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Supplement to The Wireless & Electrical Trader, March 11, 1944

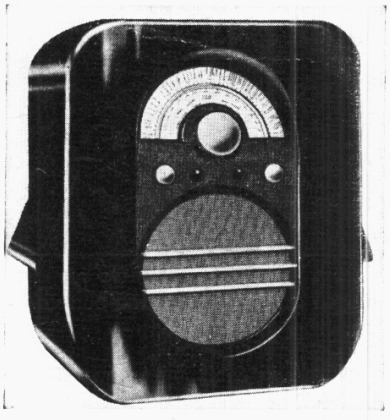
"TRADER" SERVICE SHEET

663

EKCO ACT96

TRANSPORTABLE AC SUPERHET

REVISED ISSUE OF SERVICE SHEET No. 138



SIX valves, including an RF amplifier and a double triode (plus a thermionic rectifier) are employed in the Ekco ACT96, an AC-operated transportable superhet designed for mains of 200-250 V, 40-100 c/s.

It is housed in a plastic cabinet, with carrying handles on the sides, available in walnut or black and chromium finish. A feature of the construction is that the receiver chassis, which is mounted above the power unit, may be swung upwards to permit access to its underside.

Release date: July, 1936.

Original prices: Walnut, £13 2*s*. 6*d*.; *Black and chromium*, £13 13*s*.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L2, C26** (MW) and **L3, C26** (LW) precedes variable-mu RF pentode valve **(V1, Mazda metallised AC/VP1),** which operates as signal frequency amplifier. Sockets are provided for connecting an external aerial system, and **L1** then prevents MW break-through on LW.

Tuned-secondary RF transformer coupling by **L4, L5, L6, L7** and **C28** between **V1** and octode frequency changer **(V2, Mullard metallised FC4),** which operates with electron coupling. Oscillator grid coils **L8** (MW) and **L9** (LW) are tuned by **C30.** Parallel trimming by **C31** (MW); tracking by specially shaped vanes of **C30** (MW) and series condensers **C6, C32** (LW). Reaction coupling from anode by **L10, L11.**

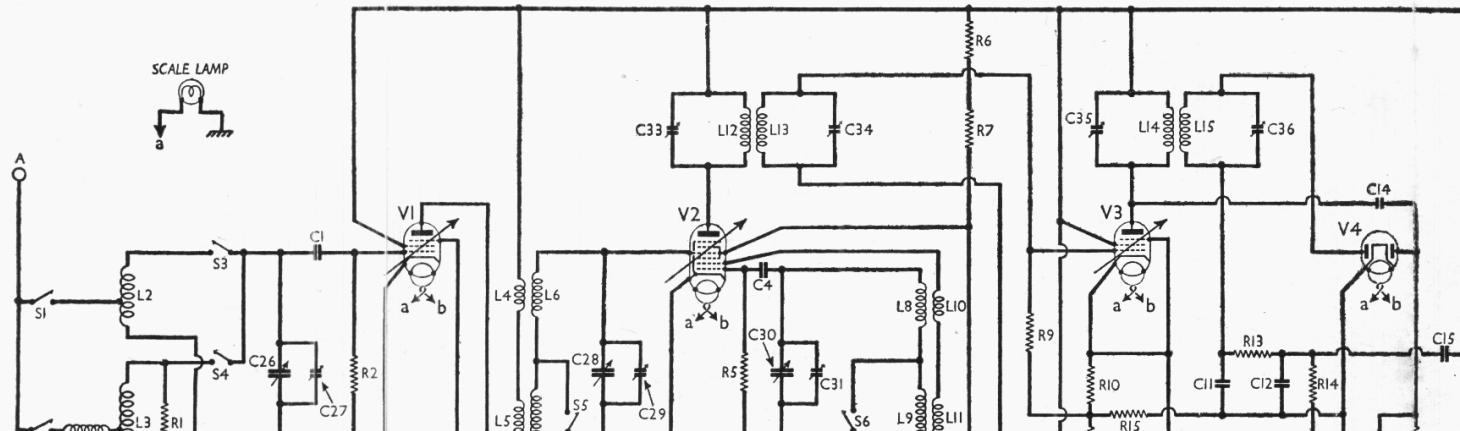
Third valve **(V3, Mazda metallised AC/VP1)** is a second variable-mu RF pentode, operating this time as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C33, L12, L13, C34** and **C35, L14, L15, C36.**

Intermediate frequency 130 kc/s.

