CH+

Performance Verification Manual

For the Signature CH+ when used with easy-wire software

Version 2011.1.0
January 5, 2011

CIRRIS®

An ISO 9001 Certified Company

CH+ Performance Verification Manual

Version 2011.1.0
January 5, 2011
Copyright by Cirris System Corporation
1991 Parkway Boulevard
Salt Lake City, Utah 84119-2026
U.S.A

All Rights Reserved

It is important to us that our products are effective and user-friendly. Please contact us with any suggested changes you may have for this product or manual so we can better server you.

Email us at info@cirris.com or call us at (800) 441-9910

Introduction

The CH+ Performance Verification Kit allows you to verify the calibration and proper operation of the Cirris CH+ tester. Each performance verification kit has a life cycle of two years from the time of purchase. At the end of two years the kit can be recalibrated or replaced. All components for the performance verification kit are tested with instruments traceable to the National Institute of Standards and Technology (NIST).

You should run performance verification on your CH+ tester at least once a year, and any time you suspect that the tester is not operating properly. No external adjustments can be made to fix the tester.
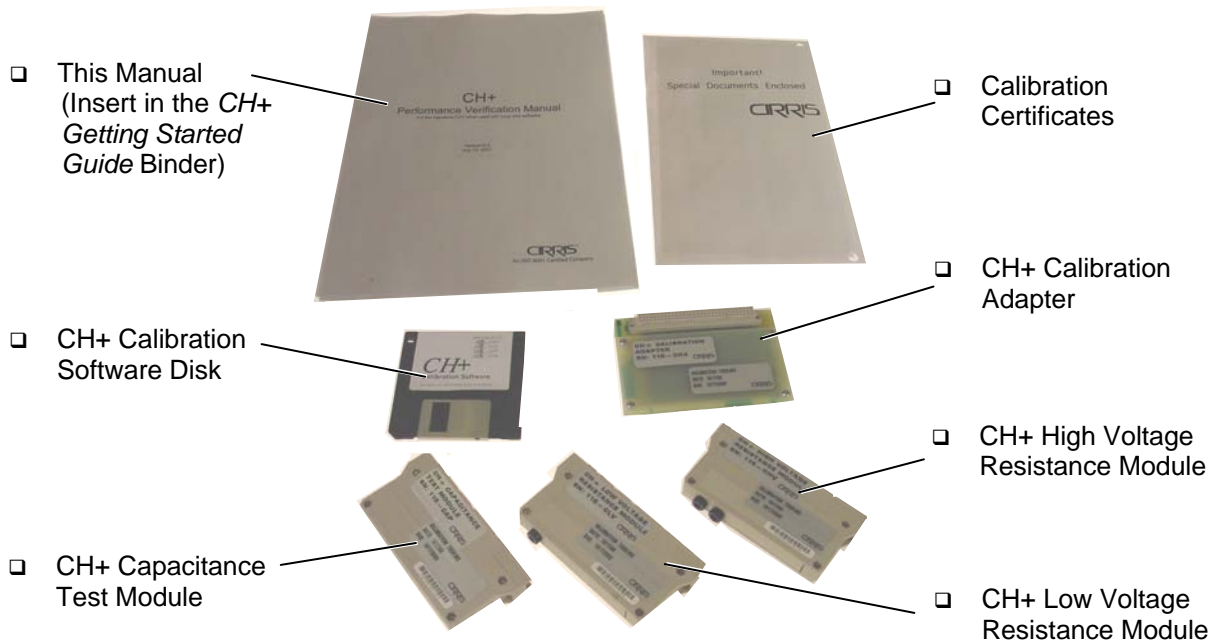
For information on setting up a quality system that meets national quality standards such as ANSI/NCSL Z540-1, and ISO 10012-1 see the appendix of this manual.

Disclaimer
All calibration procedures are performed in-house at the factory. Older versions of the software may use the word "calibration" during the verification process. Note that in these instances "calibration" means verification.

Parts List
Make sure you received the following parts:

- ❏ This Manual (Insert in the *CH+ Getting Started Guide* Binder)
- ❏ Calibration Certificates
- ❏ CH+ Calibration Software Disk
- ❏ CH+ Calibration Adapter
- ❏ CH+ High Voltage Resistance Module
- ❏ CH+ Capacitance Test Module
- ❏ CH+ Low Voltage Resistance Module

Requirements

To complete the performance verification, you must have the following:

❑ A Voltmeter[1]

❑ A CH+ Computer Workstation[2]

[1] To perform traceable measurements the voltmeter or multimeter must be calibrated traceable to national standards, and be capable of measuring an AC or DC voltage from .09 to 1.6 volts to at least 1% accuracy. Avoid using a bench top meter.

[2] The CH+ computer workstion must have a 3½ floppy drive to import test files. For information on computer system requirements and software installation instructions, see the *CH+ Getting Started Guide* that came with the CH+ analyzer.

