

CVT-765

Capacitor Voltage Transformer Ratio Tester

USER'S MANUAL



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

TEL: (909) 923-9390
FAX: (909) 923-9391

May 2011
Revision 1

SAFETY SUMMARY

FOLLOW EXACT OPERATING PROCEDURES

Any deviation from procedures described in this User's Manual may create one or more safety hazards, damage the CVT-765, damage the test transformer, or cause errors in the test results. Vanguard Instruments Company, Inc. assumes no liability for unsafe or improper use of the CVT-765.

SAFETY WARNINGS AND CAUTIONS

The CVT-765 shall be used only by **trained operators**. All transformers under test shall be **off-line** and **fully isolated**. Always ground the CVT-765 to a substation ground before connecting the test cables to a transformer. Do not perform test procedures or service unless another person is also present who is capable of rendering aid and resuscitation.

DO NOT MODIFY TEST EQUIPMENT

To avoid the risk of introducing additional or unknown hazards, do not install substitute parts or perform any unauthorized modification to any CVT-765 test unit. To ensure that all designed safety features are maintained, it is highly recommended that repairs 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.

WARNING

Do not remove test leads during a test. Failure to heed this warning can result in electrical shock to personnel and damage to the equipment.

Always **check the voltage setting** of the unit before plugging in to power. Failure to heed this warning may damage the device.

TABLE OF CONTENTS

CONVENTIONS USED IN THIS DOCUMENT	1
1.0 INTRODUCTION	2
1.1 General Description and Features	2
1.2 Technical Specifications	3
1.3 Controls and Indicators	4
2.0 PRE-TEST SETUP	6
2.1 Operating Voltages	6
2.2 LCD Screen Contrast Control	6
3.0 OPERATING PROCEDURES	7
3.1 Connection Diagram	7
3.2 Setting the Date and Time	8
3.3 Setting the Interface Language	9
3.4 Setting the Frequency (50 or 60 Hz)	10
3.5 Performing Tests	11
3.5.1. Entering Test Record Header Information	11
3.5.2. Performing a Transformer Test	15
3.6 Working With Test Records	20
3.6.1. Viewing the Contents of the Working Memory	20
3.6.2. Saving Test Results to a Test Record	21
3.6.3. Restoring a Test Record From Flash EEPROM	24
3.6.4. Restoring a Test Record From a USB Flash Drive	28
3.6.5. Copying Test Records to a USB Flash Drive	31
3.6.6. Viewing the Test Record Directory	34
3.6.7. Erasing Test Records from the Flash EEPROM	36
3.6.8. Erasing Test Records from a USB Flash Drive	40

LIST OF TABLES

Table 1. CVT-765 Technical Specifications	3
Table 2. Functional Descriptions of CVT-765 Controls and Indicators	5

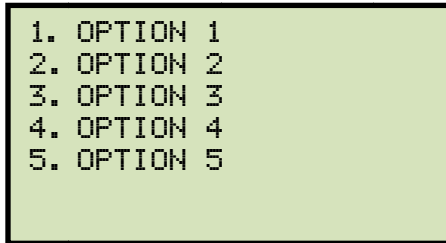
LIST OF FIGURES

Figure 1. CVT-765 Controls and Indicators	4
Figure 2. Typical CVT-765 Cable Connections	7

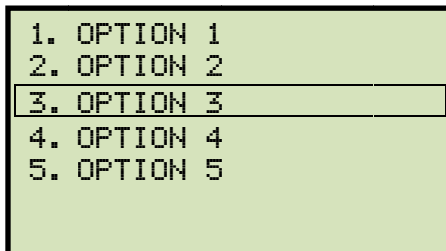
CONVENTIONS USED IN THIS DOCUMENT

This document uses the following conventions:

- A key, switch, or knob on the CVT-765 is indicated as **[KEY]**, **[SWITCH]**, **[KNOB]**.
- Menu names are referenced as "MENU NAME"
- CVT-765 LCD screen output is shown as:



- When instructions are provided, the menu item that should be selected is outlined with a rectangle as shown below (option 3 should be selected):



- Warning messages are indicated as:



- Important notes are indicated as:



1.0 INTRODUCTION

1.1 General Description and Features

The Vanguard CVT-765 is a microprocessor-based, single phase, automatic, transformer turns-ratio tester. This portable test unit is specifically designed to measure the turns-ratios of Capacitor Voltage Transformers (CVT's).

The CVT-765 determines the transformer turns-ratio using the IEEE C57.12.90 measuring method. It uses a 7500Vac excitation voltage source to accurately measure the turns-ratio of Capacitor Voltage Transformers with a rating of up to 765KV. The transformer turns-ratio is determined by precisely measuring the voltages across the unloaded transformer windings.

The CVT-765 can measure the turns-ratios of Capacitor Voltage Transformers ranging from 75 to 15,000. The measured turns-ratio, winding polarity, and winding phase angle are displayed on the unit's LCD screen.

A transformer's nameplate voltages can also be entered, and the CVT-765 will display the turns-ratio percentage error by comparing the test results with the nameplate voltage values. This convenient feature eliminates any user-calculation errors when testing transformers.

User Interface

The CVT-765 features a back-lit LCD screen (128 x 64 pixels) that is viewable in bright sunlight and low-light conditions. A rugged 16-key membrane keypad is used to enter test information and to operate the unit.

Test Record Storage

The CVT-765 can store 128 records of 33 readings internally, and up to 999 test records on an external USB Flash drive. Test records can be recalled using the included Transformer Analysis PC Software.

Computer Interface

A Windows® based (XP/Vista/7) Transformer Analysis Software is provided with each unit and can be used to remotely control the CVT-765 via the RS-232C port. Using this software, the user can retrieve test records (from the CVT-765's memory or a USB Flash drive), analyze test results, and print test results on a desktop printer. Test results are automatically exported to PDF, EXCEL, and XML formats.

Operating Voltage

The CVT-765 can be operated from 100-120Vac or 220-240Vac. The proper voltage can be set using the voltage selection switch on the front panel.

1.2 Technical Specifications

Table 1. CVT-765 Technical Specifications

TYPE	Portable, automatic, CVT, VT, PT turns-ratio tester
PHYSICAL SPECIFICATIONS	Dimensions: 19.5" x 12" x 17" D (49.5 cm x 30.5 cm x 43.2 cm) Weight: 55 lbs. (24.9 Kg)
INPUT POWER	100-120 Vac or 220-240 Vac (selectable), 50/60 hz
MEASUREMENT METHOD	ANSI/IEEE C57.12.90
RATIO MEASURING RANGE	75 - 15,000 (5 digit resolution)
TURNS-RATIO ACCURACY	75 - 5,000: $\pm 0.25\%$, 5,001 - 10,000: $\pm 0.35\%$, 10,001 - 15,000: $\pm 0.5\%$
PHASE ANGLE READING	0-360 degrees, ± 0.1 degree accuracy
POLARITY	In-Phase or Out-of-Phase indication
TEST VOLTAGE	7440Vac @ 50ma
DISPLAY	Back-lit LCD (128 x 64 pixels), viewable in direct sunlight and low light levels
COMPUTER INTERFACE	RS-232C
PC SOFTWARE	Windows XP/Vista/7 Transformer Analysis Software (included with purchase)
INTERNAL TEST RECORD STORAGE	128 test records. Each record contains 33 readings.
EXTERNAL TEST RECORD STORAGE	Up to 999 test records on external USB Flash drive.
SAFETY	Designed to meet IEC 61010A-1 and CAN/CSA C22.2 No. 1010.1-92 Standards
ENVIRONMENT	Operating: -10° to 50° C (15° to $+122^{\circ}$ F); Storage: -30° C to 70° C (-22° to $+158^{\circ}$ F)
HUMIDITY (MAX)	90% RH @ 40° C (104° F) non-condensing
ALTITUDE (MAX)	2000m (6562 ft) to fully safety specifications
CABLES	One 50 ft. H cable, one 15 ft. X cable, one power cable, one safety ground cable
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 Controls and Indicators

The CVT-765 controls and indicators are shown in Figure 1. A leader line with an index number points to each control and indicator, which is cross-referenced to a functional description in the corresponding table. The purpose of the controls and indicators may seem obvious, but users should familiarize themselves with them before using the CVT-765. 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.

