



**IDEAL INDUSTRIES, INC.
TECHNICAL MANUAL**

**MODEL: 61-740 (2002P) (Older Model)
61-740 (2002PA) (Newer Model)**

The Service Information provides the following information:

- Precautions and safety information
- Specifications
- Performance test procedure
- Calibration and calibration adjustment procedure
- Basic maintenance (replacing the battery)

Form number: TM61740
Revision: 1. Date: Oct 2003

TABLE OF CONTENTS

Title	Page
Introduction	1
Precautions Information	1
Safety Information	1
61-740 Older Model Section	2
Specifications	2
General Specification	2
Voltage Specifications	2
Current Specifications	2
Resistance Specifications	2
Certifications and Compliances	2
Required Equipment	2-3
Performance Verification	3
Calibration	4
Replacing the Battery	5
61-740 Newer Model Section	6
Specifications	6
General Specification	6
Voltage Specifications	6
Current Specifications	6
Resistance Specifications	6
Continuity Specifications	6
Voltage Output Specifications	6
Certifications and Compliances	7
Required Equipment	7
Performance Verification	8
Calibration	9-10
Replacing the Battery	11

Introduction

Warning

To avoid shock or injury, do not perform the verification tests or calibration 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 61-740 contains parts that can be damaged by static discharge. Follow the standard practices for handling static sensitive devices.

*For additional information about IDEAL INDUSTRIES, INC. and its products, and services, visit IDEAL INDUSTRIES, INC. web site at:
www.idealindustries.com*

SAFETY

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use the product only as specified.

It is recommended that you read through the Operation or User manual before starting. Not all Caution, Warning, or Danger precautions are listed in this manual.

CAUTION.

These statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING.

These statements identify conditions or practices that could result in personal injury or loss of life.

Specific precautions

Use proper Fuse. To avoid fire hazard, use only the fuse type and rating specified for this product.

Do not operate without covers. To avoid personal injury, do not apply any voltage or current to the product without the covers in place.

Electric overload. Never apply a voltage to a connector on the product that is outside the range specified for that connector.

Avoid electric shock. To avoid injury or loss of life, do not connect or disconnect probes or test leads while they are connected to a voltage source.

Do not operate in wet/damp conditions. To avoid electric shock, do not operate this product in wet or damp conditions.

61-740 Older Model Section General specifications

Characteristics	Description
Display	3 ½ Digit LCD display
Display Count	2000 count, maximum reading 1999
Over-range Indication	“OL” is displayed
Sampling Rate	3 time/second with a response time of approx. 1 seconds
Operating Environment: Relative Humidity	-10°C to 50°C (14°F to 122°F) 0 ~ 85% RH
Storage Environment:	-20°C to 60°C (-4°F to 140°F) at <85% relative humidity
Power source:	9V Battery)
Battery Live:	< 400 hours typical (Manganese)
Low Battery Indicator:	“BATT” indicates low battery voltage
Dimensions	9.64” H X 2.75” W X 1.41” D 245mm H X 70mm W X 36mm D
Maximum Cable Size	ACA 2.2” (55mm), DCA 2.2” (55mm)
Weight:	Approximately 14.1 oz. or 400g including battery

RANGES and ACCURACY SPECIFICATION

Accuracy: Accuracy specifications at 23°C ±10°C (73.4°F ±18°F) at Relative Humidity of 0~85%

Electrical Specification: Accuracy are ±(reading plus number of digits) at 23°C ±10°C <85% RH

