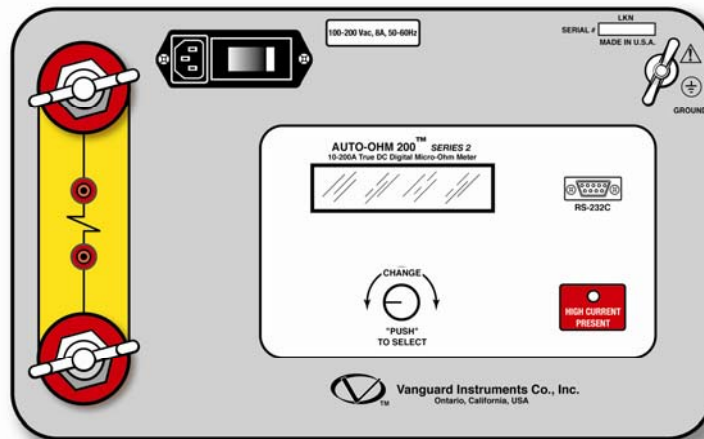
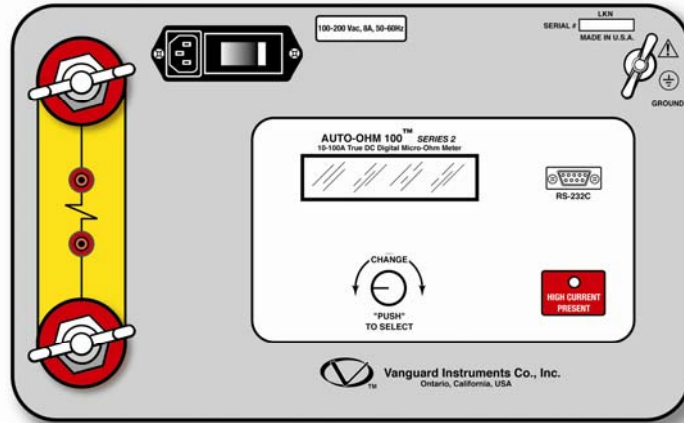


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**OPERATING INSTRUCTIONS**  
for the  
**AUTO-OHM 100/200 Series 2**  
**10-100/200 Amperes True DC**  
**Digital Micro Ohm Meter**



Vanguard Instruments Company, Inc.  
**1520 S. Hellman Ave.**  
**Ontario, California 91761**

SAFETY SUMMARY

**NOTICE**

*This manual applies to Models Auto-Ohm 100 Series 2, and Auto-Ohm 200 Series 2. The operating procedures are virtually the same for all models. Any differences are clearly described in the step-by-step procedures.*

**FOLLOW EXACT OPERATING PROCEDURES**

Any deviation from the procedures described in this operator's manual may create one or more safety hazards, damage the Auto-Ohm, or cause errors in the test results; Vanguard Instruments Co., Inc. assumes no liability for unsafe or improper use of the Auto-Ohm. The following safety precautions must be observed during all phases of test set-up, test hookups, testing, and test-lead disconnects.

**SAFETY WARNINGS AND CAUTIONS**

This device shall be used only by **trained operators**.  
All circuit breakers under test shall be off line and fully isolated.

**DO NOT MODIFY TEST EQUIPMENT**

Because of the risk of introducing unknown hazards, do not install substitute parts or perform any unauthorized modification to any Model Auto-Ohm Test unit. To ensure that all designed safety features are maintained, it is recommended that repairs be performed only by Vanguard Instruments Co. factory personnel or by an authorized repair service. Unauthorized modifications can cause serious safety hazards and will nullify the manufacturer's warranty.

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## **AUTO-OHM 100/200 Series 2 Operating Procedures**

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### 1.0 INTRODUCTION

#### 1.1 Applicability

This manual applies to the Model Auto-Ohm 100 Series 2 and Model Auto-Ohm 200 Series 2 (hereafter, Auto-Ohm), made by Vanguard Instruments Company.

#### 1.2 General Description

The Auto-Ohm-100/200 Series 2 are the third generation micro-ohmmeters made by Vanguard Instruments Company. The Auto-Ohm 100/200 features microprocessor-controlled measuring of very low resistances ranging from 1 micro-ohm to 300 milli-ohms with high accuracy. The Auto-Ohm is field-portable, rugged, and easily operated by first-time users having a minimum of training. It features one-knob control and an LCD alpha/numeric display of the resistance measured. The one-knob control operation is logical and simple: **Turning the knob** scrolls through a menu of possible options (which display in sequence) and **pressing the knob** activates the selected function. As its name implies, the Auto-Ohm operation is automatic, requiring little more from the user than connecting it to an unknown resistance and selecting the desired functions and its options. The Auto-Ohm automatically stores the last 3 resistance measurements, which can be displayed after testing.

#### 1.3 Functional Description

The Auto-Ohm's operation is based on the electrical relationships described by Ohm's law:  $R=V/I$ , where I is a known current and V is the dc voltage measured across the unknown resistance (typically, a circuit breaker's contacts). Since the current (user selected) through the unknown resistance is known and the voltage across the unknown resistance is measured by a precision voltmeter, the resistance read-out can be calculated using Ohm's law.

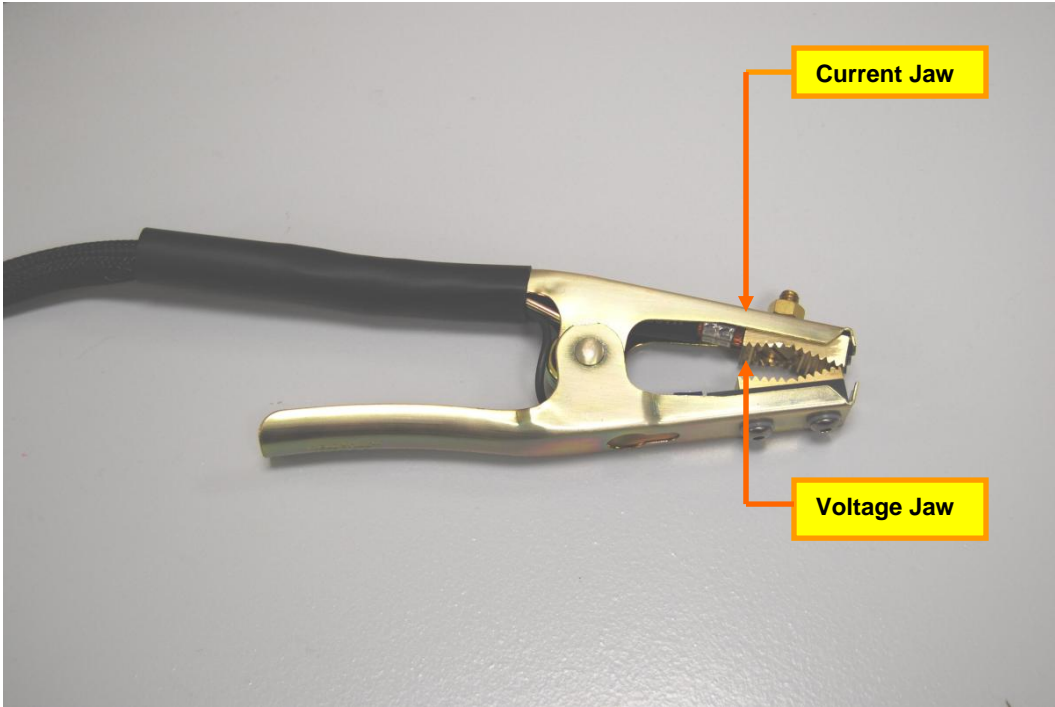
The Auto-Ohm test voltage is supplied by a true 5Vdc power supply. The true DC test current is selectable in 2-amp steps, from 10 to 100 amperes for the Auto-Ohm-100 and from 10 to 200 amperes for Auto-Ohm-200. The test current is automatically ramped up and down slowly. This current ramp rate is programmable from 5 seconds to 30 seconds.

The voltmeter test leads run separately from the current-bearing test leads to the resistive load thus eliminating any  $I \cdot R$  voltage drop error in the current cables. These Auto-Ohm features make very precise micro-ohm measurements possible without having to calculate compensations for current lead resistance errors.

