

FLUKE®

183/185

True RMS Multimeter

Calibration Manual

PN 1610436

May 2001 Rev.1, 6/02

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Each Fluke 20, 70, 80, 170 and 180 Series DMM will be free from defects in material and workmanship for its lifetime. As used herein, "lifetime" is defined as seven years after Fluke discontinues manufacturing the product, but the warranty period shall be at least ten years from the date of purchase. This warranty does not cover fuses, disposable batteries, damage from neglect, misuse, contamination, alteration, accident or abnormal conditions of operation or handling, including failures caused by use outside of the product's specifications, or normal wear and tear of mechanical components. This warranty covers the original purchaser only and is not transferable.

For ten years from the date of purchase, this warranty also covers the LCD. Thereafter, for the lifetime of the DMM, Fluke will replace the LCD for a fee based on then current component acquisition costs.

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Fluke Corporation
P.O. Box 9090
Everett, WA 98206-9090
U.S.A.

Fluke Europe B.V.
P.O. Box 1186
5602 BD Eindhoven
The Netherlands

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183 & 185

Maintenance and Calibration

Introduction

⚠ Warning

To avoid shock or injury, do not perform the verification tests or calibration adjustment 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 183/185 Multimeters contain parts that can be damaged by static discharge.

Follow the standard practices for handling static sensitive devices.

The information in this manual deals with the Fluke Models 183 & 185 True RMS Multimeters, (hereafter referred to as “the meter”). Information provided includes:

- Precautions and safety information
- Specifications
- Basic maintenance (cleaning, replacing the battery and fuse)
- Performance test procedures
- Calibration adjustment
- Accessories and replaceable parts

For complete operating instructions, refer to the *Model 183 & 185 Users Manual*.

Contacting Fluke

To order accessories, receive assistance, or locate the nearest Fluke distributor or Service Center, call:

USA: 1-888-99-FLUKE (1-888-993-5853)

Canada: 1-800-36-FLUKE (1-800-363-5853)

Europe: +31 402-678-200

Japan: +81-3-3434-0181
Singapore: +65-738-5655
Anywhere in the world: +1-425-446-5500

Address correspondence to:

Fluke Corporation
P.O. Box 9090
Everett, WA 98206-9090
USA

Fluke Europe B.V.
P.O. Box 1186
5602 BD Eindhoven
The Netherlands

Visit us on the World Wide Web at: www.fluke.com

Precautions and Safety Information

⚠ Warning

If the Meter is used in a manner not specified by the manufacturer, the protection provided by the equipment 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.

Safety Precautions

⚠ Warning











**Only qualified personnel should perform service procedures.
To avoid fire or personal injury:**

- **Connect and disconnect properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.**
- **Observe all ratings and markings on the meter. Consult the meter user manual for further ratings information before making connections to the meter.**
- **Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.**
- **If the meter is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.**
- **Replace batteries only with the proper type and rating specified.**
- **Do not operate the meter with covers or panels removed.**
- **Use only the fuse type and rating specified for this meter.**
- **Avoid exposed circuitry. Do not touch exposed connections and components when power is present.**
- **If you suspect there is damage to the meter, have it inspected by qualified service personnel.**
- **Do not operate in wet/damp conditions. Do not operate in an explosive atmosphere. Keep meter surfaces clean and dry.**
- **This meter is sensitive to strong external magnetic fields. Do not use the meter within 1-inch (2.54 cm) of strong external magnetic fields such as that produced by the Fluke ToolPak hanging magnet accessory. Incorrect readings may result. If erratic behavior is noted, turn meter off to reset.**

International Symbols

International symbols used on the Meter and in this manual are explained in Table 1.

Table 1. International Symbols

	Risk of electric shock
	Risk of danger. Important Information. See manual
	Equipment protected by double or reinforced Insulation
	Battery
	Conforms to CSA C22.2 No 1010. 2.032-96
	Conforms to EU directives
	Earth
	AC or DC
	Conforms to relevant Australian standards
	Inspected and licensed by TÜV Product Services
VDE	Conforms to VDE EN61010

Specifications

All specifications are warranted, unless noted as typical, for the rated temperature range of 23 °C ± 5 °C at less than 80% relative humidity.

Characteristics	Description
LCD display digits	3 4/5 (default) or 4 4/5
Display counts	5,000 (default) or 50,000
Bargraph	20 segment, updated 20 times per second
Memory locations	183: 10, 185: 30
Out of range indicator	<i>OL</i> : overrange <i>Ur</i> : underrange
Low voltage indicator	Battery symbol shows on LCD at 2.0 V. Meter powers down at 1.5 V.
Battery life	100 hours continuous use with backlight off (typical)
Auto-off	Adjustable, 30 minute default
Power source	Two AA 1.5 V alkaline batteries (NEDA 15 A)
Maximum input voltage between terminals and between terminals and earth.	1000 V RMS Installation Category III (CAT III) ¹
F1 fuse protection	11 A (1000 V) service-replaceable
Backlight	Green LEDs
1. If the meter is exposed to water have it inspected by qualified service personnel.	

Table 2. DC Voltage Characteristics

Characteristic	Description
Settling time	3 readings (typical)
Reading rate	5,000 ct.: 4 readings per second 50,000 ct.: 1 reading per second
Rejection ratio	
Common mode	120 dB at DC or 50 Hz or 60 Hz
Normal mode	60 dB at 50 Hz or 60 Hz
Input impedance	10 M Ω (typical)

Table 3. DC Voltage Range, Resolution, and Accuracy

Range	Resolution		Accuracy ¹	
	5,000 counts	50,000 counts	183	185
0.5 V	100 μV	10 μV	± (0.07% + 1 count)	± (0.05% + 1 count)
5 V	1 mV	100 μV		
50 V	10 mV	1 mV		
500 V	100 mV	10 mV		
1000 V	1 V	100 mV		
Temperature coefficient		Add (0.005% + 0.1 ct.)/°C to accuracy beyond rated temperature range.		
1. Accuracy in 50,000-count mode is % + 10 counts.				

Table 4. AC Voltage Characteristics

Characteristic	Description
Input impedance	10 M Ω in parallel with 100 pF (typical)
Settling time	4 readings (typical)
Reading rate	5,000 ct.: 4 readings per second 50,000 ct.: 1 reading per second
Common mode rejection ratio	60 dB at DC to 60 Hz
Crest factor, maximum	Full scale: 3 Half scale: 6
AC+DC ¹ total RMS volts accuracy	AC (RMS) accuracy + 0.1% + 1 count
AC DC ¹ dual display accuracy	DC Accuracy + 0.05% + 1 count AC RMS Accuracy + 0.1% + 1 count
Upper display frequency (5,000 counts)	
Accuracy	$\pm (0.002\% + 1 \text{ count})$ for 20 Hz to 20 kHz
Sensitivity	10% of selected voltage range
dB reference ²	1 VRMS (adjustable)
dBm reference ²	775 mV across 600 Ω (1 mW)
1. 5,000-count mode only.	
2. See "dB and dBm Voltage Measurements" in the users manual for dB and dBm calculations.	

