

Model 77 Series IV

Digital Multimeter

Calibration Information

Introduction

⚠⚠ Warning

To avoid electric shock or injury, do not perform the performance tests or calibration adjustment procedures unless qualified to do so.

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

The *Model 77 Series IV Calibration Information* provides the information necessary to adjust and verify the performance of the Fluke Model 77 Series IV Digital Multimeter (hereafter known as the Meter).

The following information is included in this document:

- Safety Information (page 2)
- International Electrical Symbols (page 3)
- Test Lead Alert (page 3)
- Specifications (page 4)
- Testing and Replacing the Fuses (page 7)
- Replacing the Battery (page 8)
- Cleaning (page 9)
- Replacing the LCD (page 9)
- Performance Tests (page 10)
- Calibration Adjustment (page 14)
- Replaceable Parts and Accessories (page 17)
- Complete Warranty (page 19)

See the *Model 77 Series IV Users Manual* for complete operating instructions.

Service Information

To contact Fluke, call one of the following telephone numbers:

USA: 1-888-99-FLUKE (1-888-993-5853)
Canada: 1-800-36-FLUKE (1-800-363-5853)
Europe: +31 402-675-200
Japan: +81-3-3434-0181
Singapore: +65-738-5655
Anywhere in the world: +1-425-446-5500

Or, visit Fluke's Web site at www.fluke.com.

To register your product, visit register.fluke.com

Safety Information

Warning and Caution Statements

A **⚠⚠ Warning** identifies hazardous conditions and actions that could cause bodily harm or death.

A **⚠ Caution** identifies conditions and actions that could damage the Meter, the equipment under test, or cause permanent loss of data.

⚠⚠ Warnings and Precautions

To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, adhere to the following practices:

- Use the Meter only as specified in this manual or the protection provided by the Meter might be impaired.
- Do not use the Meter or test leads if they appear damaged, or if the Meter is not operating properly. If in doubt, have the Meter serviced.
- Always use the proper terminals, switch position, and range for measurement.
- Verify the Meter's operation by measuring a known voltage.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and earth ground.
- Use caution with voltages above 30 V ac rms, 42 V ac peak, or 60 V dc. These voltages pose a shock hazard.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- Do not use the Meter around explosive gas or vapor.
- When using the test leads, keep your fingers behind the finger guards.
- Remove test leads from the Meter before opening the Meter case or battery door.

International Electrical Symbols

The following international symbols appear in this document, and on the Meter.

Symbols	Description	Symbols	Description
	AC (Alternating Current)		Fuse
	DC (Direct Current)		Conforms to European Union directives
	DC/AC		Conforms to relevant Canadian Standards Association directives
	Earth ground		Double-insulated
	Important Information; see manual.		Hazardous Voltage
	Battery. (Low battery when shown on display)		Underwriters Laboratories, Inc. Meter in accordance with IEC 61010-1. 54CJ
	Inspected and licensed by TÜV (Technischer Überwachungs Verein) Product Services.		Conforms to relevant Australian standards
	<i>Verband Deutscher Elektroniker.</i> German electronics association.		

Test Lead Alert

Warning

Attempting to make a measurement with a test lead in an incorrect terminal might blow a fuse, damage the Meter, and cause serious personal injury.

As a reminder to check that the test leads are in the correct terminals, **LEAD** is momentarily displayed when the Rotary Switch is moved to or from the **mA** or **A** position.

Specifications

Accuracy is specified for 1 yr after calibration, at operating temperatures of 18 °C to 28 °C, with relative humidity at 0 % to 90 %. Accuracy specifications take the form of $\pm([\% \text{ of Reading}] + [\text{Counts}])$.

Maximum voltage between any

terminal and earth ground 1000 V

Surge protection 8 kV peak per IEC 61010

⚠ Fuse for mA inputs 440 mA, 1000 V FAST Fuse

⚠ Fuse for A inputs 11 A, 1000 V FAST Fuse

Display

Digital 6000 counts, updates 4/sec

Bar Graph 33 segments; Updates 32/sec

Frequency 10,000 counts

Capacitance 1,000 counts

Altitude

Operating 2,000 meters

Storage 12,000 meters

Temperature

Operating -10 °C to +50 °C

Storage -40 °C to +60 °C

Temperature coefficient 0.1 X (specified accuracy / °C (<18 °C or >28 °C))

Electromagnetic Compatibility

(EN 61326-1:1997) In an RF field of 3 V/M, accuracy = specified accuracy except in temperature: specified accuracy ± 5 °C (9 °F)

Relative Humidity (Maximum Non-condensing) 90 % to 35 °C
 75 % to 40 °C;
 45 % to 50 °C

Battery Life 400 hrs typical (Alkaline)

Size (H x W x L) 4.3 cm x 9 cm x 18.5 cm

Weight 420 g

Safety Compliance ANSI/ISA S82.02.01, CSA C22.2-1010.1, IEC 61010 to 1000 V Measurement Category III, 600 V Measurement Category IV

