

36 AC/DC True Rms Clamp Meter

Service Information

Warning

Do not service the Meter unless you are qualified to do so. The service information provided in this document is for the use of qualified personnel only.

To avoid electrical shock or personal injury: Always remove the test leads and input signals from the Meter before opening the case.

Use caution when working with voltages above 60V dc or 30V ac.

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.

Caution

The Meter is protected throughout by double insulation or reinforced insulation. When servicing the Meter, use only specified replacement parts.

Caution

This Meter contains parts that can be damaged by static discharge. Follow the standard practices for handling static sensitive devices.

Introduction

This *Service Information* document provides the following service information for the *36 AC/DC True Rms Clamp Meter* (hereafter referred to as the Meter):

- Product specifications
- Required equipment
- Performance test procedure and test values
- Preparing for calibration
- Calibration procedure and adjustments
- AC amps test
- Replacement parts

For operating information, refer to the *Instruction Sheet* that came with the Meter.

Service

The Meter is warranted to be free from defects in material and workmanship for one year.

The warranty does not cover abuse, batteries or fuses, or damage caused by using the Meter outside its rated specifications or operating environment. The complete warranty statement is in the Meter's *Instruction Sheet*.

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

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

Europe: +31 402-678-200

Japan: +81-3-3434-0181

Singapore: +65-*276-6196

Anywhere in the world: +1-425-356-5500

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

To order replacement parts, call 1-800-526-4731.

Outside U.S.A. contact your nearest service center.

Service, repairs, and replacement parts are warranted for 90 days.

Product Specifications

Measurement Accuracy

The accuracy of the Meter is specified for one year after calibration, at 18°C to 28°C (64°F to 82°F), with relative humidity to 90%.

The Meter is true rms sensing and calibrated to the rms value of a sine wave input.

General Specifications

General specifications are shown in Table 1.

Table 1. General Specifications


Maximum voltage and frequency between any terminal and earth ground	600V, 400 Hz
Operating Temperature	-10°C to +50°C (-14°F to 122°F)
Operating Altitude	2,000 meters (6,562 ft)
Storage Altitude	10,000 meters (32,808 ft)
Storage Temperature	-20°C to +60°C indefinite (-4°F to 140°F)
Temperature Coefficient	0.05 x (specified accuracy)/°C (<18°C or >28°C; <64°F or >82°F)
Electromagnetic Compatibility	If RF field ≤ 1.6 V/m, total accuracy = specified accuracy; If RF field = 3 V/m, total accuracy = specified accuracy + 3.6% of range
Operating Humidity	To 30°C (85°F), 95% relative humidity; To 40°C (104°F), 75% relative humidity; To 50°C (122°F), 45% relative humidity
Battery Type	9V, NEDA 1604A or IEC 6LR61
Battery Life	Alkaline, 60 hours continuous
Jaw Size	One 3 cm (1.2 inch) conductor, or two 2.46 cm (0.97 inch) conductors
Size (HxWxL)	4.5 cm x 9.5 cm x 25 cm (1.77 x 3.75 x 9.8 inches)
Safety	UL 3111,  , TÜV, Complies with IEC 1010-1 for use in 600V, CAT III locations (industrial)

Table 1. General Specifications (cont)

Case Protection	IP 30 per IEC 529
MAX Hold Feature	Accuracy: add 10 digits to ac and dc specification; Acquisition time: 250 ms (ac); 10 ms (dc)
Continuity	Beeper on at $\leq 30\Omega$; Beeper off at $\geq 70\Omega$
Rms Settling Time	The rms converter has a longer settling time for displays reading <100 counts. The display may read up to 5 digits with no voltage or current inputs.
True Rms Sensing	True rms sensing provides more accurate readings on circuits containing harmonics or distorted waveforms. An instrument with true rms reading indicates the true heat-providing current, which may cause overheated conductors, connections, breakers, or transformers.

