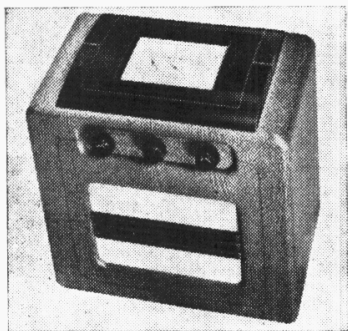


"TRADER" SERVICE SHEET

# 452

# EKCO PI50

## BATTERY PORTABLE



THE Ekco PI50 is a portable battery superhet covering the MW and LW bands, and using four Mazda economy-type 2V valves. Frame aerials are fitted, and the set has a large moulded carrying handle.

As we are still not permitted to publish Ekco circuit diagrams, this part of the Service Sheet has had to be omitted, but the circuit details given, together with the tabular lists of components and the chassis photographs should enable service engineers to locate and repair faults.

Release date: August, 1939.

### CIRCUIT DESCRIPTION

Tuned frame aerial input L1, C28 (MW) and L2, C28 (LW) to CG of pentode section of triode pentode frequency changer valve (V1, Mazda metallised TP25). Aerial circuit IF filter C2, L3 is connected between pentode CG and chassis. Independent frames are used for the two bands, and are connected to C28 via switches S2 (MW) and S3 (LW). S1 short-circuits LW frame on MW band.

V1 oscillator grid coils L4 (MW) and L5 (LW) are tuned by C29; parallel trimming by C8, C30 (MW) and C9, C31 (LW), and C6 is connected across C29; series tracking by C10 (MW) and C7 (LW). Again independent coils are employed, connected between S4 (MW), S5 (LW) and their respective trackers. All the trimmers are connected on one side to chassis, except C9 which is connected directly across L5.

Reaction by coils L6 (MW) and L7 (LW) which are connected in series between V1 oscillator anode and HT positive line.

Second valve (V2, Mazda metallised VP23) is a variable-mu RF pentode operating as IF amplifier with tuned-primary, tuned-secondary transformer couplings C3, L8, L9, L10, C4 and C14, L11, L12, L13, C15. The coils have iron-dust cores in each case but the primaries and secondaries are mounted at right-angles to each other to reduce direct coupling, and coupling is then effected by the coils L9 and L12 respectively,

which are wound on the primary formers but connected in series with the secondary windings.

### Intermediate frequency 465 KC/S.

Diode second detector is part of double diode triode valve (V3, Mazda metallised HL 23 DD). Audio frequency component in rectified output is developed across load resistance R5, which is returned to LT positive line, and passed via C19 and volume control R6 to CG of triode section. IF filtering by C17, R4 (connected between L12 and R5) and C18 in diode circuit, and C20 between triode anode and chassis.

Second diode of V3, fed from V2 anode via C16, provides DC potentials which are developed across load resistance R9 and fed back through decoupling circuits R1, C1 and R8, C12 to FC and IF valves, giving AVC.

Parallel-fed transformer coupling by R7, C21 and T1 between V3 triode and QPP double pentode output valve (V4, Mazda QP25).

Fixed tone correction by C22 and C23 (one connected between each anode and chassis) and C24 (between anodes). One end of T1 primary is returned to chassis, and the secondary CT is returned to GB source via R11.

V4 screens and T2 primary CT are fed directly from HT+lead, but the HT positive line to the rest of the receiver is fed via R10. C11 is connected between the V1, V2, V3 side of R10 and chassis, and C25 between the V4 side and chassis.

All GB and AVC delay potentials are obtained automatically from the drop along R12 and R13 which are connected between chassis and HT negative in that order. R6 and R9 are returned to the junction of R12 and R13, while R11 is returned to the other end of R13, directly to HT negative.

### DISMANTLING THE SET

**Removing Chassis.**—Remove the three control knobs (recessed grub screws); remove the two 4BA (unslotted) hexagon screws (with washers) holding the moulded escutcheon to the top of the cabinet; push the escutcheon bodily slightly forward,

when it can be removed. The handle may be left in position.