Certifications CSA, TÜV (EN61010), UL, C E,  (N10140), VDE

Function	Range	Resolution	Accuracy ± ([% of Reading] + [Counts])
AC Volts (Average responding)	6.000 V 60.00 V 600.0 V 1000 V	0.001 V 0.01 V 0.1 V 1 V	2.0 % + 2 (45 Hz to 1 kHz)
DC mV	600.0 mV	0.1 mV	0.3 % + 1
DC Volts	6.000 V 60.00 V 600.0 V 1000 V	0.001 V 0.01 V 0.1 V 1 V	0.3 % + 1
Continuity	600 Ω	1 Ω	Meter beeps at <25 Ω, beeper turns off at >250 Ω; detects opens or shorts of 250 μs or longer.
Ohms	600.0 Ω 6.000 kΩ 60.00 kΩ 600.0 kΩ 6.000 MΩ 50.00 MΩ	0.1 Ω 0.001 kΩ 0.01 kΩ 0.1 kΩ 0.001 MΩ 0.01 MΩ	0.5 % + 2 0.5 % + 1 0.5 % + 1 0.5 % + 1 0.5 % + 1 2.0 % + 1
Diode test	2.400 V	0.001 V	1 % + 2
Capacitance	1000 nF 10.00 μF 100.0 μF 9999 μF ^[1]	1 nF 0.01 μF 0.1 μF 1 μF	1.2 % + 2 1.2 % + 2 1.2 % + 2 10 % typical
AC Amps (Average responding) ^[2]	60.00 mA 400.0 mA ^[3] 6.000 A 10.00 A ^[4]	0.01 mA 0.1 mA 0.001 A 0.01 A	2.5 % + 2 (45 Hz to 1 kHz)
Notes:			
[1] In the 9999 μF range for measurements to 1000 μF, the measurement accuracy is 1.2 % + 2.			
[2] Amps input burden voltage (typical): 400 mA input 2 mV/mA, 10 A input 37 mV/A.			
[3] 400.0 mA accuracy specified up to 600 mA overload.			
[4] >10 A unspecified.			

Function	Range	Resolution	Accuracy ± ([% of Reading] + [Counts])
DC Amps ^[3]	60.00 mA 400.0 mA ^[4] 6.000 A 10.00 A ^[5]	0.01 mA 0.1 mA 0.001 A 0.01 A	1.5 % + 2
Hz ^{[1], [2]} (ac voltage input)	99.99 Hz 999.9 Hz 9.999 kHz 99.99 kHz	0.01 Hz 0.1 Hz 0.001 kHz 0.01 kHz	0.1 % + 1
MIN MAX AVG	For dc functions, accuracy is the specified accuracy of the measurement function ±12 counts for changes longer than 350 ms in duration. For ac functions, accuracy is the specified accuracy of the measurement function ±40 counts for changes longer than 350 ms in duration.		
Notes:			
[1] Frequency is specified from 2 Hz to 99.99 kHz.			
[2] Below 2 Hz, the display shows zero Hz.			
[3] Amps input burden voltage (typical): 400 mA input 2 mV/mA, 10 A input 37 mV/A.			
[4] 400.0 mA accuracy specified up to 600 mA overload.			
[5] >10 A unspecified.			

Model 77 Series IV
Calibration Information

Function	Overload Protection ^[1]	Input Impedance (Nominal)	Common Mode Rejection Ratio (1 k Ω Unbalanced)		Normal Mode Rejection
Volts AC	1000 V	>10 M Ω <100 pF	>60 dB @ dc, 50 Hz or 60 Hz		
Volts DC	1000 V	>10 M Ω <100 pF	>120 dB @ dc, 50 Hz or 60 Hz		>60 dB @ 50 Hz or 60 Hz
mV	1000 V ²	>10 M Ω <100 pF	>120 dB @ dc, 50 Hz or 60 Hz		>60 dB @ 50 Hz or 60 Hz
		Open Circuit Test Voltage	Full Scale Voltage To:		Short Circuit Current
			6.0 M Ω	50 M Ω	
Ohms/Capacitance	1000 V ²	< 8.0 V dc	<660 mV dc	<4.6 V dc	<1.1 mA
Continuity/Diode test	1000 V ²	<8.0 V dc	2.4 V dc		<1.1 mA
[1] 10 ⁷ V-Hz maximum.					
[2] For circuits <0.3 A short circuit. 660 V for high energy circuits.					

Function	Overload Protection	Overload
mA	Fused, 440 mA, 1000 V FAST Fuse	600 mA overload for 2 minutes maximum, 10 minutes rest.
A	Fused, 11 A, 1000 V FAST Fuse	20 A overload for 30 seconds maximum, 10 minutes rest.

Testing the Fuses

⚠⚠ Warning

To avoid electrical shock or personal injury:

- Remove the test leads and any input signals before replacing the battery or fuses.
- To avoid electrical shock, arc blast, or damage to the Meter, install only fuses with the amperage, interrupt, voltage, and speed ratings specified in Table 4.

