

VBT-75P S2 VACUUM BOTTLE TESTER

USER'S MANUAL



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July 2017
Revision 1.0

SAFETY SUMMARY

FOLLOW EXACT OPERATING PROCEDURES

Any deviation from the procedures described in this operator's manual may create one or more safety hazards, damage the VBT-75P S2, or cause errors in the test results; Vanguard Instruments Co., Inc. assumes no liability for unsafe or improper use of the VBT-75P S2. The following safety precautions must be observed during all phases of test set up, test hookups, testing, and test-lead disconnects.

SAFETY WARNINGS AND CAUTIONS

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

SERVICE AND REPAIR

- Do not install substitute parts or perform any unauthorized modification to any VBT-75P S2 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 VBT-75P S2 has an IP rating of 32.

Pollution Degree: The VBT-75P S2 has a pollution rating of 2.

Operating Voltage: The VBT-75P S2 is rated for use with an operating voltage of 120V or 240V, auto-ranging $\pm 10\%$ of selected voltage.

Power Cord: The VBT-75P S2 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 VBT-75P S2 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 VBT-75P S2:

- 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.

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CONVENTIONS USED IN THIS DOCUMENT

This document uses the following conventions:

- A key or switch on the VBT-75P S2 is indicated as **[KEY]** and **[SWITCH]**.
- Screen and menu names are referenced as "SCREEN/MENU NAME".
- VBT-75P S2 LCD screen output is shown as:

```
DISPLAY TEXT LINE 1  
DISPLAY TEXT LINE 2  
DISPLAY TEXT LINE 3  
DISPLAY TEXT LINE 4
```

- 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 VBT-75P S2 is Vanguard's second generation microprocessor-based, portable 75 kV dc vacuum bottle tester. This lightweight, portable tester is designed for testing circuit-breaker vacuum bottles in the field and at the shop.

Test voltages can be selected from 10 kV dc to 75 Kv dc in 1 Kv steps. The high voltage test time can be set from 5 seconds to 2 minutes. The test voltage is raised to the selected voltage and held for the test time duration. The test voltage and leakage current are displayed on the LCD during testing. After the test time duration has elapsed and the leakage current did not pass the pre-set value of 100 μ A, 200 μ A, or 300 μ A, the test voltage is returned to zero and a "Pass" message is displayed. If a flash-over condition occurs, such as bottle failure, the test voltage is immediately turned off, a "Failure" message is displayed on the LCD screen, and the "TEST FAIL" LED light on the unit is also illuminated.

The presence of high voltage is indicated by an audible tone and an illuminated "HIGH VOLTAGE" LED light. For additional operator safety, an "ARM" switch must be held down during testing.

The VBT-75P S2 features a back-lit LCD screen (20 characters by 4 lines) that is viewable in both bright sunlight and low-light levels. A rugged, 16-key, membrane keypad is used to control the unit. Test results can be printed on the built-in 2.5" wide thermal printer.

The VBT-75P S2 can store up to 84 records of 16 readings in Flash EEPROM. Test records can be retrieved and printed on the built-in thermal printer, or they can be transferred to a PC via the unit's USB Flash drive port. The VBT-75P S2's firmware can also be updated in the field via the same USB Flash drive port. Windows-based Vanguard Universal Software (VUS) is provided with each unit. Using this software, test records can be retrieved from the VBT-75P S2 and then stored on the PC for future analysis and report generation. Additionally, test records can be exported in PDF, Excel, and XML formats.

The VBT-75P S2 is furnished with a 10-foot test cable that is terminated with a quick-disconnect test clip. A transportation case is also included.

1.2 Printer Paper

The VBT-75P S2's built-in thermal printer uses 2.5-inch 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: VIC TP-3 paper

BG Instrument Co.