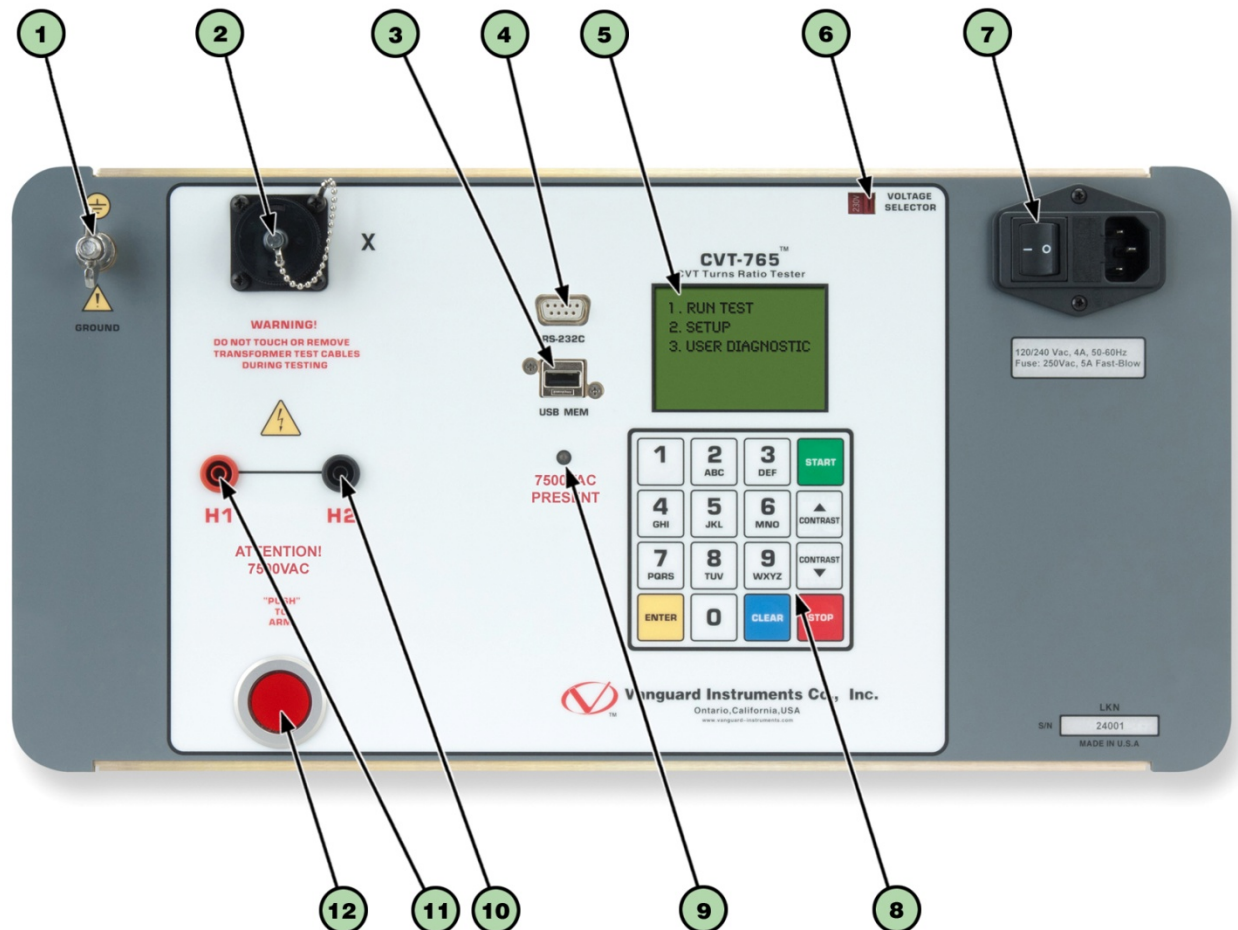


Figure 1. CVT-765 Controls and Indicators

Table 2. Functional Descriptions of CVT-765 Controls and Indicators

Item Number	Panel Markings	Functional Description
1	GROUND	Ground stud for connecting to sub-station ground
2	X	X voltage connector
3	USB MEM	USB Flash drive interface port
4	RS-232C	RS-232C computer interface port
5		Back-lit LCD screen (128 x 64 pixels), viewable in direct light and low light conditions
6	VOLTAGE SELECTOR	Voltage selection switch
7	120/240 Vac, 4A, 50-60 Hz Fuse: 250Vac, 5A Fast Blow	Input power connector and fused power switch with third-wire safety ground
8		Rugged alpha-numeric keypad
9	7500VAC PRESENT	7500VAC hazard warning LED. This LED will be lit when a test is being performed to remind the user that 7500VAC is present.
10	H2	H2 voltage connector
11	H1	H1 voltage connector
12	"PUSH" TO ARM	Spring-loaded push button switch. Press and hold to initiate a test.

2.0 PRE-TEST SETUP

2.1 Operating Voltages

The CVT-765 can be operated from 100-120 Vac or 220-240 Vac. The proper voltage can be set using the voltage selection switch on the front panel (see Figure 1).

2.2 LCD Screen Contrast Control

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

3.0 OPERATING PROCEDURES

The CVT-765 should always be grounded with the provided ground cable before connecting H and X cables. The transformer bushings should also be grounded before connecting test leads to the transformer. This will prevent inducing any voltages into the CVT-765. All transformer bus connections must be removed, and the transformer must be isolated before performing any tests.

3.1 Connection Diagram

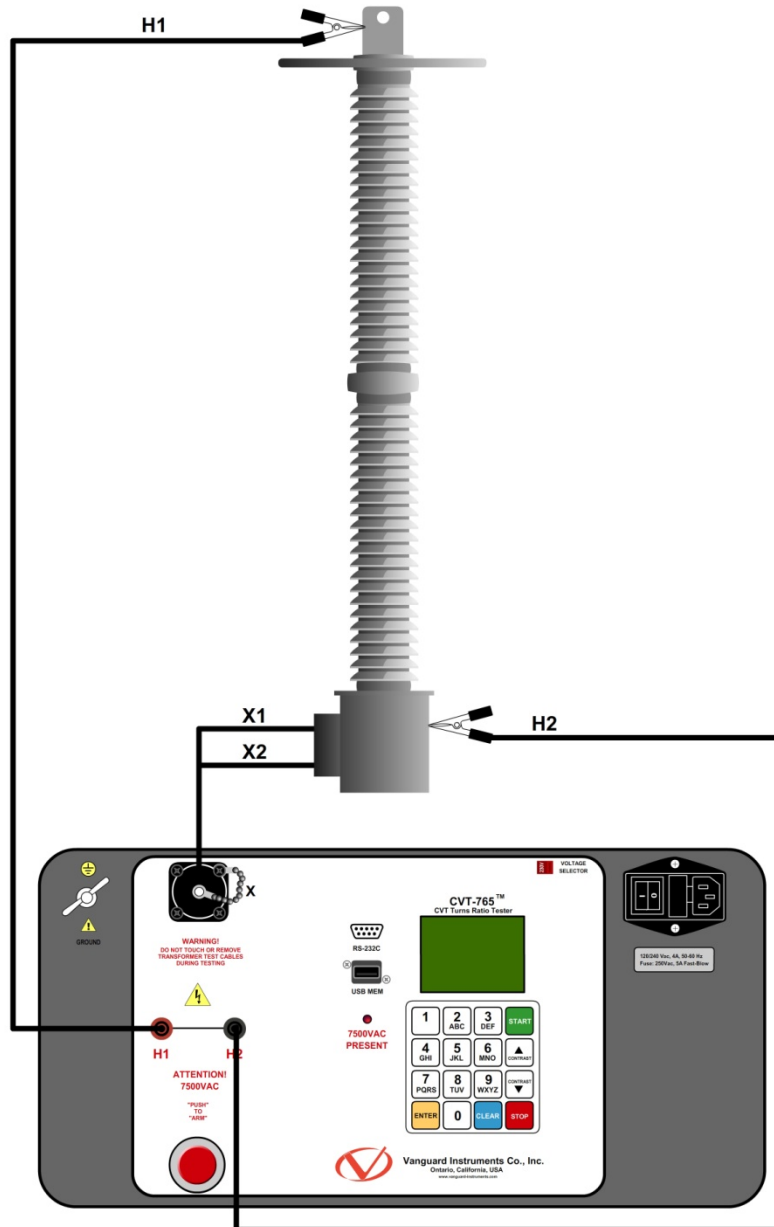
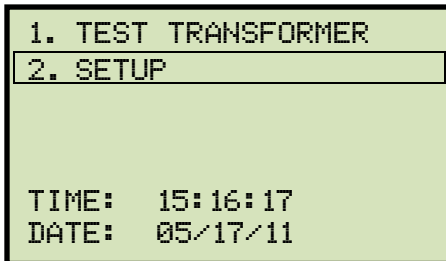