To test the fuses (refer to Figure 1):

1. Set the Rotary Switch to Ω .
 2. Plug a test lead into the **V Ω →** terminal and touch the probe to the **400 mA** to test the 440 mA Fuse or **10 A** terminal to test the 11 A Fuse.
- If the display shows a resistance value in the range shown in Figure 1, the fuse is good.
 - If the display reads **OL**, replace the fuse and test again.
 - If the display shows any other value, have the Meter serviced. See “Service Information” earlier in this manual.

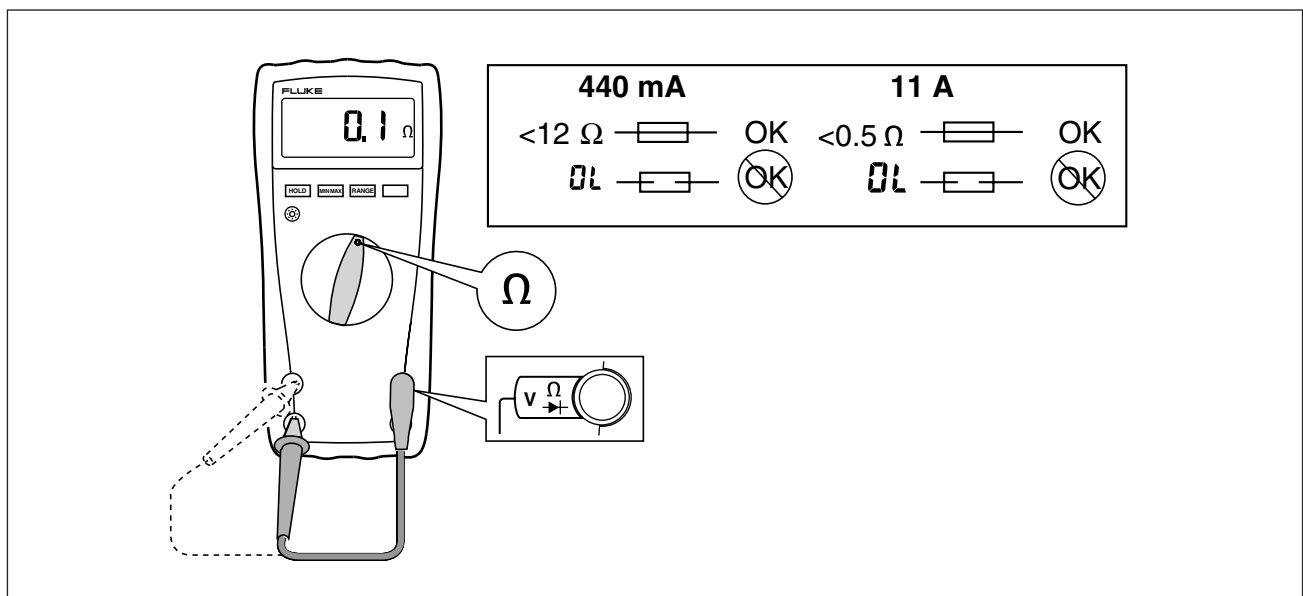


Figure 1. Testing the Current Fuses

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Replacing the Fuses

⚠ ⚠ Warning

To avoid electrical shock, arc blast, or damage to the Meter, install only fuses with the amperage, interrupt, voltage, and speed ratings specified in Table 4.

To replace the Fuses (refer to Figure 2):

1. Turn the Rotary Switch to **OFF**.
2. Disconnect the test leads and/or any connectors from the terminals.
3. Remove the four screws from the Case Bottom and separate the Case Top from the Case Bottom.
4. Remove the fuses F1 and F2 by gently prying one end loose, then slide the fuse out of its bracket, and replace with exact replacement only.
5. Rejoin the Case Bottom, Case Top, Battery compartment door, and reinstall the four screws.

Replacing the Battery

To replace the Battery (refer to Figure 2):

1. Turn the Rotary Switch to **OFF** and remove the test leads from the terminals.
2. Remove the two screws from the Battery Compartment Door, and remove it from the Case Bottom.
3. Remove the Battery (B1) from the battery connector.
4. Replace the Battery with a new 9 V battery (NEDA A1604, 6F22, or 006P).
5. Reattach the Battery Compartment Door to the Case Bottom, and reinstall the two screws.