Import the Test Files

Before performing the performance verification procedure, you will need to import the test files from the CH+ Calibration Disk to the station(s) or network where the performance verification procedure is being performed.
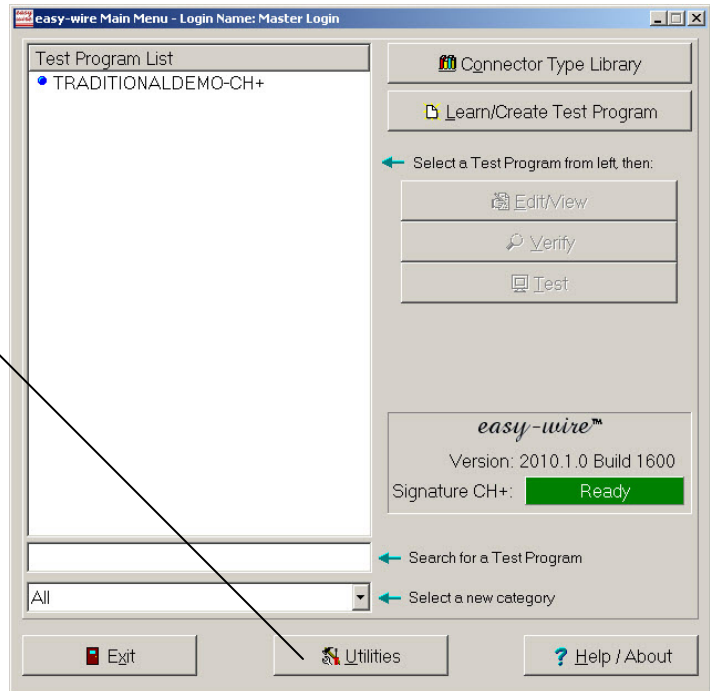
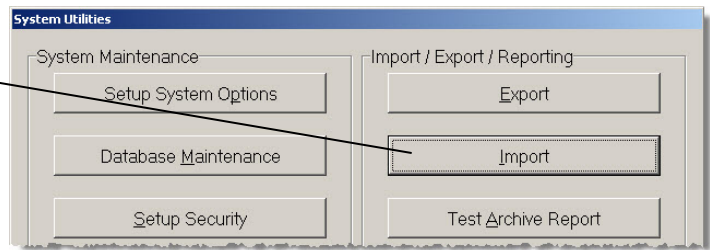1. Insert the *CH+ Calibration Software Disk* into the floppy drive on the CH+ computer station.
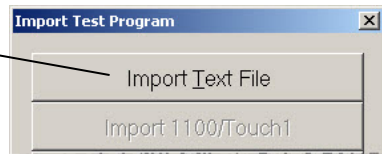

2. Open the *easy-wire* software.

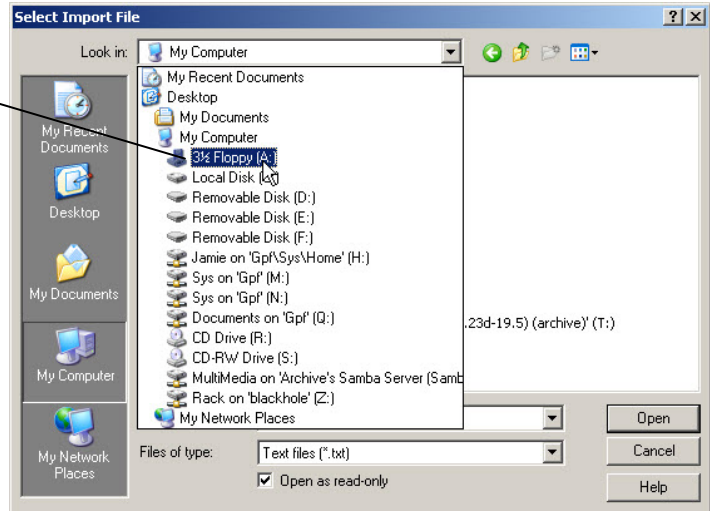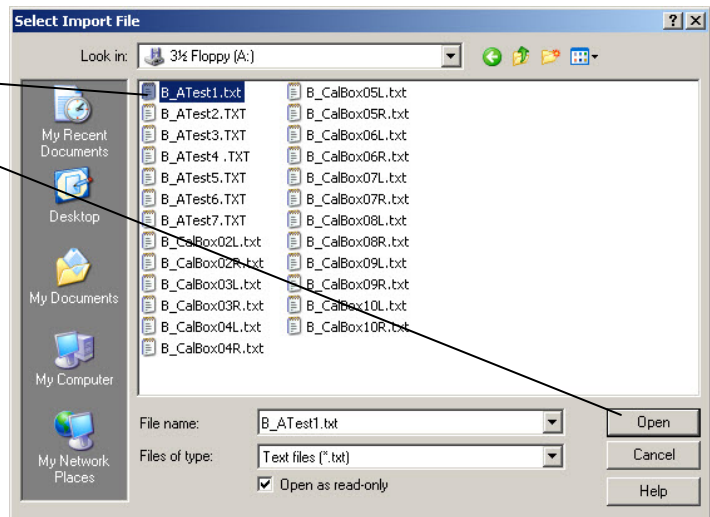3. From the easy-wire Main Menu, click **Utilities.**

