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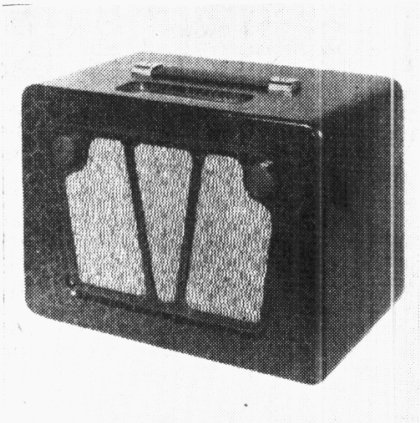
"TRADER" SERVICE SHEET

489

ULTRA P62 AND P60, P61 PORTABLES



The appearance of the Ultra P62 battery portable superhet.

THE Ultra P62 is a 2-band battery portable, using 2V valves and an accumulator cell for LT supply. It is fitted into a crackle-finished wooden cabinet provided with a turntable and carrying handle.

Model P60 is similar, but is fitted in a leather cloth-covered cabinet, and has a sloping tuning scale, with edge-operated tuning and volume controls. A hinged flap covers the control panel when the set is not in use.

Model P61 is similar to the P60, but has a walnut cabinet, without a hinged flap.

This *Service Sheet* covers all three models.

Release dates: P60, April, 1939; *P61, August*, 1939; *P62, January*, 1940.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L2** (MW) plus **L3** (LW) and **C21** to triode-pentode valve (**V1, Mazda metallised TP26**), which operates as frequency changer with cathode injection coupling. Provision for connection of external aerial, via coupling winding **L1** in frame aerial assembly, and an external earth connection.

V1 triode oscillator anode coils **L8** (MW) and **L9** (LW) are tuned by **C24.** Parallel trimming by **C22** (MW) and **C7, C23** (LW); series tracking by **C5** (MW) and **C6** (LW). Cathode injector coupling by parallel wound iron-cored chokes **L4, L5** in **V1** filament leads, coupled to the tuning coils by **L6** (MW) and **L7** (LW) via switches **S2, S3.**

Reaction coupling between cathode and anode circuits is effected by **L6** and **L7,** while further reaction coupling is achieved by returning the control grid to chassis via **S4** and **S5** and the trackers **C5** and **C6,** where the grid and anode circuits are common.

Second valve (**V2, Mazda metallised VP23**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C2, L10, L11, C3** and **C10, L12, L13, C11.**

The tuning condensers of these transformers are fixed, but the coils are fitted with iron-dust cores which are adjustable for alignment purposes.

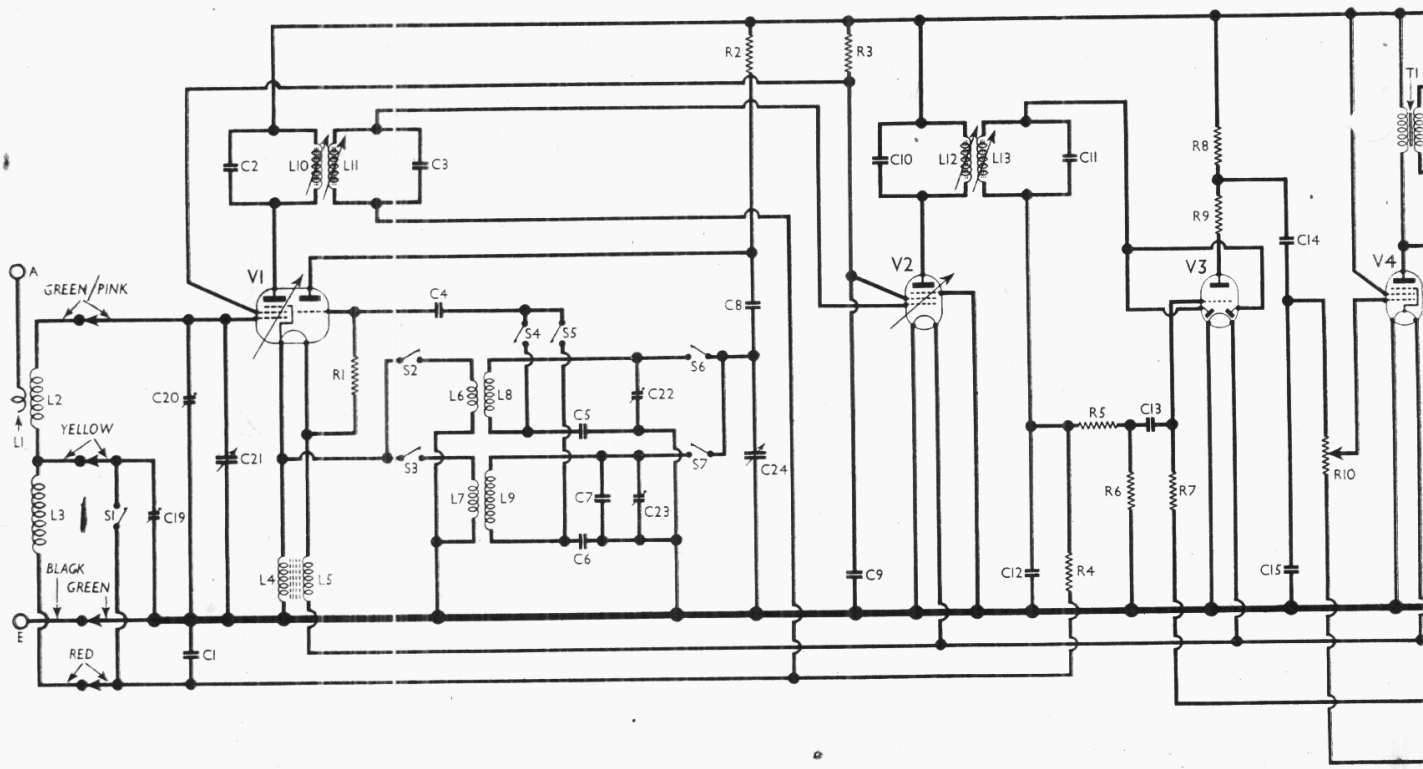
Intermediate frequency 510 KC/S.

