SGT-200
SAFETY GROUND TESTER

USER'S MANUAL

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SAFETY SUMMARY

FOLLOW EXACT OPERATING PROCEDURES

Any deviation from the procedures described in this user's manual may create one or more safety hazards, damage the SGT-200, or cause errors in the test results. Vanguard Instruments Co., Inc. assumes no liability for unsafe or improper use of the SGT-200. The following safety precautions must be observed during all phases of test setup, test hookups, testing, and test lead disconnection.

SAFETY WARNINGS AND CAUTIONS

The SGT-200 shall be used only by trained operators. All circuit breakers under test shall be off-line and fully isolated.

SERVICE AND REPAIR

- Do not install substitute parts or perform any unauthorized modification to any SGT-200 test unit.
- Repairs must be performed only by Vanguard Instruments Company factory personnel or by an authorized repair service provider. Unauthorized modifications can cause safety hazards and will void the manufacturer's warranty.

EQUIPMENT RATINGS

IP Rating: The enclosure for the SGT-200 has an IP rating of 32.

Pollution Degree: The SGT-200 has a pollution rating of 2.

Operating Voltage: The SGT-200 is rated for use with an operating voltage of 120V or 240V, auto-ranging ±10% of selected voltage.

Power Cord: The SGT-200 is supplied with a 16 AWG, 16A power cord with a NEMA 5-15P plug. Replacement cable shall have the same or better rating and is available through the manufacturer.

VENTILATION REQUIREMENTS

The SGT-200 must be operated with the enclosure lid open.

SAFETY SYMBOLS


Indicates that caution should be exercised


Indicates location of chassis ground terminal

CLEANING

To clean the SGT-200:

- Disconnect all cables and turn the unit off.
- Use a soft, lint-free cloth to wipe all surfaces clean.
- Avoid getting moisture in openings and connectors.
- Don't use any cleaning products or compressed air.

TABLE OF CONTENTS

LIST OF FIGURES

CONVENTIONS USED IN THIS DOCUMENT

This document uses the following conventions:

- A key, switch, or knob on the SGT-200 is indicated as **[KEY], [SWITCH], [KNOB]**.
- Menu names are referenced as "MENU NAME"
- SGT-200 screen output is shown as:

```
1. OPTION 1
2. OPTION 2
3. OPTION 3
4. OPTION 4
5. OPTION 5
```

- When instructions are provided, the menu item that should be selected is shown in **bold** (option 3 should be selected):

```
1. OPTION 1
2. OPTION 2
3. OPTION 3
4. OPTION 4
5. OPTION 5
```

- Warning messages are indicated as:

Warning message

WARNING

- Important notes are indicated as:

Note details

NOTE

1.0 INTRODUCTION

1.1 General Description and Features

The Vanguard SGT-200 Safety Ground Tester is a 200A DC micro-ohmmeter designed specifically to measure the resistance of protective in-service grounding and jumper cable assemblies. The SGT-200 can measure the resistance of the grounding cables, clamps and ferrules. The measured resistance values can be compared against the calculated values (using the ASTM 2249-03 standard) and a Pass/Fail result can be printed along with the measured resistance values.

The SGT-200 can measure resistance value from 1 micro-ohm to 1000 milliohms. A typical test requires the two ends of the safety ground cable to be connected to the terminals of the SGT-200. The resistance of the cable and ferrules can then be measured. If the cable size, cable length and temperature are provided, the SGT-200 will determine if the cables passes or fails the test and a pass/fail indicator will be printed on the test report.

Test results are printed on the unit's built-in 2.5" thermal printer. A 44-key QWERTY-style rugged membrane keypad is used to input information and control the SGT-200. A back-lit graphic LCD screen (128 x 64 pixels) is used to display menus and test results.

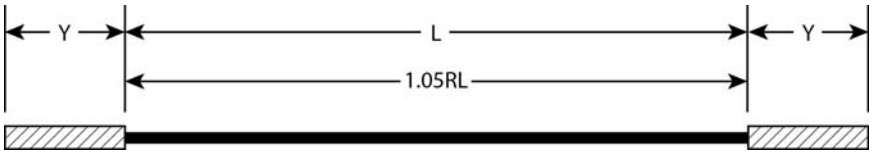
The SGT-200 can store up to 100 test records in its internal memory. It also features a USB Flash drive interface port that can be used to store test data in a USB flash drive (not included). The SGT-200 also features an RS-232C port that is used for factory diagnostics and calibration.

Test records can be reviewed and printed on a PC using the provided Vanguard VUS software.

In-Service Cable Testing

The SGT-200 measures the total resistance value of the cable under test and then compares it to the calculated value to determine the Pass or Fail result. In order to calculate the total resistance value, the user is first prompted for the cable size, cable length, and cable temperature. Total resistance (Rm) is calculated in accordance with the ASTM F2249-03 standard using the formula below:

Rm = 1.05 RL + 2Y = 1.05 RL + 320 µΩ*



Where:

Y = Resistance of clamps, ferrule, and portions of the cable inside the ferrule, in milliohms*
L = Cable length in feet (ferrule to ferrule measurement to the nearest inch)
R = Cable resistance, in milliohms/foot
*** NOTE:** The clamp and ferrule resistance value of 160 µΩ is used per the ASTM-F2249-03 standard.

The SGT-200 will calculate the maximum resistance value of the cable under test, measure the resistance value and compare this value against the limit. The resistance value and a PASS or FAIL result can be printed on the thermal printer.

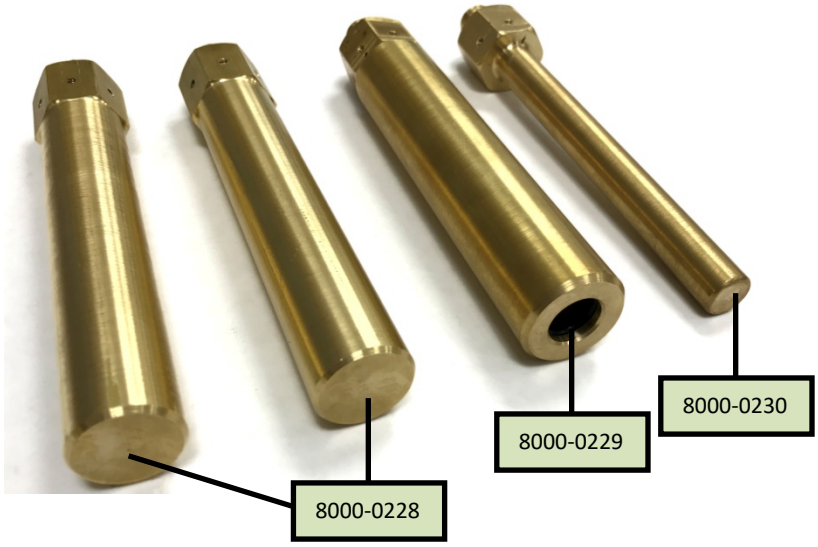
Test Cable Sizes and Length

Typical Safety Ground Cable sizes are #2, 1/0, 2/0, and 4/0. The test cable length, ranging from 1' to 50' per table 2 in the F2249-03 standard, is entered by the user. Cable size and length can be entered in either English or Metric units.

Test Record Storage

The SGT-200 can store 100 test records internally. Each test record contains test header information, test cable size, test cable length, temperature, test current, and cable resistance. Test records can also be stored on a USB flash drive via the unit's USB flash drive interface.

Included Connection Posts



Ordering Information

Part No.	*Description*
9133-UC	SGT-200 unit and cables
9133-SC	SGT-200 shipping case
8000-0228	Standard cable stud set, 1" diameter (2 pcs)
8000-0229	Elbow adapter, female, 1/2" diameter (1 pc)
8000-0230	Bushing adapter, male, 1/2" diameter (1 pc)
TP3-CS	TP3 thermal printer paper (36 rolls)

1.2 SGT-200 Technical Specifications

TYPE	Portable Micro-Ohmmeter
PHYSICAL SPECIFICATIONS	**Dimensions:** 21"W x 8"H x 14" D (53.3 cm x 20.3 cm x 35.6 cm) **Weight:** 31 lbs. (14.1 Kg)
INPUT POWER	100 – 240 Vac, 50/60 Hz
RESISTANCE READING RANGE	1 micro-ohm to 1000 milliohms (max 1.5 milliohms @ 200A, 450 milliohms @ 10A, 1000 milliohms @ 1A)
TEST CURRENT RANGE	10A – 200A (selectable in 1A steps); thermally protected DC power supply
ACCURACY	10A – 49.9A: 1% ±2 micro-ohms, 50A – 200A: 1% ±1 micro-ohm
TEST VOLTAGE	5 Vdc
DISPLAY	back-lit LCD screen (128 x 64 pixels) viewable in bright sunlight and low-light levels
KEYPAD	rugged, 44-key "QWERTY"-style membrane keypad
INTERNAL TEST RECORD STORAGE	100 test records
EXTERNAL TEST RECORD STORAGE	up to 999 test records on external USB flash drive
PC SOFTWARE	Windows®-based analysis software is included with purchase price
COMPUTER INTERFACES	one RS-232C PC interface, one USB flash drive interface
PRINTER	built-in 2.5" wide thermal printer
SAFETY	designed to meet IEC 61010 (1995), UL 61010-a, and CAS-C22.2 standards
TEMPERATURE	**Operating:** -10°C to +50°C (+15°F to +122°F) **Storage:** -30°C to +70°C (-22°F to +158°F)
HUMIDITY	90% RH @ 40°C (104°F) non-condensing
ALTITUDE	2,000 m (6,562 ft) to full safety specifications
CONNECTION POSTS	Two 2"/3" diameter posts
CABLES AND ACCESSORIES	power cord, ground cable, standard cable stud set, 1" diameter (2 pcs), elbow adapter, female, 1/2" diameter (1 pc), bushing adapter, male, 1/2" diameter (1 pc)
OPTIONS	shipping case
WARRANTY	one year on parts and labor

NOTE

The above specifications are valid at nominal operating voltage and at a temperature of 25°C (77°F). Specifications may change without prior notice.

1.3 SGT-200 Controls and Indicators

The SGT-200's controls and indicators are shown in Figure 1. The purpose of the controls and indicators may seem obvious, but users should familiarize themselves with them before using the SGT-200. Accidental misuse of the controls will usually cause no serious harm. Users should also familiarize themselves with the safety summary information found on the front page of this User's Manual.