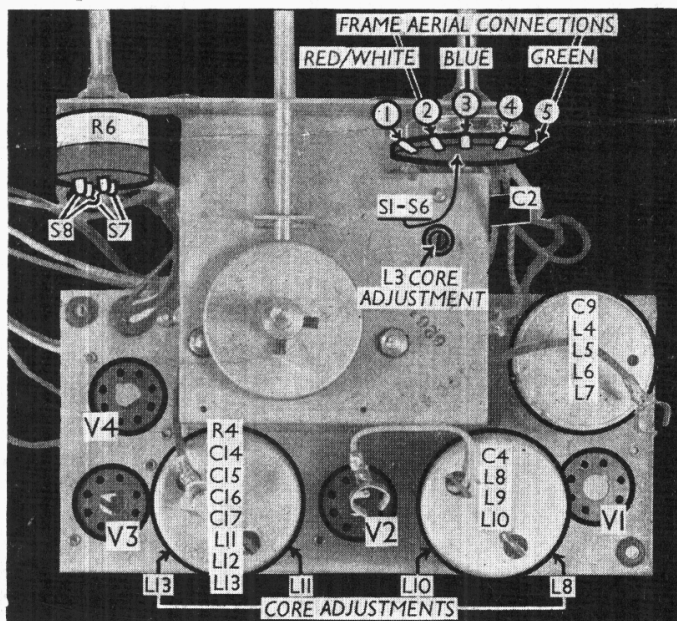
Remove the scale pointer (pull off); remove (with tubular box spanner) the 4BA nuts (with washers) holding the top of the chassis to the front of the cabinet. This can be more easily accomplished if V3 and V4 are first withdrawn;

remove the round-head wood screw (with washer) holding the front left-hand corner of the chassis (viewed from rear of case); remove the 4BA round-head screw (with washer) holding the rear right-hand corner of the chassis to the bracket on the side of the case.

If the chassis is now swung round a little to clear this bracket, it can be dropped slightly until the tuning spindle clears the tuning scale, and then withdrawn to the extent of the speaker and frame aerial leads, which is sufficient to give access to any part of the chassis.

To free chassis entirely, unsolder the frame leads from the tags on the wavechange switch, and the speaker leads from the output transformer.

When replacing, before fitting the chassis into position, connect the frame leads to the wavechange switch as follows, numbering the tags from left to right, as indicated in our chassis plan view:



Plan view of the chassis, showing the frame aerial connections.

- 1, blank;
- 2, red/white lead from trimmer inside top of case;
- 3, blue lead from same trimmer;
- 4, no frame connection;
- 5, green lead from top right-hand front corner of case.

Connect speaker leads as follows, numbering the tags from top to bottom:

- 1, yellow lead from chassis (and green lead from speaker);
- 2, blank;
- 3, blue lead from chassis;
- 4, red lead from chassis;
- 5, blue lead from chassis.

Before replacing moulded escutcheon, replace scale pointer, one end of which should coincide with the 1,000m mark with condenser vanes fully enmeshed.

### EKCO P150—(continued)

**Removing Speaker.**—Unsolder the two leads from the speech coil tags; remove the four nuts (with washers) holding the speaker to the sub-baffle.

**When replacing,** connecting tags should be on the left;

connect the green lead from transformer to the upper tag, and the other lead, in yellow sleeving, coming directly from the transformer winding, to the lower tag.

**Removing Output Transformer.**—Unsolder the two leads from the tags on the speaker; remove the two fixing screws holding the transformer to the sub-baffle.

**When replacing,** the connecting tags should be on the right; the countersunk-head wood screw goes at the bottom;

the 4BA cheese-head screw goes at the top (its nut remains behind the sub-baffle).

### VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with a new 90V HT battery reading 90V on load. The receiver was tuned to the bottom of the MW band and the volume control was at maximum, but the frame aerial connections were shorted.

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

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TP25	75	0.3	38	0.8
V2 VP23	75	2.0	38	0.2
V3 HL23DD	51	0.4	—	—
V4 QP25	82†	1.9	83	0.9

† Each anode.

### COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	V1 pentode CG decoupling...	270,000
R2	V1 osc. CG resistance ...	100,000
R3	V1, V2 SG's HT feed ...	33,000
R4	IF stopper ...	56,000
R5	V3 signal diode load ...	680,000
R6	Manual volume control ...	850,000
R7	V3 triode anode load ...	47,000
R8	AVC line decoupling ...	680,000
R9	V3 AVC diode load ...	1,000,000
R10	V1, V2, V3 HT feed ...	1,800
R11	V4 CG's decoupling ...	100,000
R12	V1, V2 fixed GB; V3 triode	75
R13	and V4 GB; and AVC delay resistances ...	620

CONDENSERS		Values (μF)
C1	V1 pentode CG decoupling ...	0.06
C2	Aerial IF filter tuning ...	0.00004
C3	1st IF transformer fixed tuning condensers ...	0.00014
C4	...	0.00014
C5	V1 osc. CG condenser ...	0.00005
C6	Osc. circuit fixed trimmer...	Very low
C7	Osc. circuit LW tracker ...	0.000345‡
C8	Osc. circuit MW fixed trimmer ...	Very low
C9	Osc. circuit LW fixed trimmer ...	0.00014
C10	Osc. circuit MW tracker ...	0.00063†
C11*	HT circuit reservoir ...	4.0
C12	V2 CG decoupling ...	0.04
C13	V1, V2 SG's decoupling ...	0.1
C14	2nd IF transformer fixed tuning condensers ...	0.00014
C15	...	0.00014
C16	Coupling to V3 AVC diode	0.000015
C17	IF by-pass condensers ...	0.00014
C18	...	0.0002
C19	AF coupling to V3 triode ...	0.01
C20	IF by-pass ...	0.0003
C21	AF coupling to T1 ...	0.1
C22	...	0.003
C23	Fixed tone correctors ...	0.003
C24	...	0.003
C25	HT circuit RF by-pass ...	0.1
C26*	Auto GB circuit by-pass ...	50.0
C27†	Frame aerial LW trimmer	—
C28†	Frame aerial tuning ...	—
C29†	Oscillator circuit tuning ...	—
C30†	Osc. circuit MW trimmer ...	—
C31†	Osc. circuit LW trimmer ...	—

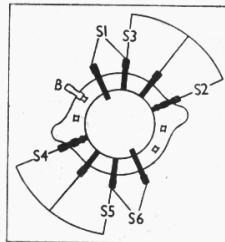
\* Electrolytic. † Variable. ‡ Pre-set.  
§ 0.000305 μF + 0.00004 μF in parallel.  
¶ 0.00059 μF + 0.00004 μF in parallel.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Frame aerial windings ...	4.0
L2	...	23.0
L3	Aerial circuit IF filter ...	13.0
L4	Osc. circuit MW tuning coil ...	4.0
L5	Osc. circuit LW tuning coil ...	7.5
L6	Oscillator MW reaction ...	3.5
L7	Oscillator LW reaction ...	5.0
L8	{ Pri. ...	0.1
L9	{ Coupling ...	5.0
L10	{ Sec. ...	5.0
L11	{ Pri. ...	5.0
L12	{ Coupling ...	0.1
L13	{ Sec. ...	5.0
L14	Speaker speech coil ...	1.8
T1	Intervolve trans. { Pri. ...	460.0
	{ Sec. total ...	3,000.0
T2	Output trans. { Pri., total ...	1,250.0
	{ Sec. ...	0.2
S1-S6	Waveband switches ...	—
S7	LT circuit switch; ganged	—
S8	HT circuit switch; R6	—

### GENERAL NOTES

**Switches.**—S1-S6 are the waveband switches in a rotary unit on the control strip of the chassis. It is indicated in our plan chassis view, and shown in detail in the diagram below, as seen from the rear of the top of the chassis. S1, S2, S4 and S6 are closed on MW and open on LW, while S3 and S5 are closed on LW, and open on MW.

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



S7, S8 are the QMB LT and HT circuit switches, ganged with the volume control R6. They are indicated in both chassis views.

**Coils.**—The frame aerials L1 and L2 are incorporated in the woodwork of the cabinet, the MW being towards the front. Each has two connection tags on small panels. One connection is common to both frames, and is taken to the chassis by a red/white lead. The green lead is the other connection of the MW frame and the blue lead is the other connection of the LW frame.

L3 is beneath the section of the chassis on which the gang condenser is mounted, and has an adjustable core.

L4-L7, and the IF transformers L8-L10 and L11-L13 are in three screened units on the chassis deck. The first contains also C9; the second contains also C4; and the third contains also R4 and C14-C17. The core adjustments are shown in the plan chassis view.

