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"TRADER" SERVICE SHEET

# 782

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# EKCO AW119

## A.C. SUPERHET

A FEATURE of the Ekco AW119 is the inclusion of 7-metre channel for the reception of the television sound programme. The remaining three bands include a short-wave range of 16-51m, and provision is made for use with a dipole aerial.

The receiver is a 4-valve (plus rectifier) superhet, designed to operate from A.C. mains of 200-250V, 40-80 c/s. There is provision for the connection of a gramophone pick-up and an external speaker. A negative feed-back circuit reduces harmonic output, and a special filter circuit rejects heterodyne whistles.

*Release date and original price: June, 1938. £11 11s.*

### CIRCUIT DESCRIPTION

Aerial input on M.W. via coupling capacitor **C2,** and on L.W. via coupling coil **L2,** to mixed coupled band pass filter. Primary Coils **L3, L4** are tuned by **C37;** secondary coils **L9, L10** by **C43.** On L.W. aerial circuit is shunted by I.F. filter **L1, C3.** Image suppression by **C42.**

On television sound, referred to as "T.S.," and S.W. bands, input is via coupling coil **L5** (T.S.) or **L6** (S.W.) to single-tuned circuits **L7, C43** (T.S.) or **L8, C43** (S.W.). The two dipole connections are aerial socket "**A**" and the unmarked socket immediately beneath it. Socket "**E**" should be connected to earth.

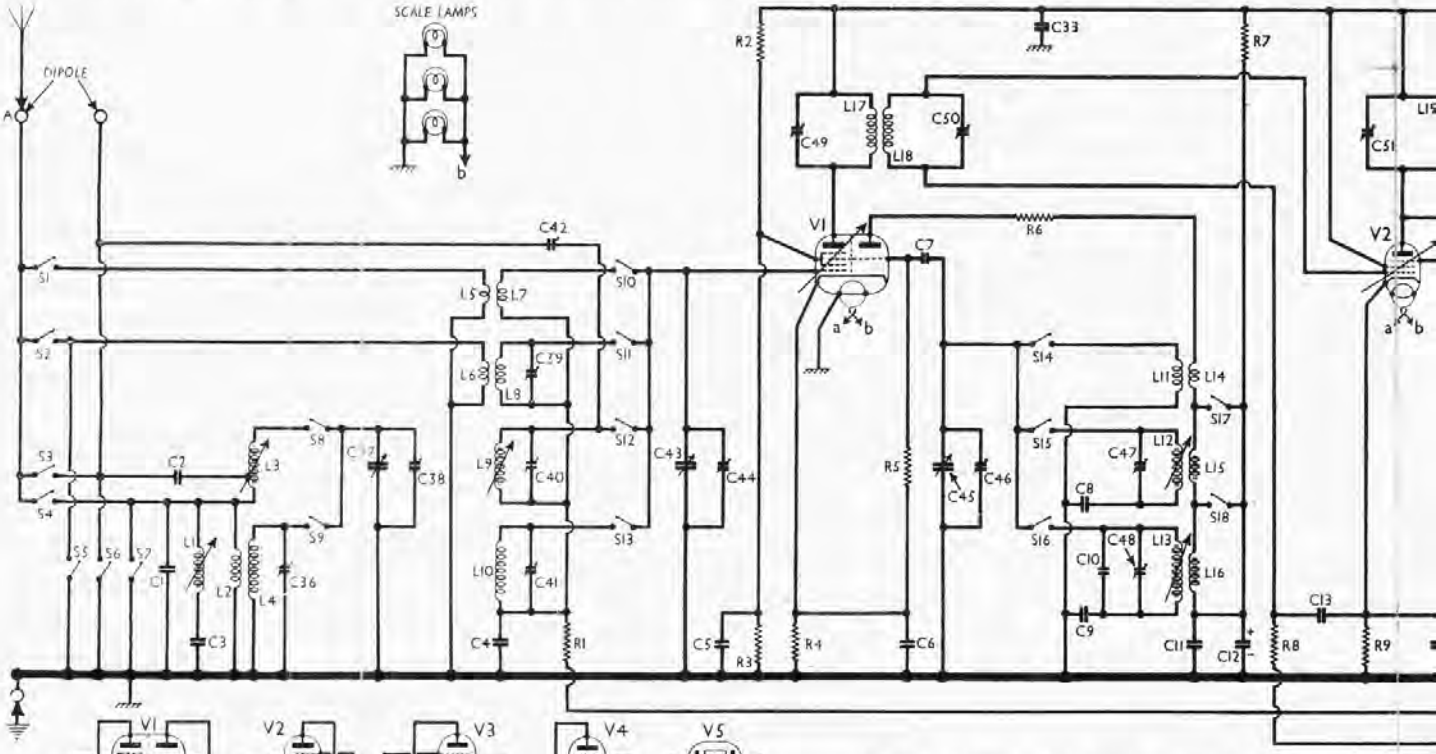
First valve **(V1, Mullard metallised TH4A** or **TH4B),** is a triode-hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L11** (T.S. and S.W.), **L12** (M.W.) and **L13** (L.W.) are tuned by **C45;** parallel trimming by **C46** (S.W.), **C47** (M.W.) and **C10, C48** (L.W.); series tracking by **C8** (M.W.), **C9** (L.W.), and adjustable iron-dust cores in both cases. A harmonic of the S.W. oscillator is used for T.S.

