NUMBER SIXTY-THREE

'TRADER' SERVICE SHEETS

MULLARD MA3

3-VALVE (PLUS RECTIFIER) A.C. RECEIVER

THE Mullard model MA3 is a 3-valve (plus valve rectifier) "straight" A.C. receiver. In its receiving circui it uses pentodes throughout, the H.F. valve being of the variable-mu type. Some models (those intended for use in the Droitwich "swamp" area) are fitted with a special Droitwich filter.

CIRCUIT DESCRIPTION

Three alternative aerial connections (**A1** direct, **A2** via fixed condenser **C1**, and **D** via Droitwich wavetrap **L1, C18**) to coupling coils **L2, L3.** Single tuned circuit **L4, L5, C21** precedes variable-mu pentode H.F. amplifier (**V1, Mullard metallised VP4A**). Gain control by variable potentiometer **R5** in cathode circuit which also acts as aerial-earth shunt resistance.

Tuned-secondary transformer coupling by **L6, L7, L8, L9** and **C23** to H.F. pentode detector (**V2, Mullard metallised SP4**) which operates on grid leak system with **C6** and **R7, R8.** A simple form of automatic volume control is obtained by tapping off part of the D.C. potential developed across the grid leak, and feeding it back through decoupling circuit **R9, C4** as G.B. to H.F. amplifier. Provision for connection of gramophone pick-up in **V2** grid circuit. No reaction. H.F. filtering by **L10, C10,** and **C11.**

Resistance-capacity coupling by **R11, C12** and **R12** to output pentode (**V3, Mullard Pen 4VB**). H.F. filtering in grid circuit by **R13, C13, R14.** Tone compensation in anode circuit by impedance-limiting filter **R15, C14.** Provision for connection of high resistance external speaker across primary of speaker input transformer **T1.**

H.T. current is supplied by full-wave rectifying valve (**V4, Mullard IW3**). Smoothing by speaker field winding **L13** and electrolytic condensers **C16, C17.**

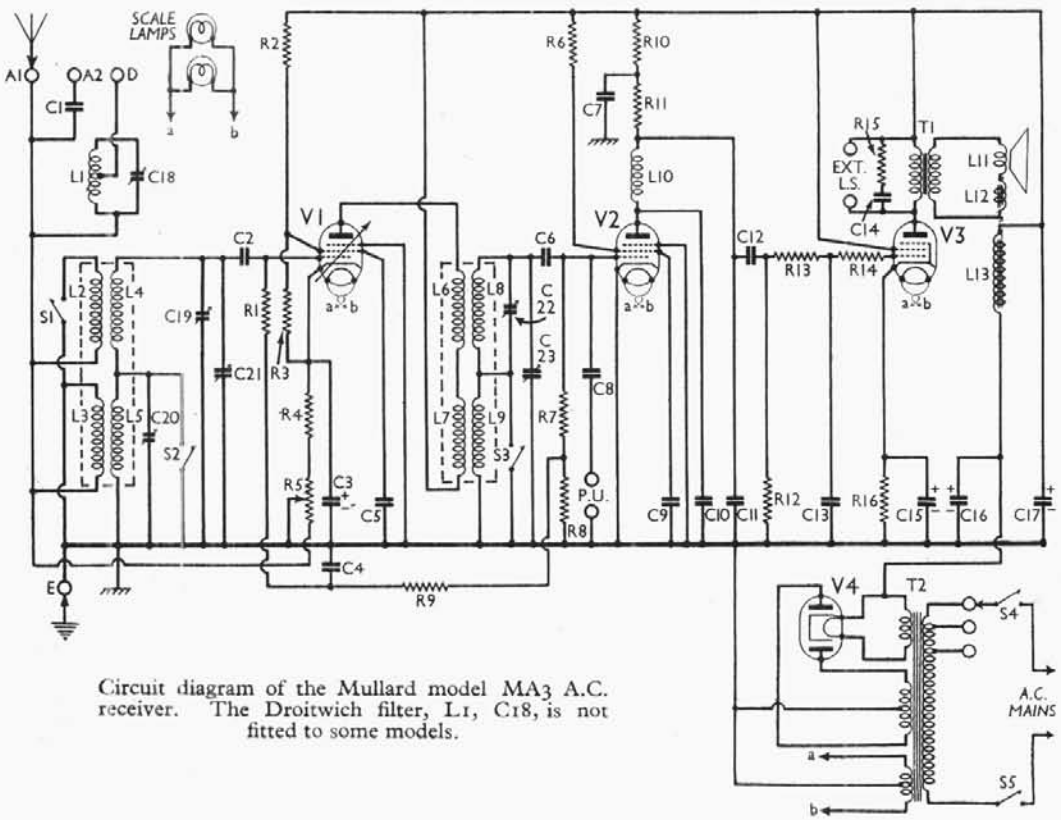
COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	V1 grid resistance	1,000,000
R2	V1 S.G. pot. divider	50,000
R3	V1 S.G. pot. divider	64,000
R4	V1 fixed G.B. resistance	250
R5	V1 gain control	10,000
R6	V2 S.G. H.T. feed	1,000,000
R7	V2 grid resistances	50,000
R8	V2 grid resistances	1,000,000
R9	A.V.C. circuit decoupling	2,000,000
R10	V2 anode decoupling	25,000
R11	V2 anode load	100,000
R12	V3 grid resistance	500,000
R13	V3 grid H.F. stoppers	125,000
R14	V3 grid H.F. stoppers	160,000
R15	Part of tone comp. circuit	5,000
R16	V3 auto. G.B. resistance	160