**Condenser C27.**—This is mounted inside the cabinet, connected across the LW frame aerial.

**Condensers C6, C8.**—These are two semi-fixed condensers of the wire-wound type, situated beneath the chassis.

**Trimmers C30, C31.**—These are mounted beneath the chassis, and can be reached by a long box spanner inserted through holes in the back plate of the chassis.

**Batteries.**—LT, 2V 10AH celluloid-cased accumulator cell, Exide CYU3K; HT, 90V dry battery, Drydex H1146, or Vidor L5039.

**Battery Leads and Voltages.**—Black lead, spade tag, LT negative; red/white lead, spade tag, LT positive 2V; yellow lead, white plug, HT negative; maroon lead, red plug, HT positive 90V.

**Chassis Divergencies.**—Early models may have a trimmer across L1, the MW frame, in which case it will be mounted at the side of C27, inside the cabinet. The following differences were noted in the maker's diagram: The lower side of C3 (first IF primary fixed trimmer) is shown connected to chassis, not to the bottom of the IF primary coil, as in our chassis; the trackers C7, C10 are shown as single condensers, but in our chassis they each consist of two fixed condensers in parallel; the small wire-wound condensers C6, C8 are not shown in the maker's diagram; S6 is directly across L5 in the maker's diagram, but in our chassis is returned to chassis.

### CIRCUIT ALIGNMENT

Alignment must be performed with the chassis and batteries in situ in the cabinet.

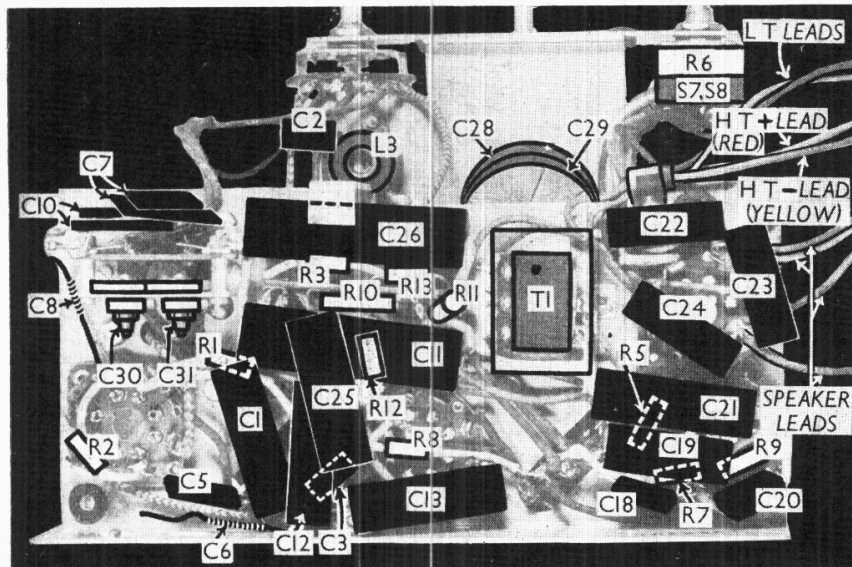
**IF Stages.**—Switch set to MW, and turn gang to maximum. Connect signal generator, via a 0.02 μF condenser, to control grid (top cap) of V1, and to chassis. Feed in a 465 KC/S signal, and adjust cores of L8, L10, L11 and L13 in turn for maximum output.

**IF Filter.**—Couple signal generator via a loop of wire round the outside of the cabinet. Switch set to MW, tune to 500m on scale, feed in a strong 465 KC/S signal, and adjust core of L3 for minimum output.

**RF and Oscillator Stages.**—With gang at maximum, pointer should cover 1,000m mark on scale. Couple signal generator as for IF filter adjustment.

**MW.**—Switch set to MW, tune to 250m on scale, feed in a 250m (1,200 KC/S) signal, and adjust C30 for maximum output, rocking gang slightly for optimum results. In early models, adjust the MW frame trimmer as well.

**LW.**—Switch set to LW, tune to 1,200m on scale, feed in a 1,200m (250 KC/S) signal, and adjust C31, then C27 (inside cabinet) for maximum output.



Under-chassis view, with various leads indicated.