JDR INSTRUMENTS
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MADE IN KOREA

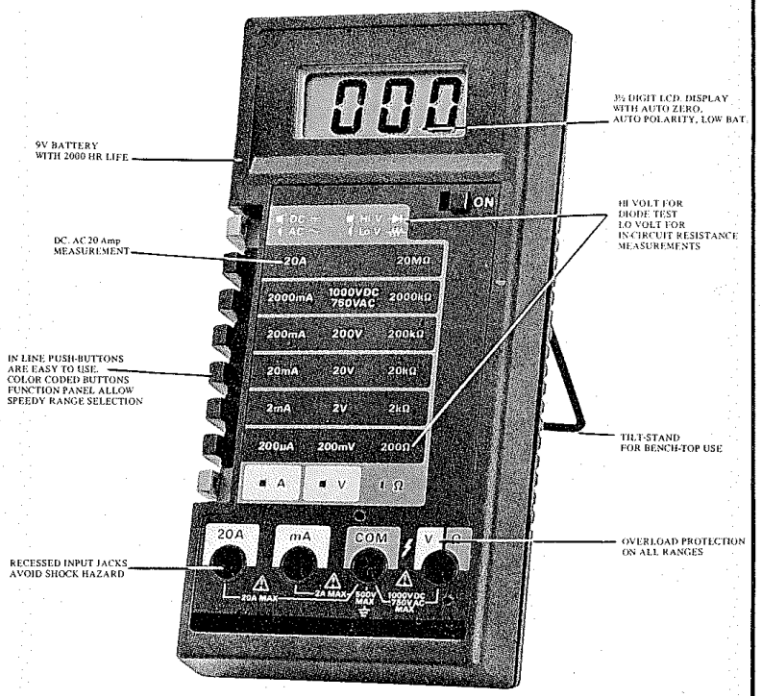
DIGITAL MULTIMETER
MODEL DMM-200

JDR INSTRUMENTS

RELIABLE, ACCURATE MEASUREMENTS

0.25%BASIC DC ACCURACY. 20 AMP, AC/DC,

AMAZING QUALITY AT LOW COST!



SAFETY SYMBOLS

The symbol ⚠ on the instrument denotes that the user should refer to the operating instruction.

The symbol ⚡ on the instrument denotes that a high voltage may be present on the terminal(s).

SAFETY RULES

⚠ This symbol means "refer to the operating instructions."

WARNING

This tester has been designed with your safety in mind. However, no design can completely protect against incorrect use. Electrical circuits can be dangerous and/or lethal when lack of caution or poor safety practices are used.

READ THE MANUAL

Read this Instruction Manual carefully and completely. Voltages and currents within the capability of this test equipment can be hazardous. Follow the instructions in this manual for every measurement. Read and understand the general instructions before attempting to use this tester. Do not exceed the limits of the tester.

SAFETY CHECK

Double check the switch setting, and lead connections before making measurements. Are you following all of the instructions? Disconnect the tester or turn off the power before changing switch positions. Do not connect to circuits with voltage present when switch is in any ohms or current position. When replacing fuses use only specified typefuses and insert in correct fuse holder.

DON'T TOUCH

Don't touch exposed wiring, connections or other "live" parts of an electrical circuit. If in doubt, check the circuit first for voltage before touching it.

Turn off the power to a circuit before connecting test probes to it. Be sure there is no voltage present before you touch the circuit. Do not use cracked or broken test leads. Check the test leads periodically. Leads that are worn, have damaged insulation. damaged plugs, damaged probes or loose parts should be replaced.

HIGH VOLTAGE IS DANGEROUS

Always start with the power off. Be sure there is no voltage present before making connections to the circuit. Don't touch the tester, its test leads, or any part of the circuti while it is on.

Check the test leads periodically

Before disconnecting the tester, turn the circuit off and wait for the meter to return to "zero."

DISTRIBUTION CIRCUITS PACK A PUNCH

In high energy circuits such as distribution transformers and bus bars, dangerous arcs of explosive nature can occur if the circuit is shorted. If the tester is connected across a high energy circuit when set to a low resistance range, a current range, or any other low impedance range, the circuit is virtually shorted.

