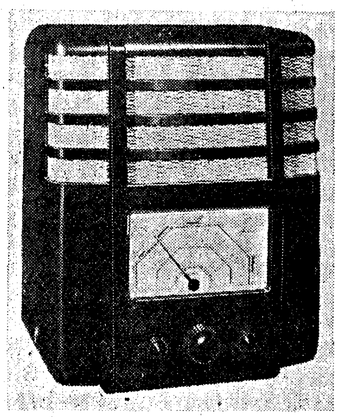
'TRADER' SERVICE SHEET

295

EKCO AW69

3-BAND A.C. SUPERHET



A SHORT-WAVE range of 15-52 m. is covered by the Ekco AW69 3-band superhet. This is a 3-valve (plus rectifier) model with a triode-hexode frequency changer, a variable-mu pentode IF amplifier and a double diode output pentode. Provision is made for an extension speaker, and there is a switch for cutting out the internal speaker.

CIRCUIT DESCRIPTION

Aerial input on MW and LW via SW coupling coil **L4** and on MW, coupling condenser **C1** or, on LW, coupling coil **L1**, to mixed coupled band-pass filter. Primary coils **L2** (MW) and **L3** (LW) are tuned by **C27**; secondaries **L6** (MW) and **L7** (LW) by **C32**; coupling by mutual inductance. On SW, coupling is via **L4** to single-tuned circuit **L5, C32.** Image suppression by **C29.**

First valve (**V1, Ekco metallised TX41**) is a triode hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L8** (SW), **L9** (MW) and **L10** (LW) are tuned by **C34**; parallel trimming by **C35** (SW), **C36** (MW) and **C37** (LW); series tracking by **C8** (MW) and **C9** (LW). Reaction by coils **L11** (SW), **L12** (MW) and **L13** (LW).

Second valve (**V2, Ekco metallised VP41**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C38, L14, L15, R4, C39** and **C40, L16, L17, C41.**

Intermediate frequency 126.5 KC/S.

Diode second detector is part of double diode pentode output valve (**V3, Ekco DO42**). Audio frequency component in rectified output is developed across load resistance **R10** and passed via AF coupling condenser **C17** and manual volume control **R9** to CG of pentode section. I.F. filtering by **C15, R8, C16, C19.** Provision for connection of low impedance external speaker across secondary of output transformer **T1**, whilst switch **S15** permits internal speaker to be muted by breaking its speech coil circuit.

Second diode of **V3**, fed from **V2** anode via **C14**, provides DC potentials which are developed across load resistances **R14, R15** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control.

HT current is supplied by full-wave rectifying valve (**V4, Ekco R41**). Smoothing by choke **L19** and dry electrolytic condensers **C24, C25.** RF filtering in HT circuit by **C7,** and in rectifier circuit by **C23.**