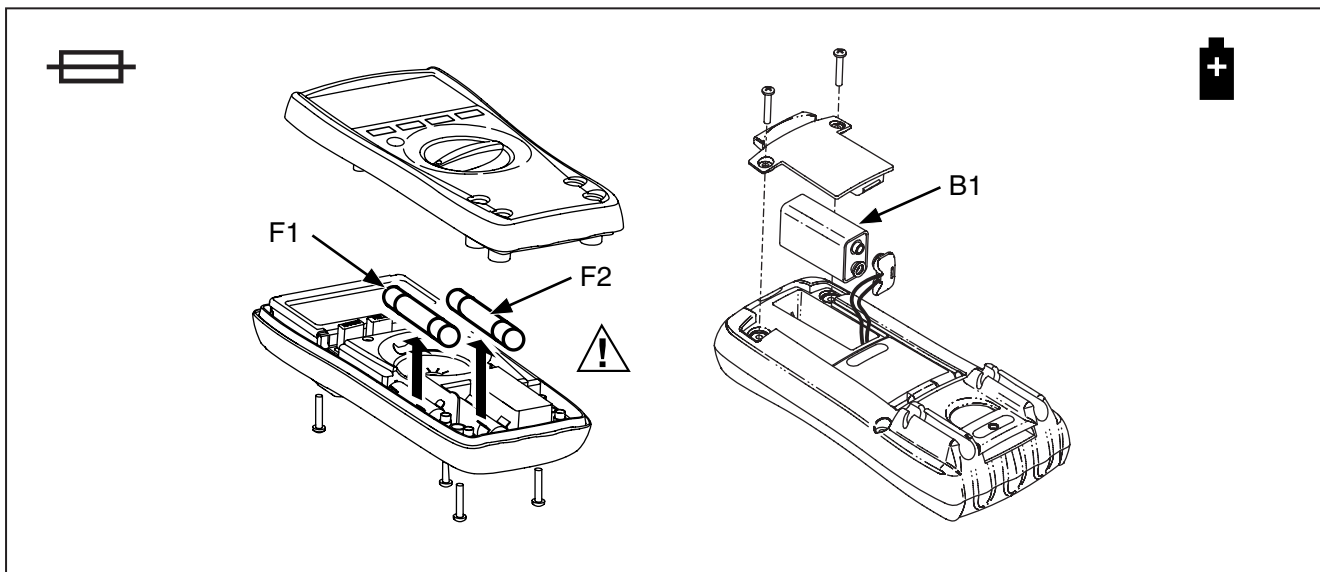


Figure 2. Battery and Fuse Replacement

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Cleaning

⚠⚠ Warning

To avoid electrical shock:

- Remove test leads and any input signals before cleaning.
- Do not reinstall the pca until it is completely dry.
- Dirt or moisture in the terminals can affect readings.

⚠ Caution

To avoid damaging the Meter, do not use aromatic hydrocarbons or chlorinated solvents for cleaning. These solutions will react with the plastics used in the instruments.

Do not use detergents of any kind for cleaning the pca.

Clean the instrument case with a damp cloth and mild detergent.

The pca may be washed with isopropyl alcohol or hot deionized water and a soft brush. Remove excess cleaning material with clean dry air at low pressure, then dry the pca at 50 °C.

Replacing the LCD

⚠ Caution

To prevent contamination, do not handle the conductive edges of the LCD or the LCD Elastomeric Connectors.

If the edges are contaminated, clean them with alcohol. Allow the alcohol to dry before reassembling.

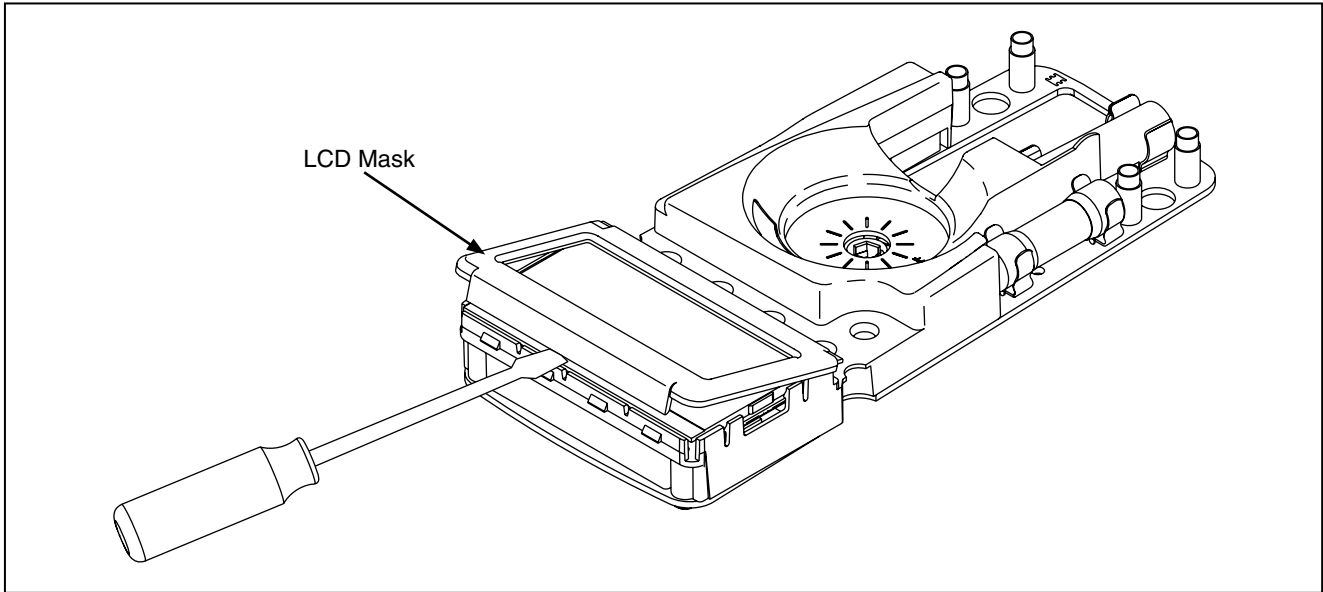
To remove and replace the LCD, perform the following procedure (refer to Figure 3):