Special equipment designed for use with these circuits is available. Contact a qualified person for assistance before attempting to make measurements on any high energy circuit.

"SAFETY IS NO ACCIDENT!"

SPECIFICATION

GENERAL

Display: 3½ digit LCD 0.5" height, with polarity sign.
Overrange Indication: 3 least significant digits blanked.
Maximum Common Mode Voltage: 500V peak.
Operating Environment: 0 to 50°C; less than 80% relative humidity up to 35°C, less than 70% relative humidity from 35°C to 50°C.
Storage Environment: -15°C to 65°C.
Temperature Coefficient (0 to 18°C and 28°C to 50°C): Less than 0.1 × applicable accuracy specification per °C.
Power: 9V alkaline or carbon-zinc battery (NEDA 1604).
Battery Life: 2000 hours with alkaline battery.
Battery Indicator: Display indicates "LO BAT" when less than 20% of life remains.
Size: 180 × 86 × 37mm.
Weight: 320g.
Fuse: 2A 250V.

DC VOLTAGE

Range	Resolution	Accuracy (1yr) 18°C to 28°C
200mV	100μV	
2V	1mV	
20V	10mV	± (0.25% of rdg + 1d)
200V	100mV	
1000V	1V	

Maximum Allowable Input: 1000VDC or peak AC.
Input Resistance: 10M all ranges.
Normal Mode Rejection Ratio: Greater than 46dB at 50Hz.
Common Mode Rejection Ratio: Greater than 100dB at 60Hz.
Response Time: 1 second to rated accuracy.

DC CURRENT

Range	Resolution	Accuracy (1yr) 18°C to 28°C	Maximum Full Scale Voltage Drop
200μA	100nA	± (0.5% of rdg + 1d)	0.25V
2mA	1μA	± (0.5% of rdg + 1d)	0.25V
20mA	10μA	± (0.5% of rdg + 1d)	0.25V
200mA	100μA	± (0.75% of rdg + 1d)	0.25V
2000mA	1mA	± (1.5% of 1dg + 1d)	0.5V
20A	10mA	± (2% of rdg + 5d)	0.3V

Overload Protection: mA input, 2A fuse/250V.
20A input; unfused, up to 20A for 15 seconds.
Response Time: 1 second to rated accuracy.

AC VOLTAGE

Range	Resolution	Accuracy (1yr) 18°C to 28°C	Frequency Range
200mV	100μV	± (0.5% of rdg + 2d)	45 Hz – 400 Hz
2V	1mV	± (0.5% of rdg + 2d)	45 Hz – 400 Hz
20V	10mV	± (0.5% of rdg + 2d)	45 Hz – 400 Hz
200V	100mV	± (0.5% of rdg + 2d)	45 Hz – 120 Hz
750V	1V	± (1% of rdg + 2d)	45 Hz – 120 Hz

Maximum Allowable Input: 750V RMS.
Input Impedance: 10M shunted by less than 100pF all ranges.
Response: Average responding, calibrated in rms of a sine wave.
Response Time: 3 seconds to rated accuracy.

AC CURRENT

Range	Resolution	Accuracy (1yr) 18°C to 28°C	Full Scale Voltage Drop
200μA	100nA	± (0.75% of rdg + 5d)	0.25V rms
2mA	1μA	± (0.75% of rdg + 5d)	0.25V rms
20mA	10μA	± (0.75% of rdg + 5d)	0.25V rms
200mA	100μA	± (0.75% of rdg + 5d)	0.25V rms
2000mA	1mA	± (1.5% of rdg + 5d)	0.5V rms
20A	10mA	± (3% of rdg + 5d)	0.3V rms

Overload Protection: mA input, 2A fuse (250V).
20A input; unfused, up to 20A for 15 seconds.
Frequency: 45 to 60 Hz.
Response Time: 3 seconds to rated accuracy.