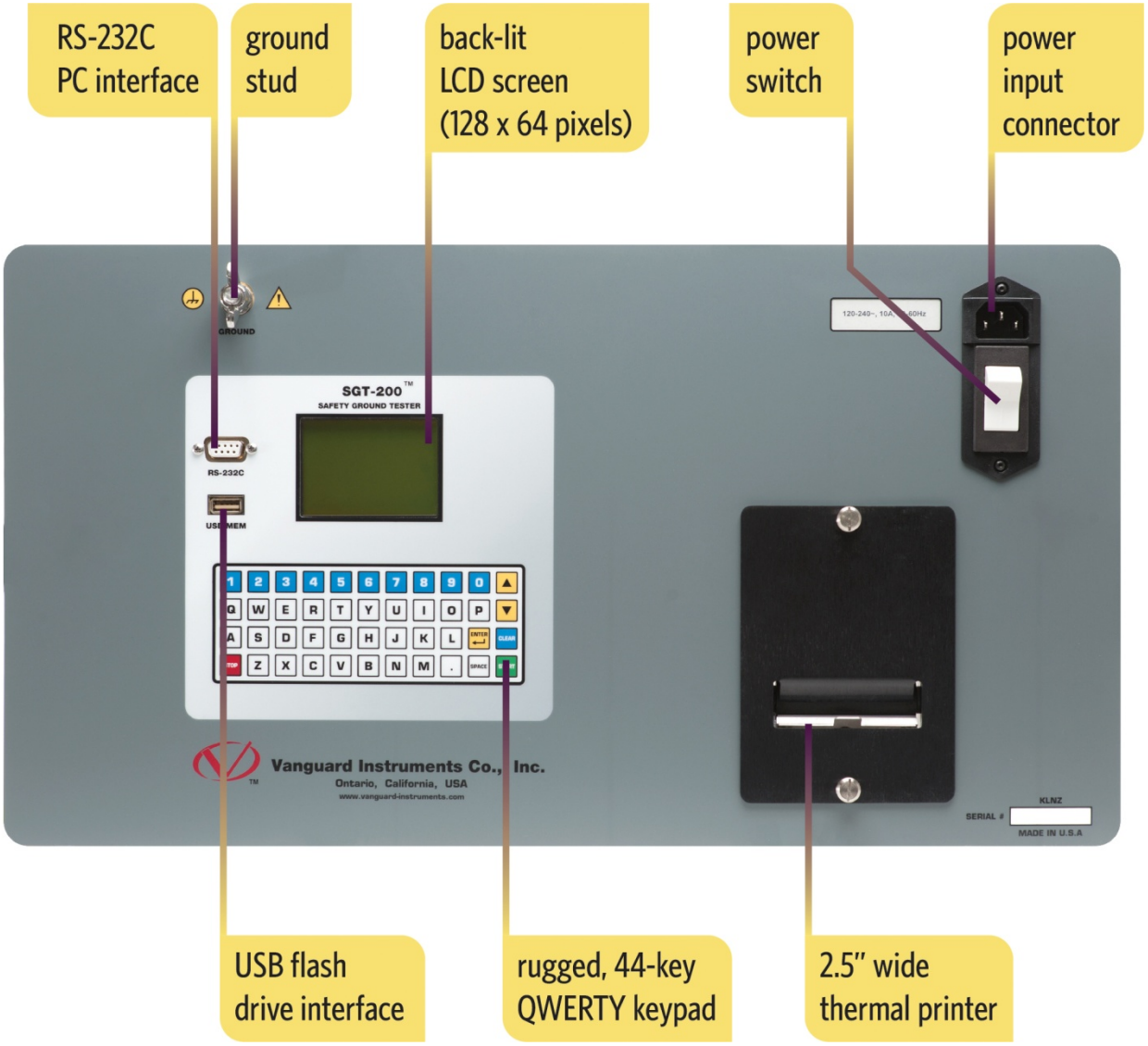


Figure 1. SGT-200 Controls and Indicators

2.0 PRE-TEST SETUP

2.1 Operating Voltages

The SGT-200 operate on voltages between 120-240 Vac, 50/60 Hz.

2.2 LCD Screen Contrast Control

To increase the LCD screen contrast, press and hold the **[▲]** key for two seconds. Release the button when the desired contrast level has been reached.

To decrease the LCD screen contrast, press and hold the **[▼]** key for two seconds. Release the button when the desired contrast level has been reached.

2.3 Safety Ground

Always ground the SGT-200 to the substation ground before connecting cables to the unit.

2.4 Printer Paper

The SGT-200's built-in thermal printer uses 2.5" wide thermal paper for printing test results. To maintain the highest print quality and to avoid paper jams, the use of thermal paper supplied by Vanguard Instruments Company is highly recommended. Additional paper can be ordered from the following sources:

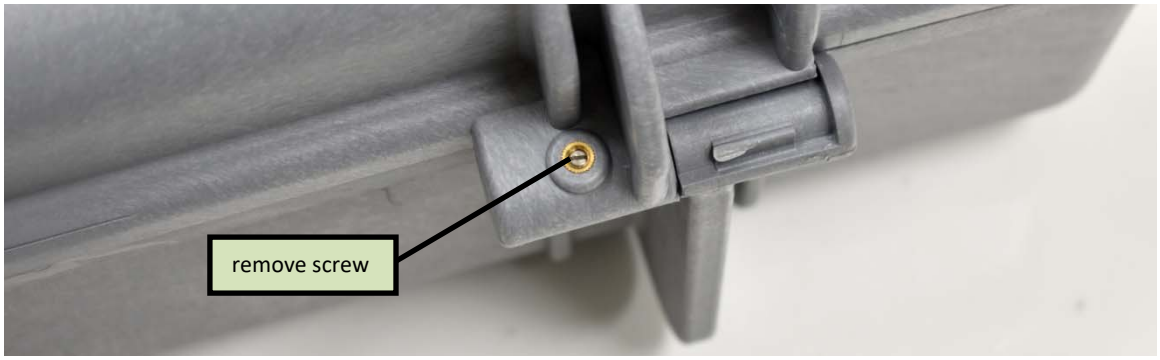
Vanguard Instruments Co, Inc.
1520 S. Hellman Avenue
Ontario, CA 91761
Tel: 909-923-9390
Fax: 909-923-9391
Part Number: TP3-CS

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

3.0 OPERATING PROCEDURESLid Removal

The SGT-200 features a lid that can be easily removed for greater convenience during testing. Follow the steps below to remove the lid:

a. Remove the set screw from the back of the left lid hinge.



b. Rotate the lid open approximately 45 degrees to align the enclosure tab with the groove in the lid hinge.

c. Slide the lid horizontally to the right.

d. Continue to slide the lid horizontally to the right to completely remove.

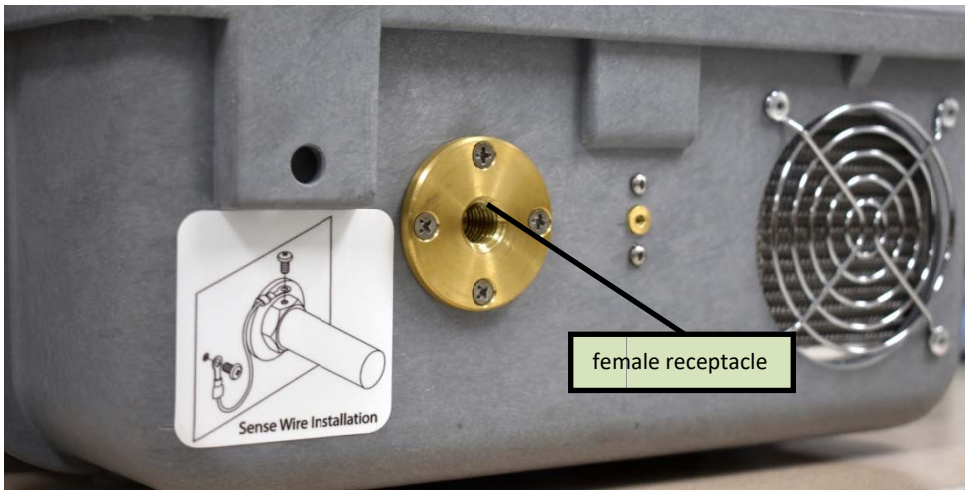
3.1 Cable Connection Post and Sense Wire Installation

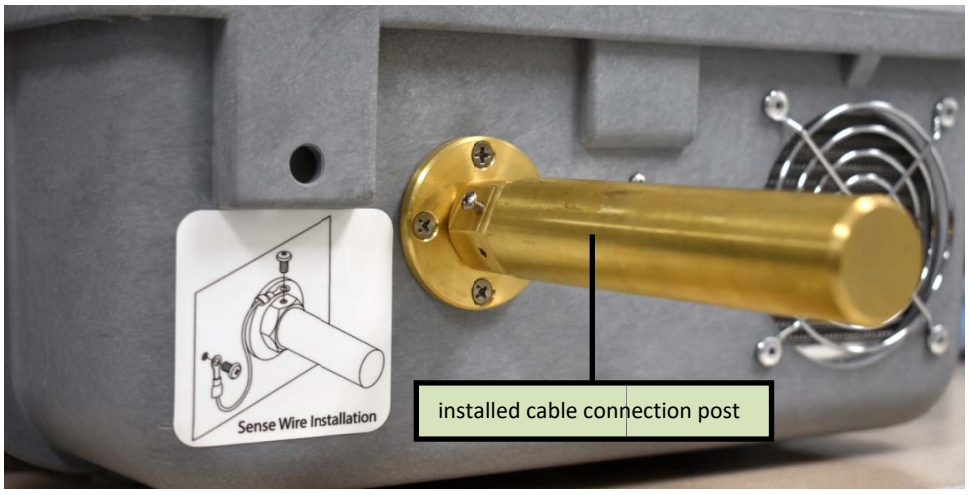
Follow the steps below to install the cable connection posts and sense wires:

a. Select the cable connection posts to be used with the test cables. Screw the connection posts into the SGT-200 female receptacles on each side of the SGT-200.

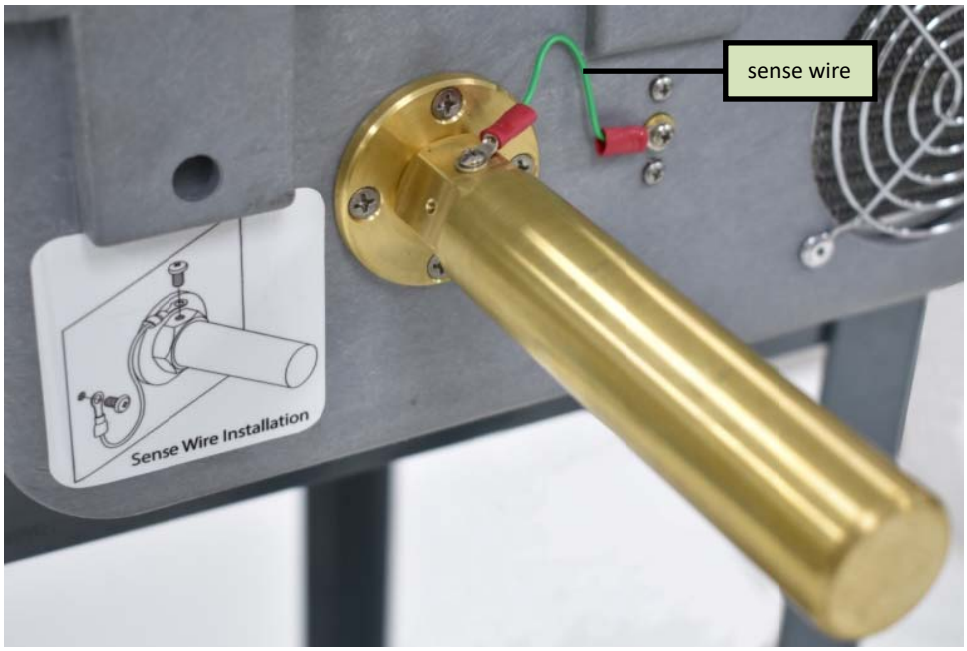
NOTE

Make sure the posts are screwed in completely and firmly. Loose connection posts will yield inaccurate test results.





