Performance Verification Manual
for the CH2 Tester

CIRRIS®

**Performance Verification Manual
for the CH2 Tester**

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Introduction

The **CH2 Performance Verification Kit** allows the user to verify calibration and proper operation of the Cirris CH2 tester. Each kit includes a certificate of calibration that's valid for two years. At the end of two years, the kit should be replaced or recalibrated. The values of the components in the Performance Verification Kit have been verified with calibrated instruments traceable to the NIST.
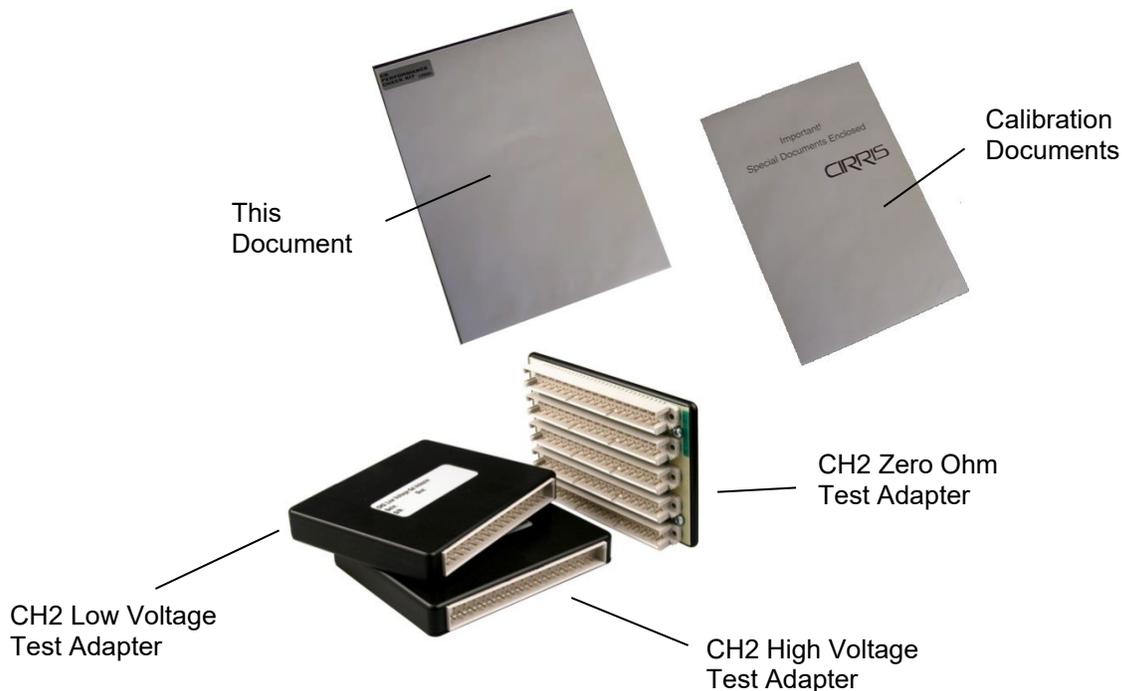
Cirris recommends that the Performance Verification described in this manual be performed annually, at a minimum, to verify the calibration of the CH2. The verification may also be used as part of a troubleshooting process whenever a problem with the CH2 is suspected.

Note: No adjustments are made to the CH2 tester during the performance verification. If the CH2 fails any step in the process, the tester requires service.

For helpful information about setting up a calibration system, see the appendix of this manual.

This verification procedure requires *Easy-Wire™* software version 8.6 or higher.

You Should Have Received:

This Document

Calibration Documents

CH2 Zero Ohm Test Adapter

CH2 Low Voltage Test Adapter

CH2 High Voltage Test Adapter

Note: Before performing any of the tests in this manual, remove all adapters from the tester (including from the expansion enclosures) except for the adapters needed for verification.

Required to Perform the Test:

Standard Pin Probe Test Leads for a multimeter.

A calibrated multimeter capable of measuring AC and DC voltages within a range of .1 to 1.5 volts with an accuracy of ±1%, such as a Fluke 80 Series meter or equivalent. The meter must have an input impedance of 10Mohm (±10%). Bench multimeters, such as Keysight units, typically do not meet this input impedance requirement.

## Import/Configure the Test Files

Before performing the calibration procedure, you must import the test files to the station(s) or network where the performance verification procedure is being performed. The following steps will create a category called **Calibration.** Import the test files into the Calibration category and configure the test files to run.