Diode second detector is part of separate double diode valve **(V4, Mullard metallised 2D4A),** whose cathode is returned via stabilising resistor **R15** to the potential divider in **V3** cathode circuit. Audio frequency component in rectified output is developed across load resistor **R14** and passed via AF coupling condenser **C15** and manual volume control **R18, C16** to CG of triode valve **(V5, Mullard metallised 354V),** which operates as AF amplifier. **C16** serves to attenuate the treble, to compensate for the apparent loss of bass, as the volume control is turned downwards. IF filtering by **C11, R13, C12** in diode circuit, and by **C18** in **V5** anode circuit.

Second diode of **V4,** fed from **V3** anode via **C14,** provides DC potentials which are developed across two load circuits in parallel: **R16, R17** and **R8, R9,** the second of which is returned to the same point in **V3** cathode circuit as is **V4** cathode. The junction between the two elements of each load circuit is fed back the control grid of **V1** and **V2** (from the former load) and **V3** (from the latter), giving automatic volume control.

Resistance-capacity coupling by **R21, C19** and **R22** between **V5** and pentode output valve **(V6, Mullard Pen4VA).** Fixed tone correction by **C21,** and variable tone control by **C22, R24,** in anode circuit. Provision for connection of low-



Circuit diagram of the Ekco ACT96 AC transportable superhet. **L2, L3** are the frame aerial windings. Facilities are provided for co aerial/earth system, and then **L3** prevents MW break-through on LW. **R16, R17** form one branch of the AVC diode load, and **R8, R9** noise suppressor control, which biases both AVC and signal diodes. **R23** provides GB for **V5** and **V6,** and for this reason it is important th good condition.

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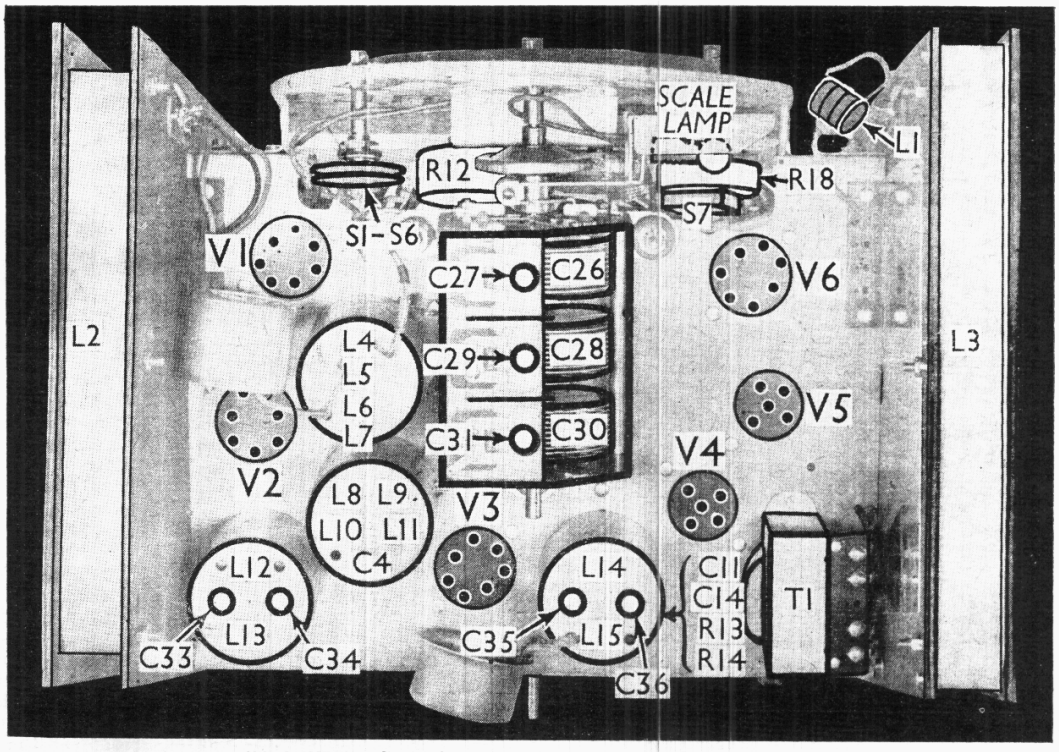


