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Signature 1100H+

Performance Verification Manual

Version 2013.2.0

December 16, 2013

CIRRIS®

(ISO 9001 Certified)

Signature 1100H+

Performance Verification Manual

Version 2013.2.0

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Introduction

The 1100H+ Performance Verification Kit allows you to verify the calibration and proper operation of the 1100H+ 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 this performance verification kit are tested with instruments traceable to the National Institute of Standards and Technology (NIST).

You should run performance verification on your 1100H+ tester at least once a year, and any time you suspect that the tester is not operating properly. If any step in the performance verification procedure fails, send the tester back to Cirris for repair. 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.

Hipot Warning!

Possible electric shock!



Cirris hipot testers are designed to be safe for operators. Injuries from hipot test equipment are rare; however, not every hipot test situation is safe. Hipot testing is not a danger to healthy individuals; although, at times a mild electric shock may be experienced. A small shock will only occur during a hipot test when the operator touches an energized connection point. A shock from the tester may result in a hipot test failure.

Medical Warning!

A child or individual wearing a cardiac pacemaker, an insulin pump, or an electronically controlled medical device should NOT perform Hipot testing.

For more information on improving hipot safety visit:
www.cirris.com/testing/guidelines/hipot_safety.html

Setting Up

Performance Verification Certificate and Data Sheet

The Easy Touch Performance Verification Certificate and the Verification Data Sheet are at the end of this manual. You can record verification data on these documents for your records. If you plan to use these documents, make photocopies to maintain master copies for future use.

Install Add-on Scanners

The examples in this manual use an Easy Touch with no expansion boxes.

Install any add-on scanners you want to use. For instructions, see the 1100H+ Getting Started Guide.



Plug in the Tester

Connect the power supply from the tester to the power cord, and connect the power cord from the power supply to a grounded outlet.



Parts List

Make sure you received the following parts:

- ❑ Zero Ohm Adapter



- ❑ Resistor Leak Adapter



- ❑ Capacitance/Fourwire Adapter



Required Tools (not provided by Cirris)

- ❑ Volt Meter



Fluke 70/80 Series (or equivalent)
Input Resistance: 10 M Ω ±10%

(avoid using a bench top meter)

- ❑ High Voltage Probe



Fluke 80K-6 (or equivalent)
Input Resistance: >50 M Ω

(use alligator clip test lead from tip to terminal on PCB)

Caution! Your volt meter may become damaged if you do not take the following precautions:

- High voltage verification requires measurements beyond the range of most volt meters. A high voltage probe is required for all measurements.
- Test voltages of 2000 VDC may be used. Measurement equipment must be able to safely withstand over 2500 VDC, and input resistance must be no less than 50M ohms.

Signal Routing Sytem Test

1. From the tester's Main Menu, press **Set Up Test Program** and then **Create New Test.** Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	.1 Ω
LV Insulation Resistance	5M Ω
Hipot Test	OFF
Set Learn Components	OFF for all components

2. Install the Zero Ohm Adapter in the J1-J2 position as shown.



3. Press the BACK button and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen. The screen will display TEST:xxxxxx-xxxxx where xxxxxx-xxxxx is the cable signature. Write the displayed signature on the verification sheet under "Signal Routing System Test". If the displayed signature matches the correct signature, check off Pass; otherwise, check off Fail.

4. Remove the Zero Ohm Adapter and place it in the J3-J4 position as shown.



5. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.**

6. The tester will learn the cable and display the CABLE LEARNED screen. The screen will display TEST:xxxxxx-xxxxx where xxxxxx-xxxxx is the cable signature. Write the displayed signature on the verification data sheet under “Signal Routing System Test”. If the displayed signature matches the correct Signature shown on the sheet, check off Pass; otherwise, check off Fail.

