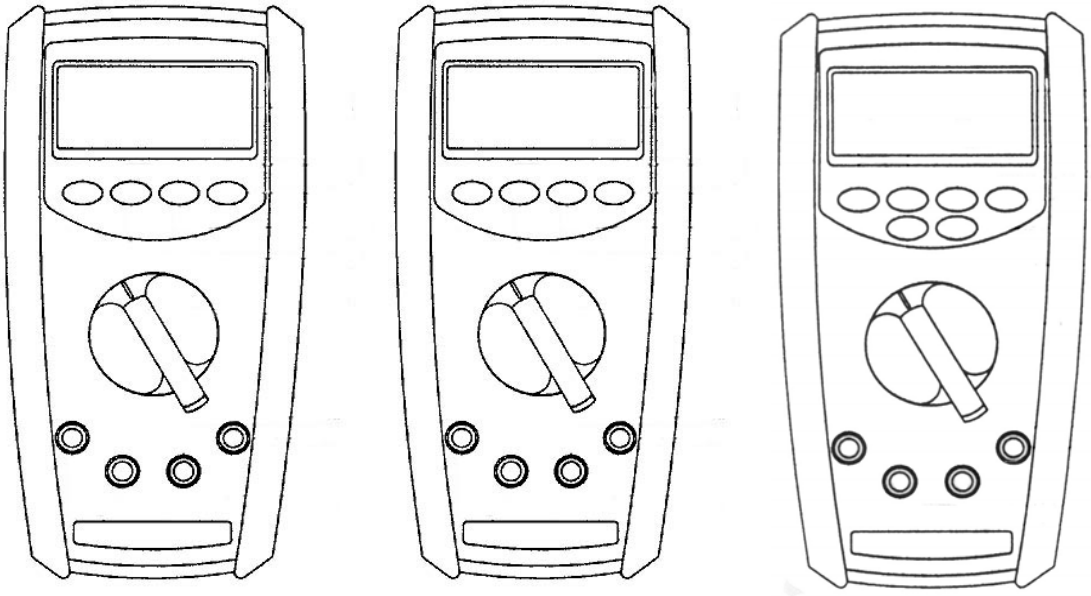
IDEAL INDUSTRIES, INC.
TECHNICAL MANUAL
MODEL: 61-480
MODEL: 61-481
MODEL: 61-482

The Service Information provides the following information:

- Precautions and safety information
- Specifications
- Basic maintenance (cleaning, replacing the battery and fuses)
- Performance test procedures
- Calibration and calibration adjustment procedures



Form number: TM61480-1-2
Revision: 5. Date: July 2002

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Introduction

⚠Warning
To avoid shock or injury, do not perform the verification tests or calibration procedures described in this manual unless you are qualified to do so.

The information provided in this document is for the use of qualified personnel only.

⚠Caution
The 61-480 serials contain parts that can be damaged by static discharge. Follow the standard practices for handling static sensitive devices.

For additional information about IDEAL INDUSTRIES, INC. and its products, and services, visit IDEAL INDUSTRIES, INC. web site at:
www.idealindustries.com

Precautions and Safety Information

Use the meter only as described in the *Users Manual*. If you do not do so, the protection provided by the meter may be impaired. Read the "Safety Information" page before servicing this product. In this manual, a **Warning** identifies conditions and actions that pose hazard (s) to the user; a **Caution** identifies conditions and actions that may damage the meter or the test instruments.

The Symbols

The symbols used on the meter and in this manual are explained in Table A.

Table A Symbols

Meter Safety Symbol	Description
	Battery
	Fuse
	Cautionary or important information in manual
	Danger- Risk of electrical shock
	Double Insulation- Protection Class II
CAT III	IEC Over-voltage Category III

SAFETY

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use the product only as specified.

⚠ **CAUTION.** These statements identify conditions or practices that could result in damage to the equipment or other property.

⚠ **WARNING.** These statements identify conditions or practices that could result in personal injury or loss of life.

Specific precautions

Do not operate without covers. To avoid personal injury , do not apply any voltage or current to the product without the covers in place.

Electric overload. Never apply a voltage to a connector on the product that is outside the range specified for that connector.

Avoid electric shock. To avoid injury or loss of life, do not connect or disconnect probes or test leads while they are connected to a voltage source.

Do not operate in wet/damp conditions. To avoid electric shock , do not operate this product in wet or damp conditions.

SPECIFICATIONS (Model 61-480)
All specifications are warranted unless noted typical and apply to the 61-480.
Stated accuracies are at 23°C ±5°C at less than 80% relative humidity.
If Low Battery indicator is active then specification could be effective.