Important: To ensure use of the correct test files, re-import the files any time you update Easy-Wire or anytime you haven't run the test in a while. Re-importing test files guarantees they are the correct version.
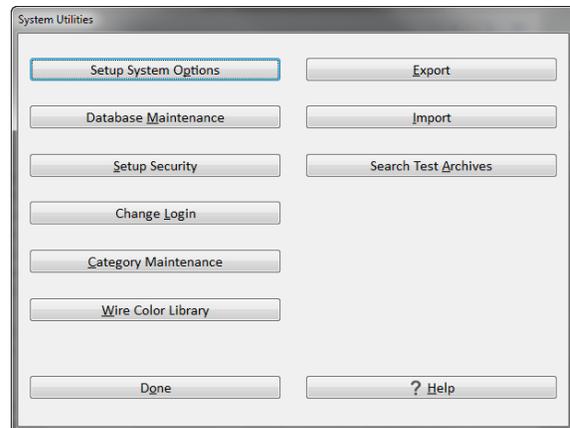
1. Start the *Easy-Wire* software.
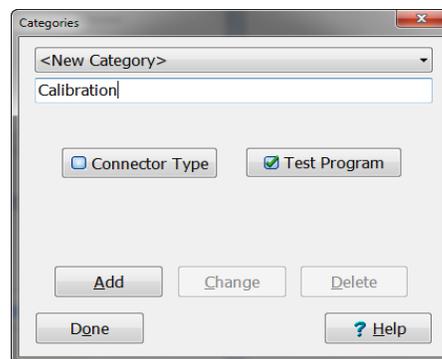
2. From the Main Menu, click **Utilities.**
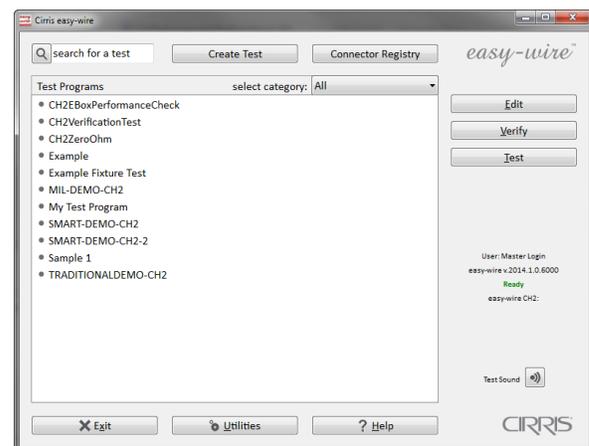
3. Click **Test Category Maintenance** (or Test Category Maintenance in version 8.6).

4. Make sure **Test Program** is checked. Click the down arrow and see if there is a category called **Calibration.**

   If there is no Category called **Calibration,** create one by entering the word **"Calibration"** in the text box and clicking **Add.**
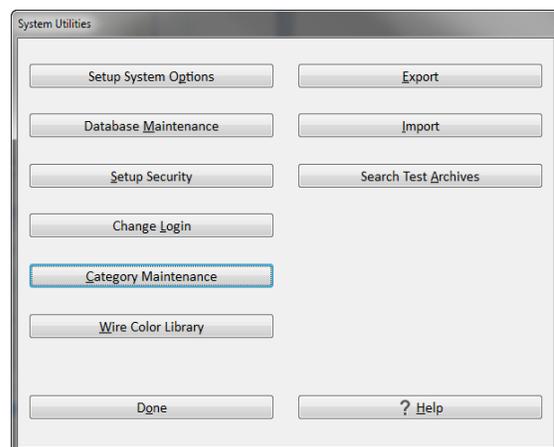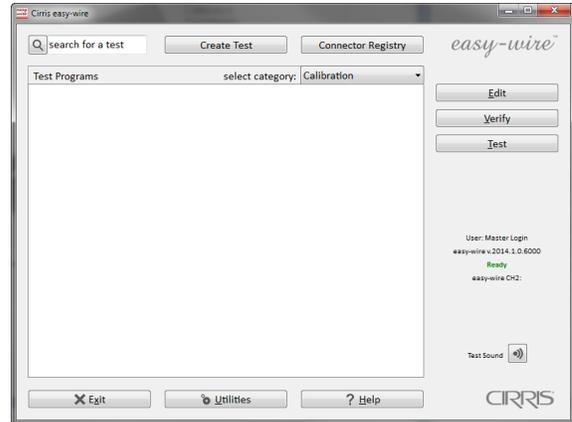
5. Click **Done.**

Click the down arrow to see the available categories.

Make sure **Test Program** is checked.
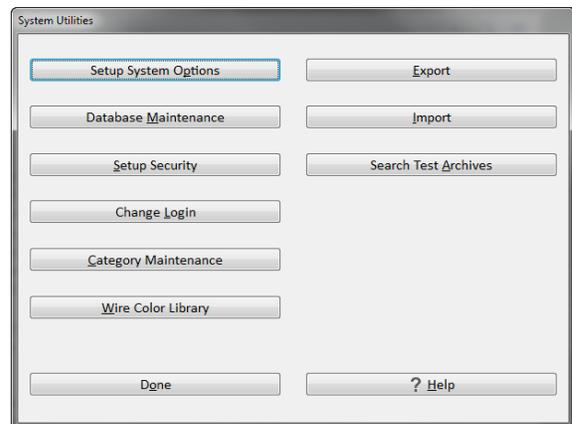
6. Click **Done.**

7. Select **Calibration** as the category.

8. Click **Utilities.**

9. In **System Utilities,** click **Import.**

10. Click **Import Text File.**
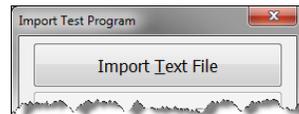
11. Browse to the path where the calibration files are located.

