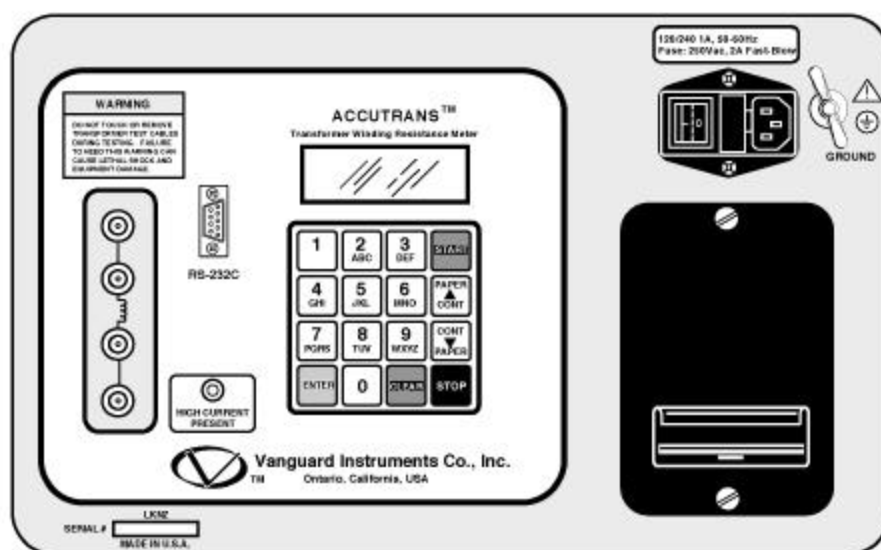


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**OPERATING INSTRUCTIONS**  
for the  
**ACCU-TRANS™**  
**TRANSFORMER-WINDING**  
**RESISTANCE METER**  
Series II  
Part Number VIC-8000-S2



**Vanguard Instruments Company**  
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**July 2001**  
**Rev 0**



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**SAFETY SUMMARY**

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The following safety precautions must be observed during all phases of test set-up, test hookups, testing, and test-lead disconnects.

**Do Not Service or Test Alone**

Do not perform test procedures or service unless another person is also present who is capable of rendering aid and resuscitation.

**Avoid Contact with High Voltage**

Because electric utility station environments contain high voltages and currents, there's always the possibility of personal contact with an unexpected lethal voltages generated by magnetically induced and/or electrostatic leakage from nearby live circuitry. When test units are connected to de-energized ("dead") lines, regardless of how short these lines may be, always discharge the lines before attaching test lead. Because of the possibly deadly consequences of physical contact with such lines, engineers and technicians must always treat electrical equipment and hookups as though a lethal condition will eventually occur. Therefore, no matter how unlikely it may be, never assume anything about the safety of any test setup.

*Ensure the safety of personal by checking first-hand to eliminate every possible hazard!*

**Avoid Contact With High-Voltage "Kicks"**

Any transformer with many windings turns and an iron core supports induced magnetic fields, such that even low-level test currents produce a magnetic field that, if interrupted,

can produce a high-voltage spike capable of causing severe injury or death. Accordingly, its important for personnel safety that test leads be securely attached to the transformer terminals to prevent their being accidentally disconnected during testing. All personnel are warned to stand clear of the transformer during all testing. Test technicians should always ensure that all non-technical personnel (who may not understand the hazards) be required to stand clear of all transformers and equipment during all phases of transformer testing.

**Do Not Modify Test Equipment**

Because of the added risk of introducing additional or unknown hazards, do not install substitute parts or perform any unauthorized modification to the Accu-Trans. To ensure all designed safety features are maintained, it is recommended that all Accu-Trans repairs be performed at Vanguard Instruments Co. or by an authorized repair-service. Unauthorized equipment modifications can create safety hazards and will void the Accu-Trans warranty.

**Follow Exact Operating Procedures**

Any deviation from the operating procedures described in this manual may create one or more safety hazards, damage the unit or cause test result errors; Vanguard Instruments Co. assumes no liability for unsafe or improper use of the Accu-Trans.



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## 1.0 INTRODUCTION

### 1.1 Applicability

This manual applies to a second-generation Accu-Trans<sup>™</sup> (Series II, henceforth, called the Accu-Trans), part number VIC-80000-S2 manufactured by the Vanguard Instruments Co. A prior manual supports a first generation Accu-Trans (i.e., a Series I configuration).

### 1.2 Supersedure Notice

This Operator's manual is the basic issue for the Accu-Trans and does not supersede any previously published manual.

### 1.3 General Description

Vanguard Instruments Company produces the Accu-Trans, a microprocessor-controlled winding resistance meter that measures low resistances of a transformer's inductive windings, in a range from 1 micro-ohm to 200 ohms with very high accuracy. This instrument can also measure any low milliohm resistance (e.g., the contact resistance of a circuit breaker).

This Accu-Trans is simple-to-use; it features keypad controls and an alpha/numeric display of the measured resistance, test current, and operator-entered test parameters and identifying data.

