Not Recommended for New Installations.
Please contact Technical Support for more information.

True RMS Handheld Multimeter

Model M-3640D

Documentation Number M3640D1598

B&B Electronics Mfg. Co. Inc.
707 Dayton Road -- P.O. Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

Internet:
http://www.bb-elec.com
sales@bb-elec.com
support@bb-elec.com

B&B Electronics -- May 1997

ATTENTION: METEX USERS

This addendum contains corrections and additions to the user's manual.

Paragraph 6-12-2, page 32, of the M-3640D Digital Multimeter manual refers to two computer programs: METEX and Scopeview. These programs are no longer available and have been replaced by METVIEW. This program works with Windows 3.11, Windows 95, and Windows NT. Please use the following Installation information and NOT the information in the manual. The Hardware Interfacing information in paragraph 6-12-1 is correct.

Installing the Supplied Software

We have included a Windows 95/NT program, named METVIEW.EXE, to log data collected with your meter. To install the software on your hard drive:

1. Insert the disk in drive A.
2. Click the start button in the lower left corned of the screen and choose "Settings I Control Panel I Add / Remove Programs".
3. Click the install button and follow the directions.

Using the Software

To run the software after it has been installed, click the start button in the lower left corner of the screen and choose "Programs I Metex I Metex". After starting the metex program, click the setup button. A dialog box appears that allows you to select the serial communications port, sampling interval, and logging file. Note that the logging file can only be changed when the “Enabled Data Logging" check box is checked. The filename may be typed in or you can click the browse button to select where the file should be located. Once you have completed the setup, click the OK button.

To start collecting data from the meter, click the button labeled "start". Data is read from the meter at the sampling interval that was selected when you setup the software. If data logging is enabled, the data is written to a disk file. To stop collecting data, click the button labeled "stop". Note that this is the same button as the start button.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

Format of the Data File

The data is written to the logging file as fixed length records. The format is:

HH:MM:SS XX######YYYY↵

where HH:MM:SS is the hour (24 hour format), minute and second when the sample was taken, XX is the meter function, ###### is the value read from the meter, and YYYY is the units. This file can be read by a program, such as Microsoft Excel, to analyze the data or print out a chart.

Telephone..... 815-433-5100
8 am--4:30 pm Central Standard Time
Monday through Friday
24-hour FAX..... 815-433-5104
Intemet E-Mail
Sales..... orders@bb-elec.com
Technical Support..... support@bb-elec.com
World-Wide Web Site ..... http://www.bb-elec.com
Postal Mail ..... B&B ELECTRONICS MFG CO INC
707 DAYTON ROAD
PO BOX 1040
OTTAWA IL 61350 USA

Table of Contents

1. INTRODUCTION 1
2. SAFETY INFORMATION 2
2-1. Safety Requirements 2
2-2. Safety Symbols 2
2-3. Safety Warnings 3
3. PREPARING FOR OPERATION 4
3-1. Installing the Battery 4
3-2. Using the Test Probes 5
3-3. Using the Stand 5
4. PRE-OPERATION CHECK 6
5. HOW TO USE THE METER 7
5-1. Pushbuttons 7
5-2. Items 7-8 describe the Sockets. 8
5-3. Input Terminals 10
5-4. Digital and Bar Graph Displays 10
5-5. Annunciators 14
6. HOW TO MAKE MEASUREMENTS 17
6-1 . Measuring DC /AC Voltage 17
6-2. Measuring Current 18
6-3. Continuity Testing 19
6-4. Measuring Resistance 20
6-5 Checking Diode 21
6-6. Measuring Frequency 22
6-7. Measuring Capacitance 23
6-8. dB Measurement (M-3640D/3660D only) 23
6-9. Checking Transistors 24
6-10. Measuring Temperature (M-3640D / 3660D only) 25
6-11. Logic Test 26
6-12. Using the Meter with a Computer 27
7. CARE AND MAINTENANCE 30
7-1. Replacing the Fuse 30
7-2. General Maintenance 31
8. SPECIFICATIONS 32
8-1. General Characteristics. 32
8-2. Special Characteristics 36

Due to our policy to refine the products continuously, this manual may contain minor differences in specifications, components, parts and circuit design from the instrument actually delivered.

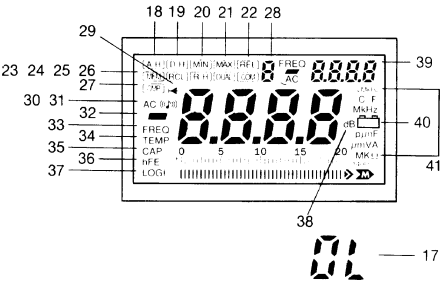
B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

1. INTRODUCTION

The new concept M-3600D Series Multimeters have Dual-Display and Communication function with computer by RS-232C as basic. The meter is a handheld 1999 count instrument with True Rms, dB range, temperature measurement for some models (M-3640D, M-3660D), and frequency measurement up to 20MHz (M-3650D, M-3660D)

Please read these operating instructions very carefully before commencing your measurement.

1. Power Button
2. Function Button
3. Set/Reset Button
4. DC/AC Button
5. Up Button
6. Down Button
7. Transistor Socket
8. Capacitance/Temp. Socket
9. Rotary Switch
10. 20A Terminal
11. mA Terminal
12. COM Terminal
13. V/Ω Terminal
14. LCD (3 1/2 digit, Max 1999)
15. Analog Bargraph
16. Bargraph Scale



17. Overload Indication
18. Auto-Hold
19. Data-Hold
20. Minimum
21. Maximum
22. Relative
23. Memory
24. Memory Recall
25. Dual-Display
26. Communication
27. Comparison
28. Address Number
29. Diode Test
30. Alternating Current or Voltage
31. Continuity Test
32. Negative Polarity
33. Frequency
34. Temperature
35. Capacitance
36. Transistor hFE
37. Logic Test
38. Decibel
39. Sub-display
40. Low battery indication
41. Annunciators

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

2. SAFETY INFORMATION

2-1. Safety Requirements

This meter has been manufactured and tested in accordance with IEC 348 and DIN57411/VDE0411 Part 1: Safety Requirement for Electronic Measuring Apparatus, Safety Class II.

This manual contains information and warnings which must be observed to assure safe operation and maintain the meter in safe condition.

NOT FOR HIGH ENERGY INDUSTRIAL USE.

2-2. Safety Symbols

We have placed the following special markings on the panel to remind you of the measurement limitations and safety.

20A	The maximum current that you can measure at this terminal is 20 amps DC/AC. This terminal is fuse protected. For your safety during continuous measurements, keep the duty cycle within 30 seconds in use and more than 15 minutes in rest.
mA	The maximum current that you can measure at this terminal is 200mA DC/AC. This terminal is fuse protected.
MAX ⏚ 500V	To avoid electrical shock or instrument damage, do not connect the Common Input Terminal COM to any source of more than 500 Volts with respect to earth/ground.
MAX ⎓ 1000V ~ 750V	The maximum voltage this meter can measure is 1000V DC or 750V AC.
	Be extra careful when making high-voltage measurements. DO NOT TOUCH THE TERMINALS OR PROBE ENDS.
	Refer to the complete operating instructions.
	Indicates protection class II, double insulation.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

2-3. Safety Warnings

2-3-1. To prevent electric shock hazard and/or damage to the meter, do not measure voltage exceeding 1000V DC or 750V AC.

