INSTRUCTIONS

DIGITAL MULTIMETER DM2

sinclair

INTRODUCTION

The Sinclair DM2 is a compact battery operated digital multimeter housed in a rugged steel case. The instrument will measure AC and DC volts, AC and DC current, and resistance in a total of 22 ranges easily selected by push buttons. The large light emitting diode display will read up to 1999 and automatically indicate polarity. Indication of positive and negative overload is also provided. The instrument is fitted with a combined carrying handle and bench stand and a socket is provided for the connection of a Sinclair Mains Adaptor (see important note on Page 3).

DC Volts – Specification @ 21 °C ± 1 °C

Range	Accuracy	Input Impedance	Resolution	Max. Cont. Overload.
1v	0.3% ± 1 Digit	>100 MΩ	1 mV	350v
10v	0.5% ± 1 Digit	10 MΩ	10 mV	1000v
100v	0.5% ± 1 Digit	10 MΩ	100 mV	1000v
1000v	0.5% ± 1 Digit	10 MΩ	1 V	1000v

AC Volts – Specification @ 21 °C ± 1 °C

Range	Accuracy	Input Impedance	Frequency Range	Max. Overload.
1v	1.0% ± 2 Digits	10MΩ//70pF	20Hz – 3K Hz	300v
10v	1.0% ± 2 Digits	10MΩ//50pF	20Hz – 1K Hz	500v
100v	2.0% ± 2 Digits	10MΩ//50pF	20Hz – 200 Hz	500v
1000v	2.0% ± 2 Digits	10MΩ//50pF	20Hz – 200 Hz	500v

DC Current – Specification @ 21 °C ± 1 °C

Range	Accuracy	Input Impedance	Resolution	Max. Overload.
1mA	0.8% ± 1 Digit	1KΩ	1μA	1A (Fused)
10mA	0.8% ± 1 Digit	100 Ω	10μA	"
100mA	0.8% ± 1 Digit	10 Ω	100μA	"
1000mA	2.0% ± 1 Digit	1 Ω	1mA	"
[100μA	2.0% ± 1 Digit	10KΩ	100nA	10mA]

AC Current – Specification @ 21 °C ± 1 °C

Range	Accuracy	Frequency Range	Max. Overload.
1mA	1.5% ± 2 Digits	20Hz – 3K Hz	1A (Fused)
10mA	1.5% ± 2 Digits	20Hz – 3K Hz	"
100mA	1.5% ± 2 Digits	20Hz – 3K Hz	"
1000mA	2.0% ± 2 Digits	20Hz – 3K Hz	"

Resistance – Specification @ 21 °C ± 1 °C

Range	Accuracy	Measuring Current	Overload Protection
1KΩ	1.0% ± 1 Digit	1mA)	± 15v DC.
10KΩ	1.0% ± 1 Digit	100μA)	above which a
100KΩ	1.0% ± 1 Digit	10μA)	50mA fuse operates
1000KΩ	1.0% ± 1 Digit	1μA)	
10MΩ	2.0% ± 1 Digit	100nA]	

Open circuit voltage = 5.3v approximately.

Typical temperature coefficients

DC Ranges	0.03% per °C
AC Ranges	0.05% per °C
Resistance Ranges	0.05% per °C

Operating temperature range

0 °C to + 50° C.

Power consumption

70mA approximately.

Size: -

Height: 56mm
Width: 225mm
Depth: 155mm
(excluding knobs, feet and handle.)
Weight: 1.5 kg.
(excluding battery.)

OPERATION

Power Switch
The instrument is switched on when this switch is depressed. If the mains adaptor is not in use the instrument will be powered from the internal battery. When the mains adaptor plug is inserted the internal battery is automatically disconnected.

Input Terminals
The positive terminal is the low potential terminal with respect to ground. Where high frequency AC signals of substantial amplitude are present superimposed upon a DC voltage to be measured, it is essential that the positive terminal of the instrument (AC low) is connected to the earthy side of the voltage, regardless of the actual polarity.

Function
The DM2 will measure AC and DC Volts, AC and DC current, and resistance when the appropriate function button is depressed. Care must be taken to ensure that the correct function is selected before the input is connected.

Range
The four range multipliers 1, 10, 100 and 1000 are selected by pressing the appropriate button – the decimal point will be automatically positioned. The highest range should be selected first when the magnitude of the input is unknown. On DC ranges the polarity of the input will be automatically indicated. The range selectors must not be operated when the instrument is connected to an inductive circuit.