The Accu-Trans uses a 48-volt dc power supply and a special current-regulator to quickly measure transformer-winding resistances. *A typical single-phase 400MVA transformer winding resistance can be measured in less than 3 minutes.* To ensure operator safety, the Accu-Trans automatically discharges the energy stored in the transformer at the end of each test. A built-in thermal printer prints test results on 2.5-inch-wide thermal paper. Resistance and test current display on a 4-line by 20-character, back lighted LCD. Up to 63 records (96 readings each) can be stored in the Accu-Trans FLASH EEPROM. The user can recall stored reports for printing. A RS-232C serial interface port is provided for

diagnostic testing and down loading test records.

The Accu-Trans is field-portable, rugged; it features simple, easy operation by first-time users with little training.

### 1.4 Functional Description

The Accu-Trans'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). The value of the unknown resistance under test is the direct function of the measured voltage divided by the current and being calculated by the microprocessor. Resistance reading is then displayed on a back-lighted 4 line by 20 character LCD.

The Accu-Trans' 48V dc power supply applies up to 2 amperes test current to the device under test. Accu-Trans voltmeter test leads are run separately from the current-bearing test leads to the resistive load; thus, voltages are measured at the terminals of the resistance being measured, eliminating error from the  $I \cdot R$  voltage drop in the test current cables. The Accu-Trans makes precise micro-ohm measurements possible without calculating compensation for test-current-lead resistance errors.

A built-in discharge circuit automatically discharges the energy stored in the transformer at the end of each test.

### 1.5 Furnished Accessories

The Accu-Trans is shipped with two 45-foot test cables with "quick disconnect" type test plugs on the unit end and battery-type clamps at the test load end. One power cord, one ground cable, and a cable-carrying bag.

**2.0 ACCU-TRANS SPECIFICATIONS****Table 1. ACCU-TRANS SPECIFICATIONS**

---

<b>TYPE</b>	Special-purpose test equipment, portable, micro-ohmmeter
<b>SIZE (inches)</b>	16.8 wide by 12.6 high by 10.6 deep
<b>WEIGHT</b>	Less than 21 pounds
<b>RESISTANCE</b>	1 micro-ohm to 200 ohms
<b>TEST CURRENT</b>	2 amperes max
<b>DISPLAY</b>	LCD, back-lighted, 4-line by 20-character
<b>PRINTER</b>	2.5-inch wide thermal printer
<b>ACCURACY</b>	$\pm 1$ % reading, $\pm 1$ count
<b>POWER</b>	2 amps, 90-120 / 200-240 V ac (selectable), 50/60 Hz
<b>SERIAL INTERFACE</b>	RS-232C connector port
<b>ENVIRONMENT</b>	Operating: 0°C to 55°C; Storage: -40°C to 65°C
<b>WARRANTY</b>	One-year parts & labor (post warranty service is available)

**NOTE:**

**THE ABOVE SPECIFICATIONS ARE VALID AT NOMINAL OPERATING VOLTAGE AND AT A TEMPERATURE OF 25°C (77°F)**

**?ACCU-TRANS $\hat{O}$  SPECIFICATIONS MAY BE UPGRADED AND CHANGED WITHOUT PRIOR NOTICE.**



**3.0 CONTROLS AND INDICATORS**

(See Figure 1 and refer to Table 1.)  
 Accu-Trans controls and indicators are shown in Figure 1.0. A leader line with an index number points to each control and indicator, which is cross-referenced to a functional description in Table 2. This table describes the function of each item on the

control-panel. The purpose of the controls and indicators may seem obvious, but users should become familiar with them before using the Accu-Trans. Accidental misuse of the controls will usually cause no serious harm. Users should also be familiar with the Safety Summary found on the front page of this operator's manual.