Figure 2. Typical CVT-765 Cable Connections

3.2 Setting the Date and Time

To set the date and time:

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



Press the **[2]** key (*SETUP*).

- b. The following screen will be displayed:



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

- c. The following screen will be displayed:



Enter the date using the alpha-numeric keypad.

- d. The following screen will be displayed:

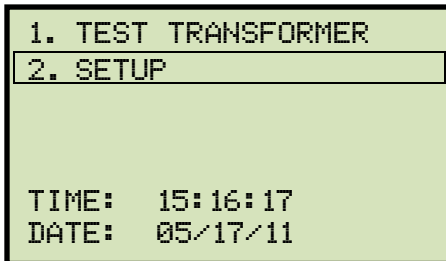


Enter the current time using the alpha-numeric keypad. When the complete time has been entered, you will be immediately returned to the "START-UP" menu.

3.3 Setting the Interface Language

Follow the steps below to set the interface language (English, Spanish, or Turkish):

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



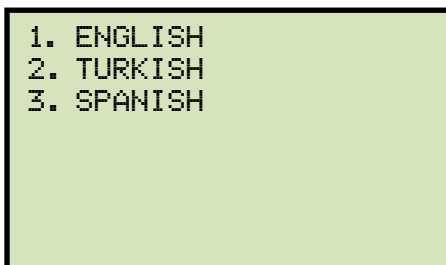
Press the **[2]** key (*SETUP*)

- b. The following screen will be displayed:



Press the **[6]** 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:

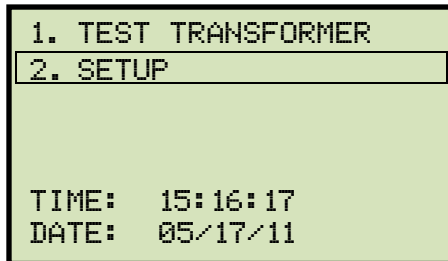


Press any key to return to the "START-UP" menu.

3.4 Setting the Frequency (50 or 60 Hz)

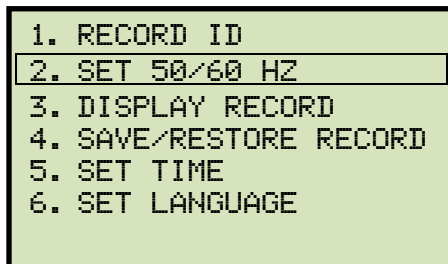
Follow the steps below to set the preferred frequency:

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



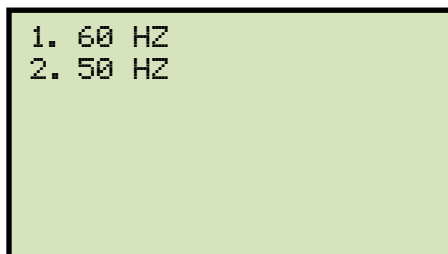
Press the **[2]** key (*SETUP*).

- b. The following screen will be displayed:



Press the **[2]** key (*SET 50/60 HZ*).

- c. The following screen will be displayed:



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



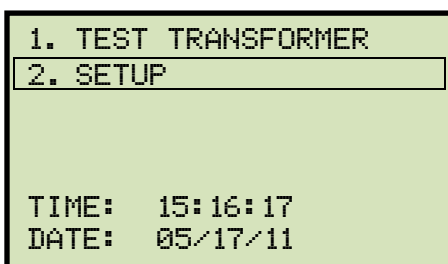
Press any key to return to the "START-UP" menu.

3.5 Performing Tests

3.5.1. Entering Test Record Header Information

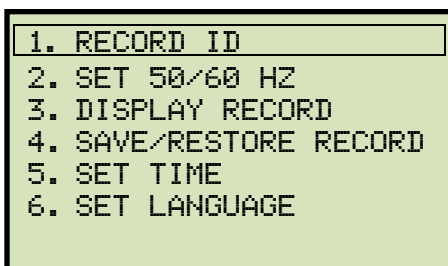
You can enter the test record header information before performing tests. The record header includes identifying information such as the company, station, circuit, manufacturer, etc. Once the header information has been set, it will apply to all subsequent test records. To enter the header information:

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



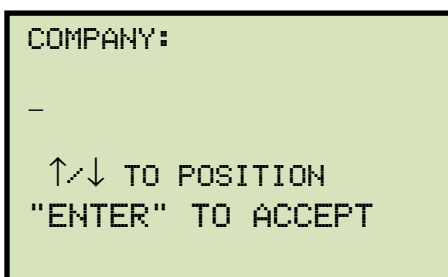
Press the **[2]** key (*SETUP*).

- 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 alpha-numeric keypad.

When pressing a key, the corresponding number on the key will be displayed first. Pressing the key again will display the first letter on the key. Pressing the key again will display the second letter on the key. For example, to type the letter "A", you must press the **[2]** key twice. To erase the character at the cursor position, press the **[CLEAR]** key. Press the **[Contrast ^]** key to move to the next character. Press the **[Contrast v]**

key to move to the previous character. Press the **[ENTER]** key when you are done typing the company name.

- d. The following screen will be displayed:

```
STATION:  
  
-  
  
↑/↓ TO POSITION  
"ENTER" TO ACCEPT
```

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

- e. The following screen will be displayed:

```
CIRCUIT:  
  
-  
  
↑/↓ TO POSITION  
"ENTER" TO ACCEPT
```

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

- f. The following screen will be displayed:

```
MANUFACTURER:  
  
-  
  
↑/↓ TO POSITION  
"ENTER" TO ACCEPT
```

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

- g. The following screen will be displayed:

```
MODEL:
-
↑/↓ TO POSITION
"ENTER" TO ACCEPT
```

Type the transformer's model information using the alpha-numeric keypad and then press the **[ENTER]** key.