7. If you have installed expansion boxes, continue the verification test by moving the Zero Ohm Adapter to each of the “J” positions and running the test. For each test, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen. The screen will display TEST:xxxxxx-xxxxx where xxxxxx-xxxxx is the cable signature. Write the displayed signature on the verification data sheet under “Signal Routing System Test”. If the displayed signature matches the correct Signature shown on the sheet, check off Pass; otherwise, check off Fail.

The following table lists the correct signatures for all the adapter “J” positions.

“J” Position for Zero Ohm Adapter	**Correct Signature**		**“J” Position for Zero Ohm Adapter**	**Correct Signature**
J1-J2	7F5527-6N030		J17-J18	8CE799-6N030
J3-J4	94C424-6N030		J19-J20	18483C-6N030
J5-J6	5CC1A1-6N030		J21-J22	3476BF-6N030
J7-J8	D3A34A-6N030		J23-J24	B5D5D5-6N030
J9-J10	51A15E-6N030		J25-J26	1E83A5-6N030
J11-J12	C50EFB-6N030		J27-J28	8A2C00-6N030
J13-J14	E93078-6N030		J29-J30	A61283-6N030
J15-J16	719A99-6N030		J31-J32	3BA461-6N030

Resistance Measurement System Test

1. From the Main Menu, press **Set Up Test Program** and then **Create New Test.**

2. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	.1 Ω
LV Insulation Resistance	5M Ω
Hipot Test	OFF
Set Learn Components	OFF for all components

3. Install the Resistor Leak Adapter in the J1-J2 position as shown.



4. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will not learn the cable and display the LEARN ERRORS screen. Press **View Errors**, to view the resistance errors.

5. Write the displayed resistance value on the on the verification sheet under “Resistant Measurement System Test”. If the displayed signature matches the correct Signature shown on the sheet, check off Pass; otherwise, check off Fail.

6. Compare the resistance value displayed by the tester with the Resistor Value shown in the table on the verification sheet under“Resistant Measurement System Test”. This value is also shown in the table below. If the displayed resistance is between the Maximum and Minimum resistance limits shown in the table, check off Pass; otherwise, check off Fail.

7. Continue scrolling through all the errors until you have recorded and checked all of the values shown below.

Resistance Measurement			
Resistor Positions	**Correct Resistance**	**Minimum Limit**	**Maximum Limit**
J1B002-J1B004	10.00 Ω	9.80 Ω	10.20 Ω
J1B003-J1B005	100.0 Ω	98.9 Ω	101.1 Ω
J1B006-J1B008	1,000 Ω	989.9 Ω	1,010.1 Ω
J1B007-J1B010	9,090 Ω	8,999 Ω	9,181 Ω
J1B013-J1B015	85.00K Ω	84.15K Ω	85.85K Ω
J1B016-J1A016	404.1K Ω	363.69K Ω	444.51K Ω
J1A020-J1A021	3.806M Ω	3.4254M Ω	4.1866M Ω
J1A022-J1A023	592.0K Ω	532.8K Ω	651.2K Ω

Resistance Threshold System Test

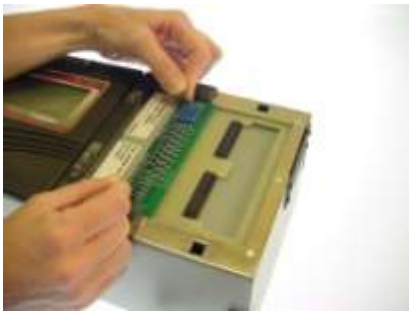
500k Ω

1. From the Main Menu, press **Set Up Test Program** and then **Create New Test.**

2. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	100k Ω
LV Insulation Resistance	500k Ω
Hipot Test	OFF
Set Learn Components	OFF for all components

3. Install the Resistor Leak Adapter in the J1-J2 position as shown.



4. From the Main Menu, press **Set Up Test Program, Create New Test**, and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen.

