NUMBER 137 **TRADER SERVICE SHEETS**

137

MULLARD MB3B

3-VALVE BATTERY RECEIVER

THE valve arrangement in the Mullard MB3B 3-valve battery-operated receiver consists of a variable-mu pentode H.F. amplifier, a pentode detector and a pentode output valve. Provision is made in the set for a gramophone pick-up and there is a fourth position on the wave-change switch for bringing a Droitwich rejector into circuit.

CIRCUIT DESCRIPTION

Aerial input via **A1** or **A2** (with series attenuator resistance **R1** for local station reception), loading coil **L1** which ensures substantially constant sensitivity over the whole wave-range, and coupling coil **L3**. Droitwich rejector **L2, C12** is switched into circuit on L.W.1.

Single tuned circuit **L4, L5, C15** precedes variable-mu pentode H.F. amplifier (**V1, Mullard metallised VP2**). Gain control by variable potentiometer **R2** which varies G.B. applied and also damps the aerial input circuits. This method enables both the input signal and the slope of the valve to be reduced, thus minimising the possibility of distortion due to modulation rise.

Tuned-secondary transformer coupling by **L6, L9, L10, C18** to H.F. pentode detector (**V2, Mullard metallised SP2**) which operates on grid leak system with **C4** and **R5**. Reaction is applied from anode by coils **L7, L8** and controlled by variable condenser **C16**. Provision for connection of gramophone pick-up in C.G. circuit. H.F. filtering in anode circuit by choke **L11** and by-pass condensers **C6, C7**.

Resistance-capacity coupling by **R9, C8** and **R10** to pentode output valve (**V3, Mullard PM22A**). H.F. filtering in C.G. circuit by **R11, R12** and **C10**. Fixed tone correction in anode circuit by condenser **C11**.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	Aerial series resistance	20,000
R2	V1 gain control	10,000
R3	V1 C.G. resistance	2,000,000
R4	Pick-up circuit H.F. stopper	250,000
R5	V2 grid leak	2,000,000
R6, R7	V2 grid leak potentiometer	500
R8	V2 S.G. H.T. feed	500,000
R9	V2 anode load	100,000
R10	V3 C.G. resistance	2,000,000
R11, R12	H.F. stoppers	100,000

	CONDENSERS	Values (μF)
C1	Blocking condenser	0·1
C2	V1 C.G. condenser	0·000025
C3	V1 C.G. decoupling	0·1
C4	V2 C.G. condenser	0·0001
C5	V2 S.G. by-pass	0·5
C6, C7	V2 anode H.F. by-passes	0·0002, 0·0001
C8	V2 to V3 L.F. coupling	0·001
C9	H.T. supply reservoir	2·0
C10	V3 C.G. H.F. by-pass	0·00005
C11	Tone corrector	0·002
C12‡	Droitwich rejector tuning	0·00016
C13‡	Aerial circuit L.W. trimmer	0·000027
C14‡	Aerial circuit main trimmer	0·000027
C15†	Aerial circuit tuning	0·00043
C16†	Reaction control	0·0002
C17‡	H.F. trans. sec. trimmer	0·000027
C18†	H.F. trans. sec. tuning	0·00043

† Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. values (ohms)
L1	Aerial loading coil	4·5
L2	Droitwich rejector coil, total	43·5*
L3	Aerial coupling coil	2·3
L4, L5	Aerial tuning coils	3·1, 30·0
L6	H.F. transformer primary	70·0
L7, L8	Reaction coils, total	7·3
L9, L10	H.F. transformer secondary	3·1, 30·0
L11	V2 anode H.F. choke	375·0
L12	Speaker speech coil	3·5
T1	Speaker input trans. Pri. / Sec.	700·0 / 0·5
S1, S2, S4	Waveband switches	—
S3	G.B. circuit switch	—
S5	H.T. circuit switch	—
S6	L.T. circuit switch	—

* Tapped at 11·5 O.

DISMANTLING THE SET

Removing Chassis.—If it is necessary to remove the chassis from the cabinet, first remove the back and the batteries, and the four control knobs (recessed grub screws). Now remove the four bolts (with washers and rubber washers) when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