Plan view of the chassis, with the two frame aerials attached. The waveband switch unit **S1–S6**, shown in detail in the drawing in col. 4 overleaf, is drawn there as seen when viewed in the direction of the arrow which indicates the unit in this view. **C4** is contained in the **L8-L11** unit, while **C11**, **C14**, **R13** and **R14** are in the **L14**, **L15** unit.

impedance external speaker across secondary of output transformer **T1**, while **S8** permits the internal speaker to be muted. GB for **V6** is obtained from drop along cathode resistor **R23** in the usual way, and that for **V5** is obtained from a tapping on **R23.**

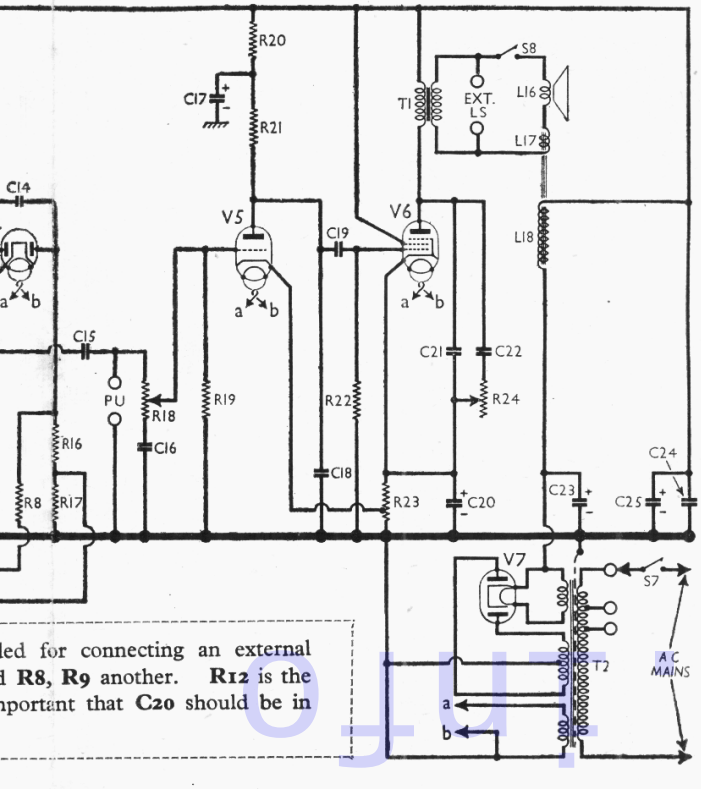
HT current is supplied by IHC full-wave rectifying valve **(V7, Mazda UU3** or **Mullard IW3).** Smoothing by speaker field **L18** and condensers **C23, C24.**

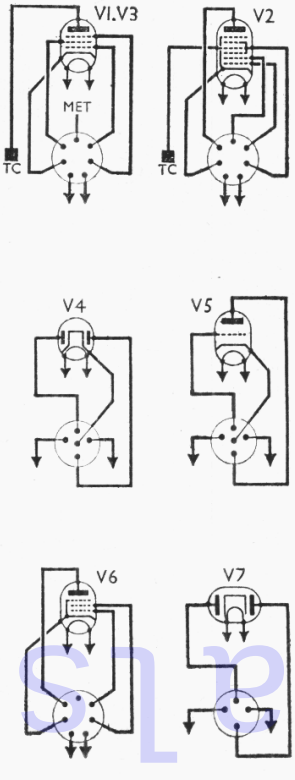
The Noise Suppressor

The effect of **V3** cathode potential divider is to bias **V4** cathode positively with respect to its anodes, so that neither anode operates until the signal exceeds the bias voltage. This voltage is determined primarily by the drop along **R12**, while **R11** imposes a minimum limit and **R10** provides fixed GB for **V3.**