13607 E. Trent Avenue

Spokane, WA 99216

Tel: 509-893-9881

Fax: 509-893-9803

Part Number: VIC TP-3 paper

1.3 Technical Specifications

Table 1. VBT-75P S2 Technical Specifications

| | |
|--------------------------------|--|
| TYPE | Portable 75 kV vacuum bottle tester with built-in thermal printer |
| PHYSICAL SPECIFICATIONS | Dimensions: 17"W x 10.5"H x 6.5" D (42.7 cm x 26.9 cm x 16.5 cm) Weight: 12 lbs. (5.44 Kg) |
| INPUT POWER | 90 – 240 Vac, 2A, 50/60 Hz |
| OUTPUT VOLTAGE | 10kV – 75 kV dc in 1 kV steps; accuracy: 1.5% |
| OUTPUT RIPPLE VOLTAGE | 3% max |
| DISCHARGE TIME | Maximum discharge time for internal high voltage is 3 seconds |
| DISPLAY | back-lit LCD (20 characters x 4 lines); viewable in bright sunlight and low-light levels |
| INDICATORS | Failure Indicator: LED illuminates when test current exceeds 100 μ A, 200 μ A, or 300 μ A (programmable) High Voltage Indicator: LED illuminates when high voltage is present |
| KEYPAD | 16-key rugged membrane keypad |
| INTERNAL DATA STORAGE | stores up to 84 records of 16 readings each |
| PC SOFTWARE | Windows-based software is included with purchase price |
| PRINTER | Built-in 2.5" wide thermal printer |
| ENVIRONMENT | Operating: -10° to 50° C (15° to +122° F); Storage: -30° C to 70° C (-22° to +158° F) |
| HUMIDITY (MAX) | 90% RH @ 40° C (104° F) non-condensing |
| ALTITUDE (MAX) | 2000m (6562 ft) to fully safety specifications |
| CABLES | one 10-foot high-voltage cable, one 10-foot high voltage return cable, one ground cable, one power cord |
| FURNISHED ACCESSORIES | Shipping case is included |
| 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.

1.4 VBT-75P S2 Controls and Indicators

The VBT-75P S2's controls and indicators are shown in Figure 1 below. A leader line with an index number points to each control and indicator, which is cross-referenced to a functional description in Table 2. The table describes the function of each item on the control panel. The purpose of the controls and indicators may seem obvious, but users should become familiar with them before using the VBT-75P S2. Accidental misuse of the controls will usually cause no serious harm. Users should also be familiar with the safety summary found on the front page of this User's Manual.

