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Test & Measurement

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- calibration
- repair
- disposal

Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

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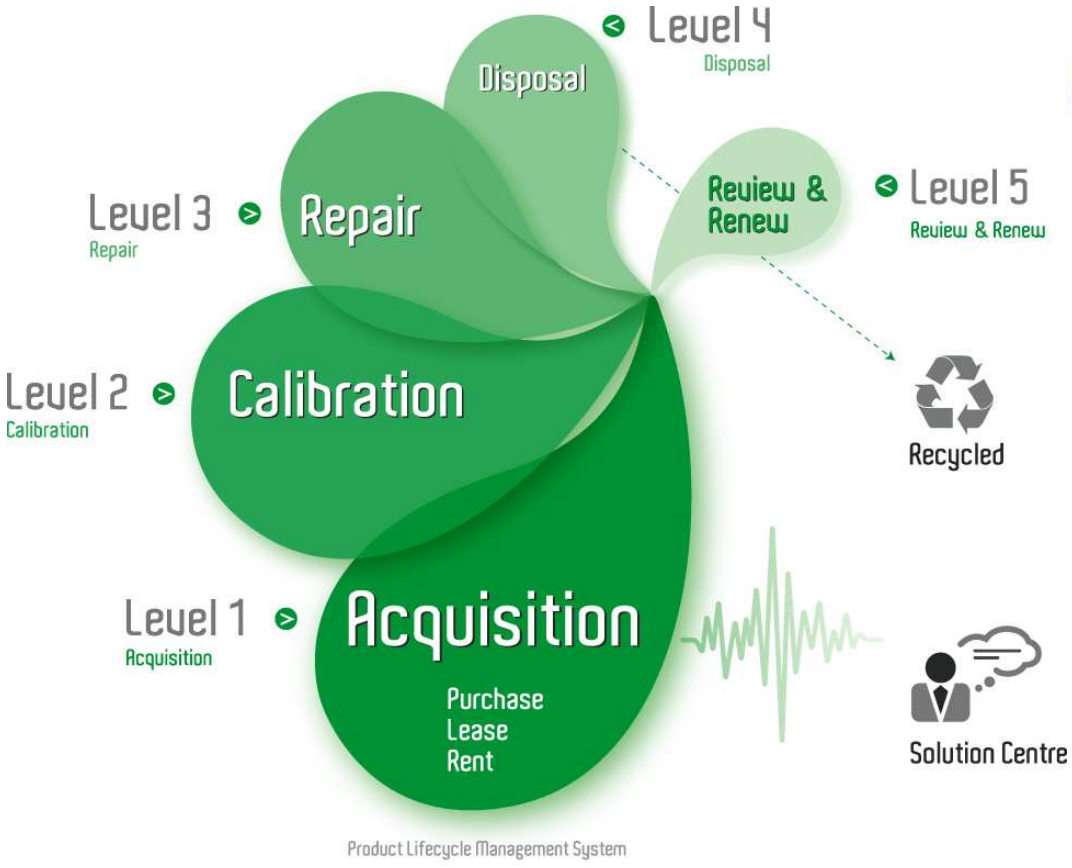


The digital multimeter, with the capability of measuring voltage, resistance, and current, is the most widely used electronic test instrument employed today, with the possible exception of the oscilloscope. Modern digital techniques have vastly improved the resolution and accuracy of the traditional volt-ohm-milliammeter, simplified instrument use, and reduced the possibilities of human error. The TM 500 Digital Multimeter line consists of two general-purpose instruments, the DM 501 and DM 502 Digital Multimeters. In addition to the usual dc and ac voltage, resistance, and dc and ac current functions, both meters offer an optional temperature measurement function. Applying the tip of the optional temperature probe to a power transistor, integrated circuit, mechanical component, or any other surface provides digital readout of the surface temperature in degrees Celsius or degrees Fahrenheit at the user's choice. The DM 502 further extends measurement capability by providing a standard decibel (dB) measurement feature across all ac ranges.

The DM 501 and DM 502 are similar instruments in many respects. Each measures dc voltage to 1000 volts (extendable to 40,000 volts with the addition of the optional high-voltage accessory probe), ac voltage to 500 volts, both dc and ac current to 2 amps, and resistance to 20 megohms. Optionally, both provide probe measurement of surface temperatures from −55°C to +150°C. The most significant differences lie in the dB capability of the DM 502, the 4½ digits of the DM 501 versus 3½ in the DM 502, and the floating bcd output of the DM 501 (for compatibility with the TEKTRONIX 31/53 Calculator Instrumentation System and other digital readout systems).