General specifications

Characteristics	**Description for 61-480**
LCD display digits	3¾ LCD Display
Bargraph segments	70 Segment Graph
Display count	3200
Numeric update rate	2 times / sec
Polarity display	Automatic
Over range display	"OL" is displayed
Low voltage indicator	"⊟" is indicated
Automatic power-off time	Automatic backlit off =1minutes
Power source	2 AAA dry cell battery
Maximum input voltage	1000V (750V AC) CAT II Between V and COM
Maximum floating voltage	1000V (750V AC) CAT II between any terminal and earth ground
Maximum input current	400mA between mA and COM, 10A continuous between A and COM
Maximum open circuit Voltage (current inputs)	600V between A and COM, and between mA and COM
Overload protection mA connector	1A (500V) fast blow fuse
A connector	16A (500V) fast blow fuse
V connector	Ω •))) ⊣ HZ
Temperature Coefficient	0.1 x (Spec. Accuracy) / °C < 18°C or > 28°C .
Battery Life	500 hours typical (alkaline)

SPECIFICATIONS (Model 61-481 and 482)
All specifications are warranted unless noted typical and apply to the 61-481 and 61-482.
Stated accuracies are at 23°C ±5°C at less than 80% relative humidity.
If Low Battery indicator is active then specification could be effective.

General specifications

Characteristics	**Description for 61-481 & 61-482**
LCD display digits	3¾ LCD Display
Bargraph segments	82 Segment Graph
Display count	4000
Numeric update rate	2 times / sec
Bargraph	12 times/sec
Polarity display	Automatic
Over range display	"OL" is displayed
Low voltage indicator	"  " is indicated
Automatic power-off time	Automatic backlit off =1minutes
Power source	One 9V dry cell Battery
Maximum input voltage	1000V (750V AC) CAT II Between V and COM
Maximum floating voltage	1000V (750V AC) CAT II between any terminal and earth ground
Maximum input current	400mA between mA and COM, 10A continuous between A and COM
Maximum open circuit Voltage (current inputs)	600V between A and COM, and between mA and COM
Overload protection mA connector	1A (500V) fast blow fuse
A connector	16A (500V) fast blow fuse
V connector	Ω •))) HZ
Temperature Coefficient	0.1 x (Spec. Accuracy) / °C < 18°C or > 28°C
Battery Life	300 hours typical (alkaline)

Measurement Characteristics
(All at 23°C ± 5°C, < 80% R.H.) ± ([% of reading] + [number of least digits]).

DC Volts: Model 61-480 only

Range	Resolution	Accuracy	Over Voltage Protection
300mV	.1mV	± (0.25% + 1 digit)	1000 V rms
3V	1mV	± (0.4% + 1 digit)	
30V	10mV	± (0.25% + 1 digit)	
300V	100mV		
1000V	1V		

Input Impedance: 10MΩ (over 1000MΩ in 400mV range)

DC Volts: Model 61-481 and 61-482 only

Range	Resolution	Accuracy	Over Voltage Protection
400mV	.1mV	± (0.25% + 5 digits)	1000 V rms
4V	1mV	± (0.4% + 1 digit)	
40V	10mV	± (0.25% + 1 digit)	
400V	100mV		
1000V	1V		

Input Impedance: 10MΩ (over 1000MΩ in 400mV range)

AC Volts: Model 61-480

Range	Resolution	Accuracy	Over Voltage Protection
3V	1mV	± (1.3% + 5 digits) [1]	1000 V rms
30V	10mV		
300V	100mV		
750V	1V		

1 Frequency Response: 40 Hz to 1 kHz
AC conversion Type: Average Sensing rms calibrated to a sine wave.
Input Impedance: 10Ω // less than 100pF

AC Volt / True RMS: Models 61-481 and 61-482

Range	Resolution	Accuracy	Over Voltage Protection
400mV	.1mV	± (2.0% +10 digits) [3]	1000 V rms
4V	1mV	± (1.0% + 5 digits) [1 2]	
40V	10mV	± (1.3% +5 digits) [1]	
400V	100mV		
750V	1V		

1. ±(1.5% reading+5digits) for (50% ~ full Scale) of range
2. Frequency Response: 40Hz ~ 1KHz: ±(1.5%+5digits) for 500Hz to 1KHz
3. Frequency Response: 50Hz ~ 60Hz
AC Conversion Type: AC conversions are AC-coupled, true rms responding, calibrated to the rms value Sine wave input.
Input Impedance: 10MΩ less than 100 PF.
Crest Factor: +1.5% additional error for C.F. from 1.4 to 3
+3.0% additional error for C.F. from 3 to 4

DC Current: Model 61-480

Range	Resolution	Accuracy	Burden Voltage
30mA	10µ	± (1.5% + 2 digits)	200mV max
300mA	.1mA	± (1.5% + 2 digit)	2V max
10A	10mA	± (2.0% + 3 digit)	2V max

DC Current: Model 61-481 and 61-482

Range	Resolution	Accuracy	Burden Voltage
40mA	10µ	± (0.6% + 2 digits)	200mV max
400mA	.1mA	± (0.7% + 2 digit)	2V max
10A	10mA	± (1.0% + 3 digit)	2V max

Overload Protection: 1A (500V) fast blow fuse for mA input
16A (500V) fast blow fuse for A input

AC Current: Model 61-480 only

Range	Resolution	Accuracy	Burden Voltage
30 mA	10µA	± (2.0% +5 digits)	200mV max
300mA	.1mA		2V max
10A	10mA	± (2.5% +5 digits)	2V max

