"TRADER" SERVICE SHEET

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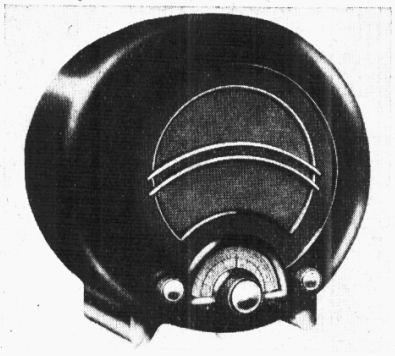
EKCO AD36

AC/DC TRF RECEIVER



AN aerial input "Backing off" to provide a zero input balance, neutralising some of the input signal in order to obtain a well-graded control action, is fitted in the Ekco AD36.

The set is a 3-valve (plus rectifier), 2-band TRF receiver, in a moulded cabinet made in two alternative finishes : walnut or black and chromium. It is designed to operate from AC or DC mains of 200-250 V, 50/100 c/s in the case of AC.

Release date, both models: 1935. *Original prices: Walnut, £8 8s.; black and chromium, £8 18s. 6d.*

CIRCUIT DESCRIPTION

Aerial input via mains isolating condensers **C1, C2** and differential coupling condenser **C14** to tappings on single-tuned circuit coils **L3** (MW) and **L4** (LW), tuned by **C16.** On LW, series choke **L1** is inserted in the lead to prevent MW breakthrough. A "zero balance" circuit **C15, L2,** coupled to the tuned circuit, provides a method for obtaining a low minimum input from a powerful local transmitter which would otherwise swamp the receiver. **C14** operates as volume control.

First valve **(V1, Mullard metallised SP13)** is an RF pentode operating as signal frequency amplifier. On MW, this is choke-capacity coupled by **L5, C4** and the tuned-grid circuit **L9, C19** to triode valve **(V2, Mullard metallised HL13),** which operates as grid leak detector with **C5, R2;** on LW, **V1** is transformer-coupled by **L6, L9, L10, C19** to **V2,** while **L5** is short-circuited by **S4.** Reaction from anode is coupled via coils **L7, L8** and controlled by variable condenser **C21.**

Resistance-capacity coupling by **R4, C8** and **R5** between **V2** and pentode output valve **(V3, Mazda Pen 3520).** Fixed tone correction by **C9** in anode circuit.

When the receiver is operating on AC mains, HT current is supplied by half-wave rectifying valve **(V4, Brimar 1D5)** which, with DC mains, behaves as a low resistance. Smoothing is effected by speaker field **L13** and electrolytic condensers **C11, C12.** The normal HT current through **L13** is augmented, by shunting **R7** across the HT circuit, to the extent of nearly 40 mA in order to provide an adequate energising current for the speaker magnet.

Valve heaters, together with scale lamp (which is shunted by **R8**) and ballast resistor **R9,** are connected in series across mains input. A filter circuit **L14, L15, C13** suppresses mains-borne interference.

