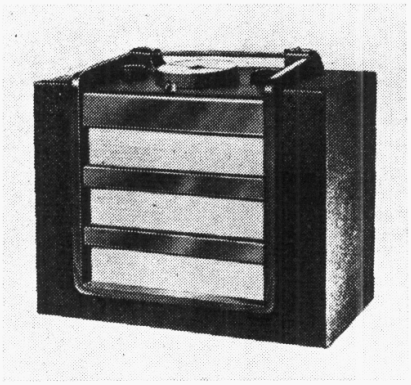
'TRADER' SERVICE SHEET 325

EKCO PU148

AC/DC TRANSPORTABLE



THE Ekco PU148 "Pick-Me-Up" portable is a 3-valve (plus rectifier) AC/DC 2-band receiver, enclosed in a cabinet of small dimensions and including separate frame aerials for each band. It is suitable for mains of 105-115 and 200-250 V. Features are a local-distant switch, and provision for an external aerial and earth.

We regret that permission to publish a circuit diagram of this set is not available, but the information given here should be adequate to enable most faults to be traced and corrected.

CIRCUIT DESCRIPTION

Separate MW or LW tuned frame aerial input **L1, C16,** via **S1** (MW) or **L2, C16,** via **S2** (LW) to variable-mu pentode valve (**V1, Ekco metallised VPU1** or **Mullard VP13C**) operating as RF amplifier with gain control by variable potentiometer **R11** in cathode circuit, the resistance element of which forms the GB resistance of **V3** in its cathode lead to chassis. Additional resistances in **V1** cathode lead are **R1** (connected to cathode) fixed minimum GB resistance, and **R2** (connected between **R1** and **R11** slider), which, with **S6** connected across it, forms the "Local-distant" control, **S6** opening on "Local" for reception of local transmissions.

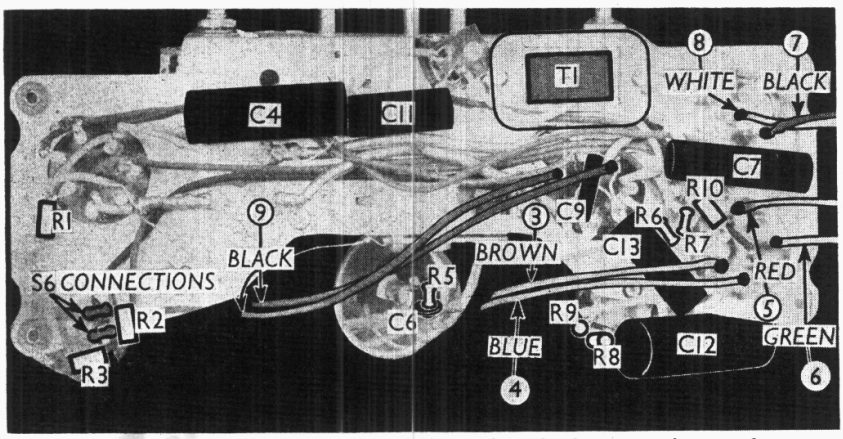
Provision for connection of external aerial to **V1** CG via small condenser **C2,** and earth via isolating condenser **C1** to chassis. **C3** is a fixed trimmer across LW frame winding, which is short-circuited on MW by **S3.**

Tuned-secondary RF transformer coupling by **L3, L4** (primaries, in series), **L7, L8** (secondaries, in series) and **C19, L4** and **L8** each being short-circuited on MW by **S4** and **S5** respectively, between **V1** and detector valve (**V2, Mullard metallised SP13C**), an RF pentode operating on grid leak system with **C6** and **R5,** the latter being returned to chassis. RF filtering in anode circuit by RF choke **L9,** condenser **C9** and resistance **R9.** Reaction is applied from anode, via damping resistance **R4,** by coils **L5, L6** coupled back to RF transformer, and controlled by variable condenser **C18,** with which is also ganged **R11** slider. HT feed resistance **R7,** besides feeding **V2** anode, also feeds **V1** SG directly, and **V2** SG via a further resistance **R6.**

Parallel-fed auto-transformer coupling by **R8, C11** (via **R9**) and **T1** (via **R10**) between **V2** and pentode output valve (**V3, Mullard Pen36C**). Fixed tone correction in anode circuit by **C13.** Speaker frame and speech coil together with **T2** secondary are connected to chassis and therefore "live."