Diode second detector is part of double diode triode valve (**V3, Mazda metallised HL23DD**), whose diode anodes are strapped together to operate as a single diode. Audio frequency component in rectified output is developed across the load resistance **R6** and passed via audio frequency coupling condenser **C13** and CG resistance **R7** to control grid of triode section, which operates as audio frequency amplifier. IF filtering in diode circuit by **C12** and **R5.**

DC potential developed across **R5** and **R6** is used as control voltage and fed back through decoupling circuit **R4, C1** as GB to pentode section of the frequency changer and IF amplifier valves, giving automatic volume control.

Resistance-capacity coupling by **R8, R9, C14** and the manual volume control **R10** between **V3** triode and pentode output valve (**V4, Mazda Pen 25**).

The resistances **R8** and **R9** together form the anode load resistance for **V3** triode. They constitute a potential divider and provide a means to achieve a step-down coupling; at the same time **R9,** in conjunction with the by-pass condenser **C15,** functions as a second IF filter.



Fixed tone correction in **V4** anode circuit by **C16. C17,** connected between HT positive line and chassis, operates as an HT reservoir condenser.

Grid bias voltages for **V3** triode and **V4** are obtained automatically from the drop along resistances **R11** and **R12,** which form a potential divider in the negative HT lead to chassis.

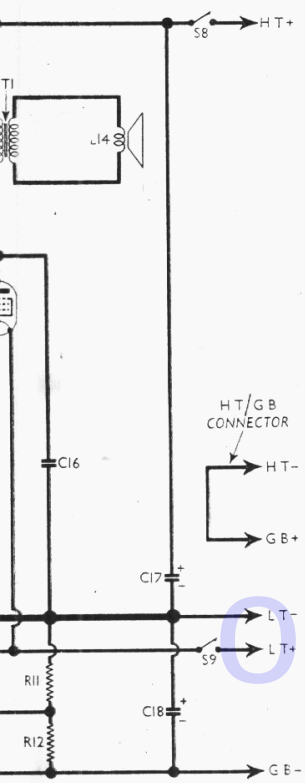
Since grid bias is automatic, no GB battery is necessary; but as the battery supplied with the receiver has a separate unconnected GB section in it, it is necessary to link together the two sections by means of connecting strap, shown to the right of the circuit diagram and labelled "HT/GB connector," if the GB section is to be usefully employed.

