FLUKE

80 Series V

Digital Multimeter

Calibration Manual

September 2004, Rev. 2, 12/24

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.

THIS WARRANTY IS YOUR ONLY REMEDY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSED OR IMPLIED. FLUKE SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY. AUTHORIZED RESELLERS ARE NOT AUTHORIZED TO EXTEND ANY DIFFERENT WARRANTY ON FLUKE’S BEHALF. Since some states do not allow the exclusion or limitation of an implied warranty or of incidental or consequential damages, this limitation of liability may not apply to you. If any provision of this warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

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Introduction

⚠⚠ Warning

To avoid shock or injury:

- **Read "Safety Information" before performing the verification tests or calibration adjustment procedures documented in this manual.**
- **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 manual is for the use of qualified personnel only.**

⚠Caution

- **The 80 Series V Digital Multimeters contains parts that can be damaged by static discharge.**
- **Follow the standard practices for handling static sensitive devices.**

The *80 Series V Calibration Manual* provides the following information:

- Maintenance
- Performance test procedures
- Calibration adjustment procedures

For complete operating instructions, refer to the *80 Series V* or *88 Series V Users Manual*.

Contacting Fluke

Fluke Corporation operates worldwide. For local contact information, go to our website: www.fluke.com

To register your product, view, print, or download the latest manual or manual supplement, go to our website.

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Safety Information

⚠⚠Warning

To avoid possible electric shock or personal injury, inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before using the Meter.

General Safety Information is in the *Fluke Safety Information* that shipped with the Product. More specific safety information is listed where applicable.

In this manual, a **Warning** identifies conditions and actions that pose hazards to the user. A **Caution** identifies conditions and actions that may damage the Meter or the equipment under test.

Specifications

Safety Specifications are in the printed Safety Information that shipped with the Product. Detailed specifications are located in the Users Manual, found at www.fluke.com.

Maintenance

General maintenance is in the Users Manual, available at www.fluke.com. General maintenance includes:

- Cleaning the Product
- Fuse Test

Other maintenance information is below.

⚠⚠Warning

To avoid possible electric shock or personal injury:

- **Remove the test leads and any input signals before opening the case or replacing the battery or fuses.**
- **Repairs or servicing covered in this manual should be performed only by qualified personnel.**

Static Awareness

Semiconductors and integrated circuits can be damaged by electrostatic discharge during handling. This notice explains how to minimize damage to these components.

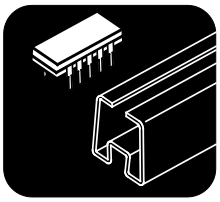
1. Understand the problem.
2. Learn the guidelines for proper handling.
3. Use the proper procedures, packaging, and bench techniques.

Follow these practices to minimize damage to static sensitive parts.

⚠ Warning

To prevent electric shock or personal injury. De-energize the product and all active circuits before opening a product enclosure, touching or handling any PCBs or components.

- Minimize handling.
- Handle static-sensitive parts by non-conductive edges.
- Do not slide static-sensitive components over any surface.
- When removing plug-in assemblies, handle only by non-conductive edges.
- Never touch open-edge connectors except at a static-free work station.



- Keep parts in the original containers until ready for use.
- Use static shielding containers for handling and transport.
- Avoid plastic, vinyl, and Styrofoam® in the work area.

- Handle static-sensitive parts only at a static-free work station.
- Put shorting strips on the edge of the connector to help protect installed static-sensitive parts.
- Use anti-static type solder extraction tools only.
- Use grounded-tip soldering irons only.

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 and do the following:

1. Disconnect test leads from any live source, turn the rotary knob to **OFF**, and remove the test leads from the front terminals.
2. Remove the battery door by using a flat-blade screwdriver to turn the battery door screws 1/4-turn counterclockwise.
3. The case bottom is secured to the case top by three screws and two internal snaps (at the LCD end). Using a Phillips-head screwdriver, remove the three screws.

⚠Caution

To avoid damaging the Meter, the gasket that is sealed to the bottom case, and is between the two case halves, must remain with the case bottom. The case top lifts away from the gasket easily. Do not damage the gasket or attempt to separate the case bottom from the gasket.

4. Hold the Meter display side up.
5. Pushing up from the inside of the battery compartment, disengage the case top from the gasket.
6. Gently unsnap the case top at the display end, see Figure 1.