Functional Specifications

Functional specifications are shown in Table 2.

Table 2. Functional Specifications

Function	Range	Accuracy*	
$\overline{\overline{A}}$	1000A 1000A 200A	0-600A, 1.9% Rdg + 4 dgts 600-1000A, 3% Rdg + 3 dgts 0-200A, 1.9% Rdg + 7 dgts	
$\overline{\overline{V}}$	600V 200V	1.0% Rdg + 3 dgts	
\widetilde{A} (45-400 Hz)	600A 200A	10-600A, 2% Rdg + 3 dgts 0.5-200A, 2% Rdg + 5 dgts	
\widetilde{V} (45-400 Hz)	600V 200V	1.5% Rdg + 3 dgts	
Ω	200 Ω	1.2% Rdg + 5 dgts	
		Crest Factor	Overload Protection \triangle
$\overline{\overline{A}}$	1000A 1000A 200A	NA	1000A
$\overline{\overline{V}}$	600V 200V	NA	1200V rms continuous
\widetilde{A} (45-400 Hz)	600A 200A	$2 \leq CF \leq 3$, add 2% Rdg	600A continuous (CF ≤ 3)
\widetilde{V} (45-400 Hz)	600V 200V	≤ 3 (peak voltage $\leq 933V$)	1200V rms
Ω	200 Ω	NA	660V rms continuous

* See electromagnetic compatibility specification under "General Specifications."

Required Equipment

Equipment required for the performance test and calibration procedure is shown in Table 3.

Table 3. Required Equipment

Equipment	Recommended Model
AC Calibrator	Fluke 5700A or 5500A
Digital Multimeter (DMM)	Any Fluke model
Transconductance Amplifier	Fluke 5220A
Resistor, MF, 31.6Ω, 1%	Fluke P/N 296673
Resistor, MF, 34.8Ω, 1%	Fluke P/N 343897
Resistor, MF, 61.9Ω, 1%	Fluke P/N 305961
50-Turn Current Coil	Fluke 5500A/Coil

Performance Test

Warning

To avoid shock, do not execute the performance tests unless the Meter is fully assembled.

The performance test verifies that the Meter is working properly and performs to specification.

To test each of the Meter's functions and operating ranges, do the following:

1. Connect the source to the Meter's VΩ and COM input jacks.
2. Referring to Table 4, put the Meter in the function and range for Function Test number 1 (i.e., the 200V dc function).
3. Apply the first indicated output (i.e., 20.0V dc) from the source.
4. The reading on the Meter display should be within the low and high values shown (i.e., 19.5 and 20.5, respectively).
5. Repeat steps 1-4 for each function and range in Table 4. (Tests 9-15 require the 50-Turn Current Coil; tests 11-15 require the 50-Turn Current Coil and Transconductance Amplifier.)

If the Meter fails to perform within the low-high range indicated for each test in Table 4, the Meter needs to be calibrated and adjusted, or requires some repair.

Table 4. Performance Test Values

Function Test	Meter Range	Source	Output	Measured	Low	High
1. DC Volts	200V	5700A or 5500A	20.0V dc	20.0V	19.5V	20.5V
			100.0V dc	100.0V	98.7V	101.3V
			-200.0V dc	-200.0V	-202.3V	-197.7V
2. AC Volts	200V	5700A or 5500A	200V at 50, 60, & 400 Hz	200.0V	196.7V	203.3V
3. DC Volts	600V	5700A or 5500A	-600V dc	-600V	-609V	-591V
4. AC Volts	600V	5700A or 5500A	100V at 50, 60, & 400 Hz	100	95	105
5. AC Volts MAX Hold	600V	5700A or 5500A	100V at 60 Hz	100V	85V	115V
				Apply voltage. Press MAX button. Remove voltage. Check limits		

Table 4. Performance Test Values (cont)