VALVE ANALYSIS

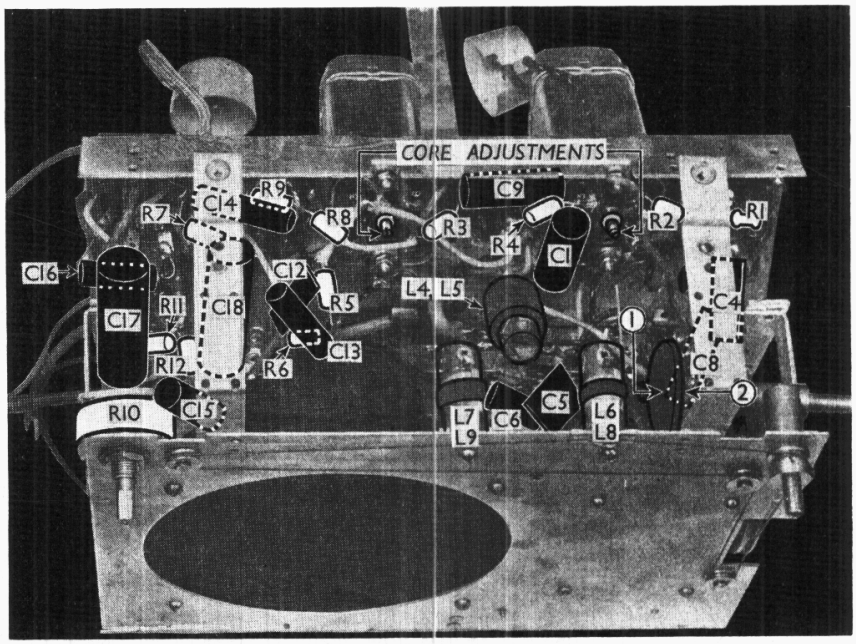
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TP26	98	0·8	56	0·25
	Oscillator 72	1·0		
V2 VP23	98	1.1	56	0·45
V3 HL23DD	70	0·35	—	—
V4 Pen25	97	2·8	98	0·68

Valve voltages and currents given in the table above are those measured in our receiver when it was operating with a new HT battery, the HT and GB sections of which were connected in series and which read 100 V overall on load.

The receiver was tuned to the lowest wavelength on the medium band, and the volume control was at maximum. The frame aerial was disconnected and there was no signal input; the top cap was connected to the AVC line by joining together the green/pink and red frame aerial leads.



Circuit diagram of the Ultra P62 portable superhet. The circuit of the P60 and P61 is identical with this. Cathode injection is used in the mixer circuit. The volume control **R10** is in the control grid circuit of the output valve. The HT/GB connector links together those two sections if an HT battery in which they are separate is used.



Half-plan view of the chassis. Means of access to this part of the chassis is described under "Dismantling The Set."

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

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (recessed grub screws);

unsolder from the frame aerial connecting strip the four leads connecting it to chassis;

remove the two round-head screws holding the carrying handle clamps to the top of the case;

remove the fixing screw (with washer) holding the chassis to the bottom of the case.

When replacing, connect the frame aerial leads as follows, numbering the tags on the connecting strip from top to bottom:

1, green/pink;
2, yellow
3, red } emerging from black braided lead.
4, green

If the leads from the frame aerial have been disconnected from the connecting strip, their order is as follows, numbering again from top to bottom:—

1, green/pink;
2, yellow;
3, red/pink;
4, black/pink.

Access to components in chassis.—To obtain access to the components in the chassis, the metal front chassis panel and the chassis deck must be separated, as shown in our half-plan view.

To do this, remove the tuning scale by prising up the four press-studs, taking care that the studs do not fly;

remove the four slotted hexagon-head self-tapping screws holding the compressed card panel to the upright brackets at the rear of the chassis;

remove the four round-head screws (with nuts, washers and lock-washers) holding the two top brackets to the flange on the upper edge of the chassis deck;

remove a further four similar screws, etc., holding the tops of the upright brackets to the lower edge of the chassis deck.