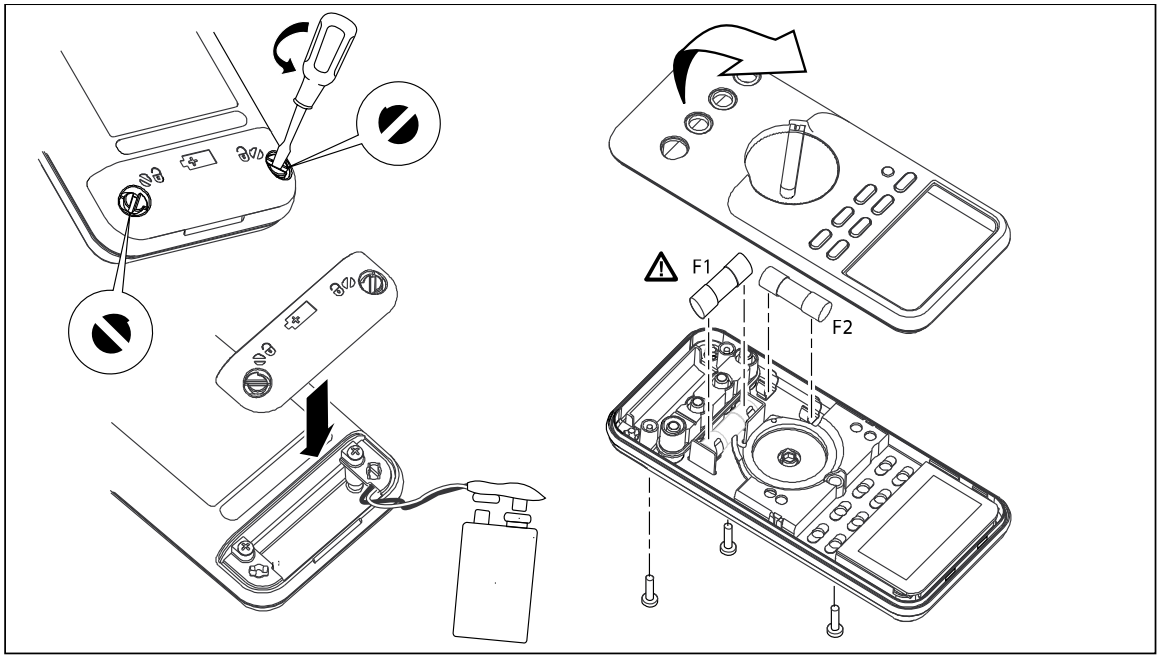


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Figure 1. Opening the Meter, Battery and Fuse Replacement

Accessing the PCA and Replacing the LCD

Once the case has been opened, the A1 Main PCA can easily be removed. The shields disconnect from the PCA as follows:

1. Remove the five Phillips-head screw securing the top and bottom shields to the PCA.
2. Remove the top shield assembly that also houses the LCD and lightpipe for the LCD backlight.
3. To access the LCD, unsnap the LCD mask using a small flat-blade screwdriver. The LCD may now be removed. Refer to Figure 2.

Note

Two elastomeric connectors make electrical contact between the LCD and the PCA. These connectors usually stick to the LCD when it is removed. If the connectors are to be reused, do not handle them, as the electrical contact points might become contaminated. Use tweezers to remove these connectors.

4. To reinstall the connectors, replace the LCD and LCD mask and lay the top shield face down. Install the elastomeric connector strips into the slots on the top shield.
5. Place the PCA onto the top shield so that the screw holes align.
6. Place the bottom shield onto the PCA and secure the assembly with five Phillips-head screws. Ensure that the shields are tightly attached. Properly fitted shields are required for the Meter to perform to specifications.

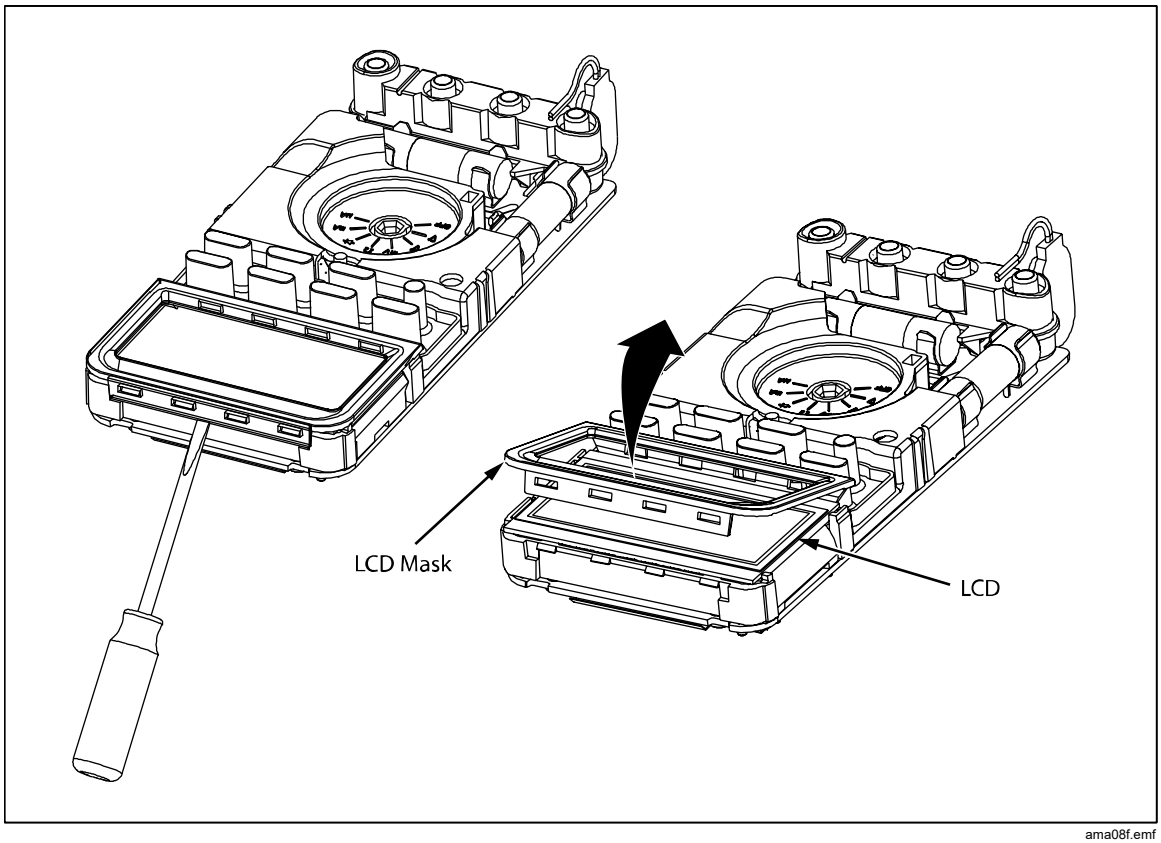

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Figure 2. Removing LCD Mask to Access LCD

Reassembling the Meter Case

To reassemble the Meter case:

1. Verify that the rotary knob and circuit board switch are in the **OFF** position, and that the gasket remains secured to the bottom case.
2. Place the PCA into the bottom case.
3. Place the case top on the case bottom.
4. To avoid damaging the battery wire, ensure the wire exits the middle of the battery compartment.
5. Properly seat the case gasket and snap the case halves together above the LCD end. See Figure 1.
6. Reinstall the three case screws and the battery door.
7. Secure the battery door by turning the screw 1/4-turn clockwise.
8. Go to "Performance Tests" later in this document, and perform the procedures described.