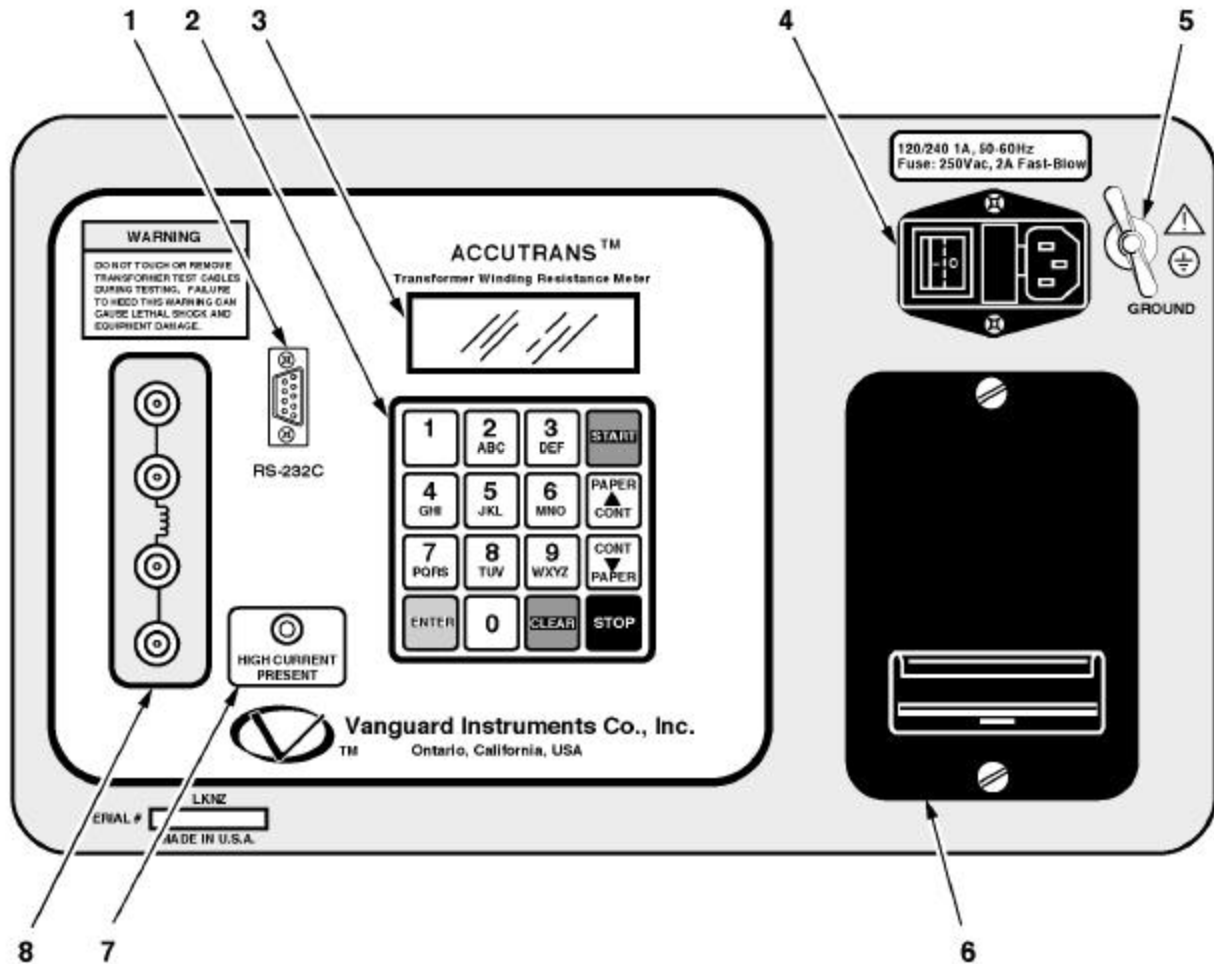


Figure 1.0 Accu-Trans Controls and Indicators

Table 1.0 Functional Descriptions of Accu-Trans Controls and Indicators

Fig. 1 Index	Panel Markings	Functional Descriptions								
1	<b>RS-232C</b>	Computer interface port; 9-pin connector; female DB type. The data are set to 19,200 baud, 1 start bit, 2 stop bits, 8 data bits, and no parity bit. <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>	<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									
2	(Not titled; 16-key pad)	Pushbutton operating controls; 10 key pad, plus START, STOP, ENTER, CLEAR, two paper-drive buttons; number keys 2 thru 9 have dual functions as letter entries (a la telephone dialer key pad).								
3	(Not titled; LCD)	Liquid-Crystal Display, 4-line by 20 character; back lighted and readable in sunlight; Displays menus, user selections, status readouts, and test results.								
4	<b>120/240 2A, 50-60 Hz Fuse: 250 Vac, 3A Slow Blow</b>	Input power connector with third-wire safety ground, ON (1)/OFF (0) rocker toggle switch; has built-in fuse protection.								
5	<b>GROUND</b>	Stud, 5/16-18 thread, with hand-turned wing nut; Safety Ground; This must be connected to station ground before connecting cables to transformer and begin testing.								
6	(Not titled; thermal printer)	Built in thermal printer; prints test results in the field on 2.5-inch-wide paper. NOTE: For best high-contrast print quality, it is recommended that only VIC thermal paper be used.								
7	<b>HIGH CURRENT PRESENT</b>	LED indicator light, red; When lighted, this indicator warns operators that there is a possibility that lethal high voltage will exist if any test lead is disconnected while current is running through an inductive load. <i>Failure to heed this warning can result in shock and/or fatal injury to personnel.</i>								
8	(Not titled; test lead jacks)	Test connector jacks, female; for connecting heavy gauge current leads and voltage-sensing test leads. Plug-in voltage plugs are not polarity sensitive, but must be plugged into the jacks adjacent to their companion current jacks.								