R12 is the noise suppressor control, and as it is variable it can be adjusted to suit local conditions. It is calibrated for "Strong," "Medium" and "All Stations," and the signal is suppressed with the unwanted noise unless it exceeds it in strength, and its principal purpose is to prevent the onrush of noise between stations when tuning. With the control turned to "Strong," the signal diode is biased at about 14 V.

The AVC diode is not biased back quite so far, because **R9, R8, R16** and **R17** form a potential divider across **R11, R12,** and the centre of it is connected to the diode anode, so that this anode is more positive than the signal diode anode.





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l **R8, R9** another. **R12** is the
nportant that **C20** should be in

COMPONENTS AND VALUES

	RESISTORS	Values (ohms)
R1	LW frame aerial shunt ...	50,000
R2	V1 CG resistor	500,000
R3	V1 fixed GB resistor ...	300
R4	AVC line decoupling ...	500,000
R5	V2 osc. CG resistor ...	50,000
R6	V2 osc. anode and SG	10,000
R7	HT feed resistors ...	10,000
R8	V4 AVC diode load	500,000
R9	resistors for V3 ...	250,000
R10	V3 fixed GB resistor ...	300
R11	Noise suppressor limiter...	75
R12	Noise suppressor control	2,000
R13	IF stopper	100,000
R14	V4 signal diode load ...	100,000
R15	V4 cathode resistor ...	2,000
R16	V4 AVC diode load ...	250,000
R17	resistors for V1, V2 ...	500,000
R18	Manual volume control ...	250,000
R19	V5 CG resistor	500,000
R20	V5 anode decoupling ...	9,000
R21	V5 anode load	50,000
R22	V6 CG resistor	250,000
R23	V5, V6 GB resistor ...	400*
R24	Variable tone control ...	60,000

* Tapped at 75Ω from chassis.

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CONDENSERS		Values (μF)
C1	V1 CG condenser	0·0001
C2	V1 cathode by-pass ...	0·1
C3	AVC line decoupling ...	0·1
C4	V2 osc. CG condenser ...	0·001
C5	AVC line decoupling ...	0·1
C6	Osc. LW tracker, fixed ...	0·0007
C7	V1 HT feed decoupling ...	0·1
C8	V3 CG decoupling ...	0·02
C9	V3 anode decoupling ...	0·1
C10	V3 cathode by-pass ...	0·1
C11, C12	IF by-pass condensers ...	0·0003, 0·0003
C13	V4 cathode by-pass ...	0·1
C14	Coupling to V4 AVC diode	0·000015
C15	AF coupling to V5 ...	0·01
C16	Bass compensator ...	0·25
C17*	V5 anode decoupling ...	2·0
C18	V5 anode IF by-pass ...	0·001
C19	AF coupling to V6 ...	0·01
C20*	V6 cathode by-pass ...	50·0
C21	Fixed tone corrector ...	0·0025
C22	Part variable TC filter ...	0·02
C23*	HT smoothing condenser	8·0
C24	RF by-pass	0·1
C25*	HT smoothing condenser	8·0
C26†	Frame aerial tuning ...	—
C27‡	Frame aerial MW trimmer	—
C28†	RF trans. sec. tuning ...	—
C29‡	RF trans. sec. trimmer ...	—
C30†	Oscillator circuit tuning...	—
C31‡	Oscillator MW trimmer ...	—
C32‡	Oscillator LW tracker ...	—
C33‡	1st IF trans. pri. tuning...	—
C34‡	1st IF trans. sec. tuning...	—
C35‡	2nd IF trans. pri. tuning	—
C36‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	MW suppression choke ...	45·0
L2	MW frame aerial	2·0
L3	LW frame aerial	28·0
L4, L5	Trans. pri., total	4·5
L6, L7	Trans. sec.	2·2, 28·0
L8, L9	Oscillator tuning coils ...	5·0, 10·0
L10, L11	Oscillator reaction coils total	5·0