Table 5. AC Voltage Range, Resolution, and Accuracy

Range	Resolution		Accuracy ¹	
	5,000 Counts	50,000 Counts	183	185
0.5 V	100 μV	10 μV	40 Hz – 20 kHz ± (0.6% + 2 counts)	40 Hz – 20 kHz: ± (0.4% + 2 counts)
5 V	1 mV	100 μV		
50 V	10 mV	1 mV		
500 V ²	100 mV	10 mV		
1000 V ²	1 V	100 mV	40 Hz – 10 kHz: ± (0.6% + 2 counts)	40 Hz – 10 kHz: ± (0.4% + 2 counts)
Temperature coefficient		AC: Add (0.03% + 0.1 ct.)/°C beyond rated temperature range		
		AC+DC: Add (0.06% + 0.1 ct.)/°C beyond rated temperature range		
1. Accuracy in 50,000-count mode is % + 20 counts.				
2. For voltages > 100 V, the maximum volts–Hz product < 1 X 10 ⁷ VHz.				

Table 6. DC Current Characteristics

Characteristics	Description
Burden voltage	5 mA to 5 A: 0.3 V max. 10 A: 0.5 V max.
Percent 4-20 mA (calculated in 50 mA range)	4 mA = 0% 20 mA = 100%
Settling time	4 readings (typical)
Reading rate	5,000 ct.: 4 readings per second 50,000 ct.: 1 reading per second

Table 7. DC Current Range, Resolution, and Accuracy

Range	Resolution		Accuracy	
	5,000 Counts	50,000 Counts	183	185
500 μA	100 nA	10 nA	± (0.2% + 4 counts) ¹	
5 mA	1 μA	100 nA	± (0.2% + 2 counts) ²	
50 mA	10 μA	1 μA		
500 mA	100 μA	10 μA		
5 A	1 mA	100 μA	± (0.4% + 2 counts) ²	
10 A for 3 minutes (15 A for 30 sec.)	10 mA	1 mA	± (0.8% + 2 counts) ²	
Temperature coefficient		Add (0.05% + 0.1 ct.)/°C beyond rated temperature range.		
1. Accuracy in 50,000-count mode is % + 40 counts.				
2. Accuracy in 50,000-count mode is % + 20 counts.				

Table 8. AC Current Characteristics

Characteristics	Description
Burden voltage	0.5 mA to 5 A: 0.9 V max. 10 A: 1.0 V max.
AC+DC ¹ Accuracy	AC RMS amps accuracy + DC amps accuracy
Upper display frequency	
Accuracy	$\pm (0.002\% + 1 \text{ count})$ for 20 Hz to 5 kHz
Sensitivity	10% of range
Settling time	4 readings (typical)
Reading rate	5,000 ct.: 4 readings per second 50,000 ct.: 1 reading per second
1. 5,000-count mode only	

Table 9. AC Current Range, Resolution, and Accuracy

Range	Resolution		Accuracy ^{1,2}	
	5,000 Counts	50,000 Counts	183	185
0.5 mA	100 nA	10 nA	40 Hz – 1 kHz: ± (0.6% + 2 counts) 1 kHz – 5 kHz: ± (7.5% + 2 counts)	
5 mA	1 µA	100 nA		
50 mA	10 µA	1 µA		
500 mA	100 µA	10 µA		
5 A	1 mA	100 µA		
10 A (15 A for 30 sec.)	10 mA	1 mA		
Temperature coefficient		Add (0.05% + 0.1 ct.)/°C beyond rated temperature range.		
1. Accuracy in 50,000-count mode is % + 20 counts.				
2. > 5% of range.				

Table 10. Resistance (Ω) Characteristics

Characteristics	Description
Update rate	5,000 ct.: 2 readings per second 50,000 ct.: 1 reading per second 50 M Ω : 1 reading per second
Settling time	50 Ω to 5 M Ω range: 3 readings (typical) 50 M Ω range: 4 readings (typical)
Compliance voltages (typical)	0.6 V (50 Ω and 500 Ω range is 1.3 V)
Common mode rejection ratio	60 dB at DC, 50 Hz, or 60 Hz
Normal mode rejection ratio	20 dB at \geq 50 Hz

Table 11. Resistance Range, Resolution, and Accuracy

Range	Resolution		Accuracy
	5,000 Counts	50,000 Counts	183 185
50 Ω	0.01 Ω ¹	—	± (0.1% + 10 counts)
500 Ω	0.1 Ω	0.01 Ω	± (0.1% + 4 counts) ²
5 kΩ	1 Ω	0.1 Ω	± (0.1% + 2 counts) ³
50 kΩ	10 Ω	1 Ω	
500 kΩ	100 Ω	10 Ω	
5 MΩ	1 kΩ	100 Ω	± (0.4% + 4 counts) ²
50 MΩ	10 kΩ	—	± (1.0% + 4 counts) ²
Temperature coefficient		50 Ω to 500 kΩ: Add (0.03% + 0.1 ct.)/°C beyond rated temperature range. 5 MΩ to 50 MΩ: Add (0.2% + 0.1 ct.)/°C beyond rated temperature range.	
1. 5,000 count mode only. 2. Accuracy in 50,000-count mode is % + 40 counts. 3. Accuracy in 50,000-count mode is % + 20 counts.			

Table 12. Continuity Characteristics

Characteristics	Description
Continuity threshold	Beeper sounds when resistance is 100 Ω or less (typical)
Response time	< 1 ms

Table 13. Diode Test Characteristics

Characteristics	Description
Test current (typical)	0.35 mA
Test voltage	3.3 V maximum, open circuit
Accuracy	± 1.0%

**Table 14. Capacitance Range, Resolution, and Accuracy
(5,000 counts only)**

Range	Resolution ¹	Accuracy ²	
		183	185
5 nF ³	1 pF	± (1.0% + 5 counts) (using REL Δ mode)	
50 nF	10 pF	± (1.0% + 3 counts) (using REL Δ mode)	
500 nF	100 pF	± (1.0% + 3 counts)	
5 μF	1 nF		
50 μF	10 nF	± (3.0% + 3 counts)	
500 μF	100 nF		
5 mF	1 μF		
50 mF	10 μF		
Temperature coefficient	Add (0.05% + 0.1 ct.)/°C beyond rated temperature range.		
1. 5,000 count mode only.			
2. >1% of range.			
3. ± (1% + 10) below 0.500 nF.			

Table 15. Frequency Characteristics, Resolution, and Accuracy

Characteristics	Description
Signal coupling	AC
Minimum frequency	0.5 Hz
Maximum frequency	1 MHz
Accuracy	$\pm (0.002\%) + 1 \text{ count}$
Best resolution	10,000 count: 0.01 Hz 100,000 count: 0.001 Hz
Temperature coefficient	Add 0.00004%/°C beyond rated temperature range

Table 16. Frequency Voltage Range

Range	Sensitivity, 10 Hz - 100 kHz	Sensitivity, 1 MHz ¹
500 mV	100 mV	—
5 V	500 mV	2 V
50 V	5 V	20 V
500 V	50 V	—
1. For voltages > 100 V, the maximum volts-Hz the meter is < 10 ⁷ VHz.		

Table 17. Duty Factor Characteristics

Characteristics	Description
Range	1 Hz to 100 kHz
Accuracy	$\pm (0.1\% + 0.05\% \text{ per kHz})$ for 5 V input (logic signals only)
Signal coupling	DC
Resolution	0.1%
Sensitivity	30% of range

Table 18. Temperature Characteristics

Characteristics	Description
Main display	
Range	−50 °C to +980 °C
Accuracy	$\pm 3 \text{ °C}^1$ (typical)
Thermocouple type	K
Upper display	
Accuracy	$\pm 3 \text{ °C}$ of ambient temperature (typical)
1. Use the water and ice offset calibration adjustment method in the "Temperature Measurements (185 only)" section of the users manual for accuracy to $\pm 1.0 \text{ °C}$.	