Function Test	Meter Range	Source	Output	Measured	Low	High
6. AC Volts	600V	5700A or 5500A	600V, 50, 60, & 400 Hz	600V	588V	612V
7. Ohms	200Ω	Ohms Source ¹	30Ω	Beeper on	NA	NA
			70Ω	Beeper off	68.7Ω	71.3Ω
			190Ω	190Ω	187.2Ω	192.8Ω
8. DC Amps Zero	200A	NA	Turn DC Amps ZERO knob fully clockwise	Positive span	3.0A	19.0A
			Turn DC Amps ZERO knob counter-clockwise	Negative span	-19.0A	-3.0A
9. DC Amps ²	200A	5700A or 5500A	0.40A dc	20.0A	18.9A	21.1A
			-1.0A dc	-50.0A	-51.7A	-48.3A
10. AC Amps	200A	5700A or 5500A	0.40A, 50, 60, & 400 Hz	20.0A	19.1A	20.9A
11. DC Amps	200A	5x00A ³ + 5220A	4.0A dc	200.0A	195.5A	204.5A
12. DC Amps Balance	200A	5x00A + 5220A	4.0A dc	Move conductor from center of jaw to top and bottom. Maximum change of ± 2.0A in reading allowed.		
13. AC Amps	200A	5x00A + 5220A	4.0A, 50, 60, & 400 Hz	200.0A	195.5A	204.5A
14. DC Amps	1000A dc	5x00A + 5220A	12.0A dc	600A	585A	615A
			-12.0A dc	-600A	-615A	-585A
			18.0A dc	900A	870A	930A
			-18.0A dc	-900A	-930A	-870A
15. AC Amps	600A ac	5x00A + 5220A	12.0A, 50 & 60 Hz	600A	585A	615A
Notes:						
1. Use either a 5500A or Decade Resistor as the ohms source.						
2. Prior to performing DC amp tests, use the DC ZERO adjustment to ensure that the meter displays 00.0 in the 200A range before you apply current.						
3. 5x00 is either the Fluke 5700A or 5500A calibrator.						

Preparing for Calibration

Before calibrating the Meter, do the following:

1. Turn on the Calibrator and allow it to warm up and stabilize for 30 minutes.
2. Put the meter face down.

There are three screws on the back of the Meter.

3. Remove the middle screw (which holds the battery cover to the back of the Meter).
4. Remove the battery cover.
5. Lift out the battery and remove the PCB mounting screw in the bottom of the battery compartment. (See Figure 4.)
6. Turn the Meter on and use a DMM to verify that the battery voltage is at least 7V.

If the battery voltage is too low, replace the battery before proceeding.

7. Reinsert the battery in the battery compartment.
8. Put the battery cover back in place and reinsert the battery cover screw.
9. Remove the screws at the top and bottom of the back of the Meter.
10. Turn the Meter face up and proceed with the calibration procedure that follows.

Calibration and Adjustment

To ensure that the Meter performs to specification, calibrate the Meter and check the AC Amps function on a yearly basis.

Always perform the complete calibration procedure. Partially calibrating the Meter will not ensure that the Meter performs to specification.

A six-step calibration and adjustment procedure follows. Adjustment points are shown in Figure 1.

Step 1. DC Voltage

1. Turn the rotary switch on the Meter to the 200V setting.
2. Toggle the DC/AC selector until "DC" is shown on the display.
3. Lift off the case top.

Note the alignment mark on the rotary switch shaft (See Figure 1.) The orientation of this mark corresponds to the orientation of the function indicator on the rotary switch. In this case it runs along a horizontal axis, which corresponds to the 200V position setting.

4. Lift the buttons from the MAX Hold, DC/AC, and DC Amp Zero switches. (See Figure 4.)
5. Connect the Calibrator to the $V\Omega$ and COM input jacks of the Meter; apply 200V dc from the Calibrator.

If the Meter display does not read between 199.5 and 200.5, adjust R39 until it does.