**4.0 PRETEST SETUP**

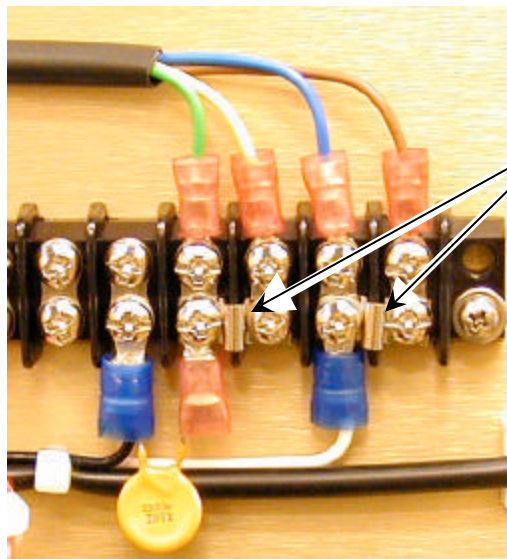
**4.1 Operating Voltages**

The Accu-Trans operating voltages are selectable between 90-130Vac, 50/60Hz or 200-240, 50/60Hz. Voltage selection is set

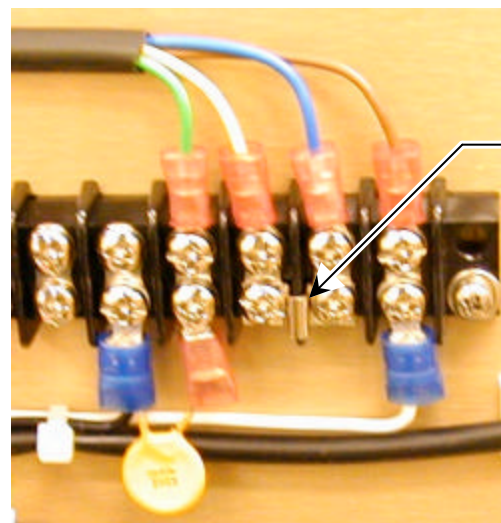
by the placement of jumpers on the power terminal block as listed in Table 2.0 below and Figures 2.0 and 3.0.

**Table 2.0 Voltage Selection**

VOLTAGE SELECTION	TERMINAL BLOCK JUMPERS
90-130Vac	Brown to Blue & Yellow to Green
200-240Vac	Blue to Yellow



**Figure 2.0 90 to 130Vac Jumper Setting**



**Figure 3.0 210 to 240Vac Jumper Setting**

#### 4.2 Accu-Trans LCD Contrast Control

To darken the LCD display, press and hold the “Paper  $\wedge$  Contrast” switch for two seconds; to lighten the LCD display, press and hold the “Paper  $\vee$  Contrast” switch for two seconds.

#### 4.3 Accu-Trans Printer Paper Control

To advance the Accu-Trans printer paper, press and release the “Paper  $\wedge$  Contrast” switch.

To retract the Accu-Trans printer paper, press and release the “Paper  $\vee$  Contrast” switch.

### 5.0 ACCU-TRANS PRINTER PAPER

The Accu-Trans built-in thermal printer uses 2.5-inch wide thermal paper for printing test results. To maintain the highest quality test-result printing and to avoid paper jamming, the use of paper supplied by our factory is highly recommended. Additional paper can be ordered from either of the two sources listed below:

Vanguard Instruments Co, Inc.  
1710 Grevillea Court  
Ontario, CA 91761  
Tel: 909-923-9390  
Fax: 909-923-9391  
Part Number: TP-3 Paper  
OR

BG Instrument Co.  
13607 E. Trent Avenue  
Spokane, WA 99216  
Tel: 509-893-9881  
Fax: 509-893-9803  
Part Number: TP-3 paper

### 6.0 OPERATING PROCEDURES

Before using the Accu-Trans for measuring any resistance, operators should review the *Summary of Step-by-Step Operation of the Accu-Trans* found in Figure 4.0. Accu-Trans operations are simple, requiring the selection of choices from the display menus and responding to the displayed prompts. However, first-time operators should review

Figure 1.0 to become familiar with the total Accu-Trans operation and the logical branching for various test options. (More experienced operators may use this figure as a handy help and reference guide.

#### WARNING

Do not touch or disconnect any test lead that is connected to a transformer terminal while high current is being conducted during any test. *Failure to heed this warning can result in lethal electrical shock to personnel and/or damage to equipment.*

#### 6.1 General Procedures

- a) Ground Accu-Trans to substation ground (item 5 in Figure 1.0).
- b) Plug Accu-Trans power cable into a power outlet.
- c) Insert current-cable plugs and voltage-sensing cable plugs into respective control-panel jacks (index 8 of Figure 1.0). Ensure that voltage plugs are plugged into jacks that are adjacent to companion current jacks.
- d) Attach test-cable clamps to transformer terminals of winding that is to be measured (or if load is not an inductance, simply attach test leads to opposite terminals of the resistive load).
- e) Turn on Accu-Trans power (item 4 in Figure 1) by pressing “I” on rocker switch.
- f) Observe that after configuration data is displayed briefly, then the start-up menu displays (with selection options for “1. RUN TEST,” “2. SETUP”).



**6.2 Step-by-Step Procedures at Start-Up Menu**

**6.2.1 START-UP Menu:**

Observe that the Start-Up menu displays as shown below:



a) Press key #1 to start test. Press #2 to select other options (i.e. enter record-identification data, recall test results, etc.)

**6.2.2 Test Transformer Procedure**

The following procedure shows the steps to get a resistance reading from a device under test.

