coupled to the grid of V2 by a tuned anode circuit to which reaction may be applied. L11 (MW) and L12 (LW) are the anode coils and are tuned by VC3 section of the ganged condenser. Decoupling and voltage dropping in the anode circuit of V1 is effected by R5, C4, and C5.

On the short wave bands separate anode and reaction coils are brought into circuit. L6 and L8 are the ultra-short wave band coils, and L7 and L9 form the second short wave band coils, with L10 shorted out of circuit. L10 is the common reaction coil coupled to the medium and long wave tuning coils, L11 and L12. VC4 is the reaction control.

V2 is a pentode valve of high impedance operating as a leaky grid detector, C6 and R7 being the grid condenser and leak. The screen of the valve is fed from the HT line through R8, which is decoupled by C7.

The anode circuit of V2 comprises R9 with the HF filter network C8 and C9 and R10 which is the LF coupling resistance. As previously stated, reaction is applied to the tuned anode coils, and the necessary HF feedback to the reaction windings, L8, L9, and L10 are derived from R9.

The LF voltages developed across R10 are applied via the LF coupling condenser, C10; the filter resistance, R11, and the grid stopper, R12, to the pentode output valve, V3. The grid to cathode resistance is R13, which has a high-note by-pass, C11, in shunt with it.

V3 is biased by R14, which is decoupled by C13. The low impedance speaker is coupled to the anode circuit of V3 by the output transformer, L13, L14. A permanent degree of tone correction is effected by the anode to cathode condenser, C14.

HT and LT supply circuits follow conventional lines, the heaters of all the valves and the two pilot lamps being in series with the main dropping resistance, R15, across the mains input. This is filtered by L17, L18 and C18.

HT is obtained from the half-wave rectifying valve, V4, the speaker field, L16, providing smoothing in the positive HT line. C15 is the smoothing condenser, C16 the reservoir condenser, and C17 the anode to cathode by-pass capacity.

GANGING

All adjustments to the tuned circuits of this receiver are made on medium waves at 200 metres.

A signal of this wavelength should be injected into the aerial and earth terminals through a dummy aerial, and T1, T2, T3, and T4 adjusted for maximum reading on an output meter. T5 should be adjusted to give the best results on the particular aerial which is being used with the receiver.

VALVE READINGS

On 220v, AC mains.

V	Type	Electrode	Volts	Ma
1	VP1321	Anode	150	7
		Screen	150	1.6
		Cathode	1.1	8.6
2	SP13C	Anode	38	.5
		Screen	30	.2
3	PEN36C	Anode	175	40
		Screen	210	6
		Cathode	6.7	46
4	ID5	Cathode	250	58.2

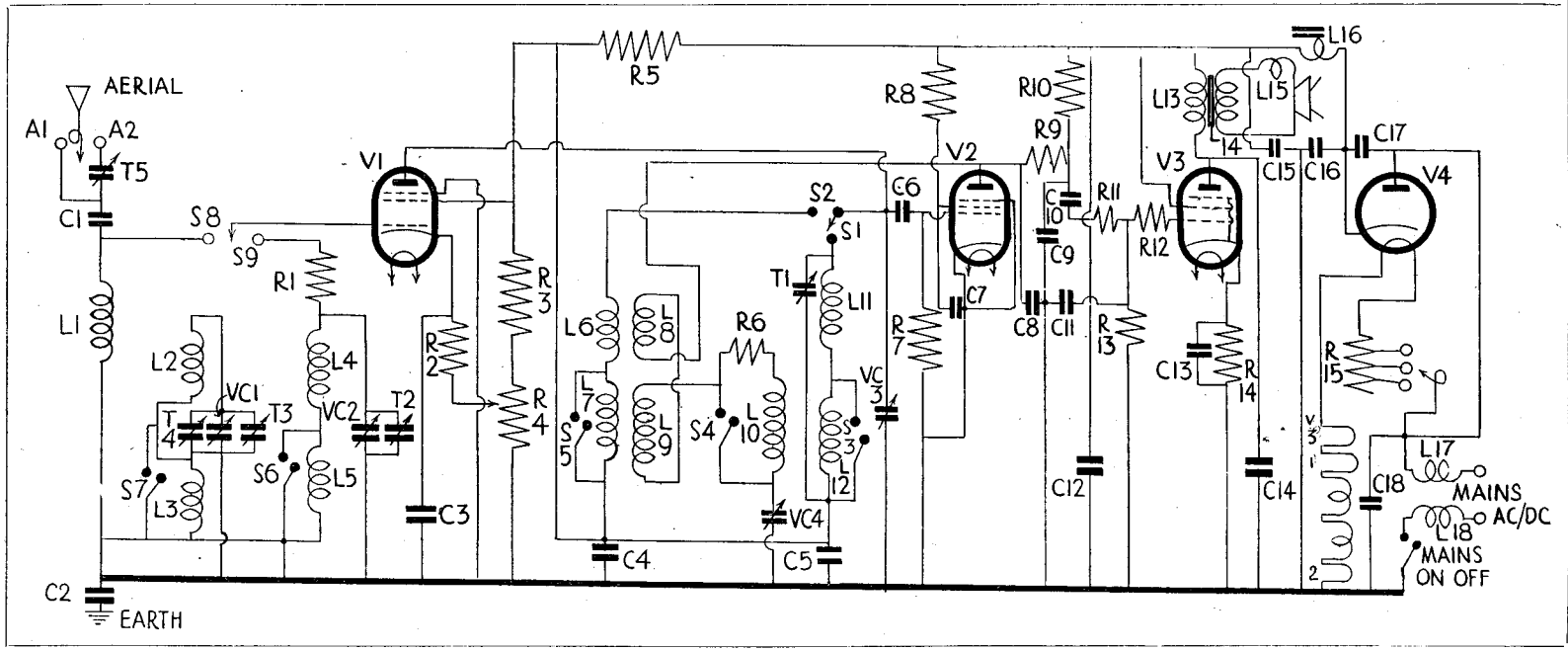
Pilot lamps, 6.2v, .3 amp.