When the receiver is used with AC mains, HT current is supplied by IHC half-wave rectifying valve (**V4, Mullard URIC**) which, with DC supplies, behaves as a low resistance. Smoothing is effected by iron-cored choke **L11** and dry electrolytic condensers **C14, C15.**

Valve heaters are connected in series, together with ballast resistance **R12** across mains input in the following order: **L13** to tap on **R12;** voltage adjustment lead end of **R12** to:—**V3, V4, V1** and **V2** heaters and chassis. The tap to **L13** on **R12** is not quite at the "top" end of **R12,** about 50 O extending beyond it, and forming a surge resistance, at the end of which is connected, via fuse **F1, V5** anode. Air-cored chokes **L12, L13** in mains input leads form a filter which suppresses mains-borne interference, **L12** being connected directly to chassis. To the outward ends of **L12, L13** are connected the mains circuit switches **S7, S8** and beyond them, via mains connection plugs, are mains circuit fuses **F1, F2,** located in the mains connection socket.



Under-chassis view. Note the coding of the various leads connecting to the power unit and speaker.

COMPONENTS AND VALUES

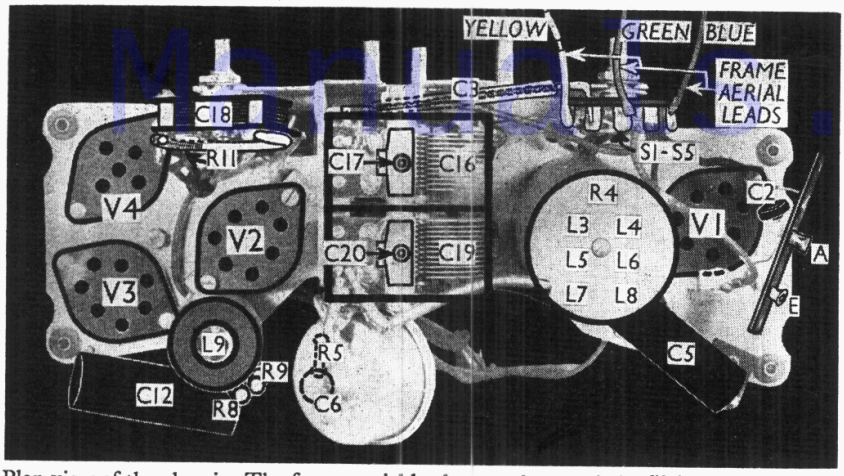
	RESISTANCES	Values (ohms)
R1	V1 "Distant" fixed GB ..	250
R2	V1 "Local" fixed GB ..	50,000
R3	V1 anode HT feed	10,000
R4	Reaction circuit damping ..	200
R5	V2 CG resistance	1,000,000
R6	V2 SG HT feed	250,000
R7	V1 SG and V2 anode HT feed	25,000
R8	V2 anode load	100,000
R9	RF stopper resistances	15,000
R10		100,000
R11	V3 GB; V1 gain control, ganged C18	148
R12	Heater circuit ballast; V4 anode current limiter, approx. total	875*

* 100 O + 100 O + 500 O + 125 O + 50 O from V3 heater end.

	CONDENSERS	Values (μF)
C1	Earth isolating condenser ..	0·1
C2	Aerial series condenser ..	0·000005
C3	LW frame aerial trimmer ..	0·000045
C4	V1 cathode by-pass	0·25
C5	V1 anode decoupling ..	0·25
C6	V2 CG Condenser	0·000015
C7	V2 SG decoupling	0·1
C8	Mains RF by-pass	0·1
C9	V2 anode RF by-pass.. ..	0·0005
C10*	V1 SG and V2 anode decoupling	2·0
C11	AF coupling to T1	0·04
C12*	V3 cathode by-pass	50·0
C13	Fixed tone corrector	0·007
C14*	HT smoothing ..	8·0
C15*		24·0
C16†	Frame aerial tuning	—
C17‡	MW frame aerial trimmer ..	—
C18†	Reaction control, ganged R11	—
C19†	RF trans. sec. tuning ..	—
C20‡	RF trans. sec. MW trimmer ..	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Frame aerial windings	1·1
L2		24·0
L3	RF trans. primary coils	5·0
L4		18·0
L5	Reaction coils, total	200·0
L6		
L7	RF trans. secondary coils	5·0
L8		20·0
L9	V1 anode RF choke	275·0
L10	Speaker speech coil	2·1



Plan view of the chassis. The frame aerial leads are colour-coded. **C3** is a fixed trimmer of the spiralled-wire type.