(Continued next column)

OTHER COMPONENTS *(continued)*			Approx. Values (ohms)
L12, L13	1st IF trans.	Pri. ...	80·0
		Sec. ...	80·0
L14, L15	2nd IF trans.	Pri. ...	80·0
		Sec. ...	80·0
L16	Speaker speech coil ...		2·0
L17	Hum neutralising coil ...		0·15
L18	Speaker field coil... ...		2,300·0
T1	Output trans.	Pri. ...	750·0
		Sec. ...	0·3
T2	Mains trans.	Pri., total ...	39·0
		Heater sec. ...	0·1
		Rect. heat. sec	0·15
		H.T. sec., total	690·0
S1-S6	Waveband switches ...		—
S7	Mains switch, ganged R18		—
S8	Internal speaker switch ...		—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 230 V, using the 220-230 V tapping on the mains transformer. Both the volume and sensitivity controls were at maximum and the receiver was tuned to the lowest wavelength on the medium band, but there was no signal input as both frames were short-circuited.

Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

VALVE	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 AC/VP1	230	8·5	230	2·3
V2 FC4	230	1·9		
	Oscillator		85	5·2
	85	2·1		
V3 AC/VP1	230	8·4	230	2·3
V4 2D4A	—	—	—	—
V5 354V	120	1·8	—	—
V6 Pen4VA	210	37·0	230	3·2
V7 UU3	350*	—	—	—

* Each anode; AC.

DISMANTLING THE SET

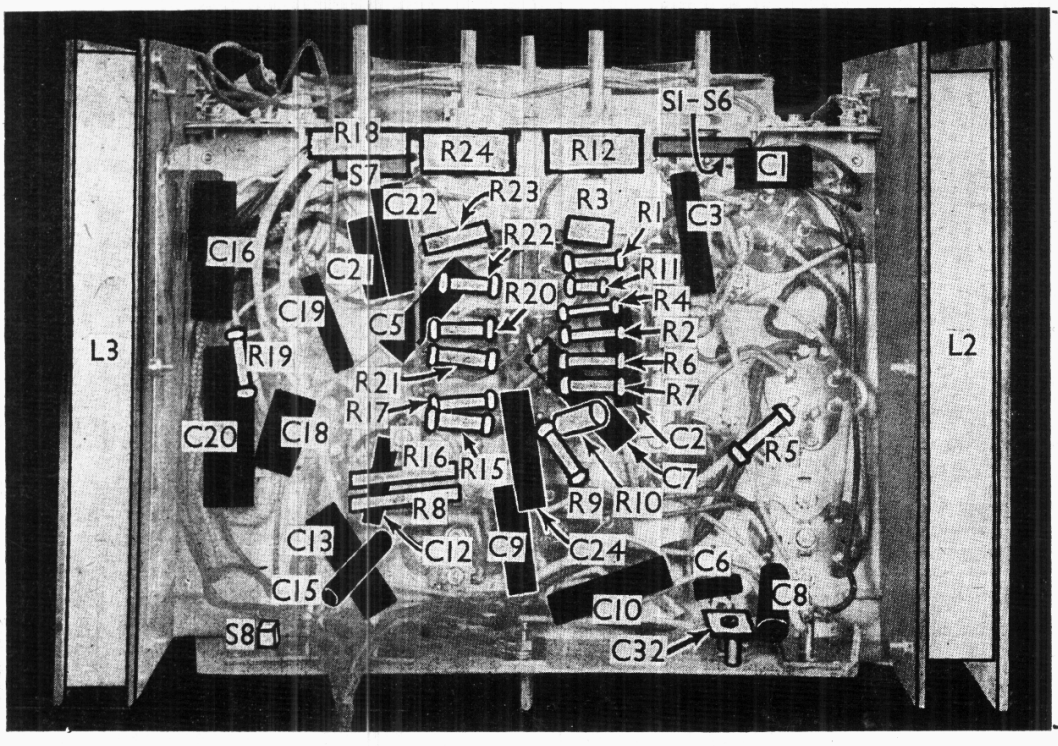
Removing Chassis.—Remove the five control knobs (recessed grub screws); withdraw the FC4 valve from its holder, and remove the two screws (with washers) holding the chassis to the front of the cabinet; remove three screws (with lock-washers and distance-pieces) holding the turntable, and the four screws (with washers) holding the chassis to the bottom of the cabinet. The complete assembly, with speaker, frames and power unit, may now be withdrawn.

