

PULLIN

Series 100

MULTI-RANGE TEST SET



THE Pullin Series 100 Multi-Range Test Set is a compact portable instrument of particular interest to radio and Electronic Engineers. A total of twenty-one basic self-contained ranges are included, which provide adequate facilities for the measurement of A.C. Voltage, D.C. Voltage and Current, and Resistance. All Voltage measurements, A.C. and D.C., are at **10,000 Ohms per Volt**, to comply with the requirements of modern radio and electronic equipment, where Voltage measurements have often to be made across high impedance circuits.

The self-contained ranges are as follows :—

D.C. Voltage	*A.C. Voltage	D.C. Current	A.C. Current
—	—	100 Microamps	100 Microamps
10 Volts	10 Volts	2.5 Milliamps	—
25	25	10	—
100	100	25	—
250	250	100	—
500	500	500	—
1000	1000	—	—

Ohms Ranges

(a) 0–1 Megohms (15,000 Ohms mid-scale value). (This can be extended to 0–10 Megohms by connecting an external 13.5 Volt battery and a 135,000 Ohm fixed resistor in series with one of the test leads).

(b) 0/10,000 Ohms (150 Ohms mid-scale value).

* By inserting a capacitor of approximately 0.5 Mfd. capacity in series with one of the test leads, the A.C. Voltage ranges may be used to measure **Output Voltages** at audio frequencies. The purpose of this capacitor is to block any D.C. component which may be present, such as when measuring output Voltages across the **primary** winding of an output transformer (or the **secondary** winding of an auto-transformer), which would otherwise cause incorrect readings to be obtained. The capacitor should be selected to have a working Voltage not less than the maximum Voltage range in use on the test set.

Where Output Voltages are measured across the **secondary** side of a normal double-wound output transformer, this capacitor is not required, as there is usually no D.C. component present.

Theoretically the effect of this capacitor is to cause a slight deterioration of accuracy with variation of frequency on the lowest Voltage ranges; due to the high sensitivity of the Series 100 Instrument (10,000 Ohms per Volt on all ranges) this error will be negligible, and not nearly as large as in other types of multi-range test sets where the sensitivity is very much lower.

APPLICATION

1. Measurement of Resistance

The self-contained ohms ranges are energised by an internal type No. 8 dry cell; as the consumption of the instrument is extremely low, even when the test terminals are short-circuited, there will be very little change in Voltage over the useful life of the cell. Compensation for any variation in battery Voltage is provided by the control marked "SET ZERO FOR OHMS"; when the battery Voltage falls by any appreciable amount such that it is impossible to set zero, the end of the useful life of the battery is indicated and it should at once be replaced by a new cell. Old cells, if left in the instrument, will rapidly deteriorate, and may cause damage to the instrument by corrosion.

PULLIN SERIES 100 MULTI-RANGE TEST SET ●



To change the cell, remove the six screws from the base plate. The old cell may then be removed from its clip and a new battery inserted.

Before using the instrument to measure resistance, the test leads must be short-circuited, and the " SET ZERO FOR OHMS " control turned so as to cause the pointer to read exactly full-scale deflection (zero Ohms). The instrument is then ready for use and readings are taken on the scale marked Ohms.

The high ohms range is used with the main range-selector switch on " OHMS " and the value of the unknown resistance is read directly off the green Ohms scale.

The low ohms range is used with the main range-selector switch on " OHMS/100 " and the value of the unknown resistance is obtained by dividing the reading off the green Ohms scale by 100.

2. Measurement of D.C. Voltage

Turn the A.C./D.C. control to the " D.C. " position and the main range-selector control to the appropriate Voltage range. Readings are taken on the Black scale and each division corresponds to the following values :—

Range	Voltage per Division
10 Volts	0.2 Volt
25 Volts	0.5 Volt
100 Volts	2.0 Volts
250 Volts	5.0 Volts
500 Volts	10.5 Volts
1000 Volts	20.0 Volts

3. Measurement of D.C. Current

Turn the A.C./D.C. control to the " D.C. " position and the main range-selector control to the appropriate Current range. Readings are taken on the Black scale, and each division corresponds to the following :—

Range	Current per Division
100 Microamps	2 Microamps
2.5 Milliamps	50 Microamps
10.0 Milliamps	200 Microamps
25.0 Milliamps	500 Microamps
100.0 Milliamps	2 Milliamps
500.0 Milliamps	10 Milliamps

4. Measurement of A.C. Voltage (and Output Voltage)

Turn the A.C./D.C. control to the " A.C. " position and the main range-selector control to the appropriate Voltage range. Voltage readings on the 10 and 25-Volt ranges are taken on the Red scale, and the remaining ranges on the Black scale. Each division corresponds to the following :

Range	Scale	Voltage per Division
10 Volts	Red	0.2 Volts RMS
25 Volts	Red	0.5 Volts RMS
100 Volts	Black	2.0 Volts RMS
250 Volts	Black	5.0 Volts RMS
500 Volts	Black	10.0 Volts RMS
1000 Volts	Black	20.0 Volts RMS

5. Measurement of A.C. Current

Turn the A.C./D.C. control to the " A.C. " position and the main range-selector control to the 100 Microamp range. Readings are taken on the Black scale and each division corresponds to 2 Microamperes RMS.