#### 1.4 Furnished Test Accessories

The Auto-Ohm is supplied with two 30-foot test cables with heavy-duty alligator clamps. Both the current (#1 AWG) and sense leads are combined into one cable (Figure 1.0). A Ground cable, and power cord are also included with each Auto-Ohm.

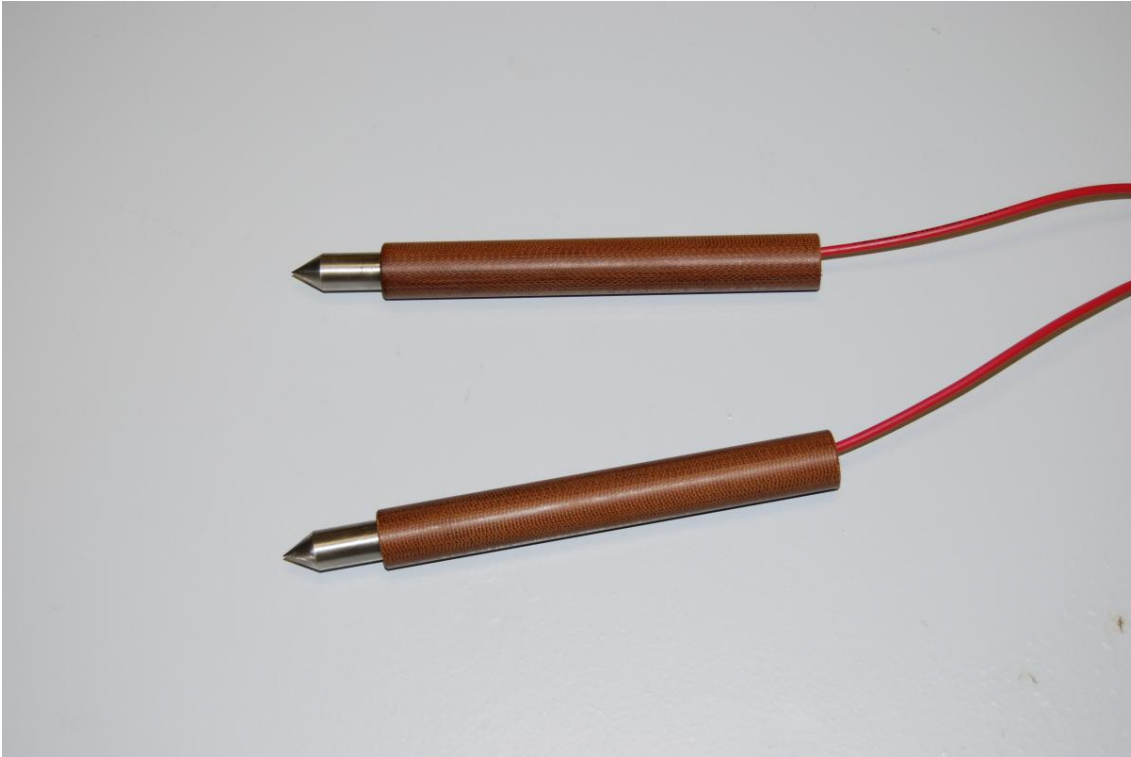
Users can select to have the current and sense leads separated as shown in Figure 2.0 and Figure 4.0. Optional hand spike sense leads are also available as shown in Figure 3.0.



**Figure 1.0 Combined Current and Sense Leads**



**Figure 2.0 Auto-Ohm 100/200 Sense Leads**



**Figure 3.0 Auto-Ohm 100/200 Hand Spikes**



**Figure 4.0 Auto-Ohm 100/200 Current Cable**



### 1.5 Optional Accessories

1. Heavy-duty welding-type C-clamps (Figure 5.0) are available as optional accessories. These C-clamps allow test lead connections to a wide variety of bushing sizes, bus bars, and conductors that require low-resistance test-lead contacts.
2. Light weight (#4 AWG) cables are also available upon request.
3. Custom cable lengths are available upon request.
4. An optional shipping case (which holds the Auto-Ohm and its cables) is also available.



**Figure 5.0 Auto-Ohm 100/200 C-Clamp Cable**

2.0 AUTO-OHM SPECIFICATIONS

2.1 Auto-Ohm 100 Series 2 Specifications

**Table 1.0 Auto-Ohm 100 Series 2 Specifications**

---

|                                 |  |
|---------------------------------|--|
| <b>MODEL</b> .....              | Auto-Ohm 100 Series 2  |
| <b>TYPE</b> .....               | Special-Purpose Test Equipment, Portable, Low Resistance-Ohmmeter  |
| <b>CONFIGURATION</b> .....      | Third-generation (improved design, superseding original model)     |
| <b>SIZE (inches)</b> .....      | 16.8 Wide by 12.6 High by 10.6 Deep (42.7 Cm x 32 Cm x 30.5 Cm)    |
| <b>WEIGHT</b> .....             | Less than 15 pounds (6.8 Kg)                                       |
| <b>OPERATING VOLTAGE</b> .....  | 8 amps, 100-240 Vac, 50/60 Hz, with built in 10A circuit breaker   |
| <b>RESISTANCE RANGE</b> .....   | 1 micro-ohm to 300 milli-ohms                                      |
| <b>TEST CURRENT RANGE</b> ..... | 10 Amperes to 100 Amperes, Selectable in 2 ampere steps            |
| <b>DISPLAY</b> .....            | Backlit LCD, 2-lines high by 16 characters Wide                    |
| <b>ACCURACY</b> .....           | $\pm 1\%$ of Reading, $\pm 1$ Count                                |
| <b>UNIT PROTECTION</b> ...      | thermal-overload sensor and cutoff                                 |
| <b>INTERFACE</b> .....          | RS-232C Connector Port for PC Interface                            |
| <b>ENVIRONMENT</b> .....        | Operating: 0°C to 55°C; Storage: -40°C to 65°C                     |
| <b>FURNISHED ITEMS</b> ...      | One power cord, one ground cable, two 30-ft. test lead cables.     |
| <b>WARRANTY</b> .....           | One-Year Parts & Labor (Post-Warranty Service Contracts Available) |

---

*AUTO-OHM SPECIFICATIONS ARE SUBJECT TO UPGRADES AND MAY BE CHANGED WITHOUT PRIOR NOTICE.*

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## **AUTO-OHM 100/200 Series 2 Operating Procedures**

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### 2.2 Auto-Ohm 200 Series 2 Specifications

**Table 2.0 Auto-Ohm 200 Series 2 Specifications**

---

|                                 |  |
|---------------------------------|--|
| <b>MODEL</b> .....              | Auto-Ohm 200 Series 2  |
| <b>TYPE</b> .....               | Special-Purpose Test Equipment, Portable, Low Resistance-Ohmmeter  |
| <b>CONFIGURATION</b> .....      | Third-generation (improved design, superseding original model)     |
| <b>SIZE (inches)</b> .....      | 16.8 Wide by 12.6 High by 10.6 Deep (42.7 Cm x 32 Cm x 30.5 Cm)    |
| <b>WEIGHT</b> .....             | Less than 21 pounds (9.5 Kg)                                       |
| <b>OPERATING VOLTAGE</b> .....  | 8 amps, 100-240 Vac, 50/60 Hz, with built in 10A circuit breaker   |
| <b>RESISTANCE RANGE</b> .....   | 1 micro-ohm to 300 milli-ohms                                      |
| <b>TEST CURRENT RANGE</b> ..... | 10 Amperes to 200 Amperes, Selectable in 2 ampere steps            |
| <b>DISPLAY</b> .....            | Backlit LCD, 2-lines high by 16 characters wide                    |
| <b>ACCURACY</b> .....           | $\pm 1$ % of Reading, $\pm 1$ Count                                |
| <b>UNIT PROTECTION</b> ...      | thermal-overload sensor and cutoff                                 |
| <b>INTERFACE</b> .....          | RS-232C Connector Port for PC Interface                            |
| <b>ENVIRONMENT</b> .....        | Operating: 0°C to 55°C; Storage: -40°C to 65°C                     |
| <b>FURNISHED ITEMS</b> ...      | One power cord, one ground cable, two 30-ft. test lead cables      |
| <b>WARRANTY</b> .....           | One-Year Parts & Labor (Post-Warranty Service Contracts Available) |

*AUTO-OHM SPECIFICATIONS ARE SUBJECT TO UPGRADES AND MAY BE CHANGED WITHOUT PRIOR NOTICE.*

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# AUTO-OHM 100/200 Series 2 Operating Procedures

## 3.0 CONTROL AND DISPLAY

### 3.1 Auto-Ohm 100 Series 2 Front Panel

The Auto-Ohm 100 Series 2 controls and displays are shown in the control-panel illustration below (Figure 6.0). Pointing leader lines reference each item with an index number. Each index number is cross-referenced to a functional description in Table 3.0, which describes the function and purpose of each item on the control panel. Although the purpose of these controls and the display may seem obvious and intuitive, users should become familiar with them before attempting to use the Auto-Ohm 100 Series 2. First-time users should also review and become familiar with the Safety Summary on the front page.