Reaction coupling by coils **L14** (T.S. and S.W.), **L15** (M.W.) and **L16** (L.W.), which are connected in series, switches **S17** (S.W.) and **S18** (M.W.) short-circuiting those coils which are not required.

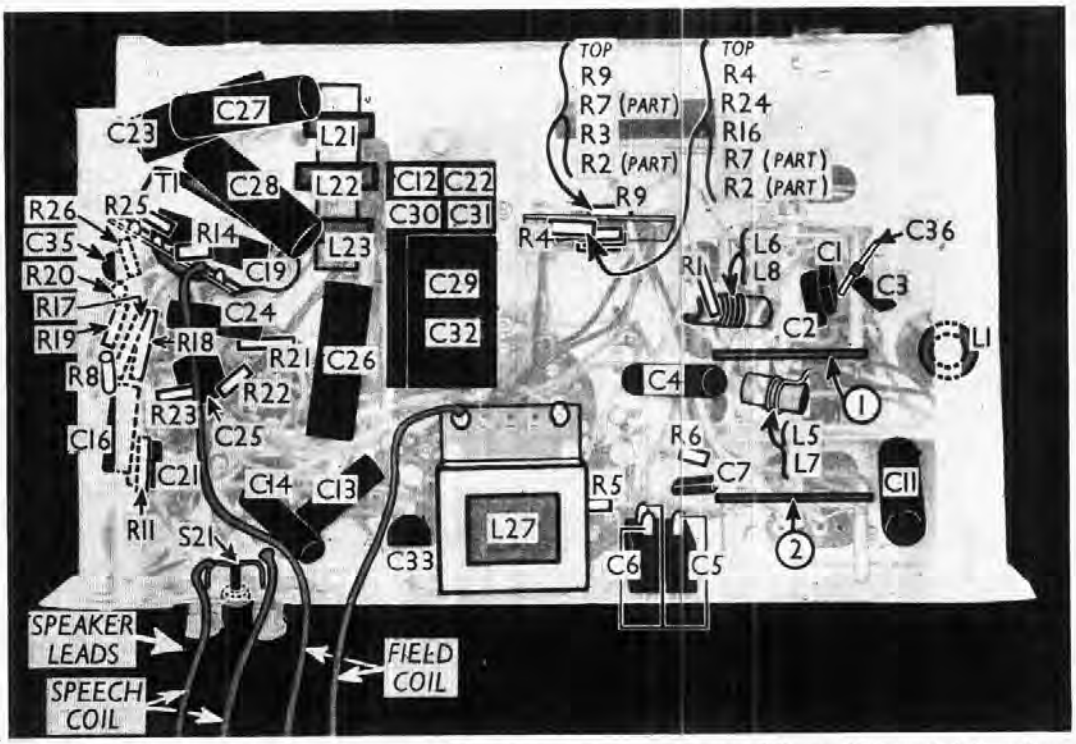
Second valve **(V2, Ekco metallised VP41** or **Mullard VP4B)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C49, L17, L18, C50** and **C51, L19, L20, C52.**