When replacing, do not omit to replace the distance-pieces between turntable and chassis. Turn the suppressor control spindle fully clockwise, and fit the knob with "Strong" uppermost. Turn the waveband control to MW, and fit the knob with the green spot uppermost.

Swinging Chassis.—To obtain access to the underside of the receiver chassis, remove from each end of the front of the chassis two screws (with three insulating washers each), and unsolder the green lead from the tag on the outer frame. The chassis may now be swung back on its rear supports, forcing the frame slightly if necessary so that the bolts through it clear the supports; remove the four screws (with lock-washers) holding the screen to the underside of the chassis.

When replacing, take care that the insulating washers are correctly inserted, otherwise the receiver may be unstable above 400 m.

Removing Speaker.—Remove the chassis from the cabinet and swing up the main receiver section from the power unit as previously described;



Under-chassis view. The **S1–S6** switch unit is indicated here but in the diagram opposite it is drawn as seen in the plan view overleaf. Most of the resistors are mounted in two assemblies near the centre, and **C2**, **C5** and **C7** are beneath them in this view.

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unsolder from the speaker terminal panel the connecting leads to chassis;
remove the screw (with lock-washer) holding the speaker to the support at the rear, and remove the nuts (with washers and lock-washers) from the four bolts holding it to the sub-baffle.
When replacing, the terminal panel should be on the right;
connect the leads as follows, numbering the tags from bottom to top; 1, red lead to rectifier; 2, black lead to tag nearest the speaker baffle on the strip mounted on the base of the power unit; 3, black lead to next tag on the strip; 4, no external connection; 5, red lead to receiver and blue lead with yellow sleeving to electrolytic condenser.

GENERAL NOTES

Switches.—**S1-S6** are the waveband switches, ganged in a single rotary unit indicated in our plan and under-chassis views. The unit is shown in detail in the diagram (below), where it is drawn as seen when viewed from above and from the rear of the chassis, as seen in our plan view. The table below gives the switch positions for the MW and LW control settings. A dash indicates open, and **C**, closed.

S7 is the QMB mains switch, ganged with the volume control **R18.** **S8** is the internal speaker switch, of the screw type, at the rear of the chassis.

Coils.—The choke L1 is on a small cylindrical former between the frame **L3** and the edge of the tuning scale. **L2** and **L3** are at the sides of the chassis. **L4-L7** and **L8-L11** are in two screened units on