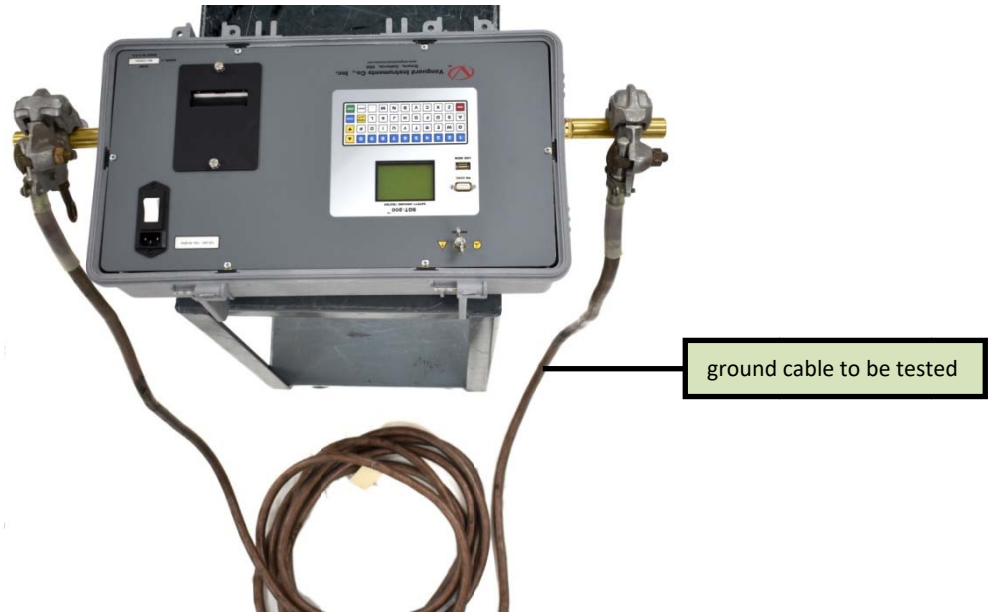
b. Connect the sense wires to the cable connection posts on both sides of the SGT-200 as shown below:



c. Connect the SGT-200 ground and power cables.

d. Connect the ground cable to be tested to the cable connection posts as shown below:

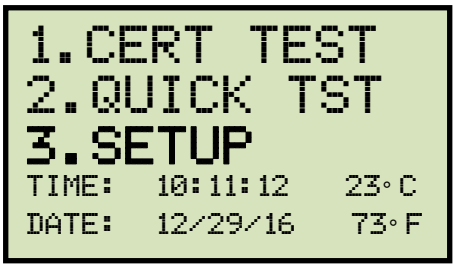
NOTE The cable does NOT need to be un-wound and can remain coiled.



3.2 Setting the Date and Time

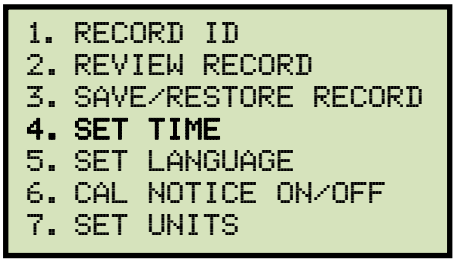
To set the date and time:

a. Start from the "START-UP" menu:



Press the **[3]** key (*SETUP*).

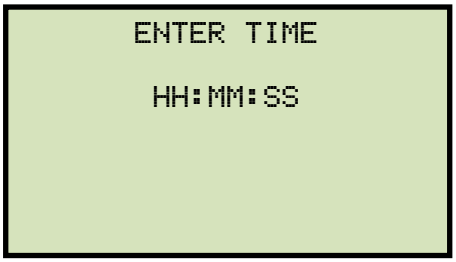
b. The following screen will be displayed:



Press the **[4]** key (*SET TIME*)

c. The following screen will be displayed:

Type in the date using the keypad. The following screen will be displayed:

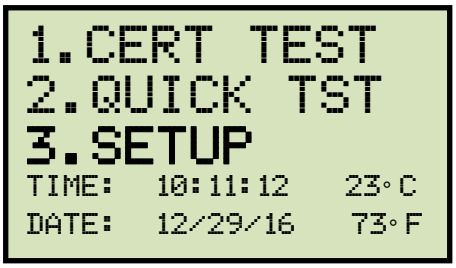


Enter the time using the keypad. When the time has been entered, you will be immediately returned to the "START-UP" menu.

3.3 Setting the Interface Language

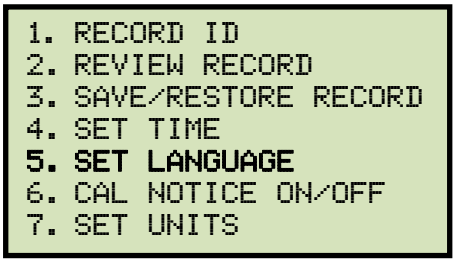
Follow the steps below to set the interface language (English):

a. Start from the "START-UP" menu:



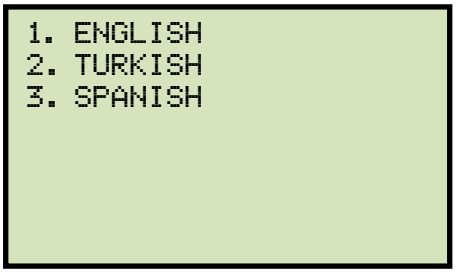
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:

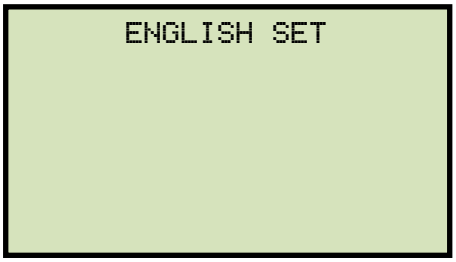


Press the **[5]** key (*SET LANGUAGE*).

c. The following screen will be displayed:



Select the preferred interface language by pressing the corresponding key on the keypad (**[1]**, **[2]**, or **[3]**). The interface language will be set and a confirmation screen will be displayed as shown below:

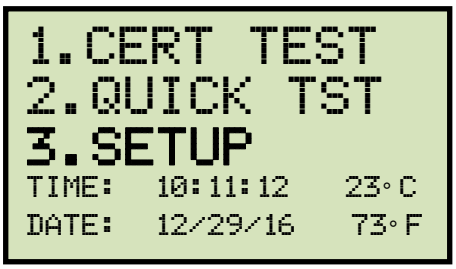


Press any key to return to the "START-UP" menu.

3.4 Setting the Option to Print the Calibration Expiration Date

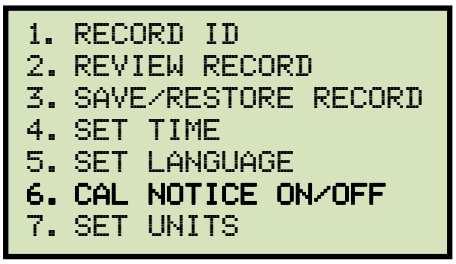
The SGT-200 can print the unit's factory calibration expiration date at the bottom of test reports if desired. Follow the steps below to configure this option:

a. Start from the "START-UP" menu:



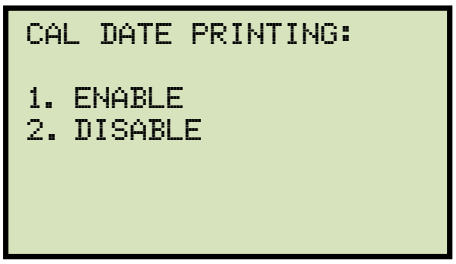
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:

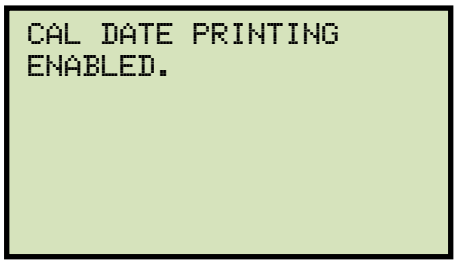


Press the **[6]** key (*CAL NOTICE ON/OFF*)

c. The following screen will be displayed:

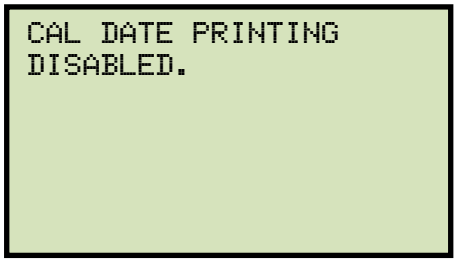


1. Press the **[1]** key to enable to option. The following screen will be displayed:



The calibration date printing option will be enabled and you will be returned to the "START-UP" menu. Figure 2 shows a sample test report with the calibration expiration date printed at the bottom.

2. Press the **[2]** key to disable the option. The following screen will be displayed:



Press any key to return to the "START-UP" menu.

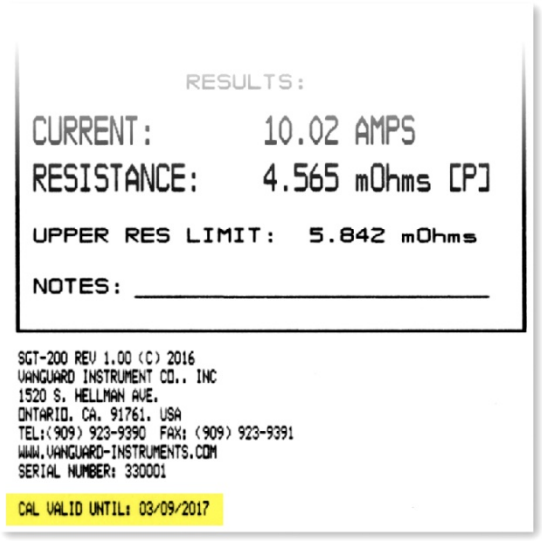
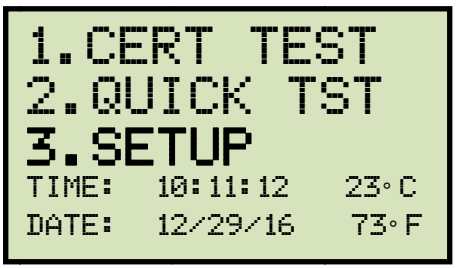


Figure 2. Sample Test Report Printout with Calibration Expiration Date

3.5 Setting the Units of Measure

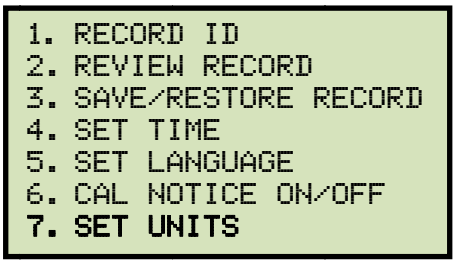
The SGT-200 supports both Metric and English units. Follow the steps below to select your preferred units of measure:

a. Start from the "START-UP" menu:



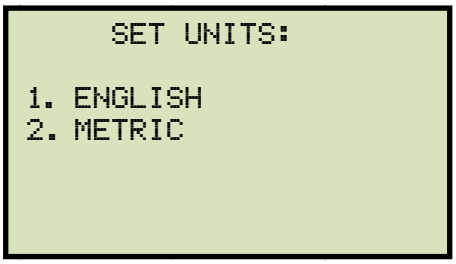
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



Press the **[7]** key (*SET UNITS*)

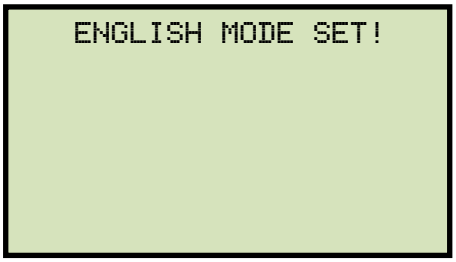
c. The following screen will be displayed:



Press the **[1]** key to select English or the **[2]** key to select Metric.

NOTE In Metric mode, the cable length will be in meters and the length can be adjusted in increments of 1/10 m. Cable sizes will also be in Metric (35 mm^2, 50 mm^2, 70 mm^2, and 95 mm^2)

d. The following screen will be displayed (English units shown for this example):



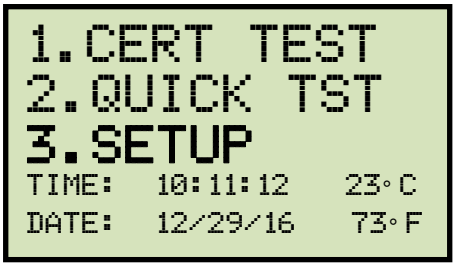
Press any key to return to the "START-UP" menu.