**Intermediate frequency 126.5 kc/s.**

Diode second detector is part of double diode triode valve **(V3, Ekco metallised DT41** or **Mullard TDD4).** Audio frequency component in rectified output is developed across load resistors **R10, R11,** and that across **R11** is passed via A.F. coupling capacitor **C16** and manual volume control **R13** to C.G. of triode section, which operates as A.F. amplifier. A fixed resistor **R12,** connected between **C16** and the top of **R13,** limits the range of the volume control to a predetermined maximum. High-note compensation by **C17** between top of **R12** and triode C.G. Variable tone control by **C18** and **R15** between triode C.G. and chassis. Provision for connection of gramophone pick-up between junction of **R10, R11** and chassis. I.F. filtering by **C20** and **C21.**




Circuit diagram of the Ekco AW119 A.C. superhet. I
In the oscillator circuit, a harmonic of the S.W. band i
connected to the two sockets indicated. **L26** is the speaker
circuit. **C29** is connected across **L26** to form a tuned f




Under-chassis view. The output transformer **T1** is almost hidden by components mounted upon it. The waveband switch units (marked **1** and **2** in circles) are indicated here and shown in detail in the diagrams in col. 4 overleaf. The components on each side of the small panel near the centre are listed in order from top to bottom, as seen here where the chassis is inverted.

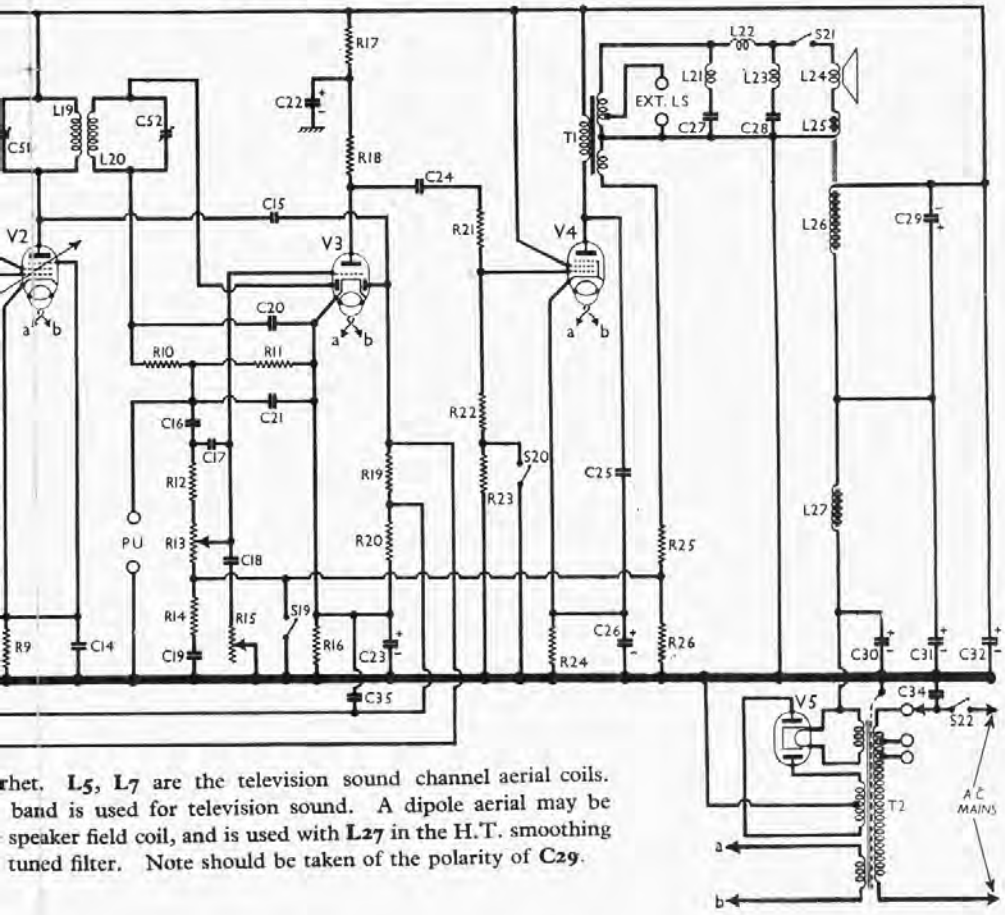
Second diode of **V3**, fed from **V2** anode via **C15**, provides D.C. potentials which are developed across load resistors **R19, R20** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. **R19, R20** are connected in series between the diode anode and cathode, so that while no delay voltage is applied to the diode the voltage existing on **V3** cathode is applied as a fixed positive bias to the controlled valves, in the opposite sense to their own fixed G.B. voltages, and so opposes both the normal G.B. and A.V.C. voltages.