Function Setting	Ranges	Accuracy
AC Voltage	0 ~ 199.9V at 50-60 Hz	1.0% ± 2 digit
	0 ~ 199.9V at 40~1K Hz	1.5% ± 3 digits
	0 ~ 750.0V at 50-60 Hz	1.0% ± 2 digit
	0 ~ 750.0V at 40~1K Hz	1.5% ± 3 digits
AC Current	0 ~ 199.9A at 50-60 Hz	1.0% ± 2 digit
	0 ~ 199.9A at 40 ~ 1K Hz	2.0% ± 2 digit
	0 ~ 1500A at 50-60 Hz	1.0% ± 2 digit
	0 ~ 1500A at 40 ~ 1K Hz	2.0% ± 2 digit
	1501~1999A at 50-60 Hz	2.5%
	1501~1999A at 40 ~ 1K Hz	5.0%
Resistance	0~199.9Ω	1.5% ± 2 digit

AC Converter: Model 61-740 Average sensing , calibrated in RMS of a sine wave.

Overload Protection: **AC Voltage:** 1000 VAC not to exceed 1 minute.

AC Current: 3000 AAC not to exceed 30 seconds

Resistance: 500 VAC not to exceed 1minute

Certifications and compliances

Safety	Designed to IEC 348
Input rating	Class II

Required Equipment

Required equipment is listed in Table A. If the recommended models are not available; equipment with equivalent specifications may be used. Only qualified personnel should perform repairs or servicing.

Table A. Required Equipment

Equipment	Required Characteristics	Recommended Model
Calibrator	AC Voltage Range: 0-750V ac Accuracy: $\pm 0.07\%$ (Basic)	Fluke 5500 or Wavetek 9100 Calibrator or equivalent
	AC Current Range: 0 ~ 10A Accuracy: AC (40Hz to 1KHz): $\pm 0.08\%$ (Basic) DC: $\pm 0.02\%$ (Basic)	
	Amplitude: 0.5V p-p ~ 1.0V p-p (square wave) Accuracy: $\pm 5\%$	
	Ω range : 1 Ω ~ 2G Accuracy: $\pm 0.03\%$ (Basic)	
	Standard Coils: 1 turn, 10 turns, and 20 turns	
	AC/DC Current Generator: 100 amps $\pm .38\%$ (50/60 Hz) Trms	
	Variable 10V Power Supply	

PERFORMANCE VERIFICATIONS

Perform the following analysis; if the meter conforms to the limits listed in Table B the meter is functioning correctly. If the meter does not conform to any of the listed limits the calibration procedure must be performed.

Performance Verification Preparation

1. Turn on the Calibrator, allow calibrator to warm up. Temperature Stabilization should be reached after 30 minutes.
2. Remove battery cover and using a calibrated meter to ensure the battery measures a minimum of 7.0V DC. If the battery measures under 7.0V DC, replace the battery before beginning the performance test.
3. Input the values listed in Table B

Table B: Performance Verification

Function Setting/Range	Input	Low Limit	High Limit
ACV 20	18V AC @ 50Hz	17.7	18.3
ACV 200	180V AC @ 50Hz	178.0	182.0
ACV 750	500V AC @ 40Hz	493	507
ACV 750	500V AC @ 1K Hz	493	507
ACA 200A	180A @ 50Hz	178.0	182.0
ACA 2000A	1000A @ 500Hz	978	1022
ACA 2000A	1800A @ 50Hz	1780	1820
Ω 200	180	177.1	182.9

CALIBRATION

Calibration Preparation

1. Turn on the Calibrator, allow calibrator to warm up. Temperature Stabilization should be reached after 30 minutes.
2. Disconnect the test leads and turn the range switch to "OFF".
3. Remove the screws holding the battery cover and one at the jaw.
4. Remove the case bottom using care not to damage the battery connector and leads.
5. Using a calibrated meter ensure the battery measures a minimum of 7.0V DC. If the battery measures under 7.0V DC, replace the battery.

Calibration Procedure (refer to Figure 1 PCB Layout)

It is recommended that all IDEAL meters undergo the following calibration procedure on an annual basis.

The class of calibrator or equipment should have an accuracy that exceeds, by an expectable ratio the accuracy of this instrument.