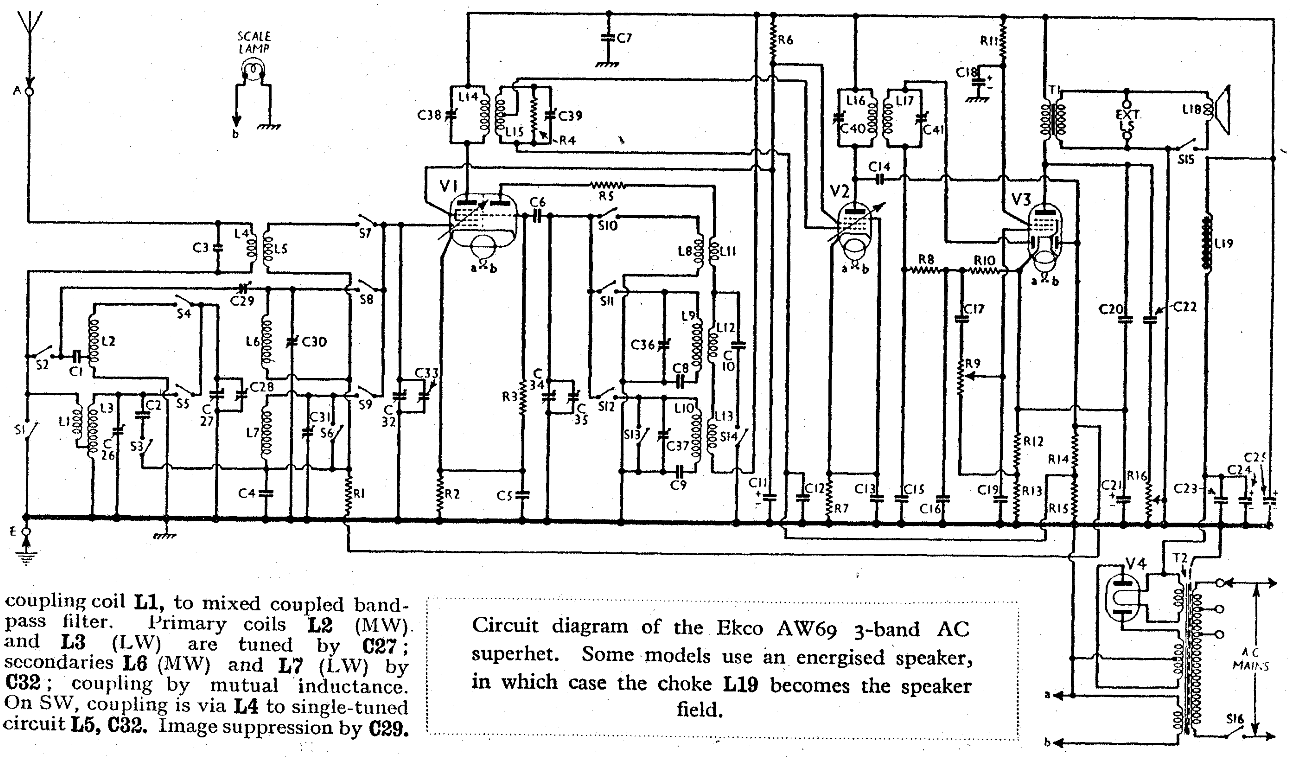
DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the three knobs at the front of the cabinet (recessed grub screws) and the tone control knob at the side of the cabinet (recessed grub screw accessible from the inside of the cabinet).

Now remove the four screws (with washers) holding the chassis to the bottom of the cabinet and the two screws (with bakelite washers and lock washers) holding the tuning scale to the front of the cabinet. Free the speaker leads from the cleat holding them to the sub-baffle.

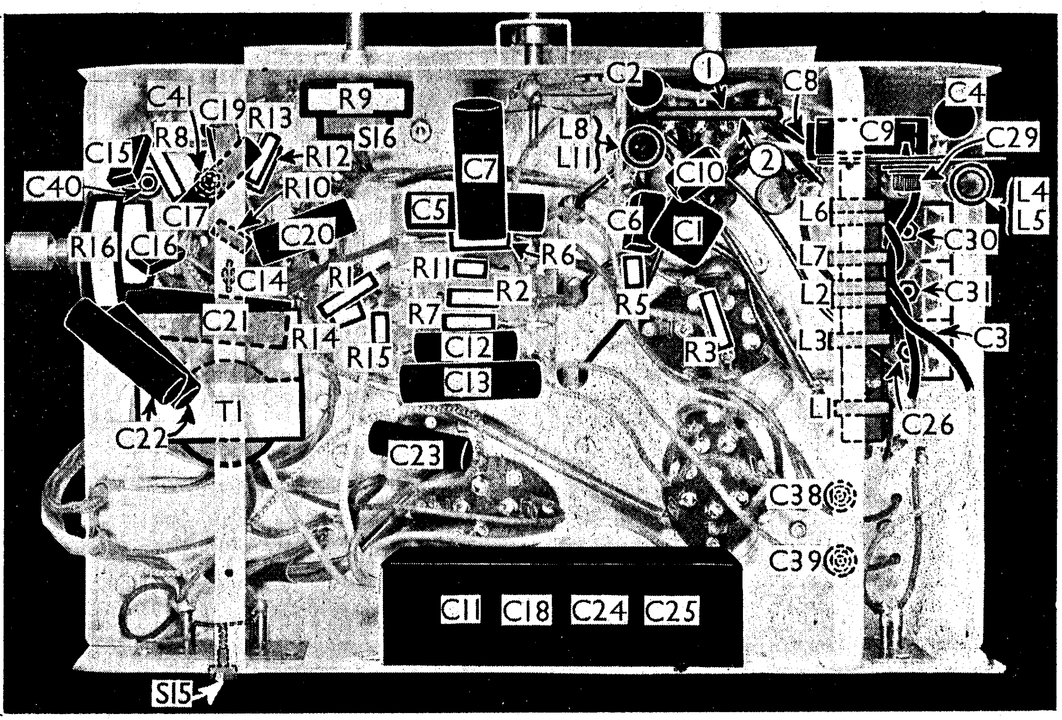
By tilting the back upwards the chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

If it is desired to free the chassis entirely, unsolder the speaker leads.