Table 19. FAST MIN MAX (1 ms) Characteristics

Characteristics	Description
Accuracy ¹	Specified voltage or current measurement ± 30 counts of the peak value of a single 1ms pulse
1. 5,000-count mode only.	

Table 20. Physical Characteristics

Characteristic	Description
Dimensions (H × W × D)	38 mm × 88 mm × 183 mm (without holster)
Weight (with batteries)	383 g (13.5 oz)
With holster	539 g (1 lb 3 oz)

Table 21. Environmental Characteristics

Characteristic	Description
Temperature	
Operating	−10 to +50 °C
Non-operating (storage)	−40 to +60 °C
Humidity	−40 to +35 °C: < 80%
	+35 to +40 °C: < 70%
	+40 to +60 °C: < 55%
Altitude	
Operating	2,000m (6,562 ft) For altitudes from 2,000 m up to 3,000 m (9,843 ft) derate voltage input to 600 VAC CAT III
Non-operating (storage)	12,300 m (40,354 ft)
Vibration	
Operating	2.66 gRMS, 5 to 500 Hz, 3 axes (10 minutes each)
Non-operating	3.48 gRMS, 5 to 500 Hz, 3 axes (10 minutes each)

Warning

This meter is sensitive to strong external magnetic fields.

Do not use the meter within 1-inch (2.54 cm) of strong external magnetic fields such as that produced by the Fluke ToolPak hanging magnet accessory. Incorrect readings may result. If erratic behavior is noted, turn meter off to reset.

Table 22. Certifications and Compliances


Category	Standards or Description
EC Declaration of Conformity – EMC	Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities: EN 61326 Class A 1,2
Australia/New Zealand Declaration of Conformity – EMC	Complies with EMC provision of Radio communications Act per the following standard(s): AS/NZS 2064.1/2 Class A Radiated Emissions
EC Declaration of Conformity – Low Voltage	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 73/23/EEC as amended by 93/69/EEC. EN 61010-1/A2:1995 Safety requirements for electrical equipment for measuring control, and laboratory use
Nationally Recognized Testing Laboratory Listing	 CAN/CSA C22.2 No. 1010.1-92 & Amd 2; 1997, UL 3111-1 Safety requirements for electrical equipment for measurement, control, and laboratory use
Additional Compliance	IEC61010-1/A2:1995 Safety requirements for electrical equipment for measurement, control, and laboratory use.
Installation Category DUAL RATINGS	Complies with IEC 1010-1 to 1000 V Overvoltage Category III, Pollution Degree 2; and IEC 664-1 to 600 V Overvoltage Category IV, Pollution Degree 2 <ul style="list-style-type: none"> • OVERVOLTAGE (Installation) Categories refer to the level of impulse withstand voltage protection provided at the specified pollution degree. • Overvoltage Category III equipment is designed to protect against transients in equipment in fixed-equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings. • Overvoltage Category IV equipment is designed to protect against transients from the primary supply level, such as an electricity meter or an overhead or underground utility service.

Table 22. Certifications and Compliances (continued)

Category	Standards or Description
Pollution Degree	A measure of the contaminates that could occur in the environment around and within a meter. Typically the internal environment inside a meter is considered to be the same as the external. Meters should be used only in the environment for which they are tested.
Pollution Degree 2	Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the meter is out of service.
Pollution Degree 3	Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.
<ol style="list-style-type: none"> 1. Add 25 counts (250 counts in 50,000 count mode) to the accuracy specifications when in the presence of an RF field as defined in IEC801–3. 2. Amps DC: Add 60 counts (600 counts in 50,000 count mode) to the amps accuracy specifications when in the presence of an RF field as defined in IEC801–3. 	

Basic Maintenance

⚠ Warning

To avoid electrical shock or personal injury, remove the test leads and any input signals before opening the case or replacing the battery or fuse. To prevent damage or injury, install ONLY batteries or the fuse specified for this product.

Opening the Meter Case

⚠ Caution

To avoid unintended circuit shorting, 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 1):

1. Disconnect test leads from any live source, turn the rotary switch to **OFF**, and remove the test leads from the front terminals.
2. Take the Meter out of the holster.
3. Pull the battery cover off of the Meter.

⚠ Caution

Before performing step 4, note which direction that the rubber gasket is installed. It is important to reinstall it correctly.

4. Carefully insert a flat-head screwdriver under the rubber gasket and remove it.

5. Using a T10 Torx wrench, remove the 2 screws located on either side of the battery holder.

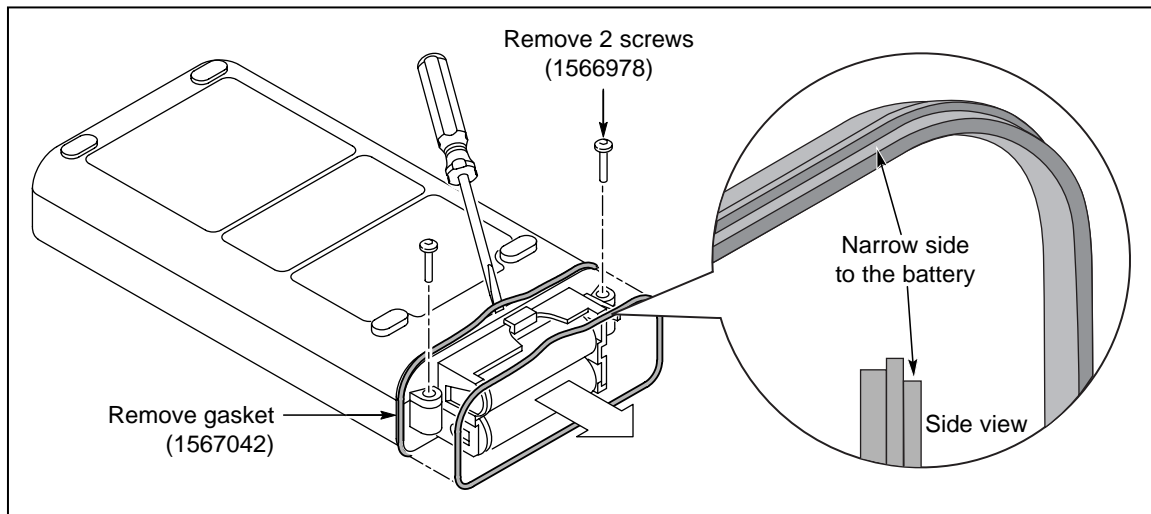


Figure 1. Opening the Case

⚠ Caution

Opening the case allows a spring loaded electrical contact pin to fall out of its holder. Take care to not lose the contact pin or allow it to remain loose in the instrument when reinstalling the bottom case half.