Battery Warning Display

1. Connect a DC power supply set at 6.93 volts to the battery connector.
2. Set UUT range to 200V AC range.
3. Adjust VR5 on the unit until "BATT" is indicated on the LCD.
4. Set the DC power supply to 7.1 volts and confirm that the "BATT" indicator goes off.

PEAK Offset Adjustment

1. Set the function/range to the 200 AAC.
2. Set the Peak Hold selector switch to the 10ms.
3. Adjust VR4 until unit display reads "00.0".
4. Set the Peak Hold selector switch to the off.

Volts AC Adjustment

1. Set the function/range to 200V AC.
2. Connect the calibrator to the V and COM inputs on the meter.
3. Output 180.0 AC@ 50Hz.
4. Adjust VR2 until unit display reads 180.0V.
5. De-energize source and remove test leads.

PEAK Sensitivity Adjustment

1. Set the function/range to the 200 VAC.
2. Connect the calibrator to the V and COM inputs on the meter.
3. Output 100V AC @ 50 Hz.
4. Adjust VR3 until unit display reads "100.0".
5. De-energize source and remove test leads.

AC Sensitivity Adjustment

1. Set the function / range to the 200 AAC.
2. Clamp the unit to a 180A@55Hz AC source.
3. Adjust VR1 until unit display reads "180.0".

Calibration of the 61-740 is complete.
Remove all leads from the calibrator and equipment.
Return unit to proper operating condition.

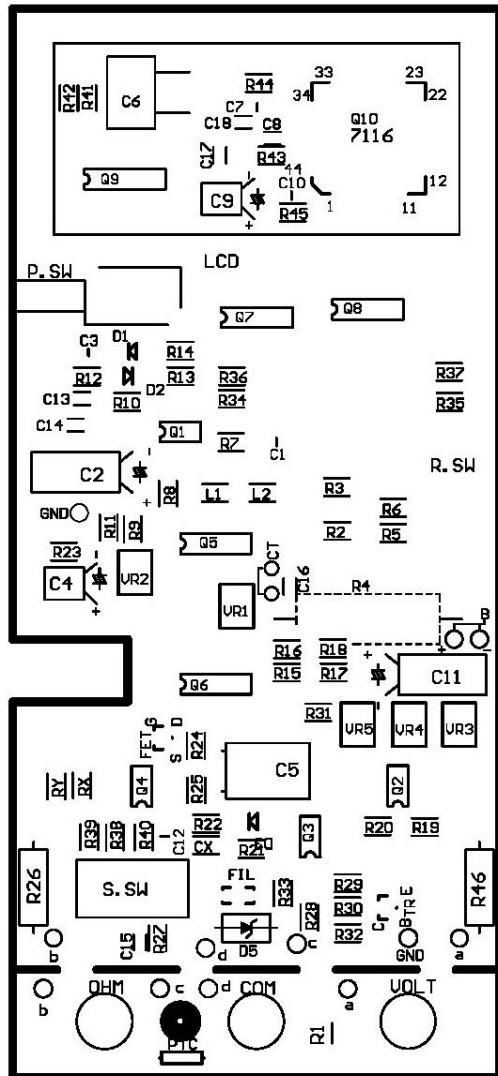


Figure 1

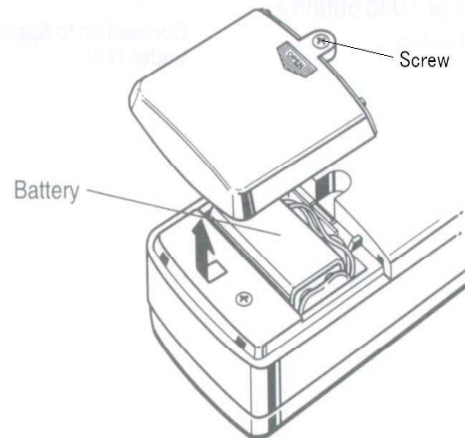


Figure 2

Battery Replacement (refer to Figure 2)

1. Disconnect the test leads from any circuit under test and turn off meter.
2. Use a Philips head screwdriver to remove the screw on battery cover.
3. Remove battery from compartment and unsnap the battery connector.
4. Install new 9V battery (NEDA #1604). An Manganese type is recommended.
5. Install new battery into compartment using care not to pinch or bind battery leads.
6. Reinstall battery cover.