AC Current/ True RMS: Models 61-481 and 61-482

Range	Resolution	Accuracy	Burden Voltage
40 mA	10µA	± (2.0% +5 digits)	200mV max
400mA	.1mA		2V max
10A	10mA	± (2.5% +5 digits)	2V max

Frequency Response: 40Hz ~ 1KHz
Overload Protection: 1A (500V) fast blow fuse for mA input
16A (500V) fast blow fuse for A input
AC Conversion Type:
Model 61-480 Average sensing rms calibrated to sine wave.
Model 61-481 and 61-482: AC conversions are ac-coupled, true rms responding, calibrated to the rms value Sine wave input.
Crest Factor: where C.F. = peak/rms
(61-481 and 61-482) +1.5% additional error for C.F. from 1.4 to 3
+3.0% additional error for C.F. from 3 to 4

Peak Hold:

Peak hold table for Model 61-482 only

Function	Range	Accuracy
DCV	400mV	Unspecified
	4V	± (1.5% + 300 digits)
	40V	± (1.5% + 60 digits)
	400V	
	1000V	
ACV	400mV	Unspecified
	4V	± (1.5% + 300 digits)
	40V	± (1.5% + 60 digits)
	400V	
	1000V	

Function	Range	Accuracy
DCA	40mA	± (3.0% + 60 digits)
	400mA	
	10 A	± (1.5% + 60 digits)
ACA	40mA	± (3.0% + 60 digits)
	400mA	
	10 A	± (1.5% + 60 digits)

Resistance (Ohms) for Model 61-480

Range	Resolution	Accuracy	Over Voltage Protection
300 Ω	.1 Ω	± (1.0% + 4 digits)	600V rms
3K Ω	1 Ω	± (0.4% + 3 digit)	
30K Ω	10 Ω		
300K Ω	.1K Ω		
3M Ω	1K Ω	± (0.6% + 3 digit)	
30M Ω	10K Ω	± (1.5% +5 digit)	

Open Circuit Voltage: 1.5V approx.

Resistance (Ohms) for Model 61-481-and 61-482

Range	Resolution	Accuracy	Over Voltage Protection
400 Ω	.1 Ω	± (0.7% + 3 digits)	600V rms
4K Ω	1 Ω	± (0.4% + 3 digit)	
40K Ω	10 Ω		
400K Ω	.1K Ω		
4M Ω	1K Ω	± (0.6% + 3 digit)	
40M Ω	10K Ω	± (1.5% +5 digit)	

Open Circuit Voltage: 1.3V approx.

Continuity Check:
Continuity Threshold: Approx. 50Ω
Continuity Indicator: 2KHz Tone Buzzer
Input Protection: 600V rms

Diode Test:
Test Current: 1.1 mA (Typical)
Open Circuit Voltage: 3.3V DC (max)
Input Protection: 600V rms

Capacitance for Model 61-481-and 61-482

Range	Resolution	Accuracy	Over Voltage Protection
4nF	1pF	± (3% + 10 digits)	600V rms
40nF	10pF	± (2% + 8digit)	
400nF	100pF		
4µF	1nF		
40µF	10nF		
400µF	100nF		
*4mF	1µF	**± (5% +20 digit)	
*40mF	10µF		

* 4mF and 40mF ranges may have rolling within accuracy
** Specify reading < half full scale of range

Frequency/RPM for Model 61-480

Range	Resolution	Sensitivity	Accuracy	Over Voltage Protection
3.0KHz/30KRPM	1Hz/10RPM	100mV	Frequency: .01% ± 10 digits	600V rms
30KHz/300KRPM	10Hz/300RPM			
300KHz/MRPM	100Hz/3KRPM			
3MHz/30MRPM	1KHz/30KRPM	250mV rms	RPM: .01% ± 10 digits	
30MHz/300MRPM	10KHz/300KRPM	1V rms		

Overload Protection: 600V rms
Less than 20Hz the sensitivity is 1.5V

Frequency/RPM for Model 61-481 and 61-482

Range	Resolution	Sensitivity	Accuracy	Over Voltage Protection
4.0KHz/40KRPM	1Hz/10RPM	100mV	Frequency: .01% ± 1 digits	600V rms
40KHz/400KRPM	10Hz/300RPM			
400KHz/4MRPM	100Hz/3KRPM			
4MHz/40MRPM	1KHz/30KRPM	250mV rms	RPM: .01% ± 10 digits	
40MHz/400MRPM	10KHz/300KRPM	1V rms		

Overload Protection: 600V rms

Volt/Amp, Frequency ~ Hz Switch (61-481 only)

Function	Range	**Sensitivity**	**Accuracy**
AC Voltage	400mV	40mV rms	± (0.01% +5)
	4V	0.2V rms	
	40V	2V rms	
	400V	20V rms	
	750V	200V rms	
AC Current	40mA	20mA rms	
	400mA	20mA rms	
	10A	2A rms	