COMPONENTS AND VALUES

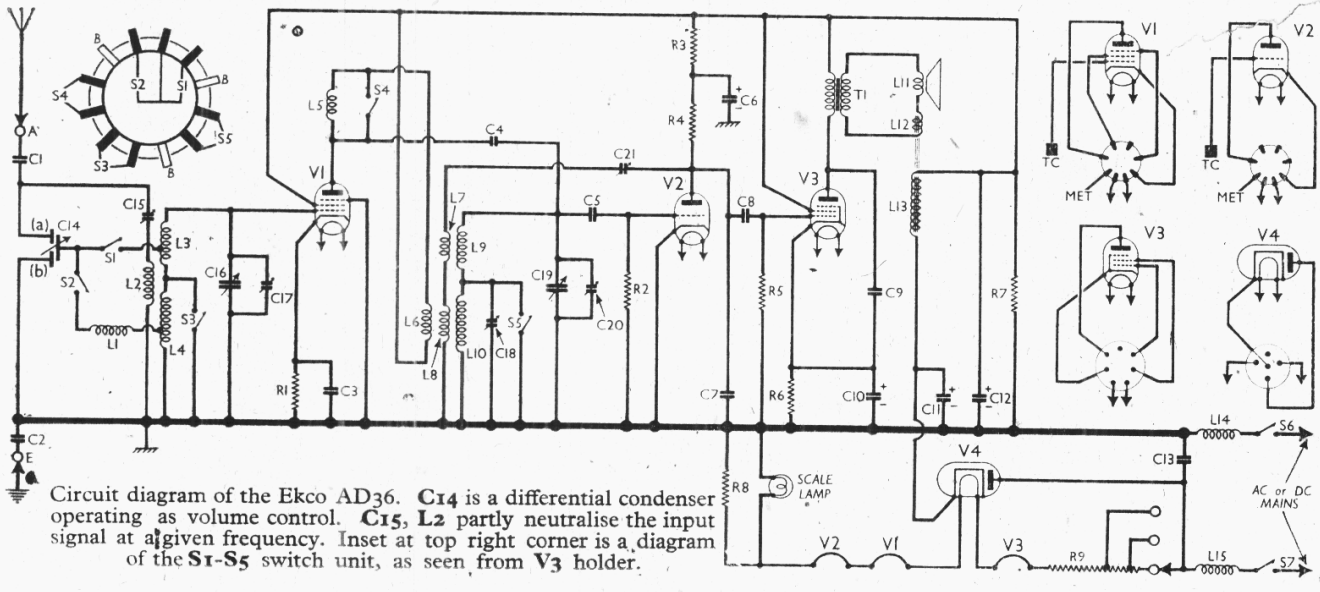
	RESISTORS	Values (ohms)
R1	V1 GB resistor	300
R2	V2 CG resistor	1,000,000
R3	V2 anode decoupling ...	4,000
R4	V2 anode load	50,000
R5	V3 CG resistor	500,000
R6	V3 GB resistor	165
R7	HT circuit shunt ...	5,000
R8	Scale lamp shunt... ...	100
R9	Heater circuit ballast ...	760*

*Tapped at 560Ω + 100 Ω + 100Ω from V3 heater end.

	CONDENSERS	Values (μF)
C1	Aerial isolator	0·001
C2	Earth isolator	0·1
C3	V1 cathode by-pass ...	0·1
C4	V1 to V2 MW coupling ...	0·00001
C5	V2 CG condenser... ...	0·0001
C6*	V2 anode decoupling ...	2·0
C7	V2 anode RF by-pass ...	0·001
C8	V2 to V3 AF coupling ...	0·01
C9	Fixed tone corrector ...	0·01
C10*	V3 cathode by-pass ...	25·0
C11*	HT smoothing condensers	8·0
C12*	HT smoothing condensers	24·0
C13	Mains RF by-pass ...	0·1
C14†	Differential aerial coupling (a) ...	0·0003
	Differential aerial coupling (b) ...	0·00015
C15‡	Zero balance trimmer ...	—
C16†	Aerial circuit tuning ...	0·0005
C17‡	Aerial MW trimmer ...	—
C18‡	RF trans. LW trimmer ...	—
C19†	RF trans. sec. tuning ...	0·0005
C20‡	RF trans. MW trimmer ...	—
C21†	Reaction control	0·0003

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial LW choke	13·0
L2	Zero balance coil	0·2
L3	Aerial tuning coils... ...	2·5
L4	Aerial tuning coils... ...	27·5
L5	V1 anode MW choke ...	36·0
L6	RF trans. LW pri. ...	2·75
L7	Reaction coils, total ...	3·75
L8	Reaction coils, total ...	3·75
L9	RF trans. sec. coils ...	2·5
L10	RF trans. sec. coils ...	27·5
L11	Speaker speech coil ...	1·5
L12	Hum neutralising coil ...	0·1
L13	Speaker field coil	400·0
L14	Mains RF filter chokes ...	2·5
L15	Mains RF filter chokes ...	2·5
T1	Speaker input trans. Pri. ...	650·0
	Speaker input trans. Sec. ...	0·25
S1-S5	Waveband switches ...	—
S6,S7	Mains circuit switches ...	—



Circuit diagram of the Ekco AD36. **C14** is a differential condenser operating as volume control. **C15, L2** partly neutralise the input signal at a given frequency. Inset at top right corner is a diagram of the **S1-S5** switch unit, as seen from **V3** holder.