61-740 Newer Model Section
General specifications

Characteristics	Description
Display	3 ½ Digit LCD display
Display Count	4000 count, maximum reading 3999
Over-range Indication	“OL” is displayed
Sampling Rate	3 time/second with a response time of approx. 2 seconds
Operating Environment: Relative Humidity	0°C to 40°C (32°F to 104°F) 0 ~ 85% RH
Storage Environment:	-20°C to 60°C (-4°F to 140°F) at <85% relative humidity
Power source:	1.5V Battery)
Battery Live:	< 150 hours typical (Manganese)
Low Battery Indicator:	“BATT” indicates low battery voltage
Sleep Mode	automatically powers down in about 30 minutes
Dimensions	9.72” H X 4.13” W X 1.93” D 247mm H X 105mm W X 49mm D
Maximum Cable Size	ACA 2.2” (55mm), DCA 2.2” (55mm)
Weight:	Approximately 16.6 oz. or 470g including battery

RANGES and ACCURACY SPECIFICATION

Accuracy: Accuracy specifications at 23°C ±5°C (73.4°F ±9°F) at Relative Humidity of 45~75%

Electrical Specification: Accuracy are ±(reading plus number of digits) at 23°C ±5°C <75% RH

Function Setting	Ranges	Accuracy
AC Voltage	0 ~ 39.99 at 50-60 Hz	1.0% ± 2 digits
AC Voltage	15.0 ~ 399.9 at 40~1K Hz	1.5% ± 3 digits
AC Voltage	150 ~ 750.0 at 40~1K Hz	1.5% ± 3 digits
DC Voltage	0 ~ 39.99	1.0% ± 2 digits
DC Voltage	15.0 ~ 399.9	1.0% ± 2 digits
DC Voltage	150 ~ 1000	1.0% ± 2 digits
AC Current	0 ~ 399.9 at 50-60 Hz	1.0% ± 3 digit
AC Current	0 ~ 399.9 at 40 ~ 1K Hz	2.0% ± 3 digit
AC Current	0 ~ 1500 at 50-60 Hz	1.0% ± 3 digit
AC Current	1501~2000 at 50-60 Hz	3.0%
Resistance	0 ~ 399.9KΩ	1.5% ± 2 digit
Continuity	Approximately 50Ω ± 35Ω,	1.5% ± 2 digits

AC Converter: Model 61-740 Average sensing, calibrated in RMS of a sine wave

Overload Protection: **AC and DC Voltage:** 1200 VDC or VAC not to exceed 10 seconds.

AC and DC Current: 2400 AAC or ADC not to exceed 10 seconds

Resistance, Continuity: 600 VDC or VAC not to exceed 10 seconds

Output (Output Impedance: approximately 10K Ω)

Measurement range		Output Voltage mVDC	Accuracy
400A Range	0 ~ 399.9A	0 ~ 399.9 mV	1.5% rdg ± 0.5mV(50/60 Hz) 2.5% rdg ± 0.5mV (40 ~ 1K Hz)
	0 ~ 1500 A	0 ~ 150.0 mV	1.5% rdg ± 0.5mV(50/60 Hz) 3.5% rdg ± 0.5mV (40 ~ 1K Hz)
2000A Range	1501 ~ 2000A	150.1 ~ 200.0 mV	3.5% rdg (50/60 Hz)

Certifications and compliances

Safety	Designed to IEC 61010-1
Input rating	2000A/1000V Category II
	2000A/600V Category III
Over voltage category	CAT III: Distribution level mains, fixed installation.
	CAT II: Local level mains, appliances, and portable equipment.
	CAT I: Signal level, special equipment or parts of Equipment, telecommunication, electronics.
Pollution Degree 2	Do not operate in environments where conductive Pollutants may be present.