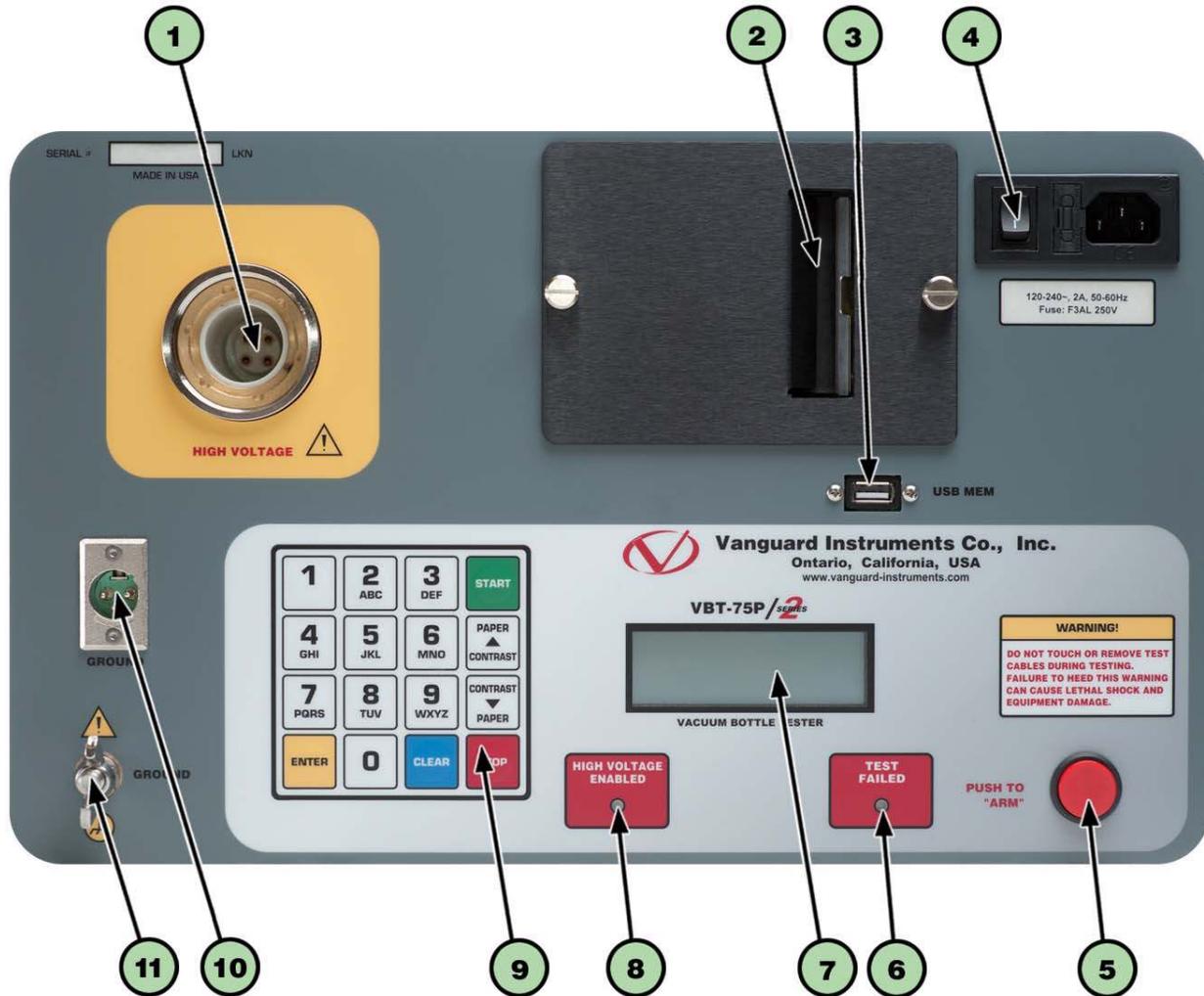


Figure 1. VBT-75P S2 Controls and Indicators

Table 2. Functional Descriptions of VBT-75P S2 Controls and Indicators

| Item Number | Panel Markings | Functional Description |
|-------------|----------------------|---|
| 1 | HIGH VOLTAGE | High voltage cable connector |
| 2 | | Built-in 2.5" wide thermal printer |
| 3 | USB MEM | USB Flash drive port |
| 4 | | Input power connector with built-in fuse holder and power switch |
| 5 | PUSH TO "ARM" | Arm switch; press and hold during testing. |
| 6 | TEST FAILED | Test failure indicator. This indicator turns on if the test current exceeds the present current threshold (100, 200, or 300 μ A). |
| 7 | | Back-lit LCD screen (20 characters x 4 lines) |
| 8 | HIGH VOLTAGE ENABLED | This indicator turns on when high test voltage is present at the test leads. |
| 9 | | Rugged membrane keypad |
| 10 | GROUND | High voltage return cable connector |
| 11 | GROUND | VBT ground stud. Connect ground stud to substation ground using the provided cable. |

2.0 CABLE CONNECTIONS

The VBT-75P S2 comes furnished with one 10-foot (3.05m) high voltage cable and one 10-foot voltage return cable. Both cables are terminated with alligator clamps that are used to connect to the vacuum bottle being tested. A typical cable connection is shown in Figure 2 below.

 **WARNING**

- To protect the VBT-75P S2 against static discharge in the substation, always connect the unit's ground stud to the substation ground.
- The circuit breaker must be off-line and completely isolated.
- The vacuum bottle under test should be in the OPEN position.

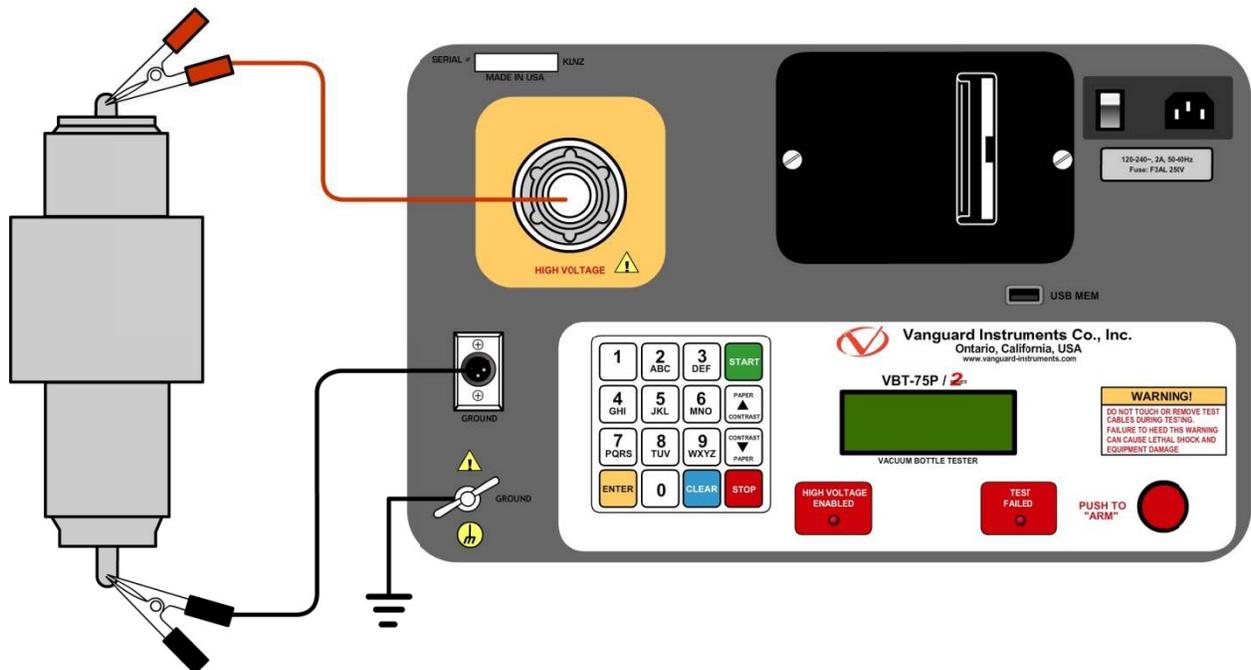


Figure 2. VBT-75P S2 Connection Diagram

3.0 OPERATING PROCEDURES

3.1 Setting the Date and Time

Follow the steps below to set the date and time for the VBT-75P S2's internal clock:

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

```
1.RUN TEST   07/10/17
2.SETUP      11:01:00
3.RECORDS
  CABLE VTG: 0V
```

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

- b. The following screen will be displayed:

```
1. ENTER SHOT ID
2. SET TIME
3. SET LANGUAGE
4. CAL PRINT ON/OFF
```

Press the **[2]** key (*SET TIME*).