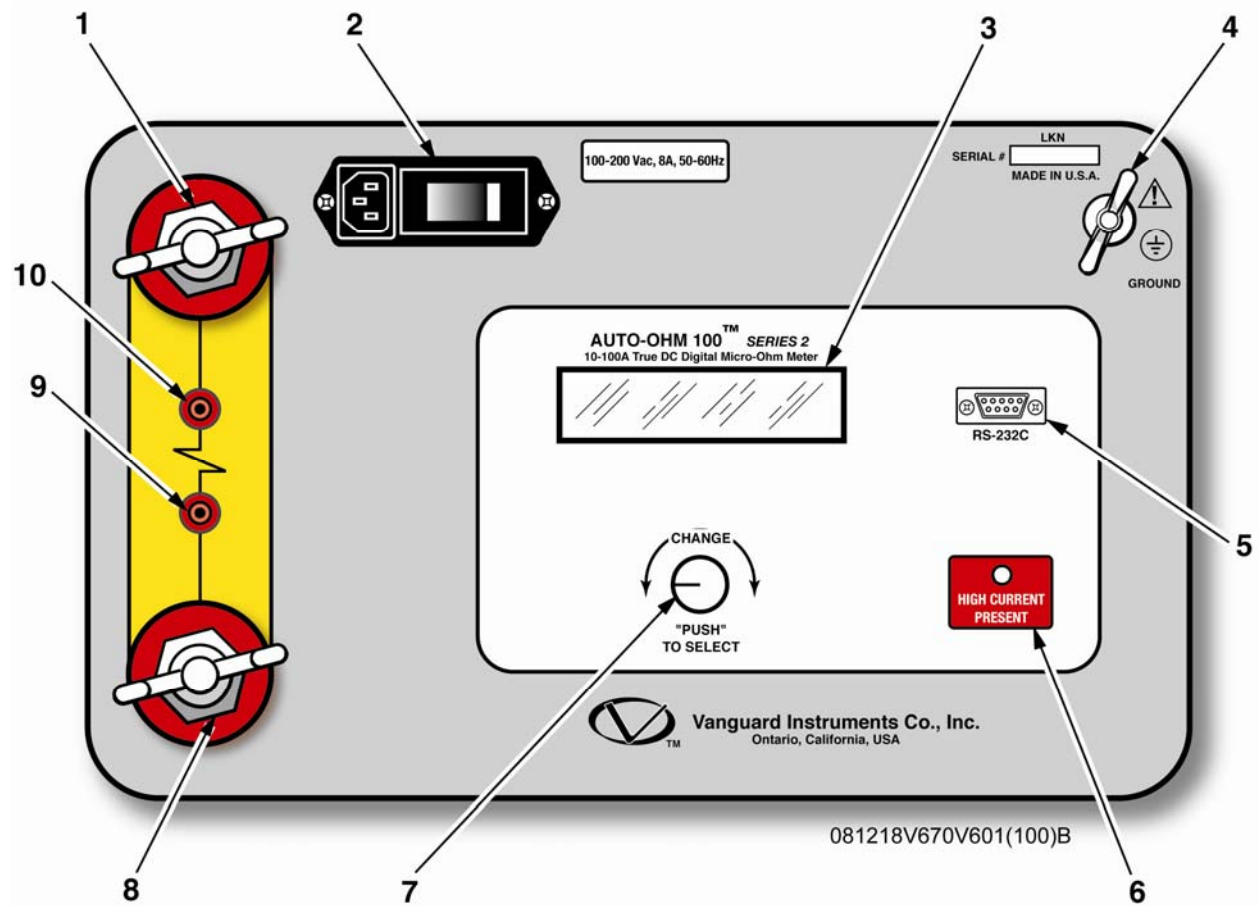


Figure 6.0 Auto-Ohm 100 Series 2 Control-Panel Controls and Display

**Table 3.0 Functional Description of Auto-Ohm 100 Series 2 Controls and Display**

| <b>Figure 6.0<br/>Index #</b> | <b>Adjacent Panel Marking</b>          | <b>Functional Description</b>   |                  |               |   |    |   |    |   |            |
|-------------------------------|--|---|------------------|---------------|---|----|---|----|---|------------|
| <b>1 &amp; 8</b>              | (Wing Nut)                             | Current lead connectors   |                  |               |   |    |   |    |   |            |
| <b>2</b>                      | <b>100-240 Vac, 8A, 50-60 Hz</b>       | Input power connector with third-wire safety ground and built-in 10A circuit breaker.   |                  |               |   |    |   |    |   |            |
| <b>3</b>                      | no marking                             | LCD; 2-line by 16-character, back-lighted, displays menus of selections, operator entries, and test-measurement results.  |                  |               |   |    |   |    |   |            |
| <b>4</b>                      | <b>GROUND</b><br>(Wing Nut)            | Auto-Ohm-100 Series 2 ground stud. Connect ground stud to substation ground using provided cable.   |                  |               |   |    |   |    |   |            |
| <b>5</b>                      | <b>RS-232C</b>                         | RS-232C interface port, 9-pin connector, female DB type. The data rate is set to 19,200 baud, 1 start bit, 8 data bits, and no parity bit.<br><table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="text-align: center;"><u>PIN</u> .....</td> <td style="text-align: center;"><u>SIGNAL</u></td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Rx</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">Tx</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">Signal Gnd</td> </tr> </table> This serial port is dedicated for factory calibration and software update. | <u>PIN</u> ..... | <u>SIGNAL</u> | 2 | Rx | 3 | Tx | 5 | Signal Gnd |
| <u>PIN</u> .....              | <u>SIGNAL</u>                          |   |                  |               |   |    |   |    |   |            |
| 2                             | Rx                                     |   |                  |               |   |    |   |    |   |            |
| 3                             | Tx                                     |   |                  |               |   |    |   |    |   |            |
| 5                             | Signal Gnd                             |   |                  |               |   |    |   |    |   |            |
| <b>6</b>                      | <b>HIGH CURRENT<br/>PRESENT</b>        | LED indicator, red, lights when high-test-current is going through the test leads.  |                  |               |   |    |   |    |   |            |
| <b>7</b>                      | <b>CHANGE<br/>"PUSH"<br/>TO SELECT</b> | One-knob control (all Auto-Ohm menus and selections are controlled by this one control knob). <i>Turning this control knob scrolls through different menu options</i> (shown on an LCD), which display. <i>Pressing the knob selects</i> the displayed function, usually producing a new menu of selectable options. See Figure 12.0 for a summary of the step-by-step operating procedures.  |                  |               |   |    |   |    |   |            |
| <b>9 &amp; 10</b>             | (resistor symbol)                      | Voltage-sensing connector jacks (red).  |                  |               |   |    |   |    |   |            |

## AUTO-OHM 100/200 Series 2 Operating Procedures

### 3.2 Auto-Ohm 200 Series 2 Front Panel

The Auto-Ohm 200 Series 2 controls and displays are shown in the control-panel illustration, Figure 7.0. Pointing leader lines reference each item with an index number. Each index number is cross-referenced to a functional description in Table 4.0, which describes the function and purpose of each item on the control panel. Although the purpose of these controls and the display may seem obvious and intuitive, users should become familiar with them before attempting to use the Auto-Ohm 200 Series 2. First-time users should also review and become familiar with the Safety Summary on the front page.