Resistance-capacitance coupling by **R18** in anode circuit and, in series from **V3** anode to chassis, **C24, R21, R22** and **R23**, between **V3** triode and pentode output valve **(V4, Ekco OP42** or **Mullard PenA4).** On television sound channel, **R23** is short-circuited by **S20.**

The output transformer **T1** is provided with two secondary windings, one for the speech coil, and the other to provide negative feed-back voltages. The speech coil secondary is tapped for a low impedance external speaker, while switch **S21** permits the internal speaker to be muted. A whistle filter of special design, comprising coils **L21, L22, L23** and capacitors **C27, C28,** is included in the leads to the speech coil.

**R25** and **R26** are connected in series to form a potential divider across the feed-back secondary winding. Across **R26** are connected a switch **S19** and a filter circuit **R14, C19,** and the voltage developed across **R26** is fed back via **R13,** which is returned to the junction of **R25** and **R26,** to **V3** triode control grid. **S19** closes on the S.W. band, muting the feed-back.

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Cossor 431U** or **Mullard IW4/350).** Smoothing by iron-cored choke **L27** and speaker field **L26** in association with dry electrolytic capacitors **C29, C30, C31** and **C32. C29** is connected in parallel with **L26** to form a tuned filter circuit.




rhet. **L5, L7** are the television sound channel aerial coils. band is used for television sound. A dipole aerial may be speaker field coil, and is used with **L27** in the H.T. smoothing tuned filter. Note should be taken of the polarity of **C29**.

## COMPONENTS AND VALUES

| | CAPACITORS | Values (μF) |
|---|---|---|
| C1 | L.W. Aerial shunt | 0·00015 |
| C2 | Aerial M.W. coupling | 0·001 |
| C3 | I.F. filter tuning | 0·00015 |
| C4 | V1 hex. C.G. decoupling | 0·04 |
| C5 | V1 S.G. decoupling | 0·1 |
| C6 | V1 cathode by-pass | 0·1 |
| C7 | V1 osc. C.G. capacitor | 0·00005 |
| C8 | Osc. circ. M.W. tracker | 0·002 |
| C9 | Osc. circ. L.W. tracker | 0·0008 |
| C10 | Osc. L.W. fixed trimmer | 0·00002 |
| C11 | V1 osc. anode decoupling | 0·1 |
| C12* | V1 osc. anode decoupling | 2·0 |
| C13 | V2 C.G. decoupling | 0·04 |
| C14 | V2 cathode by-pass | 0·1 |
| C15 | V3 A.V.C. diode coupling | 0·000015 |
| C16 | Coupling to V3 triode | 0·01 |
| C17 | High-note compensator | 0·00006 |
| C18 | Part variable tone control | 0·004 |
| C19 | Part feed-back coupling | 0·05 |
| C20 | I.F. by-pass capacitors | 0·0002 |
| C21 | I.F. by-pass capacitors | 0·0002 |
| C22* | V3 anode decoupling | 2·0 |
| C23* | V3 cathode by-pass | 50·0 |
| C24 | A.F. coupling to V4 | 0·01 |
| C25 | Fixed tone corrector | 0·0025 |
| C26* | V4 cathode by-pass | 50·0 |
| C27 | Parts of whistle filter | 0·5 |
| C28 | Parts of whistle filter | 0·5 |
| C29* | H.T. smoothing capacitors | 2·0 |
| C30* | H.T. smoothing capacitors | 8·0 |
| C31* | H.T. smoothing capacitors | 12·0 |
| C32* | H.T. smoothing capacitors | 2·0 |
| C33 | H.T. circuit R.F. by-pass | 0·1 |
| C34 | Mains R.F. by-pass | 0·01 |
| C35 | V1 A.V.C. line decoupling | 0·003 |
| C36‡ | B.-P. pri. L.W. trimmer | — |
| C37† | Band-pass pri. tuning | — |
| C38‡ | B.-P. pri. M.W. trimmer | — |
| C39‡ | Aerial S.W. trimmer | — |
| C40‡ | B.-P. sec. M.W. trimmer | — |
| C41‡ | B.-P. sec. L.W. trimmer | — |
| C42‡ | Image suppressor | — |
| C43† | Band-pass sec. tuning | — |
| C44‡ | Aerial T.S. trimmer | — |
| C45† | Oscillator circuit tuning | — |
| C46‡ | Osc. circ. S.W. trimmer | — |
| C47‡ | Osc. circ. M.W. trimmer | — |
| C48‡ | Osc. circ. L.W. trimmer | — |
| C49‡ | 1st I.F. trans. pri. tuning | — |
| C50‡ | 1st I.F. trans. sec. tuning | — |
| C51‡ | 2nd I.F. trans. pri. tuning | — |
| C52‡ | 2nd I.F. trans. sec. tuning | — |