DISMANTLING THE SET

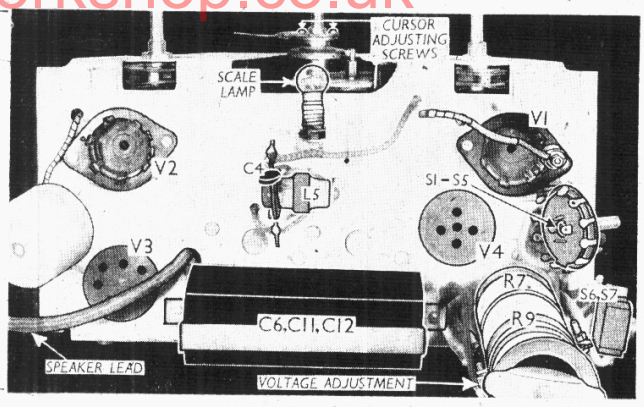
Removing Chassis.—Remove back cover (five screws) and lift away so that the heat vent cowl does not foul the voltage adjustment panel;
remove the three control knobs (recessed grub screws) from front of cabinet;
from the side of the cabinet, remove the waveband switch control knob (recessed grub screw inside cabinet), and remove the mains switch fixing ring, pushing switch through hole into cabinet;
unsolder from speaker transformer the three leads connecting it to chassis;
remove two cheese head screws (with washers) holding rear of chassis to ribs moulded in the cabinet, and two screws (with lock-washers) holding brackets at front of chassis to sub-baffle;
return to front of cabinet, slacken the two cursor adjusting screws (indicated in our plan view), turn cursor so that it clears the bottom of the scale, and withdraw chassis.
When replacing, readjust pointer for correct calibration and tighten adjusting screws before fitting tuning knob.
Connect speaker leads as follows, numbering tags on transformer from left to right: 1, black; 2, yellow; 3 and 4 (joined together), red.
Do not omit to re-wax grub screw heads in the three front control knobs.
Removing speaker.—Remove chassis as previously described, then remove two screws (with washers) holding top of the sub-baffle to front of cabinet. DO NOT remove nuts holding speaker to sub-baffle, as the screws will turn, necessitating the piercing of the silk to reach their heads when replacing.
When replacing, transformer should be at the top. Connect speaker leads as described previously.

GENERAL NOTES

Switches.—**S1-S5** are the waveband switches, ganged in a two-position rotary unit mounted on a bracket on the chassis deck. The unit is indicated in our plan view of the chassis, and shown in detail in the diagram inset in the top left-hand corner of the circuit diagram overleaf, where it is drawn as seen when viewed from the **V2, V3** end of the chassis, as indicated by the direction of the arrow in our plan view. **S1, S3** and **S5** close on MW and open on LW, while **S2** and **S4** open on MW and close on LW.

S6, S7 are the QMB mains switches, in a double-pole, toggle-operated unit mounted on the cabinet, near the **S1-S5** unit, but attached to chassis by leads.

Plan view of the chassis. The **S1-S5** switch unit is shown in detail in the diagram inset in the circuit diagram overleaf. **C4** is a small disc condenser mounted on the **L5** coil unit.



Coils.—**L1** is a LW aerial series choke, designed to prevent MW break-through. It is mounted unscreened beneath the chassis. The aerial tuning and zero balancing coils **L2-L4** are contained in a screened unit beneath the chassis.

L5 is a small MW RF choke mounted near the middle of the chassis deck, with the small MW coupling condenser **C4** mounted upon it.

The LW RF transformer and MW grid tuning coils **L6, L9, L10,** with the reaction coils **L7, L8,** are in a second screened unit beneath the chassis. The mains RF filter chokes **L14, L15,** with their by-pass condenser **C13,** are mounted in a small assembly inside the rear chassis member.

Scale Lamp.—This is an Osram lamp, with an MES base and a large spherical bulb, rated at 6.2 V, 0.3 A. It is shunted by **R8,** and its chassis connection is made via its mounting bracket.

Chassis Divergencies.—In the makers' diagram, **L1** is shown connected in the same lead but on the other side of **S2.** Also, **C9** is returned to chassis, not to **V3** cathode as shown in our diagram.