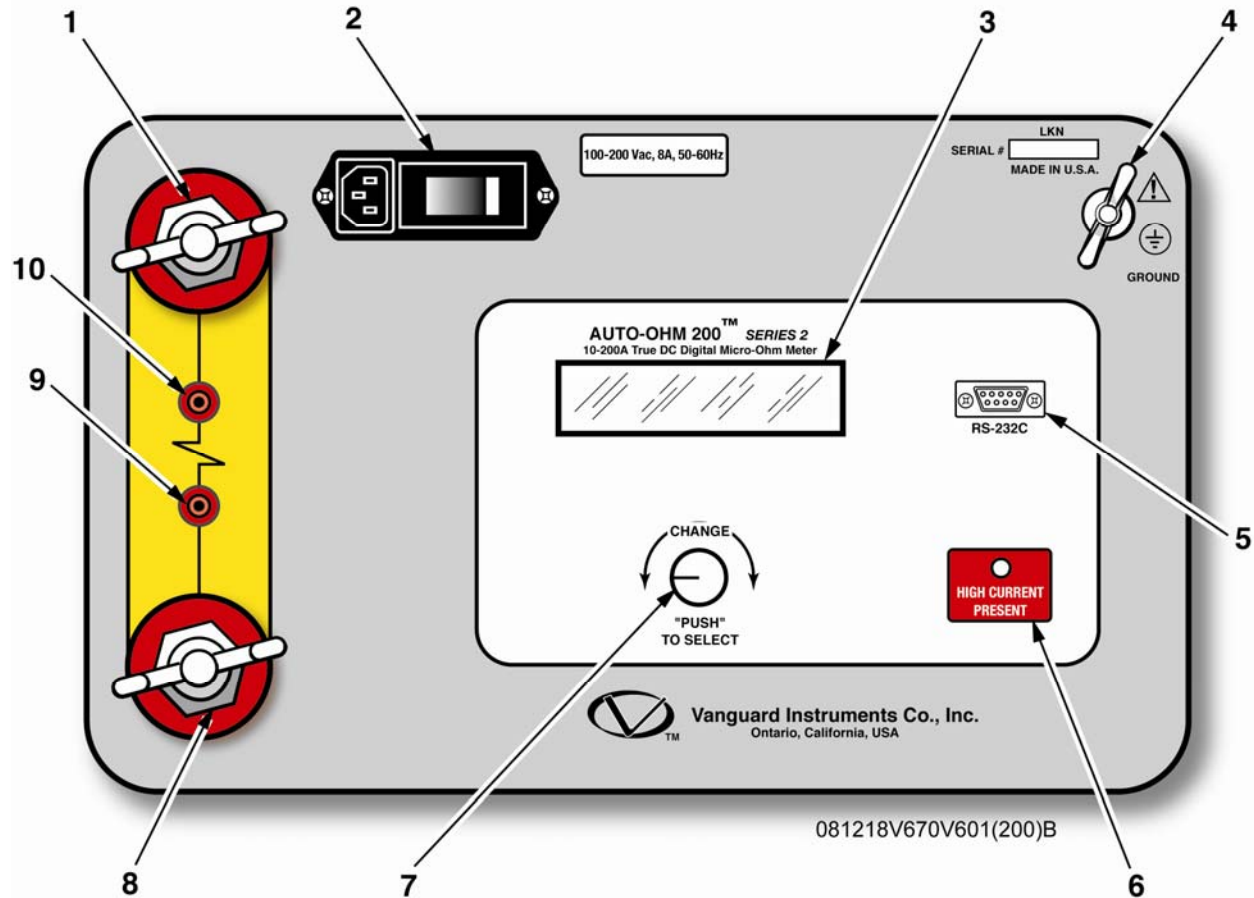


Figure 7.0 Auto-Ohm 200 Series 2 Control-Panel Controls and Display

**Table 4.0 Functional Description of Auto-Ohm 200 Series 2 Controls and Display**

| <b>Figure 7.0<br/>Index #</b> | <b>Adjacent Panel Marking</b>          | <b>Functional Description</b>  |                  |               |   |    |   |    |   |            |
|-------------------------------|--|--|------------------|---------------|---|----|---|----|---|------------|
| <b>1 &amp; 8</b>              | (Wing Nut)                             | Current lead connectors  |                  |               |   |    |   |    |   |            |
| <b>2</b>                      | <b>100-240 Vac, 8A, 50-60 Hz</b>       | Input power connector with third-wire safety ground and built-in 10A circuit breaker.  |                  |               |   |    |   |    |   |            |
| <b>3</b>                      | no marking                             | LCD; 2-line by 16-character; back-lighted; displays menus of selections, operator entries, and test-measurement results.   |                  |               |   |    |   |    |   |            |
| <b>4</b>                      | <b>GROUND</b><br>(Wing Nut)            | Auto-Ohm 200 Series 2 ground stud. Connect ground stud to substation ground using provided cable.  |                  |               |   |    |   |    |   |            |
| <b>5</b>                      | <b>RS-232C</b>                         | RS-232C interface port; 9-pin connector; female DB type. The data rate is set to 19,200 baud, 1 start bit, 8 data bits, and no parity bit.<br><table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><u>PIN</u> .....</td> <td style="text-align: center;"><u>SIGNAL</u></td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Rx</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">Tx</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">Signal Gnd</td> </tr> </table> This serial port is dedicated for factory calibration and software update. | <u>PIN</u> ..... | <u>SIGNAL</u> | 2 | Rx | 3 | Tx | 5 | Signal Gnd |
| <u>PIN</u> .....              | <u>SIGNAL</u>                          |  |                  |               |   |    |   |    |   |            |
| 2                             | Rx                                     |  |                  |               |   |    |   |    |   |            |
| 3                             | Tx                                     |  |                  |               |   |    |   |    |   |            |
| 5                             | Signal Gnd                             |  |                  |               |   |    |   |    |   |            |
| <b>6</b>                      | <b>HIGH CURRENT<br/>PRESENT</b>        | LED indicator, red, lights when high-test-current is going through the test leads.   |                  |               |   |    |   |    |   |            |
| <b>7</b>                      | <b>CHANGE<br/>"PUSH"<br/>TO SELECT</b> | One-knob control (all Auto-Ohm menus and selections are controlled by this one control knob). <i>Turning this control knob scrolls through different menu options</i> (shown on an LCD), which display. <i>Pressing the knob selects</i> the displayed function, usually producing a new menu of selectable options. See Figure 12.0 for a summary of the step-by-step operating procedures.   |                  |               |   |    |   |    |   |            |
| <b>9 &amp; 10</b>             | (resistor symbol)                      | Voltage-sensing connector jacks (red).   |                  |               |   |    |   |    |   |            |

# AUTO-OHM 100/200 Series 2 Operating Procedures

## 4.0 OPERATING VOLTAGES

The Auto-Ohm operates on voltages between 100-240Vac, 50/60Hz.

## 5.0 CABLE CONNECTION

The Auto-Ohm is supplied with 30-foot test cables with heavy-duty alligator clamps. Both the current (#1 AWG) and sense leads are combined into one cable (Figure 1.0). A typical cable connection for the Auto-Ohm to a device under test (using the combined test leads) is shown in Figure 9.0 and Figure 11.0. Figure 8.0 and Figure 10.0 which illustrate the connection using separate current and sense leads.

To protect the Auto-Ohm against static discharge in the substation, always connect the unit's ground stud to the substation ground. It is also highly recommended to ground one side of the circuit breaker bushing during test to eliminate any static discharge to the Auto-Ohm.