Circuit diagram of the Ekco AW69 3-band AC superhet. Some models use an energised speaker, in which case the choke L19 becomes the speaker field.

· Under-chassis view. **C22** consists of two condensers in parallel. **R16** has a switch body attached to it in our chassis, but this is not used. **C3** is a small twisted wire condenser. In PM speaker models the HT smoothing choke is fitted between **S15** and the electrolytic condenser block.



Removing Speaker.—To remove the speaker from the cabinet, remove the four screws (with lock washers) holding it to the sub-baffle and *when replacing*, see that the terminal panel is on the right.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial MW coupling condenser	0·001
C2	LW band-pass pri. shunt (on SW and MW only) ..	0·002
C3	Aerial circuit SW shunt ..	Very low
C4	V1 hex. CG decoupling ..	0·1
C5	V1 cathode by-pass	0·1
C6	V1 osc. CG condenser ..	0·0001
C7	H.T. circuit RF by-pass ..	0·1
C8	Osc. circuit MW tracker ..	0·002
C9	Osc. circuit LW tracker ..	0·0008
C10	V1 osc. anode SW RF by-pass	0·002
C11*	V1, V2 SG's decoupling ..	2·0
C12	V2 CG decoupling	0·01
C13	V2 cathode by-pass	0·1
C14	Coupling to V3 AVC diode ..	0·000015
C15	IF by-pass condensers	0·0002
C16	IF by-pass condensers	0·0002
C17	AF coupling to V3 pentode ..	0·01
C18*	V3 SG decoupling	1·0
C19	IF by-pass	0·0002
C20	Fixed tone corrector	0·0025
C21*	V3 cathode by-pass	25·0
C22	Part of variable tone control..	0·04§
C23	Rectifier RF by-pass ..	0·0025
C24*	HT smoothing ..	8·0
C25*	HT smoothing ..	8·0
C26‡	Band-pass pri. LW trimmer	—
C27†	Band-pass primary tuning ..	—
C28‡	Band-pass pri. MW trimmer	—
C29‡	Image suppressor	—
C30‡	Band-pass sec. MW trimmer	—
C31‡	Band-pass sec. LW trimmer..	—
C32†	Band-pass sec. and SW aerial tuning	—
C33‡	Aerial circuit SW trimmer ..	—
C34†	Oscillator circuit tuning ..	—
C35‡	Osc. circuit SW trimmer ..	—
C36‡	Osc. circuit MW trimmer ..	—
C37‡	Osc. circuit LW trimmer ..	—
C38‡	1st IF trans. pri. tuning ..	—
C39‡	1st IF trans. sec. tuning ..	—
C40‡	2nd IF trans. pri. tuning ..	—
C41‡	2nd IF trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.
§ Two 0·02 μF in parallel.

	RESISTANCES	Values (ohms)
R1	V1 hex. CG decoupling ..	1,000,000
R2	V1 hex. fixed GB	160
R3	V1 osc. CG resistance ..	25,000
R4	1st IF trans. sec. damping ..	1,000,000
R5	V1 osc. anode circuit stabiliser	200
R6	V1, V2 SG's HT feed.. ..	5,000
R7	V2 fixed GB	300
R8	I.F. stopper	100,000
R9	Manual volume control ..	850,000
R10	V3 signal diode load	500,000
R11	V3 SG HT feed	1,000
R12	V3 GB and AVC delay resistances	120
R13	V3 GB and AVC delay resistances	300
R14	V3 AVC diode load resistances	500,000
R15	V3 AVC diode load resistances	500,000
R16	Variable tone control	20,000

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial LW coupling coil and part L3	27·0
L2	Band-pass pri. MW coil ..	2·6
L3	Band-pass pri. LW coil ..	26·0
L4	Aerial SW coupling coil ..	0·4
L5	Aerial SW tuning coil ..	0·05
L6	Band-pass sec. MW coil ..	2·6
L7	Band-pass sec. LW coil ..	26·0
L8	Osc. circuit SW tuning coil ..	0·05
L9	Osc. circuit MW tuning coil ..	8·25
L10	Osc. circuit LW tuning coil ..	17·5
L11	Oscillator SW reaction coil ..	0·35
L12	Oscillator MW reaction coil ..	1·5
L13	Oscillator LW reaction coil ..	2·75
L14	1st IF trans. Pri. ..	70·0
L15	1st IF trans. Sec., total..	75·0
L16	2nd IF trans. Pri. ..	70·0
L17	2nd IF trans. Sec. ..	75·0
L18	Speaker speech coil	4·0
L19	HT smoothing choke ..	700·0*
T1	Output trans. Pri. ..	330·0
	Output trans. Sec. ..	0·3
T2	Mains trans. Pri., total ..	35·0
	Mains trans. Heater sec. ..	0·1
	Mains trans. Rect. heat. sec.	0·15
	Mains trans. HT sec., total	450·0†
S1-S14	Waveband switches	—
S15	Internal speaker switch ..	—
S16	Mains switch, ganged R9 ..	—