2-3-2. To avoid damage to the meter and/or injury, observe the input limits as stated in Table 1.

2-3-3. To avoid damage to the meter, disconnect test leads from test points before changing the function/range.

2-3-4. To avoid electric shock, use caution when working above 60V DC or 25V AC RMS. Such voltage pose a shock hazard.

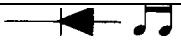
2-3-5. The 20A range is protected by the fuse. To avoid damage or injury, use the meter only in circuits limits by fuse or circuit-breaker to 20A or 4000VA.

Do not apply voltage to between 20A or mA and COM terminals. This warning is to assure protection against injury and/or damage to the meter and the user.

2-3-6. Do not get the meter and test leads wet.

2-3-7. Ensure the test leads are in good condition.

Table 1. INPUT LIMITS

FUNCTION	TERMINAL	INPUT LIMITS
V DC	V/Ω+COM	1000V DC
V AC	V/Ω+COM	750V AC
Ω	V/Ω+COM	250V DC/AC
mA DC/AC	mA+COM	200mA DC/AC
20A DC/AC	20A+COM	20A DC/AC
	V/Ω+COM	250V DC/AC
Freq.	V/Ω+COM	750V DC/AC
Logic	V/Ω+COM	250V DC/AC
DB	V/Ω+COM	20V AC

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

3. PREPARING FOR OPERATION

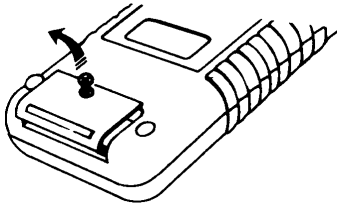
3-1. Installing the Battery

Your meter requires a 9V battery for power. The  symbol appears when the battery voltage drops to certain limits. For proper operation, replace the battery as soon as possible. Continued use with a low battery will lead to abnormal readings.

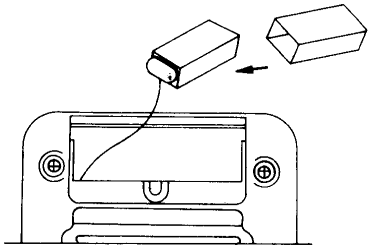
WARNING: TO AVOID ELECTRIC SHOCK, DISCONNECT BOTH LEADS FROM EQUIPMENT BEFORE YOU REMOVE OR INSTALL THE BATTERY.

Follow these steps to install the battery:

1. Turn off the power and disconnect the two test probes.
2. Remove the screw to open the battery compartment.



3. Place the battery into the insulation capsule and snap it on the contacts.



WARNING: DO NOT DISCARD THE PROVIDED BATTERY INSULATION CAPSULE. IF YOU DO NOT USE THIS INSULATION CAPSULE PROPERLY, IT MIGHT CAUSE DAMAGE OR INJURY.

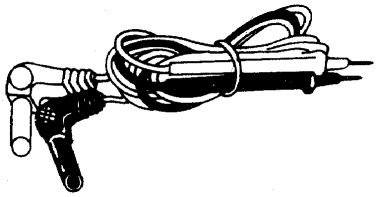
4. Replace the battery compartment cover and secure it with the screw.

WARNING: DO NOT OPERATE THE METER UNTIL YOU REPLACE THE BATTERY AND CLOSE THE BATTERY COMPARTMENT COVER.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

3-2. Using the Test Probes

Use only the type of test probes supplied with your meter. These test probes are rated for 1200 volts.



Cautions:

- Although the replacement test probes are rated for 1200 volts, the maximum rating of your meter is 1000 volts DC and 750 volts AC. If you try to measure DC voltages above 1000 volts or AC voltages above 750 volts rms, you might damage your meter and expose yourself to a serious shock hazard. Use extreme care when you measure high voltages.
- Never connect the probe you plug into the COM terminal to a source of voltage greater than 500 volts with respect to earth ground. This creates a serious shock hazard.

3-3. Using the Stand

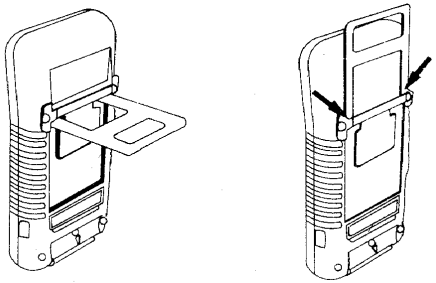
Use your meter's stand to prop up or hang the meter.

Propping Up the Meter

If you prop your meter on a benchtop, the stand helps provide a better viewing angle. To use the stand as a prop, just open it away from the meter and set it on a flat surface.

Hanging the Meter

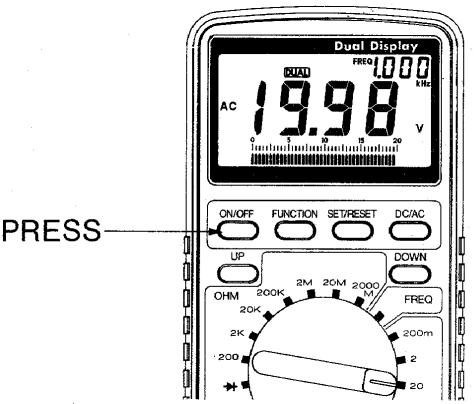
To hang the meter, remove the stand by pressing the lower parts of the stand together. Then insert the stand into top 2 holes.



4. PRE-OPERATION CHECK

To ensure correct operation and familiarize yourself with the meter, follow these steps before you use it.

4-1. Press the ON/OFF button to ON



4.2 To select a function, turn the rotary switch to the appropriate switch position at your desire. The meter is ready for normal operation.

4.3 To select an additional operation, press the appropriate push buttons above the rotary (See Table 2)

- To operate the UP DOWN buttons, press to address the stored reference value in the (MEM) ; (RCL) modes, press to determine the polarity, reference value in the (REL) and (CMP) modes.
- To operate the FUNCTION button, press to select the function mode at your desire, press again to scroll and press SET/RESET button twice to exit.
- To operate the SET/RESET button, press to enter, and press again to exit.
- To operate the DC/AC button, press to toggle between AC and DC when the rotary switch set to Voltage or Current.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

5. HOW TO USE THE METER

This section describes your meter and how to use it. FOR EASE OF REFERENCE, EACH DESCRIPTION IS NUMBERED AND KEYED TO THE ILLUSTRATION INSIDE THE FRONT COVER.

5-1. Pushbuttons

Items 1-6 describe how to use the pushbuttons. These buttons are used (in conjunction with rotary switch) to select operating modes. When a button is pushed the beeper sounds. A summary of pushbutton operation is shown in Table 2. An annunciator is displayed to indicate that a mode or function has been selected. A quick way to reset all the pushbuttons to their default state is to turn the rotary switch to an adjacent function and then back to the function you are using.

1. ON/OFF POWER ON/OFF

Press the ON/OFF(RED) button to turn the meter on. Press again to turn the meter off.

Automatic Power-off

Automatic Power-off extends the life of the battery by turning the meter off if neither the rotary switch nor a pushbutton is operated for 10 minutes. However, during communication with a PC, Hi mode at capacitance, AC mV range and dB measurement, power will not be turned off automatically.