### NOTE

*The sense input is not polarity sensitive. The sense cables may be connected to either input without affecting circuit operation.*

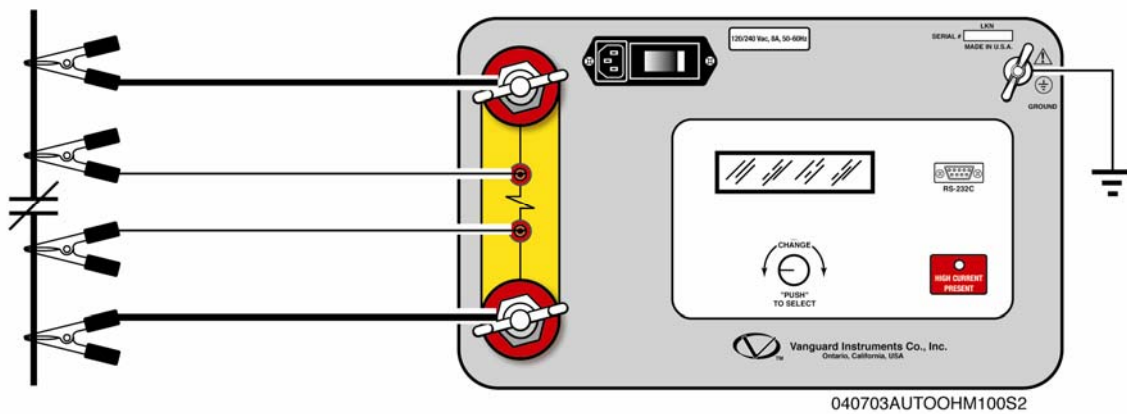


Figure 8.0 AUTO-OHM 100/200 Connection Diagram 1 (Separate Leads)

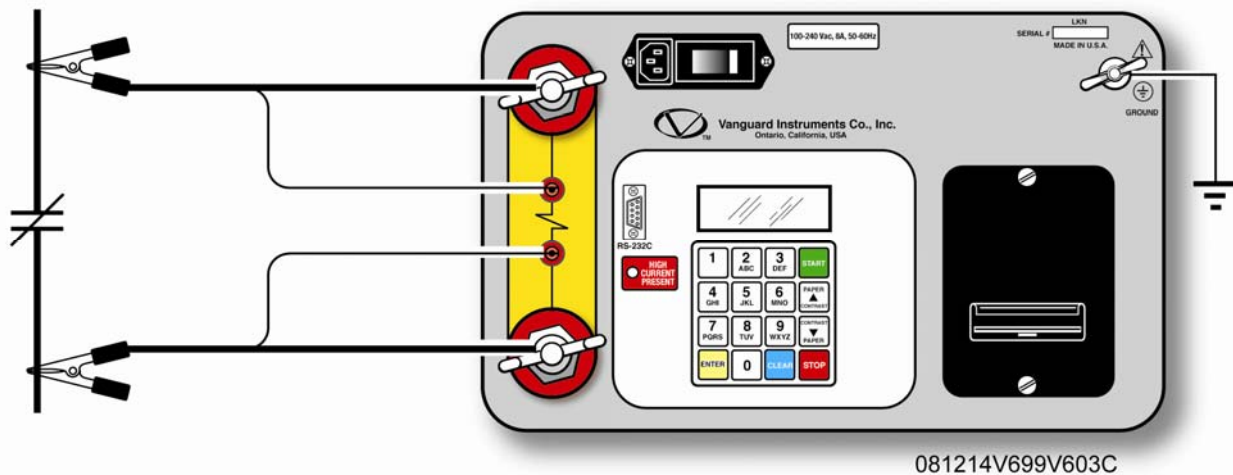


Figure 9.0 AUTO-OHM 100/200 Connection Diagram 2 (Combined Leads)



# AUTO-OHM 100/200 Series 2 Operating Procedures

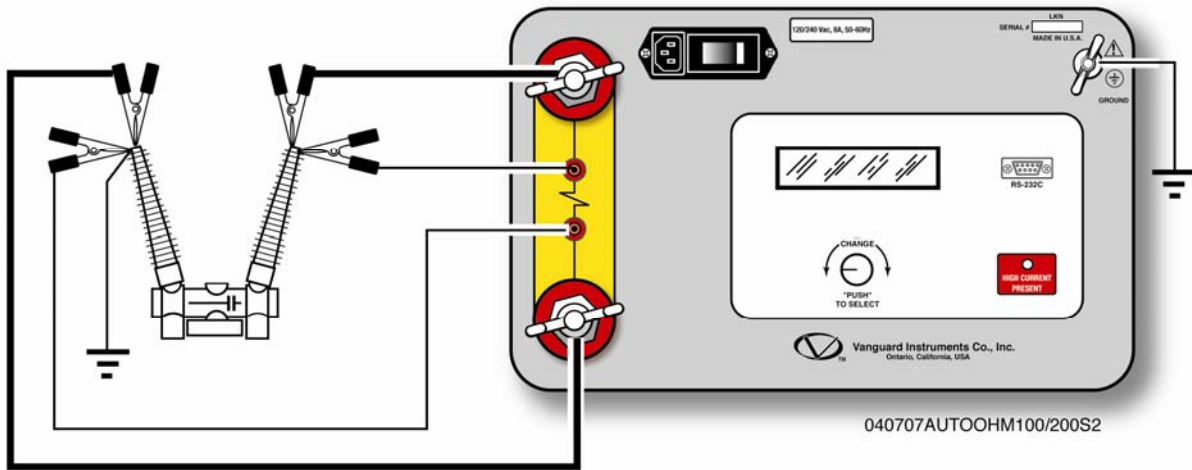


Figure 10.0 AUTO-OHM 100/200 Connection Diagram 3 (Separate Leads)

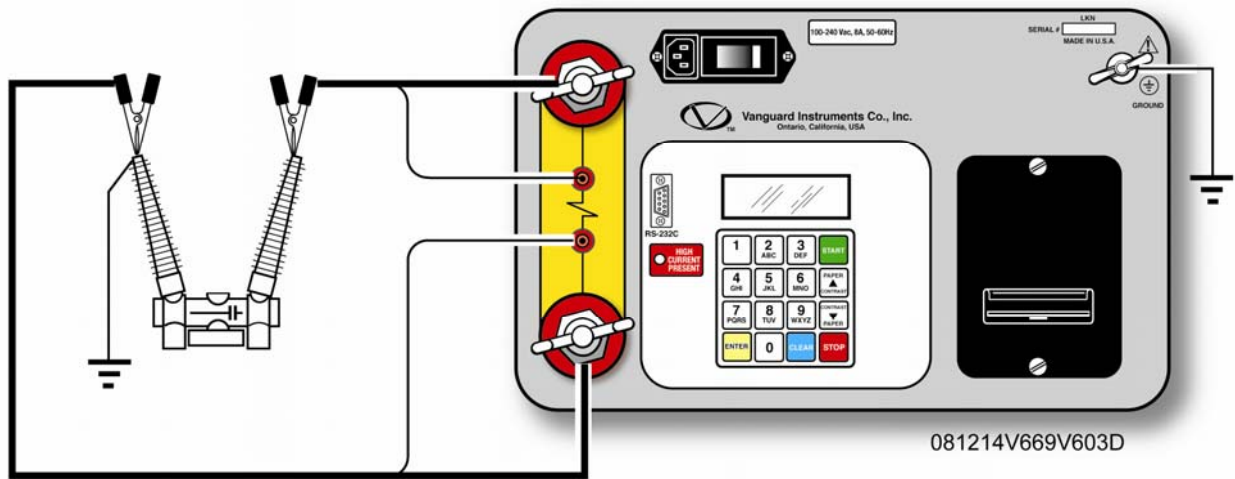


Figure 11.0 AUTO-OHM 100/200 Connection Diagram 4 (Combined Leads)

