

V.U. 7.

A VALVE FOR EVERY WIRELESS CIRCUIT

**Mullard**  
LOW TEMPERATURE FILAMENT  
LOW POWER RECTIFYING VALVE  
TYPE DU/10.



Max. Overall Length  
135 mm. or 5½ ins.  
CODE WYSSA.

Max. Overall Diam.  
53 mm. or 2½ ins.  
PRICE 15s.

The cap on this valve has three pins only, corresponding to the filament and anode pins of the standard cap. There is no grid.

Filament Voltage	..	..	..	4.0 volts.
Filament Current	..	..	..	1.1 amps (approx.).
Anode Impedance	..	..	..	300 ohms (approx.).

The MULLARD WIRELESS SERVICE Co., Ltd.,  
NIGHTINGALE WORKS, NIGHTINGALE LANE, BALHAM, S.W. 12  
Telephone: BATTERSEA 3M8 (6 lines)      Telegrams: EMVALCO, WANDSLOM, LONDON

MULLARD - THE - MASTER - VALVE

## A VALVE FOR EVERY WIRELESS CIRCUIT

### 1. GENERAL.

The D.U.10 is a half-wave rectifier suitable for :—

- (1) Working an H.T. Battery Eliminator.
- (2) Charging an H.T. Accumulator Battery.

#### CHARACTERISTIC CURVE.



### 2. FILAMENT SUPPLY TO D.U.10 VALVES.

As this valve will usually be used in conjunction with the house lighting supply it is recommended that a transformer be used to supply the filament heating power. Any control resistance used should be capable of carrying 1.1 amperes per valve continuously and should be fixed in value. A variable resistance is a source of danger to the valve. **The filament voltage should be 4 volts ; higher or lower voltages will shorten the life of the valve.** Owing to the difficulty of measuring accurately low A.C. voltages, it is recommended that the transformer be made to give exactly 4.0 volts at full load (*i.e.*, 1.1 amps per D.U.10 valve) and that no control resistance be used.

MULLARD - THE - MASTER - VALVE

## A VALVE FOR EVERY WIRELESS CIRCUIT

### 3. NOTES FOR CONSTRUCTORS.

The D.U. 10 may be used with or without an H.T. Transformer. In general, the use of a transformer is to be recommended as it enables a larger output to be obtained and the difficulty of arranging an "earth" on the set is overcome. When the A.C. mains are used direct on the valve it should be remembered that the apparatus is deriving its energy from a power station and therefore must not be directly earthed and must be adequately protected by fuses. A wireless set connected to such rectifying apparatus should have a 0.1 (approx.) microfarad condenser inserted in the earth connection.

### 4. USE OF D.U.10 VALVES FOR BATTERY CHARGING.

(a) *Half-Wave Rectification as in Fig. 1.*

The following circuit is recommended for charging H.T. Accumulators, the positive terminal being connected to B, the negative to A.



FIG. 1.

R is a safety limiting resistance which should always be inserted in the circuit. Its value depends upon the A.C. supply voltage, and the accumulator battery voltage. Its value in ohms is given in the following Table I, the D.U.10 being run at the filament voltage of 4.0 volts.

TABLE I.

A.C. Mains Voltage (R.M.S.)	Accumulator Voltage.						
	160	140	120	100	80	60	40
240	600	700	800	900	1000	1100	1200
200	300	400	500	600	700	800	900
160	—	100	200	300	400	500	600
120	—	—	—	—	100	200	300

MULLARD - THE - MASTER - VALVE

## A VALVE FOR EVERY WIRELESS CIRCUIT

### (b) Half-wave Rectification with Transformer.

Instead of applying the mains voltage direct as in Fig. 1, a transformer may be used and is desirable when the mains voltage is low. The secondary voltage can be stepped up to 240 and a greater output thus obtained by the use of a transformer. The resistance R should then have the values as indicated for "A.C. mains voltage 240" in Table I.



FIG. 2.

### (c) Full-wave Rectification as in Fig. 3.

The following circuit is suitable for full-wave rectification. It gives double the output of a single valve under the same conditions of loading.



FIG. 3.

$L_1$  and  $L_2$  are two similar electric lamps of the mains voltage (two 30 or two 60 watt lamps)  $V_1$  and  $V_2$  are two D.U. 10 valves and  $T$  is a filament transformer yielding 2.2 amps. at 4 volts maximum. The resistance  $R$  should have the following minimum values (see Table II.).

MULLARD - THE - MASTER - VALVE

## A VALVE FOR EVERY WIRELESS CIRCUIT

### TABLE II.

Resistance R (ohms).

A.C. Mains Voltage (R.M.S.)	Accumulator Voltage.					
	120	100	80	60	40	20
240	0	0	100	200	300	400
200	—	0	0	0	150	250
160	—	—	0	0	0	100
120	—	—	—	0	0	0

(d) *Full-Wave Rectification with Transformer.*

The following circuit also is suitable for full-wave rectification.

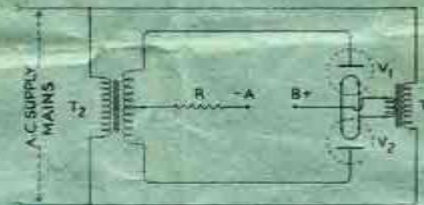


FIG. 4.

T<sub>2</sub> is a transformer with centre tapped secondary giving up to a maximum of 240 volts from each outer to centre tap. The other apparatus is as shown in Fig. 3.

The resistance R should have the values indicated in Table I. reading for "A.C. mains voltage" the voltage from centre tap to outer of the transformer in use.