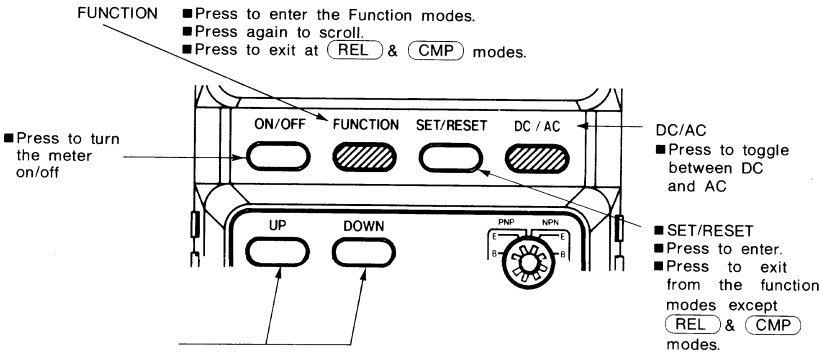


Table 2. Summary of Pushbutton Operations

2. FUNCTION

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

The sign (A-H) will be displayed on the LCD when you turn the power on.

Press the FUNCTION button to enter the function mode. You can select a function mode at your desire by pressing the FUNCTION button and SET/RESET button by turns.

- Sequence of scroll in the Function modes

(A-H) → (D-H) → (MIN) → (MAX) → (REL)
→ (MEM) → (RCL) → (DUAL) → (COM) → (CMP)

3. SET/RESET

Press the SET/RESET button to enter the selected function mode and press again to exit. Then the (A-H) will be displayed on the LCD.

In the function modes of (REL) and (CMP), the RESET function does not work. To exit from these modes, you have to move the selector switch to an adjacent range or press the function key.

4. DC/AC

Press DC/AC button to toggle between DC and AC when the rotary switch is set to Voltage or Current.

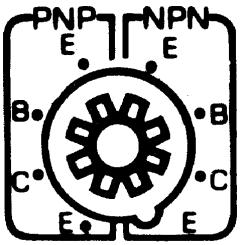
5 & 6. UP DOWN

Press UP DOWN buttons to determine the polarity, value of the reference value in the (REL) and (CMP) modes, to address the stored reference value in the (MEM) and (RCL) modes.

5-2. Items 7-8 describe the Sockets.

7. TRANSISTOR hFE

Insert the base, collector, and emitter pins in the correct sockets, as marked.

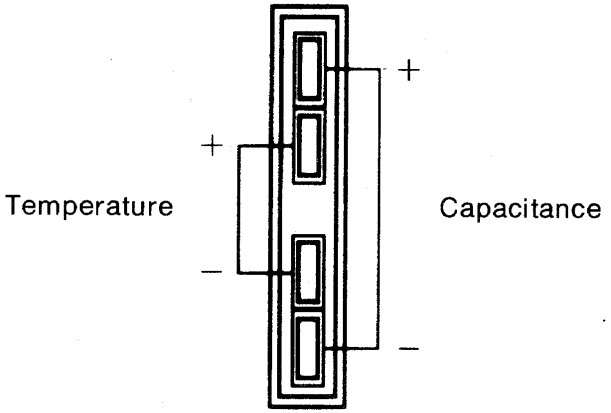


8. CAPACITOR (excluding M-3610D)
TEMPERATURE SOCKET (M-3640D/M-3660D only)

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

Insert the discharged capacitor into the CAP + and - clips connectors, as marked.

Insert the optional K-type thermocouples into the correct sockets, as marked.



9. FUNCTION SELECTOR ROTARY SWITCH

Item 9 describes functions that are selected by setting the rotary switch.

mV	Millivolts	ac/dc
V	Volts	ac/dc
mA	Milliampere	ac/dc
A	Amperes	ac/dc
♫	Continuity	
Ω	Resistance	
⊣▶	Diode Test	
FREQ	Frequency	
CAP	Capacitance	
hFE	Transistor	
TEMP	Temperature	
HIGH / HOW	Logic Test	
dB	Decibel	

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

5-3. Input Terminals

Items 10-13 describe the input terminals (See Table 1 for overload limits.)

10. 20A Amperes Input Terminal

For current measurements (AC or DC) up to 20A when function selector switch is in the 20A position.

11. mA Milliamp Input Terminal

For current measurements up to 200mA (AC or DC) when the function selector switch is in the mA position.

12. COM Common Terminal

Return terminal for all measurements.

13. V/Ω

Continuity, Diode, Ohms, Volt, Frequency, dB, Logic Test Terminal.

5-4. Digital and Bar Graph Displays

Items 14-16 & 17 describe the digital and bar graph displays.

14. Digital Display

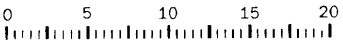
Digital readings are displayed on a 1999-count display with automatic polarity indication and decimal point placement.

15.  **Analog Bar Graph**

The bar graph consists of 23 segments that illuminate from left to right as the input increases.

It functions much the same as the needle on an analog meter without the mechanical overshoot inherent in needle movements.

If the input equals or exceeds 1,999 counts on the range selected, OL is displayed with flashing in the Bar-graph.

16. 

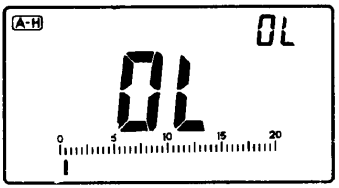
Bar Graph Scale

Scale for absolute readings.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

17. OL **Overload Indication**

OL is displayed with flashing the bar-graph, when input is too excess to display.



18. (A-H) **Auto-Hold**

The meter will freeze a reading automatically recorded 4 seconds ago, when last reading is completed.

19. (D-H) **Data-Hold**

In this mode, you can freeze a reading on the sub-display by pressing the SET/RESET button, and the subsequent reading wilI be displayed on the main-display.

20. (MIN) **Minimum**

Lets you keep a minimum reading on the sub-display while showing the present readings on the main-display.

21. (MAX) **Maximum**

Lets you keep a maximum reading on the sub-display while showing the present readings on the main-display.

22. (REL) **Relative**

Enables you to compare the reference value with a subsequent reading.

To set the reference value, follow these steps:

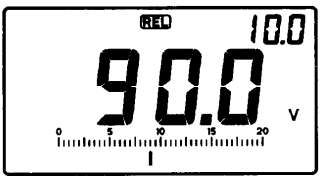
1. Set the function mode at (REL) mode.
2. Store the polarity, values of the reference value you desire by pressing the UP DOWN buttons and SET/RESET button by turns.
3. Press SET/RESET button for final setting.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

Example: Store Polarity +/ - (with UP/DOWN)

	⇒ SET/RESET ⇒
Store 1st Value	⇒ SET/RESET ⇒
Store 2nd Value	⇒ SET/RESET ⇒
Store 3rd Value	⇒ SET/RESET ⇒
Store 4th Value	⇒ SET/RESET ⇒

4. To exit (REL) mode, press the function key or turn the rotary switch to an adjacent range.
   Your meter will display the difference between the stored reference value and subsequent readings on the sub-display while showing the present measurement on the main-display. For example, if the stored reference value is 100.0V and the present reading is 90.0V, the sub-display will indicate - 10.0 V and the main display will indicate 90.0V



   If the new reading is the same as the reference value, the display will be zero. In this mode, the total range of relative offset is 1999 counts.