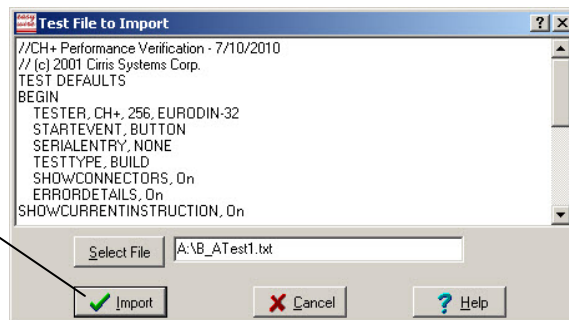
4. Click **Import.**

5. Click **Import Text File.**

6. Select the floppy drive where the calibration files are located.

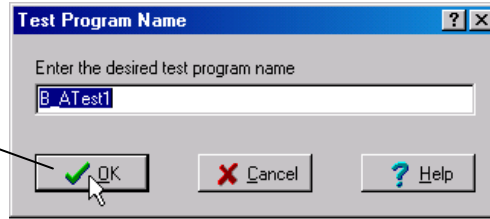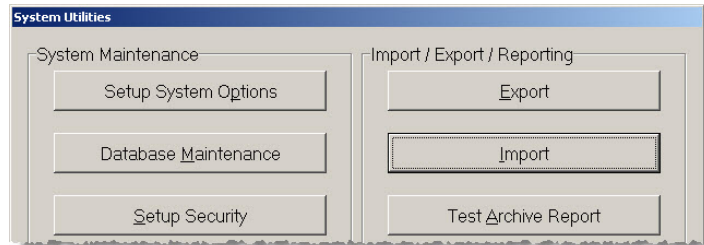7. Click the file **B_ATest1.txt,** and click **Open.**

8. Click **Import.**

9. Click **OK**.

Test Program Name

Enter the desired test program name

B_ATest1

✓ OK   ✗ Cancel   ? Help

---

10. Repeat the import process (steps 4 through 9) to import each of the following files:

> B_Test2.txt
> B_Test3.txt
> B_Test4.txt
> B_Test5.txt
> B_Test6.txt
> B_Test7.txt

System Utilities

System Maintenance
- Setup System Options
- Database Maintenance
- Setup Security

Import / Export / Reporting
- Export
- Import
- Test Archive Report

---

11. If you have more than one *CH+ Scanner Test Point Box*, repeat the import process (steps 4-9) to import the corresponding "left side" and "right side" test files for each scanner.
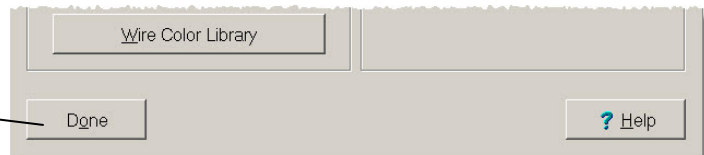
Example:

Box 3

Box 2

For Box 3, import:
B_CalBox03L.txt and
B_CalBox03R.txt

For Box 2, import:
B_CalBox02L.txt and
B_CalBox02R.txt

---

12. When you've imported all the files you need and want to return to the Main Menu, click **Done**.

Wire Color Library

Done   ? Help

Performance Verification Records

Depending on your quality system requirements, you may need to prepare forms to record the performance verification test results. At the end of the appendix you will find a *CH+ Performance Verification Certificate* and a *CH+Verification Data Report*. If using these forms, make a photocopy of each so you can maintain master copies for the next time you perform the test procedure.

To fulfill more detailed test reporting requirements, you can use the test reporting capabilities of the CH+ system. To setup this capability, see *Creating Test Reports* in the appendix.

Test Procedure

You will need to perform seven tests to verify the calibration and proper operation of the CH+ base unit and first scanner.

Set Up for Test 1

1. Install the *CH+ Calibration Adapter* on the left side of the first *CH+ Test Point Scanner*.

   CH+ Calibration Adapter

2. Insert the *CH+ High Voltage Resistance Module* into the CH+ Calibration Adapter.
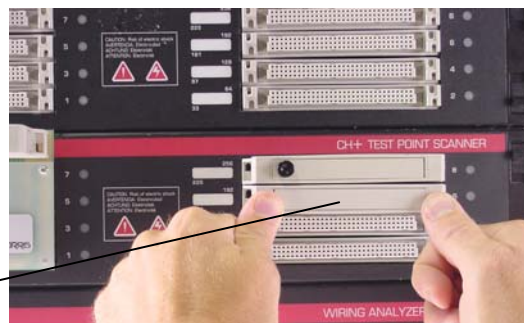
   CH+ High Voltage Resistance Module

3. Put the *CH+ Low Voltage Resistance Module* on position 8 on the first *CH+ Test Point Scanner*.

   CH+ Low Voltage Resistance Module

4. Put the *CH+ Capacitance Test Module* on connector position 6.
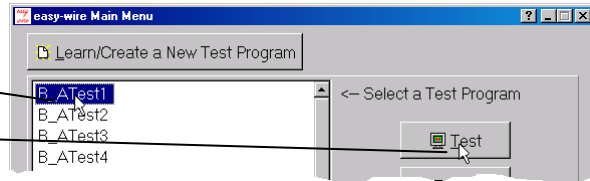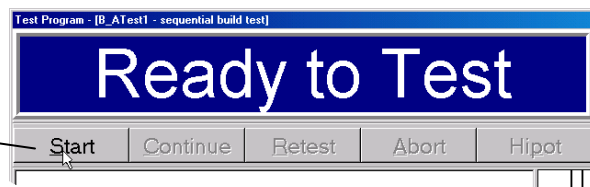
   CH+ Capacitance Test Module

Run Test 1:

Test 1 verifies three aspects of CH+ performance:

    (1) Correct signal routing to, and good condition of the connectors on the left side of the first scanner,
    (2) Accuracy of the capacitance and resistance measurement, and
    (3) Accuracy of insulation resistance levels (high voltage resistance).