Temperature °C, Model 61-482 only

Temperature	**Accuracy**	**Overload Protection**
-20 ºC ~ 0 ºC	± (2% + 4 ºC)	600V rms
1 ºC ~ 100 ºC	± (1% + 3 ºC)	
101 ºC ~ 500 ºC	± (2% + 3 ºC)	
500 °C ~ 800 °C	± (3% + 2 ºC)	

Temperature °F, Model 61-482 only

Temperature	**Accuracy**	**Overload Protection**
-4 ºF ~ 32 ºF	± (2% + 8 ºF)	600V rms
33 °F ~ 212 °F	± (1% + 3 °F)	
213 ºF ~ 932 ºF	± (2% + 6 ºF)	
933 º F ~ 1472 ºF	± (3% + 4 ºF)	

Physical Characteristics

Characteristics	**Description**
Dimensions (H x W x D)	183mm x 85mm x 33mm 202mm x 95mm x 46mm(with holster)
Weight (with battery)	0.4Kg
With holster	0.6Kg
Environmental Characteristics	**Description**
Temperature operating	0 to + 50°C
Non-Operating	-20 to + 60°C
Humidity (operating)	< 80% R.H.
Altitude Operating	2,222 m (7290 ft.)
Non-Operating	12,300 m (40354 ft.)
Vibration & shock Operating	MIL-T-28800E TYPE II Class 5 2.66gRMS, 5 to 500 Hz, 3axes (10 minutes each)
Dust / Water Protection IP Rating	IP 64
Indoor Use	

Certifications and compliances

Safety	Designed to IEC 1010-1, UL3111-1 and CSA specifications
Input rating	1000V DC Category II
	600V DC Category III
	750V AC Category II
	600V AC Category III
Over voltage category	CAT III: Distribution level mains, fixed installation.
	CAT II: Local level mains, appliances, and portable equipment.
	CAT I: Signal level, special equipment or parts of equipment, telecommunication, electronics.
Pollution Degree 2	Do not operate in environments where conductive Pollutants may be present.
EC Declaration of Conformity	Meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility and Low Voltage Directive 73/23/EEC for Product Safety. Compliance was demonstrated to the following specifications as listed in the official Journal of the European Communities: En 55011 Class A : Radiated and Conducted Emissions. EN 50082-1 Immunity: IEC 801-2 Electrostatic Discharge IEC 801-3 RF Radiated EN 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use.

Required Equipment

Required equipment is listed in Table B. If the recommended models are not available, equipment with equivalent specifications may be used. Only qualified personnel should perform repairs or servicing.

Table B. Required Equipment

Equipment	Required Characteristics	Recommended Model
Calibrator	**AC Voltage Range:** 0-750V ac **Accuracy:** ±0.07% (Basic) **Frequency Range:** 40 ~ 100KHz **Accuracy:** ± 2% **DC Voltage Range:** 0-1000V dc **Accuracy:** ±0.006% (Basic) **Current Range:** 0 ~ 10A **Accuracy:** AC (40Hz to 1KHz): ±0.08% (Basic) DC: ± 0.02% (Basic) **Frequency Source:** 5.00Hz ~ 1.0000MHz **Accuracy:** ±0.001% **Amplitude:** 0.5V p-p ~ 1.0V p-p (square wave) **Accuracy:** ± 5% • **range:** 1• ~ 2G **Accuracy:** ±0.03% (Basic) **Capacitance Range:** 1pF ~ 40mF **Accuracy:** ±0.10% (Basic) **Temperature Range:** -200°C ~ 1200°C **Accuracy:** ±0.3°C (Basic)	Fluke 5500 or Wavetek 9100 Calibrator or equivalent

Basic Maintenance

⚠Warning
To avoid shock, remove the test leads and any input signals before opening the case or replacing the battery or fuses.

Opening Meter Case

⚠Caution
To avoid unintentional short circuit, always place the uncovered meter assembly on a protective surface. When the case of the meter is open, circuit connections are exposed.

To open the meter case, refer to Figure 2 and do the following :

1. Disconnect test leads from any live source, turn the rotary switch to OFF, and remove the test leads from the front terminals.
2. Remove the screw from the battery cover, and lift to remove.
3. The case bottom is secured to the case top by four screws and internal snaps (at the LCD end). Using a Phillips-head screwdriver, remove the four screws.
4. Hold the meter display side up.
5. Lifting up on the input terminal end, disengage the case top from the gasket.
6. Gently unsnap the case top at the display end.