23. (MEM) Memory

Enable you to memorize the reference values up to 10 measurements in the meter.

To memorize the reference value, follow these steps:

1. Set the function mode at (MEM) mode.
2. Press UP DOWN buttons to address the number from 0 to 9.
3. Press SET/RESET button to memorize the reference value you desire.
   If you memorize the reference values continuously under the same address number, then the previous reference value will be cleared automatically.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

24. (RCL) Memory Recall

Enables you to get the memorized reading back on the LCD.

To get the memorized reference value, follow these steps:

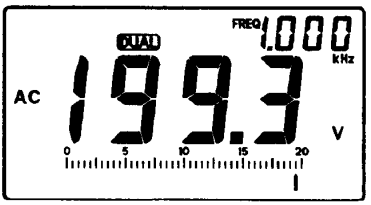
1. Set the function mode at (RCL) mode.
2. Press UP DOWN buttons to address the number from 0 to 9.
3. Press SET/RESET button to get the memorized value back on the LCD. Then the reference value you chose will appear on the sub-display.

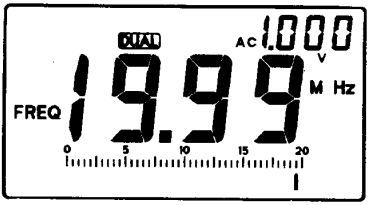
25. (DUAL) Dual-Display

Lets you have two primary+secondary readings on the LCD in the following ranges (See Table 3)

Table 3. Dual-Display

INPUT RANGE	MAIN-DISPLAY	SUB-DISPLAY
AC VOLTAGE	VOLTAGE	FREQUENCY
FREQUENCY	FREQUENCY	AC VOLTAGE
TEMPERATURE	°C	°F
LOGIC	HI/LO	FREQUENCY
dB	dB	AC VOLTAGE





Notes:

- Your meter will display Ripple Frequency at DC Voltage position.
- In the ranges of DC/AC A, Resistance, Diode and hFE, the sub-display might show the FREQ .000. This is not intended for dual-display mode.
- When you select dual measurement while measuring frequency, the meter selects the 20V AC range for the secondary display. To measure both the voltage and frequency, when the voltage is greater than 20V AC, select AC voltage as the primary measurement.

26. (COM) Communication

Allows you to interface the meter with your PC to communicate with your PC in all function ranges. To avoid operation error, do not set your meter at (COM) mode during communicating with a computer.

27. (CMP) Comparison

Enables you to do the High Low Test of subsequent readings by comparing a reading with both the stored high reference value and the stored low reference value.

On the sub-display, Lo sign for reading less than the low reference value, Hi sign for reading more than the high reference value and PASS sign for middle ranges will be shown.

To store the reference values of Min/Max, see the steps of REL 2, 3.

To exit (CMP) mode, press the function key or turn the rotary switch to an adjacent range.

28. Display for address number

To operate this address number, you can address the stored reference values up to 10 measurements in the (MEM) and (RCL) modes, each time press UP DOWN buttons.

5-5. Annunciators

Items 29-32 describe annunciators that indicate the mode or state in which the meter is operating.

29. Diode Test

The value displayed is the forward voltage of semiconductor function(s) at approximately 1 mA test current. Single 0-2.0V range.

30. AC Alternating Current or Voltage

31. Continuity Check

Make it easy to check wiring, continuity of cables, fuses and connections. etc.

32. Negative Polarity

Automatically indicates negative inputs. When (REL) is enabled, indicates negative results of math calculations.

33. FREQ Frequency Count Mode

Can measure up to 1 MHz with 4 steps of 2, 20, 200KHz, 1 MHz (for M-3610D/3630D/3640D).

Can measure up to 20 MHz with 5 steps of 2, 20, 200KHz, 2, 20 MHz (for M-3650D/3660D).

34. TEMP Temperature (M-3640D/M- 3660D only)

Can measure from -40° C to 1200°C by using the optional K-type thermocouple.

35. CAP Capacitance (Except M-3610D)

Let you to measure capacitance from LO: nF 2, 2O, 200 to Hi: uF 2, 20, 200.

36. hFE Transistor hFE (Except M-3610D)

Enables you to measure hFE value.

37. LOG Logic Test

Enables you to check logic levels without extra logic probes. This function displays Hi, Lo or ••• to indicate logic high, logic low, or undetermined, respectively.

38. dB Decibels (M-3640D/3660D only)

Enables to check the logarithmic ratio of input voltage to the standard stored value.

39. Sub-display

Lets you see the secondary readings in all function modes.

40.  Low Battery

Meter is powered by a single 9V battery. At least 8 hours of battery life remain when  is first displayed.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

41. The following annunciators indicate the unit of the value displays:

AC	Alternating current or voltage
DC	Direct current or voltage
mV	Millivolts ($1x10^{-3}$ volts)
V	Volts
KHz	Kilohertz ($1x10^{3}$cycles) Frequency
MHz	Megahertz($1x10^{6}$cycles) Frequency
°C	Centigrade Degree
°F	Fahrenheit Degree
uF	Microfarads (10^{-6} Farads)
nF	Nanofarads (10^{-9} Farads)
A	Ampere (Amps) Current
mA	Milliampere ($1x10^{-3}$amps) Current
Ω	Ohm
KΩ	Kiloohm($1x10^{3}$)
MΩ	Megaohm ($1x10^{6}$)
dB	Decibels

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

6. HOW TO MAKE MEASUREMENTS

This section discusses some common applications for your meter, and alerts you to some considerations to keep in mind when making measurements.

6-1. Measuring DC /AC Voltage

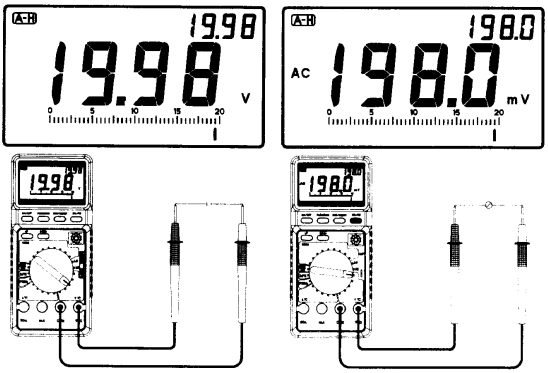
WARNING: DO NOT TRY TO MEASURE A VOLTAGE GREATER THAN 1000 VOLTS DC OR 750 VOLTS AC. YOU MIGHT DAMAGE YOUR METER AND EXPOSE YOURSELF TO A SEVERE SHOCK HAZARD.

Follow these steps to measure DC/AC Voltage:

1. Set the rotary switch to the desired voltage position with 5 steps: 200mV, 2, 20, 200V(DC/AC) and 1 000V(DC), 750V(AC).
2. Press the DC/AC button to toggle between alternating and direct voltage.
3. Connect the meter in parallel with the load or circuit.

Notes:

- Due to the sensitive nature of 200mV & 2V AC ranges, your meter displays a small value. This residual value will not affect the actual measurements.