   Windows 7 – Windows 10:
   ```
   C:\Users\Public\Documents\Cirris\easywi
   re\CalFiles\CH2
   ```

   XP:
   ```
   c:\Documents and Settings\All
   Users\Shared Documents\Cirris
   \easywire\calfiles\CH2
   ```

   Vista:
   ```
   c:\Users\Public\Public Documents\Cirris
   \easywire\calfiles\CH2
   ```


12. Click **CH2VerificationTest.txt,**
    and click **Open.**
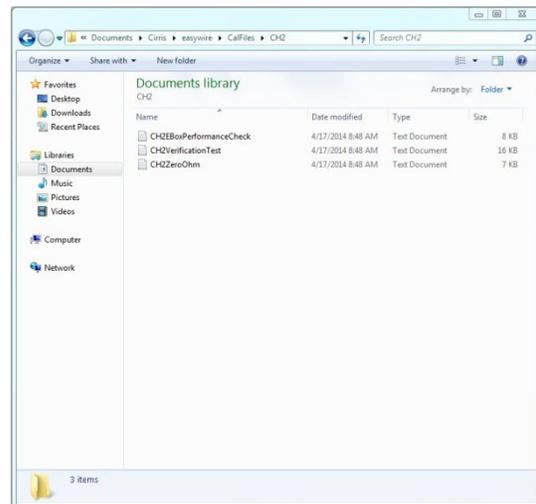
13. Click **Import.**
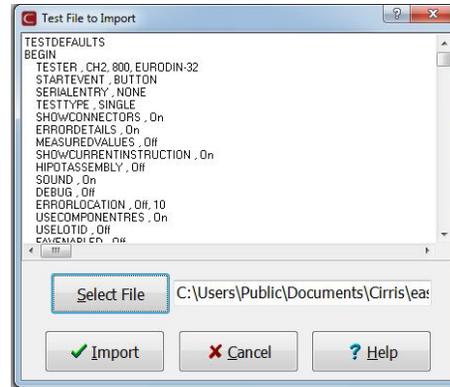
14. You may be asked to choose an existing category for storing connector types. If so, choose any category and click **OK.**

    (This window will only appear the first time calibration files are imported.)

15. When asked for a test program name, click **OK.**
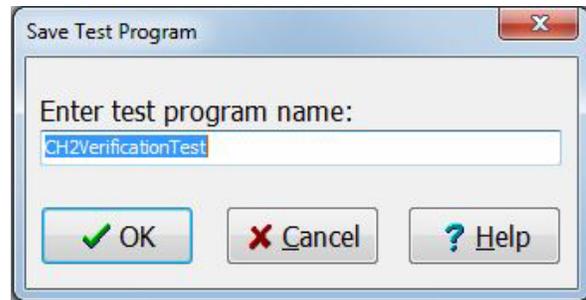
16. Follow the same process to import the test file to test your Energization (E-Box) scanner modules if applicable.

Import: CH2ZeroOhm.txt

17. When you have imported all the files, click **Done** until you reach the main menu.
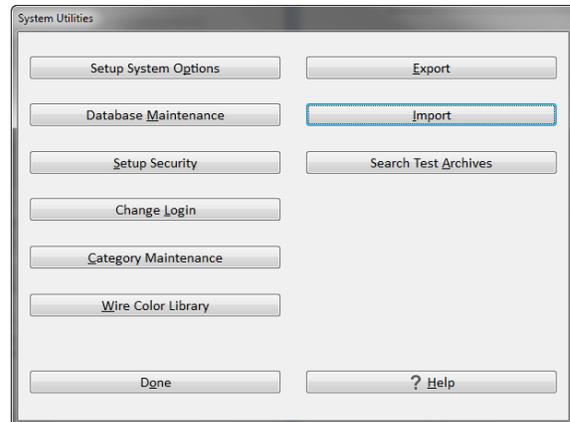
Making Calibration Records

Your calibration system requirements may require the preparation of forms to record the performance verification results. The **CH2 Certificate of Calibration Verification** and **CH2 Calibration Verification Data Report** found in the appendix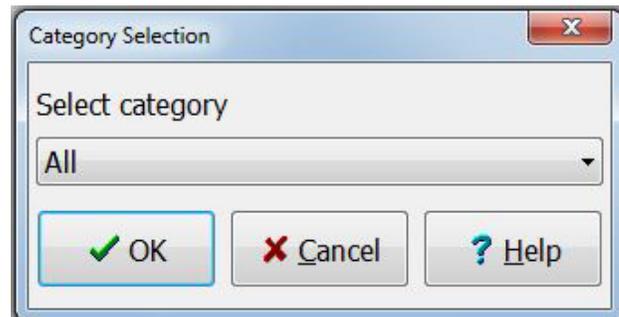 can be used for this purpose. If viewing this manual as a printed document, before using these forms make a photocopy of each to preserve clean masters for future use.