* May be speaker field coil (1,250 O).
† 550 O in models with energised speaker.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 225 V, using the 220-230 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 there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

If, as in our case, **V2** should become unstable when its screen current is being measured, it can be stabilised by connecting a non-inductive condenser of about 0·1 μF from grid (top cap) to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TX41 ..	259 / Oscillator 257	3·7 / 6·7	207	6·6
V2 VP41 ..	259	8·2	207	3·4
V3 DO42 ..	248	34·0	254	4·2
V4 R41 ..	340†	—	—	—

† Each anode, AC. 285V in models with PM speaker.

GENERAL NOTES

Switches.—S1-S14 are the waveband switches, in a double-sided rotary unit beneath the chassis. The sides are marked 1 and 2 in the under-chassis view, and diagrams of them are given in detail on page IV.

The table (p. IV) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

S15 is the internal speaker switch of the screw type, operated by a small knob at the rear of the chassis. When

Continued overleaf

EKCO AW69—*Continued*

this is unscrewed, the internal speaker speech coil circuit is broken.

S16 is the QMB mains switch, ganged with the volume control, **R9.**

Coils.—**L1, L2, L3, L6, L7** are in a single unscreened unit beneath the chassis, while **L4, L5** and **L8, L11** are on two moulded tubular formers, also beneath the chassis. **L4** and **L11** are interwound with **L5** and **L8** respectively.

L9, L10, L12, L13 and the IF transformers **L14, L15** and **L16, L17** are in three units on the chassis deck. The first has a metallic screening can, but the covers over the IF units provide no screening, and merely prevent mechanical damage and ingress of dust.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (3-4 O) external speaker. **S15** cuts out the internal speaker if desired.

Scale Lamp.—This is an MES type, rated at 6·2 V, 0·3 A.

Condensers C11, C18, C24, C25.—These are four 450 V working dry electrolytics in a single carton beneath the chassis, having a common negative (black) lead. The green lead is the positive of **C11** (2μF), the blue lead the positive of **C18** (1μF), the red lead the positive of **C24** (8μF), and the yellow lead the positive of **C25** (8μF).

Condenser C22.—This consists of two 0·02 μF paper condensers in parallel in our chassis.

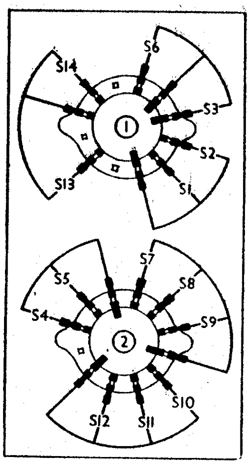
Condenser C3.—This is formed by the leads to the connecting tags of **L4** being twisted together. Its capacity is very low.

Resistance R5.—This is not shown in the makers' blue-print.

Valve V3.—The DO42 has the alternative base connections as employed in the Mullard Pen4DD, in which the anode and cathode pins are transposed, compared with other makes. Adopting the usual pin numbering, the connections are: 1, D1; 2, C; 3, D2; 4, H; 5, H; 6, A; 7, G2; top cap, G1.

Chassis Divergencies.—Some models use an energised speaker instead of the PM model. **L19** is then the speaker field, with a resistance of 1,250 O. In addition, there will then be the usual hum coil in series with **L18**, and **L18** will have a DC resistance of 3 O.

DIAGRAMS AND TABLE OF THE SWITCH UNITS



Diagrams of both sides of the switch unit, looking in the directions of the arrows in the under-chassis view.