DC Voltage measurement

AC Voltage measurement

- Each of the five dc/ac voltage ranges presents an input impedence of approximately 10M Ω in parallel with less than 100pF. AC voltage in ac-coupled to the 10M Ω input.

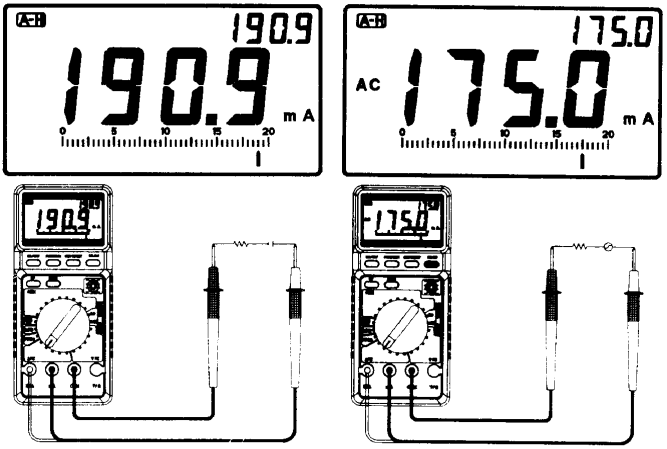
B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

6-2. Measuring Current

WARNING: YOU MAY DAMAGE THE METER OR BE INJURED IF THE FUSE BLOWS WHILE CURRENT IS BEING MEASURED IN A CIRCUIT WHICH EXHIBITS AN OPEN CIRCUIT VOLTAGE GREATER THAN 250V. THE 20A TERMINAL IS FUSED. A SEVERE FIRE HAZARD AND SHORT CIRCUIT DANGER EXISTS IF YOU APPLY A VOLTAGE WITH HIGH-CURRENT CAPABILITY TO THIS TERMINAL. THE METER CAN BE DESTROYED UNDER SUCH CONDITI ONS.

Follow these steps to measure Current:

1. Set the rotary switch to the desired Ampere position with 5 steps of 200 µA, 2, 20, 200mA, 20A (for M-3630D/3650D) and with 4 steps of 200 µA, 2,200mA, 20A (for M-3610D) and with 3 steps of 2, 200mA, 20A (for M-3640/3660D).
2. Press the DC/AC button to toggle between alternating and direct current.
3. Connect the meter in series with the load or circuit under test.



DC Current measurement

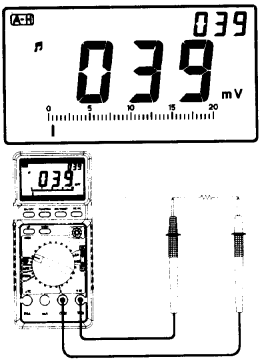
AC Current measurement

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

Notes:

- If you do not know approximately what the current is, connect the circuit to 20A input terminal first to see if you have a safe level for the mA input terminal. Use the mA input terminal for Current up to 200mA.
- When measuring Current, the meter's internal shunt resistors develop a voltage across the meter's terminals called "burden voltage". This voltage drop is very low in your meter, but it may affect precision circuits or measurements.
- If you set the meter for DC current,—appears or disappears to indicate the polarity of the measured current.

6-3. Continuity Testing



Audible Continuity Test

Continuity testing verifies that circuit connections are intact. To perform audible continuity tests, set the rotary switch to ♫ and connect the meter to your circuit.

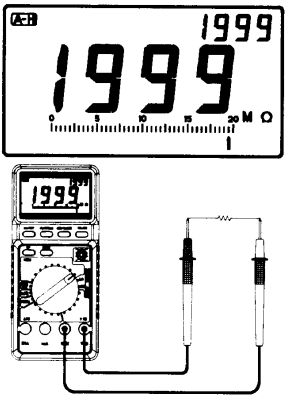
Caution: Never perform a continuity measurement on a circuit that has power connected.
Note: The buzzer sounds if the measured resistance is below 40 ohms.

6-4. Measuring Resistance

WARNING: NEVER CONNECT THE TEST PROBES TO A SOURCE OF VOLTAGE WHEN YOU HAVE SELECTED THE OHMS FUNCTION AND PLUGGED THE PROBES INTO V/Ω TERMINAL. BE SURE THAT THE CIRCUIT UNDER TEST HAS ALL POWER REMOVED AND THAT ANY ASSOCIATED CAPACITORS ARE FULLY DISCHARGED BEFORE YOU MAKE A RESISTANCE MEASUREMENT.

Follow these steps to measure resistance:

1. Set the rotary switch to any of 200 Ohm to 2000 Mohm with 7 steps (for Model M-3610D/3630D/3650D) or 200 to 20 Mohm with 6 steps (for Model M-3640D/3650D)
2. Connect the test Ieads to the device you want to measure.



Resistance measurement

Notes:

- The resistance in the test leads can diminish accuracy on the lowest (200-ohm) range. The error is usually 1 to 0.2 ohms for a standard pair of test leads. To determine the error, short the test leads together and read the resistance of the leads.
- When measuring resistance, be sure that the contact between the probes and the circuit is good. Dirt, oil, solder flux, or other foreign matter seriously affect resistance.
- If the measured resistance value exceeds the maximum value, OL displays to indicate overload and the bar graph flashes.
- For resistance of approximately 1 Megaohm and above, the display might take a few seconds to stabilize. This is normal for high resistance readings.

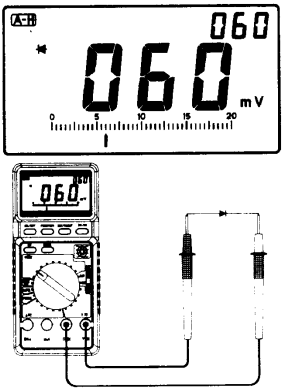
B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

6-5 Checking Diode

This function lets you check diodes and other semiconductors for opens and shorts. It also lets you determine the forward voltage for diodes. You can use this function when you need to match diodes.

Follow these steps to check Diode

1. Rotate the rotary switch to ⊣◀ position.
2. Plug the test probes into the COM and V/ Ω terminals.
3. Connect the test leads to the diode you want to check and note the meter reading.



Diode measurement

Notes:

- If the display indicates an overrange condition, reverse the polarity of the connection.
- If the display shows a value, the device is good. The displayed value is the components actual forward voltage (up to 2.0 volts).
- If the display still indicates an overrange condition, the device is open.
- If the display shows a value both before and after you reverse the polarity, the device is shorted.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

6-6. Measuring Frequency

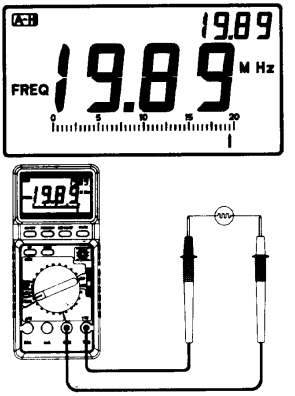
WARNING: IF YOU TRY TO MEASURE THE FREQUENCY OF A SIGNAL THAT EXCEEDS 750 VOLTS AC RMS, YOU MIGHT DAMAGE YOUR METER AND EXPOSE YOURSELF TO SEVERE SHOCK HAZARD.

Follow these steps to measure the frequency of a signal.

