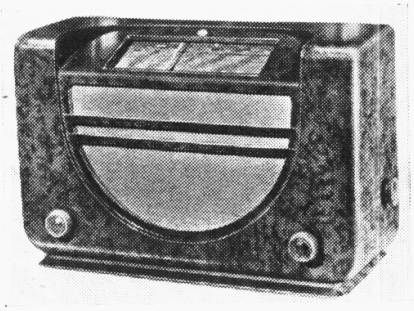
'TRADER' SERVICE SHEET 349

MULLARD MB5

2-BAND BATTERY RECEIVER



INCORPORATING a 3-valve chassis for battery operation, the Mullard MB5 is a 2-band TRF receiver with a third position on the wave-change switch for bringing in a Droitwich rejector. Two alternative aerial sockets are provided, one being for use when the set is installed near a powerful station.

There is a second model of this set called the MB5E and designed for use in Southern Ireland, this differing only in that the second position of the wave-change switch connects a filter for Athlone (see under "Switches"). This *Service Sheet*, however, was prepared on an MB5.

CIRCUIT DESCRIPTION

Two alternative aerial input sockets **A1**, via series condenser **C1**, and **A2**, via series resistance **R1**, to coupling coils **L2** (MW), **L3** (LW), and single-tuned circuits comprising **L4** (MW), plus **L5** (LW), tuned by **C23**. Droitwich rejector circuit **L1, C4, C21** is inserted in the aerial lead on a third position of the wave-change switch, when **S1** opens.

First valve (**V1, Mullard metallised VP2B**) is a variable-mu hexode, with second and fourth grids strapped, operating as RF amplifier with gain control by potentiometer **R2** connected across the aerial circuit so that as the gain is reduced the aerial is progressively damped.

Tuned anode coupling by **L8, L9, C26** between **V1** and RF pentode valve (**V2, Mullard metallised SP2**) operating as detector on grid leak system with **C12, R9.** Reaction is applied from anode by coils **L6, L7** and controlled by variable condenser **C24.** RF filtering in anode circuit by **L10, C15, C16.**

Resistance capacity coupling by **R11, C17, R12,** via RF stopper **R13,** between **V2** and pentode output valve (**V3, Mullard PM22D**). Fixed tone correction in anode circuit by **C18.**

GB potentials for **V1** and **V3** are obtained automatically from drop along resistances **R14, R15** forming a potential divider in the negative HT lead to chassis.

RF filtering in HT circuit by **C10,** while **C19** acts as reservoir condenser.

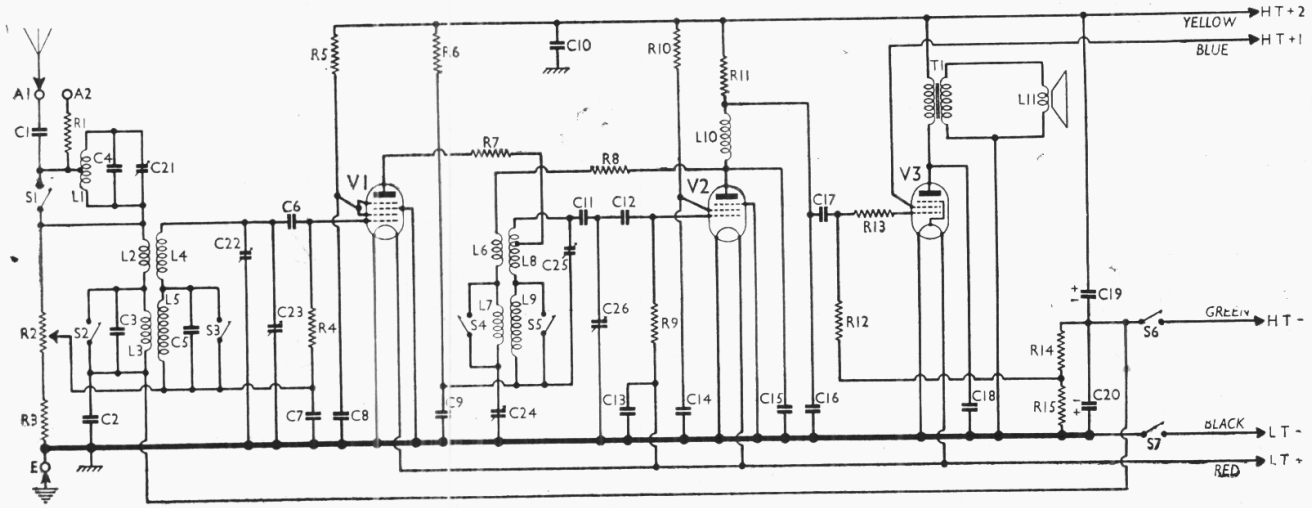
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	A2 series resistance	250,000
R2	Aerial pot. and V1 gain control	50,000
R3	V1 fixed GB	8,000
R4	V1 CG resistance	1,000,000
R5	V1 SG HT feed	100,000
R6	V1 anode HT feed	10,000
R7	V1 anode stabiliser	200
R8	V2 reaction stabiliser	200
R9	V2 grid leak	2,000,000
R10	V2 SG HT feed	250,000
R11	V2 anode load resistance	100,000
R12	V3 CG resistance	500,000
R13	V3 CG RF stopper	200,000
R14, R15	Automatic GB potential divider resistances	1,000 320