5. The tester should display TEST:EB4F69-6J6F0. Write the displayed signature on the verification sheet under "Resistance Threshold System Test, 500k Ω". If the displayed signature matches the correct signature, check off Pass; otherwise, check off Fail.

6. Press **TEST:EB4F69-6J6F0** to test the resistance threshold at 500k Ω.

7. The tester should display FAILED: LOW VOLTAGE. Press **View Errors** to view which points failed.

8. If the failed points are J1B016 and J1A016, check off Pass on the verification sheet; otherwise, check off Fail (the actual value for the error in this part of the test is irrelevant and does not need to be recorded).

1M Ω

1. From the Main Menu, press **Set Up Test Program** and then **Create New Test.**

2. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	500k Ω
LV Insulation Resistance	1M Ω
Hipot Test	OFF
Set Learn Components	OFF for all components

3. Make sure the Resistor Leak Adapter is installed in the J1-J2 position.

4. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN**. The tester will learn the cable and display the CABLE LEARNED screen.

5. The tester should display TEST:75698A-6L6J0. Write the displayed signature on the verification sheet under “Resistance Threshold System Test, 1M Ω”. If the displayed signature matches the correct signature, check off Pass; otherwise, check off Fail.

6. Press **TEST:75698A-6L6J0** to test the resistance threshold at 1M Ω.

7. The tester should display FAILED: LOW VOLTAGE. Press **View Errors** to view which points failed.

8. If the failed points are J1A022 and J1A023, check off Pass on the verification sheet under “Resistance Threshold System Test, 1M Ω”; otherwise check off Fail (the actual value for the error in this part of the test is irrelevant and does not need to be recorded).

5M Ω

1. From the Main Menu, press **Set Up Test Program** and then **Create New Test.**

2. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	1M Ω
LV Insulation Resistance	5M Ω
Hipot Test	OFF
Set Learn Components	OFF for all components

3. Make sure the Resistor Leak Adapter is installed in the J1-J2 position.

4. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen.

5. The tester should display TEST:CEF39B-6N6L0. Write the displayed signature on the verification sheet under "Resistance Threshold System Test, 5M Ω". If the displayed signature matches the correct signature, check off Pass; otherwise, check off Fail.

6. Press **TEST:CEF39B-6N6L0** to test the resistance threshold at 5M ohms.

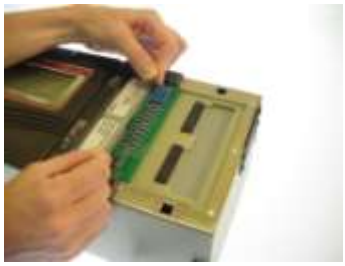
7. The tester should display FAILED: LOW VOLTAGE. Press **View Errors** to view which points failed.

8. If the failed points are J1A020 and J1A021, check off Pass under "Resistance Threshold System Test, 5M Ω"; otherwise, check off Fail (the actual value for the error in this part of the test is irrelevant and does not need to be recorded.

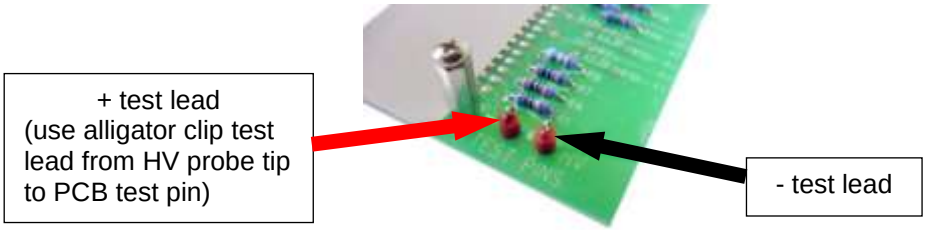
HV System Test

In general, the high voltages on the 1100H+ tester are not considered dangerous because the current is limited to a safe level. However, touching cable connections when high voltage is applied causes an unpleasant shock. An operator who has a health condition that could be aggravated by a startle should not do high voltage tests.

