

Defective instruments should be returned carriage paid to the Multimeter Service Dept. Sinclair Radionics Ltd. Careful packing is essential - retain the original packing material. If the guarantee has expired or if the fault is the result of misuse, the repair will be carried out and charged unless other instructions are received.

Customers outside the UK should contact the dealer from whom the meter was purchased to ascertain service arrangements for that country.

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sinclair

PDM 35

Digital Multimeter

OWNER'S MANUAL

The Sinclair PDM35 is a very compact portable digital multimeter which combines high performance with ease of operation.

High accuracy, high resolution and high impedance are combined with the precision of a digital readout.

The instrument will measure AC \sim and DC --- voltage, DC --- current and resistance on an LED display reading up to ± 1999 . Operation is via a standard 9 volt battery and a socket is provided for the connection of a Sinclair AC adaptor when required.

Part No 58121 - 060

SPECIFICATIONS

DC volts	Range	1V 10V 100V 1000V	Typical Accuracy (of reading) (19°C - 23°C)	1.0% ± 1 count 1.0% ± 1 count 1.0% ± 1 count 1.0% ± 1 count	Max. Permissible Overload	240V 1000V 1000V 1000V
	AC volts	1000V	1.0% ± 2 counts	1000V	1V	500V
DC current	Range	0.1µA 1µA 10µA 100µA 1mA 100mA	1.0% ± 1 count 1.0% ± 1 count 1.0% ± 1 count 1.0% ± 1 count 1.0% ± 1 count 1.0% ± 1 count	10M Ω 10M Ω 10M Ω 10M Ω	Resolution	0.1nA 1nA 10nA 100nA 1µA 100µA
	Resistance	1K Ω 10K Ω 100K Ω 1M Ω 10M Ω	1.5% ± 1 count 1.5% ± 1 count 1.5% ± 1 count 2.5% ± 1 count	Frequency Range 40Hz - 5KHz	1mV 10mV 100mV 1V	15V 120V 240V 240V 240V 240V
		Measuring Current				
		1mA 100µA 1µA 100mA				

Power Consumption

9V, 35mA-battery
9V, 45mA-AC adaptor

Size

6.2" × 3" × 1.25"
157mm × 76mm × 32mm

Weight

5½ oz (excluding battery)
150 gms.

Preparing for Operation

The instrument must be fitted with a 9-volt battery of the rectangular or PP3 type. A good quality battery should be used, and a high power or Alkaline version chosen where possible.

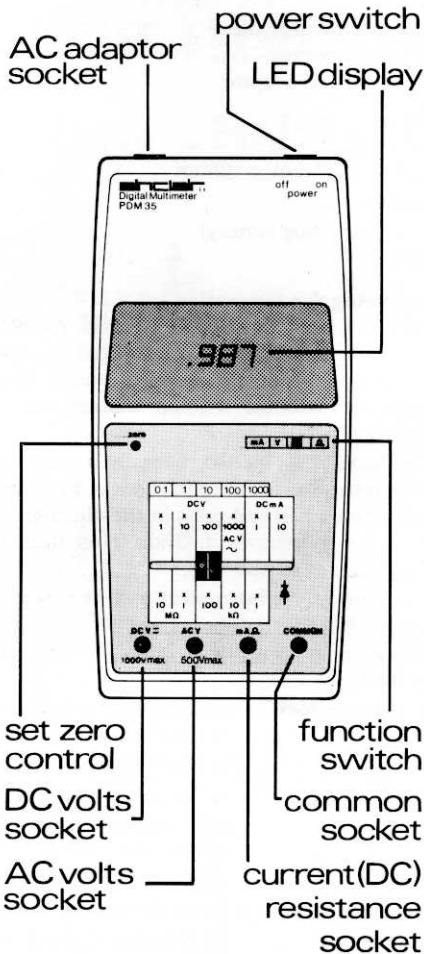
The battery is located beneath a snap-on cover at the back. Lift up the back of the cover with a finger nail and press in the direction of the arrow to remove it. Slide it on until it clicks home to replace.

Alternatively, the instrument may be powered from an AC adaptor of an approved type (see later note) by plugging it into the socket on the back.

AC Adaptor socket - connect approved adaptor to run from 117V, 220V or 240V power.

Function Switch - set to mA/V for current and voltage measurements, set to Ω for resistance measurement.

Range Switch - set to the desired range of voltage, current or resistance as written above or below the knob.



With the instrument set as above for the X100V DC range, the display shown reads 0.987×100 volts = 98.7 volts.

- Common socket - connect the black test lead to this socket.
- DC V \equiv socket - connect the red test lead to this socket when measuring DC \equiv voltages.
- AC V \sim socket - connect the red test lead to this socket when measuring AC \sim voltages.
- mA- Ω socket - connect the red test lead to this socket when measuring DC \equiv current or resistance.

Functions and Ranges

The desired function is selected by setting the mA/V - Ω switch, and connecting the red test lead to the appropriate socket. The range is then selected by the larger range-switch.

The display always has a fixed decimal point and the displayed value must be multiplied by the number next to the range-switch to obtain the true reading.

Zero Adjustment

In order to take accurate measurements the meter must be accurately set to zero. Set the function switch to mA/V and push the range switch fully to the right (DCmA \times 100). With no input connected the display should read 000 or -000, if not adjust by using a very small screwdriver through the ZERO hole provided. A slight jitter to 001 may occur - this is normal.