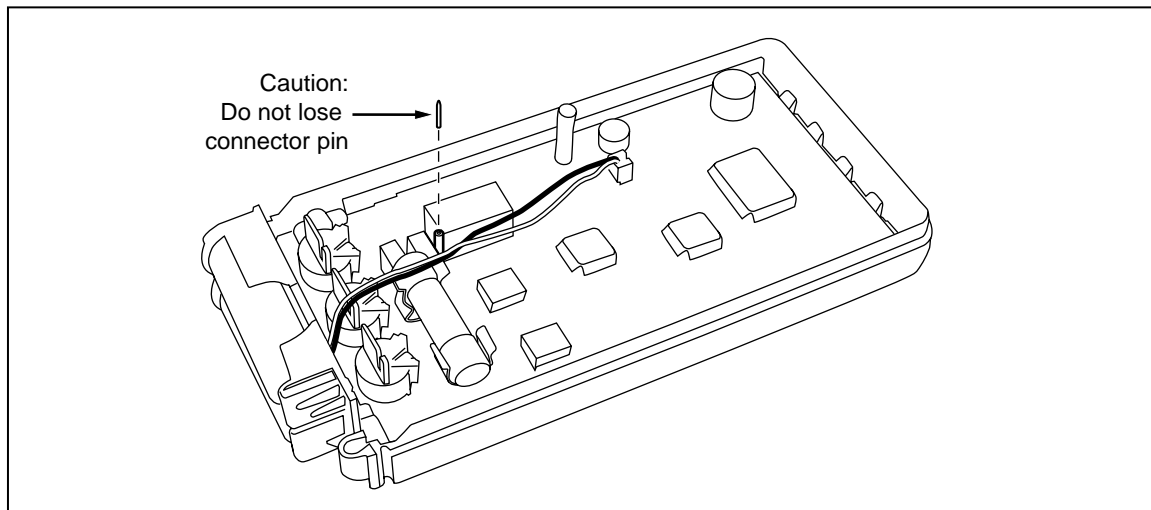


Figure 2. Connector Pin

6. Pull the two halves of the case apart.

Removing and Reinserting the Circuit Board Assembly

The circuit board assembly must be removed to access and replace the LCD.

⚠ Caution

The circuit board is extremely susceptible to contamination. Handle it by the input receptacle, fuse clips or edges of the board only. You can use clean surgical gloves to help avoid contamination.

1. Open the Meter case and remove the case bottom to access the circuit board.
2. Remove the two Torx-head screws securing the circuit board to the case top.
3. Lift the LCD-end of the circuit board out of the top case taking care to not damage the battery wires that remain attached to the circuit board.
4. To reinsert the circuit board, simply place it into the case top with the LCD display showing through the window.
5. Carefully replace the two Torx-head screws that connect the circuit board to the case top.

⚠ Caution

Do not over-torque the two Phillips-head screws when you reconnect the circuit board to the case top. Doing so may create shielding problems and cause the Meter to give incorrect readings.

6. Reinstall the rubber gasket. It is important to reinstall it in the proper direction.

Replacing the LCD

If the LCD needs to be replaced, it is easier to leave the LCD assembly attached to the circuit board and access the LCD by removing the LCD bezel from the front of the LCD assembly.

1. Remove the circuit board as described under “Removing and Reinserting the Circuit Board Assembly.”
2. Carefully insert the tip of a thin screwdriver under the LCD bezel at the top of the display as shown in Figure 3. Take care not to crack or scrape the LCD with the screwdriver.

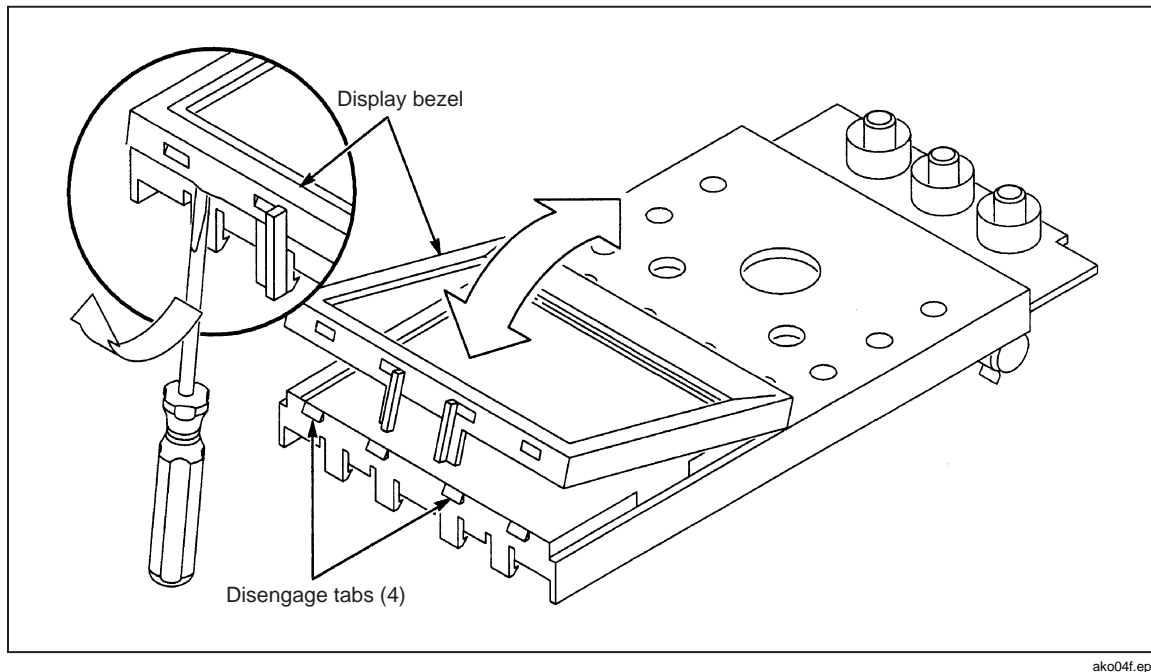
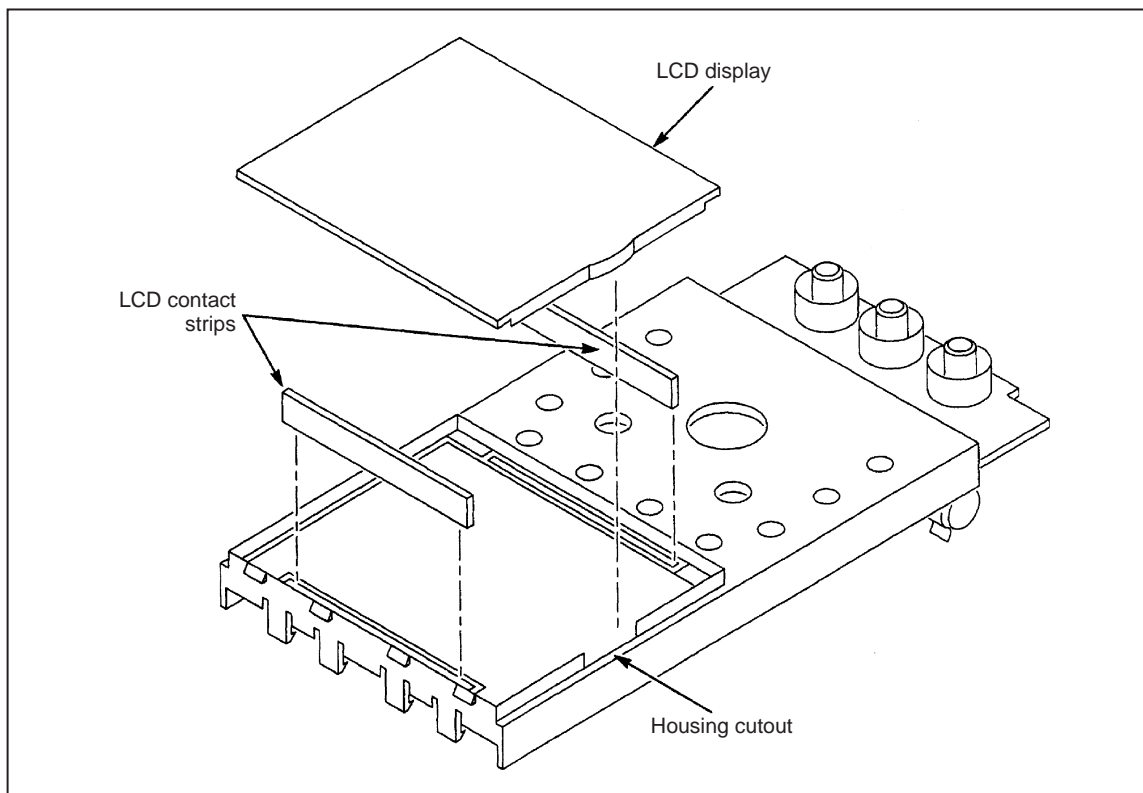