To fulfill more detailed test reporting requirements, you can use the test reporting capabilities of the CH2 system. To set up this capability, see **Creating Test Reports** in the appendix.

A relatively few number of CH2 systems are equipped with **Earth Ground Power Supplies (EGPS)** that provide the capability to test devices that are connected to earth ground. These power supplies are incompatible with the performance verification process and, therefore, they must be disconnected before proceding with the test procedure described in the next section.

If the system is equipped with the Earth Ground Power Supplies, **EGPS** will be included on the Easy-Wire Main Menu in the lower right system attributes section.
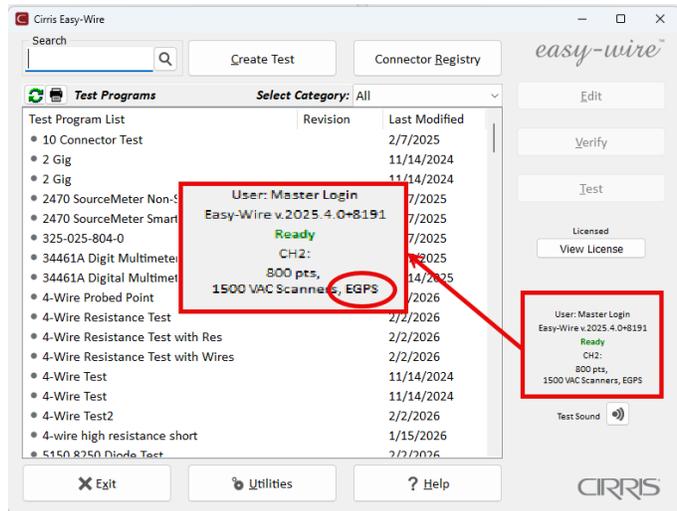
If so equipped, the two EGPS are connected on the back panel of the CH2 Base Unit to the connectors labeled **AUX. SUPPLY**. To disconnect the supplies, close the Easy-Wire software, disconnect both power supply cables, and restart the Easy-Wire software. **EGPS** will be eliminated from the system attributes on the Easy-Wire Main Menu and the system is now ready for the performance verification.

Test Procedure

To verify the calibration of the CH2 analyzer, you will test the operation of the measurement system as well as the operation of each of the 160 point scanner modules.

To test the measurement system:

1. Install the CH2 Low Voltage Calibration Adapter on the first connector of the **CH2 Test Point Scanner.**

   Install the CH2 High Voltage Calibration Adapter on the second connector on the **CH2 Test Point Scanner.**

