

# UNIVERSAL AVOMETER

## MODEL 7

# WORKING INSTRUCTIONS

## IMPORTANT

**GENERAL.** To ensure accurate readings, use the instrument face upwards. If necessary, set the pointer to D.C. zero by means of the screw in the panel. The A.C. switch must be at its D.C. position for this operation. On A.C. ranges the pointer is automatically displaced from D.C. zero to correct for internal losses, the  $1\frac{1}{2}$ V. cell being employed for this purpose. D.C. tests can only be carried out with the D.C. switch set to the appropriate range and with the A.C. switch at its D.C. position. The reverse procedure applies to A.C. tests.

To prevent damage to the instrument, see that it is set to a suitable range before connecting to the circuit under test. When in doubt set to the highest range and work downwards, there being no necessity to disconnect the leads. Do not, however, switch off by rotating the switches to blank positions. The automatic cut-out completely protects the instrument in the case of normal overload by interrupting the main circuit. If it operates DO NOT re-set with the leads connected to the supply, but ensure that the fault is cleared before continuing tests. Since mechanical shock may cause the cut-out to trip, handle the meter carefully. Do not lubricate the plunger.

The  $\pm 2$  button is for use when measuring current and voltage only, and if the meter is on a normal range, it should never be pressed when the pointer shows more than half scale deflection. The resistance of the meter is the same on a press button range as on the normal one. Press the button firmly.

**KNOB "Q" MUST ALWAYS BE REPLACED IN NORMAL POSITION AFTER USE.**

A copper oxide rectifier is incorporated for A.C. measurements and the instrument calibrated for sinusoidal input (form factor 1.11).

Special care should be exercised when using high voltages. If the meter is used to measure voltage calling for an external multiplier, or to measure current in such a circuit, it must be used at the earth potential end.

**AMPERES.** Ten ranges D.C. and eight ranges A.C. are incorporated. These ranges may be extended by the use of external shunts (100mV.) or transformers (secondary to suit a current range).

**VOLTS.** Ten ranges D.C. In addition the 2 mA range can be used as one of 100 mV. or 50 mV. with the button pressed.

Eight ranges A.C. Suitable for out-put measurements at audio frequency.

All normal ranges of D.C. and A.C. except 10V. A.C. consume 2mA. at full scale deflection (500 ohms per volt) or 1mA. at full scale for press button ranges (1,000 ohms per volt) the current being proportionately less for smaller deflections. The 10V. A.C. and 5V. A.C. ranges consume 20 and 10 mA. respectively at full scale deflection.

**OHMS.** Three self contained ranges and two using external voltage. The press button should not be used on resistance ranges.

**10,000 and 100,000 Ohms Ranges.** Before commencing tests on these ranges it is advisable to check, and if necessary, to adjust for both voltage and resistance of the  $1\frac{1}{2}$ V. cell by means of the potentiometer "P" and resistance "R".

- (1) Connect leads together
- (2) With switch at 100,000 ohms position adjust by "P" so that the pointer indicates approximately 0 ohms.
- (3) Adjust by "R" when on 10,000 ohms range until pointer takes up the same position irrespective of whether the switch is on the 10,000 or 100,000 ohms range.
- (4) Set accurately to zero ohms by means of "P".

**MEG OHM RANGE.** Before testing on this range, it is necessary to adjust as follows:—

- (1) Connect leads together.
- (2) Set switch to 1 megohm position.
- (3) Raise adjusting knob "Q" and rotate in a clockwise direction until the pointer indicates 0 ohms.

After carrying out tests on this range, return knob "Q" to its normal position in the panel.

**BATTERY REPLACEMENT.** If it is impossible to obtain zero ohms setting, the internal batteries should be replaced, a  $1\frac{1}{2}$ V. cell for the two lower ranges and two  $4\frac{1}{2}$ V. batteries for the high range.

**10 & 40 MEGOHM RANGES.** These ranges are available by using the 100 or 400V. A.C. or D.C. ranges respectively in conjunction with a suitable source of voltage. It is safe and correct to use a voltage between  $\frac{1}{3}$  to  $2\frac{1}{2}$  times that of the range in use, adjustment for zero on the ohms scale being carried out by means of "Q" knob. After adjusting for voltage the test resistance is connected in series, its value being that shown on the ohms scale multiplied by 1,000 or 4,000 as the case may be. With these high voltages the circuit should not be handled while "live".

Return "Q" knob to its normal position in panel after tests.

**CAPACITY.** 50  $\sim$  A.C. Mains supply from 65 to 250V. should be connected to the meter when set to its capacity range, and the "Q" knob should be operated as in the megohm range to bring the pointer to its infinity capacity position. The unknown condenser should then be connected in series, direct indication of capacity being shown within usual commercial limits of accuracy.

Frequencies other than 50 cycles may be used, but this affects the voltage necessary for adjustment. 250 V. A.C. must not be exceeded.

Return "Q" knob to its normal position after tests.

**POWER AND DECIBELS.** This range gives a maximum reading of 2 watts, the impedance being 5,000 ohms. The corresponding d.B. scale is calibrated from -15 to +16 d.B., the reference level (0.0 B.) being 50 mW.

The 10V. A.C. and the 100V. A.C. ranges can be used as power ranges of 200 m.W., the impedance being 500 and 50,000 ohms respectively.

**POWER FACTOR AND WATTAGE.** The two sockets, marked "P.F.", at the top of the panel are for use with the Model 7 "Power Factor and Wattage Unit". See instruction booklet.

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