

15B MAX/17B MAX Digital Multimeters

Calibration Manual

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Introduction

The 15B MAX/17B MAX Digital Multimeters (the Product) are 6000 count instruments. The Product is battery powered with a digital display. Unless otherwise identified, all illustrations show the 17B MAX. See the Users Manual for usage information and user-replaceable parts.

Contact Fluke

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

www.fluke.com.

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

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Safety Information

General Safety Information and Symbols are in the printed Safety Information document that ships with the Product and is available at www.fluke.com. More specific safety information is listed in this manual where applicable.

A **Warning** identifies hazardous conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

Specifications

Safety Specifications are in the Safety Specifications section of the Safety Information document. Complete Product specifications are in the Users Manual and at www.fluke.com.

Maintenance

Beyond battery and fuse replacement, do not attempt to repair or service the Product unless you are qualified to do so and have the relevant calibration, performance test, and service instructions. The recommended calibration adjustment cycle is 12 months.

Warning

To prevent possible electrical shock, fire, or personal injury, and for safe operation and maintenance of the product, see [Safety Information](#).

General Maintenance

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents. Dirt or moisture in the terminals can affect readings.

To clean the terminals:

1. Turn the Product off and remove the test leads.
2. Shake out any dirt that may be in the terminals.
3. Soak a new swab with isopropyl alcohol and work it around the inside of each input terminal.

Test Fuses

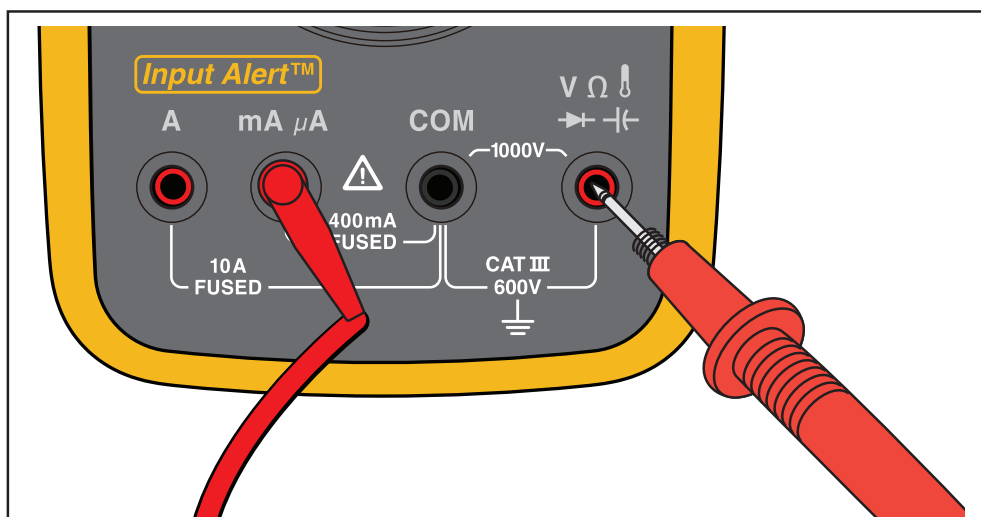
⚠⚠ Warning

To prevent electric shock or injury, remove the test leads and any input signals before you replace the fuses.

To test the fuses:

1. Turn the rotary switch to Ω .
2. Plug a test lead into the **A** or **mA** μ **A** terminal and touch the probe to the $V \Omega \text{ } \frac{V}{\Omega}$ terminal. See [Figure 1](#).
 - A good **A** terminal fuse reads $<0.5 \Omega$.
 - A good **mA** μ **A** terminal fuse reads $<10 \text{ k}\Omega$.
 - If the display reads **OL**, replace the fuse and test again.
 - If the display shows any other value, have the Product serviced.

Figure 1. Test Fuses





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.

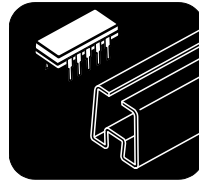
Follow these practices to minimize damage to static sensitive parts.