3.6 Testing Procedures

3.6.1. Entering Test Record Header Information

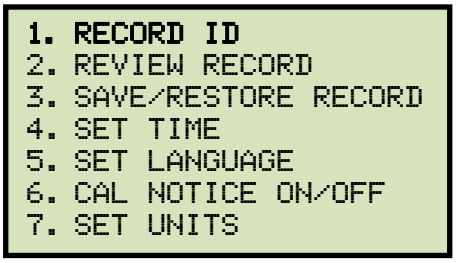
You can enter the test record header information before performing tests. The record header includes identifying information such as the company, station, circuit, manufacturer, etc. Once the header information has been set, it will apply to all subsequent test records. Follow the steps below to enter the test header information:

a. Start from the "START-UP" menu:



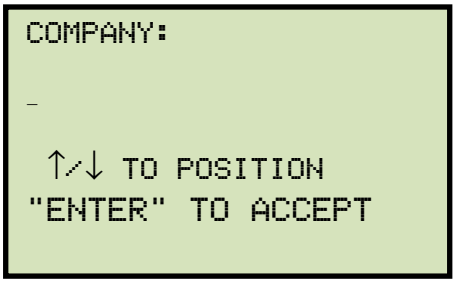
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



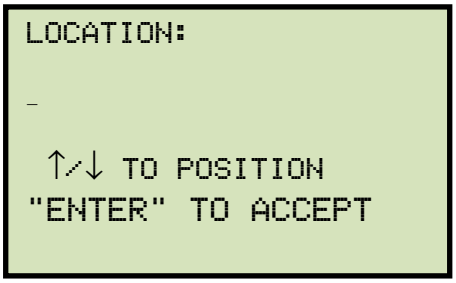
Press the **[1]** key (*RECORD ID*).

c. The following screen will be displayed:



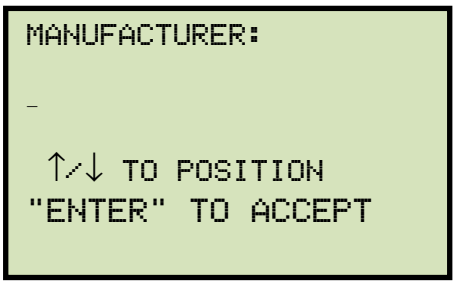
Type the company name using the keypad. Press the **[ENTER]** key when you are done typing the company name.

d. The following screen will be displayed:



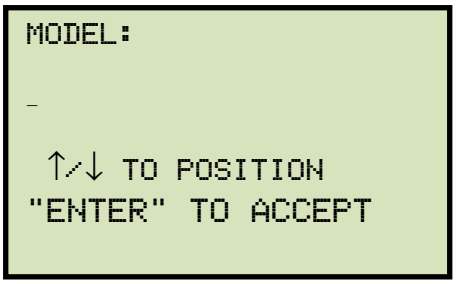
Type the location name using the keypad and then press the **[ENTER]** key.

e. The following screen will be displayed:



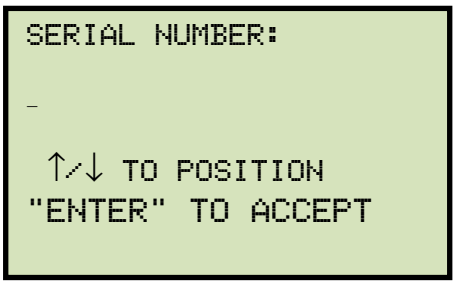
Type the manufacturer name using the keypad and then press the **[ENTER]** key.

f. The following screen will be displayed:



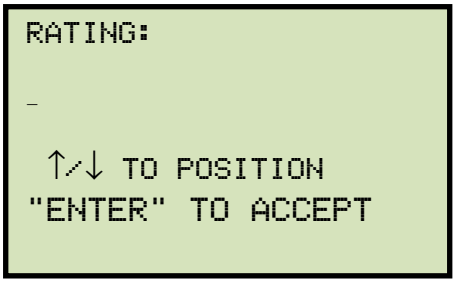
Type the safety ground cable's model information using the keypad and then press the **[ENTER]** key.

g. The following screen will be displayed:



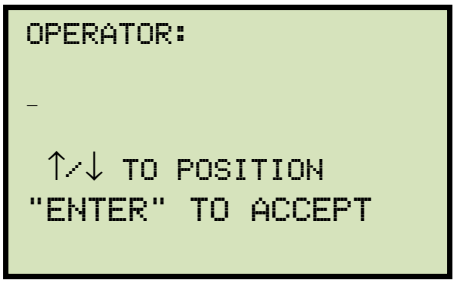
Type the safety ground cable's serial number using the keypad and then press the **[ENTER]** key.

h. The following screen will be displayed:



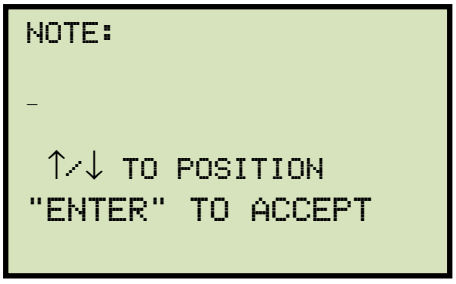
Type the safety ground cable's rating using the keypad and then press the [**ENTER**] key.

i. The following screen will be displayed:



Type the operator's name using the keypad and then press the **[ENTER]** key.

j. The following screen will be displayed:



Type any additional notes regarding the test and then press the **[ENTER]** key. All header information will be saved, and you will be returned to the "START-UP" menu.

3.6.2. Performing a Test

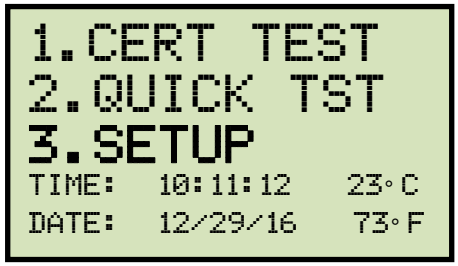
There are two ways to perform a test using the SGT-200. You can perform a certification test or a quick test. When performing a certification test, after the test is finished, you will be given the option to print the test results and will also be able to save the test record. You can then choose to re-run the test.

When performing a quick test, after the test is finished, you will only be able to re-run the test. You will not be able to print or save the test results. The quick test is ideal for testing a batch of similar cables.

In both test modes, the user is required to enter the cable size, length, and temperature. The SGT-200 will calculate the maximum allowable resistance value according to the ASTM F2249-03 standard. The measured resistance value is then compared to the calculated value to determine whether the cable passes or fails. A "P" or "F" is displayed in the test results to indicate "Pass" or "Fail", respectively.

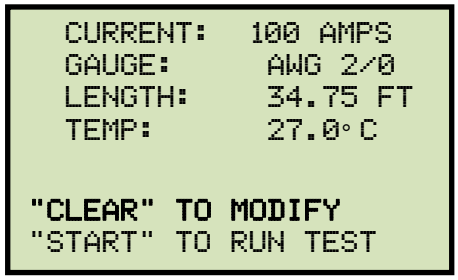
Follow the steps below to perform a test.

a. Start from the "START-UP" menu:



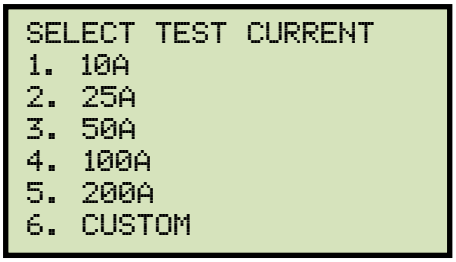
Press the **[1]** key (*CERT TEST*) to perform a certification test or press the **[2]** key (*QUICK TST*) to perform a quick test.

b. The following screen will be displayed showing the test parameters from the last test performed:



If the test parameters are correct, you can press the **[START]** key to start the test immediately. For this example, we will change the parameters by pressing the **[CLEAR]** key.

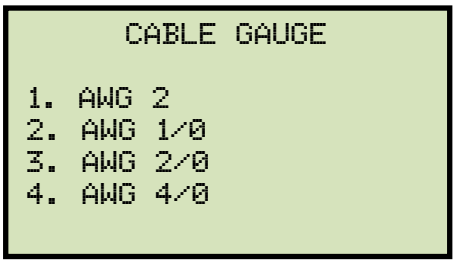
c. The following screen will be displayed:



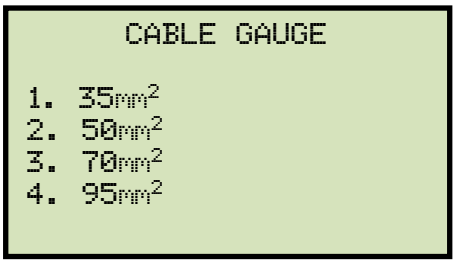
Select the test current by pressing the corresponding key on the keypad. We will press the **[4]** key (*100A*) for this example. You can also enter a specific test current between 10A and 200A by pressing the **[6]** key (*CUSTOM*).

d. One of the following screens will be displayed depending on the units of measure setting:

English Units Screen



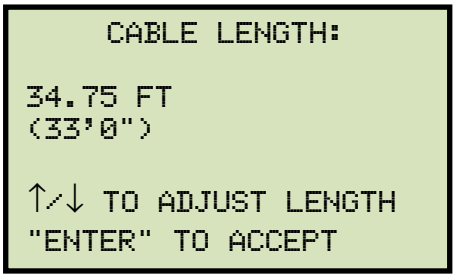
Metric Units Screen



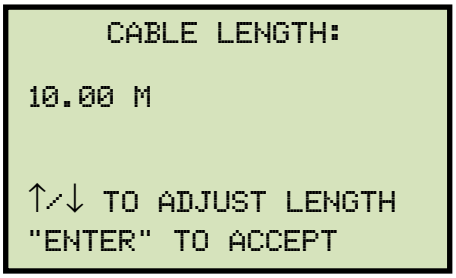
Select the cable gauge by pressing the corresponding key on the keypad.

e. One of the following screens will be displayed depending on the units of measure setting:

English Units Screen

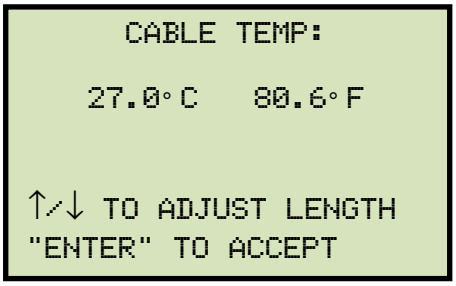


Metric Units Screen



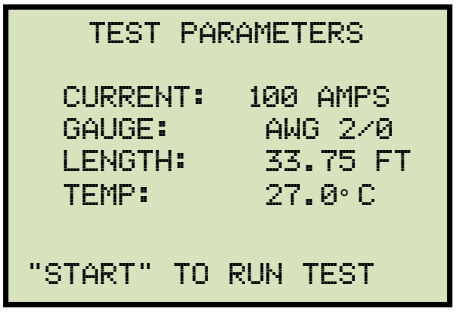
You can adjust the cable length by 3" (when using English units) or 0.1m (when using Metric units) increments. Press the **[▲]** key to increase the cable length or the **[▼]** key to decrease the cable length. The screen will be updated showing the new length. Press the **[ENTER]** key when the correct length is displayed.

f. The following screen will be displayed:



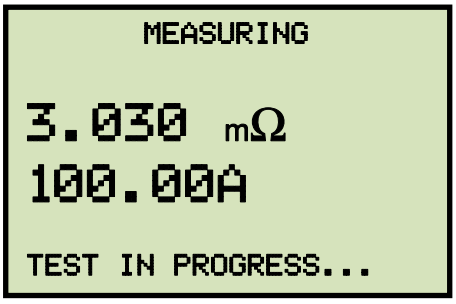
You can adjust the cable temperature by 0.5° C increments. Press the **[▲]** key to increase the cable temperature or the **[▼]** key to decrease the cable temperature. Press the **[ENTER]** key when the correct cable temperature is displayed.

g. A summary of the test parameters will be displayed as shown below:

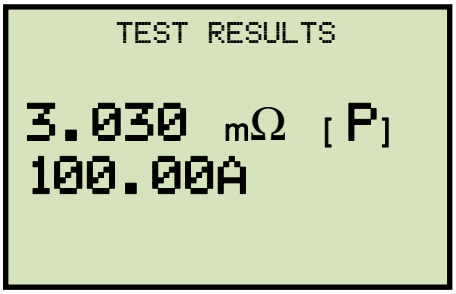


Press the **[START]** key to run the test.

h. Once the test current has been reached, the SGT-200 will measure the resistance and update the screen as shown below:



The unit will then ramp down the current to zero and display the final test results as shown below:



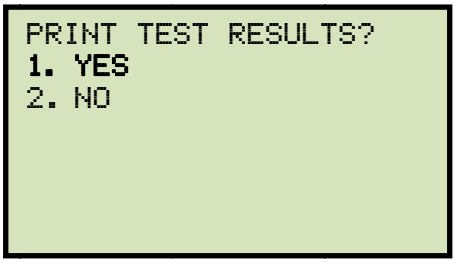
If the cable under test passed the test, "[P]" will be displayed as shown in the example above. If it failed, "[F]" will be displayed next to the test results.