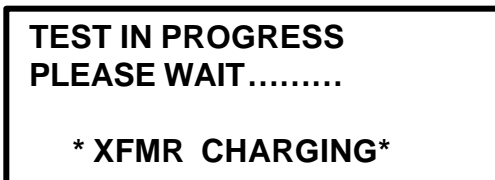
a) To start a test, press key #1 (TEST XFMR) from main menu. When the test mode is selected, a “WARNING!” display is shown below:



This warning reminds operators that the next sequence of test steps will run current through the load, which, if inductive, will cause lethal voltages to be generated if the cables are disconnected before the current is ramped down to zero.

b) Press the ENTER key and proceed to the next step. The start test display appears:

c) Press the START key to Start test. The test-in progress display appears below:



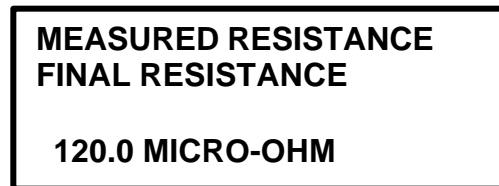
This display doesn’t prompt any action; but simply reminds the user that a test is in progress. The time for this display depends on size of the winding’s inductance and the test mode selected.

The Accu-Trans determines when the resistance reading is stable and shows resistance value on LCD as follows:

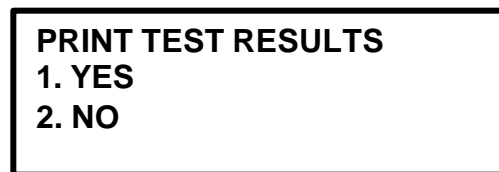


The Accu-Trans continues to apply the test voltage on the transformer’s winding and updates the resistance value on the display.

d) The user presses STOP key to retain this data and go to the next step. (If the displayed data is not O.K., press CLEAR to return to the Start-Up Menu.)



e) Press ENTER key and go to the next step. The print-option menu is now displayed.



f) Press key #1 to print test results. Typical Accu-Trans test report is shown in figure 5.

g) Select key #2 to bypass printing results.

h) When either option is selected, the next window displays with the prompt “KEEP THIS READING? Go to the next step.

**KEEP THIS READING**  
**1. YES**  
**2. NO**

i) If the KEEP THIS READING prompt is answered with a YES, the following display appears.

j) Go to step i. If NO is selected, the next display is skipped and the second display following appears.

**TEST SAVED**

The TEST SAVED display advises that the resistance measurement has been saved.

k) Press ENTER and go to the next step. “RUN ANOTHER TEST?” message will appear.

l) Select NO from “KEEP THIS RESULTS” will take the user to the “RUN ANOTHER TEST?” menu.

**RUN ANOTHER TEST?**  
**1. YES**  
**2. NO**

m) At the “RUN ANOTHER TEST?” Menu, the operator may choose to run another test, by selecting “YES”. Return to step 6.2.2.a to run test.

n) If NO is selected (i.e., don’t run another test) the program returns to the Start-Up. Menu (section 6.2.1).

### 6.3 SETUP Menu:

This menu is displayed by again selecting 2 (SETUP) on the Start-UP MENU

**1. ENTER XFMR DATA**  
**2. REVIEW RECORD**  
**3. RESTORE RECORD**  
**4. NEXT PAGE**

a) Select key 1 to 4. When key #4 (NEXT PAGE) is selected, More choices for setup menu are shown (below).

**1. COMPUTER CONTROL**  
**2. SET TIME**  
**3. ENABLE TEST MODE**  
**4. VOLTAGE REG. TEST**

REC NUMBER 1	
TEST RESULTS	
DATE: 07/07/01	TIME: 15:13:14
COMPANY: STATION: CIRCUIT: MFR: MODEL: S/N: KVA RATING: OPERATOR:	
ACTIVE TEST: 11.012 OHMS TEST CURRENT: 0.816 AMPS TAP/WINDING: _____	
ACTIVE TEST: 122.87 MILLI-OHMS TEST CURRENT: 2.000 AMPS TAP/WINDING: _____	

Figure 5.0 Typical Test Report Printout

### 6.3.1 Transformer ID Entries:

The operator can enter test data using the following procedures.

#### OPERATOR'S NOTE

Test Identification data are entered with the keypad (item 2 of Figure 1.0). The keypad has 10 keys that are alpha-numerically marked, like pushbuttons on a telephone. Keys are pressed for each character position (marked by the cursor) in the identification area; thus: If, for example, we consider the key marked 2/A B C, the first press of the key selects the number "2," pressing the key a second time selects the letter "A," pressing the key a third time selects the letter "B," and pressing the key a fourth time selects the letter "C." Further pressing of the key returns to the number selection; the cycle repeats

as the key continues to be pressed. The characters selected are entered at the position of the cursor. Pressing the up key (^) advances the cursor by one space; pressing the down key (v) moves the cursor back one space. If a character is erroneously entered, select the new key to get the correct entry.

The first Identification (ID) display is the COMPANY screen, which is shown below:

COMPANY:
----------

- a) Enter the characters of the utility company's name. When this is done, press



ENTER key and go to the next step. The STATION screen will then be displayed.