Figure 3. Removing LCD Mask to Access LCD

3. Lift up the LCD bezel gently with the screwdriver blade to loosen the bezel from the assembly. Be careful to press upward, not inward toward the LCD. Tilt the LCD bezel upward to release it.
4. Replace the LCD (refer to Figure 4). The LCD must be centered on the platform between the brackets before you replace the LCD mask. If the LCD is improperly aligned, the display may show missing segments or meaningless readings.
5. Reattach the LCD bezel by pressing it over the LCD until it snaps into place. Attach the bottom end of the bezel first. Push the bottom end of the bezel up until the bottom end snaps into place and then push down the top end. It may be necessary to slightly slide the LCD towards the bottom end of the bezel.
6. Wipe any fingerprints from the LCD using a soft cloth.
7. Follow steps for reinstalling the circuit board in “Removing and Reinserting the Circuit Board Assembly.”



ako05f.eps

Figure 4. Reassembling the LCD

Reassembling the Meter Case

To reassemble the Meter case:

1. Verify that the rotary switch is in the **OFF** position.
2. Reinsert the circuit board by placing it into the case top with the LCD showing through the window. Carefully replace the two Torx-head screws that connect the circuit board to the case top.

⚠ Caution

Do not over-torque the two Torx-head screws when reconnecting the circuit board to the case top. Doing so may create shielding problems and cause the Meter to give incorrect readings.

3. Hold the Meter face down and place the case bottom on the case top.
4. Reinstall the two screws and the battery cover.
5. Reinstall the rubber gasket. It is important to reinstall it in the proper direction. Refer to Figure 1.
6. Go to the “Performance Test” section in this document, and perform the procedures described.

Testing the Fuse

⚠ Warning

To avoid electrical shock or personal injury, remove the test leads and any input signals before replacing the battery or fuse. To prevent damage or injury, install ONLY the specified replacement fuse with the amperage, voltage, and speed ratings shown in the specifications.

To test the fuse:

1. Set the rotary switch to $\Omega \rightarrow$ and press **F2** for continuity.
2. Plug a test lead into the **V** terminal and touch the probe to the **A** terminal. The meter indicates "shrt" and the continuity beeper will sound.
3. If the display reads **OL**, replace the fuse and test again.
4. If the display shows any other value have the Meter serviced. See "Service and Service Information" earlier in this manual.

Replacing the Fuse

⚠ Warning

To avoid electrical shock, remove the test leads and any input signals before replacing the battery or the fuse. To prevent damage or injury, install ONLY the specified fuse and batteries.

To replace the fuse:

1. Turn the rotary switch to **OFF** and remove the test leads from the terminals
2. Open the case (refer to "Opening the Meter Case").
3. Remove the fuse by gently prying one end loose, then lifting the fuse out of the fuse contacts.
4. Install **ONLY** the specified fuse. Refer to the Replacement Parts and Accessories Table.
5. Reassemble the case. Refer to "Reassembling the Meter Case".

Battery Replacement

When replacing a battery, the Meter calibration is not affected and stored data is not lost.

Refer to Figure 5 to replace the battery.

Remove the battery cover only in a clean, dry environment.

See Table 26 for the descriptions and part numbers of the replaceable batteries.

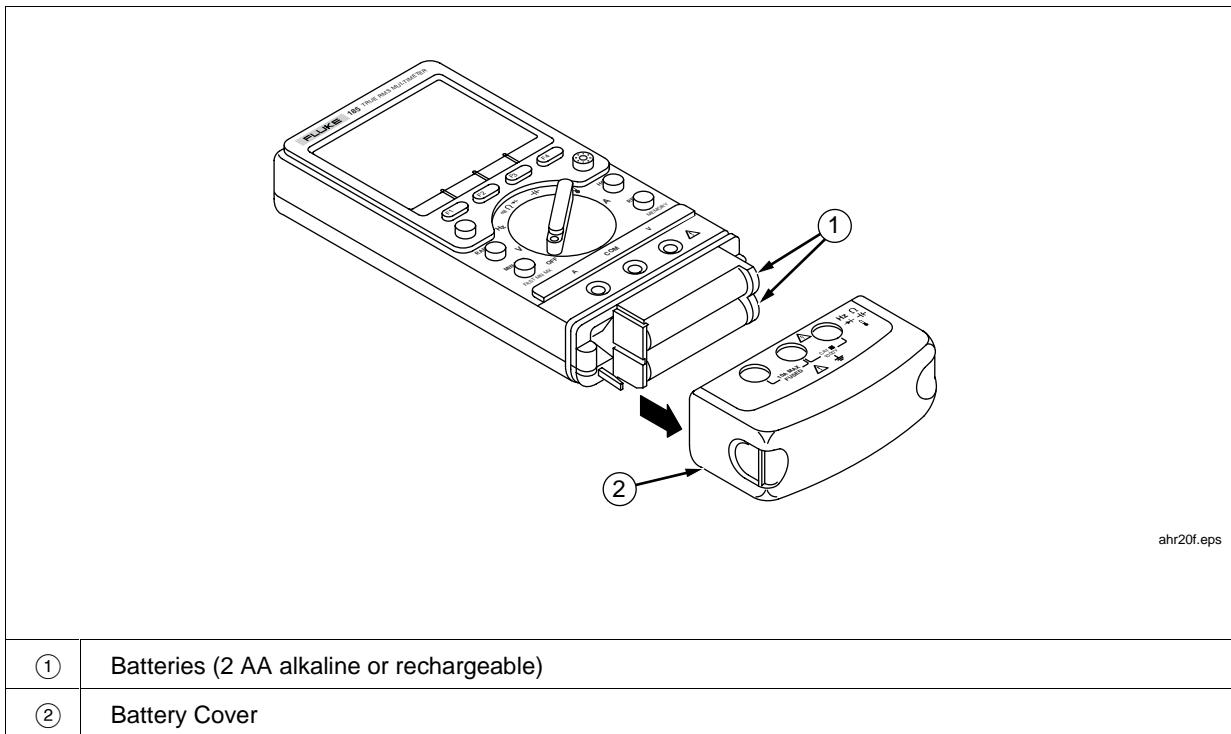


Figure 5. Replacing the Batteries

Cleaning

⚠ Warning

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

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.

Clean the terminals as follows:

1. Turn the Meter off and remove all test leads.
2. Shake out any dirt that may be in terminals.
3. Soak a new swab with alcohol. Clean each terminal with the swab.

Performance Tests

The following performance tests will ensure that the Meter is in proper operating condition and will check the accuracy of each function against its specifications. If the Meter fails any of these tests, it needs calibration adjustment or repair.

Required Equipment

Required equipment is listed in Table 23. If the recommended models are not available, equipment with equivalent specifications may be used.

Repairs or servicing should be performed only by qualified personnel.