RESISTANCE

Range	Resolution	Accuracy (1yr) 18°C to 28°C
200	100m ohm	± (0.5% of rdg + rd)
2K	1 ohm	± (0.3% of rdg + 1d)
20K	10 ohm	± (0.3% of rdg + 1d)
200K	100 ohm	± (0.3% of rdg + 1d)
2000K	1K ohm	± (0.75% of rdg + 1d)
20M	10K ohm	± (1.5% of rdg + 1d)

Maximum Open Circuit Voltage: Less than 3V.
Overload Protection: 250V DC or rms.

FULLY OVERLOAD PROTECTED

Overload Protection is available on all ranges. For overvoltage protection, a selected sparkagp with low capacitance is used. An inrush current limiter protects the resistance ranges. A pair of fast switching high current silicon diodes plus a fuse provide excellent protection on current ranges. Furthermore, the input of the AC converter is overvoltage protected with use of a resistordiode combination.

HI-LOW RESISTANCE/DIODE CHECK

On all resistance ranges a HI (3V) and LOW (600mV) is available. Test Voltage is push-button switch selectable (2nd function of AC/DC switch). Low voltage allows convenient in-circuit measurements of all electronic components without affecting semi-conductors. The HI (3V) allows testing of diode forward and reverse resistance.

OPERATING INSTRUCTIONS

GENERAL

The power switch is on the right side below the display. It is recommended that for maximum battery life, the switch should be left in the off position when measurements are not being taken.

The top button sets the instrument for AC operation in the "In" position, for DC in the "Out" position, when measuring either current or voltage. When measuring ohms, the same botton selects either a 3V voltage in the "Out" position or a 600 mV voltage in the "In" position. Use of these voltages is explained in the section entitled "Measuring Resistance". The bottom button sets the instrument for measuring voltage and current in the "Out" position and ohms in the "In" position. The light colored buttons select the ranges as indicated.

On DC measurements a "–" sign in the display means the common is positive, the other lead negative. A reading exceeding the selected range is indicated by the appearance of a left side "1" and the absence of the three remaining digits to the right.

MEASURING DC VOLTS

1. Plug black lead in "COM", red lead in "VΩ" jacks.
2. Top button "Out".
3. Bottom button "Out"
4. Push range selector button to the voltage range on volt scale higher than expected voltage.

CAUTION

DO NOT MEASURE OVER 1000 VOLTS DC TO AVOID DANGER TO OPERATOR AND INSTRUMENT. DO NOT CONNECT "COMMON" TO VOLTAGE SOURCES OVER 500 VOLTS ABOVE GROUND TO ABOID RISK OF SERIOUS SHOCK.

5. Turn power "ON" and connect test leads to circuit under test.
6. If a "1 " shows with no other digits, scale chosen was too low; push successive higher range buttons until a 3 digit or 4 digit number appears. If the display number is less than "200", going to a lower range will increase, the resolution and accuracy.
7. If "–" shows on display "COM" lead is "+" and "VΩ" lead (Red) is "–".

MEASURING DC CURRENT

1. Plug black lead in "COM"; red lead in "mA" jack for 200μA to 2000mA, when measuring more than DC 2000mA, red lead in "20A" jack.
2. Top button "Out".
3. Bottom button "Out".
4. Push range selector button to a current range higher than the expected current.
5. Turn power "ON", and connect test leads in series with current to be measured.
6. If a "1" shows with no other digits, scale chosen was too low; push successive higher range buttons until a 3 digit or 4 digit number appears If the display number is less than "200", going to a lower range will increase the resolution and accuracy.
7. If "–" shows on display, "COM" lead in "+" and "mA" or "20A". lead (Red) is "–".

MEASURING AC VOLTS

1. Plug one lead in "COM", other lead in "VΩ" jacks.
2. Top button "In".
3. Bottom button "Out".
4. Push range selector button to a voltage range higher than the expected voltage.

CAUTION

DO NOT MEASURE OVER 750 VOLTS AC TO AVOID DANGER TO OPERATOR AND INSTRUMENT. DO NOT CONNECT "COMMON" TO VOLTAGE SOURCES OVER 500 VOLTS ABOVE GROUND TO AVOID RISK OF SERIOUS SHOCK.