100 MULTI-RANGE TEST SET

SERIES 100 MULTI-RANGE TEST SET (continued)

SPECIFICATION

- **Six D.C. Voltage Ranges :**
0/10V. ; 0/25V. ; 0/100V. ; 0/250V. ; 0/500V. ; and 0/1,000V. ; all at 10,000 Ohms per Volt. (Current for full-scale deflection is 100 Microamps).
- **Six A.C. Voltage Ranges :**
0/10V. ; 0/25V. ; 0/100V. ; 0/250V. ; 0/500V. ; and 0/1,000V. ; all at 10,000 Ohms per Volt. (Current for full-scale deflection on all ranges is 100 Microamps.).
- **One A.C. Current Range :**
0 to 100 Microamps. (Voltage drop on this range is 10.0 Volts).
- **Six D.C. Current Ranges :**
0/100 Microamps; 0/2.5 mA.; 0/10 mA.; 0/25 mA.; 0/100 mA. ; and 0/500mA.
- **Two Ohms Ranges :**
0/1 Megohm (15,000 Ohms mid-scale).
0/10,000 Ohms (150 Ohms mid-scale).
The 1 Megohm range can be extended to 10 Megohms by connecting an external 13.5 volt battery and a 135,000 ohms fixed resistor in series with one of the test leads.

Meter : 3 $\frac{1}{2}$ " scale, rectangular pattern, with knife-edged pointer and three coloured scales ; sensitivity 100 Microamps full-scale deflection.

Case : Strong, but light, aluminium-alloy case with black moulded carrying handle ; " blue hammer " finished.

Size : 9 $\frac{3}{8}$ " \times 5 $\frac{1}{4}$ " \times 4 $\frac{3}{8}$ " (including handle).

Weight : 3 lbs. 8 ozs.

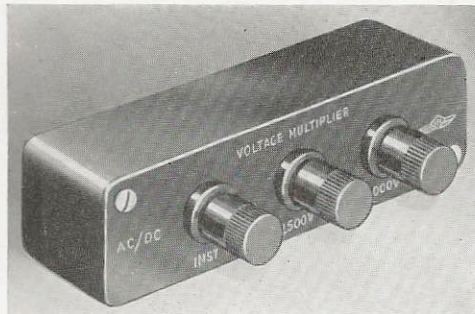
Accuracy : 3% on D.C. Ranges. 4 $\frac{1}{2}$ % on A.C. Ranges on any frequency from 15 to 20,000 c.p.s. (for sinusoidal waveforms). 5% on Resistance Range (Compensated for normal variation of cell voltage).

Auxiliary Equipment : Two test leads with detachable bull-dog clips and test prods. One (Internally mounted) 1.5-Volt Cell taken from a No. 8 Battery.

Price ... £11 11s. 0d. complete

ACCESSORIES

A.C./D.C. VOLTAGE MULTIPLIER



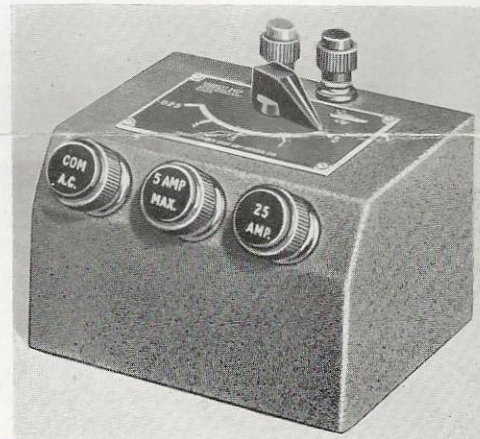
For 2,500 and 5,000 volts. The resistances are housed in a moulded box fitted with three suitably insulated terminals. When connecting in series with the Test Set, the main selector control of the latter should be turned to the 1,000 volt range, and the common terminal on top of the box should be connected to the Test Set by one of the leads supplied with it. Heavily insulated leads are supplied with the Voltage Multiplier.

Price : £3 8s. 0d. complete with heavily insulated leads, with detachable bulldog clips and test prods.

MULTI-RANGE CURRENT TRANSFORMER

For A.C., 50 cycles, current ranges of 0.025, 0.1, 0.5, 1.0, 5.0, and 25.0 Amps. A rectifier is incorporated in the unit which gives 25 milliamps D.C. across the output terminals. When connecting this unit across the Test Set, the main selector switch should be turned to the 25 milliamp position, and the A.C./D.C. Control turned to the D.C. position.

Price : £6 14s. 6d.



MIP
LTD

MEASURING INSTRUMENTS (PULLIN) LTD.

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Acorn 4651