   CH2 Low Voltage Test Adapter

   CH2 High Voltage Test Adapter
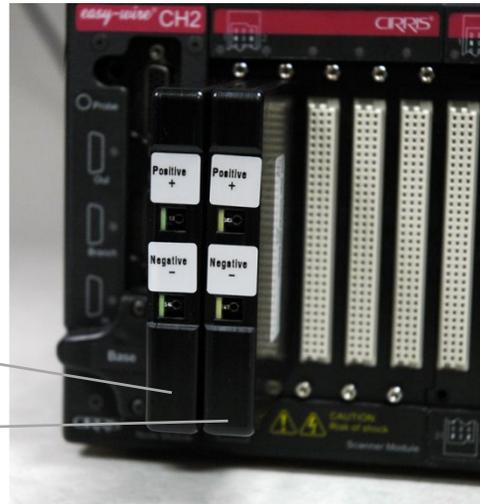
2. From the Main Menu, click the test program **CH2VerificationTest** and click **Test.**
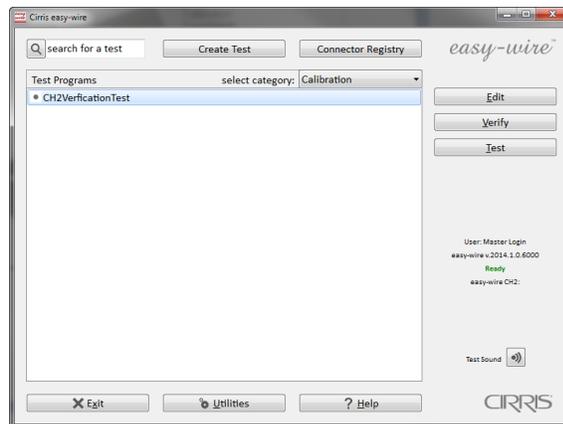
3. Click **Start.**
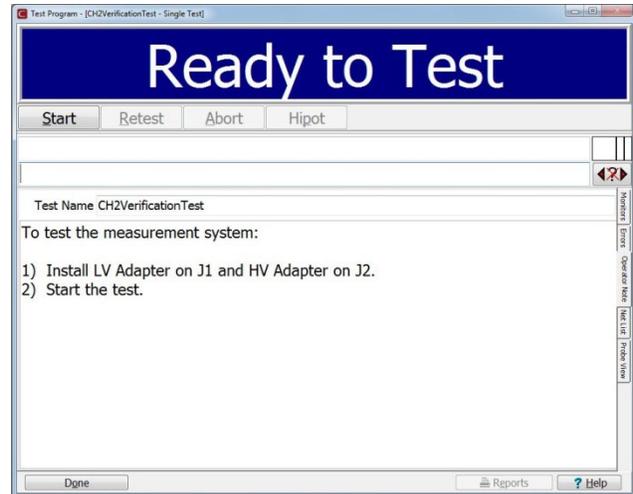
4. The **CH2 Verification Assistant** window will open. Once the test starts, this window will give you prompts to complete the test.
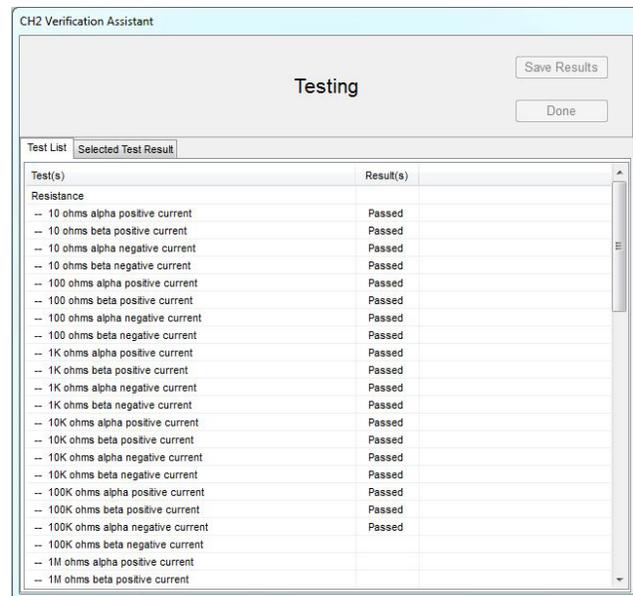
5. When the **CH2 Verification Assistant** prompts you to attach the meter leads to the **CH2 Low Voltage Test Adapter,** insert the positive lead into the top jack and the negative lead into the bottom jack.
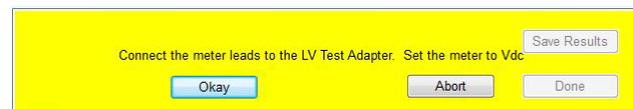
6. Set the meter to the range shown in the prompt ("Vdc" for example).

   Be ready to read the meter! Once you click **Okay,** a voltage will appear on the meter. The value will only be shown for several seconds so be ready to read it.
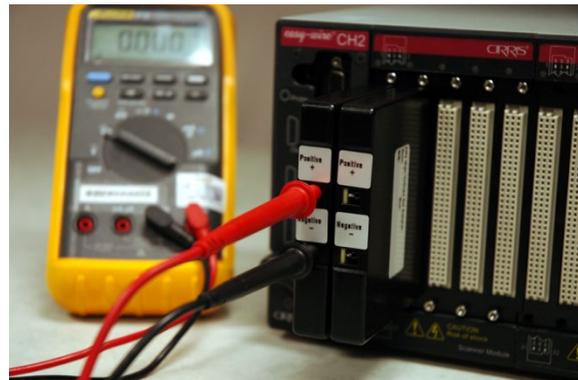
7. Read the meter and enter the value (in volts) into the box on the Verification Assistant and click **Okay.**

Note: Some meters auto-scale measured results differently. The CH2 test is written to accept values as volts. For example, if the prompt is asking for an **DC Voltage Measurement** and the meter shows a value of 100 mV, the value entered should be 0.100.
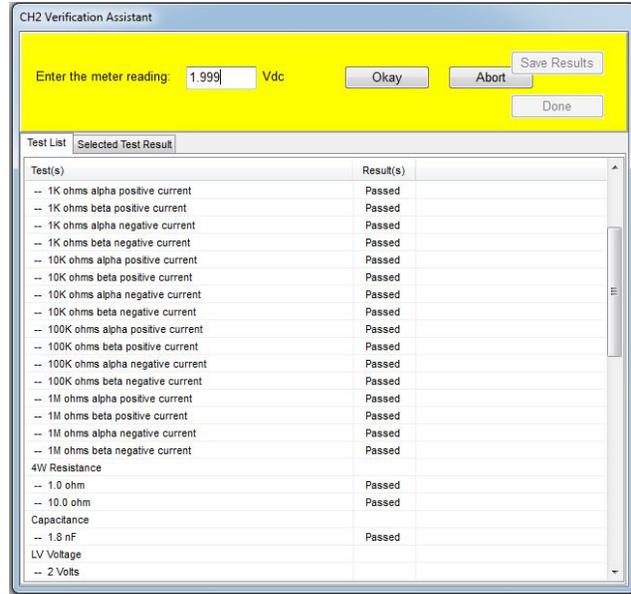
8. When the Verification Assistant prompts you to attach the meter leads to the **CH2 High Voltage Test Adapter.** Move the positive lead into the top jack and the negative lead into the bottom jack of the **HV Test Adapter.**

9. Each time you are prompted to read the meter make sure you set the meter to the range shown in the prompt ("Vdc" or "Vac" for example).