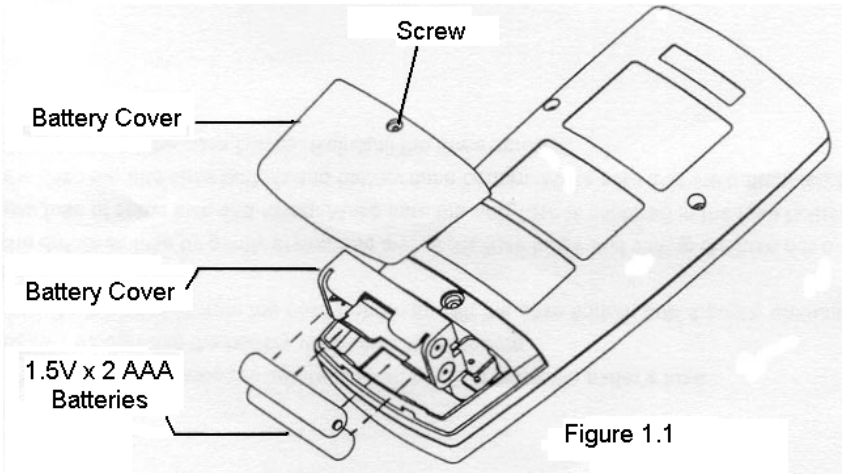


Figure 1.1

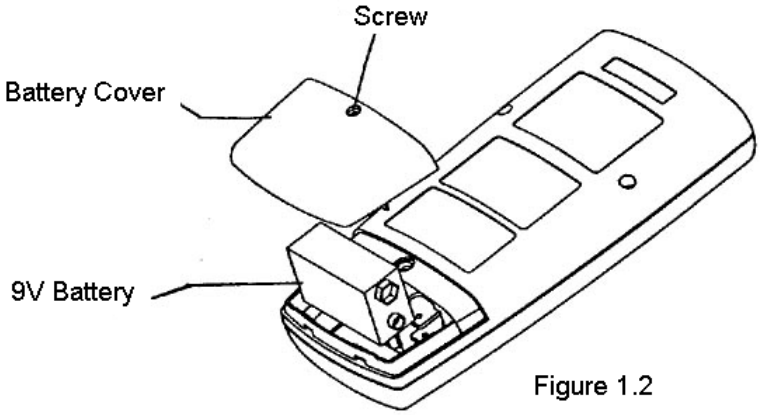


Figure 1.2

Battery Installation or Replacement:

1. The Model 61-480 is powered by two 1.5V, AAA batteries. See Figure 1.1
2. The Model 61-481 and 61-482 are powered by one 9V battery. See Figure 1.2
3. Remove the test leads from the front terminals and turn the meter off.
4. Remove the screw from the battery cover and lift to remove.
5. Remove battery and replace.
6. Make sure the battery box leads do not become pinched between the case and battery cover before replacing the battery cover and screw.

Testing Fuses (FS1 and FS2):

To test the internal fuses of the meter:

1. Turn the rotary selector switch to the Ω position.
2. To test FS1, plug a test lead into VΩHz input terminal, and touch the probe to the A input terminal. The display should indicate between 0.0 to 0.2Ω.
   If display reads higher than 0.2Ω, replace the fuse FS1 (16A/500V)
3. To Test FS2. please remove the case bottom and remove FS2 (1A/500V) by gently prying one end loose and sliding out of the fuse holder. You may use the meter or a separate meter to measure across the fuse. The display should indicate between 0.0 to 0.4Ω.
   If display reads higher than 0.4Ω, replace the fuse FS2 (1A/500V)
   Note: Lead resistance is not factored into this measurement. Make sure you are using good quality test leads

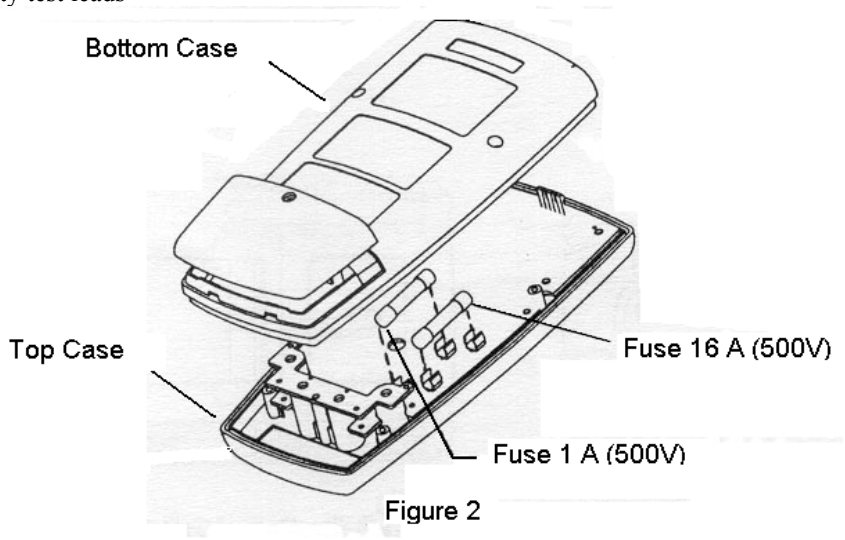


Figure 2

Fuse Replacement:

⚠ Warning

To avoid electrical shock, remove the test leads and any input signals before replacing the battery or fuses. To prevent damage or injury, INSTALL ONLY quick acting fuses with the following Amp/Volt current interrupt rating
FS1 Fuse: 16A 500V, fast blow fuse for A input
FS2 Fuse: 1A 500V, fast blow fuse for mA input
Both 10KA breaking capacity @ 440VAC, Size 32 x 6.3 mm

To replace fuses, refer to Figure 2 and do the following:

1. Remove the test leads from the front terminals and turn the meter off.
2. Remove the screw from the battery cover and lift to remove.
3. Remove the screws from the bottom case and the inside of the battery cover and lift the case bottom until it unsnaps from the case top.