6. Set the output of the Calibrator to zero; then disconnect the Calibrator from the Meter.
7. Put the case top back on the case bottom, making sure that the rotary switch shaft is correctly seated in the rotary switch knob.
8. Turn the Meter off.
9. Proceed to calibrate the AC Voltage function.

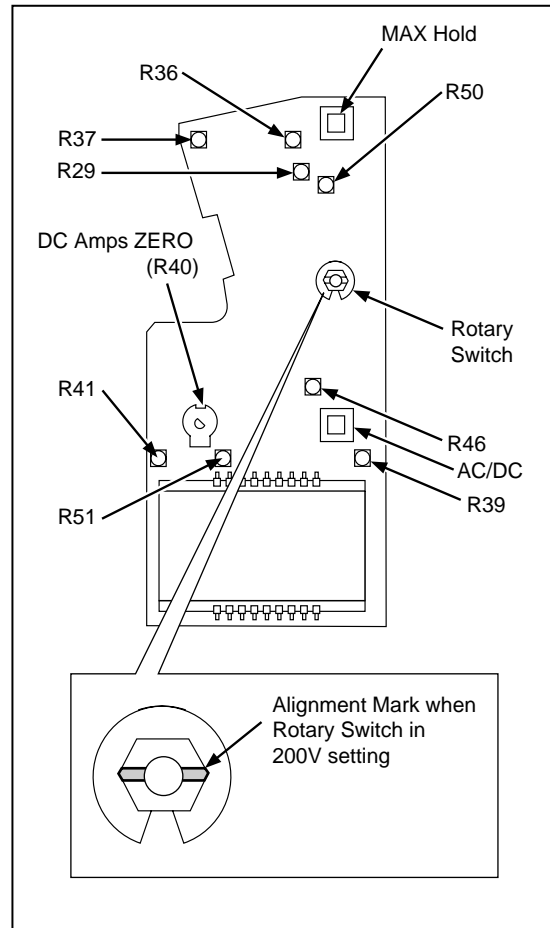


Figure 1. Calibration Adjustment Points

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Step 2. AC Voltage

1. Turn the rotary switch on the Meter to the 600V setting.
2. Toggle the DC/AC selector until "AC" is shown on the display.
3. Lift off the case top.
4. Connect the Calibrator to the V Ω and COM input jacks; then apply 600V ac from the Calibrator.
If the Meter display does not read between 599 and 601, adjust R46 until it does.
5. Set the output of the Calibrator to zero; then disconnect the Calibrator from the Meter.
6. Put the case top back on the case bottom, making sure that the rotary switch shaft is correctly seated in the rotary switch knob.
7. Turn the Meter off.
8. Proceed to calibrate the beeper function.

Step 3. Continuity Beeper

1. Turn the rotary switch on the Meter to the 200 Ω setting.
"OL" should appear on the display.
2. Lift off the case top.
3. Connect the 34.8 Ω resistor across the V Ω and COM inputs of the Meter.
4. Slowly turn R41 until the continuity beeper comes on.

5. Replace the 34.8 Ω resistor with the 61.9 Ω resistor.
The beeper should be off.
6. Replace the 61.9 Ω resistor with the 31.6 Ω resistor.
The beeper should be on.
7. Put the case top back on the case bottom, making sure that the rotary switch shaft is correctly seated in the rotary switch knob.
8. Turn the Meter off.
9. Proceed to calibrate the DC Amps Zero function.

Step 4. DC Amps Zero

1. Turn the rotary switch on the Meter to the 200A setting.
2. Toggle the DC/AC selector until "DC" is shown on the display.
3. Lift off the case top.
4. Mechanically center R40, which is the DC Amps ZERO adjustment (When R40 is centered, the cutout on the shaft is horizontal.)
5. Adjust R36 until the display reads between -1.0 and +1.0.
6. Turn R40 fully clockwise.
The display should read 7.1 or above.
7. Turn R40 fully counter-clockwise
The display should read -7.1 or below.
8. Put the case top back on the case bottom, making sure that the rotary switch shaft is correctly seated in the rotary switch knob.
9. Turn the Meter off.
10. Proceed to calibrate the MAX Hold function.