<b>STATION:</b>
-----------------

b) Enter characters for naming the station where the transformer to be tested is located. When all the characters are selected or identifying the station, press ENTER key and go to the next step. The CIRCUIT screen displays.

<b>CIRCUIT:</b>
-----------------

c) Enter all characters needed to identify the circuit name, then press ENTER key and go to the next step. The manufacturer screen displays.

<b>MANUFACTURER:</b>
----------------------

d) Enter all characters needed to identify the manufacturer of the transformer being tested, then press ENTER key and go to the next step. The MODEL screen displays.

<b>MODEL:</b>
---------------

e) Enter the characters of the transformer's model number, then press ENTER key and

go to the next step. The SERIAL NUMBER screen displays.

<b>SERIAL NUMBER:</b>
-----------------------

f) Enter the alpha-numeric characters needed to identify the serial number, then press ENTER key and go to the next step. The KVA RATING screen displays.

<b>KVA RATING:</b>
--------------------

g) Enter the numbers to identify the KVA rating for the transformer being tested, then press ENTER key and go to the next step. The OPERATOR screen displays.

<b>OPERATOR:</b>
------------------

h) Enter the characters needed to identify the operator who is performing the tests. This completes entries for the transformer identification data. Press ENTER key to enter the selected data: the program returns to the START-UP MENU.

### **6.3.2 Review Test Records Procedure**

This procedure describes steps to review a test record residing in Accu-Trans<sup>TM</sup> working memory. The user can view the record on the LCD display or from a thermal printout.

**NOTE**

To review a test record stored in Flash EEPROM, the user must first restore test record from Flash EEPROM to working memory (see paragraph 6.3.3).

These procedural steps begin by selecting SETUP on the Start-Up Menu, which displays the Set-Up Menu, shown below:

**1. ENTER XFMR ID  
2. REVIEW RECORD  
3. RESTORE RECORD  
4. NEXT PAGE**

a) In the Set-Up Menu (see above), press 2 to select the REVIEW RECORD procedure. It starts with the display shown below. Go to the next step.

**REVIEW RECORD  
1. SCROLL TEST RECORD  
2. PRINT TEST RECORD**

b) Press 1 (SCROLL TEST RECORD) to view all the test records in memory (see menu above).

c) Press 2 (PRINT TEST RECORDS) to output test record to the thermal printer. See Fig. 5.0 for typical test record printout.

d) Pressing the 1 key (SCROLL TEST RECORD) produces the RECORD "ID" INFO display. This menu displays the information related to the test.

**RECORD "ID" INFO:**

e) To scroll through the test records in memory, press the UP (^) key to roll up or

press the down (v) key to roll down, through the saved test records.

The next menu displays the number of test in the record, time and date of the test. There are 2 tests in the test record below.

**2 TESTS  
06/12/01 12:21:34**

f) Press the UP (^) key to review the resistance measured in the first test, which show in the following display.

**TEST NUMBER: 1  
ACTIVE TEST  
10.88 OHM  
AT 0.824 Amps**

g) Press the UP (^) key again to display the second test on the record as shown below:

**TEST NUMBER: 2  
ACTIVE TEST  
122.8 MILLI-OHMs  
AT 2.000 Amps**

h) When the operator has reviewed the test measurement for the selected record in the display above, press STOP to return to the Start-Up Menu. This ends the steps for reviewing saved test records.

**6.3.3 Restore Recording Procedures**

This procedure allows the user to restore a test record from the Accu-Trans Flash EEPROM to working memory. The user can then review the test record using the REVIEW RECORD command (6.3.2).

The Restore Recording Procedure steps begin at the Set-Up Menu, shown next:

1. ENTER XFMR ID
2. REVIEW RECORD
3. RESTORE RECORD
4. NEXT PAGE

**RECORD RESTORED!**

a) To begin the Restore Recording steps, press key # 3 (RESTORE RECORDING), which shows a menu for three main procedures, as displayed below. Go to next step.

The above display confirms to the operator that the selected record has been restored.

e) When the restoration is confirmed, press ENTER key to select the viewing option as shown below.

1. RESTORE RECORD
2. DIRECTORY
3. ERASE RECORDS
4. NEXT PAGE

**REVIEW RECORD**

1. SCROLL TEST RECORD
2. PRINT TEST RECORD

b) Press key # 1 (RESTORE RECORD) to begin the procedure. The next display appears. Go to the next step.

f) If the user wants to scroll through the test record, press key #1 and continue from step 6.3.2.b.

**RESTORE RECORD**

1. ENTER RECORD NUMBER
2. SCROLL TO SELECT

i) Press key # 2 will produce a test record print out on the thermal printer. See figure 5.0 for a typical test record printout.

c) Press # 1 (ENTER RECORD NUMBER) to produce the Restore Record display, as shown below. Go to next step.