4. Remove the defective fuse by gently prying one end of the fuse loose and sliding the fuse out of the fuse holder.
5. Install a new fuse of the same size and rating. Make sure it is centered in the fuse holder.
6. Make sure the battery box leads do not become pinched between the case and battery cover before replacing the bottom case and battery cover.

Cleaning

⚠ Warning

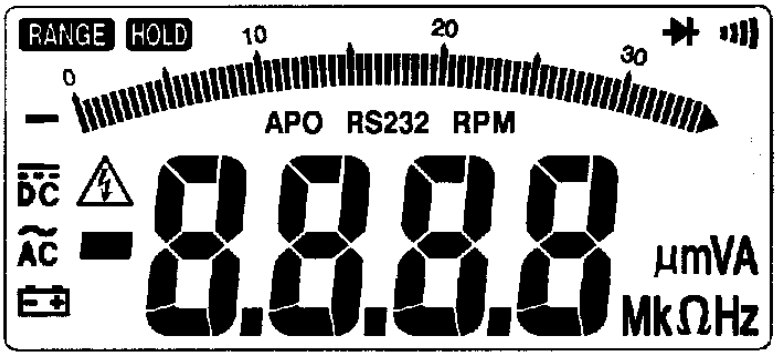
To avoid electrical shock or damage to the meter, never allow water inside the case.
To avoid damaging the meter's housing, never apply solvents to the meter.

Performance Test

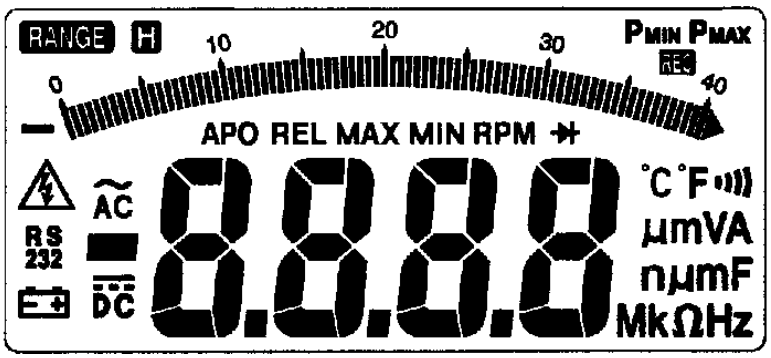
Testing the Display

Turn the meter on while holding down the [HOLD] key for 2 sec to activate the Display Test Mode on the meter. To De-activate the Display Test Mode turn meter off and back on.
Compare the display with the appropriate example in the figure below.

LCD Graphics Model 61-480



LCD Graphics Model 61-481 and 61-482



Performance Tests
The following performance tests verify the complete operability of the meter and checks the accuracy of each meter function against the meter's specifications.

Accuracy specifications are valid for a period of one year after calibration, when measured at an operating temperature of 18°C to 28°C and at a maximum of 80% relative humidity.

To verify the accuracy of each function do the following:
1. Connect the calibrator to the proper input terminals for the function listed in each table.
2. Turn the rotary switch to the function being tested and input the source to the meter
3. For each input, compare the readings on the meter display to the display readings in each table.
5. If the display reading falls outside of the range shown in the tables, the meter does not meet specification.

DC Voltage Test: Model 61-480

Range	Source	Reading
300mV	290mV	289.2 to 290.8
-300mV	-290mV	-289.2 to -290.8
3V	2.900V	2.888 to 2.912
30V	29.00V	28.92 to 29.08
300V	290.0V	289.2 to 290.8
1000V	900V	897 to 903

DC Voltage Test: Model 61-481 and 61-482

Range	Source	Reading
400mV	390mV	388.6 to 391.4
-400mV	-390mV	-388.6 to -391.4
4V	3.9V	3.884 to 3.916
40V	39V	38.90 to 39.10
400V	390V	389.0 to 391.0
1000V	900V	897 to 903

***Press the blue button on the Meter to toggle to ACV Function**
AC Voltage Test: Model 61-480

Range	Source	Frequency	Reading
3V	2.900V	50Hz	2.858 to 2.942
3V	2.900V	500Hz	2.858 to 2.942
30V	29.00V	50Hz	28.58 to 29.42
30V	29.00V	1KHz	28.58 to 29.42
300V	290.0V	50Hz	285.8 to 294.2
300V	290.0V	1KHz	285.8 to 294.2
750V	700V	50Hz	686 to 714
750V	700V	1KHz	686 to 714

***Press the Blue button to enter AC Voltage function**

AC Voltage Test: Model 61-481 and 61-482

Range	Source	Frequency	Reading
400mV	370.0mV	50Hz	361.8 to 378.4
400mV	370.0mV	60Hz	361.8 to 378.4
4V	3.700V	50Hz	3.647 to 3.753
4V	3.700V	500Hz	3.647 to 3.753
40V	37.00V	50Hz	36.47 to 37.53
40V	37.00V	1KHz	36.47 to 37.53
400V	370.0V	50Hz	364.7 to 375.3
400V	370.0V	1KHz	364.7 to 375.3
750V	700V	50Hz	686 to 714
750V	700V	1KHz	686 to 714