   Be ready to read the meter! Once you click **Okay,** a voltage will appear on the meter. The value will only be shown for several seconds so you need to be ready to read it.

10. When you are ready to read the meter, click **Okay.**

11. Read the meter and enter the value (in volts) into the box on the Verification Assistant and click **Okay.**

Note: The **HV Cal Adapter** contains a voltage divider circuit that reduces the high voltage down to safe levels. This should work for any type of meter and will be harmless if you come in contact with the meter leads during the test.

Tests show their status as they are being performed.

When complete, the test will show its final status of PASSED or FAILED.

CH2 Verification Assistant

Testing

Save Results
Done

Test List | Selected Test Result

Test(s)			Result(s)
4W Resistance			
-- 1.0 ohm			Passed
-- 10.0 ohm			Passed
Capacitance			
-- 1.8 nF			Passed
LV Voltage			
-- 2 Volts			Passed
High Voltage Testing - DW DC			
-- DW 90.0 Vrms	2.250 mA		Passed
-- DW 450.0 Vrms	2.250 mA		Passed
-- DW 900.0 Vrms	2.250 mA		Passed
-- DW 1350.0 Vrms	2.250 mA		Passed
High Voltage Testing - DW AC			
-- DW 500.0Vrms 60Hz	0.128mAT	0.100mAR	Passed
-- DW 1000.0Vrms 60Hz	1.021mAT	1.000mAR	Passed
-- DW 90.0Vrms 60Hz	2.251mAT	2.250mAR	Passed
-- DW 500.0Vrms 50Hz	0.121mAT	0.100mAR	Passed
-- DW 1000.0Vrms 50Hz	1.018mAT	1.000mAR	Passed
-- DW 90.0Vrms 50Hz	2.251mAT	2.250mAR	Passed
High Voltage Testing - DW/IR			
-- DW/IR 100.0 Vrms	0.100 mA	100.0 Vrms 1...	Passed
-- DW/IR 500.0 Vrms	0.100 mA	500.0 Vrms 5...	Passed
-- DW/IR 1000.0 Vrms	0.100 mA	1000.0 Vrms ...	

Once the test is complete, the Verification Assistant will ask you where you would like to save the test results.

12. Choose a path and file name for the test results.

13. Click **Save.**

The text file (.csv) that will be saved can be loaded into any spreadsheet program.

Note: THERE are no adjustments made to the CH2 tester during the performance verification process. If the CH2 fails any step in the performance verification procedure, it indicates the tester requires service.

Test results can be viewed for each individual test by selecting the test you want to view:

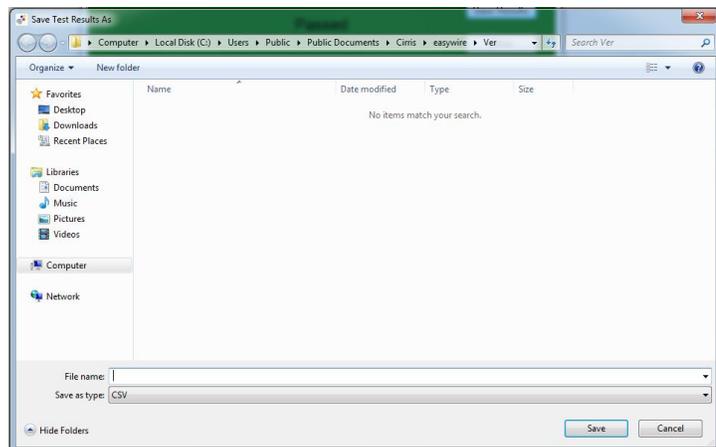|				
-- DW	500.0 Vrms	0.025 mA		- F A I L ...
-- DW	1000.0 Vrms	0.050 mA		- F A I L ...
High Voltage Verification AC				
-- DW	100.0Vrms 60Hz	0.016mAT	0.005mAR	- F A I L ...
-- DW	500.0Vrms 60Hz	0.078mAT	0.025mAR	- F A I L ...
-- DW	1000.0Vrms 60Hz	0.156mAT	0.050mAR	- F A I L ...
-- DW	1070.0Vrms 60Hz	0.167mAT	0.053mAR	- F A I L ...
-- DW	100.0Vrms 50Hz	0.013mAT	0.005mAR	- F A I L ...
-- DW	1070.0Vrms 50Hz	0.143mAT	0.053mAR	- F A I L ...
Update Cal Date				
-- Update cal date to 8/22/2014				- F A I L ...

and clicking the **Selected Test Result** tab.