VALVE ANALYSIS

Valve voltages and currents given in the table (Col. 3) are those quoted in the makers' manual. The conditions under which they were measured are not stated, but they may be taken to represent approximate values to be expected in the average chassis when the voltage adjustment is properly set and there is no signal input. Voltages should be measured with a high resistance voltmeter.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 SP13	190	6·0	190	2·4
V2 HL13	41	2·5	—	—
V3 Pen 3520	166	34·5	190	8·0
V4 1D5	222†	—	—	—

† Cathode to chassis, DC.

CIRCUIT ALIGNMENT

The complete alignment operation can be performed without removing the chassis from the cabinet, but the receiver should be turned on to its side to give access to the two MW trimmer adjustments, which are reached through holes in the base of the cabinet.

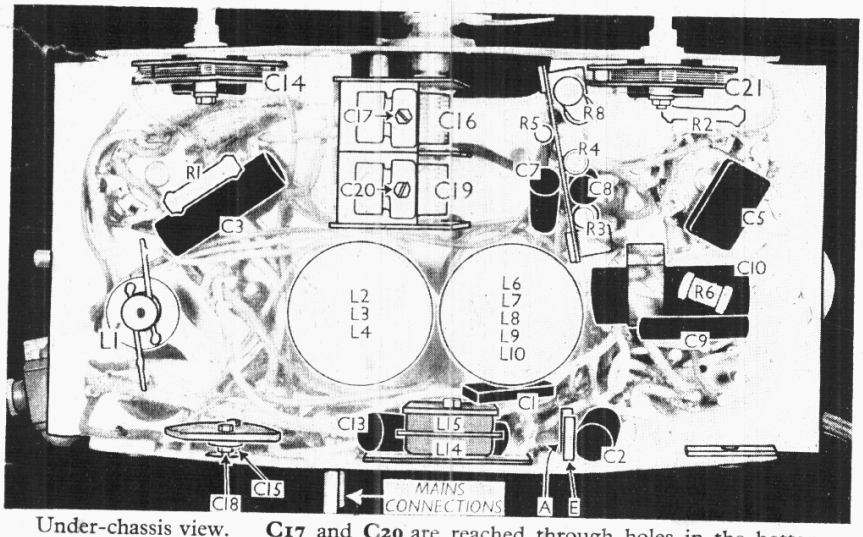
Connect signal generator via a suitable dummy aerial to **A** and **E** sockets, turn the volume control to maximum, and the reaction control to minimum.

MW.—Switch set to MW (anti-clockwise), feed in a 250 m (1,200 kc/s) signal, tune it in, and adjust **C17** (front) and **C20** (rear) beneath the cabinet for maximum output, at the same time adjusting the reaction control and rocking the gang a little for optimum results. Check calibration at several points on the scale, and adjust the cursor, if necessary, first removing the tuning knob, then slackening the two cursor screws. Finally, tighten up screws and replace knob.

LW.—Switch set to LW, feed in a 1,500 m (300 kc/s) signal, tune it in, and adjust **C18** for maximum output, adjusting the reaction control for optimum output and, while watching the scale cursor, rocking the gang to secure accurate calibration.

Aerial Input Zero Balance.—This device is designed to provide a good working minimum level on the volume control adjustment. Disconnect the signal generator, and replace it with an aerial/earth system, the one with which it is to be used, if possible.

Switch set to MW, tune in the strongest signal normally used, turn the volume control to minimum, and adjust the reaction control to some normal, usable position, then adjust **C15** for **minimum** output, if possible eliminating the signal entirely. The volume control should now operate satisfactorily.



Under-chassis view. **C17** and **C20** are reached through holes in the bottom of the cabinet. **C15** adjustment is almost completely obscured by **C18.**

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EKCO AD 36

Three-valve, plus rectifier, two-waveband TRF receiver for operation from AC or DC mains 200/250v, 50/100 cycles. Marketed by E. K. Cole, Ltd., Southend-on-Sea.

AERIAL input is *via* C1 to a differentia variable coupling condenser VC1, which is the volume control, and thence to the tapped tuned grid circuit coils L2, L3 (MW), L4, L5 (LW). On LW a further coil, L1, is in circuit to prevent MW interference.

Aerial tuning is effected by VC2 section of the twin ganged condenser, and signals are passed direct to the grid of the HF pentode V1. This valve is cathode biased by R1 decoupled by C3.

The output from V1 on MW is by means of the HF choke L11 and coupling condenser C4 to the grid coil L8 tuned by VC3. On LW, L11 is shorted and L10 functions as a coupling coil to L9, the LW grid coil.