The upper edge of the chassis deck may then be eased away outwards towards the rear.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 osc. CG resistance ...	125,000
R2	V1 osc. anode HT feed ...	25,000
R3	V1, V2 SG's HT feed ...	70,000
R4	AVC line decoupling ...	1,000,000
R5	IF stopper	25,000
R6	V3 signal diode load ...	500,000
R7	V3 triode CG resistance ...	1,000,000
R8	V3 triode anode load ...	40,000
R9	IF stopper	25,000
R10	Manual volume control ...	500,000
R11	V3 triode and V4 auto GB resistances ...	100
R12		200

	CONDENSERS	Values (μF)
C1	AVC line decoupling ...	0·05
C2	1st IF transformer tuning condensers ...	0·0001
C3		0·0001
C4	V1 osc. CG condenser ...	0·0005
C5	Osc. circuit MW tracker...	0·000456
C6	Osc. circuit LW tracker ...	0·000138
C7	Osc. circ. LW fixed trimmer	0·0001
C8	V1 osc. anode coupling ...	0·0002
C9	V1, V2 SG's decoupling ...	0·05
C10	2nd IF transformer tuning condensers ...	0·0001
C11		0·0001
C12	IF by-pass	0·0001
C13	AF coupling to V3 triode...	0·01
C14	V3 triode to V4 AF coupling	0·01
C15	IF by-pass	0·0002
C16	Fixed tone corrector ...	0·002
C17*	HT circuit reservoir ...	2·0
C18*	Auto GB by-pass... ...	100·0
C19‡	Frame aerial LW trimmer	0·00004
C20‡	Frame aerial MW trimmer	0·00004
C21†	Frame aerial tuning ...	—
C22‡	Osc. circuit MW trimmer	0·00004
C23‡	Osc. circuit LW trimmer	0·00004
C24†	Oscillator circuit tuning...	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS		Approx. Values (ohms)
L1	External aerial coupling...		—
L2	Frame aerial windings ...		6·0
L3			16·0
L4	Cathode injector coils ...		0·2
L5			0·2
L6	Oscillator coupling coils...		0·8
L7			1·6
L8	Osc. circ. MW tuning coil		5·0
L9	Osc. circ. LW tuning coil		12·0
L10	1st IF trans.	Pri. ...	9·0
L11		Sec. ...	9·0
L12	2nd IF trans.	Pri. ...	9·0
L13		Sec. ...	9·0
L14	Speaker speech coil ...		2·0
T1	Speaker input trans.	Pri.	550·0
		Sec.	0·5
S1-S7	Waveband switches ...		—
S8	HT circuit switch ...		—
S9	LT circuit switch... ...		—

GENERAL NOTES

Switches.—S1-S7 are the waveband switches, and **S8, S9** the HT and LT circuit switches, ganged in a double-sided rotary unit and operated by a knob and spindle projecting from the right-hand side of the cabinet. The unit is indicated in our half-plan view, and is shown in detail in the diagrams of each side in col. 3. Side 1 is that seen from the volume control end of the chassis; side 2 is viewed from the spindle side of the unit. The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control spindle. A dash indicates open, and **C,** closed.

Switch Table

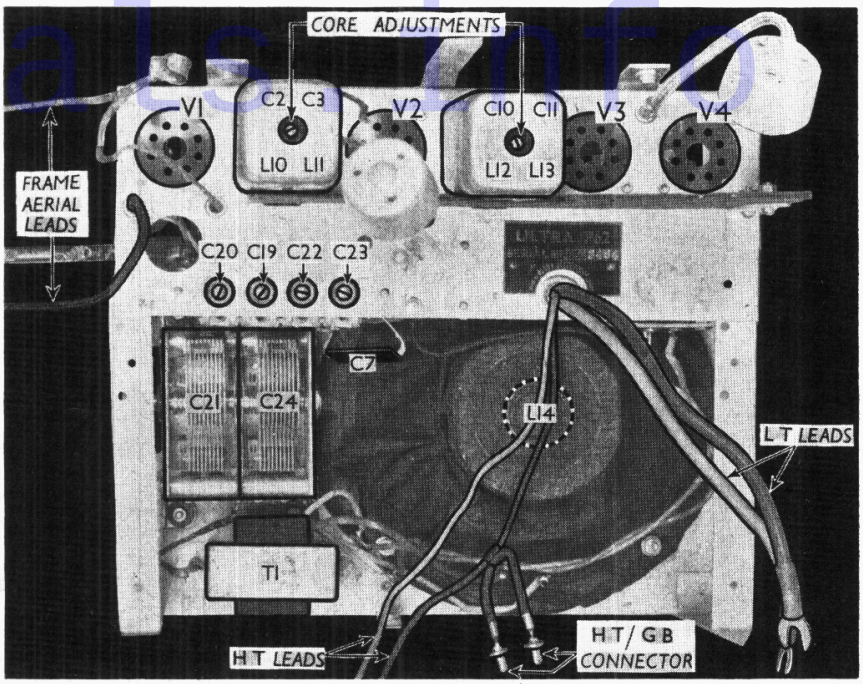
Switch	MW	Off	LW
S1	C	—	—
S2	C	—	—
S3	—	—	C
S4	C	—	—
S5	—	—	C
S6	C	—	—
S7	—	—	C
S8	C	—	C
S9	C	—	C