- c. The following screen will be displayed:

```
ENTER
MM-DD-YY  HH:MM:SS
—
```

Enter the date and time using the membrane keypad. The date and time will be set and you will be returned to the "START-UP" menu.

3.2 Adjusting LCD Screen Contrast

To adjust the LCD screen contrast, press and hold either the **[▲]** key to increase the contrast or the **[▼]** key to decrease the contrast. Release the key once the desired screen contrast has been achieved.

3.3 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:

```

1.RUN TEST  07/10/17
2.SETUP     11:01:00
3.RECORDS
  CABLE VTG: 0V
  
```

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

- b. The following screen will be displayed:

```

1. ENTER SHOT ID
2. SET TIME
3. SET LANGUAGE
4. CAL PRINT ON/OFF
  
```

Press the **[1]** key (*ENTER SHOT ID*).

- c. The following screen will be displayed:

```

COMPANY:
-
(⇄ TO POSITION)
  
```

Type the company name using the 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 **[▲]** key to move to the next character. Press the **[▼]** key to move to the previous character. Press the **[ENTER]** key when you are done typing.

- d. The following screen will be displayed:

```

STATION:
-
(⇄ TO POSITION)
  
```

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

- e. The following screen will be displayed:

```
CIRCUIT :  
-  
  
(↕ TO POSITION)
```

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

- f. The following screen will be displayed:

```
MANUFACTURER :  
-  
  
(↕ TO POSITION)
```

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

- g. The following screen will be displayed:

```
MODEL :  
-  
  
(↕ TO POSITION)
```

Type the model information using the keypad and then press the **[ENTER]** key.

- h. The following screen will be displayed:

```
SERIAL NUMBER :  
-  
  
(↕ TO POSITION)
```

Type the serial number using the keypad and then press the **[ENTER]** key.

- i. The following screen will be displayed:

```
KVA :  
-  
  
(↕ TO POSITION)
```

Enter the KVA value using the keypad and then press the **[ENTER]** key.

- j. The following screen will be displayed:

```
OPERATOR :  
_   
  
(↕ TO POSITION)
```

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

3.4 Setting the Preferred Interface Language

Follow the steps below to set the preferred language for the VT-75P S2's interface (English, Turkish, and Spanish are supported):

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

```
1.RUN TEST 07/10/17
2.SETUP    11:01:00
3.RECORDS
  CABLE VTG: 0V
```

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

- b. The following screen will be displayed:

```
1.ENTER SHOT ID
2.SET TIME
3.SET LANGUAGE
4.CAL PRINT ON/OFF
```

Press the **[3]** key (*SET LANGUAGE*).

- c. The following screen will be displayed:

```
1.ENGLISH
2.TURKISH
3.SPANISH
```

Select the preferred language by pressing the corresponding number on the keypad.

- d. A confirmation message will be displayed as shown below:

```
ENGLISH SET
```

Press any key to return to the "START-UP" menu. Menu items and messages will now be displayed in the selected language.

3.5 Setting the Option to Print the Calibration Expiration Date

The VBT-75P S2 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:

```

1.RUN TEST  07/10/17
2.SETUP     11:01:00
3.RECORDS
  CABLE VTG:  0V
  
```

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

- b. The following screen will be displayed:

```

1. ENTER SHOT ID
2. SET TIME
3. SET LANGUAGE
4. CAL PRINT ON/OFF
  
```

Print the **[4]** key (*CAL PRINT ON/OFF*).

- c. The following screen will be displayed:

```

CAL DATE PRINTING:
1. ENABLE
2. DISABLE
  
```

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

```

CAL DATE PRINTING
ENABLED.
  
```

The calibration date printing option will be enabled and you will be returned to the "START-UP" menu.

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

```

CAL DATE PRINTING
DISABLED.
  
```

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

3.6 Performing a Test

Follow the steps below to perform a test:

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

```
1. RUN TEST  07/10/17
2. SETUP     13:37:29
3. RECORDS
   CABLE VTG: 0V
```

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

- b. The following screen will be displayed:

```
1. 5 Sec    2. 10 Sec
3. 30 Sec   4. 60 Sec
5. 2 Min
```

Select the test time by pressing the corresponding number on the keypad. For this example, we will use the 5 second test time by pressing the **[1]** key.