Leaky grid rectification is employed, C5 and R2 being the grid condenser and grid leak in the grid circuit of the detector triode V2. Reaction from the anode circuit of this valve is via the variable condenser reaction control VC4 and the windings L6, L7. C6 is the anode to cathode HF by-pass.

Low frequency signals are resistance capacity coupled by R3, C8 and R5 to the grid of the pentode output valve V3. This valve is cathode biased by R6 decoupled by C9.

A permanent degree of tone correction is effected by C10, and the low impedance energised moving coil loudspeaker is coupled by the matching transformer L12, L13 to the output valve. L14 is the hum bucking coil and L15 the speech coil, while the field winding is L16.

The high- and low-tension supply circuits are taken from the mains through HF filter chokes L17, L18, with C13 as the HF by-pass condenser.

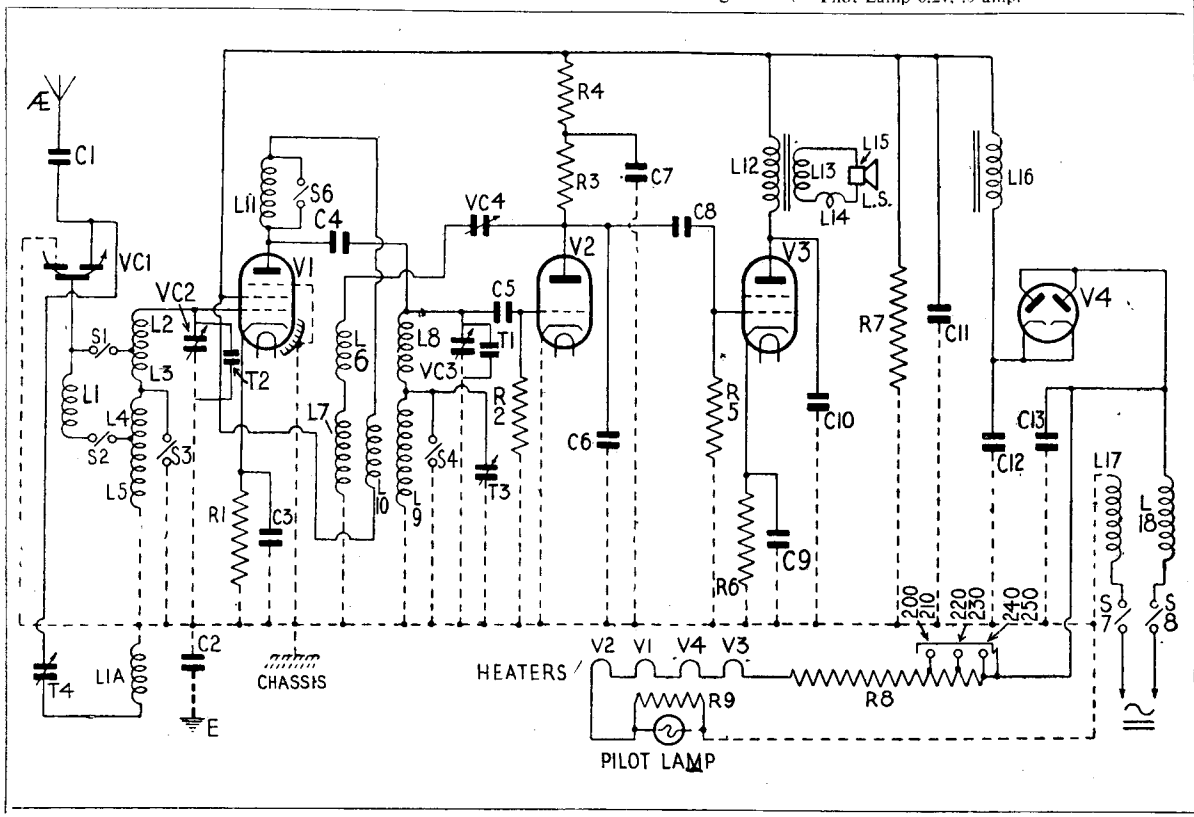
High tension supply is obtained through the fullwave rectifier V4, which has its anodes strapped so that it functions as a half-wave rectifier, and smoothing is effected by the speaker field L16 and condensers C11, C12.