• Electrolytic. † Variable. ‡ Pre-set.

| | RESISTORS | Values (ohms) |
|---|---|---|
| R1 | V1 hex. C.G. decoupling | 250,000 |
| R2 | V1 S.G. potential divider | •12,500 |
| R3 | V1 S.G. potential divider | 25,000 |
| R4 | V1 fixed G.B. resistor | 250 |
| R5 | V1 osc. C.G. resistor | 25,000 |
| R6 | V1 osc. anode stabiliser | 200 |
| R7 | V1 osc. anode H.T. feed | †20,000 |
| R8 | V2 C.G. decoupling | 1,000,000 |
| R9 | V2 fixed G.B. resistor | 300 |
| R10 | V3 signal diode load resistors | 500,000 |
| R11 | V3 signal diode load resistors | 100,000 |
| R12 | A.F. output limiter | 500,000 |
| R13 | Manual volume control | 1,000,000 |
| R14 | Part feed-back coupling | 1,000 |
| R15 | Variable tone control | 1,500,000 |
| R16 | V3 triode G.B. resistor | 2,000 |
| R17 | V3 anode decoupling | 15,000 |
| R18 | V3 triode anode load | 50,000 |
| R19 | A.V.C. diode load resistors | 500,000 |
| R20 | A.V.C. diode load resistors | 500,000 |
| R21 | V4 C.G. feed potential divider resistors | 75,000 |
| R22 | V4 C.G. feed potential divider resistors | 250,000 |
| R23 | V4 C.G. feed potential divider resistors | 250,000 |
| R24 | V4 G.B. resistor | 120 |
| R25 | Part feed-back coupling | 20,000 |
| R26 | Part feed-back coupling | 1,000 |

* Two 25,000 Ω in parallel in our chassis.
† Two 40,000 Ω in parallel in our chassis.

| | OTHER COMPONENTS | Approx. Values (ohms) |
|---|---|---|
| L1 | Aerial I.F. filter coil | 40·0 |
| L2 | Aerial L.W. coupling coil | 40·0 |
| L3 | Band-pass primary coils | 2·5 |
| L4 | Band-pass primary coils | 30·0 |
| L5 | Aerial T.S. coupling coil | Very low |
| L6 | Aerial S.W. coupling coil | 0·4 |
| L7 | Aerial T.S. tuning coil | Very low |
| L8 | Aerial S.W. tuning coil | 0·05 |
| L9 | Band-pass secondary tuning coils | 2·5 |
| L10 | Band-pass secondary tuning coils | 27·0 |
| L11 | Osc. S.W. tuning coil | 0·05 |
| L12 | Osc. M.W. tuning coil | 3·0 |
| L13 | Osc. L.W. tuning coil | 9·0 |
| L14 | Osc. S.W. reaction coil | 0·4 |
| L15 | Osc. M.W. reaction coil | 0·6 |
| L16 | Osc. L.W. reaction coil | 2·0 |
| L17 | 1st I.F. trans. Pri. | 80·0 |
| L18 | 1st I.F. trans. Sec. | 80·0 |
| L19 | 2nd I.F. trans. Pri. | 80·0 |
| L20 | 2nd I.F. trans. Sec. | 80·0 |