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

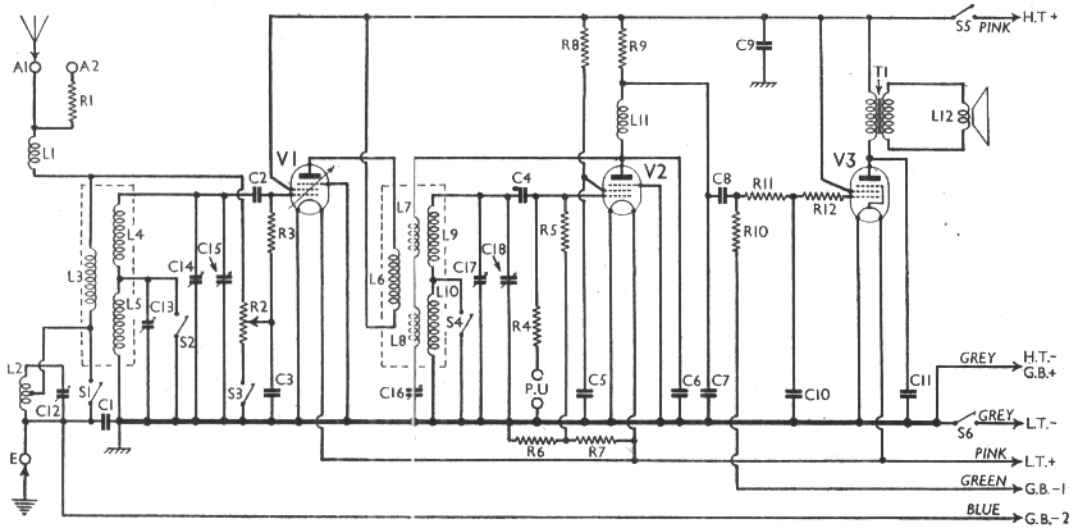
Removing Speaker.—Unsolder the leads and slacken the four clamps (nuts, locknuts and washers) holding it to the sub-baffle.

VALVE ANALYSIS

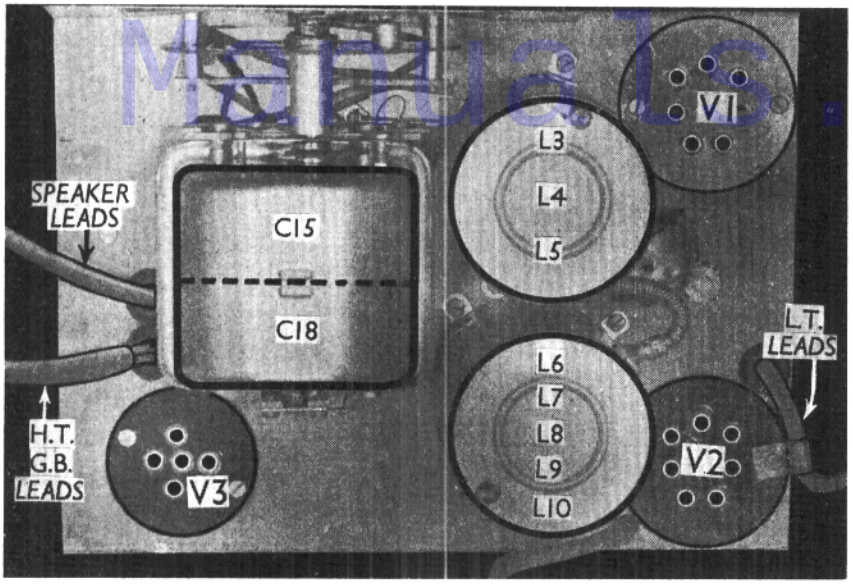
Valve voltages and currents given in the table below are those measured in our receiver when it was operating from a new H.T. battery reading 150 V. The volume control was at maximum, but the reaction control was at minimum. There was no signal input.

VALVE	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 VP2	150	3·2	150	1·0
V2 SP2	70	0·6	40	0·2
V3 PM22A	145	4·0	150	1·1

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



Circuit diagram of the Mullard MB3B battery receiver. L2 and C12 form a Droitwich filter, brought into action by S1 on the Long 1 position of the wave-change switch.



Plan view of the chassis. L1 and L2 are beneath the chassis.

GENERAL NOTES

Switches.—The wave-change and battery switches are in two rotary units beneath the chassis. They are indicated in our under-chassis view, the numbers in circles referring to the two units, and the arrows showing the directions in which they were viewed when drawing up the separate diagrams on this page. The table below shows the switch positions for the four control settings, O indicating open, and C, closed.

SWITCH	Off	M.W.	L.W.	L.W.I.
S1	O	C	C	O
S2	C	C	O	O
S3	O	C	C	C
S4	C	C	O	O
S5	O	C	C	C
S6	O	C	C	C

Coils.—**L1, L2** and **L11** are beneath the chassis, on separate formers. **L3-L5** and **L6-L10** are in two screened units on the chassis deck.

External Speaker.—No provision is made for this; though it would be possible to connect a high resistance type across the primary of **T1.**

Batteries.—No special batteries are recommended, but the set needs a 2 V L.T. cell, and a 135 V+9 V combined H.T. and G.B. battery.