Note
The very high input impedance on the 1VDC range may give rise to random readings when the input is open circuited – these readings do not affect the correct reading when the input is reconnected.

External Power
The DM2 may be safely operated from the mains supply provided that only the Sinclair Mains Adaptor is used. The internal battery is automatically disconnected when the plug is inserted. The display brightness level is also automatically increased.

WARNING. USE ONLY SINCLAIR MAINS ADAPTOR.

ADDITIONAL RANGES

The two additional ranges not indicated on the front panel may be selected as follows:—

i) 10MΩ— this may be selected by pressing the kΩ switch and releasing all the range switches. No decimal point will be indicated.

ii) 100μADC — this may be selected by pressing the DC Volts switch and the 1 and 1000 range switches simultaneously-ignore the decimal point.

Zero Adjustment

The zero may be re-adjusted if necessary after selecting 1v DC and shorting the input leads together. The control may be reached with a fine screw driver through the hole in the front panel and should be adjusted for a reading of 000 or -000.

Overload Indication

With the exception of the 1000v AC and DC and 1000mA AC and DC ranges all ranges may be used in overrange. When the reading exceeds 1999 the display will revert to 000 and the upper and lower segments of the most significant (left hand) digit will flash approximately once a second. When the input is negative the negative sign will be indicated also.

The maximum ratings stated in the specification should be carefully observed. If the maximum current rating is exceeded the instrument will continue to operate in voltage and resistance modes after the fuse has blown.

AC Ranges

The instrument senses the mean value of the input signal but is calibrated to read the r.m.s. value of a sine wave input.

Resistance Ranges

Resistance is measured by feeding a known constant current through the unknown resistance and measuring the voltage developed. The resistance ranges may be used to measure forward voltage drop, V_{be} etc. of semiconductor devices. The current is selected by operating the range switches (see specification) and the display range will be 1 volt regardless of the position of the decimal point.

BATTERY

The battery compartment may be reached by removing the bottom cover. When the battery voltage drops below approximately 6.5v the instrument will cease to function and the display will lock up in a non-flashing mode in which the left hand digit shows three horizontal bars and the remaining digits show 0. This indicates that the battery needs replacing.

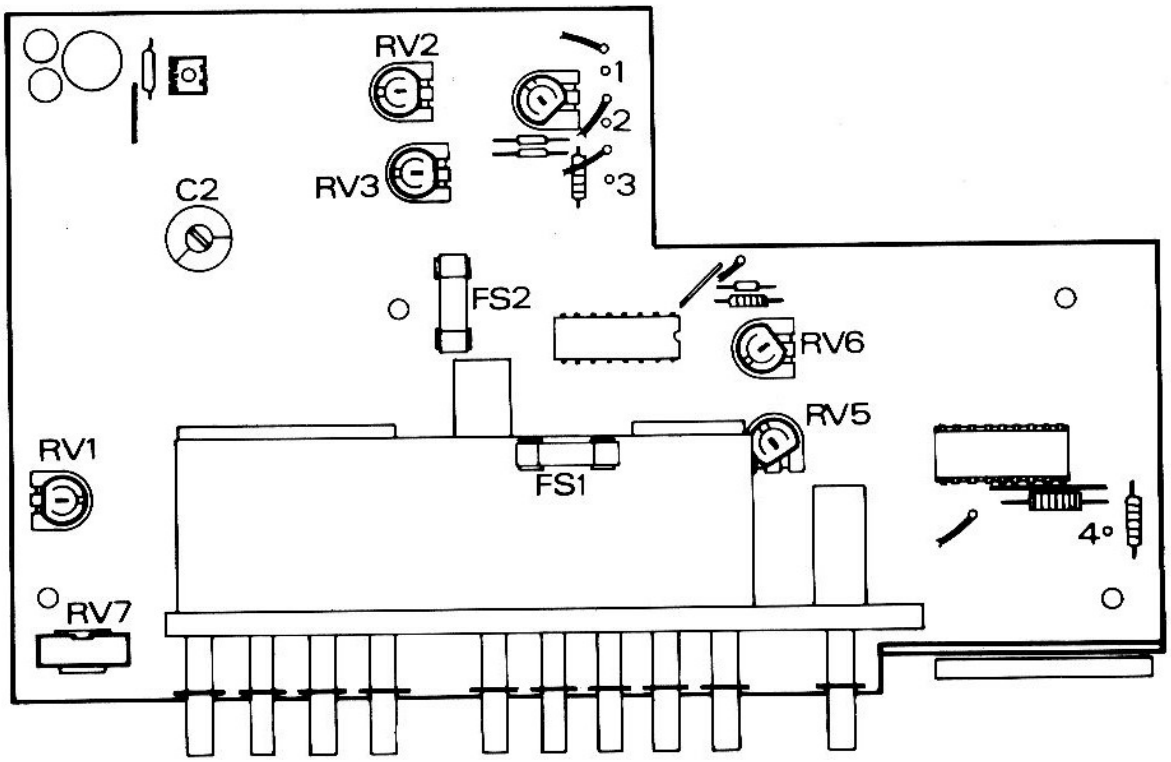
The following batteries are suitable for use in the DM2:— Australia — **276,** Denmark — **480, 780,** Finland — **LP5M9,** France — **6NX, R0617, 'TEXAS',** Germany — **439, 339, 495,** Great Britain — **PP9, M1603, RR9, VT9,** Italy — **592, 995, A23,** Japan — **N572, 306,** Norway — **439,** Singapore — **276,** South Africa — **PM9, EF/EM, FM9,** Spain — **PT673,** Sweden — **9T1,** Switzerland — **821,** U.S.A. — **D6, 276, M1603, 1603, VS306.**