- h. The following screen will be displayed:

```
SERIAL NUMBER:
-
↑/↓ TO POSITION
"ENTER" TO ACCEPT
```

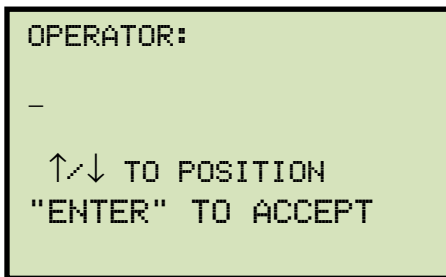
Type the transformer's serial number using the alpha-numeric keypad and then press the **[ENTER]** key.

- i. The following screen will be displayed:

```
KVA RATING:
-
↑/↓ TO POSITION
"ENTER" TO ACCEPT
```

Type the transformer's KVA rating using the alpha-numeric keypad and then press the **[ENTER]** key.

- j. The following screen will be displayed:

A screenshot of a terminal screen with a light green background and a black border. The text is in a monospaced font. It reads: OPERATOR: followed by a horizontal line. Below the line, it says: ↑/↓ TO POSITION and "ENTER" TO ACCEPT.

```
OPERATOR:  
-  
↑/↓ TO POSITION  
"ENTER" TO ACCEPT
```

Type the operator's name using the alpha-numeric keypad and then press the **[ENTER]** key. All header information will be saved, and you will be returned to the "START-UP" menu.

3.5.2. Performing a Transformer Test

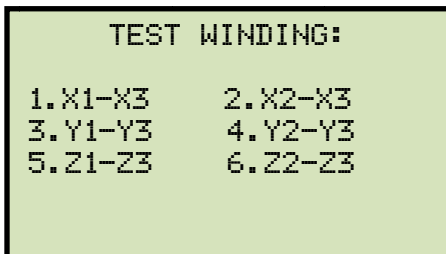
Follow the steps below to test a transformer:

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



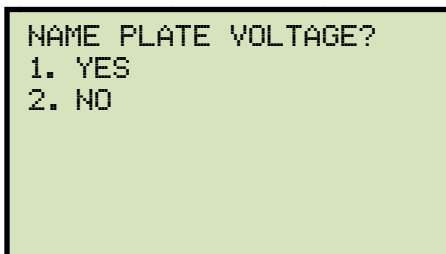
Press the **[1]** key (*TEST TRANSFORMER*).

- b. The following screen will be displayed:



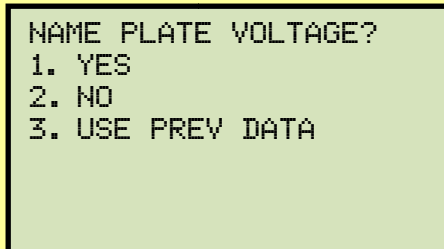
Select the winding by pressing the corresponding numeric key on the keypad.

- c. The following screen will be displayed:



If you had entered name plate voltages for a previous test, the following screen will be displayed instead of the above screen:

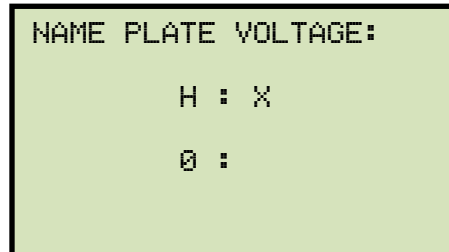
NOTE



Press the **[3]** key if you would like to use the name plate voltage values from the previous test performed. **Continue to step c.**

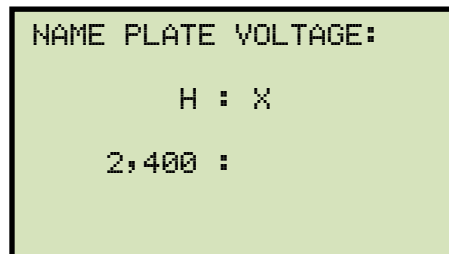
1. YES

Press the **[1]** key (YES) if you would like to enter the transformer name plate voltage values. The following screen will be displayed.



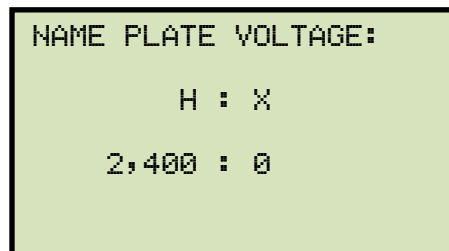
```
NAME PLATE VOLTAGE:
      H : X
      Ø :
```

Type the H winding name plate voltage value using the numeric keypad. The screen will be updated as shown below:



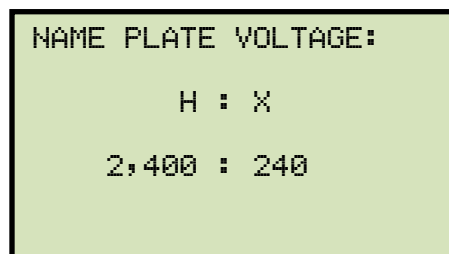
```
NAME PLATE VOLTAGE:
      H : X
    2,400 :
```

Press the **[ENTER]** key. The screen will be updated as shown below:



```
NAME PLATE VOLTAGE:
      H : X
    2,400 : Ø
```

Type the X winding name plate voltage value using the numeric keypad. The screen will be updated as shown below:



```
NAME PLATE VOLTAGE:
      H : X
    2,400 : 240
```

Press the **[ENTER]** key. **Continue to step c.**

2. NO

Press the **[2]** key (NO) if you do not want to enter the transformer name plate voltage values. **Continue to step c.**

- d. The following screen will be displayed:

```
PRESS AND HOLD ARM  
SWITCH TO TEST  
OR  
"STOP" TO ABORT
```

Press and hold the **[ARM]** switch to initiate the test.

- e. The following screen will be displayed while the test is being performed:

```
TEST IN PROGRESS  
PLEASE WAIT...
```

Continue to hold down the **[ARM]** switch. Testing will continue, and the test results will be displayed on the LCD screen when testing has finished:

```
RATIO          %DIFF  
+10.004        0.04  
PHASE = 0.02°
```

You can now release the **[ARM]** switch.

The polarity is displayed as either a plus sign (+) for “in-phase” or a minus sign (-) for “out-of-phase”. The value listed under “% DIFF” is the percentage error.

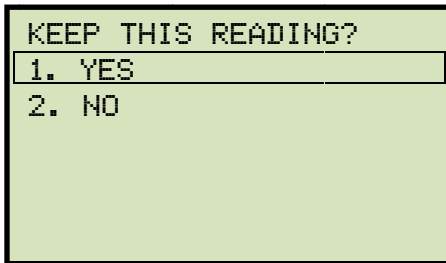


NOTE

The percentage error (% DIFF) is calculated as the absolute value of:
[(Calculated Ratio – Measured Ratio) / Calculated Ratio] x 100

Press any key to continue.

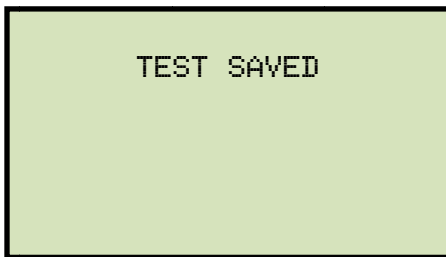
- f. The following screen will be displayed:



```
KEEP THIS READING?
1. YES
2. NO
```

Press the **[1]** key (YES) to save the reading.

- g. The following screen will be displayed:



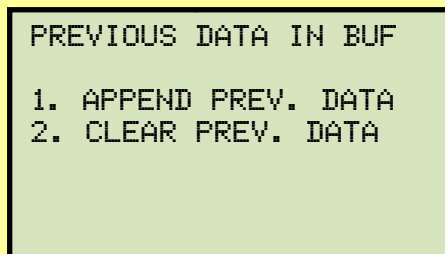
```
TEST SAVED
```

Press any key to continue.