1. Click on the test program *B_ATest1,* then click on *Test.*
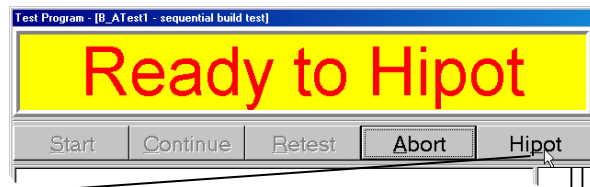
```
easy-wire Main Menu                              [?] [_][□][×]
   [D] Learn/Create a New Test Program
   B_ATest1                    <— Select a Test Program
   B_ATest2
   B_ATest3                          [■] Test
   B_ATest4
```

2. Click on *Start.*

```
Test Program - [B_ATest1 - sequential build test]

            Ready to Test

   Start    Continue   Retest    Abort    Hipot
```

If the tester completes the low voltage portion of Test 1 without any errors, the display changes to *Ready to Hipot.*

```
Test Program - [B_ATest1 - sequential build test]

            Ready to Hipot

   Start    Continue   Retest    Abort    Hipot
```

3. Click on *Hipot.*

```
Test Program - [B_ATest1 - sequential build test]

                 Bad

   Start    Continue   Retest    Abort    Hipot
```
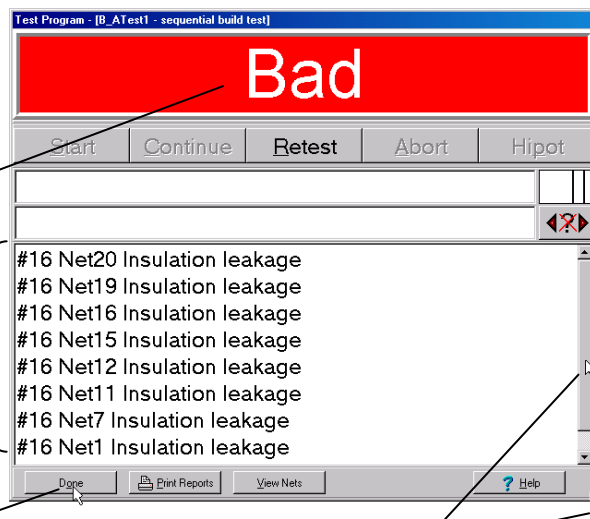
To pass the hipot portion of Test 1, the tester should display *BAD*, and display these eight errors and only these eight errors.

```
#16 Net20 Insulation leakage
#16 Net19 Insulation leakage
#16 Net16 Insulation leakage
#16 Net15 Insulation leakage
#16 Net12 Insulation leakage
#16 Net11 Insulation leakage
#16 Net7 Insulation leakage
#16 Net1 Insulation leakage

   Done    Print Reports   View Nets        ? Help
```

Why does *BAD* mean that the test passed? During this test we tested for insulation leakage. The test modules attached to the front of the CH+ have specific components that created leakage.

Scroll or resize the test screen to see all eight errors.

4. Click **Done** to exit the test program.
   Note: If required, mark the results of this test test on the CH+ Performance Verification form.

   Also remember: If the CH+ fails to pass any step in the performance verification procedure, the tester must be repaired. There are no adjustable parts in the CH+ tester.

Change the Fixturing Setup

1. Remove all the fixturing from the CH+.

2. Install the *CH+ Calibration Adapter* on the right side of first scanner box.

   If not still attached, connect the *CH+ High Voltage Resistance Module* to the *CH+ Calibration Adapter*.

   This fixture setup will be used for the next 6 tests. You can set aside the other two test modules.

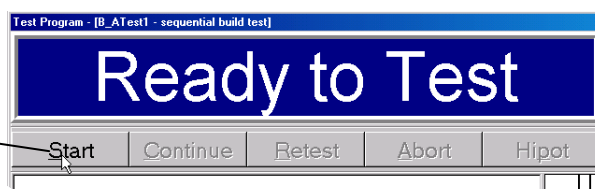CH+ High Voltage Resistance Module

CH+ Calibration Test Adapter
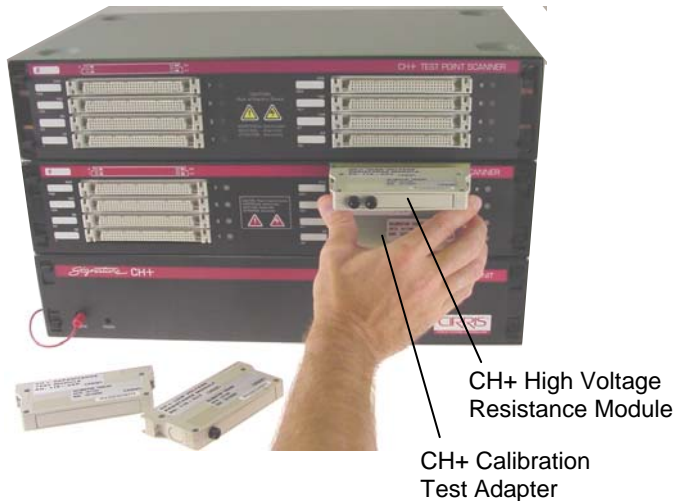
Run Test 2:

Test 2 ensures the correct signal routing of, and good condition of the connectors on the right side of the first scanner; this test also verifies the accuracy of the insulation resistance (high voltage resistance) measurement accuracy of the tester.