Required Equipment

Required equipment is listed in Table A. If the recommended models are not available; equipment with equivalent specifications may be used. Only qualified personnel should perform repairs or servicing.

Table A. Required Equipment

Equipment	Required Characteristics	Recommended Model
Calibrator	AC Voltage Range: 0-750V ac Accuracy: $\pm 0.07\%$ (Basic)	Fluke 5500 or Wavetek 9100 Calibrator or equivalent
	DC Voltage Range: 0-1000V dc Accuracy: $\pm 0.006\%$ (Basic)	
	AC Current Range: 0 ~ 10A Accuracy: AC (40Hz to 1KHz): $\pm 0.08\%$ (Basic) DC: $\pm 0.02\%$ (Basic)	
	Amplitude: 0.5V p-p ~ 1.0V p-p (square wave) Accuracy: $\pm 5\%$	
	Ω range : 1 Ω ~ 2G Accuracy: $\pm 0.03\%$ (Basic)	
	Standard Coils: 1 turn, 10 turns, and 20 turns	
	AC/DC Current Generator: 100 amps $\pm .38\%$ (50/60 Hz) Trms	
	Variable 10V Power Supply	

PERFORMANCE VERIFICATIONS

Perform the following analysis; if the meter conforms to the limits listed in Table B the meter is functioning correctly. If the meter does not conform to any of the listed limits the calibration procedure must be performed.

Performance Verification Preparation

1. Turn on the Calibrator, allow calibrator to warm up. Temperature Stabilization should be reached after 30 minutes.
2. Remove battery cover and using a calibrated meter to ensure the battery measures a minimum of 2.3V DC. If the battery measures under 2.3V DC, replace the battery before beginning the performance test.
3. Input the values listed in Table B

Table B: Performance Verification

Function Setting/Range	Input	Low Limit	High Limit
ACV 40	38V AC @ 50Hz	37.60	38.40
ACV 400	380V AC @ 50Hz	376.0	384.0
ACV 750	500V AC @ 40Hz	490	510
ACV 750	500V AC @ 1K Hz	490	510
DCV 40	38V DC	37.60	38.40
DCV 400	380V DC	376.0	384.0
DCV 1000	900V DC	889	911
ACA 400A	380A @ 50Hz	375.9	384.1
ACA 1000A	100A @ 500Hz	94	106
ACA 2000A	1800A @ 50Hz	1779	1821
Ω 400	300	295.3	304.7
Ω 4K	3000	2953	3047
Ω 40K	30K	29.53	30.47
Ω 400K	300K	295.3	304.7
Continuity Test \rightarrow	15 Ω , Beep on 85 Ω , Beep off.		

Analog Output Test: (Output Impedance: approximately 10K Ω)

Function	Setting Range /Input	Output Voltage mVDC	Low Limit	High Limit
AC 400A	10@50Hz	10.0 mV	9.4	10.6
	100@50Hz	100.0 mV	98.0	102.0
AC 2000A	100@50Hz	10.0 mV	9.4	10.6
	500@50Hz	50.0 mV	48.8	51.2
	1800@50Hz	180.0 mV	176.8	183.2

CALIBRATION

Calibration Preparation

1. Turn on the Calibrator, allow calibrator to warm up. Temperature Stabilization should be reached after 30 minutes.
2. Disconnect the test leads and turn the range switch to "OFF".
3. Remove the screws holding the battery cover and one at the jaw.
4. Remove the case bottom using care not to damage the battery connector and leads to the continuity beeper. (Beeper is attached to the bottom case cover.)
5. Using a calibrated meter ensure the battery measures a minimum of 2.3V DC. If the battery measures under 2.3V DC, replace the battery.