Step 5. MAX Hold

1. Turn the rotary switch on the Meter to the 200A setting.
2. Toggle the DC/AC selector until "DC" is shown on the display.
3. Lift off the case top.
4. Turn R40 until the display reads 00.0, then press the MAX hold selector switch.
5. Turn R51 until the display reads 00.0.
Press the MAX hold selector switch two or three times to confirm that the display continues to read 00.0.
6. Replace the case top on the case bottom, making sure that the rotary switch shaft is seated in the rotary switch knob.
7. Proceed to calibrate the DC Amps function.

Step 6. DC Amps

1. Connect the 50-Turn Current Coil (hereafter referred to as the Current Coil) to the Transconductance Amplifier, and the Trans-conductance Amplifier to the Calibrator.(See Figure 2.)
2. Turn the rotary switch on the Meter to the 200A setting.
3. Toggle the DC/AC selector until "DC" is shown on the display.
4. Lift off the case top.
5. Clamp the Meter around the Current Coil, taking care to align the conductor with the alignment marks on the jaws of the Meter.
6. Apply 4A dc to the Current Coil.

Note the exact display reading.

7. Slide the Meter in the Current Coil down, so that the conductor is at the top of the jaws.

Compare the reading with the Meter in this position to the reading noted in step 6. The difference between these two readings should be less than $\pm 0.5\%$.

If it is not, adjust R37 until it is.

8. Repeat step 7 with the conductor at the bottom of the jaws.
9. Remove the Meter from the Current Coil.

The display should read 00.0.

If it does not, adjust R40 (DC Amps Zero) until it does.

10. Clamp the Meter back around the Current Coil, taking care to align the conductor with the alignment marks on the jaws of the Meter.
11. Mechanically center R50.
12. With 4A applied to the Current Coil, adjust R29 until the display reads between 199.9 and 200.1.

If you cannot get a display reading within this range, adjust R50 until you do.

13. Remove the Meter from the Current Coil.
14. Pick up the case top and hold it face down.

Notice the plastic flanges on the underside of the rotary switch knob. These flanges hold the rotary switch knob to the case top.

15. Using your thumbs, firmly press in and down on the plastic flanges to unsnap the rotary switch knob from the case top. (See Figure 3.)
16. Place the three buttons for the MAX Hold selector, DC/AC toggle switch, and, DC Zero Amp function back in position. (See Figure 4.)
17. Put the case top back on the case bottom and turn the Meter face down.
Reinsert the case bottom screws in the case bottom. (These screws were removed earlier as part of "Preparing for Calibration.")
18. Clamp the Meter back around the Current Coil, taking care to align the conductor with the alignment marks on the jaws of the Meter.
Make sure the Meter is still in the 200A DC function.
19. With 4A applied to the Current Coil, adjust R50 through the hole in the case top (see Figure 3) until the display reads between 199.1 and 200.1.
20. Set the output of the Calibrator and the Transconductance Amplifier to zero.
21. Remove the Meter from the Current Coil.
22. Place the rotary switch knob on the rotary switch shaft, taking care to align the selection indicator on the rotary switch knob with the 200A position on the case top.
23. Using your thumbs, press down firmly on the rotary switch knob.
The rotary switch knob will snap back into the case top and seat itself on the rotary switch shaft.
24. Turn the Meter OFF.
The calibration and adjustment procedure is complete. Proceed to check the AC Amps function.