1. Turn the rotary switch to **OFF** and remove the test leads from the Meter terminals.
2. Remove the four screws from the case bottom, and separate the case top from the case bottom. The circuit board remains attached to the case bottom.
3. Remove the battery compartment and disconnect the battery from the battery connector.
4. Remove the pca screw located under the 440 mA fuse, and lift the pca out of the case bottom. The beeper is loose in the case. Exercise caution not to damage it.
5. Loosen the four screws in the area of the LCD on the back of the pca. This will facilitate reinstalling the LCD.
6. Insert a small, flat-head screwdriver under the LCD mask edge and gently pry the LCD mask from the snaps.

⚠ Caution

Take care to not break the LCD with the screwdriver.

7. Lift out the LCD.
8. Make sure that all connector contact points are clean. Refer to “Cleaning” for more information.
9. Install a new LCD, taking care that it is correctly oriented.
10. Reattach the LCD Mask to the LCD assembly by snapping the LCD mask into place.
11. Tighten the 4 screws on the back of the pca.
12. Lay the pca back into the case bottom, and screw it down.
13. Reinsert the 440 mA Fuse.
14. Reinstall the battery.
15. Rejoin the case bottom, case top, battery compartment door, and reinstall the four case screws.



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Figure 3. Removing the LCD Mask

Performance Tests

The following performance tests verify the complete operation of the Meter and check the accuracy of each Meter function against its specifications. The recommended calibration interval is 12 months. If the Meter fails any part of the test, calibration adjustment and/or repair is indicated.

In the performance tests, the Meter is referred to as the unit under test (UUT).

Required Equipment

A Fluke 5500A Multi-Product Calibrator (or equivalent) is required for the performance test procedures in this document.

If an equivalent calibrator is used, it must meet the accuracy specifications shown in Table 1.

Table 1. Calibrator Specifications

Recommended Equipment	Measurement Function	Minimum required accuracy
5500A Multi-Product Calibrator (or equivalent)	DC Volts	30 mV to 1000 V $\pm 0.075\%$
	DC Current	3 mA to 9 A $\pm 0.375\%$
	AC Volts	50 mV to 1000 V $\pm 0.5\%$ @ 45 Hz to 1 kHz
	AC Current	0.5 mA to 9 A $\pm 0.625\%$ @ 45 Hz to 1 kHz
	Resistance	25 Ω to 5 M Ω $\pm 0.125\%$ 10 M Ω to 40 M Ω $\pm 0.5\%$
	Capacitance	900 nF $\pm 0.3\%$
	Frequency	5 V, 50 kHz $\pm 0.025\%$

Preparing for the Performance Test

⚠ ⚠ Warning

To avoid possible electric shock or personal injury:

- Do not perform the following procedures unless qualified to do so. Some procedures involve the use of high voltages.
- Before handling the test connections, and in between tests, make sure the calibrator is in standby (STBY) mode.
- Do not perform the performance test procedures unless the Meter is fully assembled

To prepare for the performance test:

1. Make sure that you have the required equipment (refer to Table 1).
2. Warm up the calibrator as required by its specifications.
3. Allow the temperature of the UUT to stabilize at room temperature ($23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ [$73\text{ }^{\circ}\text{F} \pm 9\text{ }^{\circ}\text{F}$]).
4. Check the fuses and Battery, and replace them if necessary. Refer to *Testing the Fuses*, *Replacing the Fuses*, and *Replacing the Battery*.

Performance Tests

Note

When calibrating or measuring ac current, avoid the potential for errors from coupled noise by either:

1. Shorting the $V\Omega \rightarrow$ to the COM input
or
 2. Having **no** connection to the $V\Omega \rightarrow$ input.
1. Set the Meter's Rotary Switch to the position called for in Table 2, and for all measurements other than current (amps), connect the calibrator to the $V\Omega \rightarrow$ and **COM** input terminals.
 - If testing the milliamps function, connect the calibrator to the Meter **400 mA** and **COM** input terminals.
 - If testing the amps function, connect the calibrator to the Meter **10A** and **COM** input terminals.
 2. Referring to Table 2 or Table 3, apply the indicated calibrator output voltages to the UUT for each test.
 3. Verify that the UUT displays a reading that is within the limits shown in the Meter Response column.