1. Set the function selector to the FREQ position with 4 steps: 2, 20, 200KHz & 1 MHz (for M3610D/3630D/3640D) and 5 steps: 2, 20, 200 KHz, 2, 20 MHz (for M-3650D/3660D).
2. Plug the test probes into the COM and V/Q terminals.
3. Connect the test leads to the frequency source.

Caution: (M3610D/M3630D/M3640D)

- For measurement 200KHz above, neither interface the meter with a P.C nor select the function mode COM. Doing so, your meter will displays the ambiguous value.



Frequency measurement

Notes:

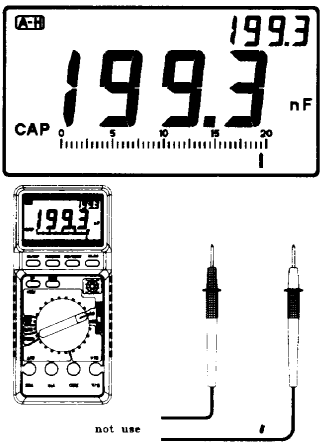
- When the test probes are connected to an AC outlet, do not turn the function selector switch to another range. It may damage the internal components, or you.
- Overload Protection: 750V DC/AC RMS
- Input limit voltage: AC 20V rms w/dual mode & PC interface.
- For the most accurate measurement, we strongly recommend you to use the type of BNC cable.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

6-7. Measuring Capacitance

Follow these steps to measure capacitance normal:

1. Discharge each capacitor before testing by shorting its leads together. Use caution when handling some capacitors, as they can be charged with considerable electricity.
   Caution: If you attempt to measure the capacitance of a charged capacitor, you might damage your meter.
2. Set the rotary switch to either Lo or Hi of CAP range.
   Lo: nF 2/20/200 High: µF 2/20/200
3. Insert the discharged capacitor into the CAP + and - clips connector. Your meter displays the capacitance value.



capacitance measurement

Notes:

- For polarized capacitors, be sure to insert the negative lead in the — (minus) clip.
- In this mode's Hi, the auto power off function does not work.

6-8. dB Measurement (M-3640D/3660D only)

WARNING: DO NOT TRY TO MEASURE A VOLTAGE GREATER THAN 20V AC. YOU MIGHT DAMAGE YOUR METER AND EXPOSE YOUR SELF TO A SEVERE SHOCK HAZARD.

Follow these steps to measure the dB (decibels)

1. Set the rotary switch to the desired position with 2 steps input voltages: 200mV & 20 V AC range.
2. Connect the meter in parallel with the load or circuit.

Notes:

- dB(decibels) in the display indicates the Logarithmic ratio of input voltage to the standard stored value.
- During activation of dB measurement, the auto power off will not work.

Table 4. Logorithmic ratio

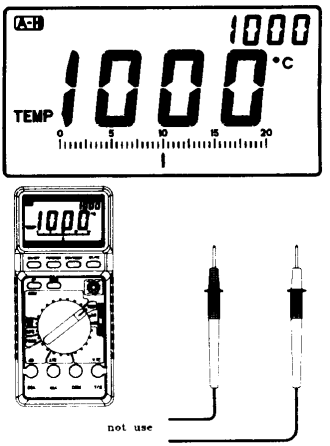
INPUT VOLTAGE	DB
0.075 mV	-60 dB
109 mV	-17 dB
1.94 V	8 dB
19.40 V	28 dB

6-9. Checking Transistors

WARNING: The transistor socket is not protected against overload. You can damage the meter and void your warranty if you build and use external leads for the transistor socket.

Follow these steps to determine a transistor's base gain:

1. Rotate the rotary switch to the hFE positon.
2. Insert the transistor you want to measure into the appropriate transistor socket. Your meter displays the transistor's hFE value.



Transistor hFE Test

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

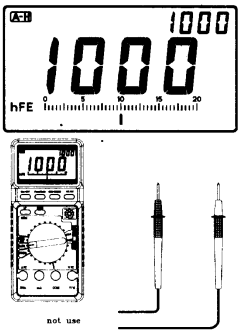
Notes:

- Insert the base, collector, and emitter pins into the correct sockets.
- Some power Darlington transistors contain internal base-to-emitter resistors. Because the meter uses two current readings to calculate hFE, any internal transistor resistance causes undependable readings.
- Do not take the hFE reading as an absolute measurement, but rather as an indication that the transistor is operation. The true gain of a transistor depends on its operating current. This meter applies up to 1000 uA to the emitter and collector and measures the collector current to calculate the hFE.
- You can't measure the hFE of a transistor that is connected in a circuit.
- You cannot measure the hFE of a FET or other non-bipolar transistor.
- High-voltage junctions in power transistors prevent correct readings. Also, the larger leads of the power transistor can damage the test socket.
- Do not try to determine type, pin-out, or hFE for power transistors with this meter.
- hFE is affected by temperature. Try not to warm the transistor with your hand when you installI the device in the socket. If the hFE reading is not stable when you first measure it, let the transistor's temperature stabilize.

6-10. Measuring Temperature (M-3640D / 3660D only)

The meter can directly display the temperature with dual-display by reading Celsius in the main-display and Fahrenheit on the sub-display at DUAL mode.

Temperature from -40°C to 1200°C can be measured by using optional K-type thermocouple at TEMP position.



Temperature Measurement

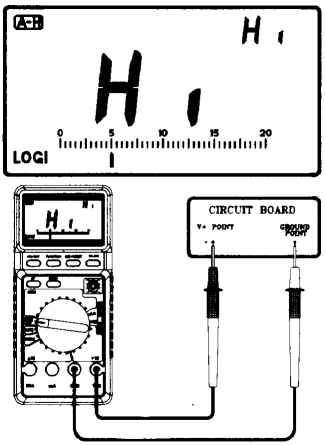
B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

6-11. Logic Test

The logic function lets you easily check digital circuits to determine the logic state of different parts of the circuit. Rather than display an absolute voltage, this function displays Hi, LO, or ••• indicate logic high, low, or undetermined respectively.

Follow these steps to perform a logic test:

1. Rotate the rotary switch to the HIGH/LOW range.
2. Plug the test leads into the COM and V/Ω inputs.
3. Connect the black probe to the ground point (GND) of the test circuit and the red probe to the supplying voltage point (V+). While keeping the test probes firmly connected to each point, press SET/RESET button.
4. While keeping a connection between the black probe and the circuits GND point, move the red probe to the other desired points. The meter immediately displays one of the 3 modes, as follows:
   - If value exceeds above 70% of the stored value, the Hi (HIGH) appears.
   - If value falls below 30% of the stored value Lo (LOW) appears.
   - If value is between stored reference value, ••• segment appears.



Logic Test

Notes:

- In this mode, the MIN MAX and D-H functions do not work.
- To set the reference value, the supplying voltage should be 3V or more, The testing range of logic is limited from 0V up to 19.99V

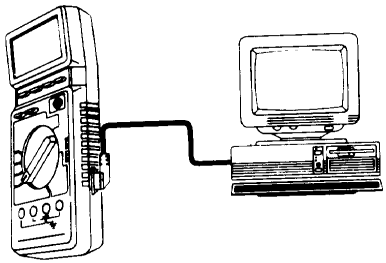
B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

6-12. Using the Meter with a Computer

6-12-1 Interfacing the Meter with a Computer

Follow these steps to connect the meter to a computer:

1. Connect the supplied RS-232C cable between the meter's and the computer's serial port, as shown.



2. Press **ON/OFF** to turn on the meter.
3. Turn on the computer.

6-12-2. Using the Supplied Software

We have included two programs to log and display data collected with your meter. The MS-DOS program is called METEX, and is in the *GRAPHIC* subdirectory on the supplied diskette. The Windows program is called Scopeview, and is in the *SCOPE* directory on the supplied diskette.

