

1.0 INTRODUCTION

1.1 Applicability

This manual applies to Series II of the Model Auto-Ohm™ (hereafter, Auto-Ohm), identified by Part Number VIC-60000-S2 made by Vanguard Instruments Company. A separate manual applies to Series I (the first design configuration) of the Auto-Ohm.

1.2 Supersedure Notice

This Operator's manual is the basic issue for Series II Auto-Ohm and does not supersede any previously published manual.

1.3 General Description

The Auto-Ohm micro-ohmmeter is made by Vanguard Instruments Company and features microprocessor-control for measuring very low resistances ranging from 1 micro-ohm to 300 milliohms with high accuracy. The Auto-Ohm is field-portable, rugged, and is easily operated by first-time users having little or no training; it features a 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 what it is to do and how the test results are to be presented. The Auto-Ohm stores the last 3 resistance measurements, which can be displayed during test.

1.4 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 read by a precision voltmeter, the resistance read-out is a direct function of the voltage being measured. The voltage is read directly as resistance (translated and displayed on a digital readout). The dc test current is selectable in 2-amp steps, from 10 to 100 amperes. Test current is gradually ramped up and down (automatic function), which virtually eliminates magnetically induced transients through the circuit-breaker current transformers. ***The risk of inductively tripping a circuit breaker (bus differential relay) is virtually non-existent.*** The Auto-Ohm performs all of these functions in one simple process. Voltmeter test leads run separately from the current-bearing test leads to the resistive load; thus, voltages are measured at the terminals of the resistance being tested, eliminating any $I \cdot R$ voltage drop error in the current cables. The Auto-Ohm test voltage is supplied by a DC power supply. A precisely regulated constant-current source ensures measured voltage is a function of the resistance alone, and not affected by current-cable resistance losses. These Auto-Ohm features make very precise micro-ohm measurements possible without having to calculate compensations for current lead resistances errors.

1.5 Furnished Test Accessories

The Auto-Ohm is supplied with one 35-foot test cable with quick disconnect test plugs at the unit end and heavy-duty alligator clamps at the test-load end. ***Heavy-duty welding-type C-clamps 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).

Auto-Ohm Operating Procedures

2.0 AUTO-OHM SPECIFICATIONS

Auto-Ohm specifications and leading particulars are listed in Table 1

Table 1. Auto-Ohm Specifications and Leading Particulars

MODEL	Auto-Ohm
PART NUMBER	VIC-60000-S2
TYPE	Special-Purpose Test Equipment, Portable, Low Resistance-Ohmmeter
CONFIGURATION	Second-generation (improved design, superseding original model)
SIZE (inches)	16.8 Wide by 12.6 High by 10.6 Deep
WEIGHT	Less than 21 pounds
RESISTANCE RANGE	1 micro-ohm to 300 milliohms
TEST CURRENT RANGE	10 Amperes to 100 Amperes, Selectable with ± 2 ampere increment
DISPLAY	Backlit LCD, 2-lines high by 16 characters Wide
ACCURACY	$\pm 1\%$ of Reading, ± 1 Count, ± 2 micro-ohms
OPERATING POWER	8 amps, 90-132 Vac or 200-230 Vac (selectable), 50/60 Hz, With 10A built in circuit breaker
UNIT PROTECTION ...	thermal-overload sensor and cutoff
INTERFACE	RS-232C Connector Port for PC Interface
ENVIRONMENT	Operating: 0°C to 55°C; Storage: -40°C to 65°C
FURNISHED ITEMS ...	One power cord, one 35-ft. test lead cable, one test-cable carrying bag
WARRANTY	One-Year Parts & Labor (Post-Warranty Service Contracts Available)

AUTO-OHM SPECIFICATIONS ARE SUBJECT TO UPGRADES AND TO BEING CHANGED WITHOUT PRIOR NOTICE.

3.0 CONTROLS and DISPLAYS

(See Figure 1 and refer to Table 2.)

The Auto-Ohm controls and displays are shown in the control-panel illustration, Figure 1. Pointing leader lines reference each item with an index number. Each index number is cross-referenced to a functional description in Table 2, 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. First-time users should also review and become familiar with the Safety Summary in the front page.