#### 6.3.4 Printing Test-Record Directory

Printing the test record directory begins with the Set-Up Menu shown below (the same display from which the Review Records steps began):

**RESTORE RECORD  
NUMBER:**

1. ENTER XFMR ID
2. PREVIEW RECORD
3. RESTORE RECORD
4. NEXT PAGE

The above display prompts the operator to enter the record number.

d) When the record number is displayed, press ENTER and go to the next step. The next display will appear.

a) Press key # 3 to select the Restore Recording step sequence, and go to the next step. The following menu displays:

**1. RESTORE RECORD  
2. DIRECTORY  
3. ERASE RECORD**

b) Press key # 2 (DIRECTORY) and go to the next step. The menu below displays:

**PRINT DIRECTORY  
1. FULL DIRECTORY  
2. SHORT DIRECTORY**

c) Press key # 1 to print the entire directory of test records; Press key # 2 to print the short directory.

A short directory lists the last 20 test records stored in the Accu-Trans memory.

This ends the print directory sequence.

TEST DIRECTORY
RECORD NUMBER: 4 DATE/TIME: 08/15/01 08:25:53 NUMBER OF TESTS: 4 STATION: CIRCUIT: MFR: MODEL: S/N:
RECORD NUMBER: 3 DATE/TIME: 07/07/01 15:15:02 NUMBER OF TESTS: 4 STATION: CIRCUIT: MFR: MODEL: S/N:
RECORD NUMBER: 2 DATE/TIME: 07/07/01 15:14:00 NUMBER OF TESTS: 3 STATION: CIRCUIT: MFR: MODEL: S/N:
RECORD NUMBER: 1 DATE/TIME: 07/07/01 15:13:14 NUMBER OF TESTS: 2 STATION: CIRCUIT: MFR: MODEL: S/N:

Figure 6.0 Typical Record Directory Printout

**6.3.5. Erase Recording Procedure**

The Erase Recording sequence begins with the Set-Up Menu, shown below. Go to the next step.

**1. ENTER XFMR ID  
2. PREVIEW RECORD  
3. RESTORE RECORD  
4. NEXT PAGE**

a) Press # 3 (RESTORE RECORD) and go to the next step. The display below appears.

**1. RESTORE RECORD  
2. DIRECTORY  
3. ERASE RECORD**

b) Press # 3 (ERASE RECORD) and go to next display.

**ERASE RECORD  
1. ERASE SINGLE REC.  
2. ERASE ALL RECORDS**

c) To erase a single a record, press key # 1; to erase all records press key # 2. If a single recording is selected go to the next step; The prompt below displays. To erase all recordings go to step f.

**ERASE RECORD  
NUMBER:**

d) Enter the number of the record that is to be erased and press ENTER key. Go to the next step. The confirmation display appears as shown below:

**RECORD NUMBER  
ERASED**

e) When the erased record number is confirmed, press ENTER key to return to the start-Up Menu ending the sequence for erasing a single record.

f) When key # 2 (ERASE ALL RECORDS) is pressed in the Erase Record display (back in step c, the following prompt displays. Go to the next step.

**ERASE ALL RECORDS!  
ARE YOU SURE?  
“ENTER” TO CONTINUE**

g) Press ENTER key to erase all test records. If ERASE ALL RECORDS was mistakenly selected, press “STOP” to abort the erase process and return to the Start-Up menu. When ENTER key is pressed, the following confirmation message is displayed. Press ENTER key to return to the Start-Up Menu:

**RECORD ERASED!**

This ends the Erase Record(s) sequence.

**6.3.6 Enabling Computer Interface**

The Computer Interface Mode allows the user to retrieve test records stored in the Accu-Trans memory via the RS-232C port. An IBM PC program is provided with each Accu-Trans allowing the user using his PC to retrieve these test records.

a) This procedure begins in the Set-Up Menu, shown below. Go to the next step:

**1. ENTER XFMR ID  
2. REVIEW RECORD  
3. RESTORE RECORD  
4. NEXT PAGE**

b) Pressing key #4 (NEXT PAGE) and the menu below appears. Go to the next step.

**1. COMPUTER CONTROL  
2. SET TIME  
3. ENABLE TEST MODES**

c) Press key # 1 (COMPUTER CONTROL) and go to the next step. The display below appears:

**COMPUTER ITF MODE**

j) Pressing the STOP key terminates the computer control, at which time the Start-Up Menu displays, ending this step sequence.

**6.3.7 Setting Date and Time**

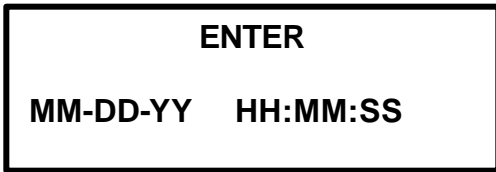
The date and time set begins at the Set-Up Menu, shown below:

**1. ENTER XFMR ID  
2. REVIEW RECORD  
3. RESTORE RECORD  
4. NEXT PAGE**

a) Begin the date and time set by pressing key # 4 (NEXT PAGE) and going to the next step. The menu below appears. Go to the next step.



b) Press key # 2 (SET TIME) and go to the next step. The display below appears:



c) Enter the date and time, which appear in the dashed-line areas, then press ENTER key to set the calendar and clock and return to the Start-UP Menu. This ends the Set Time step sequence.