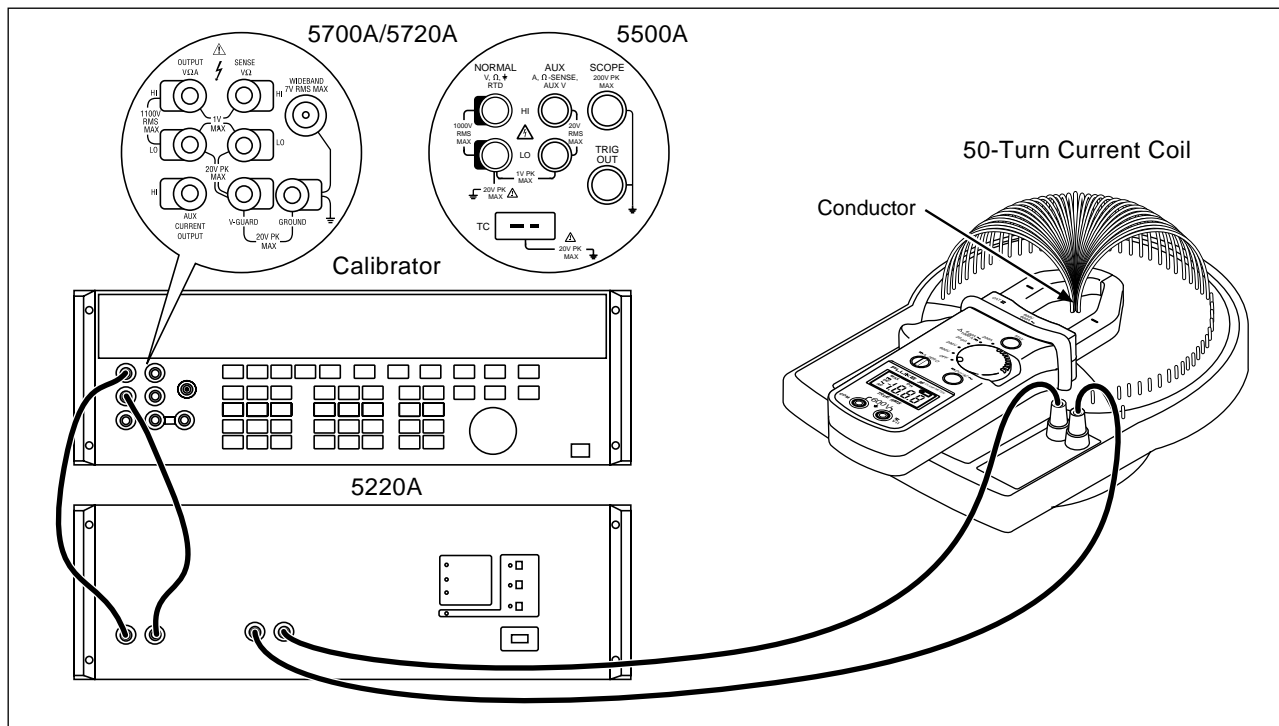


Figure 2. Equipment Connections for Current Calibration

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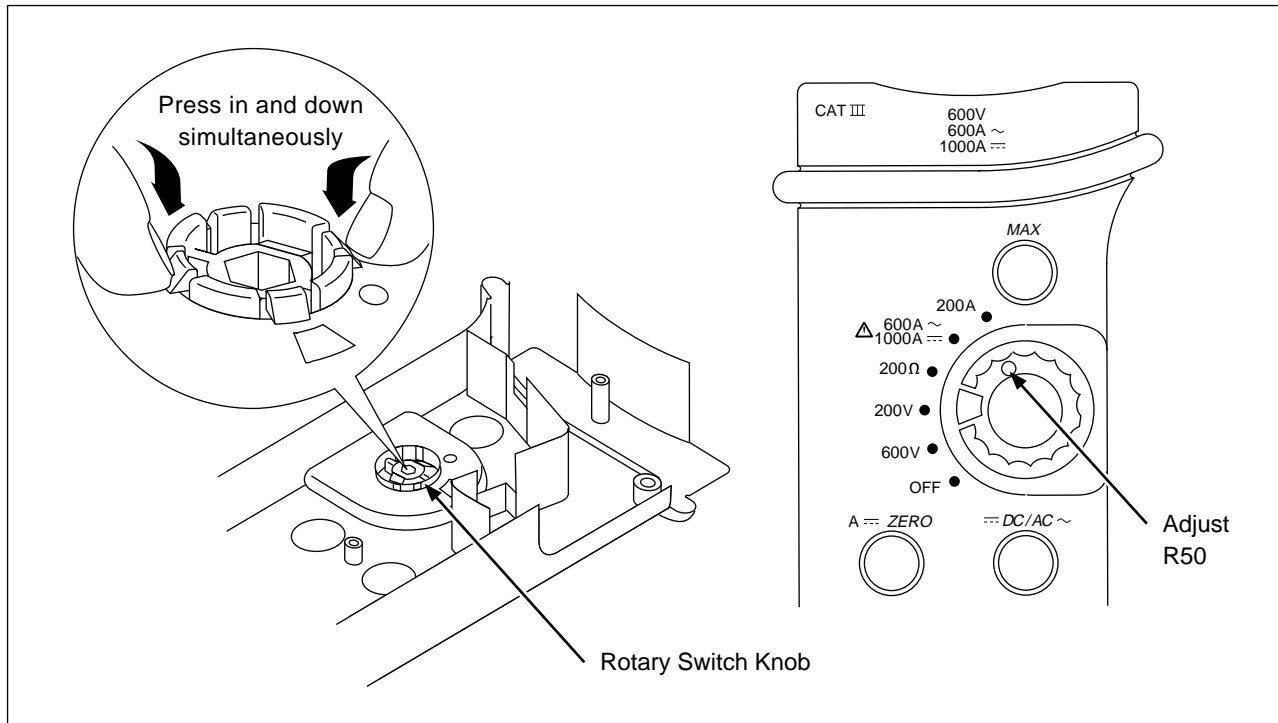


Figure 3. Removing the Rotary Switch Knob and Adjusting R50

Checking the AC Amps Function

To check the AC Amps function, do the following:

1. Make sure that the Calibrator, Transconductance Amplifier, and Current Coil are connected as shown in Figure 2.
2. Turn the rotary switch to the 600A AC setting.
3. Toggle the DC/AC selector until "AC" is shown on the display.
4. Clamp the Meter around the Current Coil, taking care to align the conductor with the alignment marks on the jaws of the Meter.
5. Apply 12A ac at 50 or 60 Hz to the Current Coil.

The display should read between 594 and 610.

If it does not, repeat the DC Amps calibration procedure under "Step 6. DC Amps."

Completing Reassembly

After you have completed the last calibration procedure and checked the AC amps function, do the following:

1. Remove the battery cover screw.
2. Lift off the battery cover and lift out the battery.
3. Reinsert the PCB mounting screw inside the battery compartment. (See Figure 4.)
4. Return the battery to the battery compartment.
5. Put the battery cover back in place, taking care not to pinch the battery leads.
6. Reinsert the battery cover screw.