1. Install the Resistor Leak Adapter in the J1-J2 position as shown.



2. Connect your voltmeter probes to the test pins on the Resistor Leak adapter as shown.



3. From the Main Menu, press Set User Preferences to set how the tester will do the hipot test. Set the User Preferences to the following values:

User Preferences	
Setting	**Value**
Automatic Hipot	OFF
High Speed Hipot	ON

50 Volt

1. From the Main Menu, press **Set Up Test Program** and then **Create New Test.** Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	100k Ω
LV Insulation Resistance	100k Ω
Hipot Test	STANDARD
Hipot Voltage	50 V
HV Insulation Resistance	50M Ω
Duration	10 sec
Hipot To	CONN ONLY
High Cap Shield	NO
Maximum Soak	0 sec
Set Learn Components	OFF for all components

2. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen.
3. The tester should display TEST:577188-3X6FT. Write the displayed signature on the verification sheet under “HV System Test, 50 Volt”. If the displayed signature matches the correct signature, check off Pass; otherwise, check off Fail.
4. Press **TEST:577188-3X6FT** to begin the test.
5. At the PASSED LOW VOLTAGE screen, press START HIPOT to test the high voltage at 50 volts.
6. Write the displayed voltage value from the voltmeter on the verification sheet under “HV System Test, 50 Volt”. If the displayed voltage falls between the Maximum and Minimum voltage limits shown below, check off Pass; otherwise, check off Fail.

Correct Voltage	Minimum Limit	Maximum Limit
50 Volts	45 Volts	55 Volts

7. At the PASSED ALL TESTS screen, press **STOP TEST RUN** to return to the Main Menu. The hipot test takes 60 seconds to complete. If the hipot test is still running, press **ABORT TEST** and then the Back button to return to the Main Menu.

630 Volt

1. In the Main Menu, press **Set Up Test Program** and then **Create New Test.**

2. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	100k Ω
LV Insulation Resistance	100k Ω
Hipot Test	STANDARD
Hipot Voltage	630 V
HV Insulation Resistance	50M Ω
Duration	10 sec
Hipot To	CONN ONLY
High Cap Shield	NO
Maximum Soak	0 sec
Set Learn Components	OFF for all components

3. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen.

4. The tester should display TEST:577188-FR6FT. Write the displayed signature on the verification sheet under “HV System Test, 630 Volt”. If the displayed signature matches the correct signature, check off Pass; otherwise, check off Fail.

5. Press **TEST:577188-FR6FT** to begin the test.

6. At the PASSED LOW VOLTAGE screen, press **START HIPOT** to test the high voltage at 630 V.

7. Write the displayed voltage value from the voltmeter on the verification sheet under “HV System Test, 630 Volt”. If the displayed voltage is between the Maximum and Minimum voltage limits shown below, check off Pass; otherwise, check off Fail.

Correct Voltage	Minimum Limit	Maximum Limit
630 V	567 V	693 V

8. At the PASSED ALL TESTS screen, press STOP TEST RUN to return to the Main Menu. The hipot test takes 60 seconds to complete. If the hipot test is still running, press **ABORT TEST** and then the Back button to return to the Main Menu.

1000 Volt

Be certain your voltmeter is equipped with a high voltage probe. This probe must have > 50M ohms of input resistance and must be able to withstand at least 1000 VDC. **Your voltmeter may become damaged if you do not take these precautions!**

1. From the Main Menu, press **Set Up Test Program** and then **Create New Test**. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	100k Ω
LV Insulation Resistance	100k Ω
Hipot Test	STANDARD
Hipot Voltage	1000 V
HV Insulation Resistance	50M Ω
Duration	10 sec
Hipot To	CONN ONLY
High Cap Shield	NO
Maximum Soak	0 sec
Set Learn Components	OFF for all components

2. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen.
3. The tester should display TEST:577188-LN6FT. Write the displayed signature on the verification sheet under “HV System Test, 1000 Volt”. If the displayed Signature matches the Correct Signature, check off Pass; otherwise, check off Fail.
4. Press **TEST:577188-LN6FT** to begin the test.
5. At the PASSED LOW VOLTAGE screen, press **START HIPOT** to test the high voltage at 1000 volts.
6. Write the displayed voltage value from the voltmeter on the verification sheet under “HV System Test, 1000 Volt”. If the displayed voltage is between the Maximum and Minimum voltage limits shown below, check off Pass; otherwise, check off Fail.