(*Continued next col.*)

| | OTHER COMPONENTS (*Continued*) | Approx. Values (ohms) |
|---|---|---|
| L21 | Parts of whistle filter | 2·5 |
| L22 | Parts of whistle filter | 5·0 |
| L23 | Parts of whistle filter | 2·5 |
| L24 | Speaker speech coil | 24·0 |
| L25 | Hum neutralising coil | 0·7 |
| L26 | Speaker field coil | 1,250·0 |
| L27 | H.T. smoothing choke | 350·0 |
| T1 | Output trans. Pri. | 350·0 |
| T1 | Output trans. Speech sec. | 4·0 |
| T1 | Output trans. F.-B. sec. | 40·0 |
| T2 | Mains trans. Pri., total | 35·0 |
| T2 | Mains trans. Heater sec. | 0·05 |
| T2 | Mains trans. Rect. heat. sec. | 0·1 |
| T2 | Mains trans. H.T. sec., total | 550·0 |
| S1-S20 | Waveband switches | — |
| S21 | Int. speaker switch | — |
| S22 | Mains switch, ganged R13 | — |

## VALVE ANALYSIS

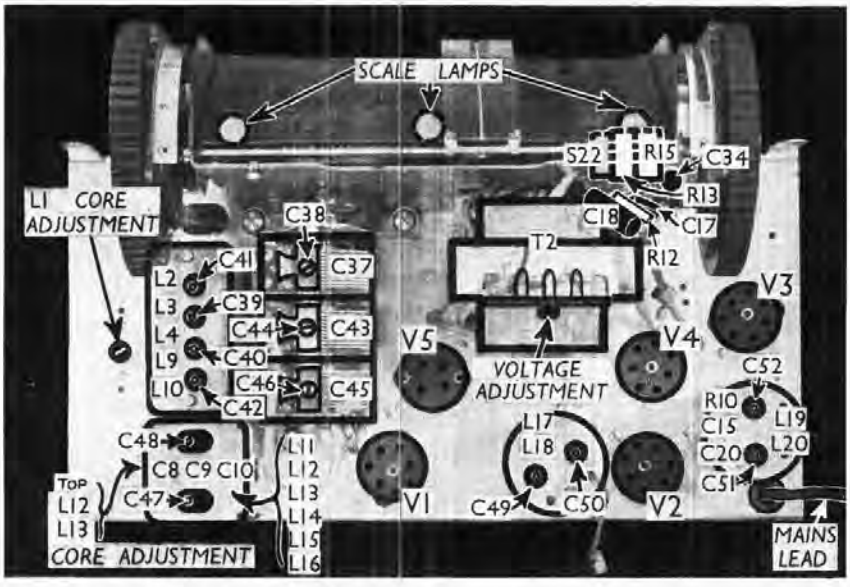
Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 225 V, using the 220-230 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was 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 measurements are being made of its anode current, it can be stabilised by connecting a non-inductive capacitor 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 TH4A | 240 | 3·4 | 84 | 7·5 |
| | Oscillator | | | |
| | 82 | 7·0 | | |
| V2 VP41 | 240 | 11·5 | 240 | 5·0 |
| V3 DT41 | 110 | 1·7 | — | — |
| V4 OP42 | 225 | 40·0 | 240 | 5·0 |
| V5 43IU | 377† | — | — | — |

† Each anode A.C.




Plan view of the chassis. **R13** and **R15** are operated on the right. Tuning and waveband switching are controlled by the drum and lever on the left. Most of the trimmers are grouped on the left.

## DISMANTLING THE SET

**Removing Chassis.**—Remove one round-head wood screw from each side of the front of the chassis, and the two 4BA screws holding the scale assembly brackets to the top of the cabinet;

from beneath the rear of the chassis remove the two 4BA screws which hold it to the cross-bar, and remove the bar;

then, supporting the chassis with one hand, remove one round-head wood screw from each end of the rear member of the chassis with the other, when the chassis may be withdrawn to the extent of the speaker leads.