Table 2. Performance Tests

Steps	Test (Switch Position)	5500 Output	Meter Response	
			Lower Limit	Upper Limit
1	Ω Ohms ^[2]	500 Ω	497.3 Ω	502.7 Ω
2		50 k Ω	49.74 k Ω	50.26 k Ω
3		5 M Ω	4.974 M Ω	5.026 M Ω
4		10 M Ω	9.79 M Ω	10.21 M Ω
5		40 M Ω	39.19 M Ω	40.81 M Ω
6))) Continuity	25 Ω	Beeper On	
7		250 Ω	Beeper Off	
8	\tilde{V} AC Volts	50 mV 45 Hz	0.47 V ac	0.53 V ac
9		5 V 45 Hz	4.898 V ac	5.102 V ac
10		5 V 1 kHz	4.898 V ac	5.102 V ac
11		50 V 45 Hz	48.98 V ac	51.02 V ac
12		50 V 1 kHz	48.98 V ac	51.02 V ac
13		500 V 45 Hz	489.8 V ac	510.2 V ac
14		500 V 1 kHz	489.8 V ac	510.2 V ac
15		1000 V 45 Hz	978 V ac	1022 V ac
16		1000 V 1 kHz	978 V ac	1022 V ac
17		\tilde{V} Hz AC Volts Frequency ^[1]	5 V 50 kHz	49.94 kHz

Table 2. Performance Tests (cont)

Steps	Test (Switch Position)	5500 Output	Meter Response	
			Lower Limit	Upper Limit
18	V DC Volts	5 V	4.984 V dc	5.016 V dc
19		300 V	299.0 V dc	301.0 V dc
20		1000 V	996 V dc	1004 V dc
21		-1000 V	-1004 V dc	-996 V dc
22	mV DC Millivolts	30 mV	29.8 mV dc	30.2 mV dc
23		-300 mV	-301.0 mV dc	-299.0 mV dc
24		600 mV	598.1 mV dc	601.9 mV dc
25	⊕ Capacitance ^[1]	Apply 900 nF	887 nF	913 nF
26	→ Diode Test ^[1]	0.5 mA 45 Hz	0.47 mA ac	0.53 mA ac
27		50 mA 1 kHz	48.73 mA ac	51.27 mA ac
28	mA AC Milliamps	400 mA 1 kHz	389.8 mA ac	410.2 mA ac
29	A AC Amps	4.0 A 45 Hz	3.898 A ac	4.102 A ac
30		9.0 A 1 kHz	8.75 A ac	9.25 A ac
31	mA DC Milliamps ^[1]	3 mA, 0 Hz	2.93 mA dc	3.07 mA dc
32		50 mA	49.23 mA dc	50.77 mA dc
33		-400 mA	-406.2 mA dc	-393.8 mA dc
34	A DC Amps ¹	4.0 A	3.938 A dc	4.062 A dc
35		-9.0 A	-9.16 A dc	-8.84 A dc

1. Press the YELLOW button to access this function.
2. Does not include test lead resistance.

Calibration Adjustment

Perform the calibration adjustment procedures if the Meter fails the performance tests.

The Meter buttons behave as follows when the calibration mode is enabled:

- | | |
|--------|--|
| HOLD | Press and hold this button to test the present function. This measurement is uncalibrated and may be inaccurate. This is normal. |
| MINMAX | Press and hold this button to display the required input. |
| | Press this YELLOW button to store the calibration value and advance to the next step. This button is also used to exit calibration mode after the calibration adjustment sequence is complete. |

Calibration Adjustment Procedure

Use the following steps to adjust the Meter's calibration:

Switch the Meter to $\overline{\text{mV}}$ DC.

1. Turn the Meter over and find the Calibration Seal located near the top of the Meter (refer to Figure 4).
2. With a small probe, break the Calibration Seal and press the Calibration Button for 1 second. The Meter will beep and change to the calibration mode. The display reads [-0] , designating the first calibration step. The Meter remains in calibration mode until the Rotary Function Switch is turned off.
3. Proceed through the calibration steps by entering the input value listed in the table for each step.

Note

When calibrating or measuring ac current, avoid the potential for errors from coupled noise by either:

1. *Shorting the $\text{V}\Omega\rightarrow$ to the COM input*
- or
2. *Having NO connection to the $\text{V}\Omega\rightarrow$ input.*

Note

After pressing the yellow button, wait until the step number advances before changing the calibrator source or turning the Rotary Switch.

4. After each input value is applied, press the yellow button to accept the value and proceed to the next step ([-0] and so forth).
5. When the last step in a function is reached, turn the Rotary Function Knob to the next required function. The Meter will not allow a step to be completed if the Rotary Function Knob is turned to the wrong function.

Note

If the calibration adjustment procedure is not completed correctly, the Meter will not operate correctly. When calibration adjustment is not performed correctly, the Meter displays the messages [AL] and [Err] and the Meter must be recalibrated.

The Meter is damaged and requires service if:

- [AL] and [Err] messages continue to appear after a proper recalibration.
- [EEPr] and [Err] messages are alternating on the display.
- [EEPr] message appears on the display.