OTHER COMPONENTS (*Continued*)		Approx. Values (ohms)
L11	HT smoothing choke	353·0
L12, L13	Mains filter chokes ..	2·5 each
T1	Intervalve auto trans., total ..	3,680·0
T2	Output trans. Pri. ..	660·0
	Sec. ..	0·4
S1-S5	Waveband switches	—
S6	Local-distant switch	—
S7, S8	Mains switches.	—
F1	V4 anode fuse ..	—
F2, F3	Mains circuit fuses (in plug connector)	—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, first remove the knobs from the wave-change switch and the volume control (recessed grub screws covered with wax) and then the tuning dial by unscrewing the moulded centre boss, removing the two countersunk-head screws holding the scale, and slackening the two recessed grub screws holding the dial to the spindle. Then remove the felt from the control spindle.

Now remove the valves, the strip of asbestos from the top of the cabinet (two round-head wood screws with washers) and the aerial and earth socket strip and the escutcheon (two screws with nuts). Then unsolder the leads from the chassis and speaker to the output transformer, the yellow lead from the speaker to the earthing tag on the chassis and the three leads to the frame aerials (four tags, two on MW frame on right, two under top of cabinet belonging to the concealed LW frame).

Remove the two countersunk-head wood screws holding the power unit to the bottom of the cabinet, and the four screws (with washers) holding the chassis to the front of the cabinet. Withdraw the power pack and the chassis, and unsolder from the chassis the leads to the local-distant switch, when the chassis and power pack can be withdrawn together.

When replacing, connect the local-distant switch leads to the tags across resistance **R2**, and connect the frame aerial leads as follows:—blue to further tag on right-hand frame, green to further tag on other (concealed) frame, yellow to nearer tags on both frames. Connect the leads from the chassis and speaker to the output transformer **T2** as follows, numbering the tags from left to right:—1, black, from speaker; 2, blue, from speaker; 3, brown, from chassis; 4, blue, from chassis; 5, red, from chassis.

Removing Speaker.—If it is desired to remove the speaker from the cabinet, first remove the chassis and power pack as described above, then remove the nuts, lock washers and washers from the four screws holding the speaker to the sub-baffle. *When replacing*, see that the connecting tags are on the left.

Removing Power Pack.—To remove the power pack only, unsolder the five leads from the chassis and speaker to the output transformer, the green lead from the left-hand tag on the mains resistance, and the three black and one white leads from the fuse panel. Now remove the two countersunk-head wood screws holding the unit to the bottom of the cabinet, when it can be withdrawn to the extent of the lead to the earth socket, which is sufficient for normal purposes.

When replacing, take the two black leads from the chassis (9) to the bottom right-hand tag on the fuse panel, the single black lead to the top left-hand tag on the fuse panel, the white lead (8) to the tag below it, and the green lead (6) to the left-hand tag on the mains resistance. Connect the leads to the output transformer as follows, numbering the tags from left to right:—1, black lead to speaker; 2, blue braided lead to speaker; 3, brown lead to chassis; 4, blue lead to chassis; 5, red lead to chassis.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on AC mains of 228 V, using the 220-230 V tapping on the mains resistance. The receiver was tuned to the lowest wavelength on the medium band, and the combined volume and reaction control was advanced to a point just short of oscillation, the local-distant switch being in the distant position. There was no signal input as the frame aerial connections were shorted.

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

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VPU1	158	5·1	133	2·2
V2 SP13C	43	0·8	50	0·3
V3 Pen36C	190	41·0	220	6·8
V4 UR1C†	—	—	—	—

† Cathode to chassis, 246 V DC.