1. Click on **B_Atest2,**

   then click **Test.**
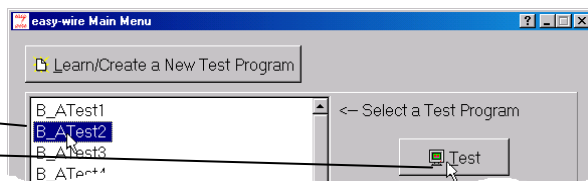
2. Click **Start.**

If the display changes to *Ready to Hipot,* the tester has successfully passed the low voltage portion of Test 2.
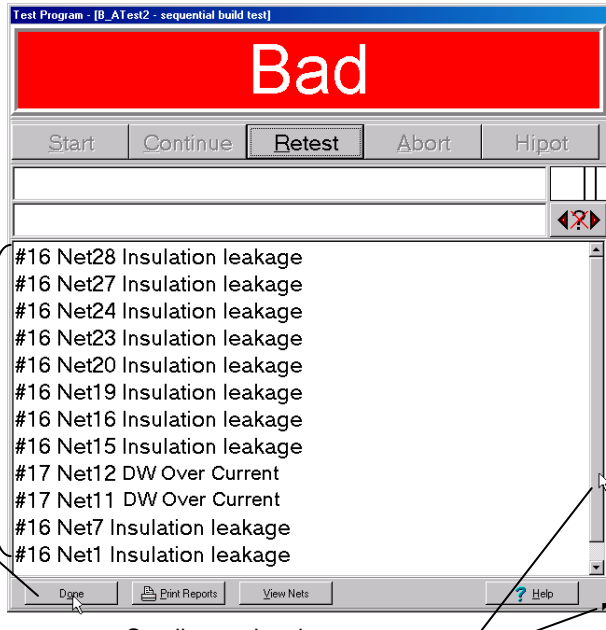
Ready to Hipot

| Start | Continue | Retest | Abort | Hipot |

3. Click **Hipot.**

Bad

| Start | Continue | Retest | Abort | Hipot |

The tester should display BAD and 12 errors; then the high voltage portion of Test 2 has passed.

Note: In some instances the last two errors (Net7 and Net1) may be either of the following:

> #26 Net IR Dielectric Breakdown
> #27 Net IR Over Current

This is acceptable; test 2 has still passed.

#16 Net28 Insulation leakage
#16 Net27 Insulation leakage
#16 Net24 Insulation leakage
#16 Net23 Insulation leakage
#16 Net20 Insulation leakage
#16 Net19 Insulation leakage
#16 Net16 Insulation leakage
#16 Net15 Insulation leakage
#17 Net12 DW Over Current
#17 Net11 DW Over Current
#16 Net7 Insulation leakage
#16 Net1 Insulation leakage

4. Click **Done** to exit the test program.
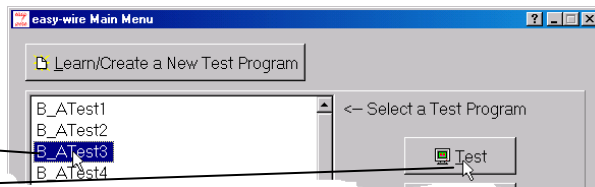
| Done | Print Reports | View Nets | Help |

Scroll or resize the test screen to see all twelve errors as shown.
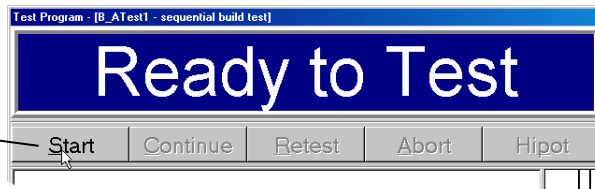
Run Test 3

Test 3 additionally verifies the insulation resistance (high voltage resistance) measurement accuracy of the tester.

The fixturing should still be on the right side of the first scanner box as in the second test.

1. Click on **B_ATest3,**

    then click **Test.**

easy-wire Main Menu
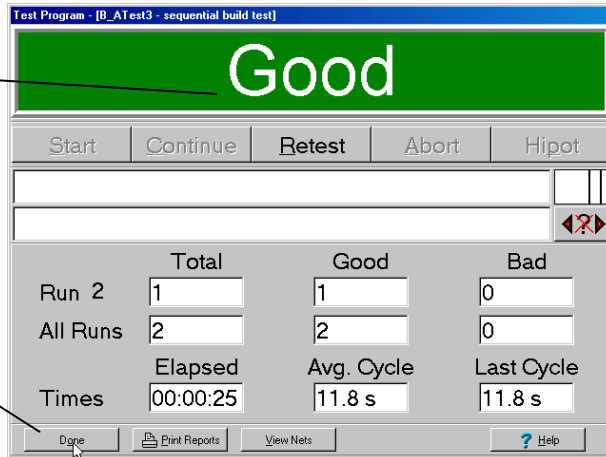
Learn/Create a New Test Program

B_ATest1
B_ATest2
B_ATest3
B_ATest4

<- Select a Test Program

Test

2. Click **Start.**

Ready to Test

| Start | Continue | Retest | Abort | Hipot |

If the display changes to *Ready to Hipot*, the tester has passed the low voltage portion of Test 3.

Test Program - [B_ATest1 - sequential build test]

Ready to Hipot

| Start | Continue | Retest | Abort | Hipot |
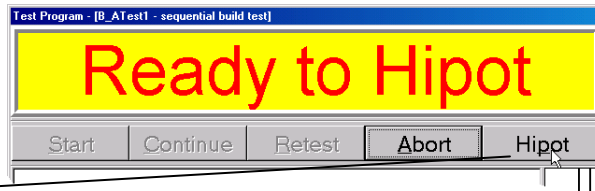
3. Click **Hipot.**

If *GOOD* is displayed, the tester has passed the high voltage portion of Test 3.