Calibration Procedure (Refer to Figure 5 PCB Layout)

It is recommended that all IDEAL meters undergo the following calibration procedure on an annual basis. The class of calibrator or equipment should have an accuracy that exceeds, by an expectable ratio the accuracy of this instrument.

Battery Warning Display

1. Connect a DC power supply set at 2.1 volts to the battery connector.
2. Set UUT range to 400A AC range.
3. "BATT" is indicated on the LCD.
4. Set the DC power supply to 2.6 volts and confirm that the "BATT" indicator goes off.

AC Current Sensitivity Adjustment

1. Set the range switch at the 'A AC' position.
2. Connect the wires according to the figure 3. Set the indication of the voltmeter to 0.0000V by turning the VR4.
3. Confirm that the indication of the LCD is '00.0A'.
4. Clamp the test coil according to the figure 3. And generate the AC current 300A/50Hz.
5. Set the indication of the voltmeter from "0.3000" by turning the VR1.
6. Calibrate the indication value of the LCD 300.0A by turning the VR5 (rough) and VR8 (exact).

Peak Hold Adjustment

1. Set the range switch at the 'A AC' position.
2. Press the SW2 to select the Peak mode.
3. Connect the wires according to the figure 4. Set the indication of the voltmeter to 0.0000V by turning the VR3. (Confirm that the indication of the LCD is '00.0A' when press the sw3.)
4. Clamp the test coil according to the figure 4. And generate the AC current 300A/50Hz.
5. Set the indication of the voltmeter from "0.3000" by turning the VR2.
6. Press the SW3 again, confirm that the indication of the LCD is "300.0".

Volts AC Sensitivity Adjustment

1. Set the range switch at the 'ACV' position.
2. Connect the wires according to the generate the AC voltage 30V/50Hz.
3. Calibrate the indication value of the LCD from "30.00" by turning the VR6.
5. De-energize source and remove test leads.

OHM Sensitivity Adjustment

1. Set the range switch at the ' Ω / \bullet)' position.
2. Connect the wires according to the resistance box to 30k Ω .
3. Calibrate the indication value of the LCD to "30.00" by turning the VR7.

Calibration of the 61-740 is complete.

Remove all leads from the calibrator and equipment.

Return unit to proper operating condition.