5. Turn power "ON" and connect test leads to circuit under test.
6. If a "1" shows with no other digits, scale chosen was too low; push successive higher range button until a 3 digit or 4 digit number appears. If the display number is less than "200", going to a lower range will increase the resolution and accuracy.
7. Readings are calibrated to read RMS for sine waves only.

MEASURING AC CURRENT

1. Plug one lead in "COM", the other in "mA" jack for 200μA to 2000mA, when measuring more than AC 2000mA, red lead in "20A" jack.
2. Top button "In".
3. Bottom button "Out".
4. Push range selector button to a current range with higher than the expected current.
5. Turn power "ON" and connect test leads in series with current to be measured.
6. If a "1" shows with no other digits, scale chosen was too low; push successive higher range buttons until a 3 digit or 4 digit number appears. If the display number is less than "200", going to a lower range will increase the resolution and accuracy.
7. Readings are calibrated to read RMS for sine waves only.

MEASURING RESISTANCE

1. Plug black lead in "COM", and red lead in "VΩ" jacks.
2. Bottom button "In".
3. Push range selector button to a resistance range higher than the expected resistance.

4. If taking resistance readings on components that are not voltage sensitive, leave the top button "Out". This applies <3 volts to the device and gives somewhat higher accuracy. This position is also used when checking front to back ratios on semiconductors since the voltage exceeds the turn on threshould of most devices. The black lead will be negative and the red lead positive if step 1 is followed.
5. If taking resistance readings on components in a circuit where voltage sensitive components are involved, push the top button "In". This drops the voltage at the test leads to <600mV, which is below the threshold of operation of most semiconductors.

CAUTION

MAKE CERTAIN WHEN TAKING RESISTANCE READINGS THAT CIRCUITS ARE DE-ENERGIZED AND CAPACITORS ARE DISCHARGED TO AVOID A BLOWN FUSE DUE TO EXCESSIVE CURRENT.

6. Turn power "On" and connect test leads to component or circuit under test.
7. If a "1" shows, with no other digits, scale chosen was too low. Push successive higher range buttons until a 3 digit or 4 digit number appears. If the display number is less than "200", going to a lower range will increase the resolution and accuracy.

MAINTENANCE PROCEDURES

Regular operator maintenance of the multimeters consists of cleaning case and window, battery replacement, and fuse replacement. All other repairs should be performed by qualified instrument service personnel.

CLEANING CASE AND WINDOW

CAUTION

DO NOT USE AROMATIC HYDROCARBONS OR CHLORINATED SOLVENTS FOR CLEANING. THESE CHEMICALS WILL REACT WITH PLASTICS USED IN CONSTRUCTION OF CASE.

The front panel case should be cleaned with a mild solutionof detergent and water. Apply sparingly with a soft cloth and allow to dry completely before using.

BATTERY/FUSE REPLACEMENT

When the 9V battery has reached the end of its useful life, the words "LO BAT" will appear on the LCD screen. The fuse rarely needs replacement and blows almost always as a result of operator error. The 2amp fuse protects the current measuring circuits which measure up to 2000mA.

WARNING

TO PREVENT ELECTRICAL SHOCK HAZARD, TURN OFF MULTIMETER AND DISCONNECTOR TEST LEADS BEFORE REMOVING BACK COVER.

1. After disconnecting test leads and turning off multimeter remove back cover by removing three screws than life off back cover.
2. The battery/fuse is located in the lower part of the case. Disconnect battery from instrument and replace with a standard 9 Volt transistor battery.
3. Replace back cover and secure with three screws.

WARNING

DO NOT OPERATE MULTIMETER WITH BACK COVER REMOVED (EXCEPT DURING CALIBRATION).

ARNING

TO PREVENT FIRE, USE 2A/250V FUSE ONLY.