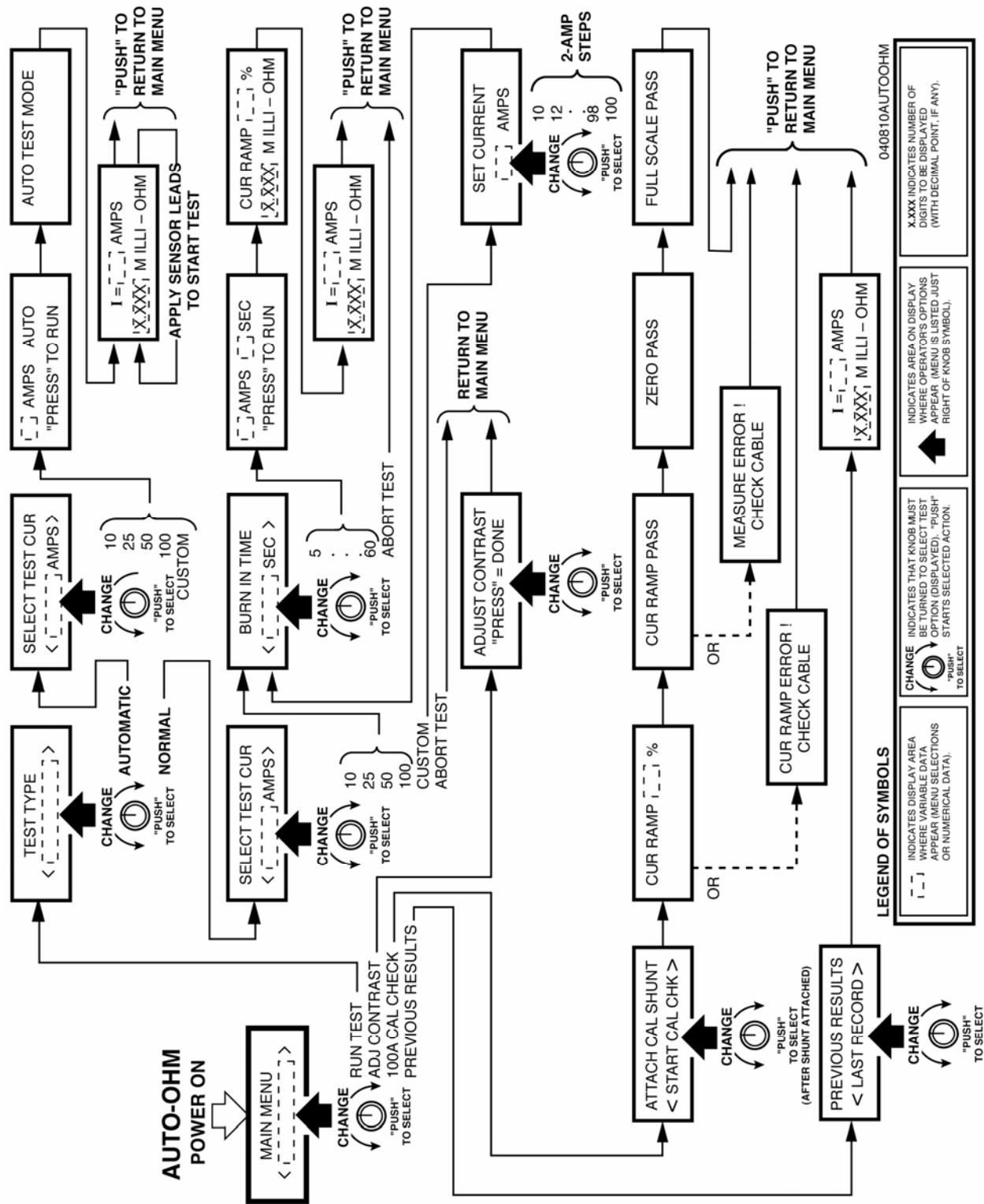


Figure 12.0 Step-by-Step Procedures for Auto-Ohm Operation

### 6.0 OPERATING THE AUTO-OHM

The Auto-Ohm is operated with one dual-function control knob. The operator turns the control knob to scroll through different menu selections on the display. When the desired option appears, it is selected by pressing the control knob like a pushbutton. Review Figure 12.0 before proceeding with the step-by-step procedures that follow.

#### 6.1 Step-by-Step Procedures

The following sections present step-by-step procedures for the operation of the Auto-Ohm 100 and Auto-Ohm 200 Series 2.

#### 6.2 Precautions

Do not measure the resistance of inductive devices. This can generate unsafe high-voltage spikes (created by a collapsing magnetic field) if the test current is interrupted by detaching a test lead during a test. Do not touch or disconnect any test lead that is connected to a device under test while current is being conducted. **Failure to heed this warning can result injury to the user and/or damage to the Auto-Ohm.** The Auto-Ohm measures low, non-inductive resistances (e.g., breaker contacts and bus-bar junctions). If the resistance of an inductive device needs to be measured, then the use of an instrument designed for that purpose is recommended (such as the WRM made by the Vanguard Instruments Company).

#### 6.3 Preparations

- a. Ground Auto-Ohm to Substation ground.
- b. Plug the Auto-Ohm power cable into a power outlet.
- c. Connect current-cable lugs and voltage-sensing cable plugs to control-panel (Figure 6.0 and Figure 7.0).
- d. Attach current test-cable clamps to opposite terminals of the resistive load being tested (Figure 8.0 to Figure 11.0).
- e. If separate cables are used, attach voltage-sensing clamps to the terminals of the resistive load. Sensing voltage clamps should be inside the current clamps.
- f. To turn on Auto-Ohm power, press the rocker switch to ON.

#### **NOTE**

*All Auto-Ohm operations begin at the MAIN MENU, which appears after the initial boot-up (after configuration and software revision data display briefly.) The Main Menu display is shown below.*



**Figure 13.0 Main Menu**

- g. The main menu displays a list of four options, which appear in sequence as the control knob is turned. The four options of the **MAIN MENU** list are **RUN TEST**, **ADJ CONTRAST**, **100A CAL. CHECK**, and **PREVIOUS RESULTS**.

**h.** When the option of choice appears in the **MAIN MENU**, press (or “Push”) the control knob to enter the selection and start that sequence. The step-by-step operating procedures to follow describe each of the selected options in the order listed above.

### 6.4 Running a Normal Test Procedure

To run a test, *turn the control knob* until **RUN TEST** appears on the display, *then press the control knob* to begin the procedures for running a test.

The **TEST TYPE** menu allows the user to select **NORMAL** Test or **AUTOMATIC** Test mode. **NORMAL** test mode allows the user to select test current, ramp time, and burn-in time. Press the control knob when the Auto-Ohm displays <NORMAL> under the **TEST TYPE** menu.

A rectangular box with a black border containing the text "TEST TYPE" on the top line and "<NORMAL>" on the bottom line, both in bold, uppercase letters.

**Figure 14.0 Test Type Menu <NORMAL>**

The **SELECT TEST CUR** (current) menu will now appear on the Auto-Ohm’s display.

A rectangular box with a black border containing the text "SELECT TEST CUR" on the top line and "<10 AMPS>" on the bottom line, both in bold, uppercase letters.

**Figure 15.0 Select 10A Menu**

**a.** This screen prompts the user to select the desired test current. Test current options are 10, 25, 50, and 100 Amp (for Auto-Ohm 100) or 10, 25, 50, 100, and 200 Amp (for Auto-Ohm 200), **CUSTOM**, and **ABORT TEST**. Select the desired test current option by turning the control knob until the proper current level displays, then press the knob to enter that choice (in which case go to step d). If a smaller increment of current is desired, select **CUSTOM** (Figure 16.0) and press the control knob and go to the next step.

A rectangular box with a black border containing the text "SELECT TEST CUR" on the top line and "<CUSTOM>" on the bottom line, both in bold, uppercase letters.

**Figure 16.0 Select Custom Current Menu**

**b.** This menu allows the user to select any test current from 10 to 100 amperes (200 amperes for Auto-Ohm 200) in 2 amperes steps.

A rectangular box with a black border containing the text "SET CURRENT:" on the top line and "50 AMPS" on the bottom line, both in bold, uppercase letters.

**Figure 17.0 Custom Current Menu**

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c. Custom current is defaulted to 50 amperes for the Auto-Ohm 100 (100A for Auto-Ohm 200) in this menu. Turning the control knob clockwise or counter-clockwise will increment or decrement the current reading on the display. Turn the control knob until the desired current is displayed, then press the control knob to enter the desired current. The display will now show the **BURN IN TIME** menu (Figure 18.0).