DC Current Test: Model 61-480

Range	Source	Reading
30mA	20.00mA	19.68 to 20.32
300mA	200.0mA	196.8 to 203.2
1A	.90A	.86 to .94
10A	9.0A	8.79 to 9.21

DC Current Test: Model 61-481 and 61-482

Range	Source	Reading
40mA	37.00mA	36.76 to 37.24
400mA	370.0mA	367.3 to 372.7
1A	.90A	0.88 to .92
10A	9.0A	8.88 to 9.12

***Press the Blue button to enter AC Current function**

AC Current Test: Model 61-480

Range	Source	Frequency	Reading
30mA	20.00mA	50Hz	19.55 to 20.45
30mA	20.00mA	1KHz	19.55 to 20.45
300mA	200.0mA	50Hz	195.5 to 204.5
300mA	200.0mA	1KHz	195.5 to 204.5
1A	.90A	50Hz	0.83 to .97
1A	.90A	1KHz	0.83 to .97
10A	9.0A	50Hz	8.73 to 9.27
10A	9.0A	1KHz	8.73 to 9.27

***Press the Blue button to enter AC Current function**
AC Current Test: Model 61-481 and 61-482

Range	Source	Frequency	Reading
40mA	37.00mA	50Hz	36.21 to 37.79
40mA	37.00mA	1KHz	36.21 to 37.79
400mA	370.0mA	50Hz	362.1 to 377.9
400mA	370.0mA	1KHz	362.1 to 377.9
1A	.90A	50Hz	0.83 to .97
1A	.90A	1KHz	0.83 to .97
10A	9.0A	50Hz	8.73 to 9.27
10A	9.0A	1KHz	8.73 to 9.27

Resistance Test: Model 61-480

Range	Source	Reading
300Ω	180Ω	177.8 to 182.2
3KΩ	1.800KΩ	1.785 to 1.815
30KΩ	18.00KΩ	17.85 to 18.15
300KΩ	180.0KΩ	178.5 to 181.5
3MΩ	1.800MΩ	1.779 to 1.821
30MΩ	29.00MΩ	28.37 to 29.63

*Lead resistance on the 300 Ω range is not included in error.

Resistance Test: Model 61-481 and 61-482

Range	Source	Reading
400Ω	360Ω	357.2 to 362.8
4KΩ	3.600KΩ	3.583 to 3.617
40KΩ	36.00KΩ	35.83 to 36.17
400KΩ	360.0KΩ	358.3 to 361.7
4MΩ	3.600MΩ	3.57 to 3.62
40MΩ	39.00MΩ	38.37 to 39.63

*Lead resistance on the 400 Ω range is not included in error.

***Press the Blue button to test •))) function**
Continuity Beep Test: All Models

Range	Source	Test
•)))	20Ω	.Beeper on
•)))	50Ω	Beeper off

Buzzer will Alarm if resistance is less than approximately 30Ω

***Press the Blue button to test ⊣◀ function**
Diode Test: All Models

Range	Source	Reading
⊣◀	500mV DC	Approx. .485 - .515

Note: The accuracy of the Calibrator's Frequency function must be appropriate for the specified Accuracy of the Meter.

Frequency Test: Model 61-480

Range	Source	Level	Reading
3KHz	3.000KHz	0.5 Vp-p	2.999 to 3.001
30KHz	30.00KHz	0.5 Vp-p	29.99 to 30.01
300KHz	300.0KHz	0.5 Vp-p	299.9 to 300.1
3MHz	3.000MHz	0.5 Vp-p	2.999 to 3.001
10MHz	10.00MHz	0.5 Vp-p	9.99 to 10.01

Note: The accuracy of the Calibrator's Frequency function must be appropriate for the specified Accuracy of the Meter.

Frequency Test: Model 61-481 and 61-482

Range	Source	Level	Reading
4KHz	3.600KHz	0.5 Vp-p	3.599 to 3.601
40KHz	36.00KHz	0.5 Vp-p	35.99 to 36.01
400KHz	360.0KHz	0.5 Vp-p	359.9 to 360.1
4MHz	3.600MHz	0.5 Vp-p	3.599 to 3.601
10MHz	10.00MHz	0.5 Vp-p	9.99 to 10.01

~ HZ Test (push button) (61-481 only)

Select ACV at 4V range. Push the ~ HZ key and apply 500Hz at 100mv.
Reading should be 500.0 Hz +/- 1½ count.

Note: *Sensitivity of the ~ HZ mode is 1/100 of full scale.*
The measurement frequency is from 40 Hz to 1 kHz.

Testing the Capacitance Function: Model 61-481 and 61-482

The meter measures capacitance by charging the capacitor with a known direct current, measuring the resultant voltage, and calculating the capacitance. If the same capacitance is measured on an impedance bridge, a different reading may result. This variance is likely to be greater at higher frequencies.