Since the DM 501 is a 4½ digit instrument, it can provide significantly more precise values than 3½ digit instruments, including the DM 502. At a given signal level, the 4½ digit instrument can supply X10 better resolution and conversely it can also measure X10 as large a signal at any given resolution level.

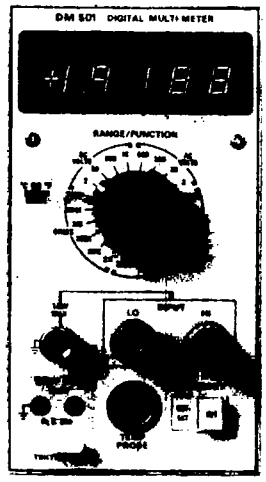
For example, an exact 2.000-volt signal must be measured on the 20-volt range on either instrument, since full scale on the nominal 2-volt range is actually 1.999 or 1.9999 volts. The specified possible error of the DM 502 (display 2.00) is ± 0.1% of reading ± 1 count, equal to ± 12 millivolts, or 0.6% of reading. The same input is displayed on the DM 501 as 2.000, and the possible error of ± 0.1% of reading ± 2 counts is 2.2 millivolts, or 0.11% — almost six times better.

The dB feature of the DM 502 is of great value in the general audio and communications industry: in mobile radio, microwave, telephone communication, computer time-sharing, and other applications of data transmission via voice links, broadcasting, high-fidelity and recording industries, sonar, acoustics, audiometrics, and many other fields. The absolute reference of the DM 502 may be selected, by internal jumper, as dBm (0 dB = 0.775 V or 1 mW in 600 Ω) or dBV (0 dB = 1 V). With either reference, the dynamic range extends from −60 dB to approximately +56 dB.

DIGITAL MULTIMETERS DM 501 AND DM 502 COMPARISON OF CHARACTERISTICS

The following is a comparison of the major characteristics of the DM 501 and DM 502. A complete set of specifications may be found on the following pages.

	DM 501	DM 502
Number of Digits	4½	3½
Dc Volts — full scale	2 V to 1 kV	0.2 V to 1 kV
Ac Volts — full scale	2 V to 500 V	0.2 V to 500 V
Dc Current — full scale	2 mA to 2 A	200 μA to 2 A
Ac Current — full scale		
Resistance — full scale	2 kΩ to 20 MΩ	200 Ω to 20 MΩ
Temperature Probe	Optional	Optional
dB	No	−60 dB to +56 dB
Bcd Output	Full Floating	Nonfloating
Input Impedance	10 MΩ	10 MΩ normal; FET input on 0.2 and 2 volt scales by internal jumper
Price	**$350 to $475**	**$250 to $375**



DM 501

0.1% Dc Voltage Accuracy

4½ Digit LED Display

Auto Polarity

Measures Volts, Current, Resistance, Temperature

Fully Isolated Serial Bcd Output

The DM 501 Digital Multimeter measures dc and ac voltage and current, resistance, and temperature. Dc voltage measurement accuracy is 0.1%. The ac functions are average responding and rms calibrated. A single front-panel control selects all functions and ranges. A pushbutton selects front-panel input or optional rear interface connector input. Temperature measurements are made using a TEKTRONIX P6058 Probe or other suitable sensing devices. Front-panel pin jacks provide external temperature readout, at 10 mV per degree, regardless of the position of the function switch. An internal switch selects calibration in degrees Celsius or Fahrenheit. Readout is a 4½ digit stored display using seven segment LEDs. The decimal point is automatically positioned by the RANGE/FUNCTION switch and leading zeros (those to the left of the decimal point or most significant digit) are blanked. Polarity indication is automatic. A blinking display indicates overrange. Serial bcd output is available at the rear interface connector.

DC VOLTAGE

Range — 2 V, 20 V, 200 V, and 1 kV full scale (19999 max reading), accurate within 0.1% of reading ±2 counts.

Resolution — 100 μV on 2 V range.

Common-Mode Rejection — > 100 dB at dc, 80 dB at 60 Hz with 1 kΩ imbalance.

Step Response Time — <1 s.

Normal-Mode Rejection — ≥30 dB at 60 Hz increasing 20 dB per decade.