Warning

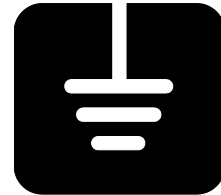
To prevent electric shock or personal injury. De-energize the product and all active circuits before opening a product enclosure, touching or handling any PCBs or components.



- 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.

Replace Batteries and Fuses

⚠⚠ Warning

To prevent false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator (🔋) appears.

To prevent damage or injury, install **ONLY** replacement fuses with the specified amperage, voltage, and interrupt ratings.

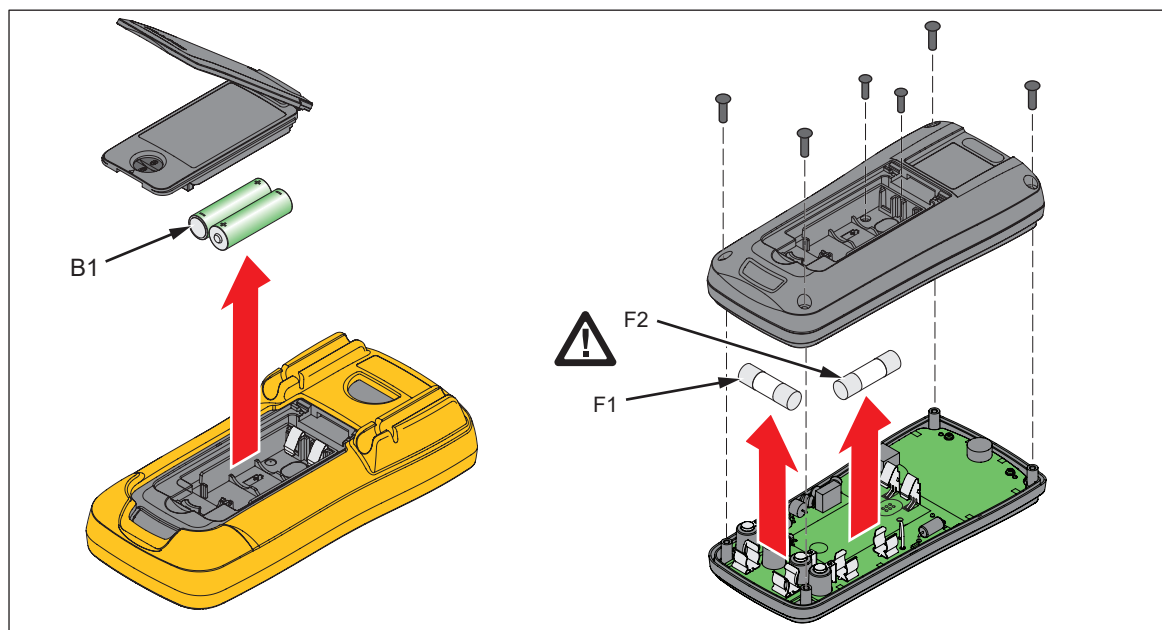
Disconnect test leads before you open the case or the battery door.

Dispose of old devices in a professional and environmentally appropriate manner.

- Delete personal data on the Product before disposal.
- Remove batteries that are not integrated into the electrical system before disposal. Dispose of batteries separately.

To replace the batteries or fuses, see [Figure 2](#).

Figure 2. Replace Batteries and Fuses



Performance Tests

Use the performance tests to make sure the Device Under Test (DUT) operates properly and to make sure the DUT is accurate. If the DUT fails any part of the performance test, repair and/or calibration adjustment are required. See [Temperature Connections](#). If the DUT continues to fail to meet the range indicated, see [Contact Fluke](#).

Table 1 lists the equipment required for the performance tests.

Table 1. Required Equipment

Equipment	Recommended Model
Calibrator	Fluke Calibration 5560A or equivalent
Type K to dual banana adapter	Fluke 80AK-A

Before you do the performance test, make sure to warm up the calibrator.

To test each function and operating ranges:

1. For each step in Table 2, set the DUT to the specified function and range.
2. Connect the source to the input jacks on the DUT.
3. Apply the output from the source. For temperature connections, see Figure 3.
4. Make sure the DUT readings are within the limits in Table 2.

