

# EKCO MODEL AC97 SUPERHET FIVE

**CIRCUIT.**— An inductively coupled band-pass filter precedes V1, the frequency changer. On medium waves the aerial is coupled to a tap on the aerial coil through a small series condenser, and an image rejector condenser is in circuit. Separate coils are used in the aerial circuit for medium and long waves.

Coupling to V2, an H.F. pentode is by means of an I.F. transformer tuned to 126.5 kc. and to V3, a double diode triode, through a second I.F. transformer.

The first I.F. transformer is capacitively as well as inductively coupled, and includes a resistance in series with each winding and shorted by switches. With these resistances in circuit the band spread of the transformer is broadened.

One diode of V3 is used for demodulation, and the other to supply A.V.C. bias to the preceding valves in the orthodox manner.

The TV4 visual tuning indicator is connected via a resistance and capacity stage to the demodulator diode.

The L.F. output of the demodulator diode is fed through a resistance and capacity stage to the grid of the triode section of the same valve. The volume control forms part of the network, and is in series with a resistance, RL3, which is in turn connected to a tap on the cathode bias network. This provides a certain amount of tone correction.

V3, which is used for demodulation and delayed A.V.C., has its cathode connected to a potentiometer network, consisting of R's 19, 20 and 26, connected between the main H.T. line and the chassis.

The L.F. output of V3 passes through a capacity coupled auto-transformer to the output valve, V4, a triode.

A tone control, VR2, is included in this circuit. It is ganged with the volume con-

trol and accentuates the bass and treble when the volume is low. A whistle filter, consisting of an air-cored choke tuned by T10 is also included in the grid circuit. This is tuned to give a sharp cut-off at 9,000 cycles, and starts cutting at 8,000 cycles.

Grid bias is obtained for this valve from a potentiometer network in the negative H.T. line.

The muting circuit shorts out the grid leak, R22, and applies a paralysing bias to the grid of V4 and also to the grid of V3.

V4 has a 2-volt heater, and is run from a separate 4-volt winding on the mains transformer. It has, therefore, a shunt resistor VR3, a variable centre tap of which is connected to earth.

Mains equipment consists of transformer, full-wave rectifier, electrolytic condensers and the speaker field.

**Special Notes.**—The dial lights are rated at 6.2 volts .3 amp. They are fixed to brackets in the cabinet above the dial assembly by means of the usual spring clips and are removed by lifting vertically.

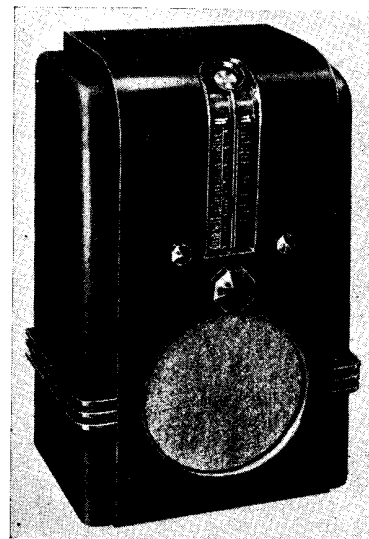
A terminal strip on the back of the chassis provides connections for an external moving-coil speaker and for a pick-up. The speaker connections are taken from the secondary of the output transformer, and the extra speaker should have a speech-coil impedance of from 4 to 5 ohms.

The internal speaker may be silenced by unscrewing the black knob which will be found on the connecting panel.

When using the set with a pick-up, the aerial should be removed or the set tuned to a point where there is no transmission. The input is via the volume control to the grid of V3 so no external volume control is needed.

T10, which tunes the whistle filter, is accurately adjusted before the receiver leaves the factory, and must on no account be touched. Should the setting become altered for any reason, adjustment must be carried out with an audio-oscillator.

**Removing Chassis.**—Remove three knobs from the front of the cabinet (grub screws) and the wave-change knob from the side of the cabinet. This also has a grub screw which is reached from inside the



The AC97 made by E. K. Cole Ltd., is a four-valve plus rectifier superhet including several refinements and housed in this modernistic moulded cabinet.

## CIRCUIT

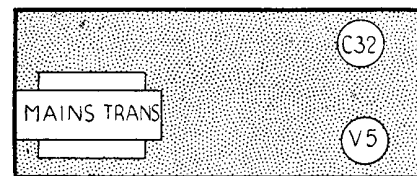
NO circuit diagram is given with this review because E. K. Cole, Ltd., do not permit the circuits of their receivers to be published.

A particularly long circuit description is given on this page, however, and the component tables, in conjunction with the layout diagrams, explain the function of every part of the receiver.