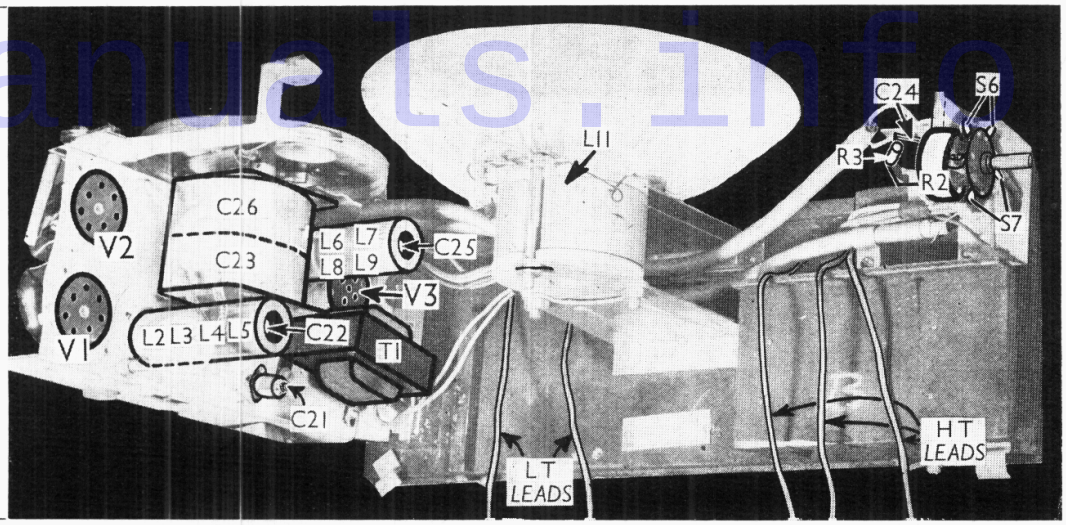
	CONDENSERS	Values (μF)
C1	A1 series condenser	0·002
C2	Auto GB RF by-pass	0·1
C3	Aerial LW coupling shunt	0·0001
C4	Droitwich rejector fixed trimmer	0·000106
C5	Aerial circuit LW trimmer	0·00002
C6	V1 CG condenser	0·0001
C7	V1 CG decoupling	0·1
C8	V1 SG decoupling	0·1
C9	V1 anode decoupling	0·1
C10	HT circuit RF by-pass	0·05
C11	HT isolating condenser	0·05
C12	V2 CG condenser	0·00002
C13	V2 CG and LT RF by-pass	0·1
C14	V2 SG decoupling	0·1
C15, C16	V2 anode circuit RF by-pass condensers	0·0001 0·00025
C17	V2 to V3 AF coupling	0·01
C18	Fixed tone corrector	0·002
C19*	HT reservoir condenser	8·0
C20*	Auto GB by-pass	50·0
C21‡	Droitwich rejector tuning	0·00003
C22‡	Aerial circuit MW trimmer	0·00003
C23†	Aerial circuit tuning	0·00049
C24†	Reaction control	0·0002
C25‡	V1 anode MW trimmer	0·00003
C26†	V1 anode circuit tuning	0·00049

*Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Droitwich rejector coil	38·0
L2	Aerial MW coupling coil	26·0
L3	Aerial LW coupling coil	100·0
L4	Aerial MW tuning coil	4·5
L5	Aerial LW tuning coil	40·0
L6, L7	Reaction coils	6·0 31·0
L8	V1 anode MW tuning coil (total)	4·5
L9	V1 anode LW tuning coil	40·0
L10	V2 anode RF choke	340·0
L11	Speaker speech coil	4·0
T1	Output trans. Pri. Sec.	1,500·0 0·3
S1	Droitwich rejector switch	—
S2-S5	Waveband switches	—
S6	HT circuit switch ganged	—
S7	LT circuit switch R2	—



Circuit diagram of the Mullard MB5 battery receiver. The MB5E has an identical circuit, but **L1, C4, C21** then becomes an Athlone and not a Droitwich, rejector.



General view of the complete assembly removed from its cabinet. Components on the deck of the main chassis are seen on the left. On the right are the gain control and battery switches, the reaction control and **R3.**

DISMANTLING THE SET

NOTE.—In the following paragraphs the term "cabinet" is used to indicate the moulded part and "baseboard" to denote the wooden bottom.

Removing Chassis.—The chassis and speaker can be removed together by removing the baseboard from the cabinet, to do which first remove the two knobs at the front of the cabinet (two recessed grub screws in each, accessible through holes in the base of the cabinet) and the two knobs at the sides (two recessed grub screws in each, accessible from the inside of the cabinet).

Next slacken the two clamps holding the speaker to the sub-baffle, free the leads to the volume control from the cleat on the sub-baffle, and free the chassis bracket from the sub-baffle (round-head wood screw with washer). Unsolder the earthing lead from the left of the chassis to the screen inside the cabinet.

Now remove the two screws (with nuts and washers) holding the front of the baseboard to the cabinet, slacken the two clamps holding the back of the baseboard to the cabinet, and remove the screw (with washer) holding the chassis to the back of the cabinet.

Release the pointer from the drive wire (screw with washer), slacken the pulley on the right (two screws with washers) and release the wire from the pulleys, clipping the wire to the drive drum with crocodile clips so that it does not become displaced. The baseboard can now be withdrawn from the cabinet, when access can be gained to all the components.

When replacing, do not forget to bring out to the back the earthing lead from the screen on the left of the cabinet.

Removing Speaker.—The speaker can be removed without first withdrawing the chassis by unsoldering the leads and removing the four screws (with washers) holding the speaker supports to the baseboard. *When replacing*, note that the longer lead goes to the right-hand tag and that the other goes to the remaining two tags.

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 2) are those measured in our receiver when it was operating with an HT battery reading 120 V, on load. The receiver was tuned to the lowest wavelength on the medium band, the volume control was at maximum and the reaction control at minimum. There was no signal input.

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

In our chassis **V3** was grade "A."

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP2B	90	1·8	48	0·6
V2 SP2	40	0·6	45	0·2
V3 PM22D	104	3·4	110	0·8

GENERAL NOTES

Switches.—**S1** is the Droitwich rejector switch, and **S2-S5** the waveband switches, ganged in two rotary units beneath the chassis. These are indicated in our underchassis view, and shown in detail in the diagrams on page IV, where unit 1 is that nearest to the switch knob, and unit 2 that nearest to the chassis.

The table (page IV) gives the switch positions for the three control settings in the case of the MB5 model, starting from fully anti-clockwise. A dash indicates open, and **C,** closed.

In the MB5E, the first position (fully anti-clockwise) is for the MW band, the second is for the MW band with an Athlone rejector, and the third for the LW band. **S1** thus closes in the first and third positions, and opens in the second, and the other switches are transposed to the different waveband positions of the control.