Coils.—L1, L2 and L3 are mounted on a wooden framework attached to the inside of the back of the cabinet. **L1,** the external aerial coupling coil, is a half-turn of tinned copper wire, coupled to **L2,** the larger of the two frame aerial windings. **L3** is the inner (smaller) frame aerial winding. The connections of these windings are colour-coded in the circuit diagram and are explained under "Dismantling the Set."

L4, L5; L6, L8 and **L7, L9** are in three unscreened tubular units inside the chassis, and indicated in our half-plan chassis view. **L10, L11** and **L12, L13** are the IF transformers, in two screened units mounted on the rear of the chassis, and shown in our rear chassis view. Each contains its two fixed trimmers, and two core adjustments. One adjustment is at the top of each can, and one at the bottom of each, the latter two being indicated in our half-plan view and reached from inside the chassis.

External Speaker.—No provision is made for this, but a low impedance (about 2 Ω) type could be connected across the speech coil tags of the internal speaker.

Trimmers.—Apart from the IF core adjustments, there are four pre-set condensers in a row which are reached for adjustment through four holes in the rear plate of the chassis, and are shown in our rear chassis view.



Rear chassis view. All the trimmer condensers are indicated.

Batteries.—LT, Exide 2 V 18 AH celluloid cased unspillable accumulator cell, type PY5. HT and GB, Drydex combined 99 V HT and 9 V GB battery, type H1026. This has its GB section entirely independent of the HT section, and a link is provided, and attached to the HT leads of the set to connect the HT negative and GB positive sockets of the battery.

Battery Leads and Voltages.—Black rubber lead, spade tag, LT negative; red rubber lead, spade tag, LT positive 2 V; black-braid lead and plug, in GB negative 9 V socket; red-braid lead and plug, in HT positive 99 V socket; short black link, with plugs, between HT negative and GB positive sockets of battery. If an ordinary 108 V HT battery were used, the black and red leads would go to HT negative and positive 108 V respectively, and the short link would not be used.

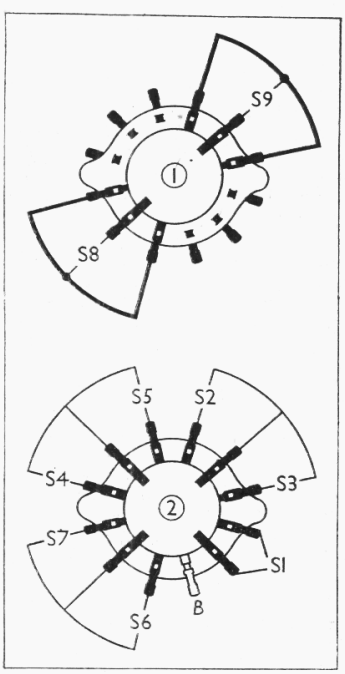
CIRCUIT ALIGNMENT

IF Stages.—Switch set to MW and turn gang to maximum. Remove top cap connector of **V1** and connect signal generator to top cap of this valve and to chassis. Also connect a 10,000 Ω resistance between top cap and chassis. Feed in a 510 KC/S signal, and adjust cores of **L13, L12, L11** and **L10** for maximum output. Check these settings, then remove signal generator and the 10,000 Ω resistance, and replace top cap connector of **V1.**

RF and Oscillator Stages.—Connect signal generator to external **A** and **E** sockets. In the case of the P60 and P62 it is necessary to keep the back of the cabinet open to reach the trimmers, and it is, therefore, advisable to place the HT and GB battery close to the frame aerials so that its position is similar to that which it occupies when the back is closed and the set is working normally.

MW.—Switch set to MW, tune to 200 m on scale, feed in a 200 m (1,500 KC/S) signal, and adjust **C22,** then **C20,** for maximum output. Check at 500 m.

LW.—Switch set to LW, tune to 1,000 m on scale, feed in a 1,000 m (300 KC/S) signal, and adjust **C23,** then **C19,** for maximum output. Check at 2,000 m.



Diagrams of the switch unit, drawn as seen in the direction of the arrows in the half-plan view.