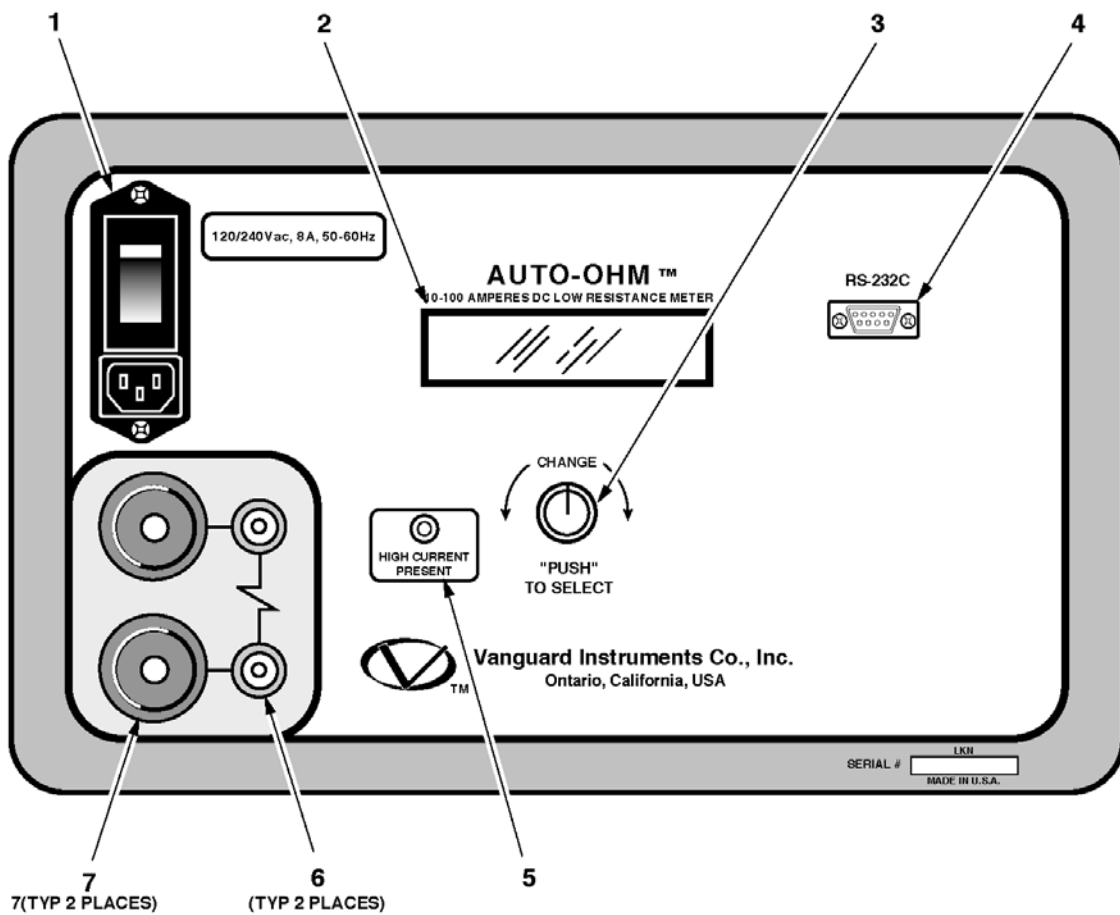


Figure 1. Auto-Ohm Control-Panel Controls and Display

Auto-Ohm Operating Procedures

Table 2. Functional Description of Auto-Ohm Controls and Display

Figure 1 Index #	Adjacent Panel Marking	Functional Description
1	120/240 Vac, 8A, 50- 60 Hz	Input power connector with third-wire safety ground and 10A built-in circuit breaker
2	no marking	LCD; 4-line by 16-character; back-lighted; Displays menus of selections, operator entries, and test-measurement results
3	CHANGE “PUSH” TO SELECT	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 2 for a summary of the step-by-step operating procedures
4	RS-232C	RS-232C interface port; 9-pin connector; female DB type. The data are set to 19,200 baud, 1 start bit, 8 data bits, and no parity bit; <u>PIN</u> <u>SIGNAL</u> 2 Rx 3 Tx 5 Signal Gnd
5	HIGH CURRENT PRESENT	LED indicator, red; Lights when high test current is going through the test leads.
6	(resistor symbol)	Voltage-sensing connector jacks (red).
7	(None)	Current lead connectors (red); Female jacks for heavy-gauge test cables, which conduct up to 100 amperes of test current.