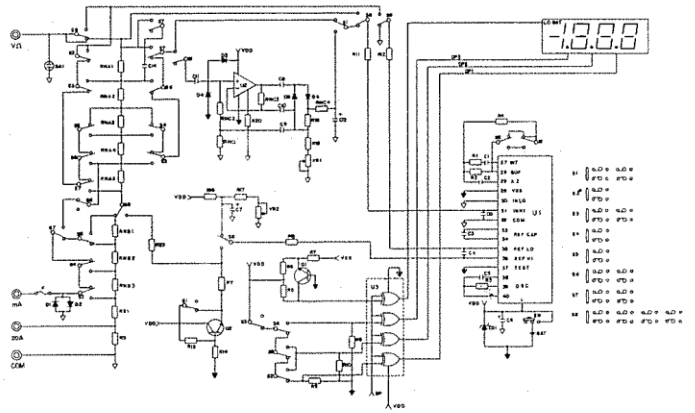
CALIBRATION PROCEDURE

Recalibration should not be necessary for long intervals. In no event should adjustments be made without highly accurate voltage standards (better than 0.1% accuracy). Carefully remove the plastic back cover With the instrument operating and set to the 200mV DC range, apply 190mV DC from an accurate source. With a small screwdriver inserted into the hole marked "DC ADJ", carefully turn the variable resistor until the resding reads 190.0mV. With set to the 200mV AC range apply an accurste 190mV pure sine wave at a frequency of 60Hz. Insert a small screwdriver in the hole marked "AC ADJ" and turn carefully until meter reads 190.0mV. Reassemble by reversing the disassembly procedure.

NOTE

THE CALIBRATION SHOULD BE PERFORMED BY THE FIRST STEP OF DC 200mV, BY THE QUALIFIED PERSONS AND BY THE SPECIFIED ENVIRONMENT.

SCHEMATIC DIAGRAM



PARTS LIST

PARTS		PARTS	DESCRIPTION
U1	A/D CONVERTOR ICL 7126	R19	RESISTOR 5.6 KΩ ½WF METAL
U2	OP AMP SFC 2776	R20	RESISTOR 680 KΩ ½WJ CARBON
U3	EX or GATE CD 4030 or 4070	R21	RESISTOR 0.09Ω ½WB WIRE
Q1, 2	TR SI NPN 2N 3904	R22	RESISTOR 100 Ω ½WC METAL
PT	CURRENT LIMITTER 1KΩ 8mA 500V	RNA	RESISTOR NETWORK HC-DMM-V 0.25%
D1, 2	DIODE 1N 5400	RNB	RESISTOR NETWORK HC-DMM-S 0.25%
D3, 4, 5, 6	DIODE 1N 914	RNC	RESISTOR NETWORK HC-501D 1%
R1	RESISTOR 750 Ω ½WF METAL	C1	CAPACITOR 0.047μF 63V METALIZED
R2	RESISTOR 1.8 MΩ ½WJ CARBON	C2	CAPACITOR 0.22μF 63V METALIZED
R3	RESISTOR 125 KΩ ½WF METAL	C3, 4, 9, 10, 13	CAPACITOR 0.1μF 63V METALIZED
R4	RESISTOR 810 KΩ ½WJ CARBON	C5	CAPACITOR 50pF 50V MICA
R5,6,8,10,11,12,13	RESISTOR 1 MΩ ½WJ CARBON	C6, 7	CAPACITOR 10μF 16V ELECTRIC
R7	RESISTOR 220 KΩ ½WJ CARBON	C8	CAPACITOR 4.7μF 16V ELECTRIC
R14	RESISTOR 150 KΩ ½WJ CARBON	C11	CAPACITOR 0.022μF 630V METALIZED
R15	RESISTOR 110 KΩ ½WJ CARBON	C12	CAPACITOR 1μF 16V ELECTRIC
R16	RESISTOR 270 KΩ ½WF METAL	C14	CAPACITOR 0.01uF 500V CERAMIC
R17	RESISTOR 8.6 KΩ ½WF METAL	VR1	SEMI VR 2 KΩ
R18	RESISTOR 12 KΩ ½WF METAL	VR2	SEMI VR 500 Ω
		JD1	RENER DIODE 1N 963B