Test List	Selected Test Result		
Test(s)			
-- DW/IR	100.0 Vrms	0.100 mA	1
-- DW/IR	500.0 Vrms	0.100 mA	5

The details of the specific test as well as the measured values will be displayed.

```
Test List   Selected Test Result
Hipot Test Parameters
    Points:J2-9,
    DWV: 1000Vrms, Total: 1.145mArms, Real: 1.110mArms
    Dwell: 10.000s, Cycles: 2, Freq: 50Hz
    No IR Test
Expected Results
    DW - Total: 1.018mArms, Real: 1.000mArms
Measured values
        Name,       Average,  Expected Val,  Expected Max,
        DWV,        1007.7,      1000.0,         1055.0,
        DWT,        0.073,       1.018,          1.145,
        DWR,        0.000,       1.000,          1.110,
```

Note: The test group, Hipot Charge Verification, may show that sections of the test failed while the overall test group passed. Failures shown within this section of the report do not mean something is wrong with your tester. As long as all the test groups in the report pass, your tester does not need to be sent in for calibration.

You can save additional copies of the test results to a .csv file by clicking **Save Results.**

To test the scanner modules:

1. Remove the **CH2 Low Voltage Test Adapter** and the **CH2 High Voltage Test Adapter** from the CH2 analyzer.

2. Locate the **CH2 Zero Ohm Cal Adapter.**

3. From the Main Menu, select the **CH2ZeroOhm** test from the list.
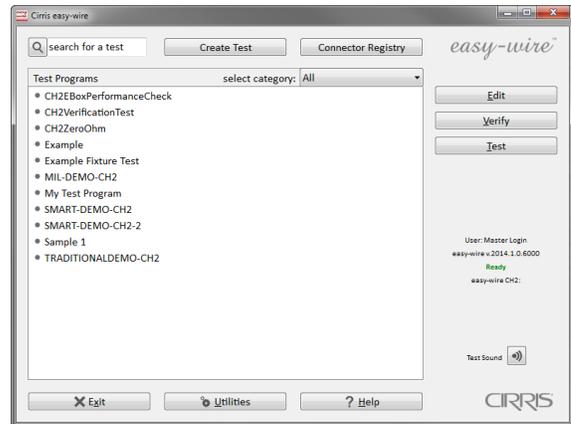
4. Click **Test.**

5. Attach the **CH2 Zero Ohm Cal Adapter** to the first Scanner Module.

   Note: The adapter is keyed to only fit one way on the Scanner Module.

6. When the test shows **Ready to Test,** click **Start.**
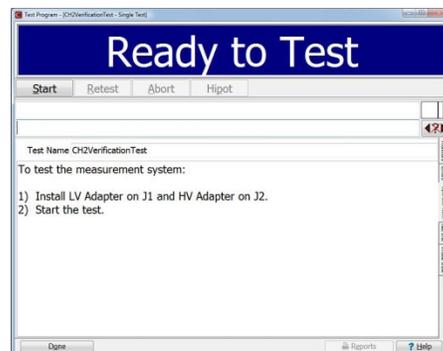
7. Press the zero-ohm adapter firmly on the front of the scanner module 1 and press **OK.**

8. The test will run automatically.
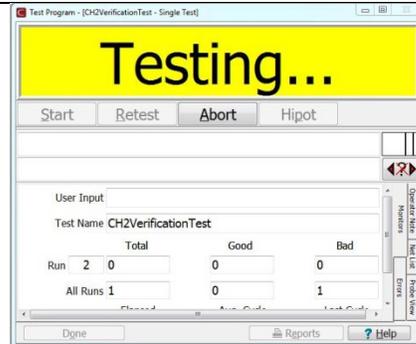
9. The final status of the test will be displayed. All of the module tests should pass.

    The results can be marked on the **Test Results** form at the end of these instructions.

10. Click **Done.**
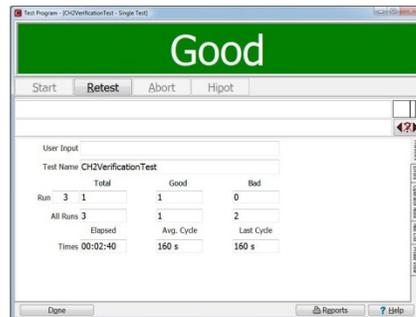
11. Move the **CH2 Zero Ohm Cal Adapter** to the corresponding scanner module, and press ok to continue the tests, until all the Scanner Modules have been tested.

Testing is now complete.

The following references and suggestions may be useful to those new to formal calibration and quality practices.

Standards

The ANSI/NCSL Z540.3 and ISO 17025 standards document requirements for the calibration of measuring and test equipment. The Z540.3 standard can be acquired from the National Conference of Standards Laboratories International (NCSL) at www.ncsli.org. The ISO standard can be acquired from the International Standards Organization (ISO) on their web site www.iso.net. Both standards provide valuable insight into calibration best practices.

Foundational Calibration Principles

Recall System

Use a tickler card file or computerized database recall system to ensure that measurement equipment is calibrated on schedule. This system should include calibration dates, due dates, calibration sources, and any other pertinent information.