Required Equipment

Required equipment for the performance tests is listed in Table 1. If the recommended models are not available, equipment with equivalent specifications may be used.

⚠⚠ 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.**
- **Repairs or servicing should be performed only by qualified personnel.**

Table 1. Required Equipment

Equipment	Required Characteristics	Recommended Model
Calibrator	AC Voltage Range: 0 V ac - 1000 V ac Accuracy: ± 0.12 % Frequency Range: 60 Hz - 20000 Hz Accuracy: ± 3 % DC Voltage Range: 0 V dc - 1000 V dc Accuracy: ± 0.012 % Current Range: 350 µA - 2 A Accuracy: AC (60 Hz to 1 kHz): ± 0.25 % DC: ± 0.05 % Frequency Source: 19.999 kHz - 199.99 kHz Accuracy: ± 0.0025 % Amplitude: 150 mV to 6V rms Accuracy: ± 5 % Range: 1 Ω - 100 MΩ Accuracy: 0.065 %	Fluke 5560A Multi-Product Calibrator or equivalent
Function Generator	Frequency = 900 kHz Amplitude = 8.3V Burst mode = 1 Burst rate = 100 Hz Burst Phase = -90 degrees	HP33120
Fluke 80 AK TC Adapter Accessory	K-type	Fluke 80 AK
K-type Thermocouple	K-type, mini-plug on both ends	-

Performance Tests

The following performance tests verify the complete operability of the Meter and check the accuracy of each Meter function against the Meter's specifications. Performance tests should be performed annually to ensure that the Meter is within accuracy specifications.

Accuracy specifications are valid for a period of one year after calibration adjustment, when measured at an operating temperature of 18 °C to 28 °C and at a maximum of 90 % relative humidity.

To perform the following tests, it is not necessary to open the case. No adjustments are necessary. Make the required connections, apply the designated inputs, and determine if the reading on the Meter display falls within the acceptable range indicated.

Note

If the Meter fails any of these tests, it needs calibration adjustment or repair.

Basic Operability Tests

Refer to the following sections to test the basic operability of the Meter.

Testing the Display

Turn the Meter on to Ṽ while holding down AutoHOLD to view all segments of the display. Compare the display with the appropriate examples in Figure 3 and Table 2.

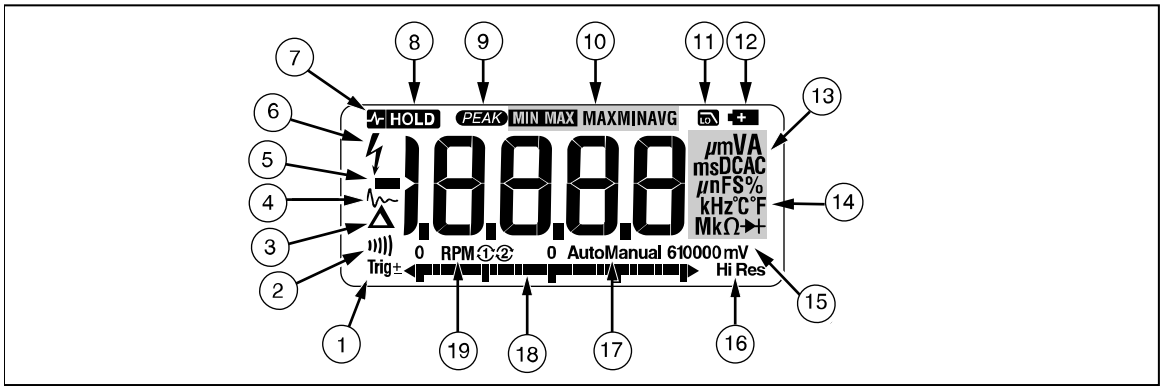

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Figure 3. Display Features

Table 2. Display Features

Number	Feature	Indication
①	±	Polarity indicator for the analog bar graph.
	Trig±	Positive or negative slope indicator for Hz/duty cycle triggering.
②	)))))	The continuity beeper is on.
③	Δ	Relative (REL) mode is active.
④	∿	Smoothing is active.
⑤	−	Indicates negative readings. In relative mode, this sign indicates that the present input is less than the stored reference.
⑥	ϟ	Indicates the presence of a high voltage input. Appears if the input voltage is 30 V or greater (ac or dc). Also appears in low pass filter mode. Also appears in cal, Hz, and duty cycle modes.
⑦	HOLD	AutoHOLD is active.
⑧	HOLD	Display Hold is active.
⑨	PEAK	Indicates the Meter is in Peak Min Max mode and the response time is 250 µs
⑩	MIN MAX MAX MIN AVG	Indicators for minimum-maximum recording mode.
⑪	LO	Low pass filter mode.
⑫	+	The battery is low. ⚠⚠**Warning: To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.**

Table 2. Display Features (cont.)

Number	Feature	Indication
⑬	**A, µA, mA**	Amperes (amps), Microamp, Milliamp
	V, mV	Volts, Millivolts
	µF, nF	Microfarad, Nanofarad
	nS	Nanosiemens
	%	Percent. Used for duty cycle measurements.
	Ω, MΩ, kΩ	Ohm, Megohm, Kilohm
	Hz, kHz	Hertz, Kilohertz
	AC DC	Alternating current, direct current
⑭	**°C, °F**	Degrees Celsius, Degrees Fahrenheit
⑮	**610000 mV**	Displays selected range
⑯	**HiRes**	The Meter is in high resolution (Hi Res) mode. HiRes=19,999
⑰	**Auto**	The Meter is in autorange mode and automatically selects the range with the best resolution.
	Manual	The Meter is in manual range mode.
⑱		The number of segments is relative to the full-scale value of the selected range. In normal operation 0 (zero) is on the left. The polarity indicator at the left of the graph indicates the polarity of the input. The graph does not operate with the capacitance, frequency counter functions, temperature, or peak min max. For more information, see “Bar Graph” in the Users Manual.The bar graph also has a zoom function, as described under "Zoom Mode" in the Users Manual.
⑲	**RPM②①**	②conventional (4 cycle) Counts every other revolution. ①waste spark of 2 cycle. Counts every revolution.
--		Overload condition is detected.