GENERAL NOTES

Switches.—**S1-S5** are the waveband switches, in a single rotary unit indicated in our plan chassis view. The individual switches are shown in the diagram on page IV. The table (page IV) gives the switch positions for the two control settings, starting from the anti-clockwise position. A dash indicates *open*, and **C** *closed*.

S6 is the QMB local-distant switch, mounted on the control panel, and not

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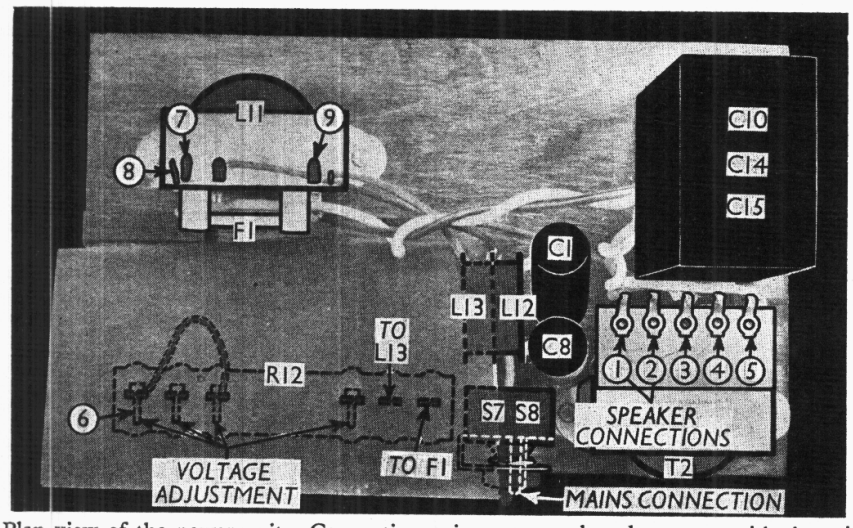


Plan view of the power unit. Connection points are numbered to agree with those in the under-chassis view.

EKCO PU148—*Continued*

shown in our chassis illustrations, though its two connection points are indicated in the under-chassis view. The switch is *closed* in the "distant" position.

S7, S8 are the QMB mains switches, in a single unit mounted above the mains input connector on the power pack.

Coils.—**L1** and **L2** are the frame aerial windings. **L1** is wound on a wooden framework on the right, looking at the back of the cabinet, while **L2** is concealed in the woodwork of the cabinet itself. **L3-L8** are in a single tubular screened unit on the chassis deck, which also contains **R4.** The choke **L9** is also on the chassis deck, and is partially screened by turns of copper foil wound round its periphery, between insulation tape, and connected to chassis by a short flexible lead.

L11-L13 are in the power pack.

External Speaker.—No provision is made for this.

Fuses.—**F1,** the **V4** anode fuse, is mounted in a holder above **L11** on the power pack. It is a standard 1¼ in. glass tubular type, rated at 500 mA. **F2, F3,** the mains circuit fuses, are mounted inside the special plug connector fitting on the pins at the rear of the power pack. Before they can be removed, the connector must be completely dismantled into its three moulded parts (one screw, one hollow screw). The fuses are 1 in. glass types, rated at 1A each.

Inter-Connections.—All the interconnecting leads are colour-coded in the chassis pictures and, except for the three frame leads, are also numbered to agree with the dismantling instructions.

Condensers C10, C14, C15.—These are three dry electrolytics in a single carton on the power pack, having a common negative (black) lead. The positive leads are: blue, **C10** (2μF); red, **C14** (8μF) and yellow, **C15** (24 μF).

Components R5, C6.—These are inside the top cap connector of **V2.**

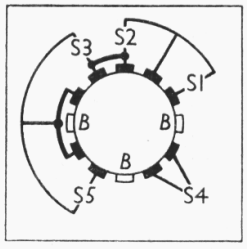
Components R11, C18.—The gain and reaction controls are ganged. During the first half of the travel of the knob, the gain is being increased, but **C18** does not mesh. During the second half, the gain remains at maximum (the thicker portion of the **R11** winding having a negligible resistance) and **C18** introduces reaction.

Condenser C3.—This fixed trimmer consists of a special wire winding on an insulated straight wire core, the whole being covered by large bore insulating sleeving. It is shown in our plan view.

Chassis Divergency.—The makers show a 0·02μF tubular paper RF by-pass condenser in parallel with **C14,** but it was not included in our chassis.