Test Program - [B_ATest3 - sequential build test]

Good

| Start | Continue | Retest | Abort | Hipot |

4. Click **Done** to exit the test program.

	Total	Good	Bad
Run 2	1	1	0
All Runs	2	2	0
	Elapsed	Avg. Cycle	Last Cycle
Times	00:00:25	11.8 s	11.8 s

| Done | Print Reports | View Nets | ? Help |

Run Test 4: DC 1500 Volts

1. Set the voltmeter to measure a DC voltage of about two volts.

---

2. Connect the voltmeter to the meter jacks on the *High Voltage Resistance Module*.

    Note: If you connect the positive (red) probe lead in the left jack, and the ground (black) probe lead in the right jack, the voltage measurements will read positive.

    ground probe lead

    positive probe lead

---
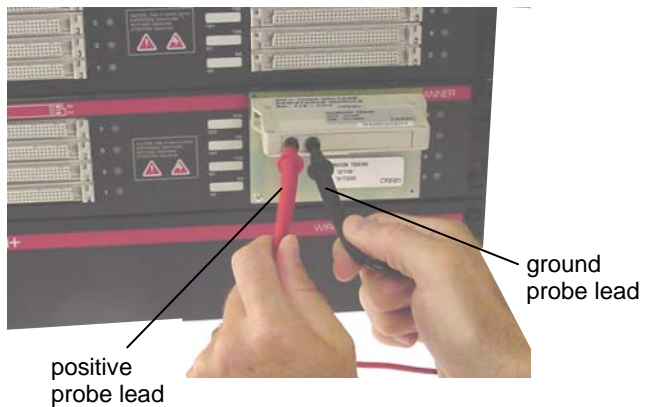
3. Select and start the test program **B_ATest4** the same way as you did for the first three tests.
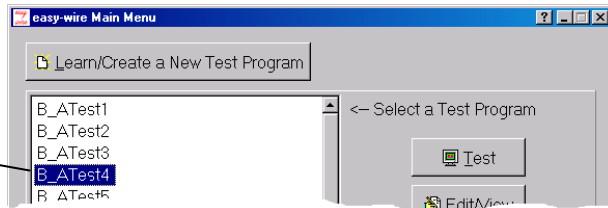
4. When the hipot test begins, make sure the meter momentarily displays a value between 1.420 and 1.580 DC volts.

   Note: the *CH+ High Voltage Resistance Module* contains a "divide by 1000" circuit. So for example, when the tester is putting out 1500 volts your meter should read 1.500 volts.
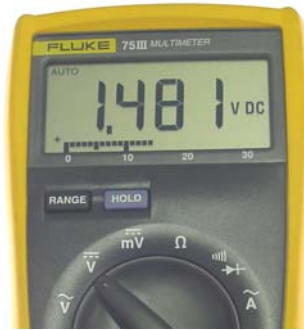
5. After the test completes, click **Done** to exit to the main menu.

   The next three tests will use the same setup; therefore, you don't need to remove the voltage meter or the fixturing from the tester.

Run Test 5: DC 100 Volts Test

You should have the same test setup as the previous test. The voltmeter should be set to measure a DC voltage near .1 volts.

1. Select and start the test program **B_ATest5.**
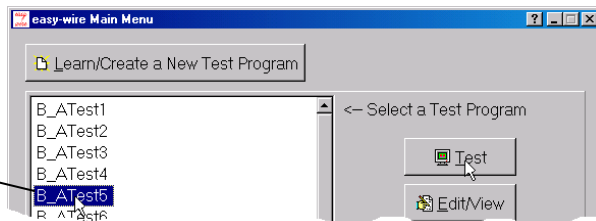
2. When the hipot test begins, make sure the meter displays a value between .090 and .110 DC volts.

   Remember that a displayed value of .100 at the probe jacks would indicate the tester is outputting a value of 100 DC volts.

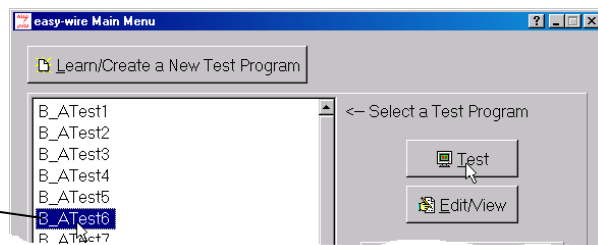3. After the hipot test completes, click **Done** to exit the test.

Run Test 6: AC 1000 Volts Test

1. Change the meter to measure an AC
    voltage up to 2 volts.

    The meter should still be connected to the
    tester through the fixturing as in the previous
    two tests.

2. Select and start the test program
    B_ATest6.

3. When the hipot test starts, make sure
    the meter momentarily displays a
    value between .945 and 1.055 AC
    volts.

    Remember that a displayed value of
    1.000 AC volts would indicate the tester is
    outputting a value of 1000 AC volts.

