'TRADER' SERVICE SHEETS *RECEIVER SERIES (NUMBER TWENTY-FOUR)*

MULLARD MB3

3-VALVE BATTERY RECEIVER

MULLARD'S first completely assembled commercial receiver, the 1934-5 MB3, is a 3-valve battery-operated model of advanced design. It employs a straight circuit comprising three pentodes in the usual H.F., detector and output sequence, and a notable point is that there is no reaction control. By the use of specially designed Litz-wound tuning coils and by most careful ganging at the factory, a high degree of selectivity has been obtained.

CIRCUIT DESCRIPTION

Aerial input (A2) to coupling coil **L2** by way of loading coil **L1,** which has the effect of giving even sensitivity over the whole waveband. Alternative aerial tap (A1) connects small fixed condenser **C1** in series. With large signal inputs this avoids the necessity for excessive G.B. on the H.F. valve, which might cause some loss of quality due to "modulation rise."

Single tuned input circuit to variable-mu pentode H.F. amplifier (**V1, Mullard metallised VP2**). Gain controlled by potentiometer **R2,** which varies G.B. applied through resistance **R1.** As bias is increased, damping is applied to aerial coil by condenser **C3.** This automatically reduces the input signal, and further reduces the possibility of distortion. Chassis of receiver is connected to earth through blocking condenser **C4** in order to prevent short-circuiting of G.B. battery.

Tuned-secondary H.F. transformer coupling to H.F. pentode detector (**V2, Mullard metallised SP2**) functioning on grid leak system with **C5** and **R4.** Primary **L5**; secondary **L6, L7** tuned by **C16.** No reaction. Efficient H.F. filtering by **L8, C6, C7** in anode circuit.

Resistance-capacity coupling to output pentode (**V3, Mullard PM22A**). Special R.C. filter **R7, R8, C10** in grid circuit. Tone correction by R.C. filter **R10, C11** in anode circuit across primary of speaker input transformer **T1.**

DISMANTLING THE SET

Removing Chassis.—Remove two control knobs. These are held in place by grub screws. *When replacing,* make sure that knob with white spot is on left-hand spindle. Remove back of cabinet (six swivel clips), accumulator, and H.T. battery. Remove four bolts from underside of cabinet which hold chassis in position. *When reassembling,* do not forget to replace two rubber bushes and a metal distance-piece with each bolt. The chassis can be withdrawn far enough for most servicing requirements without detaching speaker leads. These are threaded under wooden distance pieces inside cabinet, held by two metal clips under speaker, and soldered to the two outer tags on the input transformer. For some repairs it may be found necessary to remove one or both of the metal strips across the bottom of the chassis. These are each held in position by four small screws.

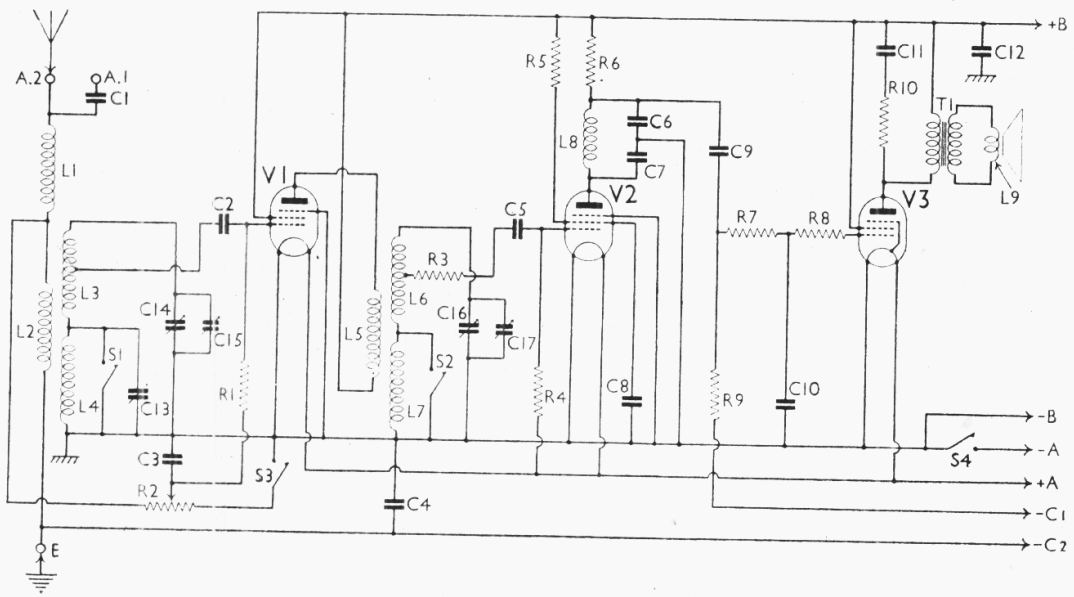
Removing Speaker.—The speaker can be removed without disturbing the chassis. It is held in position on the sub-baffle board by three special metal clips with lock-nutted bolts, the heads of which are keyed. The sub-baffle, carrying the speaker fret silk backing, is attached to the cabinet by seven wood-screws. *When replacing,* the transformer should be at the bottom.

COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	V1 grid resistance	5,000,000
R2	Volume control pot.	10,000
R3	V2 grid circuit stabiliser	100
R4	V2 grid leak	2,000,000
R5	V2 S.G. H.T. feed	160,000
R6	V2 anode resistance	100,000
R7	Parts of V3 grid H.F. filter	100,000
R8	Parts of V3 grid H.F. filter	100,000
R9	V3 grid resistance	2,000,000
R10	Part of V3 tone comp. filter	10,000

	Condensers	Values (μF)
C1	Aerial series condenser	0·000025
C2	V1 grid condenser	0·0001
C3	V1 cont. grid decoupling	0·1
C4	Earth blocking condenser	0·1
C5	V2 grid condenser	0·0001
C6	V2 anode H.F. by-passes	0·0002
C7	V2 anode H.F. by-passes	0·0005
C8	V2 S.G. by-pass	0·5
C9	L.F. coupling to V3	0·0016
C10	Part of V3 grid H.F. filter	0·00005
C11	Part of V3 tone comp. filter	0·002
C12	H.T. reservoir	2·0
C13	Aerial L.W. trimmmer, pre-set	0·000027
C14	Aerial tuning	0·00043
C15	Aerial main trimmer, pre-set	0·000027
C16	H.F. trans. sec. tuning	0·00043
C17	H.F. trans. sec. trimmer, pre-set	0·000027

(*Continued overleaf*)



The circuit diagram of the Mullard MB3. Note that the chassis is not at earth potential. R7, R8 and C10 form a special H.F. filter. L1 is an aerial loading coil.

MULLARD MB3 (contd.)

	Other Components	Values (ohms)
L1	Aerial loading coil	4·0
L2	Aerial coupling coil	2·0
L3, L4	Aerial tuning coils	3·25, 27·0
L5	H.F. transformer primary	65·0
L6, L7	H.F. transformer secondary	3·25, 29·0
L8	V2 anode H.F. choke	380·0
L9	Speaker speech coil	3·0
T1	Speaker input trans Pri. / Sec.	900·0, 0·25
S1-S2	Waveband switches	—
S3	G.B. pot. switch	—
S4	Filament switch	—

VALVE ANALYSIS

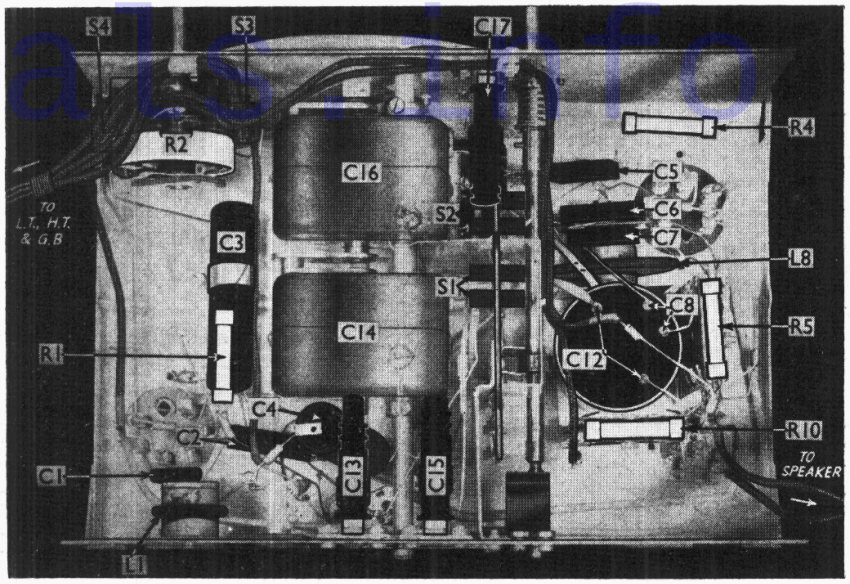
All values given in the table below were obtained from an average receiver with a new battery in use and the correct H.T. and G.B. voltages applied. The volume control was at maximum and no aerial or earth were connected. Voltages were measured on the 1,200 V scale of an Avometer with the chassis as negative, and the currents of **V1** and **V2** were taken with a milliammeter in the low H.F. potential ends of the circuits.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 VP2	135	2·75	135	1·2
V2 SP2	35	0·9	65	0·3
V3 PM22A	130	3·5	135	0·75

GENERAL NOTES

Coils and Tuning Condensers.—The two screened coil units seen in the plan view of the chassis, comprising **L2, L3, L4** and **L5, L6, L7,** are sealed, and should not be opened. The tuning condensers **C14** and **C16** are also completely screened, while the trimmers **C13, C15** and **C17** are of a special type which are sealed at the works.