Note: You cannot log frequencies on the computer if the voltage exceeds 20V AC.

6-12-3. Using the DOS Software

Follow these steps to install and run the MS-DOS software.

Note: The following steps assume a basic knowledge of MS-DOS commands, and also assume you have a hard disk. Refer to your computer s MS-DOS User s Guide for information about MS-DOS commands. This software requires a VGA monitor.

1. Insert the supplied diskette in your computer’s drive.
2. Create a directory on your hard disk for the software. For example, to make a directory called METER for the software, type:
   cd \ <ENTER>
   md METER <ENTER>
3. Make the directory you created the current directory. For example, if the directory is METER, type:
   cd\METER <ENTER>
4. Copy the files from the GRAPHIC subdirectory on the floppy drive to your hard disk. For example, type:

copy a: \ GRAPHIC c:

5. To run the program, type METEX <ENTER>. Follow the on-screen help for specific operating instructions.

Notes:

- If you do not have a hard disk, you can still run the program from the supplied floppy diskette. Change to the GRAPHIC subdirectory on the diskette, and type METEX <ENTER>.
- To stop the program or to escape from a device I/O error, press <CTRL+BREAK>.

6-12-4. Using the Windows Software

Follow these steps to install and run the Windows software.

Note: The following steps assume a basic knowledge of Microsoft Windows. Refer to your computer's Windows User's Guide for information about using Windows. This software requires Microsoft Window, Version 3.1 and a VGA or EGA display.

1. Start your computer and run Windows.
2. Insert the supplied diskette in your computer's drive.
3. From the Windows Program Manager, pull down the FILE menu and select the RUN option.
4. At the prompt, type:
   a:\scope\setup <ENTER> (If you placed the diskette in Drive A)
   b:\scope\setup <ENTER> (If you placed the diskette in Drive B)
5. Follow the on-screen prompts to complete installation.
6. To run the program, double-click the SCOPEVIEW icon. Follow the on-screen help for specific operating instructions.
   Also, refer to the **README** file in the diskette s **SCOPE** subdirectory for operation hints,

6-12-5. Technical Information

You need the following information if you are writing your own interface software:

Communication parameters

- Transmission rate: 1200 baud
- Character coding 7-bit ASCII
- Parity None
- Stop Bits: 2

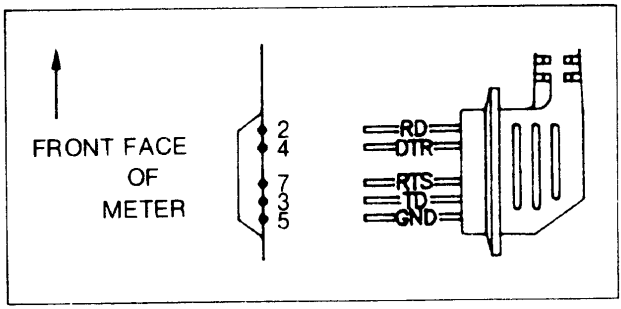
B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

Data Format

The data format consists of a frame of 14 bytes. The frames are set as follows:

BYTE) 1 2 3 4 5 6 7 8 9 A B C D E
Example 1) D C —1 . 9 9 9 V CR
Example 2) 1 . 9 9 9 Mohm CR

Connection of MT/RS - 232C cable to the meter.



The following program is an example of a BASIC program that gets a single reading from the meter:

```
10   OPEN"COM1: 1200, N, 7, 2, RS, CS, DS, CD" AS #2
20   A$ = “D”
30   PRINT #2, A$
40   IN$=INPUT$ (14, #2)
50   PRINT IN$
60   CLOSE #2
70   END
```


B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

7. CARE AND MAINTENANCE

Your digital multimeter is a precise electronic device. Do not tamper with circuit. To prevent electric shock hazard, turn off the meter and disconnect test leads before removing the back cover.

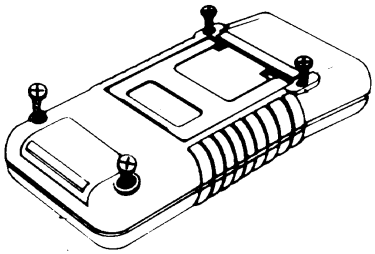
7-1. Replacing the Fuse

WARNING: TO AVOID ELECTRIC SHOCK, DISCONNECT THE TEST PROBES BEFORE REMOVING THE BATTERY OR THE FUSE. REPLACE ONLY WITH THE SAME TYPE OF BATTERY OR FUSE DO NOT REMOVE THE TOP COVER. SERVICE SHOULD BE PERFORMED ONLY BY QUALIFIED PERSONNEL.

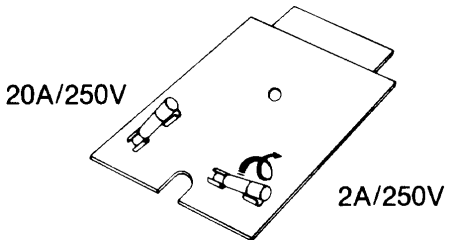
CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE OR OTHER HAZARD, REPLACE ONLY WITH FUSE OF THE SPECIFIED VOLTAGE AND CURRENT RATINGS.

Follow these steps to replace the fuse:

1. Press ON/OFF button to turn the meter off and disconnect the test probes.
2. Remove the back cover by unscrewing the four screws and pulling off the meter s cover.



3. Remove the blown fuse.



4. Install the new fuse in the fuse compartment.
5. Replace the back cover and secure it with the screws.

WARNING: DO NOT OPERATE YOUR METER UNTIL THE BACK COVER IS IN PLACE AND FULLY CLOSED.

7-2. General Maintenance

Any adjustments, maintenance, or repair of the instrument, except battery and fuse replacement should be done only by qualified service personnel.

1. Keep your meter dry. If it does get wet, wipe it dry immediately. Liquids might contain minerals that can corrode the electronic circuits.
2. Use and store your meter only in normal temperature environments. Extreme temperatures can shorten the life of electronic devices, damage battery, and distort or melt plastic parts.
3. Handle your meter gently and carefully. Dropping it can damage circuit boards and cases and cause the meter to work improperly.
4. Keep your meter away from dust and dirt, which can cause premature wear of parts.
5. Wipe your meter with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the meter.
6. Use only a brand-new battery of the same size and type. Always remove an old or weak battery. It can leak chemicals that destroy electronic circuits.

Modifying or tampering with your meter's internal components can cause a malfunction and might invalidate its warranty.