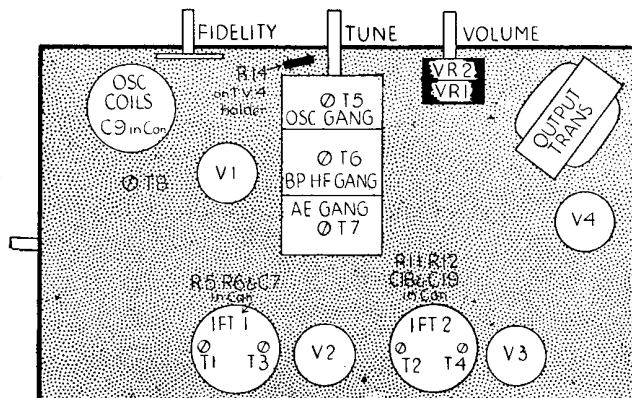
The general design of the set is entirely orthodox and no unusual problems need be anticipated.

## RESISTANCES

R.	Purpose.	Ohms.
1	V1 screen and osc. anode decoupling.	20,000
2	V1 A.V.C. decoupling ..	1.3 meg.
3	V1 cathode bias ..	300
4	V1 osc. grid leak ..	100,000
5	I.F. coupling shunt ..	3,000
6	I.F. coupling shunt ..	6,000
7	V2 A.V.C. decoupling ..	1 meg.
8	V2 cathode bias ..	300
9	A.V.C. diode load (part) ..	250,000
10	A.V.C. diode load (part) ..	500,000
11	Demodulator diode load (part) ..	50,000
12	Demodulator diode load (part) ..	250,000
13	A.F. input network (part) ..	2 meg.
14	TV4 anode feed ..	2 meg.
15	TV4 grid filter ..	500,000
16	TV4 grid filter ..	250,000
17	TV 4 grid filter ..	1 meg.
18	V3 anode load ..	50,000
19	V3 cathode bias potentiometer.	1,000
20	V3 cathode bias potentiometer.	1,000
21	V1, V2 and V3 HT decoupling ..	4,000
22	V4 grid leak ..	100,000
23	V4 grid bias potentiometer ..	100,000
24	V4 grid bias potentiometer ..	50,000
25	V4 grid bias decoupling ..	32,000
26	V3 cathode potentiometer part ..	100,000
VR1	Volume control ..	500,000
VR2	Tone compensating ..	50,000
VR3	V4 heater shunt ..	30
	Speaker field ..	2,000



POWER UNIT TOP



There are two chassis in the AC97 and the top layouts of both are given here. Rs. 5, 6, 11 and 12 and Cs. 7, 18 and 19 are housed in the I.F. cans. R14 is mounted on the holder of the TV4 cathode-ray tuning indicator.

cabinet and must be completely removed. Remove four small screws holding the chassis in position, two in the back and two in the front. Free the dial lights from their brackets and the chassis may then be removed to the extent of the power unit connecting leads.

**Removing Power Unit.**—Take out four bolts from underneath the cabinet and then the bolt passing through a bracket fixed to the chassis on to the back of the speaker field.

The chassis may then be removed to the extent of the speaker leads which are very long.

### Alignment Notes

**I.F. Circuits.**—Connect a modulated oscillator to the grid cap of V1 via a .02 mfd. condenser, leaving the grid lead connected, and an output meter across the external speaker terminals.

Inject a signal of 126.5 kc. and trim T1, T2, T3 and T4 for maximum output, reducing the oscillator input as the circuits come into line, to prevent the A.V.C. from operating.

Repeat the adjustments until best results are obtained.

**Medium Waves.**—Connect the oscillator to the aerial and earth terminals via a dummy aerial.

Tune the oscillator and the receiver to

200 metres (1,500 kc.s), fully unscrew T5 and then slowly screw it in until maximum reading is obtained on the output meter.

Inject and tune in a signal of 250 metres (1,200 kc.s), adjust T6 and T7 for maximum.

Repeat until no further improvement results.

**Long Waves.**—Tune the oscillator and the receiver to 1,700 metres (170.6 kc.), rock the gang condenser and adjust T8 for maximum.

**Image Rejector.**—If the receiver is operated in the vicinity of London Regional, West Regional or Radio Normandie, a second channel whistle may be heard on Brussels (483.9 metres), Budapest (549.5 metres), or Strasbourg (349.2 metres) respectively.

In this case T9 should be adjusted with a non-metallic screwdriver for minimum whistle.

This condenser is correctly set at the factory and should not be touched unless a pronounced whistle interferes with one of the stations named above.