S6, S7 are the battery circuit switches, ganged with the gain control **R2,** and shown in our general view of the receiver assembly.

Coils.—**L1** is beneath the chassis. **L2-L5** and **L6-L9** are in two screened units above the chassis, each containing one trimmer at the tops of the units. **L10** is in a large flat unit, beneath the chassis.

Trimmer C21.—The rejector trimmer **C21** is mounted on the chassis deck.

External Speaker.—No provision is made for this, but a low resistance (4O)

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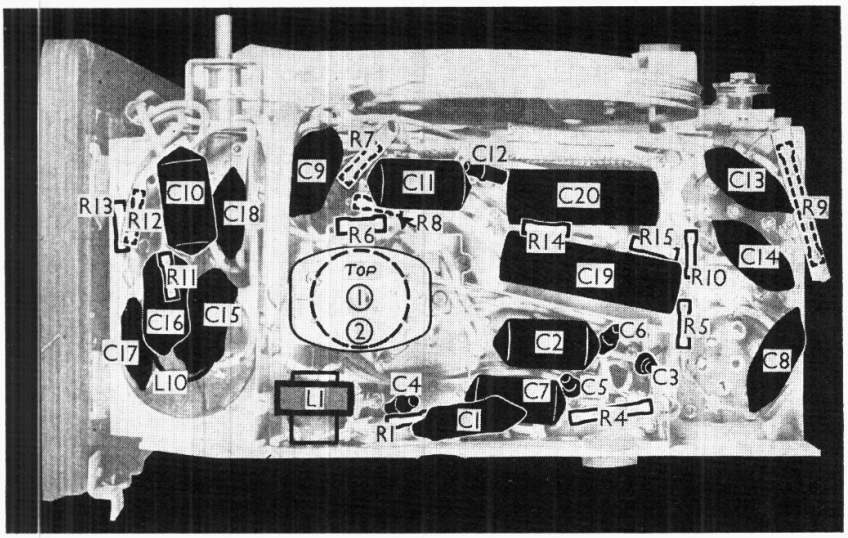

Underneath view of the main chassis. A number of small fixed condensers can be seen.

MAINTENANCE PROBLEMS

Contributed by Service Engineers

Reversed PU Leads

I RECENTLY unpacked a Bush SUG52, and on connecting up, the set howled violently. I first tried new valves, but to no purpose, and as I was preparing to take the chassis out I happened to pull the pick-up leads out of their sockets, (these are short black and red leads from the sockets on the back of the cabinet), and the set then behaved normally.

On closer examination, I found that the leads had been reversed. The black lead is earthed outside the chassis to the Ext. LS sockets, and should be uppermost. The reversal of the leads shorted the volume control, and caused the set to howl.—B. BRITTAIN, BIRMINGHAM.

Effect of Bad Contact

AN intermittent drop in volume was complained of in a Pye SE/AC console receiver, which was confirmed after giving the set a fairly lengthy test.

Unfortunately the fault cleared practically straight away, and the usual procedure of carefully prodding every likely component was resorted to. This produced negative results, so all trimmers were carefully examined, when it was found that, upon adjusting one of the trimmers associated with the RF stage, signals suddenly dropped to a low level.

The trimmer was found to be in perfect order, but slight pressure on one of the connecting wires revealed the fault. Two soldering tags were clamped by a nut to the holding down screw of the trimmer from which the connections were taken, and the faces of the soldering tags, which should have made perfect contact with one another, were badly oxidised. The two tags were removed and a single double-ended type of tag fitted, which satisfactorily cleared the fault and prevented any future repetition of the trouble.—R. A. COATES, WHITBY.

Pye T61 Improvement

HAVING had trouble with the tuning device of this receiver (which consists of the drum drive spindle, connected at right angles to the tuning knob spindle by means of a flexible drive cable), which owing to continual twisting broke, we got over the trouble by extending the tuning spindle, and the drum drive spindle, with Meccano rods, and fitting gears Nos. 26 and 27 at the end of these extensions. Since this we have had no further trouble, and the set has been working O.K. for the last four months.—D. HILL, BRIGHTON.