Press any key to continue.

If performing a certification test, continue to step i.

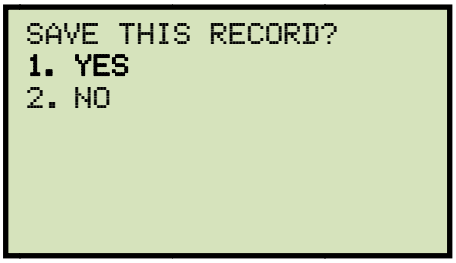
If performing a quick test, continue to step l.

i. The following screen will be displayed:



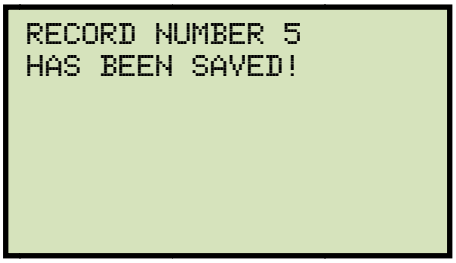
Press the **[1]** key to print the test results. Figure 3 shows a sample test results printout.

j. The following screen will be displayed:



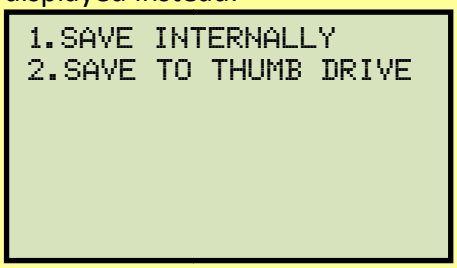
Press the **[1]** key to save the test record.

k. The following screen will be displayed:



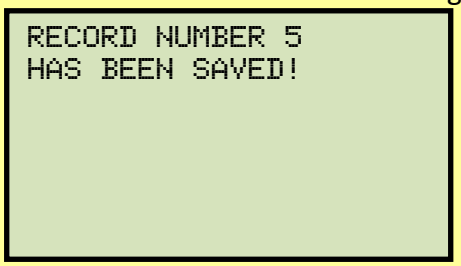
NOTES

If a USB flash drive is connected to the unit, the following screen will be displayed instead:



1. SAVE INTERNALLY

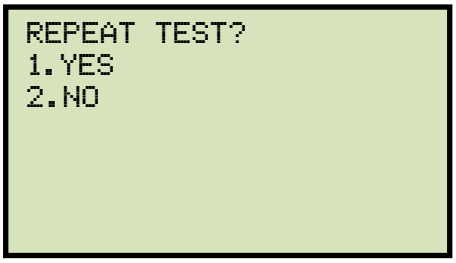
Press the **[1]** key (*SAVE INTERNALLY*) to save the test record to the unit's Flash EEPROM. The following screen will be displayed:



2. *SAVE TO THUMB DRIVE*
   Press the **[2]** key (*SAVE TO THUMB DRIVE*) to save the test record to the connected USB Flash drive. The following screen will be displayed:

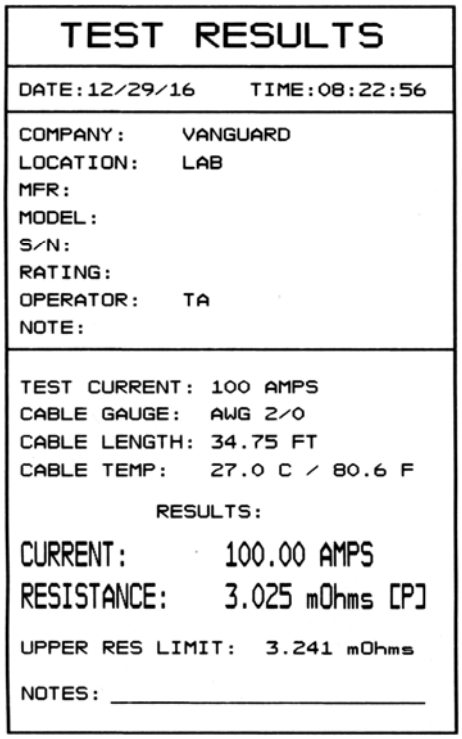
Press any key to continue.

l. The following screen will be displayed:



Press the **[1]** (*YES*) key if you would like to repeat the test. You will be returned to step b.

Press the **[2]** key (*NO*) if you do not want to repeat the test. You will be returned to the "START-UP" menu.



TEST RESULTS

DATE:12/29/16 TIME:08:22:56

COMPANY: VANGUARD
LOCATION: LAB
MFR:
MODEL:
S/N:
RATING:
OPERATOR: TA
NOTE:

TEST CURRENT: 100 AMPS
CABLE GAUGE: AWG 2/0
CABLE LENGTH: 34.75 FT
CABLE TEMP: 27.0 C / 80.6 F

RESULTS:

CURRENT: 100.00 AMPS
RESISTANCE: 3.025 mOhms [P]

UPPER RES LIMIT: 3.241 mOhms

NOTES: _____

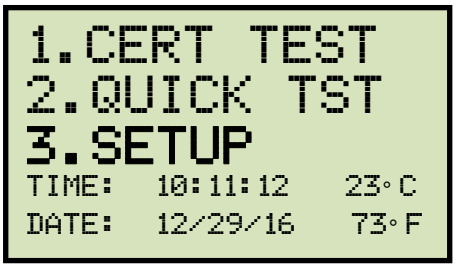
Figure 3. Sample SGT-200 Test Results Printout

3.7 Working With Test Records

3.7.1. Viewing the Contents of the Working Memory

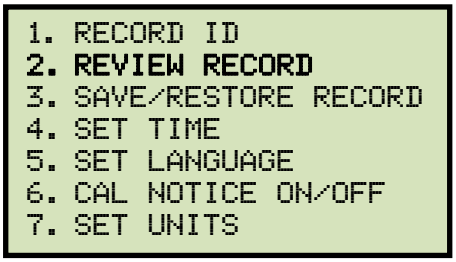
Whenever a test is performed and the reading is kept, the data is temporarily stored in the SGT-200's working memory. You can view the test reading in the unit's working memory using the steps below:

a. Start from the "START-UP" menu:



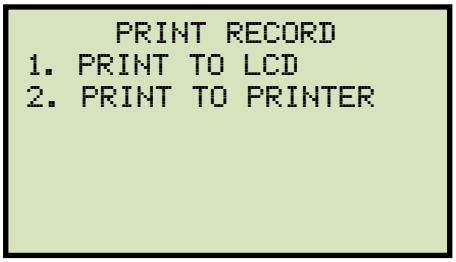
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



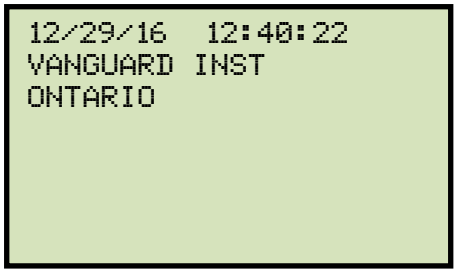
Press the **[2]** key (*REVIEW RECORD*).

c. The following screen will be displayed:

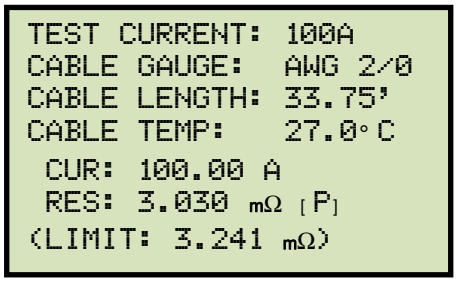


1. *PRINT TO LCD*

   Press the **[1]** key (*PRINT TO LCD*) to display the test results on the unit's LCD screen. The test record's header information will be displayed as shown below:



Press any key to continue. The test record details will be displayed as shown below:



Press any key to return to the "START-UP" menu.

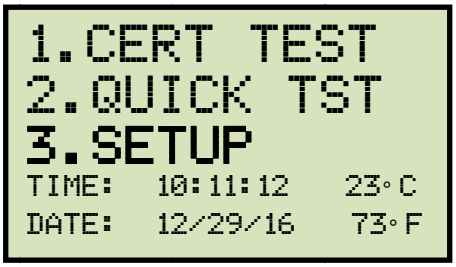
2. *PRINT TO PRINTER*

Press the **[2]** key (*PRINT TO PRINTER*) to print the test results on the unit's built-in thermal printer. The test results will be printed and you will be returned to the "START-UP" menu.

3.7.2. Saving Test Results to a Test Record

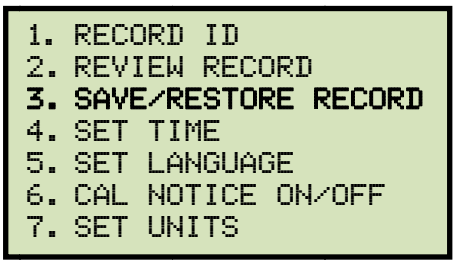
After performing a test, the user is presented the option to save the test results to the unit's Flash EEPROM or to a USB Flash drive. If the test results are not saved immediately after performing a test, they will still remain in the working memory and can be saved later, as long as a new test has not been performed and the unit has not been turned off. Follow the steps below to save the test results from the working memory to a test record (the following procedure can also be used to re-save a restored test record to a new memory location or to a USB Flash Drive):

a. Perform a test or restore a test record to the working memory (see section 3.7.3 and 3.7.4), and then start from the "START-UP" menu:



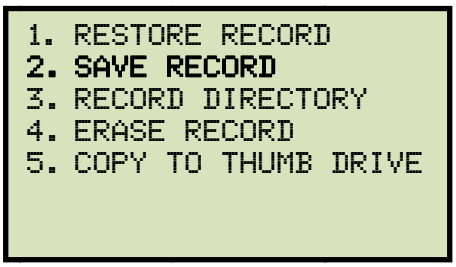
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



Press the **[3]** key (*SAVE/RESTORE RECORD*)

c. The following screen will be displayed:



NOTE

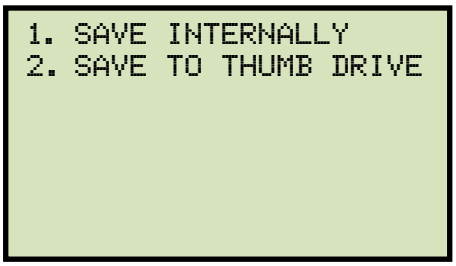
Option 5 (*COPY TO THUMB DRIVE*) will be listed only if a USB Flash drive is connected to the SGT-200.

Press the **[2]** key (*SAVE RECORD*).

If a USB Flash drive is connected to the unit, continue to step d.