Error Messages	
bAtt	Replace the battery immediately.
diSC	In the capacitance function, too much electrical charge is present on the capacitor being tested.
EEPr Err	Invalid EEPROM data. Have Meter serviced.
CAL Err	Invalid calibration data. Calibrate Meter.
LEAd	⚠Test lead alert. Displayed when the test leads are in the **A** or **mA/µA** terminal and the selected rotary switch position does not correspond to the terminal being used.
F8- Err	Invalid model. Have Meter serviced.
OPEn	Open thermocouple is detected.

Testing the Pushbuttons

To test the pushbuttons

1. Turn the Meter rotary knob to LO $\tilde{V}$.
2. Press each button and note that the meter responds with a beep for each button press.
3. Press and hold (MIN MAX) a second time to exit MIN MAX mode.

Testing Meter Accuracy

Perform the accuracy test steps in Table 3.

Table 3. Accuracy Tests

Step	Test Function	Range	Calibrator Output	Display Reading	
				83 and 88	87
1	$\tilde{V}$ AC Volts	600 mV	330 mV, 60 Hz	327.9 to 332.1	327.3 to 332.7
2		600 mV	600 mV, 13 kHz	N/A	586.0 to 614.0
3		6 V	3.3 V, 60 Hz	3.281 to 3.319	3.275 to 3.325
4		6 V	3.3 V, 20 kHz	N/A	3.214 to 3.386
5		60 V	33 V, 60 Hz	32.81 to 33.19	32.75 to 33.25
6		60 V	33 V, 20 kHz	N/A	32.14 to 33.86
7		600 V	330 V, 60 Hz	328.1 to 331.9	327.5 to 332.5
8		600 V	330 V, 2.5 kHz	N/A	323.0 to 337.0
9		1000 V	500 V, 60 Hz	495 to 505	494 to 506
10		1000 V	1000 V, 1 kHz	986 to 1014	986 to 1014
11	$\tilde{V}$ Hz AC Volts Frequency	600 mV	150 mV, 99.95 kHz	99.93 to 99.97	99.93 to 99.97
12		600 mV	150 mV, 199.50 kHz	199.48 to 199.52	199.48 to 199.52
13	Sensitivity	6 V	0.7 V, 99.95 kHz	99.93 to 99.97	99.93 to 99.97
14		60 V	7 V, 99.95 kHz	99.93 to 99.97	99.93 to 99.97
15	$\overline{\tilde{V}}$ Hz Trigger level	6 V	3.4 V, 1 kHz Sq. Wave	999.8 to 1000.2	999.8 to 1000.2
16	$\overline{\tilde{V}}$ Hz Duty Cycle	6 V	5 V, 1 kHz, DC offset 2.5 V Sq. Wave	49.7 % to 50.3 %	49.7 % to 50.3 %
17	$\overline{V}$ DC Volts	6 V	3.3 V dc	3.296 to 3.304	3.297 to 3.303
18		60 V	33 V dc	32.96 to 33.04	32.97 to 33.03
19		600 V	330 V dc	329.6 to 330.4	329.7 to 330.3
20		1000 V	1000 V dc	998 to 1002	998 to 1002
21	mV DC Volts	600 mV	33 mV dc	32.8 to 33.2	32.9 to 33.1
22		600 mV	330 mV dc	328.9 to 331.1	329.6 to 330.4

Table 3. Accuracy Tests (cont.)

Step	Test Function	Range	Calibrator Output	Display Reading	
				83 and 88	87
23	Ω Ohms	600 Ω	330 Ω (Use 2 wire Comp)[1]	328.5 to 331.5	329.1 to 330.9
24		6 kΩ	3.3 kΩ (Use 2 wire Comp)[1]	3.286 to 3.314	3.292 to 3.308
25		60 kΩ	33 kΩ	32.86 to 33.14	32.92 to 33.08
26		600 kΩ	330 kΩ	327.6 to 332.4	327.9 to 332.1
27		6 MΩ	3.3 MΩ	3.276 to 3.324	3.279 to 3.321
28		50 MΩ	30 MΩ	29.67 to 30.33	29.67 to 30.33
29	**nS** Conductance	60 nS	Open input	- 0.30 to 0.30	- 0.30 to 0.30
30		60 nS	100 MΩ	9.60 to 10.40	9.60 to 10.40
31	Diode	6 V	3.0 V dc	2.939 to 3.061	2.939 to 3.061
32	Ã AC Amps	6 A	3.0 A, 60 Hz	2.962 to 3.038	2.968 to 3.032
33	Ā DC Amps	6 A	3.0 A	2.984 to 3.016	2.990 to 3.010
33B	Ā DC Amps	10 A[6]	10 A	9.94 to 10.06	9.96 to 10.04
34	mÃ AC Milliamps	60 mA	33 mA, 60 Hz	32.58 to 33.42	32.65 to 33.35
35		400 mA	330 mA, 60 Hz	325.8 to 334.2	326.5 to 333.5
36	mA⎓ DC Milliamp	60 mA	33 mA	32.83 to 33.17	32.89 to 33.11
37		400 mA	330 mA	328.5 to 331.5	329.1 to 330.9
38	μÃ AC Microamps	600 μA	330 μA, 60 Hz	325.8 to 334.2	326.5 to 333.5
39		6000 μA	3300 μA, 60 Hz	3258 to 3342	3265 to 3335
40	μA⎓ DC Microamps	600 μA	330 μA	328.3 to 331.7	328.9 to 331.1
41		6000 μA	3300 μA	3285 to 3315	3291 to 3309
42	⊣⊢ Capacitance	10 nf	Open input[2]	0.21 to 0.31	0.21 to 0.31
43		100 nf	5 nf[5]	04.7 to 05.3	04.7 to 05.3
44		100 μf	9.5 μf	09.2 to 09.8	09.2 to 09.8
45	Ṽ Low Pass Filter	1000 V	400 V, 400 Hz	N/A	372 to 408
46		1000 V	400 V, 800 Hz[4]	N/A	226 to 340[4]

Table 3. Accuracy Tests (cont.)