### Replacement Condensers

Replacement condensers recommended by E. K. Cole, Ltd., and available from them are: C32, 5s. 6d.; block containing C's 33 and 34, 5s. 6d.; C35, 2s. 3d.; and

## Ekco AC97 on Test

**MODEL AC97.**—Standard model for 200-250 volt, 40-100 cycle A.C. mains. Price 12½ gns.; 13 gns. in black and chromium.

**DESCRIPTION.**—A high fidelity, two-waveband, five-valve superhet table model with bakelite cabinet.

**FEATURES.**— Full-vision vertical straight-line scale. Tuning indicator. Large control knob with push-action silent tuning. Three-position fidelity control.

### Sensitivity and Selectivity

**MEDIUM WAVES (195-560 metres).**—Sensitivity depends upon the fidelity control and is up to average in the medium position. Selectivity is good in the medium position, extremely good in the maximum position and low in the high fidelity position.

**LONG WAVES (825-2,000 metres).**—Performance is good and, as on the medium waves, dependent upon fidelity control setting.

### Acoustic Output

In the high fidelity position reproduction is exceptionally good, with really appreciable high and low note radiation. In the medium position the tone is representative of an average type of set, whilst in the highly selective position the tone naturally becomes rather muffled.

In the high fidelity position the general balance is excellent and the results are highly pleasing, with adequate sensitivity from all the main stations and sufficient volume for a large room.

C34, 2s. 3d. These prices are subject to the usual Ekco discount.

Replacement condensers available from A. H. Hunt, Ltd., are: C32, list 3055 (6s.), block containing C's 33, 34, list 2955 (5s. 9d.), C35, list 2944 (1s. 9d.), C24, list 2918 (1s. 9d.).

### Noise and Distortion

**A RECEIVER** was tested in the shop and seemed to function normally. When delivered to the customer, the first thing noticed was a heavy background.

It was decided that one of the circuits was not pulling its weight, and investigation showed an open circuit in the first grid circuit. The frame aerial had been severed apparently by an accidental jab of a screwdriver.

It would seem that the manufacturers passed the receiver out for the same reason it passed as O.K. in my own premises—a high background of interference masking the undue set noise.

In another case a set came in suffering from bad distortion. As the chassis was removed it was accidentally found that touching one side of the H.F. choke in the demodulation diode circuit restored normal reproduction.

This suggested an O.C. diode load resistance, and an ohmmeter test confirmed this diagnosis.—R. A. COATES.

### VALVE READINGS

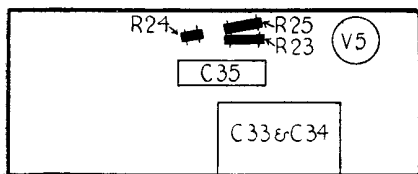
No signal. Volume maximum. High fidelity position. 200 v. A.C. mains.

V.	Type.	Electrode.	Volts.	Ma.
1	All Mullard. FC4 met. (7) ..	Anode ..	180	1.3
		Screen ..	80	3.1
		Osc. anode ..	80	1.8
2	VP4B met. (7) ..	Anode ..	180	*
		Screen ..	180	
3	TDD4 met. (7) ..	Anode ..	75	1.6
4	ACO42 (4) ..	Anode ..	255	45
5	IW4 (4) ..	Filament ..	265	

\* Inaccessible

### CONDENSERS

C.	Purpose.	Mfd.
4	Series aerial (m.w.) ..	.0008
7	I.F.T.I. coupling ..	.0003
9	V1 osc. grid ..	.0001
10	V1 cathode bias shunt ..	.1
11	V1 screen and osc. anode decoupling ..	.1
12	Long wave osc. padding ..	.0008
14	V2 A.V.C. decoupling ..	.01
15	V2 cathode bias shunt ..	.1
18	A.V.C. diode decoupling ..	.000015
19	H.F. filter ..	.00012
20	L.F. coupling ..	.1
21	A.F. input network ..	.5
22	A.V.C. decoupling ..	.1
23	H.F. filter ..	.00015
24	V3 cathode bias shunt ..	25
25	L.F. coupling ..	.25
26	V4 grid isolating ..	.25
27	Tone compensating ..	.2
29	Fidelity control ..	.0015
30	Fidelity control ..	.0005
31	TV4 grid filter ..	.1
32	H.T. smoothing ..	8
33	H.T. smoothing ..	8
34	H.T. shunt ..	4
35	V4 bias decoupling ..	4
36	V1 A.V.C. decoupling ..	.1
37	V1, 2 and 3 H.T. decoupling ..	.1



POWER UNIT BOTTOM

As the under-view layout (right) shows, the AC97 is given a very clean appearance by the use of a large condenser and resistance assembly. Construction is also simplified by separate power chassis.