4. When the test completes, click **Done**
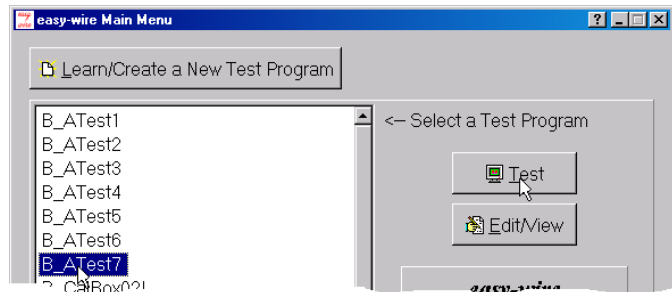   to exit to the main menu.

Run Test 7: AC 100 Volts Test

The test setup should be the same as the previous test. The meter should be set to measure an AC voltage near 0.1 Volts.

1. Select and start the test program **B_ATest7.**

2. When the hipot starts, make sure your meter displays a value between .090 and .110 AC volts.

Remember that a displayed value of .100 AC volts would indicate the tester is outputting a value of 100 AC volts.

3. When the hipot test completes, click **Done** to exit to the main menu.
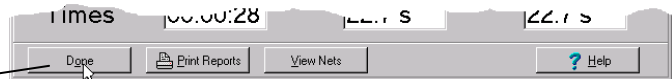
You can remove the meter leads and test fixturing from the first *CH+ Test Point Scanner.*

You *might* be done.   If your CH+ system has only a single *CH+ Test Point Scanner*, you have completed the test procedure. If the CH+ system has more than one *CH+ Test Point Scanner,* continue with the next section.

Checking the Functionality of More than One CH+ Test Point Scanner

You must run a "left" and "right" test program for each addional *CH+ Test Point Scanner* after the first scanner.

1. To check the functionality of a second scanner box, place the *CH+ Calibration Adapter* on the left side of the second *CH+ Test Point Scanner*.

    Important: Make sure *CH+ High Voltage Module* is *NOT* installed on the *CH+ Calibration Adapter*.

2. Select and start the test program, **B_CalBox02L.**
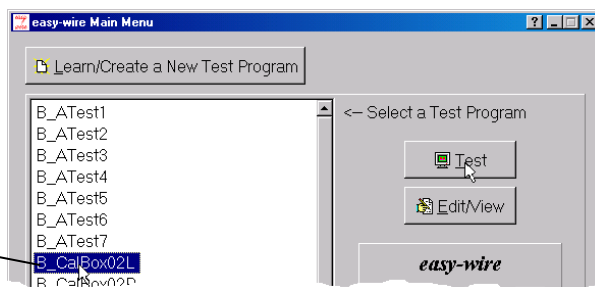
3. Click **Start.**
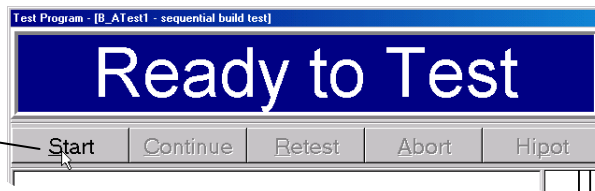
    If the low voltage test successfully completes, the display should change to *Ready to Hipot*.

4. Click **Hipot.**

    The hipot test should complete without any errors.

5. Click **Done** to exit to the main menu.

6. Now move the calibration adapter to the right side of the second scanner.

7. Perform the "right" test, **B_CalBox02R**, the same way you did the "left" test (previous steps 1-5).

8. Complete the performance verification by doing the corresponding "left" and "right" test for each of the remaining *CH+ Test Point Scanners.*

Setting Up a Quality System

The following information can be used as a guide for setting up a formal quality system in your organization.

Quality Standards

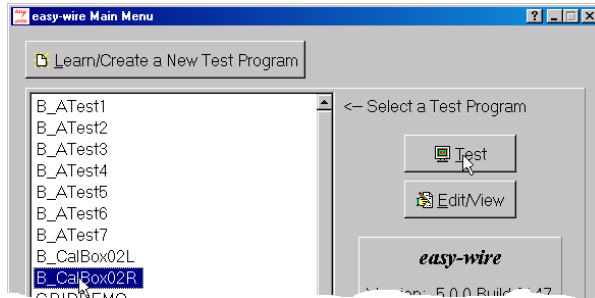These standards are quality system requirements for organizations that perform quality tests and use calibrated equipment. Establishing a quality system according to quality standards ensures that tests are done competently and lends credibility to the organization. In the United States, common quality standards include ANSI/NCSL Z540-1, ISO/IEC Guide 25, ISO 10012-1, and the former MIL-STD 45662A.

You can review the ANSI/NCSL Z540 standard referred to above, as well as other helpful metrology information, from the National Conference of Standards Laboratories International (NCSL) at 1-303-440-3339 or www.ncsli.org. You can also review the ISO standards from the International Standards Organization (ISO) at their web site www.iso.net.

In the metrology industry, the word "standards" often refers to a centralized and most accurate unit of measurement regulated by countries. The National Institute of Standards and Technology (NIST) maintains the national standards for measurements in the United States.

Good Quality Practices

Quality standards, such as ANSI/NCSL Z540-1 and ISO 10012-1, require several good practices including the following areas:

Recall System

How do you ensure that your company will remember to send an instrument in for calibration? Use a card file or a computerized database recall system. This system includes calibration dates, due dates, calibration sources, and other instrument records. The recall system ensures that instruments are recalibrated in a timely manner.

Verification Labels

How do you know if the calibration has been verified without looking for the paperwork? When an instrument's calibration is verified, the quality standards require the instrument to be labeled as such. These labels, which are applied to instruments, have fields for the instrument serial number, verification date, verification due date, and by whom. A good source of inexpensive labels is United Ad Label at 1-800-992-5755.