SWITCH TABLE AND DIAGRAM

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



Switch diagram, looking from the rear of the chassis deck.

CIRCUIT ALIGNMENT

Set local-distant switch to "distant," advance gain/reaction control until receiver is just short of oscillation, and tune to a weak station between 220 and 300 m. Adjust **C17** and **C20** for maximum output, taking care not to turn receiver on its turntable.

If pointer indication is not correct, loosen centre screw and move the celluloid disc through the necessary angle.

MAINTENANCE PROBLEMS

Tracing a Crackle

SOME days ago I had an H.M.V. 3-pentode straight battery set (Model 149) in for service. The trouble was a slight crackle, which was always there, and which would suddenly burst forth into a very heavy roar. This latter would occur perhaps three or four times during an evening.

The set was brought in and the chassis was at once removed. A thorough check on everything was made as a matter of routine, but this revealed nothing amiss.

The set was connected up to its speaker and batteries, with no aerial or earth. On removing the RF pentode in the first stage, the crackle still persisted, so the RF pentode in the detector stage was removed, and this was found to stop the crackle.

From past experiences with Pye TP/B's and Lissen 3-valve receivers of a similar type to the H.M.V., I naturally assumed the choke in the anode feed of this valve was noisy. Accordingly, I put a voltmeter across anode and chassis, and, whereas, in my past cases a definite flicker was seen, no such flicker on the needle appeared here.

I was, however, convinced that the trouble lay somewhere in the detector anode circuit, so I disconnected all batteries and read the anode line to chassis resistance with an ohmmeter. A definite flicker was noticeable, and by leaving the meter in circuit and disconnecting all parallel leads and condensers, etc., the trouble was finally traced to a trimmer in the second coil can which had a minute layer of metal dust across it.

Cleaning the trimmer and re-aligning afterwards put the set in proper working order.—S. W. Gooch, Shanklin.

Cathode By-pass Fault

AN Ekco RG86 was reported to me as suddenly bursting forth with loud whistling and sometimes making a gurgling sound. The receiver was brought into the workshop on two occasions and results were well up to standard, with no trace of instability.

After examining the installation, aerial, earth, etc., it was decided that the customer should notify us by 'phone immediately the set behaved peculiarly. At last the trouble occurred and I arrived to hear this obvious form of instability.

New valves were tried, with no better results. Resistances and by-pass condensers were checked, but appeared to be in order. At last it was found that by turning the noise suppressor control to maximum suppression, the noise would stop.

To make quite certain that the cathode by-pass condenser of the IF valve was not leaking or otherwise faulty a new one was substituted, and after three weeks of perfect radio it was decided that this was the cause of the trouble.—R. F. Howard, Holland-on-Sea.

Faulty Grid Stopper

I RECENTLY had to service a well-known mains superhet of recent issue which, the customer complained, suddenly faded out and became distorted at intervals. After having been on bench test for two days and nothing having happened, the set was returned as having undergone a thorough test without disclosing any fault.

The set worked for about a week and then the fault became troublesome again. This time a meter was left in circuit with the last valve, and fortunately the fault showed itself up. It was noticed there was an increase in anode current of several milliamperes. The bias resistor and by-pass condenser were checked and found to be in order.

Testing the grid stopper resistance, however, revealed that the resistance instead of being the rated 1,000 O, was reading in the neighbourhood of 10,000 to 12,000 O and, moreover, when the component was put on test it was noticed that at times it would become open circuited.

Replacing this component cured the fault and to date there have been no further complaints.—R. F. H.

Unusual Television Interference

A COMPLAINT of intermittent interference on a Pye Teleceiver was traced to a most unusual source. Several visits failed to reveal the origin—the di-pole aerial system being erected well out of ignition system or possible house wiring interference range.

Finally, it was noticed that a wind-vane, situated on the roof and some 12 ft. from the aerial, was fitted with an extension spindle which passed through a long bearing tube right down to the drawing-room ceiling, an ornamental device fixed to the ceiling being used to indicate the wind position.

Examination revealed wear between the spindle and tube—no doubt setting up RF disturbances—and earthing the whole arrangement at once cured the interference.—N. Steele, Dunmow.