### NOTE

*Selecting ABORT TEST causes the display to return to the Main Menu without making any selections.*



**BURN IN TIME**  
**<5 SEC>**

**Figure 18.0 The BURN-IN TIME Menu**

d. This menu selects the amount of time the burn-in current will be run through the test load before its resistance is measured. Burn-in time range is from 5 to 60 seconds (in 5-second steps). *The default burn-in time is set for 5 seconds.* Turn the control knob until the desired burn-in time appears in the display, then press the control knob to enter that time. Go to the next step.



**RAMP TIME:**  
**< 5 SEC>**

**Figure 19.0 The RAMP TIME Menu**

e. The display above shows the ramp time. The ramp time range is 5 to 30 seconds. Turn the control knob until the desired ramp time appears in the display, then press the control knob to select that time. Go to the next step.



**50 AMPS      5 SEC**  
**"PRESS" TO RUN**

**Figure 20.0 Test Current & Burn-In Time**

f. The display above shows the current and time that have been selected. If these are the intended current and time, press the control knob to accept the selections and begin the burn-in and measurement sequence. Go to the next step. Turning the knob in either direction will return the display to the **MAIN MENU**.



**CUR RAMP: 20%**

**Figure 21.0 Current Ramp Message**

g. The display above shows the current ramp percentage of the test-level current. The Auto-Ohm will ramp the test current from 0 (zero) amperes to the selected test current level in the selected ramp time. The test current is automatically ramped up and down. This current ramp rate is programmable from 5 seconds to 30 seconds. When the current reaches 100%, the next display (shown in Figure 22.0) appears automatically. This display shows the resistance reading and the remaining burn-time of the test.



Figure 22.0 The BURNING IN Menu

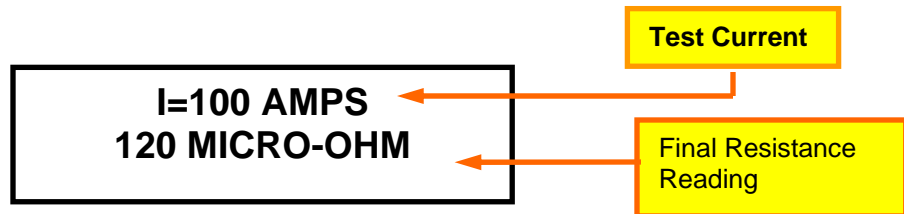


Figure 23.0 Test Current & Resistance Readings

h. The Auto-Ohm then ramps the test current back to zero. Figure 23.0 shows the final resistance measurement and the test current at which the resistance was measured. After the result is examined, press or turn the control knob for the **REPEAT TEST** menu.

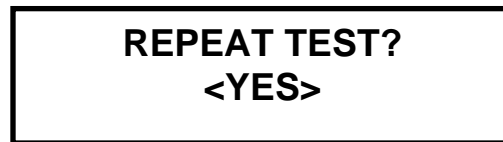


Figure 24.0 The REPEAT TEST Menu

i. To repeat the test, press then release the control knob. The Auto-Ohm repeats the test using the same test current, ramp time, and burn-in time settings.

To exit this test mode, turn the control knob to select <NO>. Press the control knob to return to the **MAIN MENU**.

From the Main Menu another test can be run. If all tests have been completed, turn off power to the Auto-Ohm, disconnect test leads and power cable, and stow them. This completes the procedure for performing the **NORMAL** test procedure.

### NOTE

*A **CABLE ERROR** message will be displayed on the Auto-Ohm LCD if the current cables or sense cables are not connected as shown in Figure 8.0 to Figure 11.0.*



Figure 25.0 Cable Error Message

### 6.5 Running an Automatic Test Procedure

The **TEST TYPE** menu allows the user to select the Normal or Automatic test mode. In the Automatic test mode the user selects the test current and ramp time. The measurement cycle is initiated when the sense leads are connected to the device under test. This feature is handy when the user wants to take resistance readings of multiple points.

To use the Automatic Test Mode the user must connect the current cables outside the two points where the measurement is to be made. The Auto-Ohm is then placed in the Automatic Test mode. The test will start as soon as the sense cables are connected to the two points of interest. The Auto-Ohm test current will ramp from zero to the selected test current. After a five second burn-in time, the Auto-Ohm current is ramped back to zero. The resistance reading is then displayed on the LCD. To start a new test, disconnect, then reconnect the sense leads between the same or two new points of interest.

#### **NOTE**

- *Current cables should be connected across the resistive load to establish the current path. Removing and reconnecting one or both sense cables starts a new test.*
- *Hand spikes (see Figure 3.0) are designed specifically for this application.*

To select the Automatic mode, turn the control knob in the **TEST TYPE** menu until **<AUTOMATIC>** menu is displayed (Figure 26.0). Press the control knob to select the Automatic test mode.



**Figure 26.0 Test Type Menu <AUTOMATIC>**

The **SELECT TEST CUR** (current) menu will now appear on the Auto-Ohm's display.



**Figure 27.0 Select 10A Menu**

**a.** This screen prompts the user to select the desired test current. Test current options are: 10, 25, 50, 100 Amp (for Auto-Ohm 100) or 10, 25, 50, 100, 200 Amp (for Auto-Ohm 200), CUSTOM, and ABORT TEST. Select the desired test current option by turning the control knob until the proper current level displays, then press the knob to enter that choice (in which case, go to step d). If a smaller increment of current is desired, select **<CUSTOM>** (Figure 28.0), press the control knob and go to the next step.



**Figure 28.0 Select Custom Current Menu**

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b. This menu allows the user to select any test current from 10 to 100 amperes (or 200 amperes for Auto-Ohm 200) in 2 amperes steps.



SET CURRENT:  
50 AMPS

**Figure 29.0 Custom Current Menu**

c. Custom current is defaulted to 50AMPS for the Auto-Ohm 100 (100A for Auto-Ohm 200) in this menu. Turning the control knob clockwise or counter-clockwise will increment or decrement the current reading on the display. Turn the control knob until the desired current is displayed, then press the control knob to enter the desired current. The **RAMP TIME** menu (Figure 30.0) will appear.



RAMP TIME:  
<5 SEC>

**Figure 30.0 The Ramp Time Menu**

d. The display above shows the Ramp Time. The Ramp Time range is 5 to 30 seconds. Turn the control knob until the desired ramp time appears in the display, then press the control knob to select that time. Go to the next step.



50 AMPS      AUTO  
"PRESS" TO RUN

**Figure 31.0 Select 50 Amperes Menu**

e. The display above (Figure 31.0) shows the selected test current. Press the control knob to start the AUTO TEST mode (Figure 32.0).



AUTO TEST MODE

**Figure 32.0 Auto Test Mode Menu**

f. The Auto-ohm is ready to start testing when the Auto Test Mode menu shown above is displayed. To start testing, connect the sense leads across the device under test. The test current is gradually ramped up and down with a 5 second burn-in test time. Test results will be displayed as shown in Figure 33.0 below.



**I=10 AMPS  
101.0 MICRO-OHM**

**Figure 33.0 Automatic Mode Test results**

g. To initiate another test, disconnect and reconnect the sense leads to the device under test. To terminate the Automatic Test Mode, press the Auto-Ohm control knob.

**NOTE**

*The user should allow two seconds between disconnecting and reconnecting to the test leads to initiate a new test.*

**6.6 Auto-Ohm Quick Test Procedure**

The Auto-Ohm Quick Test mode is a preset test that runs a test at 100 Amps for 5 seconds. To start a quick test, go to the **RUN TEST** option in the **MAIN MENU**. Press and hold the control knob for 2 seconds. A short beep will be heard at which point the knob must be quickly released. The Auto-Ohm will beep twice to acknowledge the quick test command has been accepted. Press then release the control knob again to initiate the test. The Auto-Ohm will run a 100A test with a 5-second burn in time (Figure 34.0). The displayed test result will resemble Figure 33.0.