- c. The following screen will be displayed:

```
ENTER TEST VOLTAGE:
(10 to 75)
 0 KV
```

Type the desired test voltage using the numeric keypad and then press the **[ENTER]** key.

- d. The following screen will be displayed:

```
1. 300µA
2. 200µA
3. 100µA
```

Select the leakage current limit by pressing the corresponding number on the keypad. For this example, we will select 300µA by pressing the **[1]** key.

- e. The following screen will be displayed summarizing the test parameters:

```
TEST PARAMETERS:
75KV 5Sec 300µA
"CLEAR TO CHANGE OR
"ENTER" TO CONTINUE
```

Press the **[ENTER]** key to confirm the test parameters.

- f. The following screen will be displayed:

```
PRESS RED SWITCH  
TO START TEST
```

Press and hold the red **[PUSH TO "ARM"]** switch.

- g. The VBT-75P S2 will initiate the test and start the timer based on the test duration selected. The screen will be updated with the test voltage and the leakage current as shown below:

```
TEST IN PROGRESS  
74.9KV      186 µA  
Time: 00:03
```

- h. After the test time duration has elapsed, the test results will be displayed. If the leakage current did not pass the preset value set in step d, the test voltage is returned to zero and a "PASS" message is displayed as shown below:

```
TEST COMPLETE  
>>> PASS <<<
```

However, if a flash-over condition occurred, such as bottle failure, the test voltage is immediately turned off and a "FAIL" message is displayed as shown below:

```
TEST COMPLETE  
>>> FAIL <<<
```

The "TEST FAIL" LED on the front panel will also be illuminated to indicate a test failure.

Release the **[ARM SWITCH]** and press any key to continue.

- i. The following screen will be displayed:

```
PRINT TEST RESULTS?  
1. YES  
2. NO
```

Press the **[1]** key (YES) to print the test results. A sample test results printout is shown in Figure 3.

- j. The test results will be printed, and the following screen will be displayed:

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

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

- k. The following screen will be displayed:

```
TEST SAVED
```

Press any key to continue.

- l. The following screen will be displayed:

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

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

- m. The following screen will be displayed:

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

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

- n. The following screen will be displayed:

```
RECORD 6 SAVED!
```

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

| TEST RESULTS | |
|----------------|---------------|
| DATE:07/09/17 | TIME:07:39:01 |
| COMPANY: | VANGUARD |
| STATION: | SHOP |
| CIRCUIT: | 15KV |
| MFR: | ABB |
| MODEL: | 681A308H24 |
| S/N: | 9809I82201 |
| KVA RATING: | |
| OPERATOR: | |
| TEST VOLTAGE: | 75 KV |
| TEST LIMIT: | 300 μ A |
| TEST TIME: | 0:10 |
| LAST MEAS CUR: | 98.08 μ A |
| LAST MEAS VTG: | 80.2 KV |
| TEST PASSED!! | |
| NOTES: | _____ |
| TEST VOLTAGE: | 75 KV |
| TEST LIMIT: | 300 μ A |
| TEST TIME: | 0:10 |
| TEST FAILED!! | |
| NOTES: | _____ |
| DATE:07/09/17 | TIME:07:39:43 |

Figure 3. Sample Test Results Printout

 The VBT-75P S2 can store up to 84 records of 16 readings each.

NOTE

3.7 Printing a Directory of Test Records Stored in the VBT-75P S2's Memory

You can print a directory of all the test records stored in the VBT-75P S2's Flash EEPROM using the steps below:

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

```

1.RUN TEST  07/10/17
2.SETUP     13:37:29
3.RECORDS
  CABLE VTG: 0V
  
```

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

- b. The following screen will be displayed:

```

RECORD OPERATIONS
1.SAVE      2.RESTORE
3.REVIEW    4.DIR
5.ERASE
  
```

Press the **[4]** key (*DIR*).

- c. The following screen will be displayed:



If a USB Flash drive is inserted in the VBT-75P S2's USB Flash drive port, the following screen will be displayed:

NOTE

```

1.INTERNAL DIRECTORY
2.THUMB DRIVE DIR
  
```

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

```

1.PRINT DIRECTORY
2.SCROLL DIRECTORY
  
```

1. PRINT DIRECTORY

Press the **[1]** key to print the test record directory on the unit's built-in thermal printer. The directory listing will be printed on the thermal printer and you will be returned to the "START-UP" menu.

A sample directory printout is shown in Figure 4.