Auto-Ohm Operating Procedures

4.0 OPERATING VOLTAGES

The Auto-Ohm operating voltages are selectable between 90-130Vac, 50/60Hz or

210-240, 50/60Hz. Voltage selection is set by jumpers on terminal block as shown on Table 3, below.

Table 3. Voltage Selection

VOLTAGE SELECTION	TERMINAL BLOCK JUMPERS
90-130Vac	Brown to blue & yellow to green
210-240Vac	Blue to yellow

5.0 CABLE CONNECTION

(See Figure 2.)

The Auto-Ohm is supplied with 35-foot test cables with quick disconnect test plug at one end and heavy-duty alligator clamps at the other end. Each test cable consists of a current-carrying cable and a voltage-sensing cable. The current-carrying cable is

terminated with a 200-ampere male plug. The sensing cable is terminated with a 25-ampere female plug. Insert current-cable plugs and voltage-sensing cable plugs into respective control-panel jacks (Figure 2). Ensure that ***voltage plugs are inserted into jacks adjacent to companion current jacks.***

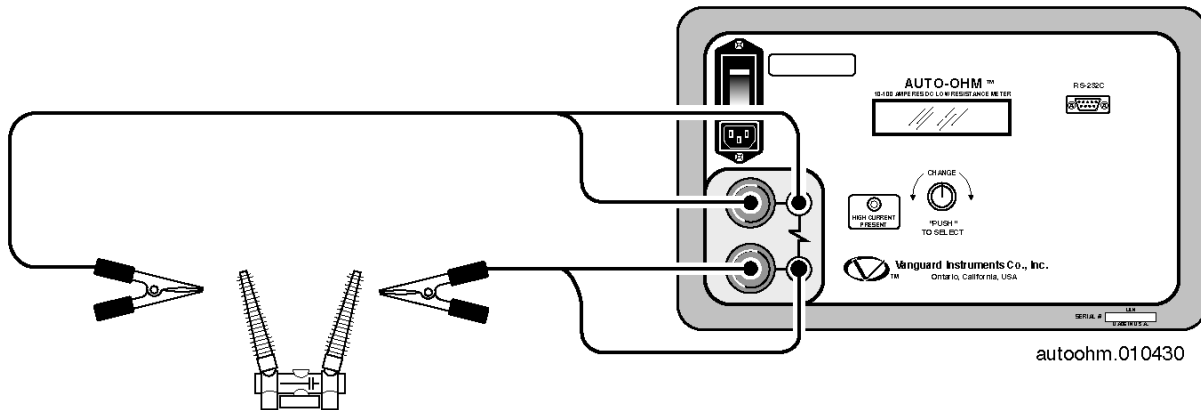


Figure 2. Typical Auto-Ohm Cable Hook-Up Diagram

Auto-Ohm Operating Procedures

6.0 OPERATING THE AUTO-OHM

(See Figure 3. for step-by-step procedures.) The Auto-Ohm is operated by just 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 simply pressing the control knob like a pushbutton. Review Figure 3 before proceeding with the step-by-step procedures that follow.

6.1 STEP-BY-STEP PROCEDURES

6.1.1 Precautions

CAUTION

Do not measure resistance of inductive devices, which can create unsafe high-voltage spikes if the test current is interrupted by a detached test lead (created by collapsing magnetic field). 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 in 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 is desired, the use of an Instruments designed for that purpose is recommended (such as the Accutrans made by the Vanguard Instruments Company).

6.1.2 Preparations

- Plug the Auto-Ohm power cable into a power outlet.
- Insert current-cable plugs and voltage-sensing cable plugs into respective control-panel jacks (Figure 2). Ensure that voltage plugs are inserted into jacks adjacent to companion current jacks.

- Attach test-cable clamps to opposite terminals of the resistive load being tested.
- To turn on Auto-Ohm power, press the rocker switch to ON (item 1 in Figure 1).

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 4. Main Menu

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

6.1.3 Run Test Procedure

The display (SELECT TEST CURRENT) will appear to the user after the user presses control knob from the RUN TEST menu, (Figure 4).



Figure 5. Select 10A Menu