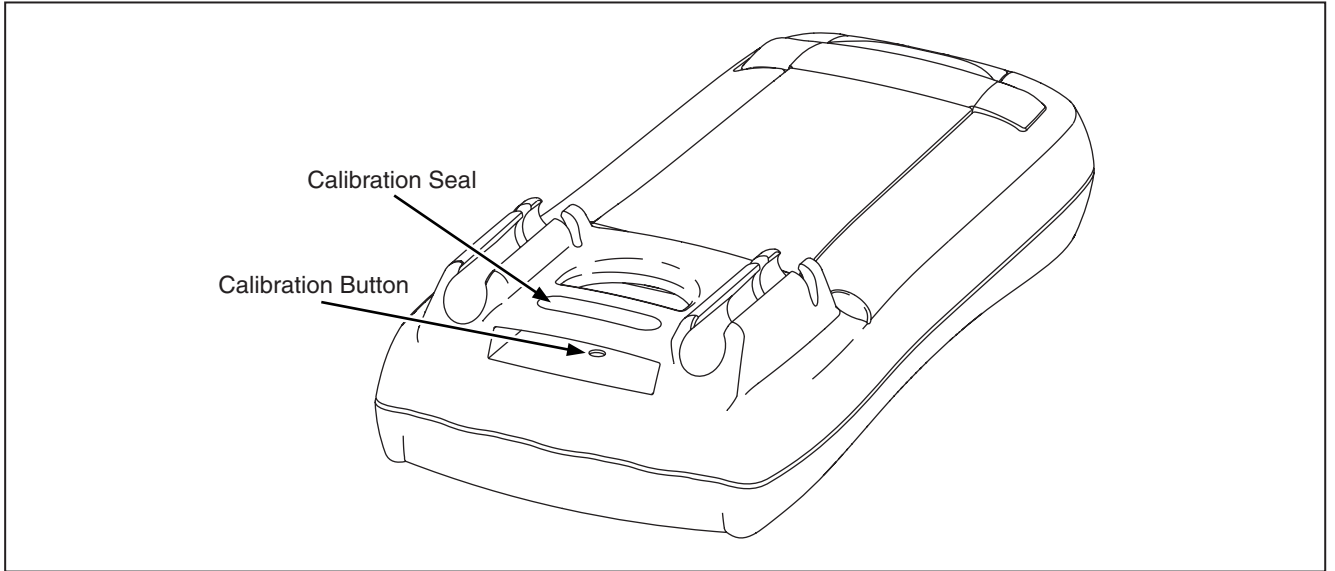


Figure 4. Calibration Access

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Table 3. Calibration Steps

Function (Switch Position)	Calibration Step	Input Value
$\overline{\text{mV}}$ (DC Millivolts)	[-01]	600.0 mV dc
	[-02]	120.0 mV dc
$\overline{\text{V}}$ (DC Volts)	[-03]	6.000 V dc
	[-04]	60.00 V dc
	[-05]	600.0 V dc
$\tilde{\text{V}}$ (AC Volts)	[-06]	600.0 mV, 60 Hz
	[-07]	600.0 V, 60 Hz
Ω (Ohms)	[-08]	600.0 Ω
	[-09]	6.000 k Ω
	[-10]	60.00 k Ω
	[-11]	600.0 k Ω
	[-12]	6.000 M Ω
$\rightarrow $ (Diode Test)	[-13]	5.000 V dc
mA (Milliamps)	[-14]	400.0 mA dc
	[-15]	400.0 mA ac, 60 Hz
A (Amps)	[-16]	6.000 A dc
	[-17]	6.000 A ac, 60 Hz

* If the Meter is not connected correctly, or if the rotary switch is in the wrong position, the Meter will beep 2 times to alert the user.

Replaceable Parts and Accessories

Replaceable parts and accessories are shown in Table 4 and Figure 5.

⚠⚠ Warning

To avoid electric shock, injury, or damage to the meter, use exact replacement parts only.

Table 4. Replaceable Parts

Item	Description	Part No	Qty
--	(Not shown) TL75 Test Lead Set*	855705	1
--	(Not Shown)		
	77 Series IV Users Manual (English only)	2695884	1
	77 Series IV Users Manual CD (English, and all translated versions)	2695825	1
1	Case Top	2695766	1
2	Window	648714	1
3	Shock Absorber	428441	1
4	Keypad	1560052	1
5	LCD Mask	2695775	1
6	LCD	1560856	1
7	LCD Light Pipe	1564806	1
8	⚠ Fuse, 11 A, (fast acting), 1000 V ac/dc, minimum interrupt rating 17 kA	803293	1
9	⚠ Fuse, 440 mA (fast acting), 1000 V ac/dc, minimum interrupt rating 10 kA	943121	1
10	PCA Screw	1626602	1
11	AC Shield	648755	1
12	AC Shield and Internal Cover screws	448456	5
13	Case Bottom (includes bottom shield and calibration button)	2095692	1
14	Battery, 9 V (Alkaline, 9 V, 0-200 mA)	614487	1
15	Battery Compartment Door	1564799	1
16	Case Screws	832246	4
17	Tilt Stand	648961	1
18	LCD Elastomeric Connector	650264	2
19	Internal Cover	1564786	1
20	Battery Connector	1988201	1
21	Beeper	2041050	1
22	Switch Detent Spring	822643	1
23	Switch Knob	648706	1
24	Calibration Button	1564889	1

* Fluke accessories are available from your authorized Fluke distributor.