Table 23. Required Performance Test Equipment

Equipment	Required Characteristics	Recommended Model
Calibrator	AC Voltage Range: 0-1000 Vac Accuracy: $\pm 0.1\%$ Frequency Range: 40 Hz - 20 kHz Accuracy: $\pm 3\%$ DC Voltage Range: 0 -1000 Vdc Accuracy: $\pm 0.0125\%$ Current Range: 0 -10 A Accuracy: AC mA - 40 Hz -1 kHz, $\pm 0.15\%$ AC A - 1 kHz - 5 kHz, $\pm 1.875\%$ Frequency range: 1 kHz - 20 kHz DC mA - $\pm 0.05\%$ DC A - $\pm 0.1\%$ Frequency Source: 1 MHz Accuracy: $\pm 0.0005\%$ Amplitude: 2.8 V pp Accuracy: $\pm 5\%$ Ohms Range: 0 Ω - 50 M Ω Accuracy: 50 Ω - 500 k Ω , $\pm 0.035\%$ 5 M Ω , $\pm 0.12\%$ 50 M Ω , $\pm 0.27\%$ Capacitance Range: 5 nF - 5 μ F $\pm 0.275\%$ Accuracy: 50 μ F - 50 mF $\pm 0.765\%$	Fluke 5520A

Testing the Display

Push down **(F2)** while turning the Meter on. Compare the display with the example in Figure 6. Check all segments for clarity and contrast.

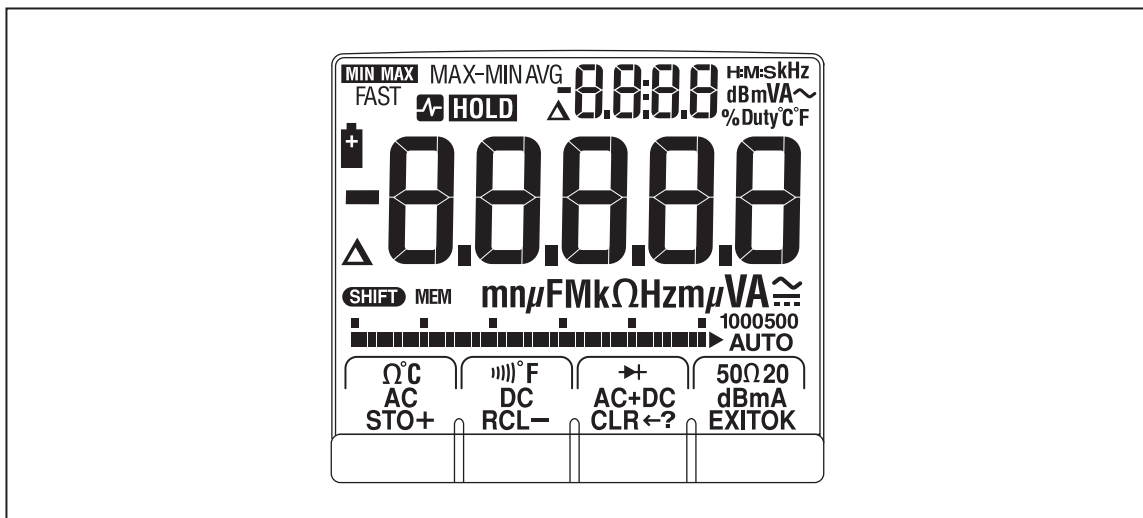


Figure 6. Display Test

ako03f.eps

Backlight Test

To test the backlight, press **(☉)**. The light will come on and the unit will beep unless the beeper was turned off in setup mode.

Keypad Test

To test the keypad, turn the Meter to AC V and push each button separately. Each button push should cause the Meter to beep unless the beeper has been turned off in setup mode.

Reset the Meter by turning it **OFF**, and then back on.

Testing Meter Accuracy

To verify the accuracy of Meter functions:

1. Connect the calibrator to the **VΩ→** and **COM** inputs on the Meter to test all but current functions. When testing current functions, connect the calibrator to the **A** and **COM** inputs.
2. Turn the rotary switch to the function listed in Table 24 for each step and use the blue softkeys for specific function parameters. For example, turn the meter to volts and press **(F2)** to access the Volts DC function.
3. Apply the input from the steps listed in Table 24. Refer to any footnotes in the table for special instructions.
4. Compare the reading on the Meter display with the Display Reading column in Table 24.
5. If the display reading falls outside of the limits shown, the Meter does not meet specification and must be adjusted or repaired.
6. Repeat steps 2 through 5 for the all performance steps shown in Table 24.

Table 24. Verification Table
































Step	Rotary Switch Function	Softkey	Range	Input level	Freq.	Display Reading	
						183	185
AC Volts Test							
1	V		500 mV	0.0000 V		000.0 to 000.2	000.0 to 000.2
2	V		500 mV	50.00mV	60 Hz	49.5 to 50.5	49.6 to 50.4
3	V		500 mV	460.0 mV	60 Hz	457.0 to 463.0	458.0 to 462.0
4	V		500 mV	460.0 mV	20 kHz	457.0 to 463.0	458.0 to 462.0
5	V		5 V	4.600V	40 Hz	4.570 to 4.630	4.580 to 4.62.0
6	V		5 V	4.600V	1 kHz	4.570 to 4.630	4.580 to 4.620
7	V		5 V	4.600V	10 k Hz	4.570 to 4.630	4.580 to 4.620
8	V		5 V	4.600V	20 kHz	4.570 to 4.630	4.580 to 4.620
9	V		50 V	46.00 V	60 Hz	45.70 to 46.30	45.80 to 46.20
10	V		50 V	46.00 V	20 kHz	45.70 to 46.30	45.80 to 46.20
11	V		500 V	460.00 V	60 Hz	457.0 to 463.0	458.0 to 462.0
12	V		500 V	320.0 V	20 kHz	317.9 to 322.1	318.5 to 321.5
13	V		1000 V	1000.0 V	60 Hz	992 to 1008	994 to 1006
14	V		1000 V	1000.0 V	10 kHz	992 to 1008	994 to 1006
AC Volts Frequency Test							
15	V		500 mV	100.0 mV	40 Hz	39.99 to 40.01	39.99 to 40.01
16	V		500 mV	100.0 mV	20 kHz	19.99 to 20.01	19.99 to 20.01
17	V		5 V ¹	500.0 mV	40 Hz	39.99 to 40.01	39.99 to 40.01
18	V		5 V ¹	500.0 mV	20 kHz ¹	19.99 to 20.01	19.99 to 20.01
1. Manually set range to 5 V.							

Table 24. Verification Table (continued)

Step	Rotary Switch Function	Softkey	Range	Input level	Freq.	Display Reading	
						183	185
DC Volts Test ²							
19	V		500 mV	0.0000V		-0.10 to 0.10	-0.10 to 0.10
20	V		500 mV	46.00 mV		45.88 to 46.12	45.88 to 46.12
21	V		500 mV	460.00 mV		459.67 to 460.33	459.67 to 460.33
22	V		500 mV	- 0.460V		-460.33 to -459.67	-460.33 to -459.67
23	V		5V	4.6000V		4.5967 to 4.6033	4.5967 to 4.6033
24	V		50V	46V		45.967 to 46.033	45.967 to 46.033
25	V		500V	460V		459.67 to 460.33	459.67 to 460.33
26	V		1000V	1000V		0998.5 to 1001.5	0998.5 to 1001.5
27	V		1000V	-1000V		-1001.5 to -0998.5	-1001.5 to -0998.5
2. Use the high resolution 50,000 -count mode (Power up option)							
Volts Peak Hold Test							
28	V	 Yellow	Max	6.4Vpp, Sq wave	500 Hz	3.167 to 3.233	3.167 to 3.233
29	V	Min Max	Min	6.4Vpp, Sq wave	500 Hz	-3.233 to -3.167	-3.233 to -3.167
AC DC Volts Test							
30	V		500 mV	32.0 mV	DC	31.8 to 32.2	31.8 to 32.2
31	V		500 mV	460.0 mV	40 Hz	456.5 to 463.5	457.4 to 462.6
AC+DC Volts and Frequency Test							
32	V	 (twice)	5 V	-1.000V	DC	0.990 to 1.010	0.990 to 1.010
33	V	 (twice)	5 V	1.000V	DC	0.990 to 1.010	0.990 to 1.010
34	V	 (twice)	5 V	1.000V	60 Hz	0.990 to 1.010	0.990 to 1.010
35 ³	V	 (twice)	5 V	500 mV	20 kHz	19.99 to 20.01	9.99 to 20.01
3. Manually select 5 V range. Frequency shown in upper display readout							

Frequency Test

Perform the following prior to performing frequency test steps in Table 24:

1. Turn the meter off.
2. Turn the meter switch to **Hz** while holding down the yellow shift key (50,000 count mode).
3. Verify that **% Duty** is NOT showing on the upper display.