If a USB Flash drive is NOT connected to the unit, continue to step e.

d. The following screen will be displayed:

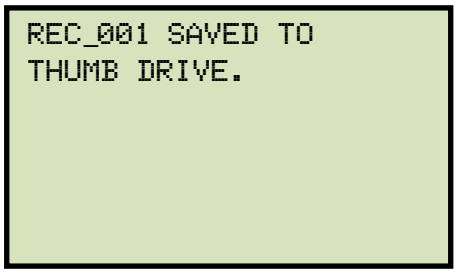


1. *SAVE INTERNALLY*

   Press the **[1]** key (*SAVE INTERNALLY*) to save the test record to the unit's Flash EEPROM. **Continue to step e.**

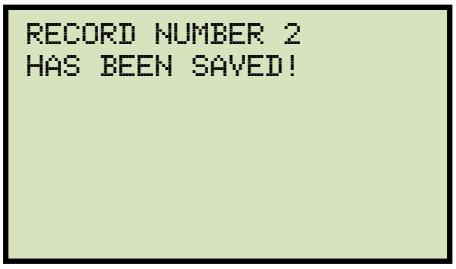
2. *SAVE TO THUMB DRIVE*

   Press the **[2]** key (*SAVE TO THUMB DRIVE*) to save the test record to the connected USB Flash drive. The following screen will be displayed:



   Press any key to return to the "START-UP" menu.

e. The following screen will be displayed:

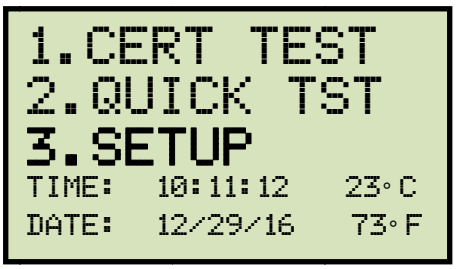


Press any key to return to the "START-UP" menu.

3.7.3. Restoring a Test Record From Flash EEPROM

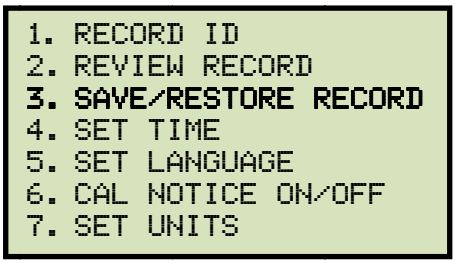
Use the steps below to restore a test record from the SGT-200's internal Flash EEPROM to the working memory:

a. Start from the "START-UP" menu:



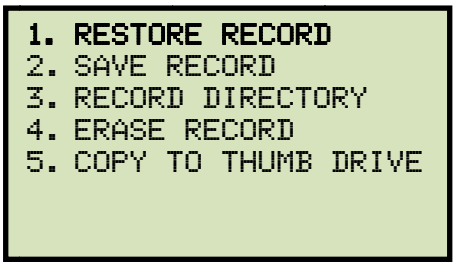
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



Press the **[3]** key (*SAVE/RESTORE RECORD*).

c. The following screen will be displayed:



NOTE

Option 5 (*COPY TO THUMB DRIVE*) will be listed only if a USB Flash drive is connected to the unit.

Press the **[1]** key (*RESTORE RECORD*).

d. The following screen will be displayed:

```
    RESTORE RECORD
1.ENTER RECORD NUMBER
2.SCROLL TO SELECT
```

NOTE

If you have a USB Flash drive inserted in the unit's "USB MEM" port, the following screen will be displayed instead of the above screen:

```
1.INTERNAL STORAGE
2.THUMB DRIVE
```

Press the **[1]** key (*INTERNAL STORAGE*).

The following screen will be displayed:

```
    RESTORE RECORD
1.ENTER RECORD NUMBER
2.SCROLL TO SELECT
```

Continue with the steps below.

1. *ENTER RECORD NUMBER*

   Press the **[1]** key (*ENTER RECORD NUMBER*) if you know the record number that you would like to restore.

   1.1. The following screen will be displayed:

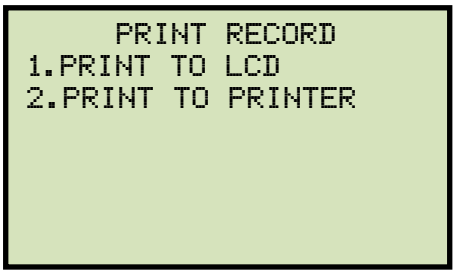
```
  RESTORE RECORD
    NUMBER:
```

   Type the record number using the alpha-numeric keypad and then press the **[ENTER]** key.

1.2. The following screen will be displayed:

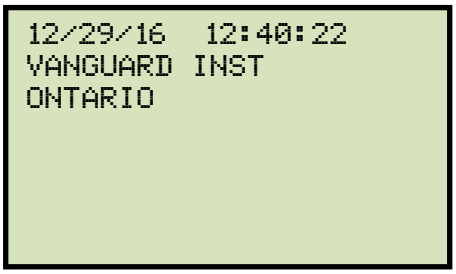
1. YES

Press the **[1]** key (*YES*) to review the test record on the screen or to print it. The following screen will be displayed:

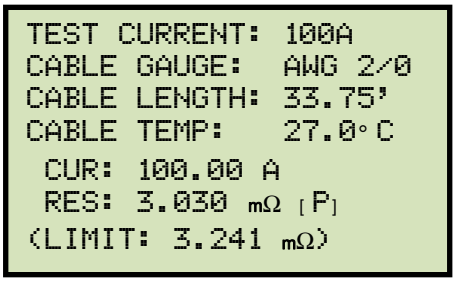


1. PRINT TO LCD

Press the **[1]** key (*PRINT TO LCD*) to review the restored test record on the unit's LCD screen. The test record's header information will be displayed as shown below:



Press any key to continue. The test record details will be displayed as shown below:



Press any key to return to the "START-UP" menu. The restored test record will remain in the unit's working memory.

2. *PRINT TO PRINTER*

   Press the **[2]** key (*PRINT TO PRINTER*) to print the restored test record on the unit's built-in thermal printer. The rest results will be printed on the printer and you will be returned to the "START-UP" menu. The restored test record will remain in the unit's working memory.

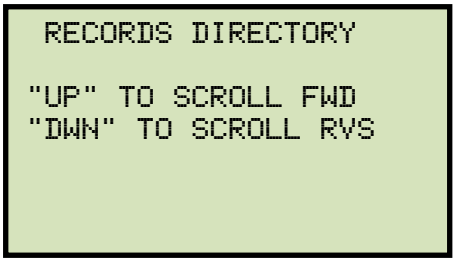
2. *NO*

   Press the **[2]** key (*NO*) if you do not want to review or print the restored test record. The test record will be restored to the working memory and you will be returned to the "START-UP" menu.

2. *SCROLL TO SELECT*

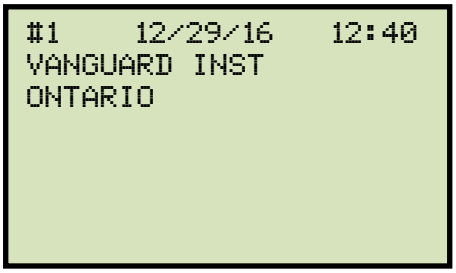
Press the **[2]** key (*SCROLL TO SELECT*) to scroll through a directory of the stored test records.

2.1. The following screen will be displayed:



Press the **[▲]** key or the **[▼]** key to display the next or previous test record, respectively.

The test record's header information will be displayed as shown below:

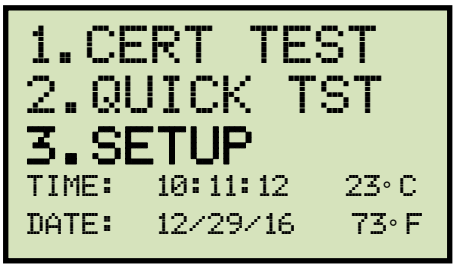


When you have located the test record that you would like to restore, press the **[ENTER]** key. **Continue to step 1.2 on page 32.**

3.7.4. Restoring a Test Record From a USB Flash Drive

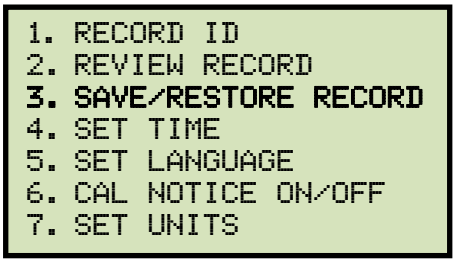
Use the steps below to restore a test record from a USB Flash drive to the SGT-200's working memory:

a. Make sure the USB Flash drive containing the test record(s) is inserted in the unit's USB Flash drive port ("USB MEM" port). Then start from the "START-UP" menu:



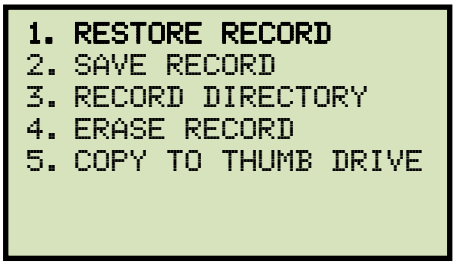
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



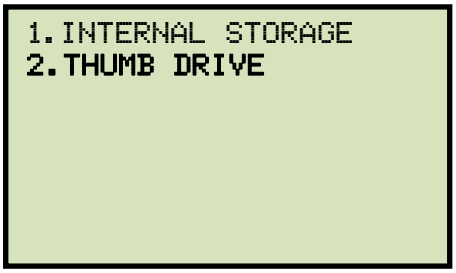
Press the **[3]** key (*SAVE/RESTORE RECORD*)

c. The following screen will be displayed:



Press the **[1]** key (*RESTORE RECORD*).

d. The following screen will be displayed:

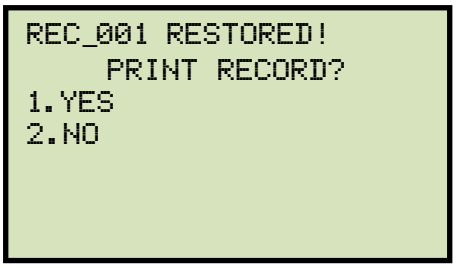


Press the **[2]** key (*THUMB DRIVE*).

e. The following screen will be displayed:

Type the record number that you would like to restore using the alpha-numeric keypad and then press the **[ENTER]** key.

f. The test record will be restored to the unit's working memory and the following screen will be displayed:

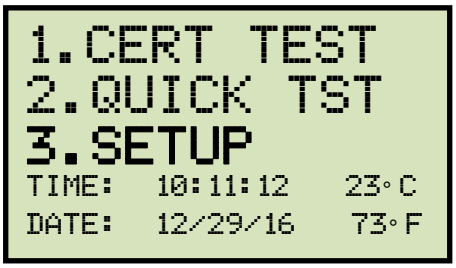


Continue to step 1.2 on page 32.

