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INSTRUCTION BOOK

for

MEGOHMMETER

Model RM-175-LZ

BRITISH PHYSICAL LABORATORIES
HOUSEBOAT WORKS . RADLETT . HERTS . ENGLAND

BRITISH PHYSICAL LABORATORIES

Designers and Manufacturers of Electrical Laboratory and Production Testing Equipment

INSTRUCTION BOOK *for* **MEGOHMMETER**

Model RM-175-LZ

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HOUSEBOAT WORKS . RADLETT . HERTS.

Telephones: RADLETT 5674-5-6

Cables: BEEPEELLE, RADLETT

Telegrams: BEEPEELLE, PHONE, RADLETT

1—DESCRIPTION

- 1.1 This instrument is capable of measuring, to a high degree of accuracy, the value of insulation resistances from under one megohm up to five million megohms. In operation it is exceptionally stable and its simplicity of control, together with the very thorough character of the incorporated protective devices, renders it entirely suitable for use by unskilled operators.
- 1.2 The circuit used combines the advantages, such as stability and accuracy, of the bridge with the direct indication of the ohmmeter; this is a feature of exceptional value, in that the effect of physical treatment of test samples (e.g., changes in ambient temperature, pressure, humidity, configuration, etc.) can be observed immediately without the readjustment delay inevitable in a simple null bridge system. In effect, the operation of this instrument is equivalent to that of a self-balancing bridge.
- 1.3 Two other valuable features are the complete protection of the indicator circuit—the meter will not be damaged even should the test terminals be short-circuited—and the fact that the polarizing voltage is substantially independent of the resistance of the circuit or component under test.
- 1.4 The RM-175 Megohmmeter is made in three standard types; all have the same resistance ranges but see paragraphs 3.1 and 3.2.
- 1.41 The RM-175-CX is the basic model, with a test pressure of 500 volts D.C. and includes an adjustable automatic delay circuit which does not insert the indicating circuit until a pre-determined charging period has elapsed; it is, therefore, particularly suitable for measuring the insulation resistance of large capacitors.
- 1.42 The RM-175-LZ includes this feature, and in addition the test voltage can be continuously varied from zero up to 1000 volts D.C.; the actual voltage is directly indicated by an additional meter. The measuring range is increased to 10×10^{12} ohms.
- 1.43 Instruments with the suffix S have the low terminal connected to chassis and earth.

2—INSTALLATION

- 2.1 This instrument is suitable for 200 to 250 volts A.C. at 50 cycles per second; within this range no other mains adjustment is necessary. No mains fuses are provided; power consumption is of the order of 70 watts.
- 2.2 It is most desirable that the instrument should be earthed and a third core (not red or black) is provided in the mains lead for this purpose.
- 2.21 For notes on guarding see paragraph 6.

- 2.3 The exact valve arrangement varies with each model; the appropriate holders are clearly indicated by labels on the chassis. It is essential that the correct replacement types be used.

	RM-175-CZ	RM-175-LZ
V.1 ...	6X5-G	6X5-G
V.2 ...	U50	HVR2
V.3 ...	6SN7	6SN7
V.4 ...	ME 1400	ME 1400
V.5 ...	ME 1400	ME 1400

- 2.33 In all cases the ME 1400 can be used as a replacement for the EF 37, used previously.

3—RANGES

- 3.1 On all instruments the same six ranges are provided; selection is made by use of the "MULTIPLY BY" Switch.

Range 1 x 1/10	0.9 to 50	megohms
Range 2 x 1	9 to 500	megohms
Range 3 x 10	90 to 5000	megohms
Range 4 x 100	900 to 50000	megohms
Range 5 x 1000	9000 to 5000000	megohms
Range 6 x 10000	90000 to 5000000	megohms

- 3.2 Since the range is a function of the test voltage, on the RM-175-LZ model, for any voltage other than 500 a very simple correction must be applied, i.e. Reading x $\frac{\text{Test Pressure}}{500}$. For example, if the test voltage is adjusted to 1000 each of the above ranges is doubled.

- 3.3 On models which incorporate a charging delay circuit, four time ranges are provided, 0, 1, 3 and 10 seconds. The most suitable range varies both with the capacitance of the condenser and with its expected leakage resistance.

4—ACCURACY

- 4.2 On the RM-175-LZ model the voltage under test is correctly indicated within 2%, unaffected by the resistance of the circuit under test.
- 4.3 The time delay circuit is adjusted to within -0, + 1 sec. of the indicated time.

5—OPERATION

- 5.1 If possible the instrument should be allowed to warm up for about 20 minutes before use.
- 5.2 The component or circuit, the resistance of which is to be measured should be connected to the terminals marked Rx.
- 5.3 Using the ADJ. TO INFINITY control, set the MEGOHMS meter to read infinity.

- 5.4 With the RM-175-LZ model, adjust the TEST VOLTAGE to the desired value, using the TEST VOLTAGE CONTROL.
- 5.5 Set the range switch (MULTIPLY BY) to the appropriate range.
- 5.6 With models with a delay circuit (RM-175-CZ and RM-175-LZ), set the delay time to an appropriate value. In practice, use of this delay circuit is confined to the testing of large condensers of high leakage resistance; the selected time should be a direct function of both capacitance and expected leakage resistance.
- 5.7 Operate the PRESS TO READ key and the insulation resistance is indicated directly by the MEGOHMS meter; in the case of the RM-175-LZ this reading is subject to correction according to the test pressure. In such a case the reading should be multiplied by test pressure divided by 500.
- 5.8 The DELAY INDICATOR lamp will indicate the expiration of the delay period, and must light up after the pre-set period. During this period any capacitance across the test sample is charged directly from a low impedance source and the indicating circuit is not in operation.

6—GUARDING

- 6.1 When testing an insulation resistance which forms part of a multi-terminal network it is frequently desirable to make use of the principle of guarding. For example, a paper condenser in a metal case may be considered as a three terminal network in that both electrodes will have some leakage resistance to the case. If this case be connected to the GUARD terminal, even should these two leakages be comparable in value with the direct electrode to electrode leakage, their presence will in no way affect the accuracy of measurement.
- 6.2 Guarding has been loosely described as “insulation by conduction”; more accurately, it confines stray leakages to paths where their effect is unimportant. It is not possible to deal more fully with the subject here and reference should be made to any standard text-book dealing with high resistance measurement.

7—SERVICE

- 7.1 In case of any difficulty, before returning the instrument the customer should communicate with the manufacturers, who will be pleased to render every possible assistance.
- 7.2 Should it be necessary to change either V4 or V5, it may also be necessary to re-adjust the sensitivity of the indicator circuit. This may be conveniently done by connecting a known resistance to the test terminals, a value of the order of one or two megohms is suitable. After having carefully adjusted the MEGOHMS meter to infinity, press the key and adjust the internal SENSITIVITY control (on the chassis) until the meter reads correctly. This correction holds good for all ranges.