Table 2. Performance Specifications

Step	Function	Calibrator Output		15B MAX	17B MAX	Lower Limit	Upper Limit
		Value	Frequency or Amplitude				
1	VAC	5.5 V	50 Hz	✓	✓	5.442	5.558
2		55 V	50 Hz	✓	✓	54.42	55.58
3		55 V	500 Hz	✓	✓	54.42	55.58
4		550 V	50 Hz	✓	✓	544.2	555.8
5		1000 V	50 Hz	✓	✓	986	1014
6	VAC/Freq.	45 Hz	1 V	X	✓	44.92	45.08
7		5 kHz	1 V	X	✓	4.992	5.008
8		100 kHz	3 V	X	✓	99.6	100.4
9	VAC/Duty	50 Hz	3 V (Square Wave)	X	✓	49.5	50.5
10	VDC	5.5 V	0 Hz	✓	✓	5.470	5.531
11		55 V	0 Hz	✓	✓	54.70	55.31
12		550 V	0 Hz	✓	✓	547.0	553.1
13		-1000 V	0 Hz	✓	✓	-1008	-992
14	mVDC	550 mV	0 Hz	✓	✓	543.5	556.5
15	mVAC	550 mV	500 Hz	✓	✓	533.2	566.8

Table 2. Performance Specifications (cont.)

Step	Function	Calibrator Output		15B MAX	17B MAX	Lower Limit	Upper Limit
		Value	Frequency or Amplitude				
16	OHM	0 Ω	Ω	✓	✓	-0.3	0.3
17		350 Ω	Ω	✓	✓	348.0	352.0
18		3.5 k Ω	Ω	✓	✓	3.480	3.520
19		35 k Ω	Ω	✓	✓	34.80	35.20
20		350 k Ω	Ω	✓	✓	348.0	352.0
21		3.5 M Ω	Ω	✓	✓	3.480	3.520
22		10 M Ω	Ω	✓	✓	9.82	10.18
23	BEEPER ON	40 Ω	Ω	✓	✓	X	X
24	DIODE	0.7 V	0 Hz	✓	✓	0.622	0.778
25	CAP ^[1]	35 nF	X	✓	✓	32.75	37.25
26		350 nF	X	✓	✓	342.5	357.5
27		3.5 μ F	X	✓	✓	3.320	3.680
28		35 μ F	X	✓	✓	33.20	36.80
29		350 μ F	X	✓	✓	332.0	368.0
30	ADC	3.5 A	0 -Hz	✓	✓	3.444	3.556
31		-10 A	0 Hz	✓	✓	-10.18	-9.82
32	AAC	3.5 A	50 Hz	✓	✓	3.444	3.556
33		10 A	400 Hz	✓	✓	9.82	10.18
34	mADC	35 mA	0 Hz	✓	✓	34.44	35.56
35		-350 mA	0 Hz	✓	✓	-355.6	-344.4
36	mAAC	35 mA	400 Hz	✓	✓	34.44	35.56
37		350 mA	50 Hz	✓	✓	344.4	355.6
38	μ ADC	350 μ A	0 Hz	✓	✓	344.4	355.6
39		-3500 μ A	0 Hz	✓	✓	-3556	-3444
40	μ AAC	350 μ A	40 Hz	✓	✓	344.4	355.6
41		3500 μ A	400 Hz	✓	✓	3444	3556
42	Temp	-50 $^{\circ}$ C	X	X	✓	-56.4	-43.6
43		35 $^{\circ}$ C	X	X	✓	33.0	37.0
44		400 $^{\circ}$ C	X	X	✓	391.0	409.0

[1] The 40 nF range tolerance includes 1.5 nF capacitance floor.

Figure 3. Temperature Connections



Adjustment Procedures

Table 3 lists the equipment required to adjust the Product.