Battery Leads and Voltages.—Grey lead, spade tag, L.T. negative; pink lead, spade tag, L.T. positive 2 V; grey lead, black plug, H.T. negative, G.B. positive; pink lead, black plug, H.T. positive 135 V; green lead, black plug, G.B. negative 1, —6 V; blue lead, black plug, G.B. negative 2, —9 V. When the H.T. voltage has fallen, reduce G.B. negative 1 to —4.5 V.

Condensers C5, C9.—These are two paper units in a cylindrical container beneath the chassis. The tags of each are indicated in our under-chassis view.

Condensers C13, C14, C17.—These are small cylindrical trimmers of the usual Mullard type.

Condenser C12.—This pre-set condenser, adjustable through a hole in the side of the chassis, tunes **L2,** forming a Droitwich rejector.

CIRCUIT ALIGNMENT

Connect up the batteries, and connect a signal generator to the A and E sockets via a dummy aerial. An output meter should be used across **T1** primary.

Note that there are calibration marks at the top edge of the scale plate, under the removable metal cover strip. These marks are at 225, 350, 520, 1,000 and 1,500 m.

Adjust tuning until pointer is at the 225 m. mark. Switch set to M.W., set gain control to give 2 V negative bias on control grid of **V1,** measuring with high resistance voltmeter. Advance reaction (**C16**) about 5 degrees from minimum position.

Set **C14** about 3 millimetres below the insulating rod and **C17** about 2 m.m. above the insulating rod. Trim accurately a signal of 225 m. for maximum output.

Advance reaction until receiver is on verge of oscillation, and re-trim, keeping reaction critical. If two peaks are noticed, retard reaction slightly.

Switch receiver to L.W., and set **C13** about 2 m.m. below insulating rod. Apply a 1,000 m. signal and adjust **C13** for maximum output, rocking the gang meanwhile.

Adjustment of Droitwich rejector.—Set gain control to maximum, switch set to L.W., apply a 1,500 m. signal, and tune. Do not use reaction. Switch set to L.W.1 (rejector position), and adjust **C12** for minimum output.

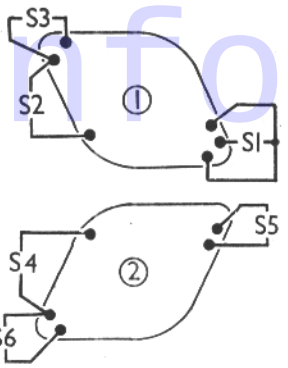
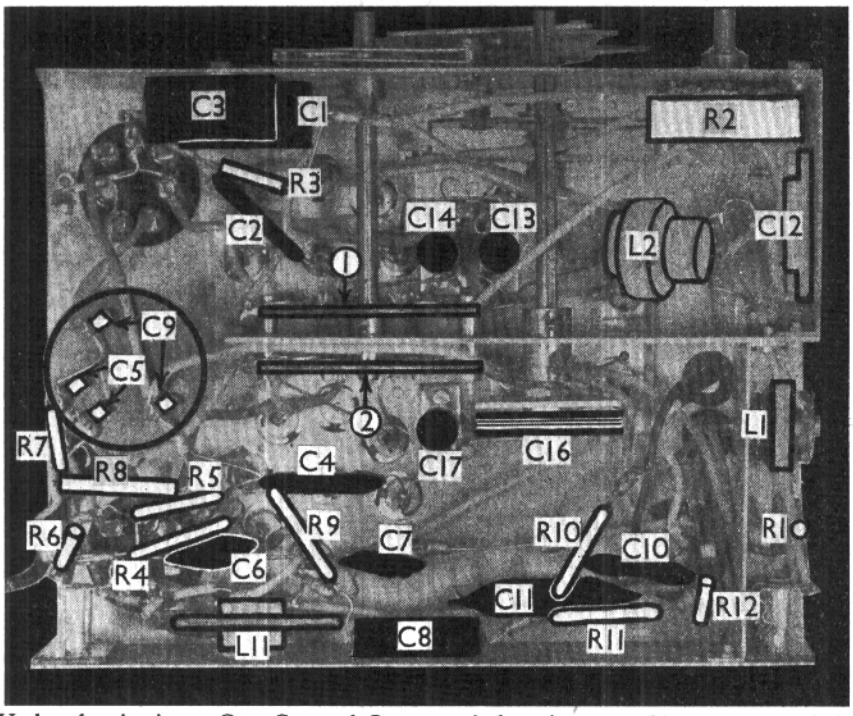


Diagram of the switch units, seen from the underside of the chassis in the directions shown by the arrows in the under-chassis view.



Under-chassis view. C13, C14 and C17 are tubular trimmers. Note the tags of the condensers C5, C9. The numbers in circles indicate the two switch units, and the arrows the directions in which they are viewed in the diagrams above.