NOTE

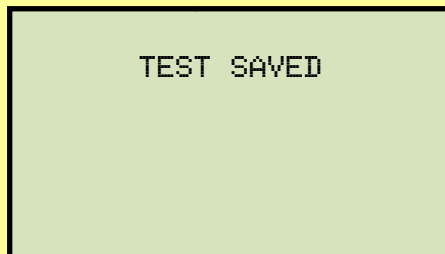
The above screen will be displayed if there is currently no data in the unit's memory buffer. If a test was previously performed or a test record was restored from Flash EEPROM or from a Flash drive, the following screen will be displayed instead:



```
PREVIOUS DATA IN BUF
1. APPEND PREV. DATA
2. CLEAR PREV. DATA
```

Press the **[1]** key (APPEND PREV. DATA) to append the data in the unit's working memory to the current test results, or press the **[2]** key (CLEAR PREV. DATA) to clear any previous data from the unit's memory buffer and only save the current test results.

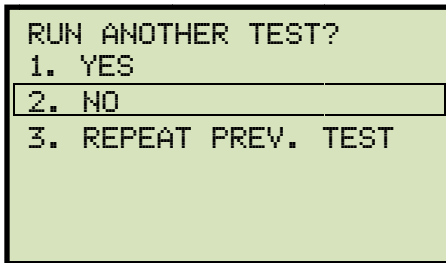
The following screen will then be displayed:



```
TEST SAVED
```

Press any key to continue.

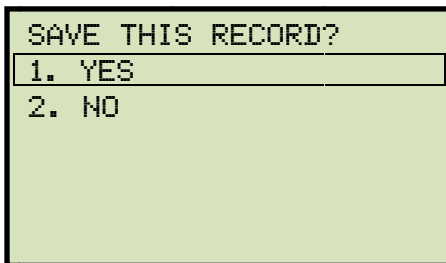
- h. The following screen will be displayed:



```
RUN ANOTHER TEST?
1. YES
2. NO
3. REPEAT PREV. TEST
```

Press the **[2]** key (*NO*).

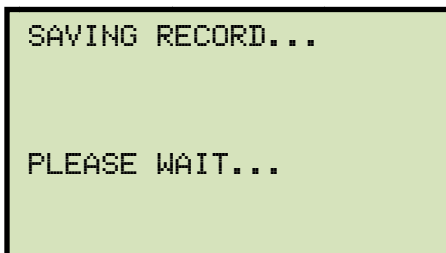
- i. The following screen will be displayed:



```
SAVE THIS RECORD?
1. YES
2. NO
```

Press the **[1]** key (*YES*) to save the test record to the unit's Flash EEPROM.

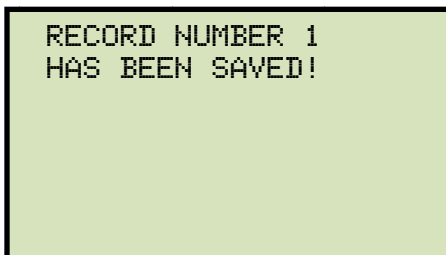
- j. The following screen will be displayed momentarily:



```
SAVING RECORD...

PLEASE WAIT...
```

The following confirmation screen will then be displayed:



```
RECORD NUMBER 1
HAS BEEN SAVED!
```



The unit will automatically assign the record number and will not over-write existing test records.

NOTE

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

3.6 Working With Test Records

3.6.1. Viewing the Contents of the Working Memory

Whenever a test is performed or a test record is retrieved, the data is stored in the CVT-765's working memory. You can view the test data using the steps below:

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

```
1. TEST TRANSFORMER
2. SETUP
TIME: 15:16:17
DATE: 05/17/11
```

Press the **[2]** key (*SETUP*).

- b. The following screen will be displayed:

```
1. RECORD ID
2. SET 50/60 HZ
3. DISPLAY RECORD
4. SAVE/RESTORE RECORD
5. SET TIME
6. SET LANGUAGE
```

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

- c. The basic test record information will be displayed as shown:

```
SINGLE PHASE
NUM TESTS: 1
04/15/11 09:52:50
```

- d. Press the **[Contrast ∇]** key. The test record details will be displayed as shown below:

```
1 SINGLE PHASE
7440 VOLTS

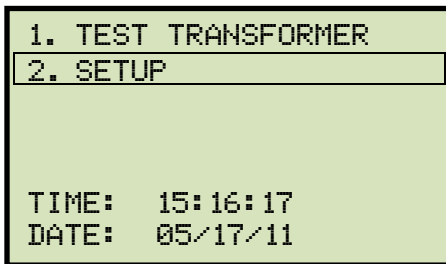
RATIO          %DIFF
10.004         0.04
```

Press the **[STOP]** key to return to the "START-UP" menu.

3.6.2. Saving Test Results to a Test Record

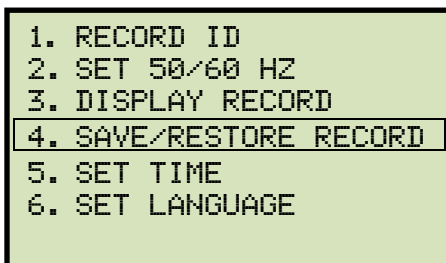
After performing a test, the user is presented the option to save the test results to the unit's Flash EEPROM or to a USB Flash Drive. If the test results are not saved immediately after performing a test, they will still remain in the working memory and can be saved later, as long as a new test has 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 3.6.3 and 3.6.4), and then start from the "START-UP" menu:



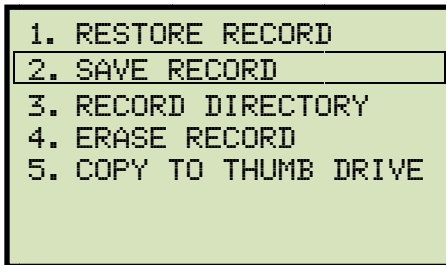
Press the **[2]** key (*SETUP*).

- b. The following screen will be displayed:



Press the **[4]** key (*SAVE/RESTORE RECORD*).

- c. The following screen will be displayed:

**NOTE**

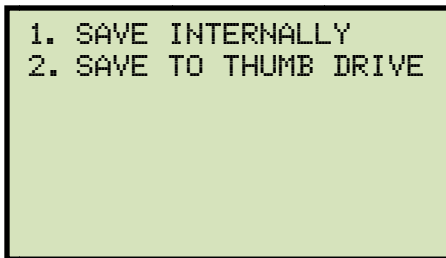
Option 5 (*COPY TO THUMB DRIVE*) will be listed only if a USB Flash drive is connected to the CVT-765.

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:

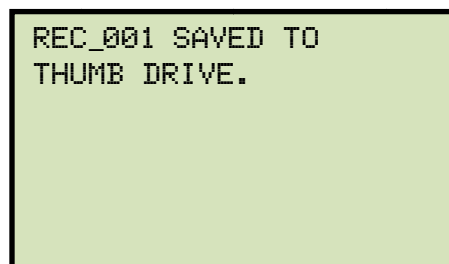


1. *SAVE INTERNALLY*

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

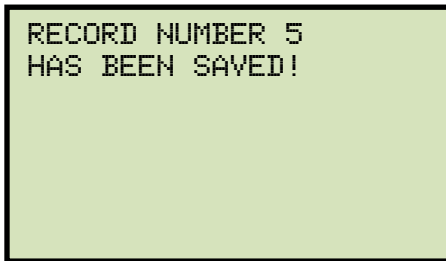
2. *SAVE TO THUMB DRIVE*

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:

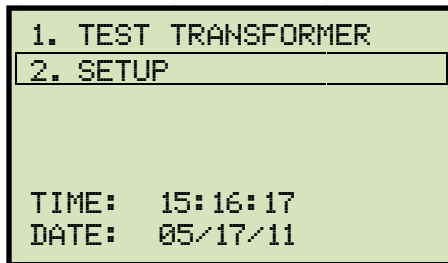


Press any key to return to the "START-UP" menu.