Step	Test Function	Range	Calibrator Output	Display Reading	
				83 and 88	87
47	$\overline{\overline{\mathbf{V}}}$ (87 and 88 only) Peak Min/Max	6 V dc	8 Vpp, 2 kHz Sq. Wave, DC offset 1 V	Max = 3.895 to 4.105 [7]	Max = 3.897 to 4.103
				Min = -1.897 to -2.103 [7]	Min = -1.898 to -2.102
49	$\mathbf{m}\overline{\overline{\mathbf{V}}}$ (87 and 88 only) Temperature[3]	-	0 °C	-1.0 to 1.0	-1.0 to 1.0
50		-	100 °C	98.0 to 102.0	98.0 to 102.0
51	Backlight	-	Press backlight button	Backlight comes on	
52		-	Press backlight button	Backlight Intensifies	
53		-	Press backlight button	Backlight off	

1. Or short test leads and use REL to offset test lead resistance.
2. Remove test leads from unit.
3. To ensure accurate measurement, the Meter and thermocouple adapter must be at the same temperature. After connecting the thermocouple adapter to the Meter allow for reading to stabalize before recording display reading.
4. The Meter accuracy is not specified at this input signal frequency with Low-pass filter selected. The display reading shown, check that the Low-pass filter is active and follows an expected roll-off curve.
5. Use REL to compensate for internal Meter and lead capacitance. Test leads must be disconnected from the calibrator before using REL.
6. ⚠ 10 A continuous up to 35 °C; < 20 minutes on, 5 minutes off at 35 °C to 55 °C. 20 A for 30 seconds maximum; > 10 A unspecified.
7. The Fluke-83 V does not have a Peak Min/Max function.

Testing the Inductive Pickup (88 Only)

To test the inductive pickup, a function generator output will simulate automobile spark plug signals on a loop of wire containing a 10 Ω resistor. The pickup will be clamped to the wire and output voltage from the pickup will be monitored by an oscilloscope.

Perform the following procedure to test the inductive pickup:

1. Solder a 10-inch piece of 14 AWG wire to one end of a 10 Ω 1 % resistor.
2. Connect the other end of the 10 Ω resistor to the terminal LOW output of the function generator. Place the other end of the 14-AWG wire to the HIGH output of the function generator. See Figure 4.
3. Connect a 10X scope probe from channel 2 (dc-coupled) of the oscilloscope across the 10 Ω resistor.
4. Clamp the inductive pickup to the wire loop on the HIGH side of the resistor as shown in Figure 4.

   Make sure that the jaws of the inductive pickup are closed completely, and that the side of the inductive pickup that says "SPARK PLUG SIDE" points toward the HIGH output of the function generator.
5. Connect a 10X scope probe from channel 1 (dc-coupled) of the oscilloscope across the output of the inductive pickup.

6. Set up the function generator as follows:

Frequency	900 kHz
Amplitude	8.3 V
Burst Mode	yes
Burst Count	1
Burst Rate	100 Hz
Burst Phase	-90 Degrees

7. Set the oscilloscope for 0.5 V/DIV @ 0.5 µs/DIV.
8. Trigger the waveform on channel 2.
9. Adjust the amplitude of the function generator to produce a 3 VP-P triangle wave. See Figure 5.
10. Set the oscilloscope for 1.0 V/DIV @ 5.0 ms/DIV.
11. Trigger the waveform on Channel 1.
12. Check that the peak voltage is greater than 5.7 V and decays to less than 1.0 V between pulses. See Figure 5. Record the peak value for later use.
13. Adjust the function generator output so the peak voltage is 6 V.
14. Set the scope for 1.0 ms/DIV and trigger waveform.
15. Check the amplitude after 3.0 ms from the waveform peak, the voltage amplitude is 2.4 V +0.5/-0.8 (1.6 V to 2.9 V). (See Figure 5(C).)
16. Re-adjust the function generator output to obtain the value recorded in step 12.
17. Set the scope for 5.0 ms/DIV.
18. Turn the inductive pickup so that "SPARK PLUG SIDE" points along the wire connected to the LOW output of the function generator. Check that the waveform is less than 2 V.