Switch Table and Diagram

Switch	MW	LW
S1	C	—
S2	—	C
S3	C	—
S4	—	C
S5	C	—
S6	C	—

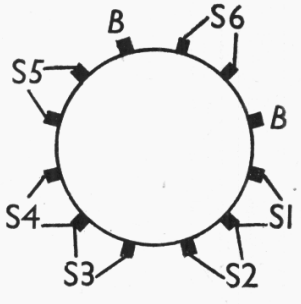
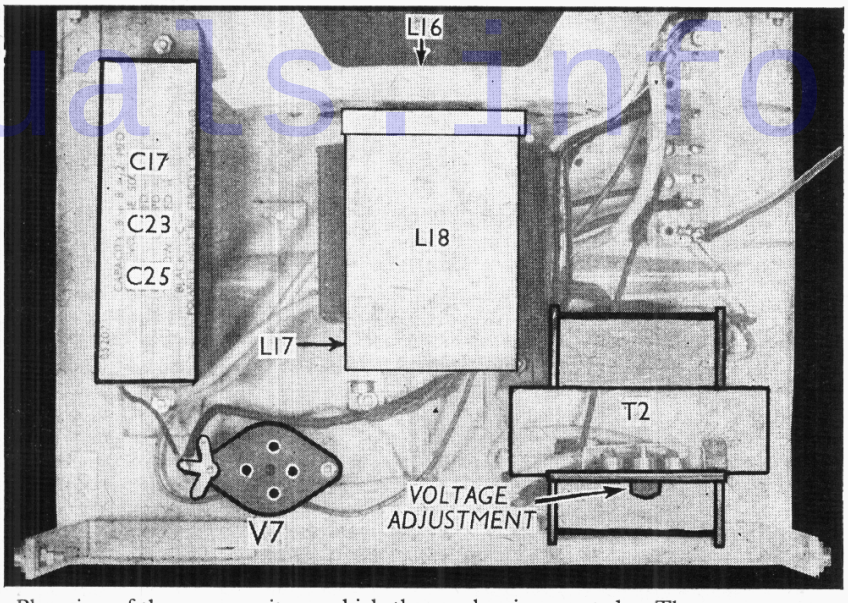


Diagram of the waveband switch unit, drawn as seen when viewed from the rear of the chassis deck, as indicated by the arrow in the plan view. *B* indicates a blank tag.

the chassis deck, as are also the IF transformers **L12, L13** and **L14, L15.**

The **L8-L11** unit also contains **C4,** while **C11, C14, R13** and **R14** are all contained in the **L14, L15** unit.

Scale Lamp.—This is a Mazda MES type, rated at 6.2 V, 0.3 A.



Plan view of the power unit, on which the speaker is mounted. The two supports on which the rear of the receiver chassis is hinged can be seen as the bottom of the illustration.

External Speaker.—There is provision at the rear of the chassis for a low-impedance (2-3 Ω) external speaker. Unscrewing **S8** cuts out the internal speaker.

Condensers C17, C23, C25.—These are three dry electrolytics in a single unit, mounted on the power pack and speaker unit. The black lead is the common negative, the yellow the positive of **C17,** the red, going to a heater socket of **V7,** the positive of **C23,** and the blue to the speaker terminal strip the positive of **C25.**

Common Faults.—Several cases have been found in which the bass compensator **C16** has become open circuited, rendering the volume control inoperative. The remedy is either to replace the condenser, or to short-circuit it, dispensing with the compensation.

Bad quality, sometimes having the appearance of instability, will result from a small deterioration in the quality of the cathode by-pass condenser **C20.** A quick test can be made by connecting a good 50 μF condenser temporarily in parallel with **C20,** replacing the faulty condenser if any change is observed.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to LW, tune to 1,900 m on scale, turn the volume control to maximum and the noise suppressor to "All Stations." Connect signal generator to **A** and **E** sockets, feed in a 130 kc/s (2,307.7 m) signal, and adjust **C33, C35, C34** and **C36,** in that order, for maximum output, reducing the signal generator output as the circuits come into line.

RF and Oscillator Stages.—Connect suitable dummy aerial in the signal generator lead, leaving other adjustments as described above.

MW.—Switch set to MW, tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C31** for maximum output. Tune to 250 m on scale, feed in a 250 m (1,200 kc/s) signal, and adjust **C29** and **C27** for maximum output.

LW.—Switch set to LW, tune to 1,700 m on scale, feed in a 1,700 m (176.5 kc/s) signal, and check accuracy of calibration by rocking gang slightly. If it is not accurate, adjust **C32** for maximum output while rocking the gang for optimum results.

Finally, after removing the signal generator leads but with the output meter still connected, tune in a reliable transmission of known wavelength and re-adjust **C27** for maximum output at the correct point on the tuning scale.

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