The heater circuit comprises the normal arrangement of valve heaters in series with the mains voltage dropping resistance R8 with a shunt, R9, across the pilot lamp. A separate winding on the mains voltage dropping resistance assembly is shunted across the HT supply and is shown as R7 in the accompanying circuit diagram.

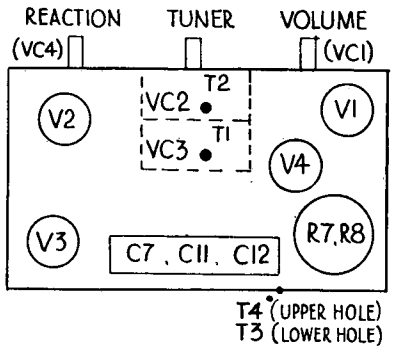
VALVE READINGS

V	Type	Electrode	Volts	Ma
1	SP13	Anode	190	6
	Mullard	Screen	190	2.4
2	HL13	Anode	41	2.5
	Mullard			
3	PEN 3520	Anode	166	34.5
	Mazda	Screen	190	8
		Cathode	7	—
4	I D 5	Cathode	222	—
	Brimar			

Pilot Lamp 6.2v, .3 amp.



Circuit diagram of the three-valve TRF universal receiver employing leaky grid rectification and resistance capacity LF coupling to the pentode output valve.



Chassis layout showing position of trimmers. T1 and T2 are accessible through holes in the base of the cabinet.

GANGING

MW Band.—Switch receiver to MW and inject a 250 metre signal into the aerial and earth sockets. Adjust T1 and T2 for maximum output. At the same time the reaction control should be manipulated and the gang rocked to obtain good results under normal conditions.

LW Band.—Switch receiver to LW and inject a 1,500 metre signal ; adjust T3 for maximum output.

CONDENSERS

C	Mfds	C	Mfds
1	.001	8	.01
2	.1	9	25
3	.1	10	.01
4	.00001	11	24
5	.0001	12	8
6	.001	13	.1
7	2		

RESISTANCES

R	Ohms	R	Ohms
1	300	6	165
2	1 meg.	7	5,000
3	50,000	8	560+100+100
4	4,000	9	100
5	500,000		

WINDINGS

L	Ohms	L	Ohms
1	13	10	2.75
1A	.2	11	36
2	2.5	12	650
3		13	.25
4		14	.1
5	27.5	15	1.5
6		16	400
7	3.75	17	2.5
8	2.5	18	2.5
9	27.5		

AERIAL BALANCING CIRCUIT

This circuit comprises trimmers T4 and backing-off coil L1A, wound the aerial end of the aerial coil former.

To adjust this circuit tune in to a loud signal on MW, and set volume control to minimum position and the reaction control to maximum usable position. Adjust T4 (top aperture at the rear of the chassis) until signal disappears or is reduced to a minimum.

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and adjust T6 and then T3 for maximum output.

Tune receiver to the dot adjacent to the 175 kcs calibration mark. Inject a signal of this frequency and adjust T7 (screw) for maximum output.

SW Band.—Switch receiver to SW and set pointer to 17 mcs where a dot will be seen. Inject a signal of this frequency into the receiver and adjust T4 for maximum output, employing the minimum capacity setting of T4 as two positions of maximum output will be found. Then adjust T1 for maximum output while rocking gang.

There is no padding trimmer on the SW band.

Push-Button Alignment

Turn the wavechange switch to the push-button position, *i.e.*, fully counter clockwise, and depress the push-button concerned. Now adjust the oscillator trimmer (screw), immediately behind the button, to give the maximum signal from the desired station.

The correct setting is obtained when the illuminated pattern on the tuning indicator is at its maximum size.

Next adjust the aerial trimmer with the special box spanner to give the maximum signal as indicated by the tuning indicator. It is important to adjust the oscillator trimmer first and to check the setting after any adjustment made to the aerial trimmer.

Faulty Output Stage

AN Ekco set was being tested for weak reception, and although the components, valves and voltages were OK, the output stage seemed faulty.

As a test, the detector was fed into a separate amplifier and this gave full output.

Further tests revealed that the anode current of the output valve was low, and the filament volts were only half the value normally used. The separate filament winding to this valve was found faulty.—F.D.L.