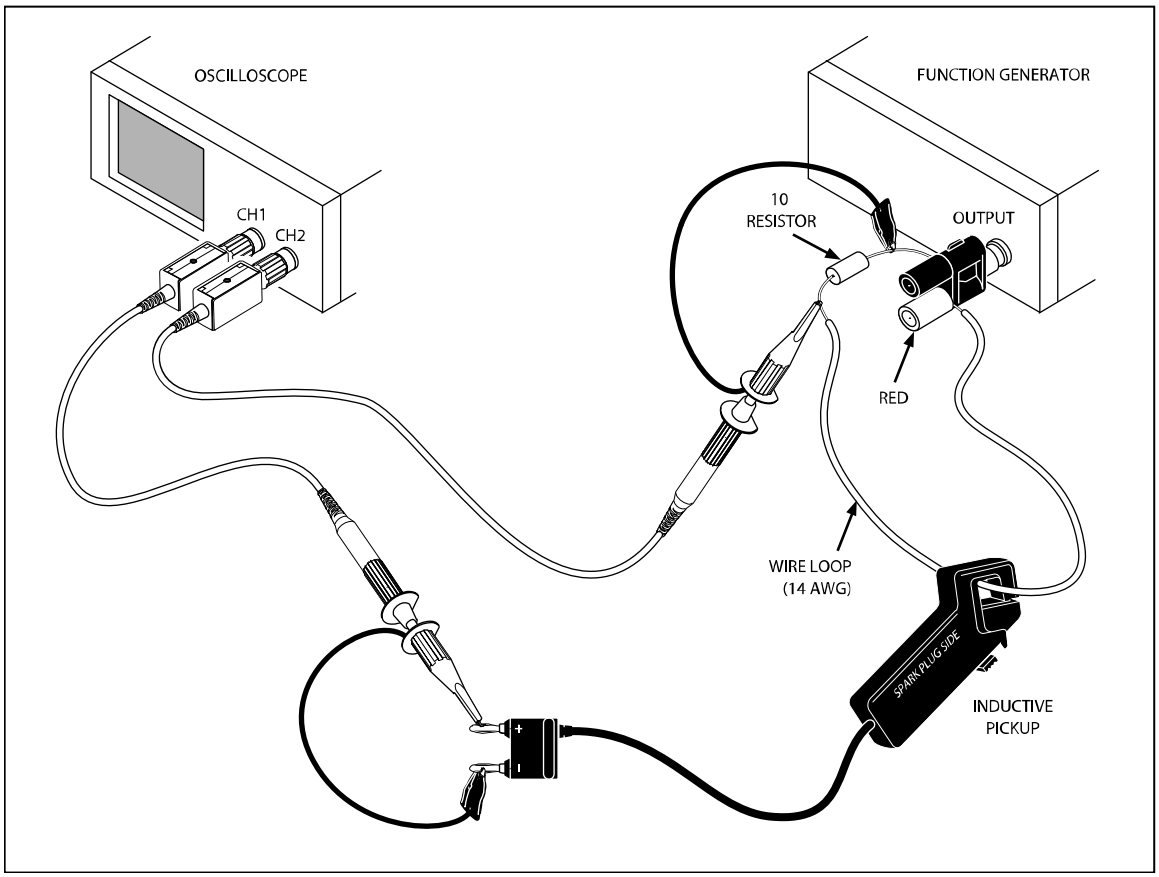


Figure 4. Setup for Inductive Pickup Test

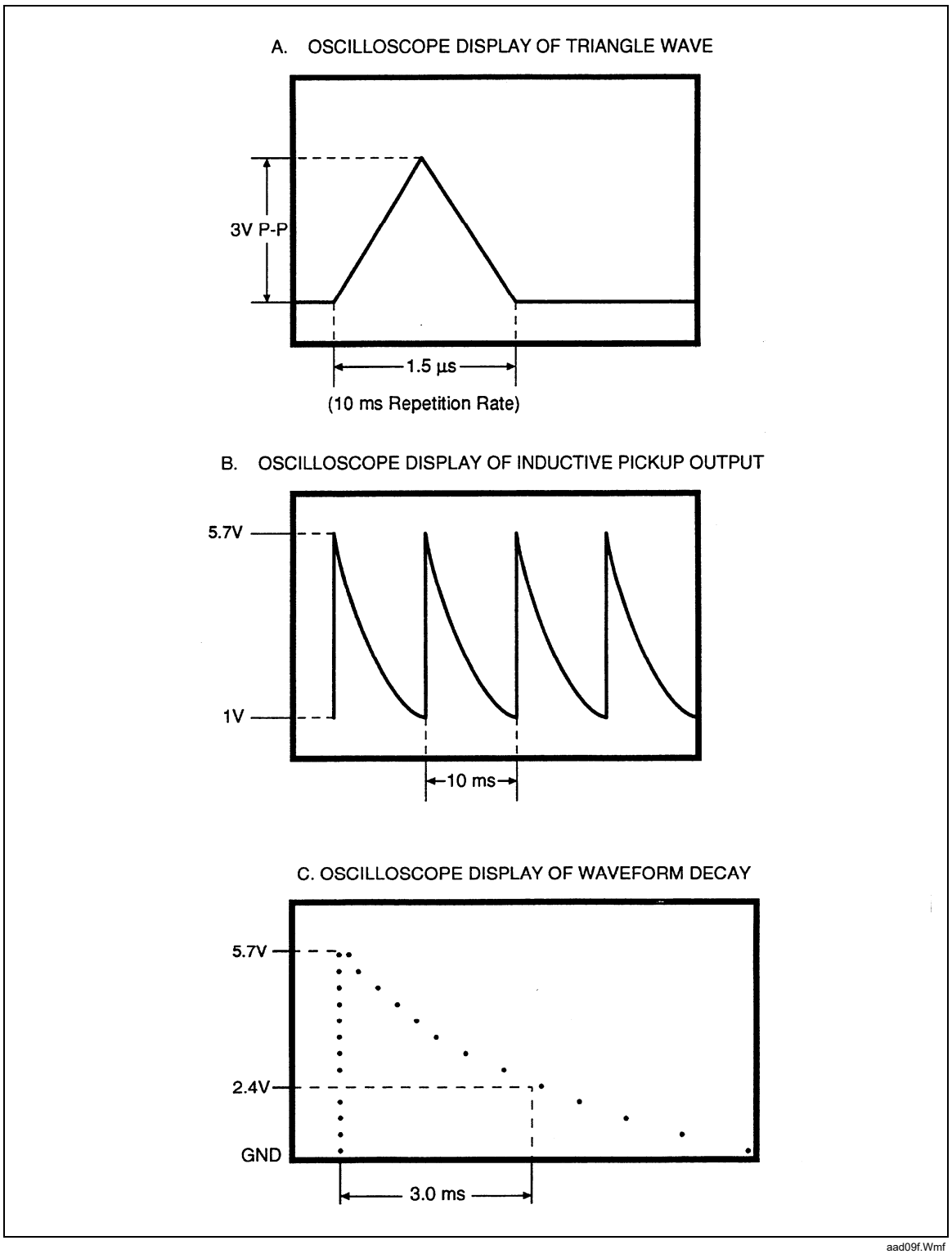


Figure 5. Waveform for Inductive Pickup Test

Calibration Adjustment

The Meter features closed-case calibration adjustment using known reference sources. The Meter measures the applied reference source, calculates correction factors, and stores the correction factors in nonvolatile memory.