The connections are as follows, referring to diagram on page 6.

Battery + ve — Pin 1
Battery — ve — Pin 3

Rechargeable Batteries

A special rechargeable battery pack is available. Connection details are provided in the pack.


RV2
°1
°2
°3
RV3
C2
FS2
RV6
RV5
RV1
FS1
4°
RV7

RECALIBRATION

The instrument may be recalibrated if inputs of greater accuracy than the DM2 specification are available. Adjustments must be carried out only in the order shown. The zero control must first be adjusted for a reading of 000 or -000 immediately before recalibration.

Fuses

FS1 Current overload protection 1A 20mm x 5mm Fast Blow.

FS2 Resistance range protection 50mA 20mm x 5mm Fast Blow.

N.B. Under no circumstances should anti-surge (Slow-Blow) fuses be fitted.

Select	Input	Adjust	Display Limits
1v DC	+1.000v	RV5	.996 - 1.004
1v DC	-1.000v	RV6	-.996 --1.004
10v DC	+10.00v	CHECK	9.94 - 10.06
100v DC	+100.0v	CHECK	99.4 - 100.6
1000v DC	+1000v	CHECK	994 - 1006
1v AC	1.000v 50Hz	RV4	.988 - 1.012
10v AC	10.00v 50Hz	CHECK	9.88 - 10.12
10v AC	10.00v 700Hz	C2	Same reading as at 50Hz
100v AC	100.0v 50Hz	CHECK	97.8 - 102.2
1000v AC	500v 50Hz	CHECK	488 - 512
1000mA DC	+1000mA	CHECK	979 - 1021
100mA DC	+100.0mA	RV1	99.1 - 100.9
10mA DC	+10.00mA	CHECK	9.91 - 10.09
1mA DC	+1.000mA	CHECK	.991 - 1.009
1mA AC	1.000mA 50Hz	CHECK	.983 - 1.017
100uA DC	+100uA	CHECK	979 - 1021*
1000mA AC	1000mA 50Hz	CHECK	978 - 1022
100mA AC	100.0mA 50Hz	CHECK	98.3 - 101.7
10 mA AC	10.00mA 50Hz	CHECK	9.83 - 10.17
1mA AC	1.000mA 50Hz	CHECK	.983 - 1.017
100KΩ	100.0KΩ	RV2	98.9 - 101.1
1KΩ	1.000KΩ	CHECK	.989 - 1.011
10KΩ	10.00KΩ	CHECK	9.89 - 10.11
10MΩ	10.00MΩ	RV3	979 - 1021
1000KΩ	1000KΩ	CHECK	989 - 1011

***Ignore decimal point**

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 misuse in any way.

When returning the instrument please enclose a letter stating your name, address and date and place of purchase. The instrument should be carefully packed, preferably in the box supplied, and sent, carriage paid, to:—

The Multimeter Service Department,
Sinclair Radionics Limited,
London Road,
St. Ives,
Huntingdon,
Cambridgeshire.
PE17 4HJ.

Tel: St. Ives (0480) 64646
Telex: 32250

Customers outside the UK should contact the main agent for that country.
Should the cause of failure during the guarantee period be due to misuse of the instrument, or if the guarantee has expired, the repair will be put in hand immediately and charged unless other instructions are received.
The policy of the company is one of continuous improvement and we reserve the right to alter specification without prior notice.

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