It is sometimes more economical to combine T<sub>1</sub> and T<sub>2</sub> into one transformer with two secondaries, one giving 4 volts, the other up to 480 volts, centre tapped.

**MULLARD - THE - MASTER - VALVE**

## A VALVE FOR EVERY WIRELESS CIRCUIT

### 5. USE OF D.U.10 IN H.T. SUPPLY UNITS. (Battery Eliminators.)

(a) *Makers' Sets.*

The D.U.10 is suitable for H.T. Supply Units that give a filament supply output of 1.1 amps per valve at 4 volts. No adjustable filament rheostat should be used.

It is important that the filament transformer embodied in the set should give the correct current and voltage, *viz.*, 1.1 amps, per valve at 4 volts max., and that the conditions specified in this leaflet are complied with by the circuit of the supply unit, otherwise no responsibility for the valve or its performance can be entertained by us.

(Note.—If the supply unit requires a full-wave rectifying valve, the D.U.1 valve should be used and NOT the D.U.10—see leaflet V.U.14.)

(b) *Smoothing circuits for use in conjunction with circuits of Figs. 1, 2, 3, 4.*

If the output from the unit is required to supply H.T. to a wireless set, then it will be necessary to add a smoothing circuit as shown in Fig. 5.

The output from the D.U. 10 is sufficient to work any ordinary receiving set, but the full-wave connection (*viz.*, as in Figs. 3 and 4) is always to be recommended as smoothing of half-wave-rectified D.C. is more difficult.

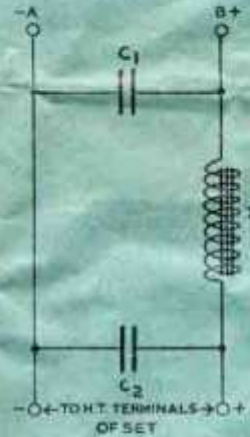


FIG. 5.

Z is an iron-core choke of 40 to 100 henries inductance, C<sub>1</sub> and C<sub>2</sub> are two condensers of 4 to 10 microfarads capacity. The higher the values of C<sub>1</sub>, C<sub>2</sub>, and Z, the more complete will be the elimination of hum from the loud-speaker output. When such a smoothing circuit is used, the limiting resistance R may be omitted if the circuit

MULLARD - THE - MASTER - VALVE

## A VALVE FOR EVERY WIRELESS CIRCUIT

of Fig. 3 is in use, and should be adjusted according to Table I. if a split secondary transformer be used, as in Fig. 4. The "A.C. mains voltage" in Table I. is then taken as the voltage from the centre tap to one outer of the transformer. It will be seen that if a 160-0-160 transformer be used then no limiting resistance is necessary, an output of 20 m.A. at 150 volts being assumed.

### 6. OUTPUT.

It is not practicable to give output current and voltage figures for all the many possible combinations of receiving valves, but the greater the H.T. current taken, the lower will be the H.T. voltage. The appended curve will, however, be some guide to the maximum safe output current in m.A. to be expected from two D.U. 10 valves used as full-wave rectifiers, the value of R being adjusted to be correct for the voltage conditions at each output. Nevertheless, it must not be assumed that if the output is adjusted to this value the set is safe. On the contrary, the set should be designed to the circuit conditions prescribed above and the output curve should be used merely as a guide.

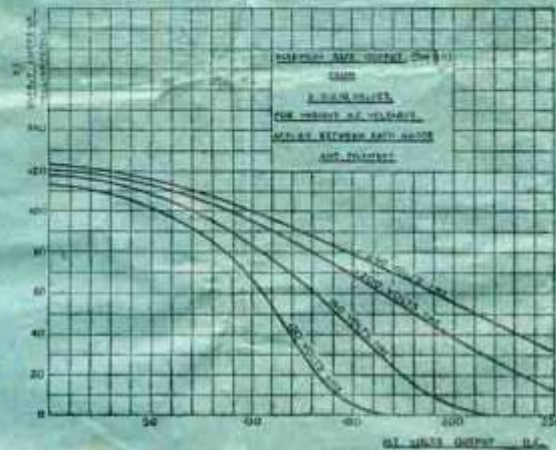


FIG. 6.

- NOTE.—(i) In no circumstances should the above output be exceeded. When charging accumulators the output figures given above may be taken as the maximum charging current.
- (ii) Do not reduce output by reducing the filament current. The limiting resistance R should be increased when it is desired to reduce output.

MULLARD - THE - MASTER - VALVE

## A VALVE FOR EVERY WIRELESS CIRCUIT

- (iii) The output figures shown in Fig. 6 should be halved when one D.U. 10 valve is used.
- (iv) When a smoothing circuit is used there will be a voltage drop in the chokes proportional to the current used (generally of the order of 15-30 volts). This must be added to the H.T. voltage at the terminals of the receiver to obtain the true H.T. output voltage figure (as used in curve above—Fig. 6). If a low voltage is required for a valve or group of valves, then a high resistance (10,000 to 100,000 ohms) shunted with a two microfarad condenser, must be connected between H.T. positive and the anode circuit of the valves concerned.

### 7. WARNING.

The apparatus described above, particularly that employing a 480 volt transformer is capable of giving shocks dangerous to life and **MUST** be handled with great care. No adjustments should be made until the mains connections have been broken by a switch.

When charging H.T. accumulators a light fuse should be included between the battery and the charger.

*For Full-Wave Rectification use the*

#### MULLARD DU/2

Filament Volts .. .. .	4 volts.
Filament Current .. .. .	1.1 amps.
Anode Impedance .. .. .	500 ohms.
Price .. .. .	30/-

MULLARD - THE - MASTER - VALVE