8. SPECIFICATIONS

8-1. General Characteristics

- Max Display ..... 1999 Counts (3½ Digit) with automatic polarity indication
- Max Input Current of AC & DC 20A
- Reading Time ..... 1-2 reading per second
- Operating Temperature ..... 0°C to 40° (32°F to 104°F)
- Storage Temperature ..... -10°C to 50°C (14°F to 122°F)
- Temperature for Guaranteed Accuracy ..... + 23°C ± 5°C
- Battery type ..... NEDA 1604 9V or 6F22 9V
- Size (H x W x L) 84x187x34mm
- Net weight ..... 305g±10g (Including 9V Battery)
- Supplied Accessories: ..... Operating Manual, pair of Test Leads, Spare Fuse, 9V Battery.
- Optional Accessories: ..... Carrying Case, Interface Cable MT/RS-232C, Floppy disc with software, K-type thermocouples.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

8-2 Special Characteristics

MODEL	FUNCTION	RANGE	ACCURACY	RESOLUTION
M-3610D M-3630D M-3650D	DC VOLTAGE	200 mV 2 V 20V 200V	±0.3% of rdg +1 dgt	100 uV 1 mV 10 mV 100 mV
		1000 V	±0.5% of rdg +1 dgt	1 V
	AC VOLTAGE	200 mV 2 V 20 V 200 V	±0.8% of rdg +3 dgts	100 uV 1 mV 10 mV 100 mV
		750 V	±1.2% of rdg +3 dgts	1 V
	RESISTANCE	200 Ω 2 KΩ 20 KΩ 200 KΩ 2 MΩ	±0.5% of rdg +3 dgts	0.1 Ω 1 Ω 10 Ω 100 Ω 1 KΩ
		20 MΩ	±1.0% of rdg +2 dgts	10 KΩ
		* 2000 MΩ	±5.0% of rdg +5 dgts	1 MΩ

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

MODEL	FUNCTION	RANGE	ACCURACY	RESOLUTION
M-3610D M-3630D M-3650D	DC CURRENT	200 uA 2 mA 20 mA	±0.5% of rdg +1 dgt	0.1 uA 1 uA 10 uA
		200 mA	±1.2% of rdg +1 dgt	100 uA
		20 A	±2.0% of rdg +5 dgt	100 mA
	AC CURRENT	200 uA 2 mA 20 mA	±1.0% of rdg +3 dgts	0.1 uA 1 uA 10 uA
		200 mA	±1.8% of rdg +5 dgts	100 uA
		20 A	±3.0% of rdg +5 dgts	10 mA

Notes: 1. DC/AC Current
20 mA – Not available in M-3610D

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

MODEL	FUNCTION	RANGE		ACCURACY	RESOLUTION
M-3610D M-3630D M-3650D	FREQUENCY	2 KHz 20 KHz 200 KHz		±1.0% of rdg +1 dgt	1 Hz 10 Hz 100 Hz
		1 MHz		±1.0% of rdg +1 dgt	1 KHz
		* 2 MHz * 20 MHz		±1.0% of rdg +1 dgt	1 KHz 10 KHz
	CAPACITANCE	LOW	2 nF	±2.0% of rdg +10 dgts	1 pF
			20 nF 200 nF	±2.0% of rdg +3 dgts	10 pF 100 pF
		HIGH	2 uF	±3.0% of rdg +10 dgts	1 nF
			20 uF	±3.0% of rdg +5 dgts	10 nF
			200 uF	±4.0% of rdg +5 dgts	100 nF
	DIODE	Measures forward resistance of a semiconductor junction in KΩ a test current of 1 mA.			

Notes: 1. FREQUENCY: *Not available in M-3610D & M630D.
2. CAPACITANCE: Not available in M-3610D.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

8-2. Special Characteristics

MODEL	FUNCTION	RANGE	ACCURACY	RESOLUTION
M-3640D M-3660D	DC VOLTAGE	200 mV 2 V 20V 200V	±0.3% of rdg +1 dgt	100 uV 1 mV 10 mV 100 mV
		100 V	±0.5% of rdg +1 dgt	1 V
	AC VOLTAGE (True rms)	200 mV	±0.8% of rdg +3 dgts	100 uV
		2 V 20 V 200 V	±2.5% of rdg +5 dgts	1 mV 10 mV 100 mV
		750 V	±1.5% of rdg +3 dgts	1 V
	RESISTANCE	200 Ω 2 KΩ 20 KΩ 200 KΩ 2 MΩ	±0.5% of rdg +3 dgts	0.1 Ω 1 Ω 10 Ω 100 Ω 1 KΩ
		20 MΩ	±1.0% of rdg +2 dgts	10 KΩ

Notes: AC Voltage (True rms)

1. The nominated accuracy is guaranteed when the input value is full-scale basis.
2. Frequency for accuracy
   - 40 Hz to 20 KHz for 200 mV, 2V, 20V & 200V.
   - 40 Hz to 400 Hz for 750 V.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

MODEL	FUNCTION	RANGE	ACCURACY	RESOLUTION
M-3640D M-3660D	DC CURRENT	2 mA	±0.5% of rdg +1 dgt	0.1 uA 1 uA 10 uA
		200 mA	±1.2% of rdg +1 dgt	100 uA
		20 A	±2.0% of rdg +5 dgts	100 mA
	AC CURRENT	2 mA	±1.0% of rdg +3 dgts	0.1 uA 1 uA 10 uA
		200 mA	±1.8% of rdg +5 dgts	100 uA
		20 A	±3.0% of rdg +5 dgts	10 mA
	TEMPERATURE	-40°C~200°C	±3.0% of rdg +5 dgts	1°C
		200°C~1200°C	±3.0% of rdg +2 dgts	
	dB	200 mV 20 V	±3.0% of rdg +5 dgts	0.1 dB

Notes: AC Current

Frequency for accuracy

- 40 Hz to 10 KHz for 2 mA & 200 mA ranges.
- 40 Hz to 1 KHz for 20A range.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

MODEL	FUNCTION	RANGE		ACCURACY	RESOLUTION
M-3640D M-3660D	FREQUENCY	2 KHz 20 KHz 200 KHz		±1.0% of rdg +1 dgt	1 Hz 10 Hz 100 Hz
		1 MHz		±1.0% of rdg +1 dgt	1 KHz
		* 2 MHz * 20 MHz		±1.0% of rdg +1 dgt	1 KHz 10 KHz
	CAPACITANCE	LOW	2 nF	±2.0% of rdg +10 dgts	1 pF
			20 nF 200 nF	±2.0% of rdg +3 dgts	10 pF 100 pF
		HIGH	2 uF	±3.0% of rdg +10 dgts	1 nF
			20 uF	±3.0% of rdg +5 dgts	10 nF
			200 uF	±4.0% of rdg +5 dgts	100 nF
	DIODE	Measures forward resistance of a semiconductor junction in KΩ a test current of 1 mA.			

Note: FREQUENCY: *Not available in M-3640D.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104

WARRANTY

Warrants this instrument to be free from defects in material and workmanship for a period of one year. Any instrument found defective within this period from the delivery date and, returned to the factory with transportation charges prepaid will be repaired, adjusted, or replaced at no charge to the original purchaser. This warranty does not cover expendable items such as batteries or fuses. If the defect has been caused by misuse or abnormal operating conditions the repair will be billed at a nominal cost.

B&B Electronics -- PO Box 1040 -- Ottawa, IL 61350
PH (815) 433-5100 -- FAX (815) 433-5104