3.7.5. Copying Test Records to a USB Flash Drive

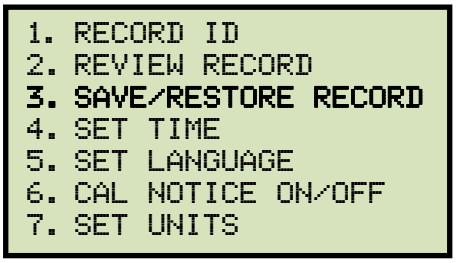
Use the steps below to copy one or all test records from the unit's Flash EEPROM to a connected USB Flash drive:

a. Make sure a USB Flash drive is connected to the unit's "USB MEM" port, and then start from the "START-UP" menu:



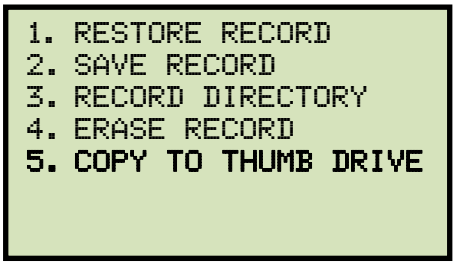
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



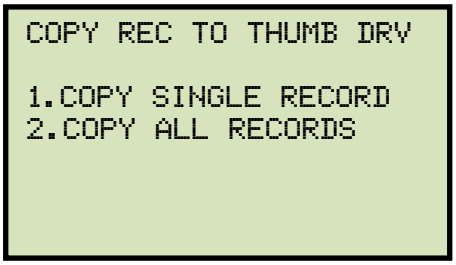
Press the **[3]** key (*SAVE/RESTORE RECORD*).

c. The following screen will be displayed:



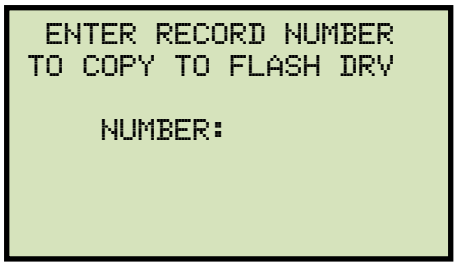
Press the **[5]** key (*COPY TO THUMB DRIVE*).

d. The following screen will be displayed:

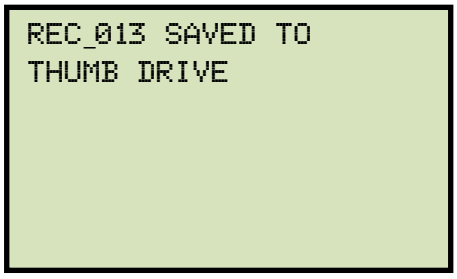


1. *COPY SINGLE RECORD*

Press the **[1]** key (*COPY SINGLE RECORD*) to copy a single test record from the unit's Flash EEPROM to the connected USB Flash drive. The following screen will be displayed:



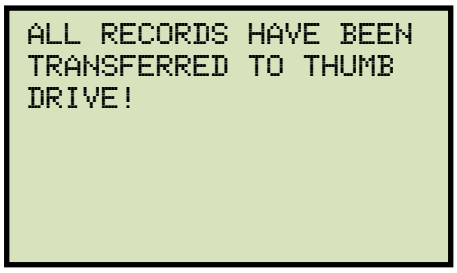
Type the record number using the alpha-numeric keypad and then press the **[ENTER]** key. The test record will be copied to the USB Flash drive and the following screen will be displayed:



Press any key to return to the "START-UP" menu.

2. *COPY ALL RECORDS*

Press the **[2]** key (*COPY ALL RECORDS*) to copy all test records from the SGT-200's Flash EEPROM to the connected USB Flash drive. All test records will be copied from the unit to the connected USB Flash drive. The following screen will be displayed when the process is finished:

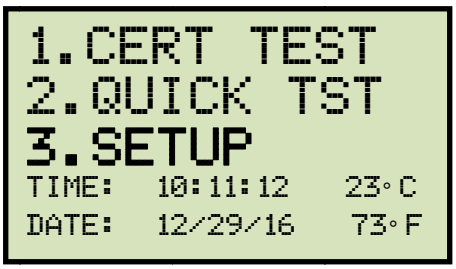


Press any key to return to the "START-UP" menu.

3.7.6. Printing the Test Record Directory

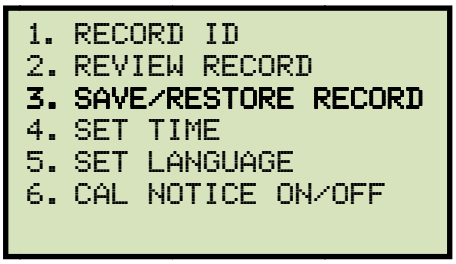
Use the steps below to print a directory of the test records stored in the SGT-200's Flash EEPROM or on a connected USB Flash drive:

a. Start from the "START-UP" menu:



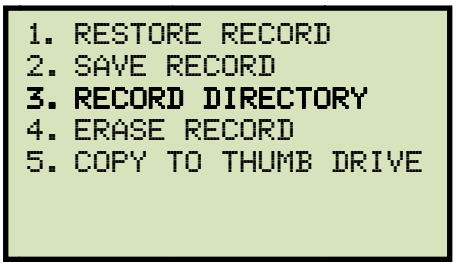
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



Press the **[3]** key (*SAVE/RESTORE RECORD*).

c. The following screen will be displayed:



NOTE

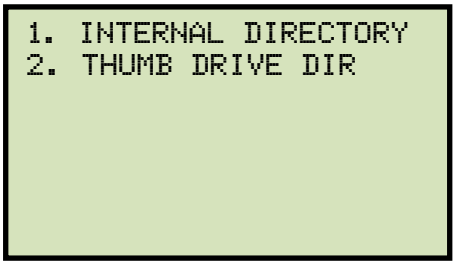
Option 5 (*COPY TO THUMB DRIVE*) is listed only if a USB Flash drive is connected to the unit.

Press the **[3]** key (*RECORD DIRECTORY*).

If a USB Flash drive is connected to the unit, continue to step d.

If a USB Flash drive is not connected to the unit, continue to step e.

d. The following screen will be displayed:



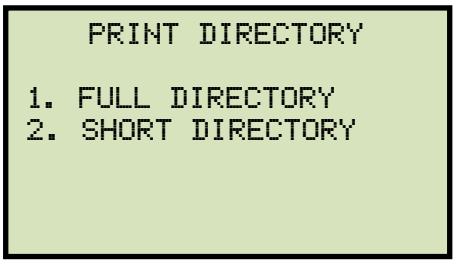
1. *INTERNAL DIRECTORY*

   Press the **[1]** key (*INTERNAL DIRECTORY*) to print a directory of the test records stored in the unit's internal memory. **Continue to step e.**

2. *THUMB DRIVE DIR*

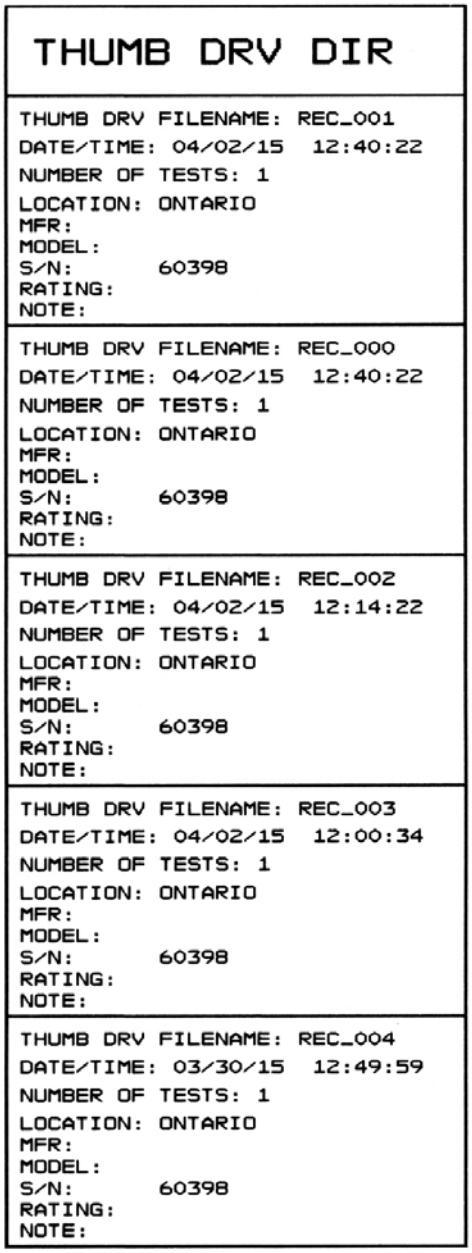
   Press the **[2]** key (*THUMB DRIVE DIR*) to print a directory of the test records stored on the connected USB Flash drive. The directory will be printed on the built-in thermal printer and you will be returned to the "START-UP" menu. A sample thumb drive directory printout is shown in Figure 4.

e. The following screen will be displayed:



Press the **[1]** key (*FULL DIRECTORY*) to print a complete directory of all test records stored in the unit's internal memory. The directory will be printed on the thermal printer and you will be returned to the "START-UP" menu. A sample internal test record directory printout is shown in Figure 5.

Press the **[2]** key (*SHORT DIRECTORY*) to print a directory of the last 10 test records stored in the unit's internal memory. The directory will be printed on the thermal printer and you will be returned to the "START-UP" menu.



THUMB DRV DIR

THUMB DRV FILENAME: REC_001
DATE/TIME: 04/02/15 12:40:22
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

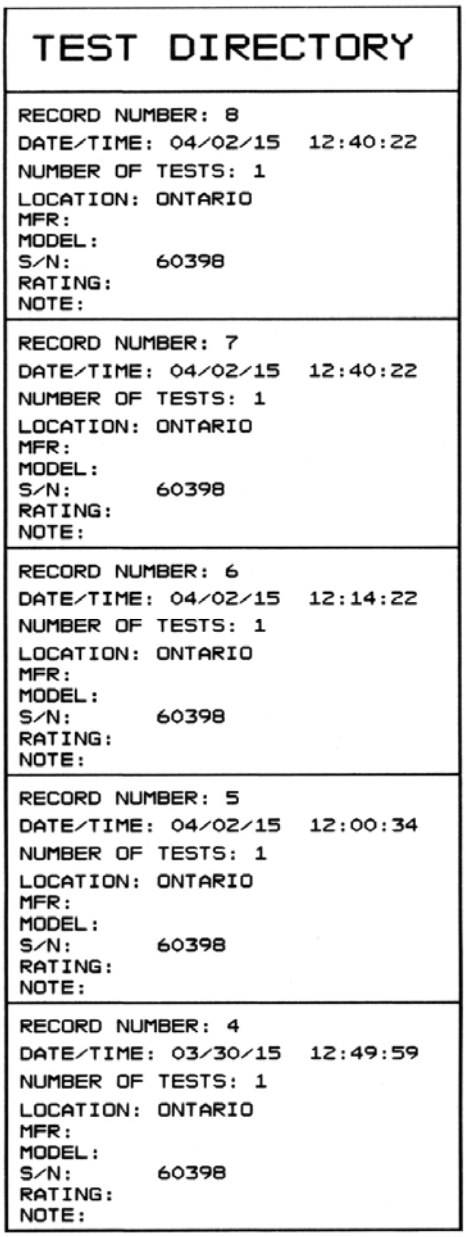
THUMB DRV FILENAME: REC_000
DATE/TIME: 04/02/15 12:40:22
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

THUMB DRV FILENAME: REC_002
DATE/TIME: 04/02/15 12:14:22
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

THUMB DRV FILENAME: REC_003
DATE/TIME: 04/02/15 12:00:34
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

THUMB DRV FILENAME: REC_004
DATE/TIME: 03/30/15 12:49:59
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

Figure 4. Sample Thumb Drive Directory Printout



TEST DIRECTORY

RECORD NUMBER: 8
DATE/TIME: 04/02/15 12:40:22
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

RECORD NUMBER: 7
DATE/TIME: 04/02/15 12:40:22
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

RECORD NUMBER: 6
DATE/TIME: 04/02/15 12:14:22
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

RECORD NUMBER: 5
DATE/TIME: 04/02/15 12:00:34
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

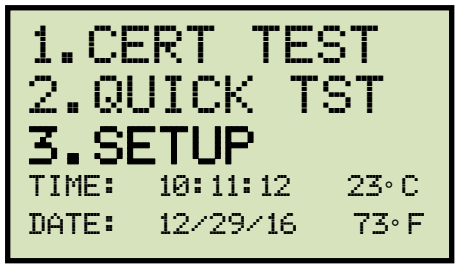
RECORD NUMBER: 4
DATE/TIME: 03/30/15 12:49:59
NUMBER OF TESTS: 1
LOCATION: ONTARIO
MFR:
MODEL:
S/N: 60398
RATING:
NOTE:

Figure 5. Sample Internal Test Record Directory Printout

3.7.7. Erasing Test Records from the Unit's Flash EEPROM

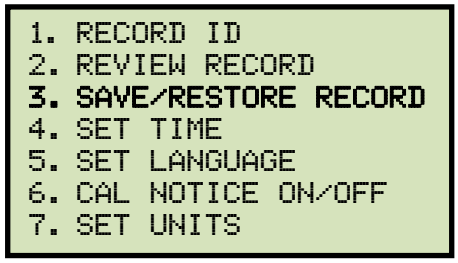
Follow the steps below to erase test records from the unit's Flash EEPROM

a. Start from the "START-UP" menu:



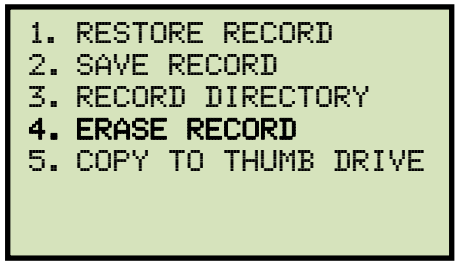
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



Press the **[3]** key (*SAVE/RESTORE RECORD*).

c. The following screen will be displayed:



Press the **[4]** key (*ERASE RECORD*).

d. The following screen will be displayed:

```
      ERASE RECORD

1.ERASE SINGLE REC.
2.ERASE ALL RECORDS

    "STOP" TO EXIT
```

NOTE

If you have a USB Flash drive inserted in the unit's "USB MEM" port, the following screen will be displayed instead of the above screen:

```
1.ERASE INTERNAL REC
2.ERASE THUMB DRV REC
```

Press the **[1]** key (*ERASE INTERNAL REC*).