To free the chassis entirely, unsolder the four speaker leads.

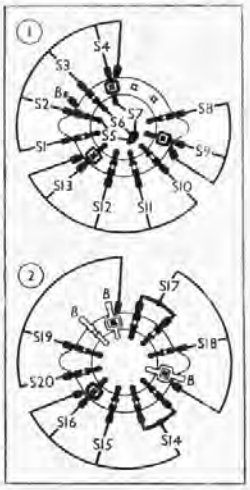
*When replacing*, connect the speaker leads as follows, numbering the tags from left to right: 1, red; 2, yellow; 3, brown; 4, red.

**Removing Speaker.**—Slacken the four clamps holding the speaker to the sub-baffle.

*When replacing*, see that the connecting strip is at the top and connect the leads as described previously.

### Switch Diagrams and Table

Diagrams of the waveband switch units, as seen when viewed from the rear of an inverted chassis. "B" indicates a blank tag. Below is the associated switch table.




| Switch | L.W. | M.W. | S.W. | T.S. |
|---|---|---|---|---|
| S1 | — | — | — | C |
| S2 | — | — | C | — |
| S3 | — | C | — | — |
| S4 | C | — | — | — |
| S5 | — | — | — | C |
| S6 | — | — | C | C |
| S7 | — | C | C | — |
| S8 | — | C | — | — |
| S9 | C | — | — | — |
| S10 | — | — | — | C |
| S11 | — | — | C | — |
| S12 | — | C | — | — |
| S13 | C | — | — | — |
| S14 | — | — | C | C |
| S15 | — | C | — | — |
| S16 | C | — | — | — |
| S17 | — | — | C | C |
| S18 | — | C | — | — |
| S19 | — | — | C | — |
| S20 | — | — | — | C |

## GENERAL NOTES

**Switches.—S1-S20** are the waveband switches, in two rotary units beneath the chassis. They are indicated in our under-chassis view, and shown in detail in the diagrams above. The table (above) shows the switch positions for the four control settings, starting from the fully anti-clockwise position of the switch spindle. A dash indicates open, and **C**, closed.

**S21** is the internal speaker switch, which is mounted at the rear of the chassis near the external speaker sockets, and controlled by a small milled knob. When this is unscrewed, the internal speaker is muted.

**S22** is the Q.M.B. mains switch, ganged with the volume control **R13.**

**Coils.—L1** is mounted beneath the chassis, and has an adjustable iron-dust core, reached through a hole in the chassis deck. **L2, L3, L4, L9, L10** and **L11-L16** are in two screened units on the chassis deck. The first of these units contains four trimmers reached through holes in the top of the can. The second contains two trimmers (reached again through holes in the top of the can) and the three fixed capacitors **C8-C10,** while the cores of **L12** and **L13** are adjustable through holes in one side of the can. **L5, L7** and **L6, L8** are on small tubular formers, supported directly on their switch units beneath the chassis.

**L17, L18** and **L19, L20** are the I.F. transformers in two further screened units on the chassis deck. They contain their associated trimmers, while the second also includes **R10, C15** and **C20.** The filter coils **L21-L23** are on a single former beneath the chassis, and are unscreened.

**Scale Lamps.**—These are three Rival M.E.S. types, rated at 6.2 V, 0.3 A.

**External Speaker.**—Two sockets are provided at the rear of the chassis for a low impedance (4Ω) external speaker. The internal speaker can be muted by unscrewing **S21.**

**Capacitors C12, C22, C30, C31.**—These are four dry electrolytics in a single large carton beneath the chassis, with a common negative (black) lead. The green lead is the positive of **C12** (2μF), the yellow lead is the positive of **C22** (2μF), the blue lead is the positive of **C30** (8μF), and the red lead is the positive of **C31** (12μF).

**Capacitors C29, C32.**—These are two further 2μF dry electrolytics in a separate smaller carton bound up with the larger one. The black lead is the negative of **C32,** the green is the positive of **C32** and the negative of **C29,** while the red is the positive of **C29.** Note that as far as polarity is concerned, **C29** and **C32** are connected in series.