% Duty can be removed in setup mode as follows:

1. Push and hold the yellow shift key for 2 seconds.
2. Press **(F4)** until **POL** is displayed.
3. Press **(F1)** until **OFF** is displayed.
4. Press the yellow shift key to exit setup.

Table 24. Verification Table (continued)











Step	Rotary Switch Function	Input level	Frequency	Display	
				183	185
Frequency Test					
36	Hz	2.828 Vpp	990.0 kHz	989.97 to 990.03	989.97 to 990.03

Duty Factor Test

Perform the following steps prior to performing duty factor steps in Table 24:

1. Turn the Meter switch to **Hz**.
2. Set the trigger edge polarity to POS as follows:
 1. Push and hold the yellow shift key for 2 seconds.
 2. Press **(F4)** soft key until **POL** is displayed.
 3. Press **(F1)** until **POS** is displayed.
 4. Press the yellow shift key to exit setup.

Table 24. Verification Table (continued)























Step	Rotary Switch Function	Input level	Frequency		Display Reading	
					183	185
Duty Factor Test						
37	Hz (duty)	5 Vpp sq. Wave	100 Hz, 10% duty		9.90 to 10.10	9.90 to 10.10
Step	Rotary Switch Function	Softkey	Range	Input level	Display Reading	
					183	185
Ohms Test						
38	Ω	REL	500	0.00 Ω	00.0 to 00.4	00.0 to 00.4
39	Ω		50 Ω	40.00 Ω	39.86 to 40.14	39.86 to 40.14
40	Ω		500 Ω	400.0 Ω	399.2 to 400.8	399.2 to 400.8
41	Ω		5 kΩ	4.000 kΩ	3.994 to 4.006	3.994 to 4.006
42	Ω		50 kΩ	40.00 kΩ	39.94 to 40.06	39.94 to 40.06
43	Ω		500 kΩ	400.0 kΩ	399.4 to 400.6	399.4 to 400.6
44	Ω		5 MΩ	4.000 MΩ	3.980 to 4.020	3.980 to 4.020
45	Ω		50 MΩ	40.00 MΩ	39.56 to 40.44	39.56 to 40.44
Diode Test						
46	Ω		5 V	0.5000 V	0.495 to 0.505	0.495 to 0.505
Continuity Test						
47	Ω			50 Ω	Beeper on	Beeper on
48	Ω			150 Ω	Beeper off	Beeper off
Capacitance Test						
*49	Cap.		5 nF	4.000 nF	3.955 to 4.045	3.955 to 4.045
*50	Cap.		50 nF	40.00 nF	39.57 to 40.43	39.57 to 40.43
51	Cap.		500 nF	400.0 nF	395.7 to 404.3	395.7 to 404.3
52	Cap.		5 uF	4.000 uF	3.957 to 4.043	3.957 to 4.043
53	Cap.		50 uF	40.00 uF	38.77 to 41.23	38.77 to 41.23
54	Cap.		500 uF	400.0 uF	387.7 to 412.3	387.7 to 412.3
55	Cap.		5 mf	4.000 mF	3.877 to 4.123	3.877 to 4.123
56	Cap.		50 mF	40.00 mF	38.77 to 41.23	38.77 to 41.23
* Use REL Δ mode to zero test leads/offsets (must disconnect test lead from source when zeroing offset).						

Current Test

To verify the accuracy of the current functions:

1. Connect the Calibrator to the **A** and **COM** inputs of the Meter.
2. Turn the rotary switch to **A** and use the yellow softkey to select AC or DC.
3. Apply the Input Level from the steps listed in Table 24.
4. Compare the reading on the Meter display with the Display column in Table 24.

Table 24. Verification Table (continued)

Step	Rotary Switch Function	Softkey	Range	Input Level	Frequency	Display	
						183	183
DC Current Test							
57	A		500 uA	0.0 μA		-000.4 to 000.4	-000.4 to 000.4
58	A		500 uA	460.0 μA		458.7 to 461.3	458.7 to 461.3
59	A		500 uA	-460.0 μA		-461.3 to -458.7	-461.3 to -458.7
60	A		5 mA	4.600 mA		4.589 to 4.611	4.589 to 4.611
61	A		50 mA	46.00 mA		45.89 to 46.11	45.89 to 46.11
62	A		500 mA	460.0 mA		458.9 to 461.1	458.9 to 461.1
63	A		5 A	4.600 A		4.580 to 4.620	4.580 to 4.620
64	A		10 A	10.00 A		9.90 to 10.10	9.90 to 10.10
AC Current Test							
65	A		500 uA	34 μA	1 kHz	33.6 to 34.4	33.6 to 34.4
66	A		500 uA	460.0 μA	60 Hz	457.0 to 463.0	457.0 to 463.0
67	A		500 uA	460.0 μA	5 kHz	425.3 to 494.7	425.3 to 494.7
68	A		5 mA	4.600 mA	60 Hz	4.570 to 4.630	4.570 to 4.630
69	A		5 mA	4.600 mA	5 kHz	4.253 to 4.947	4.253 to 4.947
70	A		50 mA	46.00 mA	60 Hz	45.70 to 46.30	45.70 to 46.30
71	A		50 mA	46.00 mA	5 kHz	42.53 to 49.47	42.53 to 49.47
72	A		500 mA	460.0 mA	60 Hz	457.0 to 463.0	457.0 to 463.0
73	A		500 mA	460.0 mA	3 kHz	425.3 to 494.7	425.3 to 494.7
74	A		500 mA	460.0 mA	5 kHz	425.3 to 494.7	425.3 to 494.7
75	A		5 A	4.600 A	60 Hz	4.570 to 4.630	4.570 to 4.630
76	A		5 A	4.600 A	5 kHz	4.253 to 4.947	4.253 to 4.947
77	A		10 A	10.00 A	60 Hz	9.92 to 10.08	9.92 to 10.08
78	A		10 A	10.00 A	5 kHz	9.23 to 10.77	9.23 to 10.77

Continuity Test

To test the Meter continuity:

1. Connect the test leads to the **V** and **COM** inputs.
2. Turn the knob to $\Omega \rightarrow$.
3. Press **(F2)**.
4. Short the test leads together. The Meter will beep and **Short** will be displayed.

IR Port Verification Test

Use a PC with Windows Hyperterminal to verify that the 183/185 IR Port is working.