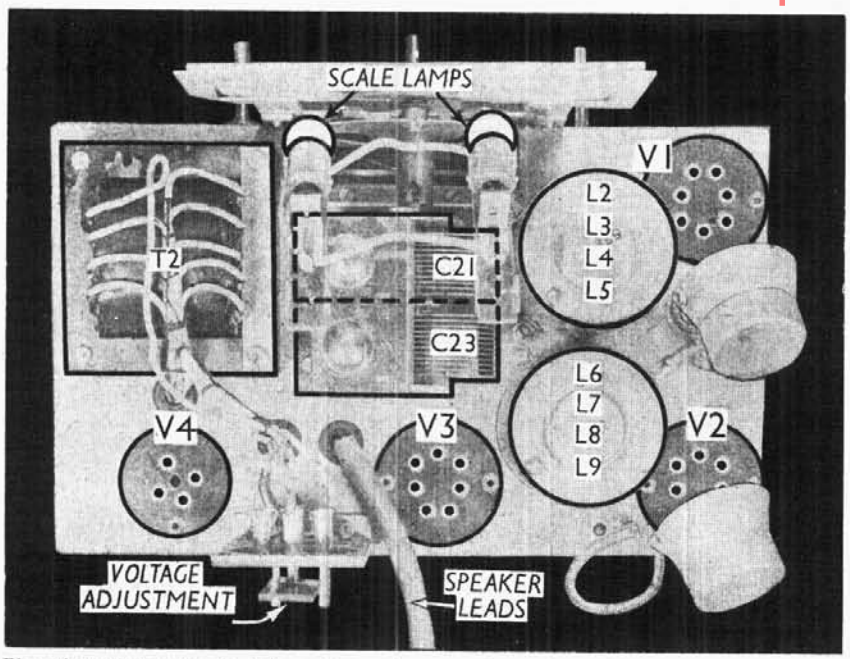
	Condensers	Values (μF)
C1	Aerial series condenser	0·00001
C2	V1 grid condenser	0·000025
C3*	V1 cathode by-pass	12·0
C4	A.V.C. circuit decoupling	0·1
C5	V1 S.G. by-pass	0·1
C6	V2 grid condenser	0·000013
C7	V2 anode decoupling	0·5
C8	Gram. pick-up coupling	0·01
C9	V2 S.G. by-pass	0·1
C10	V2 anode H.F. by-passes	0·0001
C11	V2 anode H.F. by-passes	0·0001
C12	L.F. coupling to V3	0·01
C13	V3 grid H.F. by-pass	0·00005
C14	Part of tone comp. circuit	0·002
C15*	V3 cathode by-pass	50·0
C16*	H.T. smoothing	8·0
C17*	H.T. smoothing	8·0
C18‡	Droitwich wave trap tuning	0·00016
C19‡	Aerial circuit M.W. trimmer	0·000027
C20‡	Aerial circuit L.W. trimmer	0·000027
C21	Aerial circuit tuning	0·00047
C22‡	H.F. trans. M.W. trimmer	0·000027
C23	H.F. trans. sec. tuning	0·00047

* Electrolytic. ‡ Pre-set.

	Other Components	Values (ohms)
L1	Droitwich wavetrap coil	39·0
L2	Aerial coupling coils	14·0
L3	Aerial coupling coils	110·0
L4	Aerial tuning coils	2·5
L5	Aerial tuning coils	29·0
L6	H.F. transformer primary	11·0
L7	H.F. transformer primary	57·0
L8	H.F. transformer secondary	2·5
L9	H.F. transformer secondary	29·0
L10	V2 anode H.F. choke	390·0
L11	Speaker speech coil	1·2
L12	Hum neutralising coil	0·15
L13	Speaker field winding	1,650·0
T1	Speaker input trans. Pri.	425·0
T1	Speaker input trans. Sec.	0·15
T2	Mains trans. Pri. total	30·0
T2	Mains trans. Heater sec.	0·05
T2	Mains trans. Rect. heat. sec.	0·1
T2	Mains trans. H.T. sec.	360·0
S1-S3	Waveband switches	—
S4, S5	Mains switches	—



Circuit diagram of the Mullard model MA3 A.C. receiver. The Droitwich filter, L1, C18, is not fitted to some models.