3.6.3. Restoring a Test Record From Flash EEPROM

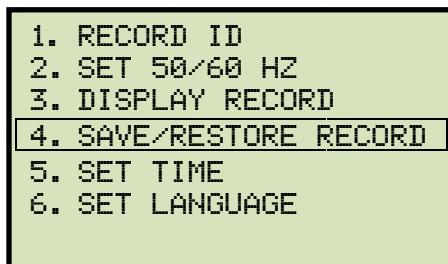
Use the steps below to restore a test record from the CVT-765's Flash EEPROM to the working memory:

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



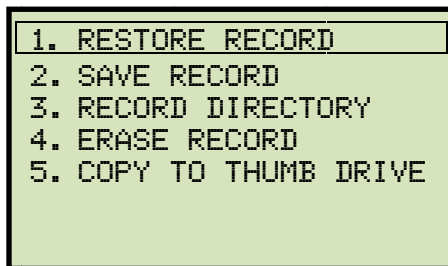
Press the **[2]** key (*SETUP*).

- b. The following screen will be displayed:



Press the **[4]** key (*SAVE/RESTORE RECORD*).

- c. The following screen will be displayed:

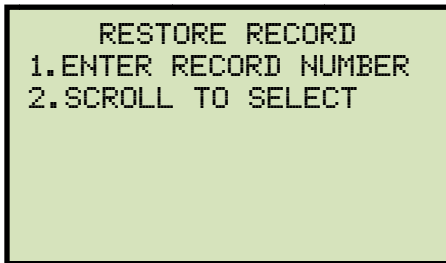


Option 5 (*COPY TO THUMB DRIVE*) will be listed only if a USB Flash drive is connected to the CVT-765.

NOTE

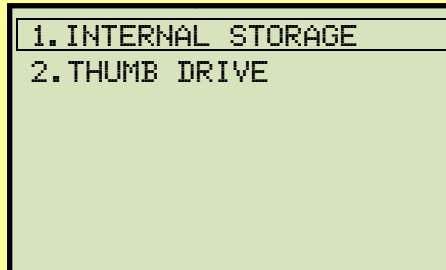
Press the **[1]** key (*RESTORE RECORD*).

- d. The following screen will be displayed:



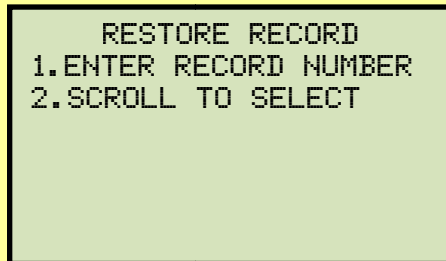
If you have a USB Flash drive inserted in the CVT-765's "USB MEM" port, the following screen will be displayed instead of the above screen:

NOTE



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

The following screen will be displayed:



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:



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

- 1.2. The following screen will be displayed:

```
RECORD RESTORED!  
DISPLAY RECORD?  
1.YES  
2.NO
```

Press the **[1]** key (YES) to display the test record.

- 1.3. The basic information about the restored test record will be displayed as shown:

```
SINGLE PHASE  
NUM TESTS: 1  
04/15/11 09:52:50
```

Press the **[Contrast v]** key. The test record details will be displayed as shown:

```
1 SINGLE PHASE  
7440 VOLTS  
  
RATIO          %DIFF  
10.004         0.04
```

Press the **[STOP]** key to return to the "START-UP" menu. The restored test record will remain loaded in the working memory.

2. *SCROLL TO SELECT*

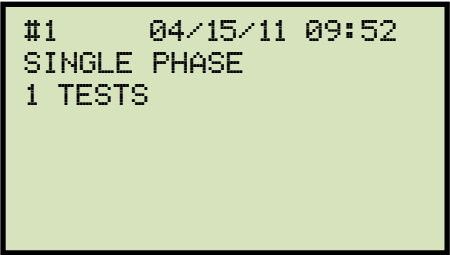
Press the **[2]** key (*SCROLL TO SELECT*) to scroll through a directory of the stored test records.

- 2.1. The following screen will be displayed:

```
RECORDS DIRECTORY  
  
"UP" TO SCROLL FWD  
"DWN" TO SCROLL RVS
```

Press the **[Contrast ^]** button or the **[Contrast v]** key to display the next or previous test record, respectively.

The basic test record information will be displayed as shown:



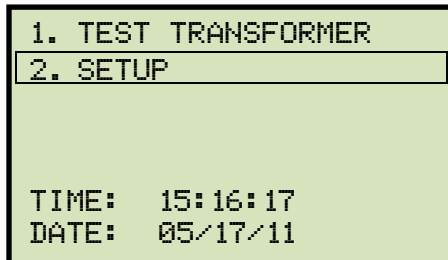
```
#1      04/15/11 09:52  
SINGLE PHASE  
1 TESTS
```

When you have located the test record that you would like to restored, press the **[ENTER]** key. **Continue to step 1.2 on page 26.**

3.6.4. Restoring a Test Record From a USB Flash Drive

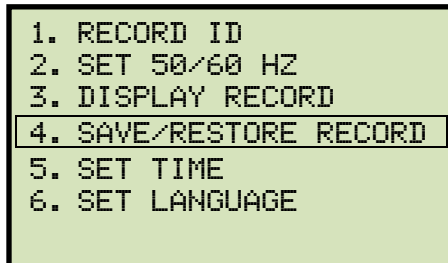
Use the steps below to restore a test record from a USB Flash drive to the CVT-765's working memory:

- a. Make sure the USB Flash drive containing the test record(s) is inserted in the CVT-765's USB Flash drive port ("USB MEM" port). Then start from the "START-UP" menu:



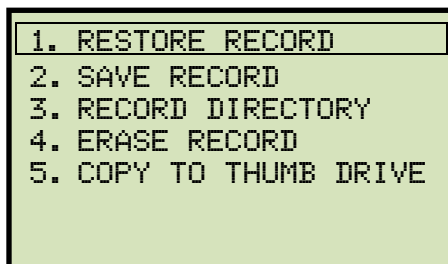
Press the **[2]** key (*SETUP*).

- b. The following screen will be displayed:



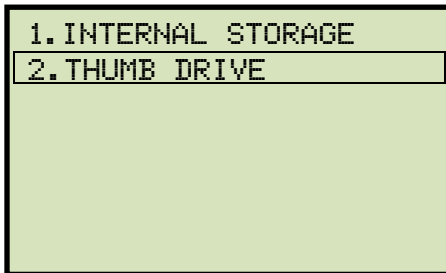
Press the **[4]** key (*SAVE/RESTORE RECORD*).

- c. The following screen will be displayed:



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

- d. The following screen will be displayed:



A monochrome screen with a light green background. It displays two menu items: "1.INTERNAL STORAGE" and "2.THUMB DRIVE". The second item is highlighted with a horizontal bar.

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

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

- e. The following screen will be displayed:



A monochrome screen with a light green background. It displays the text "RESTORE THUMB DRIVE" at the top and "REC_" in the center, indicating a prompt for a record number.

```
RESTORE THUMB DRIVE

REC_
```

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:

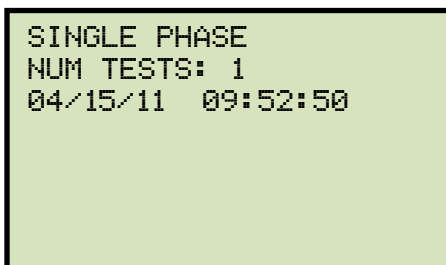


A monochrome screen with a light green background. It displays "REC_000 RESTORED!" and "DISPLAY RECORD?". Below this are two menu items: "1.YES" (highlighted) and "2.NO".

```
REC_000 RESTORED!
  DISPLAY RECORD?
1.YES
2.NO
```

Press the **[1]** key (*YES*) to display the restored test record.