Input R — 10 MΩ, constant.

AC VOLTAGE

Range — 2 V, 20 V, 200 V, and 500 V full scale (19999 max reading), average responding, rms calibrated.

Accuracy — Within 0.7% of reading ±2 counts from 40 Hz to 10 kHz; 1.2% of reading ±2 counts, 20 Hz to 20 kHz. Usable to 100 kHz. Typically <5% down between 0.4 V and 500 V at 100 kHz.

Resolution — 100 μV on 2 V range.

Response Time — <10 s.

Input R — 10 MΩ paralleled by <100 pF.

AC and DC CURRENT

Range — 2 mA, 20 mA, 200 mA, 2 A full scale (19999 max reading), ac rms calibrated, average responding.

Resolution — 100 nA on 2 mA range.

Accuracy — Dc amps, 0.2% of reading ±10 counts; ac amps, 0.6% of reading ±2 counts from 40 Hz to 1 kHz ±0.6% of reading, ±10 counts, 1 kHz to 10 kHz. Usable to 100 kHz.

Input R — $\frac{0.2\ V}{\text{Range Setting}}$ + 0.1 Ω

RESISTANCE

Range — 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 20 MΩ full scale (19999 max reading).

Accuracy — Within 0.3% of reading, ±2 counts to 2 MΩ, 0.5% of reading, ±2 counts on 20 MΩ scale.

Resolution — 0.1 Ω on 2 kΩ range.

TEMPERATURE MEASUREMENT

Range — 55°C to +150°C (−67°F to +302°F selected by internal switch), using included temperature probe. The temperature probe functions regardless of the DM 501 mode and provides a front-panel analog signal output of 10 mV/° (into 2 kΩ or greater); thus temperature may be measured simultaneously with any other function. If temperature probe is not desired, order Option 01. If temperature capability is not desired, order Option 02; note: capability cannot be restored at a later date.

Accuracy — Within 1.5°C (2.7°F) from 55°C to +125°C and within 2.5°C (4.5°F) from 55°C to +150°C.

Resolution — 0.1°.

OTHER CHARACTERISTICS

Overrange Indication — Blinking display.

Measurement Rate — 5 measurements/second.

Max Input Voltage — 1 kV. The front-panel HI and LO connectors may be floated 1.5 kV max above ground, the rear inputs 350 V max. Current measuring functions are fused at 3 A. Ohms ranges are fused at 1/16 A.

Ambient Temperature — Performance characteristics are valid over a temperature range of +15°C to +35°C.

Standard Accessories — 1 Pair Test Leads (003-0120-00), 1 P6058 Temp Probe (010-0259-00).

ORDERING INFORMATION

DM 501 Digital Multimeter **$475**

Option 01 without Temp Probe (P6058) ..... **Sub $105**

Option 02 without Temp Capability and Probe ..... **Sub $125**

Optional Accessories — Deluxe test lead with accessories including push-on spring-loaded hook tip and special IC package tip, high flexibility wire, red, 4 ft.
Order (012-0426-00) **$8.00**

As above except black.
Order (012-0426-01) **$8.00**

Test lead with alligator clip, 4 ft, black.
Order (012-0425-00) **$4.20**

High Voltage Probe to 40 kV
Order (010-0277-00) **$65**

DM 502

dB Readings from −60 dB to +56 dB

Six Functions Including Temperature and dB

0.1% Dc Voltage Accuracy

Autopolarity

DMM Prices Start at $250

The DM 502 Digital Multimeter measures dc and ac voltage and current, dBm, dBV, resistance, and temperature. The ac functions are average responding and rms calibrated. A single front-panel control selects all ranges. Front-panel pushbuttons select dB readout of ac functions in lieu of ac voltage or current and front-panel or rear interface connector input. dB is obtained by adding the selected dB scale value to the display reading. Readout in dBm or dBV is chosen by an internal jumper. An internal jumper also permits selection of FET input (>1000 MΩ) or 10 MΩ input impedance on the two lowest dc voltage ranges.

The readout is a 3½ digit display using seven-segment LEDs. The decimal point is automatically positioned by the RANGE/FUNCTION switch. Polarity indication is automatic. Maximum display at stated accuracy is 1999.

Nonfloating bcd output (referenced to the low input), is available at the rear interface connector if user wired.

DC VOLTAGE

Range — 0.2 V, 2 V, 20 V, 200 V, 1000 V.