Plan view of the chassis. The voltage adjustment is performed by a special plug-socket device. V1, V2 and V3 are all pentodes.

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and can be removed by withdrawing four round-head wood screws. Access can then be gained to most of the components concerned in normal repairs.

Removing Chassis.—To remove the chassis, remove the three control knobs (recessed grub screws), back and detachable bottom. Under this last will be found the four bolts holding the chassis, each with a rubber and metal washer. These should be removed, as should the Droitwich filter on the left-hand side of the cabinet (if fitted). Chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

Contact between the chassis and the screens on the sides and bottom of the cabinet is made by three metal strips, two of which are fitted with rubber washers. *When replacing*, these should be placed in the fixing holes at the back of the cabinet, one with a rubber washer on the right, and the other two on the left.

If it is desired to remove the chassis entirely, unsolder the leads on the speaker input transformer. When replacing, the leads should be connected as follow, numbering the tags from top to bottom with the transformer on the left:—1 and 2 joined together, yellow with red end; 3, blank; 4, screened yellow lead; 5, yellow; earth tag, tinned copper.

Removing Speaker.—If it should be necessary to remove the speaker, this can be done by slackening the four clamps which hold it to the sub-baffle (each is secured by a nut and lock-nut).

Since removing the back disconnects the mains from the chassis, it will be necessary to remove the plug from the back, if it is desired to operate the chassis. Alternatively, a new lead may be prepared with a standard 5A socket. Although the pins are not standard 5A size, they will make quite a good contact with a 5A socket.

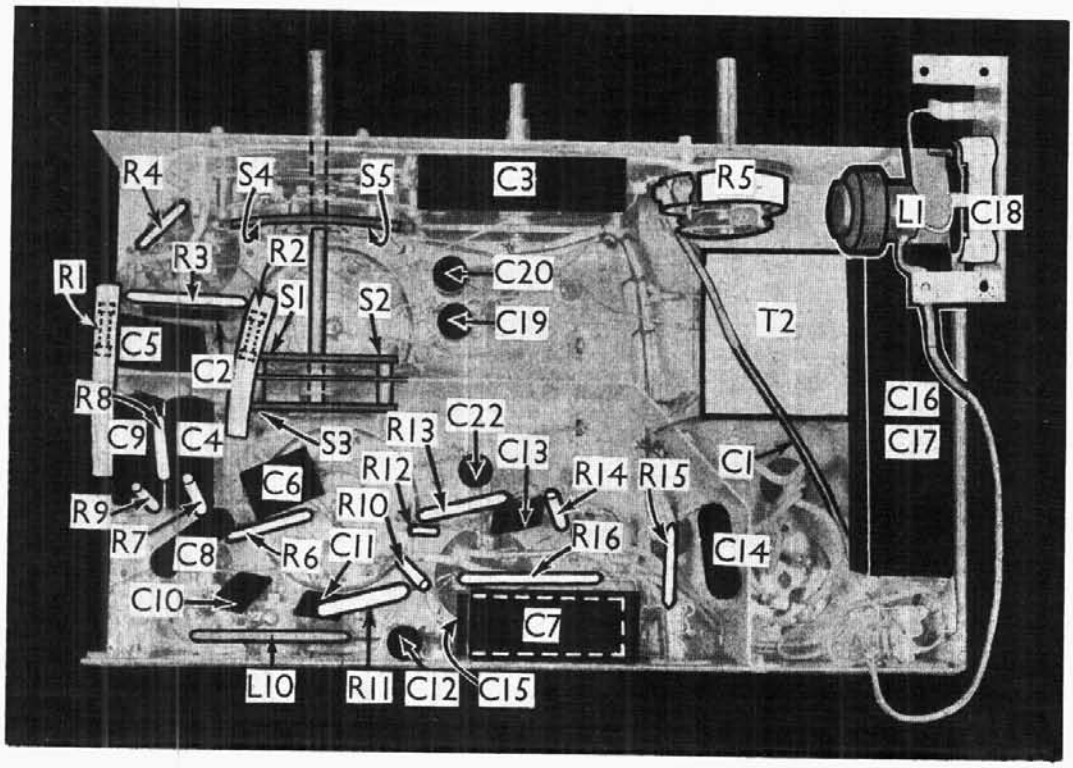
Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 VP4A	265	3·4	105	1·45
V2 SP4	112	0·65	25	0·3
V3 Pen 4VB	250	31·35	265	3·75
V4 IW3	225†	—	—	—

† Each anode, A.C.

VALVE ANALYSIS

Valve voltages and currents given in the table above were measured with no signal input and the volume control in its "maximum" position, the receiver being operated on A.C. mains of 230 V.

(*Continued overleaf*)



Under-chassis view. The positions of the switches S1-S5 are indicated roughly by arrows. R1 and R2 are inside lengths of empire tubing. The Droitwich filter is shown inset at the top right-hand corner. C15 is a tubular condenser beneath C7, while C1 is a small fixed condenser, formed of metallic screening material wound over an insulated wire.