AC/DC Heater Circuit Fault

A PORTADYNE U58 model was found to suffer from a curious fault. The customer complained that the set frequently faded right out and then returned to normal. Testing with the chassis in the cabinet proved the trouble to be in the double-diode triode circuit.

This valve was removed for substitution, when surprisingly the other heaters remained alight—the circuit being a normal series one, they should have gone out. Rocking the preceding valve then opened the heater circuit normally.

Investigation showed that a heater lead between the two valves, drawn too tight, had partly shorted through on the other heater leg of the double-diode triode so that intermittently this valve's heater supply was cut off, the others remaining normal except, of course, for some increase of potential. In this way the fading was explained, and altering the position of this lead cured the whole trouble.—S. E. PRINCE, WORTHING.

Effect of Faulty By-Pass Condenser

A CUSTOMER called a few weeks ago and complained that he was unable to receive any signals on the short wave band above 25 metres. The set, which was an Ultra 115, was only three weeks old.

I gave the set a general overhaul, particularly to see if the aerial input was at fault, but this was found to be O.K. I also inspected the tuning condenser when tuned above 25 metres, but this also was found to be in order.

On moving the chassis, I noticed pieces of sealing compound in the bottom of the cabinet, and on closer inspection, it was found that there was no sealing compound on the trimmer of the oscillator unit at all.

The trouble was eventually found to be due to a 0·5 μF cathode by-pass condenser which on test proved to be faulty, and had been getting very hot, so much so as to melt the sealing compound on the oscillator trimmer, and to cause it to vary in its capacity so that the band above 25 metres was cut completely out.

A new by-pass condenser was fitted, the trimmer re-aligned, and on test the set was found to be up to standard.—C. CLAYTON, HALIFAX.

Fault Due to Heat

I HAD an H.M.V. 655 armchair radio for repair with the complaint that after about two hours' use the receiver ceased to function. The wooden back was removed and the receiver left on test. It functioned perfectly for five days at eight hours a day.

At the end of this period the back was replaced for the set to be returned to customer. A test with the back on revealed sure enough that the set ceased to work after a time. By quickly removing the back and testing by means of the finger on grids of valves, the fault proved to be in the second IF stage.

The chassis was removed and components were tested in this circuit, and proved to be apparently O.K.

The by-pass tubular condensers were then tested on a capacity bridge with a 60 W lamp near it, and after about five minutes the 0·1 μF decoupling condenser on the IF screen showed an O/C.

On examination of the condenser it was discovered that the wire end of the condenser did not make contact when the temperature reached a certain value.—D. G. A. ROBERTS, JERSEY.

MULLARD MB5

Continued

type could be connected across the two outer tags on the internal speaker connection panel.

Trimmer C5.—Tnis is shown as a variable wire trimmer in the makers' information, but in our chassis is a 20$\mu\mu$F fixed trimmer.

Batteries.—LT, 2V accumulator cell; HT, 120 V dry battery.

Battery Leads and Voltages.—Lead with black spade tag, LT negative; red spade tag, LT positive 2 V; green plug, HT negative; yellow plug, HT positive 2, +120 V; blue plug, HT positive 1, according to letter coding of **V3**; A, +120V (plug into side of yellow plug); B, +110 V.

CIRCUIT ALIGNMENT

Fit the usual Mullard 15 degree jig to the gang condenser, and turn gang until it presses against the jig. Connect signal generator to **A1** and **E** sockets, switch set to MW, and turn reaction control to minimum and gain control to maximum. Feed in a 1,430 KC/S (210 m) signal, and adjust **C22** and **C25** for maximum output.

Switch set to LW (Droitwich rejector position), feed in a 200 KC/S (1,500 m) signal, and adjust **C21** for *minimum* output.

SWITCH TABLE

Switch	MW	LW	LW(D)*
S1	C	C	—
S2	C	—	—
S3	C	—	—
S4	C	—	—
S5	C	—	—

* LW plus Droitwich filter.

SWITCH DIAGRAMS

Switch diagrams, as seen from the underside of the chassis. Unit 1 is then on top, with unit 2 beneath it.