MAKING MEASUREMENTS

=== DC voltage:

Four ranges are available each with an input impedance of $10\text{ M}\Omega$. On the $X1$ range a small zero offset may occur from minute leakage currents. This will disappear when the leads are shorted together and will not affect the reading once a voltage is connected.

If a - sign appears in the display the voltage is negative with respect to the common lead.

CAUTION - do not apply more than 1000 volts.

AC Voltage

AC voltage is only available on the $X1000\text{ V}$ range. The input impedance is $450\text{ K}\Omega$.

The meter senses the mean value of an input and is calibrated to read the R.M.S. value of a sine wave. Any DC === on the input in addition to the AC \curvearrowright will affect the reading.

CAUTION - do not apply more than 500 volts R.M.S.

=== DC Current

6 ranges are available each with a voltage drop of 1 mV per count. All ranges are available via the $\text{mA}-\Omega$ socket and the multiplier for each μA range is written in the grey blocks above the DCV ranges.

A leakage current of up to $\pm 1\text{ nA}$ may be present in the meter which would cause an error on the xO.inA range. The offset must be added to or subtracted from the reading.

CAUTION - a current is measured by making it flow through the meter (by breaking the

circuit and re-connecting it via the test leads). Connecting the current function directly across a voltage source could result in permanent damage.

NOTE - AC current cannot be measured directly with this instrument.

Resistance

5 ranges of resistance are available each generating a voltage across the unknown resistor of $+1\text{ mV}$ per count relative to the common lead. If the resistor is in place across a semi-conductor junction, it may be necessary to reverse the leads to avoid forward biasing the junction.

CAUTION - All power must be removed from a circuit before trying to measure resistances.

Testing of Semi-conductor Junctions

The instrument measures resistance by forcing a known constant current through the resistor and measuring the voltage developed. The resistance ranges can be used to measure the forward voltage drop of semi-conductor junctions, and to match VBEs of transistors etc.

The current used on each range is as given in the grey blocks at the top of the range information, and the reading on the display is the forward voltage drop in volts. The $\text{mA}-\Omega$ socket is the positive terminal of the current source.

Overload

With the exception of the $\text{x1000V DC} ===$ and $\text{AC}\curvearrowright$ ranges, all ranges can be used up to

a displayed value ± 1999 . When this is exceeded the display will show $\equiv 000$ or $\equiv 000$, and the next highest range should be selected.

Positive overload always gives flashing bars. A small negative overload will also give flashing bars (with negative symbol), but a larger one will give fixed bars.

Remember, when switched to resistance the display will show flashing overload until a resistor lower than the maximum reading of the range is connected. Should fixed bars appear on the resistance function, connecting a resistor will restore normal operation – this is not a fault condition.

To avoid damage:

- A. Never connect more than 1000 volts to the DCV \equiv socket, or more than 500 volts R.M.S. to the ACV \cup socket.
- B. Never connect a voltage source directly to the mA – Ω socket.
- C. Never connect an input greater than the maximum permissible overload (see the specification).

Selecting a Power Source

The meter operates from a standard 9-volt battery. If possible a high power or Alkaline type should be used – ask your dealer if in doubt.

To obtain long battery life the meter must be switched off whenever measurements are not being made.

The condition of the battery may be checked as follows: Select $\times 10VDC \equiv$ and connect

the red test lead to the DCV socket. Remove the battery cover, switch the instrument on and touch the test lead onto the negative battery terminal. With a new battery the reading should be about -3 volts; if it is close to zero or is positive the battery should be replaced.

CAUTION – Never leave a weak or dead battery in the instrument. Even 'leakproof' types can leak chemicals that may cause permanent damage to the instrument – this will void the guarantee.

When continuous operation is required the meter can be operated from AC power via an optional AC adaptor. Plugging this into the socket on the back automatically disconnects the internal battery and increases the display brightness.

For safety reasons only an approved adaptor may be used; use of any other will void the guarantee. In some countries the correct Sinclair adaptor may not be available in which case the dealer will supply an alternative approved unit.

Safety Precaution

This instrument has been designed to the highest safety standards, but safe operation depends on the user so we recommend the following rules.

1. Never connect a voltage to the instrument which causes the common terminal to be raised more than 1000 volts DC or 700 volts AC RMS above earth ground.
2. Never use anything but an approved AC adaptor to power the instrument.

3. Use extreme caution when working with voltages above 100V. Always disconnect power from the circuit being tested whilst connecting or disconnecting test leads.
4. Never unplug a test lead from the instrument while it is still connected to a high voltage.
5. Use extreme caution when working with AC-DC sets with live or hot chassis.
6. Always ensure that a workbench is clean, dry and covered in non-conductive material.

Calibration

The Sinclair PDM35 comes to you fully calibrated and tested. Under normal use no further adjustment should be necessary.

Re-calibration should only be undertaken by trained engineers with access to specialised equipment, and interference by unauthorised persons will void the guarantee.

Where owners wish to undertake re-calibration or service of the meter themselves, this should be done only in conjunction with the Service Manual which may be purchased either directly from Sinclair Radionics or their agents overseas.

Guarantee

The Multimeter is guaranteed against defects arising in normal use for a period of one year from the date of purchase provided that the fault has not been caused by any type of misuse.

This guarantee is offered as an extra benefit and does not affect consumers' statutory rights.