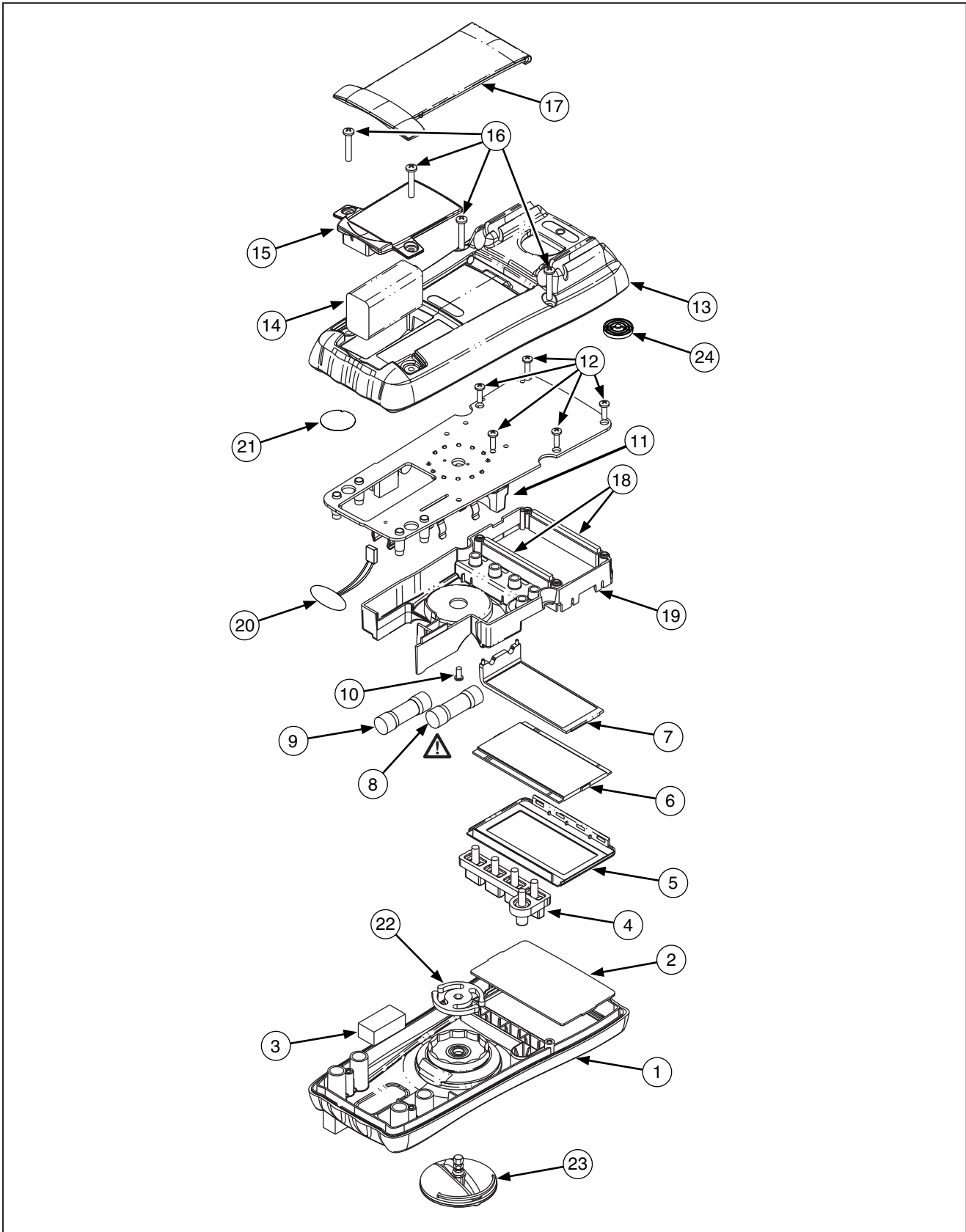


Figure 5. Replaceable Parts and Accessories

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Lifetime Limited Warranty

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.

To establish original ownership and prove date of purchase, please complete and return the registration card accompanying the product, or register your product on <http://www.fluke.com>. Fluke will, at its option, repair at no charge, replace or refund the purchase price of a defective product purchased through a Fluke authorized sales outlet and at the applicable international price. Fluke reserves the right to charge for importation costs of repair/replacement parts if the product purchased in one country is sent for repair elsewhere.

If the product is defective, contact your nearest Fluke authorized service center to obtain return authorization information, then send the product to that service center, with a description of the difficulty, postage and insurance prepaid (FOB Destination). Fluke assumes no risk for damage in transit. Fluke will pay return transportation for product repaired or replaced in-warranty. Before making any non-warranty repair, Fluke will estimate cost and obtain authorization, then invoice you for repair and return transportation.

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