It is not recommended that any of the tuned circuits should be adjusted by the service man. They are accurately ganged at the works, and, apart from complete breakdown, will not be likely to get out of adjustment in use.



Under-chassis view. The components vertically below R5 and R10 are clearly shown in the supplementary illustration on the left below. C8 and C12 are inside a cylindrical shielded unit. S3 and S4 are ganged with R2. S1 and S2 are operated by a push-pull action of the tuning control spindle.

Switches.—**S1** and **S2** are the ganged waveband switches, operated by a push-pull action of the tuning control spindle. The mechanism of this is robust, and is not likely to give trouble. The switches should be *closed* on the M.W. band (spindle pushed in) and *open* on the L.W. band (spindle pulled out).

S3 and **S4** are respectively the G.B. potentiometer switch and the filament switch. They are mounted in conjunction with **R2,** and are operated by the same spindle. To effect any adjustment of these, it will probably be necessary to take off the complete unit.

Condenser C1.—This is in series with the most selective (**A1**) aerial socket. The alternative values given for this by the makers are .000025 μF or .00001 μF. Our sample had the former value.

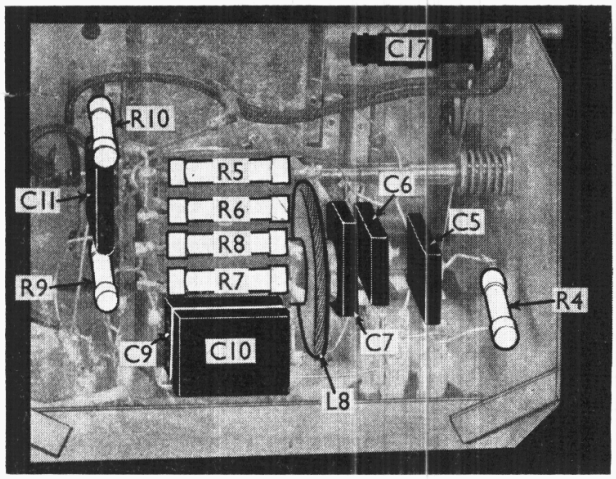
Valves V1 and V2.—These are battery H.F. pentodes, with 7-pin bases. The connections were given in Service Sheet No. 11, page 260, right-hand column.

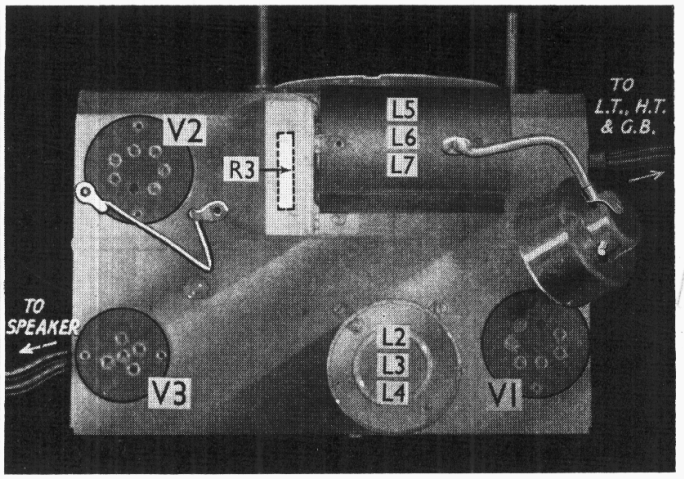
Battery Voltages and Connections.—A 2 V Exide L.T. cell is employed. Lead marked +**A** is L.T. positive, and —**A** is L.T. negative.

A special Siemens 135 V H.T. plus 9 V G.B. battery is supplied. The connections are: +**B** to socket marked +H.T.135; —**B** to socket marked —H.T.+G.B.; —**C1** to socket —6 on G.B. section of battery; —**C2** to socket —9.

As the battery voltage drops, it may be advisable to transfer —**C1** to —4.5.

V1 Cap.—The screening cap carrying the top connection of **V1** is of a special type, and care should be taken to see that a proper connection is made by first depressing the white button to open the spring contact, which clips on to the valve terminal shank.





Left : End view of chassis looking at right hand side of illustration above. This shows the components mounted on the small vertical panels which are not seen in the under-chassis view. *Right :* Plan view of the chassis. Note the shielded coil units, and the resistance R3 which is inside a small screening box.