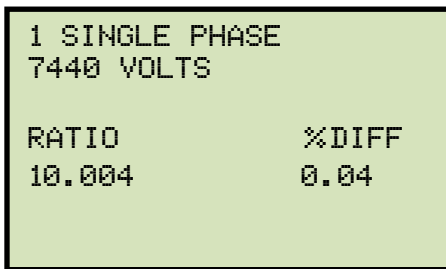
- g. The basic information about the restored test record will be displayed as shown below:



A monochrome screen with a light green background. It displays the following text: "SINGLE PHASE", "NUM TESTS: 1", and "04/15/11 09:52:50".

```
SINGLE PHASE
NUM TESTS: 1
04/15/11 09:52:50
```


Press the **[Contrast √]** key. The test record details will be displayed as shown below:



```
1 SINGLE PHASE
7440 VOLTS

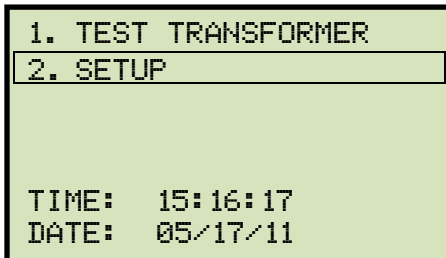
RATIO          %DIFF
10.004         0.04
```

Press the **[STOP]** key to return to the "START-UP" menu. The restored test record will remain loaded in the working memory.

3.6.5. Copying Test Records to a USB Flash Drive

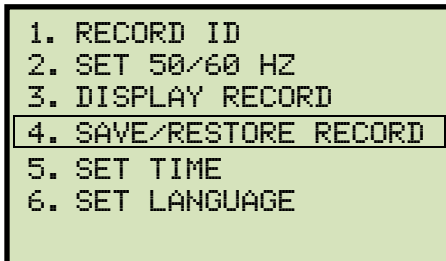
Use the steps below to copy one or all test records from the unit's Flash EEPROM to a connected USB Flash drive:

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



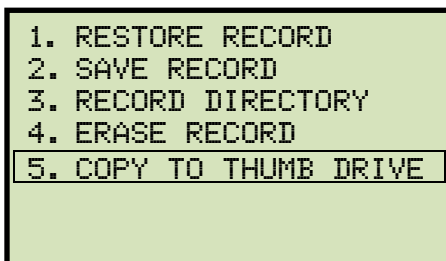
Press the **[2]** key (*SETUP*).

- b. The following screen will be displayed:



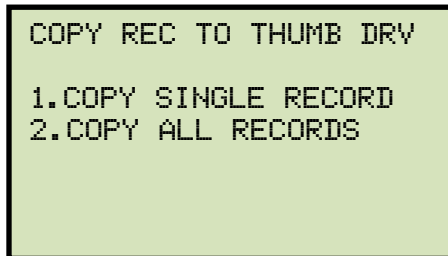
Press the **[4]** key (*SAVE/RESTORE RECORD*).

- c. The following screen will be displayed:



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

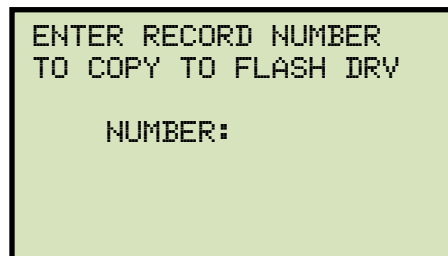
- d. The following screen will be displayed:



```
COPY REC TO THUMB DRV  
1.COPY SINGLE RECORD  
2.COPY ALL RECORDS
```

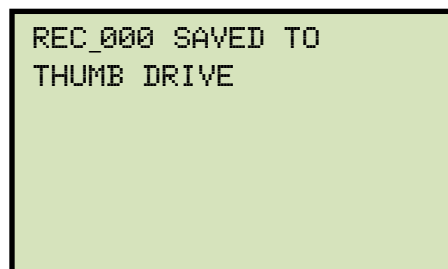
1. *COPY SINGLE RECORD*

Press the **[1]** key (*COPY SINGLE RECORD*) to copy a single test record from the CVT-765's Flash EEPROM to the connected USB Flash drive. The following screen will be displayed:



```
ENTER RECORD NUMBER  
TO COPY TO FLASH DRV  
  
NUMBER:
```

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:

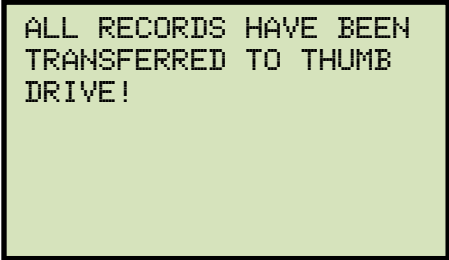


```
REC_000 SAVED TO  
THUMB DRIVE
```

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 CVT-765'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:



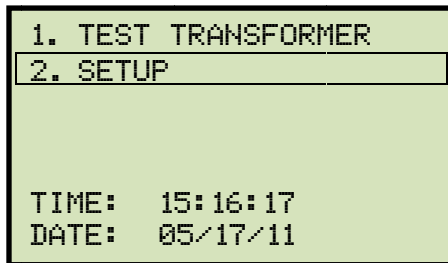
ALL RECORDS HAVE BEEN
TRANSFERRED TO THUMB
DRIVE!

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

3.6.6. Viewing the Test Record Directory

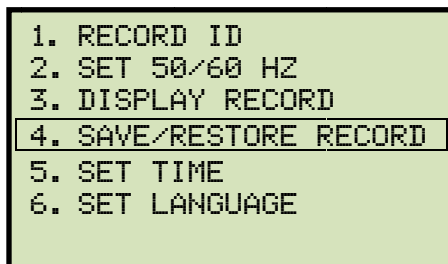
Use the steps below to browse through a directory of the test records stored in the CVT-765's Flash EEPROM memory:

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



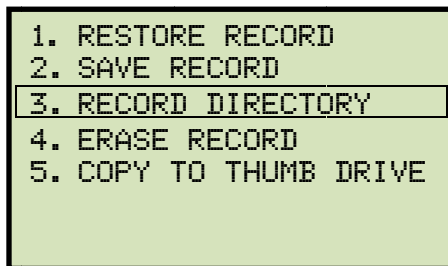
Press the **[2]** key (*SETUP*)

- b. The following screen will be displayed:



Press the **[4]** key (*SAVE/RESTORE RECORD*).

- c. The following screen will be displayed:



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

NOTE

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

- d. The following screen will be displayed:

```
RECORDS DIRECTORY  
"UP" TO SCROLL FWD  
"DWN" TO SCROLL RVS
```

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

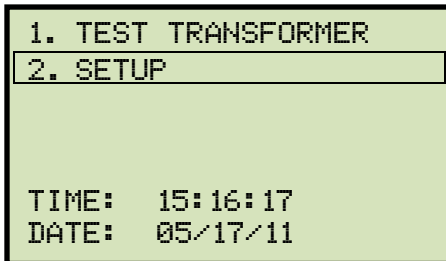
```
SINGLE PHASE  
NUM TESTS: 1  
04/15/11 09:52:50
```

You can continue to scroll through the record directory by pressing the **[Contrast ^]** and **[Contrast v]** keys. Press the **[STOP]** key to return to the "START-UP" menu.