RESISTANCES

R	Ohms	R	Ohms
1	500	9	50,000
2	150	10	250,000
3	50,000	11	50,000
4	10,000	12	100,000
5	5,000	13	250,000
6	500	14	150
7	1 meg	15	—
8	750,000		

CONDENSERS

C	Mfds	C	Mfds
1	.0005	10	.01
2	.02	11	.0002
3	.1	12	.5
4	.25	13	25
5	8	14	.005
6	.0001	15	24
7	.1	16	16
8	.00005	17	.02
9	.0005	18	.01



EKCO AW 98

Continued from page vi

IF Circuits.—Connect service oscillator to E socket, and via a 0.02 mfd condenser to grid (top cap) of V1, leaving clip in place. Switch receiver to LW, turn gang to maximum, feed in a 126.5 kc signal, and adjust T1, T2, T3, and T4 for maximum output.

SW Bands.—Connect signal generator to A and E sockets, and feed in an 18 mc signal. Switch set to SW and tune to 18 mc on scale. Fully unscrew T5, then screw it in slowly. Two peaks will be obtained; adjust to the first.

Feed in a 20.75 mc signal (its second harmonic being 41.5 mc) at full generator output. Then switch to TS and adjust T6 for maximum output.

Switch to SW, feed in a 15mc, tune to 15 mc on scale, and adjust T7 for maximum output.

(On the TS band, the IF is obtained by beating the third harmonic of oscillator circuits with the incoming signal.)

MW Band.—Switch receiver to MW, tune to 200m mark on scale, and inject a 1,500 kc signal. Fully unscrew T8, then screw it in slowly, adjusting accurately to the *first* peak.

Fully unscrew T9. Tune to 250m on scale, inject a 1,200 kc signal, and adjust T10 and T11 for maximum output. Tune to 500m on scale, inject a 600 kc signal, and adjust iron core of L12 for maximum output, while rocking gang. Repeat the adjustments at 200, 250 and 500 m.

LW Band.—Switch receiver to LW, tune to 1,100 m on scale, inject a 272.5 kc signal and adjust T12, T13, and T14 for maximum output. T14 is adjusted by sliding the spiralled wire on the insulating sleeve over the inner wire.

Tune to 1,700 m on scale, feed in a 176.5 kc signal, and adjust core of L13 for maximum output, while rocking gang.

IF Filter Adjustment.—Leaving set tuned to 1,700m, feed in a 126.5 kc signal at full generator output, and adjust core of L6 for *minimum* output. Reduce output from service oscillator and adjust to 272.5 kc. Set cursor to 1,100m on receiver scale, and repeat LW alignment.

Image Rejection Adjustment.—Switch set to MW, inject a 1,000 kc signal at full output. Tune receiver to image of service oscillator frequency (about 400m), and adjust T9 for *minimum* output.

Set cursor to 250m; inject a 1,200 kc signal, and check adjustments of T10 and T11.