The following screen will be displayed:

```
      ERASE RECORD

1.ERASE SINGLE REC.
2.ERASE ALL RECORDS

    "STOP" TO EXIT
```

Continue with the steps below.

1. *ERASE SINGLE REC.*

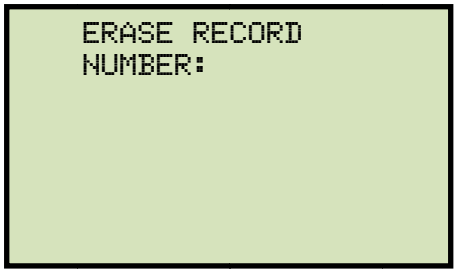
   Press the **[1]** key (*ERASE SINGLE REC.*) to erase a single test record from the unit's internal Flash EEPROM. The following screen will be displayed:

```
      ERASE RECORD

1.ENTER RECORD NUMBER
2.SCROLL TO SELECT
```

   1. *ENTER RECORD NUMBER*

      Press the **[1]** key (*ENTER RECORD NUMBER*) if you know the record number that you would like to erase. The following screen will be displayed:



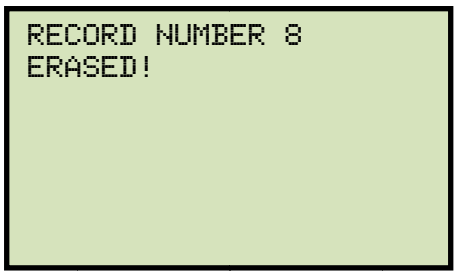
NOTE

You can cancel the process and return to the "START-UP" menu by pressing the **[STOP]** key.

Type the record number that you would like to erase using the alpha-numeric keypad and then press the **[ENTER]** key. If you do not know the test record number, you can first view the test record directory using the instructions in section 3.7.6.

The following screen will be displayed while the record is being erased:

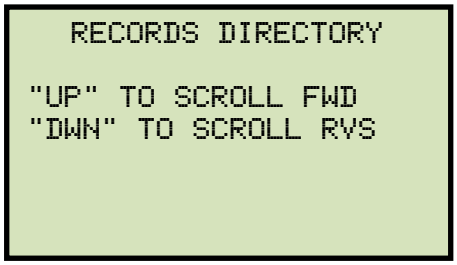
The following screen will be displayed when the test record has been completely erased:



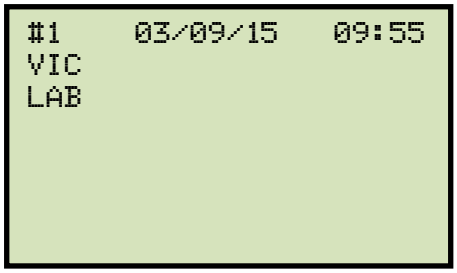
Press any key to continue. You will be returned to the beginning of step d.

2. *SCROLL TO SELECT*

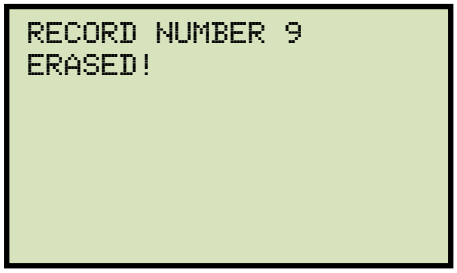
Press the **[2]** key (*SCROLL TO SELECT*) to scroll through the test record directory and locate the test record that you would like to erase. The following screen will be displayed:



Press the **[▲]** or **[▼]** key to scroll through the test record directory. The test record header will be displayed as shown:



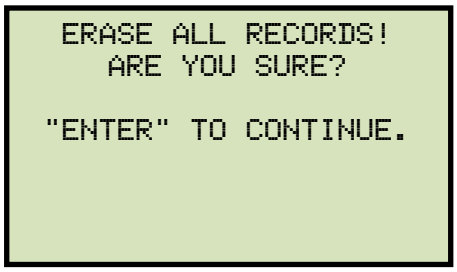
You can continue to scroll through the record directory by pressing the **[∧]** and **[∨]** keys. Once you have located the test record you would like to erase, press the **[ENTER]** key. The selected test record will be erased and the following screen will be displayed:



Press any key to continue. You will be returned to the beginning of step d.

2. *ERASE ALL RECORDS*

Press the **[2]** key (*ERASE ALL RECORDS*) to erase all the test records from the unit's internal Flash EEPROM. The following warning screen will be displayed:



You can press the **[STOP]** key to cancel the process and return to the "START-UP" menu.

Press the **[ENTER]** key to proceed with deleting all the test records from the unit's Flash EEPROM. The following screen will be displayed during the erasure process:

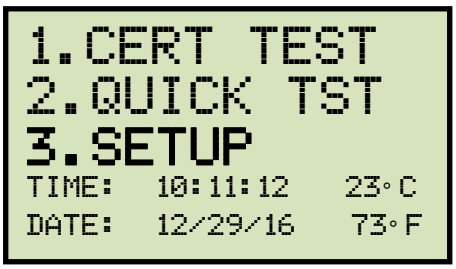
The following screen will be displayed when all test records have been completely erased:

Press any key to return to the "START-UP" menu.

3.7.8. Erasing Test Records from a USB Flash Drive

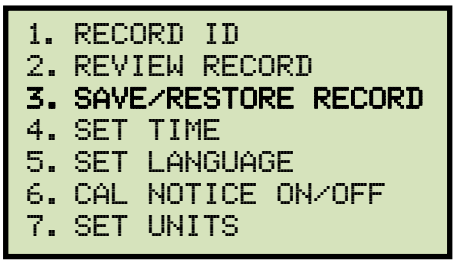
Follow the steps below to erase test records from a connected USB Flash drive:

a. Make sure a USB Flash drive is connected to the unit's "USB MEM" port, and then start from the "START-UP" menu:



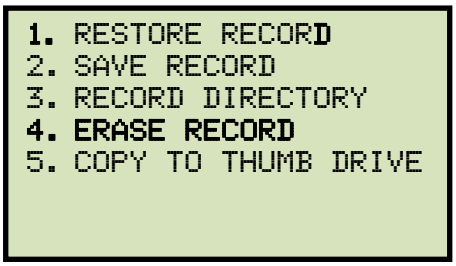
Press the **[3]** key (*SETUP*).

b. The following screen will be displayed:



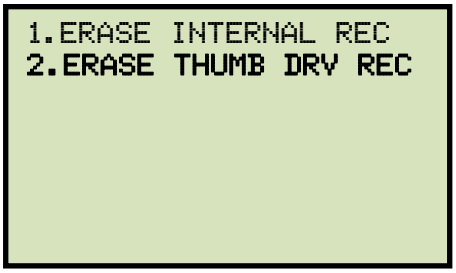
Press the **[3]** key (*SAVE/RESTORE RECORD*).

c. The following screen will be displayed:



Press the **[4]** key (*ERASE RECORD*).

d. The following screen will be displayed:



Press the **[2]** key (*ERASE THUMB DRV REC*).

e. The following screen will be displayed:

```
      ERASE RECORD

1.ERASE SINGLE REC.
2.ERASE ALL RECORDS

     "STOP" TO EXIT
```

1. *ERASE SINGLE REC.*

   Press the **[1]** key (*ERASE SINGLE REC.*) to erase a single test record from the connected USB Flash drive. The following screen will be displayed:

```
   ERASE THUMB DRIVE

    REC_
```

   Type the record number that you would like to erase using the alpha-numeric keypad and then press the **[ENTER]** key. The test record will be erased from the USB Flash drive and the following screen will be displayed:

```
THUMB DRIVE RE001
ERASED!
```

   Press any key to continue. You will be returned to the beginning of step e. Press the **[STOP]** key to return to the "START-UP" menu.

2. *ERASE ALL RECORDS*

   Press the **[2]** key (*ERASE ALL RECORDS*) to delete all test records from the connected USB Flash drive. The following warning screen will be displayed:

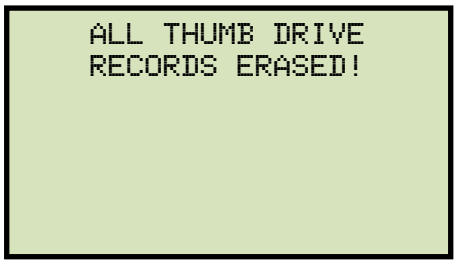
```
ERASE ALL THUMB DRIVE
RECORDS!

       ARE YOU SURE?

 "ENTER" TO CONTINUE.
```

Press the **[STOP]** key if you do not want to erase all the test records. You will be returned to the "START-UP" menu.

Press the **[ENTER]** key to proceed with deleting all the test records from the connected USB Flash drive. The following screen will be displayed when all the records have been erased:



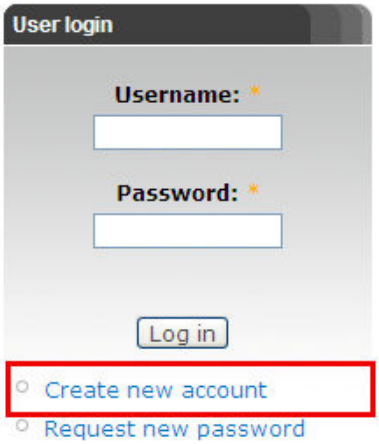
Press any key to return to the "START-UP" menu.

4.0 Getting the Latest Firmware, Software, and Manuals

The latest firmware, software, and user's manuals can be downloaded from the Vanguard Instruments Company's web site at http://www.vanguard-instruments.com. In order to download these items from our site, you will first need to sign up for a FREE user account on our site. Also, your account must be approved before it can be used to download firmware, software, and user's manuals. Follow the steps below to sign up for an account and download the latest firmware, software and user's manuals:

a. Visit our site at http://www.vanguard-instruments.com.

b. On the left hand side of the page, click on the "Create new account" link:



c. You will be presented with a sign-up form. Please complete all the required fields on the form and click on the "Create new account" button at the bottom of the page.

d. Once your account has been created, it will be reviewed by our staff and usually approved within the hour during regular business hours.

e. Once you have received the account approval email, visit our site again at http://www.vanguard-instruments.com and login to your account using your username and password.

f. Click on the "Downloads" link at the top of the page:

g. The "Downloads" page will be displayed listing all Vanguard products along with the related firmware, software, and user's manuals. Click on any of these items to download them.

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