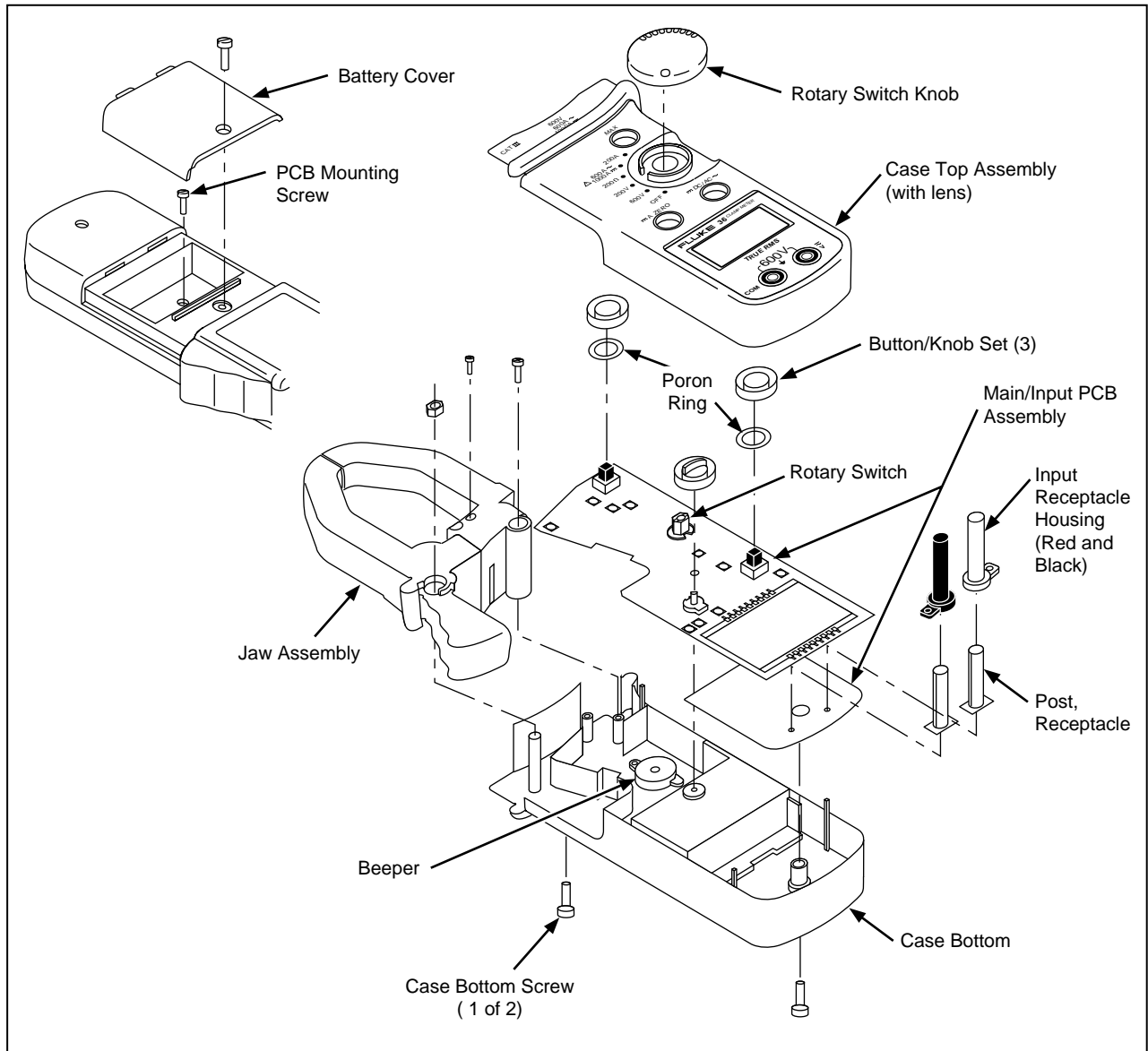
The meter is now ready for normal operation.

Replacement Parts

Replacement parts are listed in Table 4 and shown in Figure 4.

Table 4. Replacement Parts

Parts	Part No.
Input Receptacle Housing, Black	603487
Input Receptacle Housing, Red	603529
Posts, Receptacle	603537
Case Bottom	603511
Case Top Assembly (with lens)	603545
Rotary Switch Knob	603552
Rotary Switch	603560
Three-Button/Knob Set (MAX Hold, DC Amps Zero Adjustment, and DC/AC toggle)	603578
Beeper	603586
Main/Input PCB Assembly	603594
Jaw Assembly	603602
Battery Cover	603605
PCB Mounting Screw	603610
Poron Ring	642535



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Figure 4. Replacement Parts