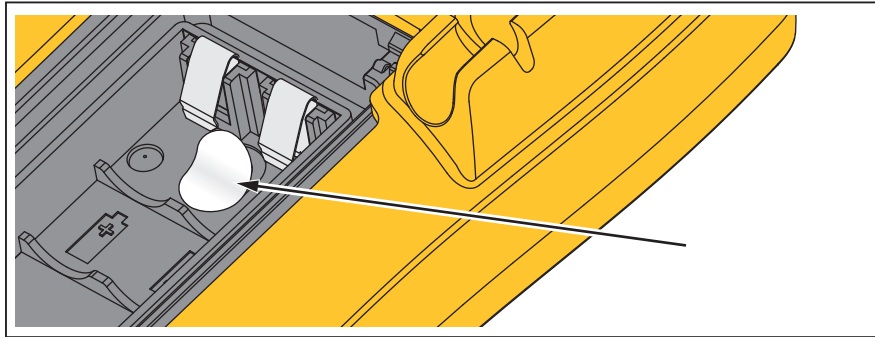
Table 3. Required Equipment for Adjustment

Equipment	Required Characteristics	Recommended Model
Calibrator	-	Fluke 5560A
Potentiometer (17B MAX)	Adjust Manually	-
Type K to dual banana (m) adapter	-	Fluke 80AK-A

To enter adjustment mode:

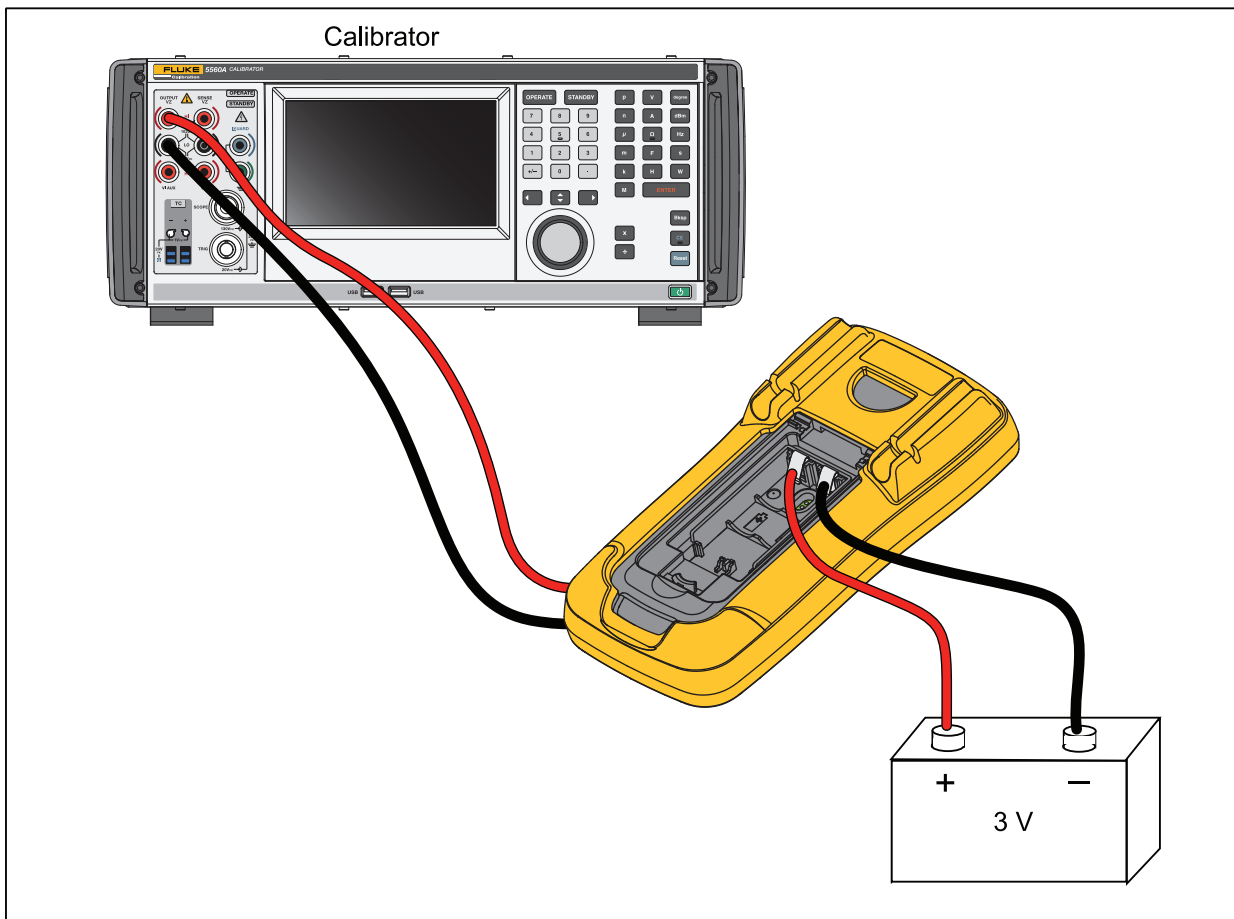
1. Remove the battery door and batteries. See [Figure 2](#).
2. Remove the calibration sticker. See [Figure 4](#).