**6.3.8 Enable Passive Test Mode**

Operators have a choice between two test modes: ACTIVE or PASSIVE. Normally, the ACTIVE test mode is best suited for quickly testing transformer resistances. In this mode, the Accu-Trans automatically ramps the test current up to its final test value (when the magnetic field is saturated) in the shortest possible time. However, in a very large inductive load, the ACTIVE test mode reading may appear to be unstable. In this situation, the user may want to try the PASSIVE test mode test. In this mode, the Accu-Trans will take longer to provide a reading, however, the reading is more stable.

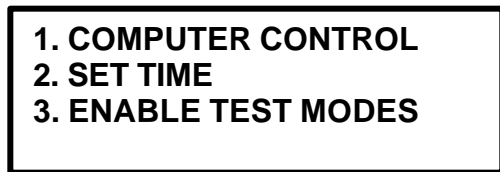
**Note**

The Accu-Trans always defaults to the ACTIVE test mode when power is first applied to the unit. The user needs to enable the PASSIVE test mode before using it.

a) This procedure begins in the Set-Up Menu, shown below. Go to the next step:



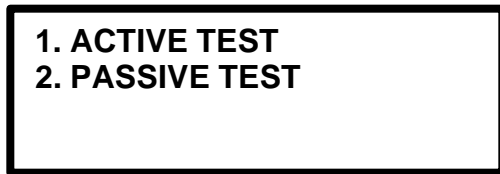
b) Pressing key #4 (NEXT PAGE) and the menu below appears:



c) Press key #3 to activate PASSIVE Test mode.

**Note**

Once the PASSIVE test mode is selected, the Accu-Trans will display the test mode selection menu (shown below) in step 6.2.2.a after the user presses key #1 (TEST XFMR).



**6.3.9 Voltage Regulator Test**

**Note**

This test verifies that a regulating switch in a primary-voltage tap regulator changes contacts through its selection range with no break in the circuit (i.e., it checks the tap switch's make-before-break). This test is important because, in actual use, any breaks in current in a regulating tap

switch generates large reactive voltage spikes that are hazardous and exceed the switch's voltage ratings, thus causing irreparable damage.

By connecting the Accu-Trans continuity test input across the switching input and running the regulator switch through all the contacts in it's range, any breaks in continuity caused by faulty tap switching are detected.

- a) To run the Voltage-Regulator test, perform the following step-by-step sequence, starting with the STARTUP MENU (see below):

**1. TEST XFMR            08/14/01**  
**2. SETUP                12:21:01**

- b) Press key #2 (SETUP) to produce the SETUP MENU (see below):

**1. ENTER XFMR ID**  
**2. REVIEW RECORD**  
**3. RESTORE RECORD**  
**4. NEXT PAGE**

- c) Press key #4 (NEXT PAGE) to produce the next menu of test options (see next display):

**1. COMPUTER CONTROL**  
**2. SET TIME**  
**3. ENABLE TEST MODES**  
**4. VOLTAGE REG. TEST**

- d) Connect Accu-Trans input to the regulating tap-switch input. Press key #4 (VOLTAGE REG. TEST) to start the regulator test (high-voltage advisory notice displays—see following):

**\*\*\*\*\*WARNING!\*\*\*\*\***  
**DANGEROUS FLASH-OVER**  
**MAY OCCUR IF CABLES**  
**ARE DISCONNECTED!**

- e) Press ENTER key for next display (see below):

**VOLTAGE REG. TEST**  
**“START” TO RUN TEST**  
**or**  
**“STOP” TO ABORT**

- f) Press START key to run the voltage regulator tap-switch test. The test begins as the magnetic field in the transformer ramps up to a stable plateau with the advisory that the transformer is charging (the red High-voltage warning indicator lights) When the transformer current stabilizes, the following prompt displays (see below):

**VOLTAGE REG. TEST**  
**CURRENT RAMP: xx %**  
**\*XFMR CHARGING\***

No operator action required; when transformer current ramps nears a flat plateau, the run tap switch prompt displays (see below):

**VOLTAGE REG. TEST**  
**RUN TAP CHANGER NOW**  
**“STOP” TO EXIT TEST**  
**XFMR CHARGING**

If no transient is detected as taps are switching, the display above will remain. Press “STOP” to end the voltage regulator test.



If a switch break is detected, an advisory displays (shown below). Press STOP to end the voltage-regulator test.

**TRANSIENT DETECTED!**

## APPENDIX A

## ACCU-TRANSÔ Troubleshooting Guide

Item	Symptom	Possible Problem	Solution
1	Reading is incorrect.	1. Poor connection at the Clips. 2. Broken sensing lead.	1. Check connection to make sure sensing and current teeth are touching the device under test (DUT). 2. Inspect sensing cables.
2	No Test Current. (Current % read zero) and resistance reading=0	1. No test current going through DUT. 2. Drive circuit not working.	1. Check Connection to DUT. 2. Run Calibration Test.
3	Have test current but resistance reading = 0.	1. Broken sense leads. 2. Reverse sense leads.	1. Inspect sense leads.

NOTE: **DUT**=Device Under Test

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