The following sections present the features and Meter pushbutton functions that can be used during the Calibration Adjustment Procedure. Perform the Calibration Adjustment Procedure should the Meter fail any performance test listed in Table 3.

Calibration Adjustment Counter

The Meter contains a calibration adjustment counter. The counter is incremented each time a Calibration Adjustment Procedure is completed. The value in the counter can be recorded and used to show that no adjustments have been made during a calibration cycle.

Use the following steps to view the Meter's calibration counter.

1. While holding down (MIN MAX), turn the rotary knob from **OFF** to **VAC**. The Meter should display "ϟ **CAL**".
2. Press (AutoHOLD) once to see the calibration counter. For example, "n001".
3. Turn the rotary knob to **OFF**.

Calibration Adjustment Password

To start the Calibration Adjustment Procedure, the correct 4-button password must be entered. The password can be changed or reset to the default as described in following paragraphs. The default password is "1234".

Changing the Password

Use the following steps to change the Meter's password:

1. While holding down (MIN MAX), turn the rotary knob from **OFF** to **VAC**. The Meter displays "ϟ **CAL**".
2. Press (AutoHOLD) once to see the calibration counter.
3. Press (AutoHOLD) again to start the password entry. The Meter displays "????".
4. The Meter buttons represent the digit indicated below when entering or changing the password:

   ( ) = 1 (MIN MAX) = 2 (RANGE) = 3 (AutoHOLD) = 4

   ☼ = 5 (•))) = 6 (REL Δ) = 7 (Hz %) = 8

   Press the 4 buttons to enter the old password. If changing the password for the first time, enter ( ) (1) (MIN MAX) (2) (RANGE) (3) (AutoHOLD) (4).
5. Press (RANGE) to change the password. The Meter displays "----" if the old password is correct. If the password is not correct, the Meter emits a double beep, displays "????" and the password must be entered again. Repeat step 4.
6. Press the 4 buttons of the new password.
7. Press (AutoHOLD) to store the new password.

Restoring the Default Password

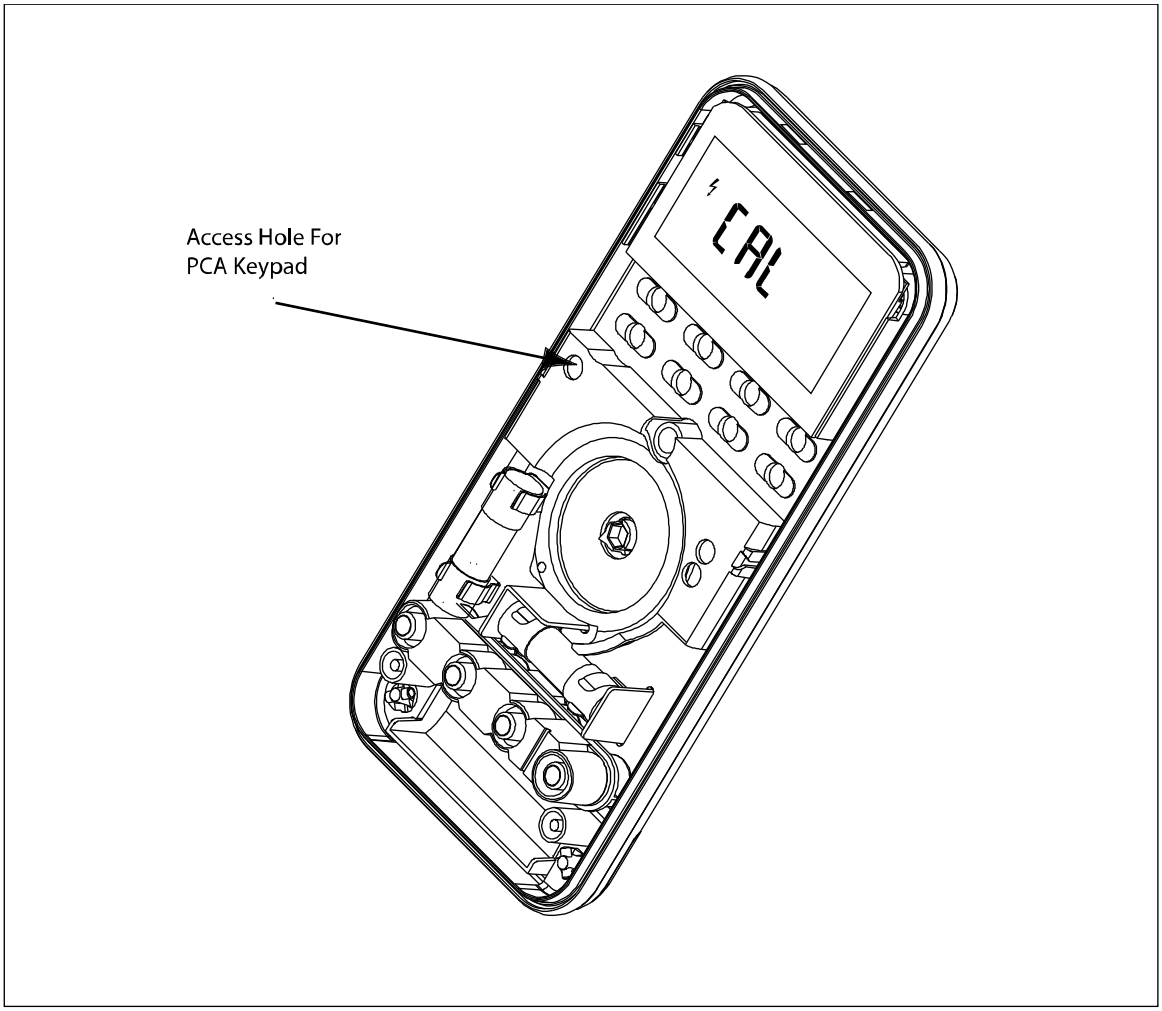
If the calibration password is forgotten, the default password (1234) can be restored using the following steps:

1. While holding down (MIN MAX), turn the rotary knob from **OFF** to **VAC**. The Meter displays "**CAL**".
2. Remove the Meter's top case. Leave the PCA in the bottom case. (See "Opening the Meter Case".)

⚠⚠Warning

To avoid electrical shock or personal injury, remove the test leads and any input signal before removing the Meter's top case.

3. Through an access hole provided in the top shield, short across the keypads on the PCA. See Figure 6. The Meter should beep. The default password is now restored.
4. Replace the Meter's top case and turn the rotary knob to **OFF**. (See "Reassembling the Meter Case).



ama01f.emf

Figure 6. Restoring the Default Password

Meter Buttons Used in the Calibration Steps

The Meter buttons behave as follows when performing the Calibration Adjustment Procedure. This may be of help determining why a calibration step is not accepted and for determining the input value without referring to Table 4.

	Press and hold to show the measured value. The measurement value is not calibrated so it may not match the input value. This is normal.
MIN MAX	Press and hold to display the required input amplitude.
Hz %	Press and hold to display the frequency of the required input.
AutoHOLD	Press 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. If the Meter is turned off before completion of the adjustment procedure, the calibration constants are not changed.

1. While holding down (MIN MAX), turn the rotary knob from **OFF** to **VAC**. The Meter displays "ϟ **CAL**".
2. Press (AutoHOLD) once to see the calibration counter.
3. Press (AutoHOLD) again to start the password entry. The Meter displays "????".
4. Press 4 buttons to enter the password.
5. Press (AutoHOLD) to go to the first calibration step. The Meter displays "C-01" if the password is correct. If the password is not correct, the Meter emits a double beep, displays "????" and the password must be entered again. Repeat step 4.
6. Using Table 4, apply the input value listed for each calibration adjustment step. For each step, position the rotary switch and apply the input to the terminals as indicated in the table.
7. After each input value is applied, press (AutoHOLD) to accept the value and proceed to the next step (C-02 and so forth).

Notes

After pressing (AutoHOLD), wait until the step number advances before changing the calibrator source or turning the Meter rotary knob.

If the Meter rotary knob is not in the correct position, or if the measured value is not within the anticipated range of the input value, the Meter emits a double beep and will not continue to the next step.

Some adjustment steps take longer to execute than others (10 seconds to 15 seconds). For these steps, the Meter will beep when the step is complete. Not all steps have this feature.

8. After the final step, the display shows "End" to indicate that the calibration adjustment is complete. Press (AutoHOLD) to go to meter mode.

Notes

Set the calibrator to Standby prior to changing the function switch position and or after completing adjustment of each function.

If the calibration adjustment procedure is not completed correctly, the Meter will not operate correctly.

Table 4. Calibration Adjustment Steps

Function (Switch Position)	Input Terminal	Adjustment Step	Input Value	
			Fluke 83-V and 88-V	Fluke 87-V
Ṽ (AC Volts)	V Ω ⊣◂	C-01	600.0 mV, 60 Hz	600.0 mV, 60 Hz
		C-02	600.0 mV, 5 kHz	600.0 mV, 20 kHz
		C-03	6.000 V, 60 Hz	6.000 V, 60 Hz
		C-04	6.000 V, 5 kHz	6.000 V, 20 kHz
		C-05	60.00 V, 60 Hz	60.00 V, 60 Hz
		C-06	60.00 V, 5 kHz	60.00 V, 20 kHz
		C-07	600.0 V, 60 Hz	600.0 V, 60 Hz
		C-08	600.0 V, 5 kHz	600.0 V, 10 kHz
V̿ (DC Volts)		C-09	6.000 V	6.000 V
		C-10	60.00 V	60.00 V
		C-11	600.0 V	600.0 V
mV̿ (DC Millivolts)		C-12	600.0 mV	600.0 mV
		C-13	60.00 mV	60.00 mV
Ω (Ohms)		C-14	600.0 Ω	600.0 Ω
		C-15	6.000 kΩ	6.000 kΩ
		C-16	60.00 kΩ	60.00 kΩ
		C-17	600.0 kΩ	600.0 kΩ
		C-18	6.000 MΩ	6.000 MΩ
		C-19	0.000 Ω	0.000 Ω
		C-20	50.0 MΩ	50.0 MΩ
⊣◂ (Diode Test)		C-21	3.000 V	3.000 V
A (Amps)	**A**	C-22	6.000 A, 60 Hz	6.000 A, 60 Hz
		C-23	6.000 A dc	6.000 A dc
mA (Milliamps)	**mA /μA**	C-24	60.00 mA, 60 Hz	60.00 mA, 60 Hz
		C-25	400.0 mA, 60 Hz	400.0 mA, 60 Hz
		C-26	60.00 mA dc	60.00 mA dc
		C-27	400.0 mA dc	400.0 mA dc
μA (Microamps)		C-28	600.0 μA ac, 60 Hz	600.0 μA ac, 60 Hz
		C-29	6000 μA, 60 Hz	6000 μA, 60 Hz
		C-30	600.0 μA dc	600.0 μA dc
		C-31	6000 μA dc	6000 μA dc

Service and Parts

Replacement parts and accessories are shown in the Users Manual. For service, see "Contacting Fluke".