Accuracy Ratios

Can you use a ruler to verify your digital calipers? The answer is no. Wherever possible, quality standards require an accuracy ratio of at least four to one. In other words, the instrument being used to measure the calibrated instrument should be at least four times as accurate as the calibrated instrument.

Performance Verification Certificate

How do you know that an instrument has been verified? The Performance Verification Certificate is a record of who, when, and by what equipment the instrument was verified. A CH+ Performance Verification Certificate is provided after this section.

Verification Data Report
How accurate is the calibrated instrument in relation to its published specifications? Some organizations require the measured values of an instrument to be written down when that instrument's calibration is verified. Calibration laboratories typically charge extra to create a data report. However, when an instrument is found to be out-of-tolerance, the quality standards require the out-of-tolerance data to be recorded in relation to the instrument specifications. A verification data report can fill this requirement. You can photocopy the CH+ Verification Data Report from the Appendix.

Traceability
Traceability refers to each unbroken link of valid verifications going back to national standards such as those maintained by the NIST in the United States. To maintain traceablity, qualified personnel must perform the performance verification under controlled conditions, using correctly calibrated instruments with correct test accuracy ratios.

Several years ago NIST numbers (ie. reference numbers issued on NIST reports) were commonly copied on successive certificates as a means of showing traceability. This practice has been discontinued. Therefore, if you are writing a performance verification procedure, do not require NIST numbers be copied on reports to show traceability. NIST numbers are sometimes confused with other numbers that calibration laboratories create for reference such as "asset numbers", "NIST trace numbers", "ID numbers", and report numbers. For more information regarding the discontinued use of NIST numbers, contact Cirris for a copy of the position paper from the National Conference of Standards Laboratories.

Creating Test Reports

The test measurements made during the first three performance verification tests are made internally to the test software, and are not inherently visible to the verification technician. If required, you can turn on the test reporting capabilities of the CH+ system to output more detailed report data.

To turn on the test reporting capability of a test do the following steps:
Before running the test,
1. From the easy-wire Main Menu, click on the test program for which you want to turn on the report printing options.
2. Click on the Edit/View button.
3. At the top of the Test Program Editor screen, click on the *Set Test Defaults* Tab.
4. Click on the *Configure Reports/Printing* button.
5. Check in the *Store measured test value* box.
6. Click the *Done button* at the bottom of the screen.
7. Select *Yes, save changes and return to the main menu.*

After the test program completes,
1. Click on the *Print Reports* button at the bottom of the test program screen.
2. Click on the *Print In Process Report* button.
3. To print the report to a printer connected, click on *Print* in the upper left corner.

Customer Service

If you need any assistance with this performance verification please call Cirris customer service toll-free at 1-800-441-9910.

CH+ Performance Verification Certificate

Organization Name:	Organization Address:		
Certificate Number:	**Performed by:**		
Verification date:	**Due date:**		
Applicable Quality Standard(s):	**Procedure:** CH+ Performance Verification Version 2010.7.0		
Temperature:	**Relative Humidity:**		

Serial Numbers:
  Wiring Analyzer Base Unit:
  Test Point Scanner(s):

Instruments used:	Serial Number	Cal Date	Due
CH+ Calibration Adapter			
CH+ High Voltage Resistance Module			
CH+ Low Voltage Resistance Module			
CH+ Capacitance Test Module			
Meter:			

Statement of Traceablility:

Certified by:

CH+ Verification Data Report

Report Number:		Verified by:	
Base Unit Serial Number:		Verification date:	
Scanner 1 Serial Number:		Due date:	

Test	Recorded Value		Low limit	High limit
Test 1: Low voltage	Pass / Fail			
Test 1: High voltage (pass=8 errors)	Pass / Fail			
Test 2: Low voltage	Pass / Fail			
Test 2: High voltage (pass=12 errors)	Pass / Fail			
Test 3: Low voltage	Pass / Fail			
Test 3: High voltage	Pass / Fail			
Test 4: DC 1500 Volts			1.420 VDC	1.580 VDC
Test 5: DC 100 Volts			.090 VDC	.110 VDC
Test 6: AC 1000 Volts			.945 VAC	1.055 VAC
Test 7: AC 100 Volts			.090 VAC	.110 VAC
Additional Scanner(s)	Serial Number	Left Test	Right Test	
Scanner 2		Pass / Fail	Pass / Fail	
Scanner 3		Pass / Fail	Pass / Fail	
Scanner 4		Pass / Fail	Pass / Fail	
Scanner 5		Pass / Fail	Pass / Fail	
Scanner 6		Pass / Fail	Pass / Fail	
Scanner 7		Pass / Fail	Pass / Fail	
Scanner 8		Pass / Fail	Pass / Fail	
Scanner 9		Pass / Fail	Pass / Fail	
Scanner 10		Pass / Fail	Pass / Fail	
Scanner 11		Pass / Fail	Pass / Fail	
Scanner 12		Pass / Fail	Pass / Fail	
Scanner 13		Pass / Fail	Pass / Fail	
Scanner 14		Pass / Fail	Pass / Fail	
Scanner 15		Pass / Fail	Pass / Fail	
Scanner 16		Pass / Fail	Pass / Fail	
Scanner 17		Pass / Fail	Pass / Fail	
Scanner 18		Pass / Fail	Pass / Fail	
Scanner 19		Pass / Fail	Pass / Fail	
Scanner 20		Pass / Fail	Pass / Fail	
Scanner 21		Pass / Fail	Pass / Fail	