**Capacitors C5, C6.**—These are two 0.1μF paper capacitors in a metal-cased unit at the inside of the rear of the chassis. The tag nearest the chassis deck is common to both sections. The other connection of each goes to one of the two tags shown numbered in the under-chassis view.

**Capacitors C10, C36.**—These are small capacitors formed of wires spiralled over insulated wires. **C10** is inside the oscillator coil unit, while **C36** is beneath the chassis near the switch units. The latter is adjustable by sliding the spiralled winding over the straight wire, or by altering the length of the spiralled winding.

**Chassis Divergencies.—R2** in our chassis was composed of two 25,000Ω resistors connected in parallel. In other chassis it may be one 12,500Ω resistor. The same applies to **R7,** which may be one 20,000Ω resistor instead of two 40,000Ω types in parallel.

**C34,** the mains R.F. by-pass, and **C35, V1** A.V.C. line decoupling, are not shown in the makers' diagram.

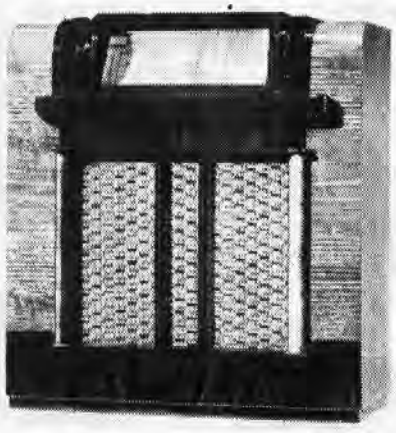
## CIRCUIT ALIGNMENT

**I.F. Stages**—Connect signal generator to **E** socket, and via a 0.02μF capacitor to control grid (top cap) of **V1,** leaving existing clip in position. Switch set to L.W., turn gang to maximum, feed in a 126.5 kc/s (2,372 m) signal, and adjust **C49, C50, C51** and **C52** for maximum output.

**R.F. and Oscillator Stages.**—See that cursor line covers the 550 m mark when gang is at maximum. Volume control should be at maximum during alignment. Transfer signal generator to **A** and **E** sockets.

**S.W.**—Switch set to S.W., tune to 18 Mc/s on scale, and feed in an 18 Mc/s (16.67 m) signal. Fully unscrew **C46,** then screw it in slowly. Two peaks will be obtained, of which the first reached is correct. Adjust to this accurately.

Feed in a 20.75 Mc/s (14.45 m) signal (its second harmonic being 41.5 Mc/s), at full generator output. Then switch to T.S. (television sound) and adjust **C44** for maximum output. Switch to S.W., feed in a 15 Mc/s (20 m) signal, tune to 15 Mc/s on scale and adjust **C39** for maximum output.



The Ekco AW119 superhet.

**M.W.**—Switch set to M.W., tune to 200 m on scale, and feed in a 200 m (1,500 kc/s) signal. Fully unscrew **C47** and then screw it in slowly, adjusting accurately to the first peak reached. Tune to 250 m on scale, feed in a 250 m (1,200 kc/s) signal and adjust **C40** and **C38** for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust iron core of **L12** for maximum output, while rocking the gang for optimum results. Repeat the adjustments at 200, 250 and 500 m.

**L.W.**—Switch set to L.W., tune to 1,100 m on scale, feed in a 1,100 m (272.5 kc/s) signal and adjust **C48, C41** and **C36** for maximum output. **C36** is adjusted by sliding the spiralled wire on the insulating sleeve over the straight wire.

Tune to 1,700 m on scale, feed in a 1,700 m (176.5 kc/s) signal, and adjust core of **L13** for maximum output, while rocking the gang for optimum results.

**I.F. Filter.**—Leaving set switched to L.W. and tuned to 1,700 m, feed in a 126.5 kc/s signal at full generator output, and adjust core of **L1** for minimum output. Reduce generator output, and adjust to 1,100 m (272.5 kc/s). Tune to 1,100 m on scale, and repeat L.W. alignment as above.

**Image Suppressor.**—Switch set to M.W., feed in a 300 m (1,000 kc/s) signal at full generator output. Tune receiver to image of generator frequency (about 400 m) and adjust **C42** for minimum output.

Tune to 250 m, feed in a 250 m (1,200 kc/s) signal, and re-adjust **C40** for maximum output.

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