Note: Lead capacitance can effect accuracy on the lower ranges [4nF, 40nF], This error is not included.

Note: The meter selects the proper range automatically. Each measurement takes about one second per range, 4mF and 40mF range take approx. 15 seconds.

Capacitance Test: Model 61-481 and 61-482

Range	Source	Reading
4nF	3.700nF	3.579 to 3.821
40nF	37.00nF	35.79 to 38.21
400nF	370.0nF	361.8 to 378.2
4µF	3.700µF	3.618 to 3.783
40µF	37.00µF	36.18 to 37.82
400µF	360.0µF	352.0 to 368.0
4mF (4,000µF)	3.600mF	3.400 to 3.800
40mF (40,000µF)	36.00mF	34.00 to 38.00

Testing the Temperature Function: Model 61-482 only
Connect the calibrator to the **VΩHz** and **COM** inputs via K-type wire and the T-V adaptor (Ideal 61-465 TC adapter).

Allow thermocouple test leads, unit, and TC adapter to reach room temperature before performing this test (not less that 30 minutes).

Temperature °C (61-482 only)

Source	Reading
-20°C	-24°C to -16°C
0°C	-4°C to 4°C
100°C	96°C to 104°C
500°C	487°C to 513°C
800°C	774°C to 826°C

Calibration
Calibrate the meter once a year to ensure that it performs according to specifications.
Perform calibration at an ambient temperature of 23°C ±2°C and relative humidity of 75% or less

Calibration for the Model 61-480 only.

(A) DC Calibration (adjust VR1: 61-480)
1. Set multimeter to "DC" "V" function.
2. Set the output of DC calibrator for 190mV ± 0.02% and connect to **V•** and **COM** input terminals on multimeter.
3. Using a small flat-tipped screwdriver adjust the potentiometer VR1 until the display reads 190.0 **±** 1 digit.
4. Disconnect the DC calibrator from the multimeter.

(B) AC Calibration (Adjust VR2: 61-480)
1. Set multimeter to "AC" "V" function. *The [Blue] key toggles between AC and DC* function
2. Set the output of AC calibrator for 19V ± 0.02% 500Hz and connect to **V•** and **COM** terminal on multimeter.
3. Using a small flat-tipped screwdriver adjust the potentiometer VR2 until the display reads 19.00 **±** 1 digit.
4. Disconnect the AC calibrator from the multimeter.
5. Set the case top rotary switch in the OFF position.
6. Replace the case top, make sure that all the gaskets are properly seated and battery leads do not become pinched between the case halves, and the snap on the case top are engaged.
7. Reinstall the three screws.

Calibration for Model 61-481 and 61-482
Perform calibration at an ambient temperature of 23°C ±2°C and relative humidity of 75% or less.

(A) DCV Calibration (Adjust VR1: Model 61-481 and 61-482)
1. Set multimeter to "DC" "V" function.
2. Set the output of DC calibrator for 380.0mV ± 0.02% and connect to **V•Hz** and **COM** input terminal on meter.
3. Using a small flat-tipped screwdriver adjust the potentiometer VR1 until the display reads 380.0 **±** 1 digit.
4. Disconnect the DC calibrator from the meter.

(B) ACV Calibration (Adjust VR2: Model 61-481 and 61-482)

1. Set multimeter to "AC" "V" function. *The [Blue] key toggles between AC and DC* function
2. Set output of AC calibration for 30Vrms 50Hz and connect to **V • Hz** and **COM** input terminals on meter.
3. Using a small flat-tipped screwdriver adjust the potentiometer VR2 until the display reads 30.00 **±**1 digit.

Model 61-482 Only:

4. Set the output of AC calibration for 300Vrms 1KHz and connect to V • Hz and COM input terminals on meter.
5. Using a small flat-tipped screwdriver adjust the potentiometer VC1 until the display reads 300.0 **±**1 digit.
6. Disconnect the AC calibrator from the meter.

(C) °C Calibration (Adjust VR3: Model 61-482 only)

1. Set multimeter to "°C" position.
2. Set the output of the thermocouple Calibrator for 0°C K Type and connect to the meter.
3. Using a small flat-tipped screwdriver adjust the potentiometer VR3 until the display reads 00.0 or –00.0

(D) °F Calibration (Adjust VR4 and VR5: Model 61-482 only)

1. Set the circuit rotary switch to the °F position.
2. Set the output of the thermocouple calibrator for 0°F K Type and connect to the meter.
3. Using a small flat-tipped screwdriver adjust potentiometer VR5 until the display reads 00.0 or –00.0
4. Set the output of the thermocouple calibrator for 932°F K Type.
5. Using a small flat-tipped screwdriver adjust potentiometer VR4 until the display reads 932 **±** 1 digit.
6. Disconnect the thermocouple calibrator from the meter.

Calibration is Complete:

1. Set the case top rotary switch in the OFF position.
2. Replace the case top, make sure that all the gaskets are properly seated and battery leads do not become pinched between the case halves, and the snap on the case top are engaged.
2. Reinstall the three screws.