Accuracy — Within ±0.1% of reading, ±1 count.

Common-Mode Rejection — ≥100 dB at dc, ≥80 dB at 50 or 60 Hz with 1 kΩ imbalance.

Normal-Mode Rejection — >80 dB at 50 or 60 Hz.

Step Response Time — <0.5 s.

Input R — 10 MΩ (jumper selectable for >1000 MΩ on 0.2 V and 2 V ranges).

AC VOLTAGE

Voltage Range — 0.2 V, 2 V, 20 V, 200 V, 500 V.

Accuracy — Within ±0.5% of reading, ±1 count, 40 Hz to 10 kHz. ±1.0% of reading, ±1 count, 20 Hz to 20 kHz. Usable to 100 kHz. Typically <10% down between 40 mV and 500 V at 100 kHz.

Response Time — <5 s.

Common-Mode Rejection — ≥60 dB at 50 or 60 Hz.

Input R — 10 MΩ paralleled by less than 60 pF.

dB VOLTS AND CURRENT

Scales — +40, +20, 0, −20, −40 dB. Reference is dBV (1 V) or dBm (1 mW dissipated in 600 Ω, 0.7746 V), selected by internal jumper.

Display — ±19.99 dB on any scale, except that the total dynamic range is limited to the range −60 dB to approx +56 dB by a 500 V max input specification.

Accuracy

Display Reading	Frequency Range	Max Error
0 to ±19.99	20 Hz to 20 kHz	0.5 dB
0 to ±10.00	20 Hz to 2 kHz	0.5 dB
	2 kHz to 20 kHz	1.0 dB
10.00 to −19.99	20 Hz to 2 kHz	0.5 dB
	2 kHz to 7.5 kHz	1.0 dB
	7.5 kHz to 20 kHz	2.0 dB

Response Time — <5 s.

Common-Mode Rejection — ≥60 dB at 50 or 60 Hz.

RESISTANCE

Ranges — 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 20 MΩ.

Accuracy — 200 Ω range, 0.5% of reading, ±1 count, +0.1 Ω; 2 kΩ through 2 MΩ range, ±0.5% of reading, ±1 count; 20 MΩ range, 1.0%, ±1 count.

Response Time — <0.5 s; 20 MΩ range, ≤5 s.

Max Output Current and Voltage — 1 mA max; approx 12 V max.

AC & DC CURRENT

Ranges — 200 μA, 2 mA, 20 mA, 200 mA, 2 A.

Accuracy — Dc current 0.2% of reading ±1 count; ac current 0.6% of reading ±1 count 40 Hz to 10 kHz.

Response Time — Dc <0.5 s; ac <5 s.

Input Impedance — $\frac{0.2\ V}{\text{Range Setting}}$ + 0.1 Ω (<2 kΩ with 200 μA range)

TEMPERATURE MEASUREMENT

Ranges — Celsius: −55°C to +150°C. Fahrenheit: 67°F to +200°F.

Accuracy — With probe shipped with instrument ±2°C (±3.6°F). With any P6430 probe prior to calibration with instrument, ±8°C (±14.4°F).

The temperature probe functions in all other modes in °C with analog signal out of 10 mV/° at rear interconnect.

OTHER CHARACTERISTICS

Overrange Indication — Blinking display.

Measurement Rate — 3.33 per second.

Inputs — The max input voltage is 1 kV. The front-panel HI and LO connectors may be floated 1 kV max above ground, the rear Inputs 350 V. Current measuring functions are fused at 2.5 A. Ohms functions protected to 120 V rms indefinitely, 250 V rms ½ hour.

Ambient Temperature — Performance characteristics are valid over a temperature range of +15°C to +40°C.

Standard Accessories — 1 pair Test Leads (003-0120-00), 1 P6430 Temp Probe (010-6430-00).

ORDERING INFORMATION

DM 502 Digital Multimeter **$375**

Option 02 without Temp Capability and Probe ..... **Sub $125**

Optional Accessories — Deluxe test lead with accessories including push-on spring-loaded hook tip and special IC package tip, high flexibility wire, red, 4 ft.
Order (012-0426-00) **$8.00**

As above except black.
Order (012-0426-01) **$8.00**

Test lead with alligator clip, 4 ft, black.
Order (012-0425-00) **$4.20**

High Voltage Probe to 40 kV
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