**100 AMPS    5 SEC  
"PRESS" TO RUN**

**Figure 34.0 Quick Test Menu**

**6.7 Contrast Adjustment**

The purpose of this procedure is to adjust the darkness level of the alpha-numeric characters shown in the LCD display, in order to produce the best readability for the ambient light in the testing area. To adjust the contrast, turn the control knob to select the **ADJ. CONTRAST** option from the **MAIN MENU** as shown in **Figure 35.0**.

**MAIN MENU  
<ADJ. CONTRAST>**

**Figure 35.0 Select Adjust Contrast Menu**

a. Press the control knob to select **ADJ. CONTRAST** mode. The following menu (Figure 36.0) will be shown.

**ADJUST CONTRAST  
"PRESS" = DONE**

**Figure 36.0 Contrast Menu**

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b. Turn the control knob until the contrast is suitable. Press the control knob to set the contrast. The display will return to the **MAIN MENU**. The contrast setting will be recalled each time the Auto-Ohm is turned on and remain until it is changed again using this procedure.

### 6.8 Auto-Ohm Calibration Check

The purpose of the Calibration Check is to verify that the Auto-Ohm is operating within acceptable specifications by running a functional check on the Auto-Ohm electronics.

To run a Calibration Check, turn the control knob to select the **100A CAL CHECK** option from the **MAIN MENU** (see Figure 37.0).



Figure 37.0 100A Cal Check

a. Press the control knob to begin the calibration check. The following display will appear.



Figure 38.0 Attach Short Bar Prompt

b. Attach the test leads to a piece of aluminum or copper bar (several inches apart, the spacing is not critical, since this is a functional check). See Figure 39.0 and Figure 40.0 below for a connection illustration. Press the control knob to start the test.

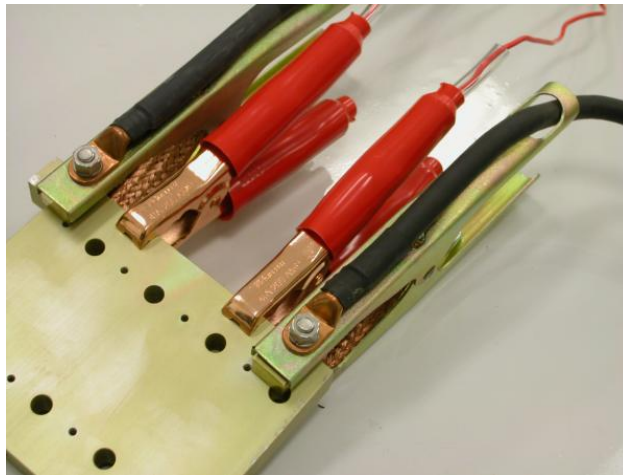
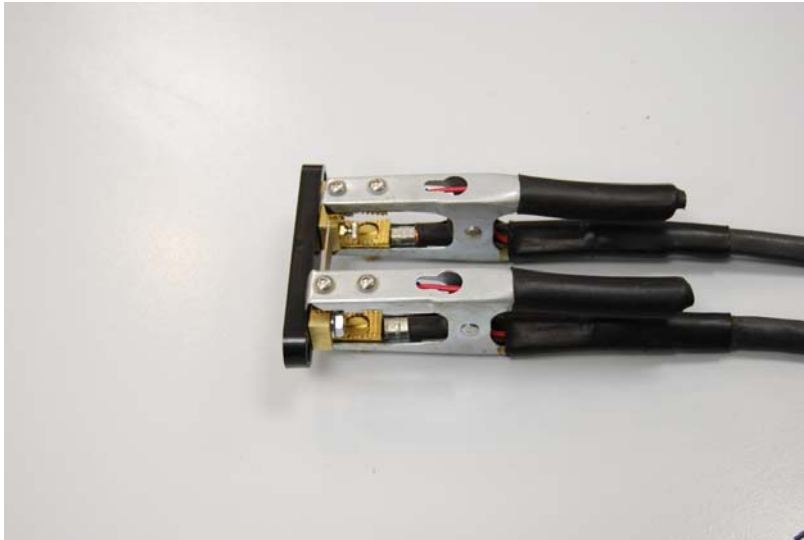


Figure 39.0 Calibration Connection (Separate Leads)



**Figure 40.0 Calibration Connection (Combined Leads)**

c. During the calibration check the display below (Figure 41.0) shows the current ramping status. When the test current ramps to 100 %, this display is automatically replaced with the test result display of Figure 42.0 or Figure 43.0.

**CUR RAMP: 20%**

**Figure 41.0 Current Ramp Message**

**CUR RAMP ERROR!  
CHECK CABLES**

**Figure 42.0 Current-Ramp Error Message**

d. If the current did not ramp properly (test failed) the **CUR RAMP ERROR** display above (Figure 42.0) will appear. Press the control knob to abort the test (restart the **CAL CHECK** when the problem is corrected).

**CURRENT RAMP CKT  
"PASS"**

**Figure 43.0 Current Ramp Circuit Pass Message**

e. The above status display indicates that the current ramped properly. The status displays of Figure 44.0 through Figure 46.0 show for about 3 seconds each as each test is performed and passed. If any test fails, the status display will stop at the failed function and indicate **"FAIL"** on

the display. The Auto-Ohm will continue to beep until the control knob is pressed. Once the problem has been fixed, the **CAL CHECK** can be rerun.

**ZERO CKT CHECK  
"PASS"**

**Figure 44.0 Zero Circuit Test Message**

f. The Auto-Ohm checks the ZERO circuit. The "PASS" message is displayed as shown above in Figure 44.0.

**FSCL CKT CHECK  
"PASS"**

**Figure 45.0 Full-Scale Circuit Test Message**

g. The full scale range check (**FSCL CKT CHECK**) is performed next. The "PASS" message is displayed as shown above in Figure 45.0.

h. The measure circuit test (**MEASURE CKT CHECK**) is performed next. The "PASS" message displays as shown below in Figure 46.0.

**MEASURE CKT CHECK  
"PASS"**

**Figure 46.0 Measure Circuit Test Message**

i. If all of the calibration functions pass, the Auto-Ohm calibration complete message appears as shown in Figure 47.0.

**CAL CHECK DONE!  
PRESS KEY.....**

**Figure 47.0 Cal Check Complete Message**

This completes the Calibration Check procedure. Press the control knob to return to the **MAIN MENU**.

### 6.9 Display Previous Results

The purpose of this procedure is to let an operator view the last 3 readings stored in the Auto-Ohm. To view previous results, turn the control knob to select the **PREV RESULTS** option from the **MAIN MENU**, as shown in Figure 48.0.



**Figure 48.0 Previous Results Menu**

a. Press the control knob to select this option. The user now can select any of the last three readings to be displayed. To select the reading, turn the control knob to one of the menus.



**Figure 49.0 Select Reading Menus**

b. When one of the prompts above displays, press the control knob to display its reading. The test results will be displayed as shown in Figure 50.0 below.



**Figure 50.0 Test Record Readout**

c. The above display shows the recorded test resistance (120.2 Micro-ohms) and the test current level (100 amps) at which it was measured. When the displayed record of resistance is reviewed and noted, press the control knob to return to the **MAIN MENU**. This ends the **PREVIOUS RESULTS** procedure.

**NOTE**

*To display previous test results, the Auto-Ohm must contain tests performed since it was last (most recently) powered on. When the Auto-Ohm is powered off, it loses all test information.*

This concludes the operating procedures for all of the Auto-Ohm functions.

**APPENDIX A**

**Auto-Ohm Troubleshooting Guide**

| <b>Item</b> | <b>Symptom</b>                | <b>Possible Problem</b>   | <b>Solution</b>  |
|-------------|-------------------------------|---|--|
| <b>1</b>    | <b>Reading is incorrect.</b>  | <b>1. Poor connection at the test clamps.</b>   | <b>1. Check connections to ensure teeth of voltage-sensing and current clamps are firmly in contact with the device under test.</b>    |
| <b>2</b>    | <b>“Cable Error” Message.</b> | <b>1. No test current going through the device under test.<br/>2. Sensing cables problem.</b> | <b>1. Check current cable Connection to the device under test.<br/>2. Check sensing cable connection.<br/>3. Run Calibration Test.</b> |



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