3.6.7. Erasing Test Records from the Flash EEPROM

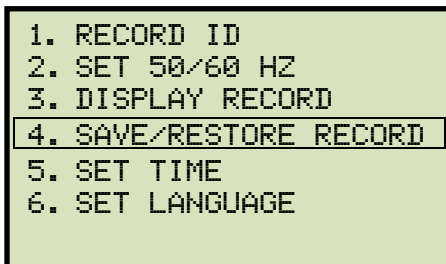
Follow the steps below to erase test records from the Flash EEPROM:

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



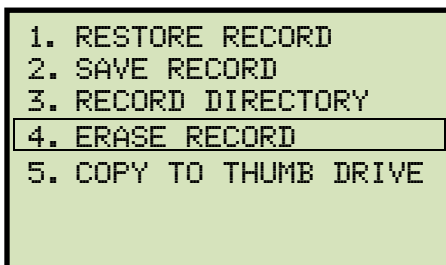
Press the **[2]** key (*SETUP*).

- b. The following screen will be displayed:



Press the **[4]** 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 CVT-765'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:

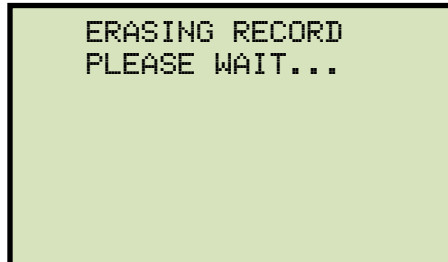
```
ERASE RECORD  
NUMBER:
```

**NOTE**

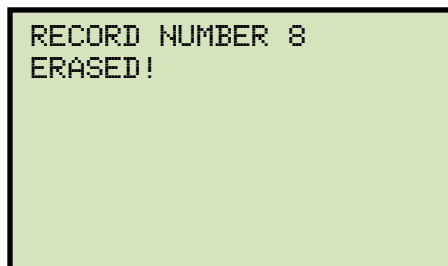
You can cancel the process and return to the "START-UP" menu by pressing the **[STOP]** key.

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 3.6.6.

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

A green rectangular screen with a black border. The text "ERASING RECORD" is on the first line and "PLEASE WAIT..." is on the second line, both in a monospaced font.

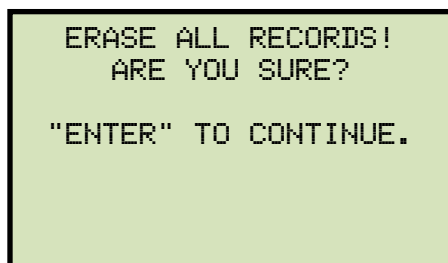
The following screen will be displayed when the test record has been completely erased:

A green rectangular screen with a black border. The text "RECORD NUMBER 8" is on the first line and "ERASED!" is on the second line, both in a monospaced font.

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:

A green rectangular screen with a black border. The text "ERASE ALL RECORDS!" is on the first line, "ARE YOU SURE?" is on the second line, and "'ENTER' TO CONTINUE." is on the third line, all in a monospaced font.


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:



ERASING RECORDS
PLEASE WAIT...

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



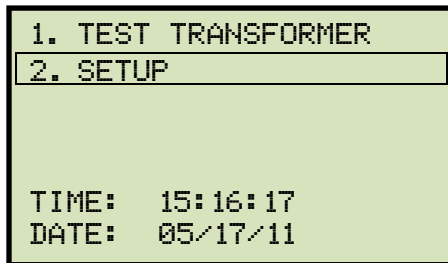
RECORDS ERASED!

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

3.6.8. Erasing Test Records from a USB Flash Drive

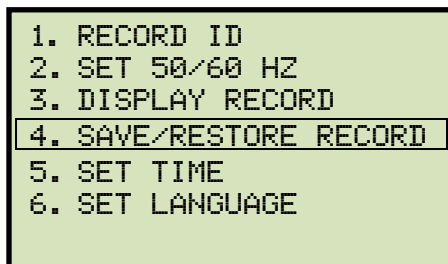
Follow the steps below to erase test records from a USB Flash drive:

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



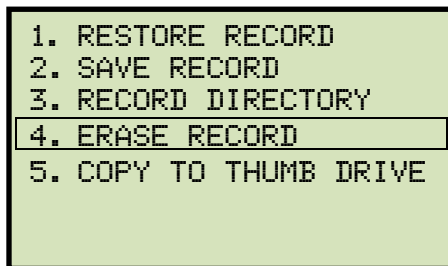
Press the **[2]** key (*SETUP*).

- b. The following screen will be displayed:



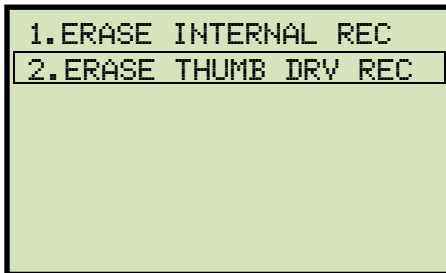
Press the **[4]** key (*SAVE/RESTORE RECORD*).

- c. The following screen will be displayed:



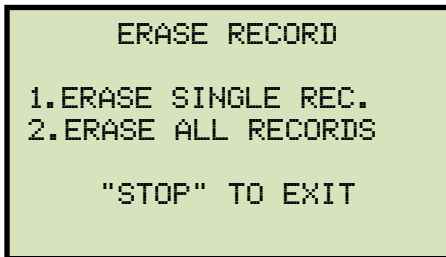
Press the **[4]** key (*ERASE RECORD*).

- d. The following screen will be displayed:



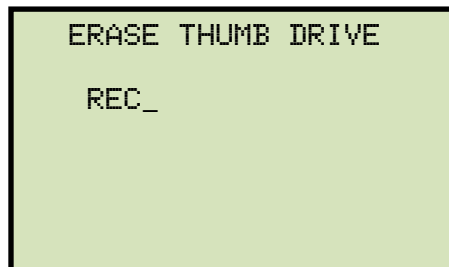
Press the **[2]** key (*ERASE THUMB DRV REC*).

- e. The following screen will be displayed:

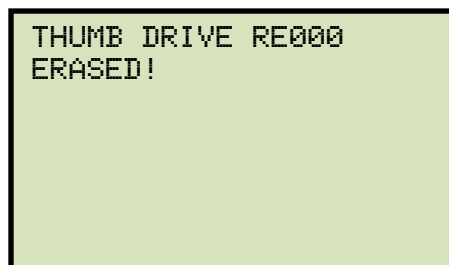


1. *ERASE SINGLE REC.*

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:



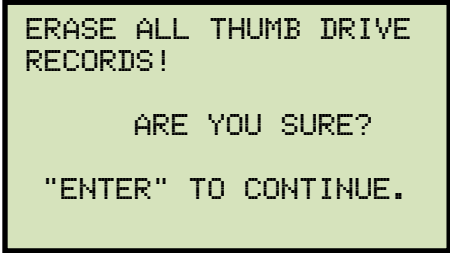
Type the record number that you would like to erase using the alpha-numeric keypad and then press the **[ENTER]** key. The test record will be erased from the USB Flash drive and the following screen will be displayed:



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:

A green rectangular screen with a black border. The text is in a monospaced font. It reads: "ERASE ALL THUMB DRIVE RECORDS!" on the first line, "ARE YOU SURE?" on the second line, and "\"ENTER\" TO CONTINUE." on the third line.


```
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:

A green rectangular screen with a black border. The text is in a monospaced font. It reads: "ALL THUMB DRIVE RECORDS ERASED!" on the first line.

```
ALL THUMB DRIVE
RECORDS ERASED!
```

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



**Vanguard Instruments
Company, Inc.**

1520 S. Hellman Ave • Ontario, CA 91761 • USA

Phone: 909-923-9390 • Fax: 909-923-9391

www.vanguard-instruments.com

Copyright © 2015 by Vanguard Instruments Company, Inc.

CVT-765 User's Manual • Revision 1.2 • October 22, 2015 • TA