Verification Labels

After calibration / verification, the quality standards require that a label indicating the calibration status be affixed to the instrument. This ensures that users will have ready access to the calibration status and helps avoid the inadvertent use of uncalibrated, or out-of-calibration, measurement equipment. The labels should include the instrument serial number, the calibration date, the calibration due date, and the name of the individual that performed the calibration. A good source of inexpensive labels is United Ad Label (www.unitedadlabel.com).

Measurement Uncertainty

Older standards referenced TUR (test uncertainty ratio) or TAR (test accuracy ratio) and suggested a 4:1 ratio between the accuracy of the measurement instrument and the accuracy of the instrument being calibrated. However, current standards emphasize the calculated measurement uncertainty. Many resources addressing the topic are available on the Internet.

Performance Verification Certificate

The Performance Verification Certificate is a record of who, when, and with what equipment the instrument was calibrated / verified. A suggested Performance Verification Certificate is provided later in this appendix.

Data Reports

Supporting verification measurement data can be recorded as described in this manual.

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 traceability, qualified personnel must perform the performance verification under controlled conditions, using correctly calibrated instruments with acceptable accuracy.

Creating Test Reports

The results of the performance verification are stored two of the following ways.

1. The **CH2VerificationTest** allows you to save a **.csv** file that contains the results of each test performed on the measurement system of the CH2. The **.csv** file can be examined, printed, and loaded into any spreadsheet program; it's intended to be a key part of your test results.

2. The results for all test runs (both the **CH2VerificationTest** and each of the **C_CalModule** tests) are stored in the Easy-Wire database and are accessible from the **Test Archive Report** or from the **In Process Report,** features of the Easy-Wire software. Those reports save the summary of the testing that was done. If required, you can have the CH2 save more information about the tests. To save more information for each test, take the following steps:

Before running the test:
1. From the Easy-Wire Main Menu, click on the test program you wish to use to turn on the test data storage options.
2. Click **Edit**.
3. At the top of the **Test Program Editor** screen, click the **Set Test Defaults** tab.
4. Check the **Store measured test value** box.
5. Check the **Store High Voltage IR Values** box (if the box is enabled).
6. Click **Done** at the bottom of the screen.
7. Select **Yes, save changes and return to the main menu.**

After the test program completes, while still in the test:
1. Click **Reports** at the bottom of the test program screen.
2. Click **In Process Report** and a test report will open.
3. Use the report's **Print Menu** to print or create a .pdf of the report.

Customer Service

Please contact Cirris technical support at techsupport@cirris.com, or your local Cirris representative, for additional assistance.

CH2 Certificate of Calibration Verification

Organization performing the verification:	**Organization Address:**
Certificate Number:	**Verified by:**
Calibrated:	**Due:**
Applicable Calibration Standard(s):	**Procedure:** CH2 Performance Verification
Temperature:	**Relative Humidity:**

Serial Numbers:

Instruments used:	Serial Number	Cal Date	Due
CH2 Low Voltage Calibration Adapter			
CH2 High Voltage Calibration Adapter			
CH2 Zero Ohm Calibration Adapter			
Multimeter			

Statement of Traceablility:

Certified by:

CH2 Calibration Verification Data Report

Report Number:		Verified by:	
Tester Serial Number:		**Verification date:**	

Test / Serial Number		Recorded Value	Test / Serial Number		Recorded Value
Scanner Module 1		Pass / Fail	Scanner Module 21		Pass / Fail
Scanner Module 2		Pass / Fail	Scanner Module 22		Pass / Fail
Scanner Module 3		Pass / Fail	Scanner Module 23		Pass / Fail
Scanner Module 4		Pass / Fail	Scanner Module 24		Pass / Fail
Scanner Module 5		Pass / Fail	Scanner Module 25		Pass / Fail
Scanner Module 6		Pass / Fail	Scanner Module 26		Pass / Fail
Scanner Module 7		Pass / Fail	Scanner Module 27		Pass / Fail
Scanner Module 8		Pass / Fail	Scanner Module 28		Pass / Fail
Scanner Module 9		Pass / Fail	Scanner Module 29		Pass / Fail
Scanner Module 10		Pass / Fail	Scanner Module 30		Pass / Fail
Scanner Module 11		Pass / Fail	Scanner Module 31		Pass / Fail
Scanner Module 12		Pass / Fail	Scanner Module 32		Pass / Fail
Scanner Module 13		Pass / Fail	Scanner Module 33		Pass / Fail
Scanner Module 14		Pass / Fail	Scanner Module 34		Pass / Fail
Scanner Module 15		Pass / Fail	Scanner Module 35		Pass / Fail
Scanner Module 16		Pass / Fail	Scanner Module 36		Pass / Fail
Scanner Module 17		Pass / Fail	Scanner Module 37		Pass / Fail
Scanner Module 18		Pass / Fail	Scanner Module 38		Pass / Fail
Scanner Module 19		Pass / Fail	Scanner Module 39		Pass / Fail
Scanner Module 20		Pass / Fail	Scanner Module 40		Pass / Fail