Switch	LW	MW	SW
S1	—	—	C
S2	—	C	—
S3	—	C	C
S4	—	C	—
S5	C	—	—
S6	—	C	—
S7	—	—	C
S8	—	C	—
S9	C	—	—
S10	—	—	C
S11	—	C	—
S12	C	—	—
S13	—	C	—
S14	—	—	C

CIRCUIT ALIGNMENT

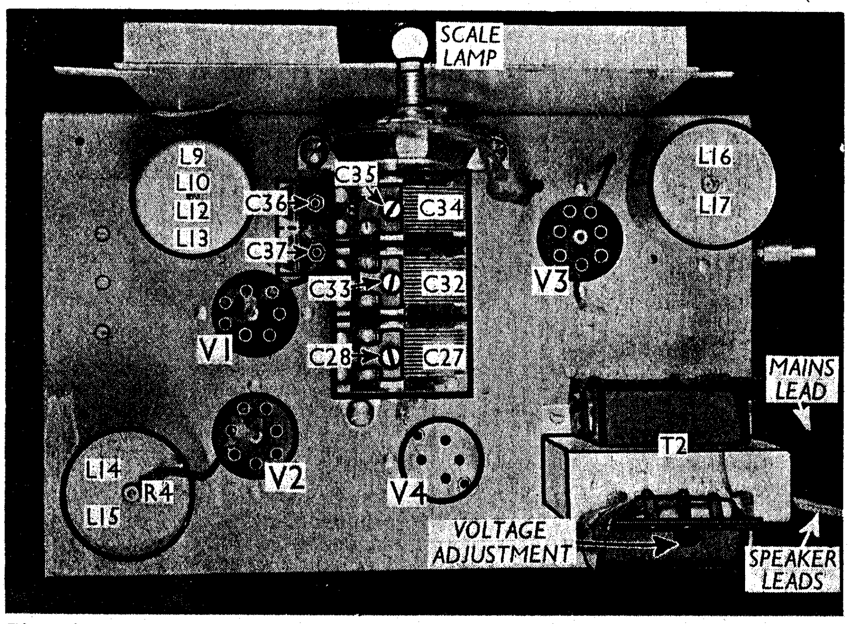
IF Stages.—Turn gang to maximum, volume control to maximum, and switch set to LW. Connect signal generator to grid (top cap) of **V1** and chassis, and feed in a 126·5 KC/S signal. Adjust **C38, C39, C40, C41** for maximum output. Repeat these adjustments.

RF and Oscillator Stages.—With gang fully closed, set pointer to datum line (horizontal) on scale. Connect signal generator to **A** and **E** sockets.

SW.—Switch set to SW, and set pointer to 20 MC/S mark on scale, feed in a 20 MC/S (15 m) signal, and adjust **C35** for maximum output. Now tune to 15 MC/S on scale, feed in a 15 MC/S (20 m) signal, and adjust **C33** for maximum output.

MW.—Switch set to MW. Adjust **C29** to minimum capacity. Tune to 200 m on scale, feed in a 200 m (1,500 KC/S) signal, and adjust **C36** for maximum output. Tune to 250 m on scale, feed in a 250 m (1,200 KC/S) signal, and adjust **C28** and **C30** for maximum output. Now feed in a fairly strong 850 KC/S (352 m) signal, and tune in its image (at about 500 m). Adjust **C29** for *minimum* output.

LW.—Switch set to LW and tune to 1,300 m on scale. Feed in a 1,300 m (230 KC/S) signal, and adjust **C37**, then **C31** and **C26**, for maximum output.



Plan view of the chassis. Note the trimmers **C36, C37.** The **L14, L15** unit also contains **R4.**

MAINTENANCE PROBLEMS

Electrolytic Leakage

I HAD a Brunswick receiver for service recently that gave me much trouble before I located the fault. The symptoms were distortion after fifteen minutes' use.

I removed the chassis and the trouble cleared automatically. Back went the chassis, and in fifteen minutes on came the fault. Out came the chassis again and exhaustive tests revealed precisely nothing except that the set was O.K. After pulling the chassis in and out of the cabinet until it was polished by the friction, I recruited a second opinion.

The trouble was finally located in an electrolytic, which developed a fault after heating up. A tiny bead of moisture appeared at the end, which made contact with earth.

The heat in the confined space of the cabinet was obviously responsible for the fact that the fault would not develop when the chassis was removed.—E. R. HEALE.

Modulation Hum

A SET in for service recently was suffering from a bad modulation hum. Everything tested O.K., and I was finally reduced to replacing components on the hit and miss principle. Eventually it was discovered that a new transformer cured the trouble.

The old one was opened up, to reveal the fact that the electrostatic screen had become disconnected.—E. R. HEALE, GUERNSEY.