Figure 4. Remove Calibration Sticker



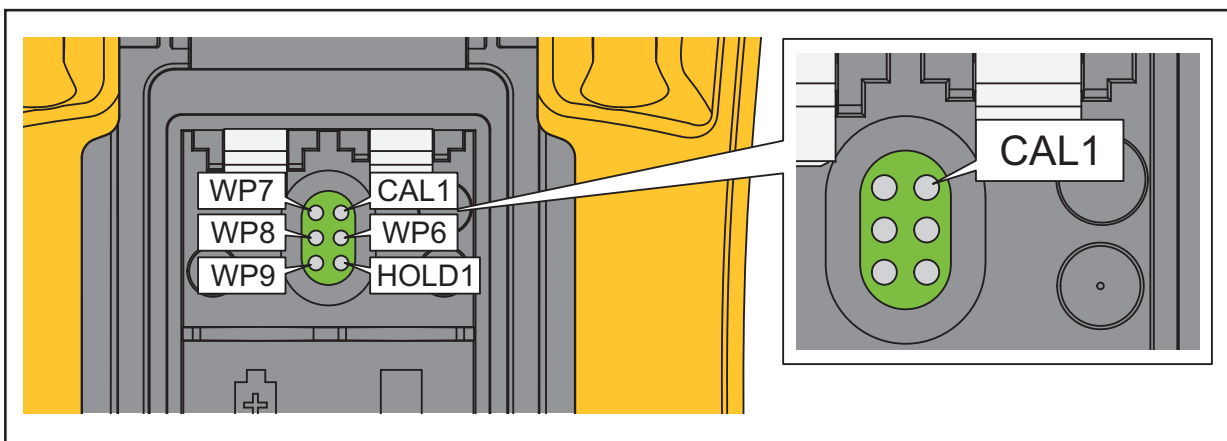
3. See [Figure 5](#) to make the connections to power and the calibrator.
- Use a contact spring to connect a 3 V dc power supply.
 - Connect the DUT signal input terminal to the calibrator.

Figure 5. Adjustment Connections



4. To put the DUT in adjustment mode, use a small probe to push the calibration button (CAL1). See [Figure 6](#).

Figure 6. Adjustment



5. Enter the adjustment values on the calibrator.
6. For each function, wait 4 seconds for the measurement to stabilize. Then push **HOLD** to confirm and go to the next step. The display shows the function and the high voltage indicator, see [Table 4](#).

Table 4. Display Indicators

1	High voltage alert
2	Function

7. For 17B MAX temperature adjustment:
 - a. Use an adjustable potentiometer to make a manual adjustment. See [Figure 7](#).
 - b. Adjust to 0.1 °C to 0.3 °C at 0 °C input.

8. When you complete adjustment, turn off the DUT.

Table 5. All Function Adjustments

Function	Step	Display	15B MAX	17B MAX	Calibrator Output
VAC	1	High voltage mark (⚡) flickers	✓	✓	3 V, 50 Hz
VDC	1	High voltage mark (⚡) flickers	✓	✓	3 V, 0 Hz
Cap	1	High voltage mark (⚡) flickers	✓	✓	100 μ F
ADC	1	High voltage mark (⚡) flickers	✓	✓	3A, 0 Hz
mADC	1	High voltage mark (⚡) flickers	✓	✓	30 mA, 0 Hz
Temperature	1	Temperature	X	✓	0 °C

Figure 7. Temperature Adjustment 17B MAX