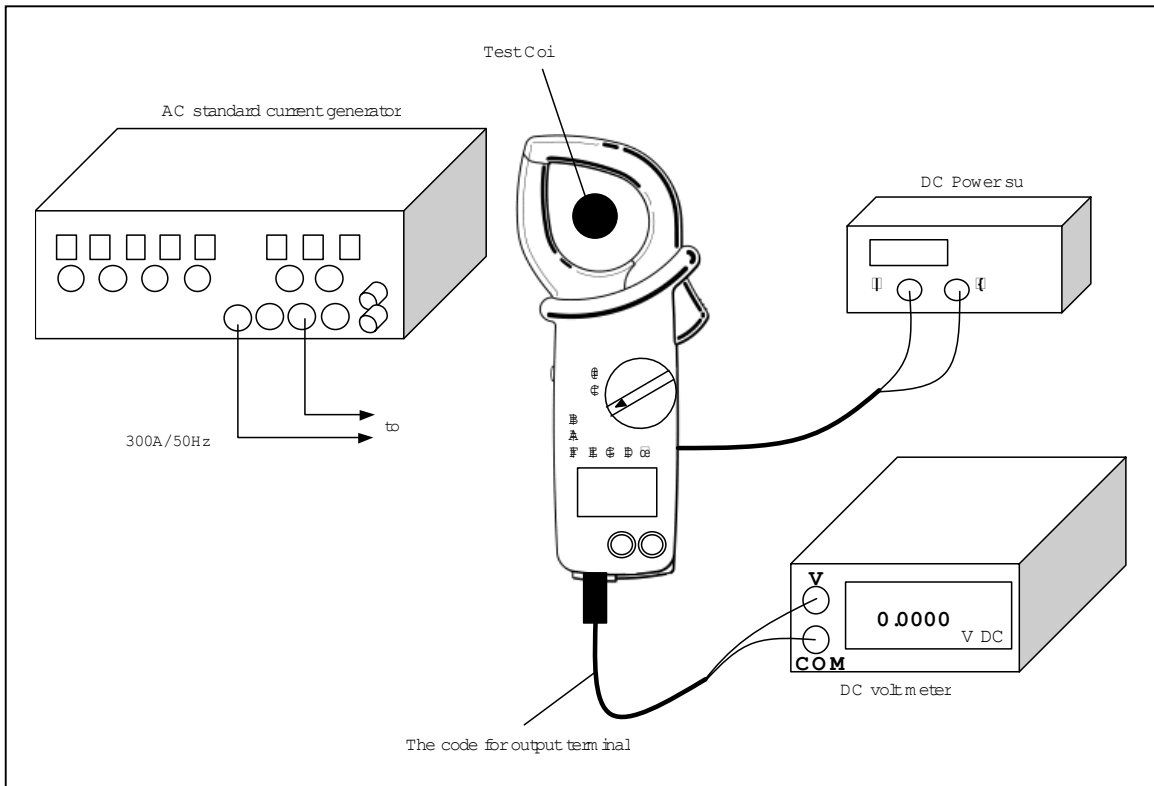


Figure 3. ACA (Normal Mode) Calibration

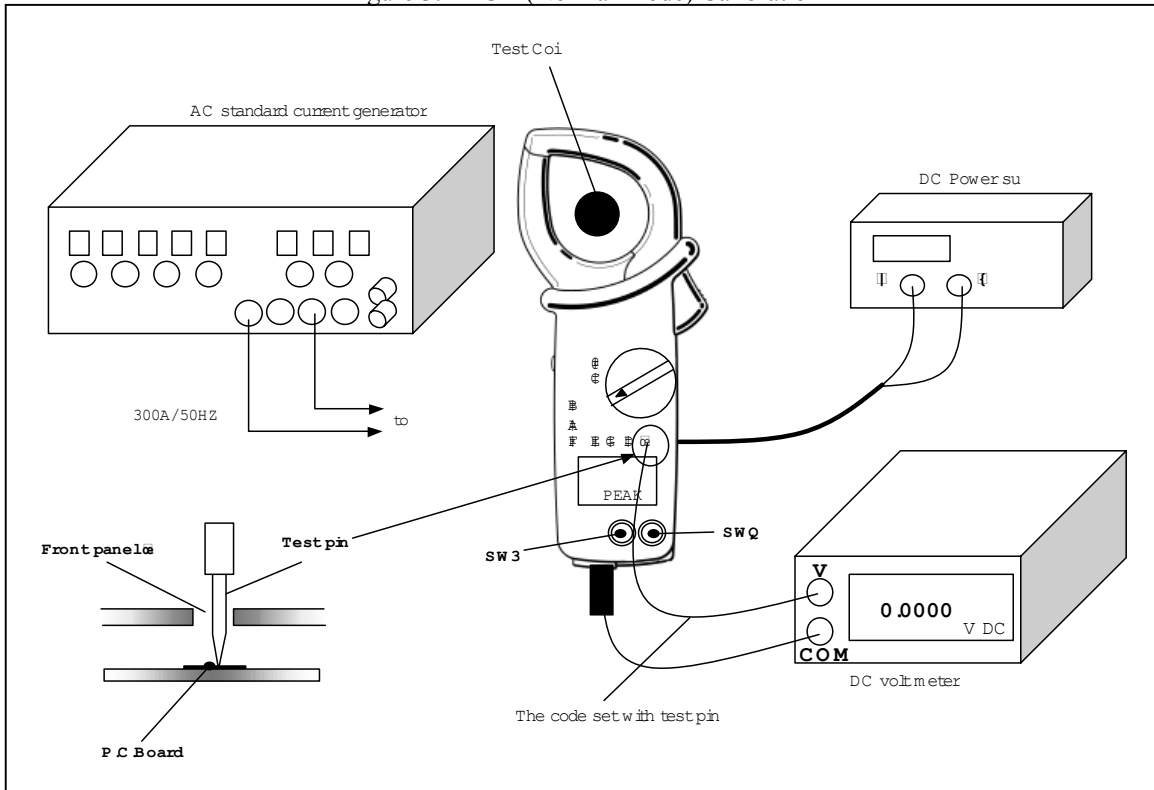


Figure 4. ACA (Peak Mode) Calibration

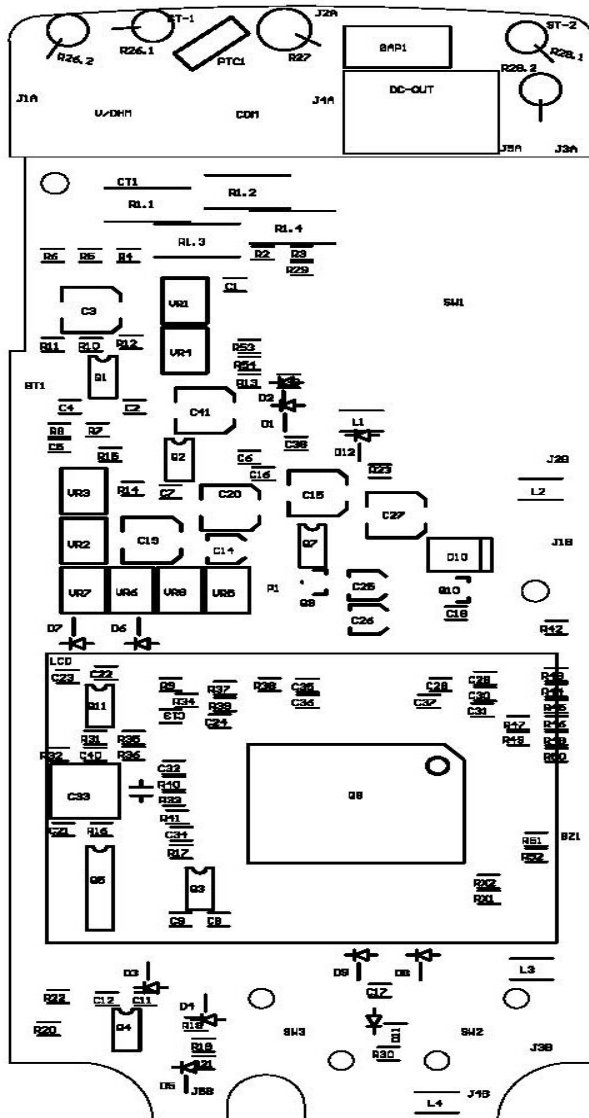


Figure 5

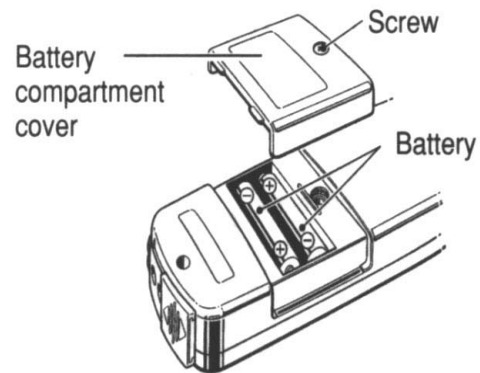


Figure 6

Battery Replacement (refer to Figure 6)

1. Disconnect the test leads from any circuit under test and turn off meter.
2. Use a Philips head screwdriver to remove the screw on battery cover.
3. Remove battery from compartment and unsnap the battery connector.
4. Install new 1.5V tow battery. Any Manganese type is recommended.
5. Reinstall battery cover.