1. Connect the IR cable and adapter to the meter and Com 1 or Com 2 of the PC.
2. Start Windows Hyperterminal from the Start menu.
3. Enter "Meter" as the connection name.
4. Set the Com port to same as IR cable is connected to.
5. Set Com Port properties as follows:
Baud Rate = 9600 bits per second
Data Bits = 7
Parity = Even
Stop Bits = 1
Flow Control = Hardware
6. Turn the meter on to V function.
7. Enter the following command:
!K?(cr) (asks the meter what function the rotary switch is set to)
8. The meter should respond as follows:
9. <OK;1 (Meter responds that it is in the "V" function)

Calibration Adjustment

The Fluke 183 and 185 require adjustment only when they fail the performance tests or have been repaired.

Software adjustment is performed through the meter's IR port using a semi-automated Fluke Met/Cal procedure and Fluke 5520A. The meters have no physical adjustments and cannot be manually adjusted.

The following list of equipment is required to adjust the Fluke 183 and 185:

Table 25. Required Equipment for Calibration Adjustment

Model/Part Number	Description	Vendor
5520A	Calibrator	Fluke
Computer	Desk top PC	IBM Compatible
P/N 1612912 Fluke 185-8023	Capacitance Calibration Cable- 183/185	Fluke
P/N 1590638	IR Cable w/ Adapter	Fluke
	183/185 MetCal Procedure	Fluke

Replacement Parts and Accessories

Replacement parts and accessories are listed in Table 26 and identified in Figure 7.

Table 26. Replacement Parts and Accessories

Description	Reference Designators	Part Number	Qty
183 Access Door, Battery / Fuse	MP7	1565237	1
185 Access Door, Battery / Fuse		1565243	1
183 Top Case, Pad Xfer	MP9	1581124	1
185 Top Case, Pad Xfer		1581089	1
Bottom Case	MP6	1565228	1
Knob Assembly	MP5	1565471	1
Light Diffuser	MP22	1567039	1
Keypad	MP11	1565225	1
Connector Pin, Spring, Barrel, Gold	J3	1566968	1
Spring	MP21	1567021	1
O-Ring	MP1	1567042	1
Holster	MP12	1556861	1
Bail Stand	-	1556877	1
⚠ Fuse, 11 A, 1000 V FAST	F1	803293	1
Battery, 1.5 V, 0-15 mA, AA Alkaline	BT1-BT2	376756	2
Screws, Torx-Head, 10 mm	H1-H4	1566979	4
185 AC70A Alligator Clip (Black)	MP19	738047	1
185 AC70A Alligator Clip (Red)	MP20	738120	1
TL75 Test Lead Set	MP14	855742	1
LCD 4.5 Digit Multiplexed	DS700	1565262	1
Connector, Elastomeric, LCD to PWB ¹	J1, J2	1565336	2
Bezel, LCD Assembly	MP2	1567056	1
Chassis, LCD Assembly	MP4	1567063	1
IR Cable Adapter	-	1574462	1
MET/CAL-PROC/0008, PROCEDURE		1620265	1
Quick Reference Cards ²		²	
Users Manuals ³		²	
IR Cable (Includes IR Cable Adapter PN 1574462)	-	1590638	1
<p>⚠ To ensure safety, use exact replacement only.</p> <p>1. Order replacement connectors separately when ordering a replacement LCD.</p> <p>2. Quick Reference Card PNs: French=1574641; Danish=1587612; Dutch=1587601; Italian=1574683; German=1574676; Finnish=1587620; Norwegian=1587635; Swedish=1587647; Spanish=1574652; Portuguese=1574665</p> <p>3. Users Manual PNs: English, French, Spanish, Portuguese=1574599; English, French, German, Italian, Dutch=1574607; English, Danish, Finnish, Norwegian, Swedish=1587740</p>			

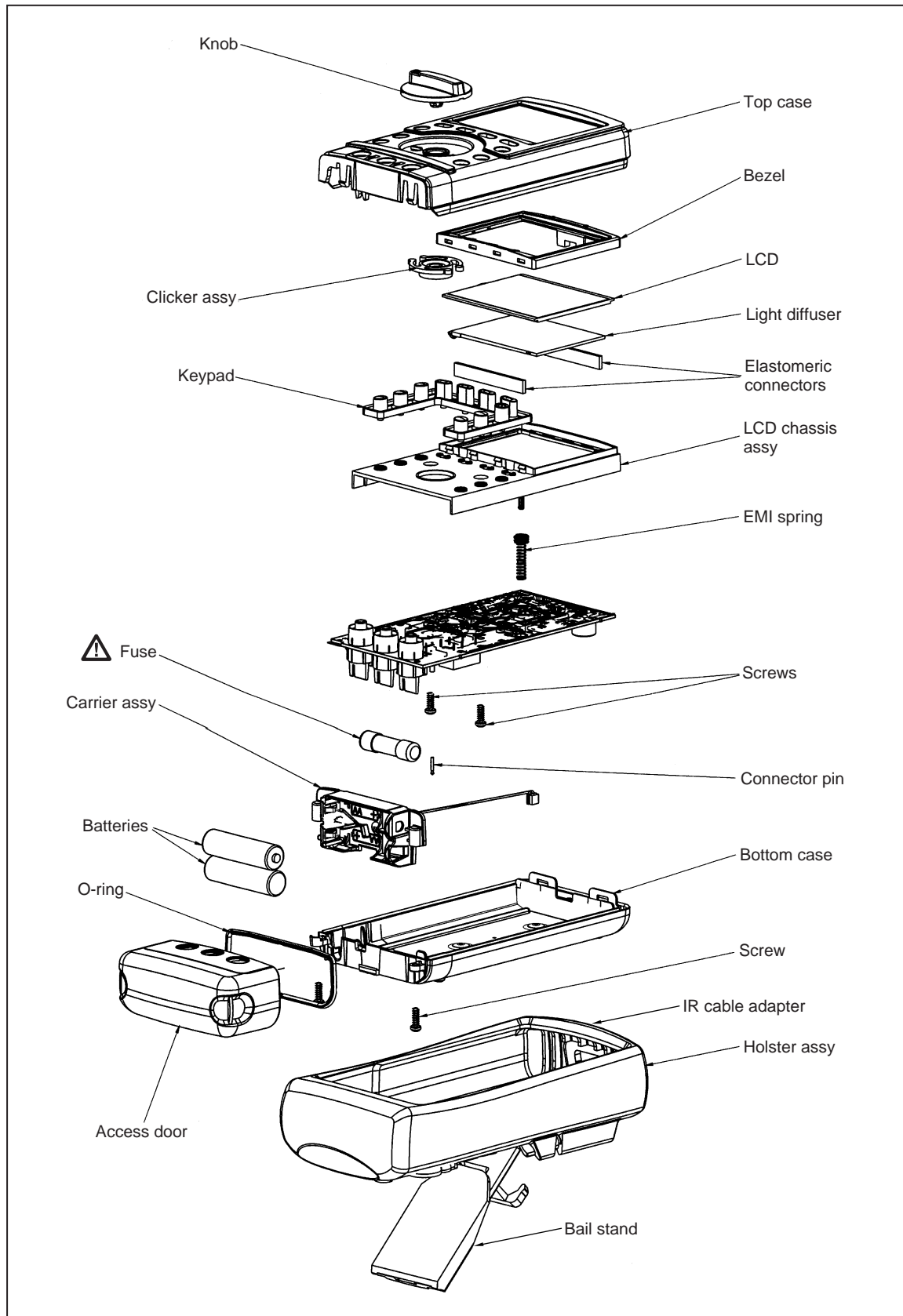


Figure 7. Replacement Parts and Accessories

ako16f.eps