2. SCROLL DIRECTORY

Press the **[2]** key to scroll through the record directory on the unit's LCD screen. The following screen will be displayed:

```

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

Press either the **[▲]** key or the **[▼]** key to display the next or previous test record, respectively. The test record information will be displayed as shown:

```

03/16/15 08:59
 1 TEST
    
```

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

| TEST DIRECTORY |
|--|
| RECORD NUMBER: 3 DATE/TIME: 07/09/17 07:39:01 NUMBER OF TESTS: 2 STATION: CIRCUIT: MFR: MODEL: S/N: |
| RECORD NUMBER: 2 DATE/TIME: 07/09/17 09:31:01 NUMBER OF TESTS: 2 STATION: CIRCUIT: MFR: MODEL: S/N: |
| RECORD NUMBER: 1 DATE/TIME: 07/09/17 07:43:07 NUMBER OF TESTS: 1 STATION: CIRCUIT: MFR: MODEL: S/N: |

Figure 4. Sample Test Record Directory Printout

3.8 Printing a Directory of Test Records Stored in a USB Flash Drive

You can print a directory of all the test records stored in a USB Flash drive using the steps below:

- a. Insert the USB Flash drive in the VBT-75P S2's USB Flash drive port.
- b. Start from the "START-UP" menu:

```
1.RUN TEST 07/10/17
2.SETUP    13:37:29
3.RECORDS
  CABLE VTG: 0V
```

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

- c. The following screen will be displayed:

```
RECORD OPERATIONS
1.SAVE      2.RESTORE
3.REVIEW    4.DIR
5.ERASE
```

Press the **[4]** key (*DIR*).

- d. The following screen will be displayed:

```
1.INTERNAL DIRECTORY
2.THUMB DRIVE DIR
```

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

- e. The Flash drive's test record directory listing will be printed on the thermal printer and you will be returned to the "START-UP" menu.

3.9 Reviewing a Test Record

If you have just performed a test or just restored a test record, it will be stored in the unit's temporary working memory. You can review the test record stored in the working memory by following the steps below:

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

```

1. RUN TEST  07/10/17
2. SETUP    13:37:29
3. RECORDS
   CABLE VTG:  0V
  
```

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

- b. The following screen will be displayed:

```

RECORD OPERATIONS
1. SAVE      2. RESTORE
3. REVIEW   4. DIR
5. ERASE
  
```

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

- c. The following screen will be displayed

```

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

Press the **[1]** key (*SCROLL TEST RECORD*) if you would like to review the test record in the working memory on the unit's LCD screen. **Continue to step d.**

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

- d. The following screen will be displayed:

```

RECORD ID INFO:
  
```

Press any key to continue.

- e. The following screen will be displayed:

```
  1 TESTS
03/16/15  08:59:56
```

Press any key to continue.

- f. The following screen will be displayed:

```
TEST NUMBER:  1
75KV   5Sec   300µA
185 µA AT 74.9KV
TEST PASSED!
```

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

3.10 Saving a Test Record

If you have just performed a test or just restored a test record, it will be stored in the unit's temporary working memory. You can save the data from the working memory to the unit's internal memory or to a connected USB Flash drive using the steps below:

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

```
1.RUN TEST 07/10/17
2.SETUP    13:37:29
3.RECORDS
  CABLE VTG: 0V
```

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

- b. The following screen will be displayed:

```
RECORD OPERATIONS
1.SAVE      2.RESTORE
3.REVIEW   4.DIR
5.ERASE
```

Press the **[1]** key (*SAVE*).

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

If a USB Flash drive is NOT connected to the unit, the data in the unit's working memory will be saved to a test record in the unit's internal memory. The following screen will be displayed:

```
RECORD 3  SAVED!
```

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

c. The following screen will be displayed:

```
1.SAVE INTERNALLY
2.SAVE TO THUMB DRV
```

1. *SAVE INTERNALLY*

Press the **[1]** key (*SAVE INTERNALLY*) to save the data in the unit's working memory to a test record in the unit's internal memory. The following screen will be displayed:

```
RECORD 3   SAVED!
```

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

2. *SAVE TO THUMB DRV*

Press the **[2]** key (*SAVE TO THUMB DRV*) to save the data in the unit's working memory to a test record in the connected USB Flash drive. The following screen will be displayed:

```
REC_001 SAVED TO
THUMB DRIVE.
```

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

3.11 Restoring a Test Record from the Unit's Internal Memory

Follow the steps below to restore a test record from the VBT-75P S2's Flash EEPROM to the working memory:

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

```

1.RUN TEST  07/10/17
2.SETUP     13:37:29
3.RECORDS
  CABLE VTG:  0V
  
```

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

- b. The following screen will be displayed:

```

RECORD OPERATIONS
1.SAVE      2.RESTORE
3.REVIEW    4.DIR
5.ERASE
  
```

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

- c. The following screen will be displayed:



If a USB Flash drive is inserted in the VBT-75P S2's USB Flash drive port, the following screen will be displayed:

NOTE

```

1.INTERNAL STORAGE
2.THUMB DRIVE
  
```

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

```

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

1. *ENTER RECORD NUMBER*

If you know the record number that you would like to restore, press the **[1]** key (*ENTER RECORD NUMBER*). The following screen will be displayed:

```

RESTORE RECORD
NUMBER:
  
```

Type the record number using the keypad and then press the **[ENTER]** key. The following screen will be displayed:

```
RECORD RESTORED!
```

Press any key to continue. **Proceed to step c of section 3.9.**

2. SCROLL TO SELECT

Press the **[2]** key (*SCROLL TO SELECT*) if you would like to scroll through a directory of the stored test records. The following screen will be displayed:

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

Press either the **[▲]** key or the **[▼]** key to display the next or previous test record, respectively. The test record information will be displayed as shown:

```
03/16/15 08:59
  1 TEST
```

When you have located the test record that you would like to restore, press the **[ENTER]** key. The following screen will be displayed:

```
RECORD RESTORED!
```

Press any key to continue. **Proceed to step c of section 3.9.**

3.12 Restoring a Test Record from a USB Flash Drive

Follow the steps below to restore a test record from a USB Flash drive:

- a. Insert a USB Flash drive containing test records in the VBT-75P S2's Flash drive port.
- b. Start from the "START-UP" menu:

```

1.RUN TEST  07/10/17
2.SETUP     13:37:29
3.RECORDS
  CABLE VTG:  0V
  
```

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

- c. The following screen will be displayed:

```

RECORD OPERATIONS
1.SAVE      2.RESTORE
3.REVIEW    4.DIR
5.ERASE
  
```

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

- d. The following screen will be displayed:

```

1.INTERNAL STORAGE
2.THUMB DRIVE
  
```

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

- e. The following screen will be displayed:

```

RESTORE THUMB DRIVE

REC_
  
```

Type the test record number you would like to restore and press the **[ENTER]** key. If you do not know the test record number, you can first print a USB Flash drive test record directory using the instructions in section 3.8.

- f. The following screen will be displayed:

```
REC_005 RESTORED!  
  PRINT RECORD?  
1. YES  
2. NO
```

**NOTE**

Whether you choose to print or not print the restored test record, it will still be loaded in the unit's working memory and can be reviewed by following the steps in section 3.9.

1. *YES*

Press the **[1]** key (*YES*) to print the restored test record. The test record will be printed on the thermal printer, and you will be returned to the "START-UP" menu.

2. *NO*

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

3.13 Copying Test Records to a USB Flash Drive

Follow the steps below to copy one or all test records from the unit's internal memory to a USB Flash drive:

- a. Insert a USB Flash drive in the unit's Flash drive port.
- b. Start from the "START-UP" menu:

```
1.RUN TEST 07/10/17
2.SETUP    13:37:29
3.RECORDS
  CABLE VTG: 0V
```

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

- c. The following screen will be displayed:

```
RECORD OPERATIONS
1.SAVE      2.RESTORE
3.REVIEW    4.DIR
5.ERASE     6.COPY
```

Press the **[6]** key (*COPY*).

- d. The following screen will be displayed:

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

1. COPY SINGLE RECORD

Press the **[1]** key (*COPY SINGLE RECORD*) if you would like to copy a single test record to the USB Flash drive. The following screen will be displayed:

```
ENTER RECORD NUMBER
TO COPY TO FLASH DRV

NUMBER :
```

Type the test record number you would like to copy, and then press the **[ENTER]** key. The following screen will be displayed:

```
REC_00? 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 unit's internal memory to the connected USB Flash drive. The test records will be copied and you will be returned to the "START-UP" menu when the process is finished.

3.14 Deleting Test Records from the Unit's Internal Memory

Follow the steps below to delete one or all test records from the VBT-75P S2's internal Flash EEPROM:

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

```

1.RUN TEST  07/10/17
2.SETUP     13:37:29
3.RECORDS
  CABLE VTG:  0V
  
```

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

- b. The following screen will be displayed:

```

RECORD OPERATIONS
1.SAVE      2.RESTORE
3.REVIEW    4.DIR
5.ERASE
  
```

Press the **[5]** key (*ERASE*).

- c. The following screen will be displayed:



If a USB Flash drive is inserted in the VBT-75P S2's USB Flash drive port, the following screen will be displayed:

NOTE

```

1.INTERNAL STORAGE
2.THUMB DRIVE
  
```

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

```

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

1. *ERASE SINGLE REC.*

Press the **[1]** key if you would like to erase a single record. The following screen will be displayed:

```

ERASE RECORD
NUMBER:
  
```

Type the record number to be erased and press the **[ENTER]** key.

**NOTES**

- You can press the **[STOP]** key to cancel the process.
- If you do not know the record number, you can first print a test record directory using the instructions in section 3.7.

The following screen will be displayed:

```
RECORD 005 ERASED!
```

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

2. ERASE ALL RECORDS

Press the **[2]** key if you would like to erase all of the test records stored in the VBT-75P S2's Flash EEPROM. The following screen will be displayed:

```
ERASE ALL RECORDS!  
Are you SURE?  
"ENTER" TO CONTINUE.
```

If you would like to CANCEL the erasure process, press the **[STOP]** key. No records will be erased and you will be returned to the "START-UP" menu.

Press the **[ENTER]** key to proceed with the erasure process. The following screen will be displayed while the records are being erased:

```
ERASING ALL SHOTS
```

The following screen will be displayed after all of the test records have been erased:

```
ALL SHOTS ERASED
```

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

3.15 Deleting Test Records from a USB Flash Drive

Follow the steps below to delete one or all test records from a USB Flash drive:

- a. Insert a USB Flash drive containing test records in the VBT-75P S2's USB Flash drive port.
- b. Start from the "START-UP" menu:

```

1.RUN TEST  07/10/17
2.SETUP     13:37:29
3.RECORDS
  CABLE VTG:  0V
  
```

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

- c. The following screen will be displayed:

```

RECORD OPERATIONS
1.SAVE      2.RESTORE
3.REVIEW    4.DIR
5.ERASE     6.COPY
  
```

Press the **[5]** key (*ERASE*).

- d. The following screen will be displayed:

```

1.INTERNAL STORAGE
2.THUMB DRIVE
  
```

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

- e. The following screen will be displayed:

```

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

1. *ERASE SINGLE REC.*

Press the **[1]** key if you would like to erase a single record. The following screen will be displayed:

```

ERASE THUMB DRIVE
REC_
  
```

Type the record number to be erased and press the **[ENTER]** key.

**NOTES**

- You can press the **[STOP]** key to cancel the process.
- If you do not know the record number, you can first print a test record directory using the instructions in section 3.8.

The following screen will be displayed:

```
THUMB DRIVE REC_007  
ERASED!
```

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

2. ERASE ALL RECORDS

Press the **[2]** key if you would like to erase all of the test records stored in the connected USB Flash drive. The following screen will be displayed:

```
ERASE ALL RECORDS!  
Are you SURE?  
"ENTER" TO CONTINUE.
```

If you would like to CANCEL the erasure process, press the **[STOP]** key. No records will be erased and you will be returned to the "START-UP" menu.

Press the **[ENTER]** key to proceed with the erasure process. The following screen will be displayed while the records are being erased:

```
ERASING ALL SHOTS
```

The following screen will be displayed after all of the test records have been erased:

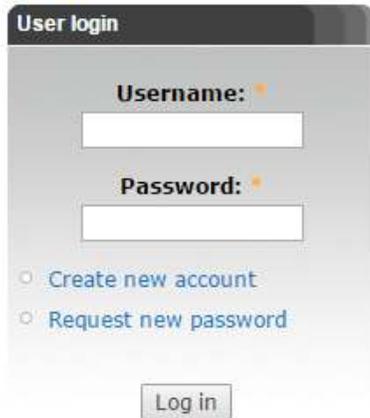
```
ALL SHOTS ERASED
```

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

3.16 Updating Firmware

The VBT-75P S2' firmware is user-upgradeable. The firmware version is displayed on the LCD screen during the start-up sequence when the unit is powered one. Follow the steps below to download and install the latest VBT-75P S2 firmware:

- a. Visit the Vanguard web site at <http://www.vanguard-instruments.com>. Login to your account using the login form on the left side of the page:



If you do not have an account, click on the "Create new account" link below the login area to create your free account. Please note that your account will need to be approved first before it can be used to download any software or firmware. This is usually done within 30 minutes of creating your account.

- b. After logging in to your account, hover your mouse over the "Downloads" link at the top of the page and click on the "Software/Firmware Downloads" link:



- c. All Vanguard products will be listed along with any compatible firmware and software. Scroll down the page to find the VBT-75P S2 listing and then click on the firmware link to save the firmware file.
- d. Once the download is complete, navigate to the folder where the file was downloaded and extract the compressed ZIP file (you may need to use a ZIP extraction application such as WinZip, 7-Zip, etc.). Once extracted, you should see the file "vbt75ps2.hex". This is the firmware file.

- e. Copy the file "vbt75ps2.hex" to the root folder of a USB Flash drive.

**NOTES**

- Please use an empty flash drive. Please backup any existing files and then delete them from the drive.
- We recommend using a flash drive with a capacity of 8GB or less.

- f. With the VBT-75P S2 turned off, insert the USB Flash drive into the VBT-75 S2's USB Flash drive port.
- g. While holding down the **[STOP]** key, turn on the power.

The VBT-75P S2 will go through the initial starting sequence and then will start the firmware upgrade process. The "START-UP" menu will be displayed once the upgrade process is complete.



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VBT-75P S2 User's Manual • Revision 1.0 • July 27, 2017 • TA