Correct Voltage	Minimum Limit	Maximum Limit
1000 Volts	900 Volts	1100 Volts

7. At the PASSED ALL TESTS screen, press **STOP TEST RUN** to return to the Main Menu. The hipot test takes 60 seconds to complete. If the hipot test is still running, press **ABORT TEST** and then the Back button to return to the Main Menu.
8. Disconnect the voltmeter from the tester.

1500 Volt

Be certain your voltmeter is equipped with a high voltage probe. This probe must have > 50M ohms of input resistance and must be able to withstand at least 1500 VDC. **Your voltmeter may become damaged if you do not take these precautions!**

9. From the Main Menu, press **Set Up Test Program** and then **Create New Test**. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	100k Ω
LV Insulation Resistance	100k Ω
Hipot Test	STANDARD
Hipot Voltage	1500 V
HV Insulation Resistance	50M Ω
Duration	10 sec
Hipot To	CONN ONLY
High Cap Shield	NO
Maximum Soak	0 sec
Set Learn Components	OFF for all components

10. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen.

11. The tester should display TEST:577188-00000. Write the displayed signature on the verification sheet under “HV System Test, 1500 Volt”. If the displayed Signature matches the Correct Signature, check off Pass; otherwise, check off Fail.

12. Press **TEST:577188-00000** to begin the test.

13. At the PASSED LOW VOLTAGE screen, press **START HIPOT** to test the high voltage at 1500 Volts.

14. Write the displayed voltage value from the voltmeter on the verification sheet under “HV System Test, 1500 Volt”. If the displayed voltage is between the Maximum and Minimum voltage limits shown below, check off Pass; otherwise, check off Fail.

Correct Voltage	Minimum Limit	Maximum Limit
1500 Volts	1350 Volts	1650 Volts

15. At the PASSED ALL TESTS screen, press **STOP TEST RUN** to return to the Main Menu. The hipot test takes 60 seconds to complete. If the hipot test is still running, press **ABORT TEST** and then the Back button to return to the Main Menu.

16. Disconnect the voltmeter from the tester.

2000 Volt

Be certain your voltmeter is equipped with a high voltage probe. This probe must have > 50M ohms of input resistance and must be able to withstand at least 2000 VDC. **Your voltmeter may become damaged if you do not take these precautions!**

17. From the Main Menu, press **Set Up Test Program** and then **Create New Test**. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	100k Ω
LV Insulation Resistance	100k Ω
Hipot Test	STANDARD
Hipot Voltage	2000 V
HV Insulation Resistance	50M Ω
Duration	10 sec
Hipot To	CONN ONLY
High Cap Shield	NO
Maximum Soak	0 sec
Set Learn Components	OFF for all components

18. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen.

19. The tester should display TEST:577188-00000. Write the displayed signature on the verification sheet under “HV System Test, 2000 Volt”. If the displayed Signature matches the Correct Signature, check off Pass; otherwise, check off Fail.

20. Press **TEST:577188-00000** to begin the test.

21. At the PASSED LOW VOLTAGE screen, press **START HIPOT** to test the high voltage at 2000 Volts.

22. Write the displayed voltage value from the voltmeter on the verification sheet under “HV System Test, 2000 Volt”. If the displayed voltage is between the Maximum and Minimum voltage limits shown below, check off Pass; otherwise, check off Fail.

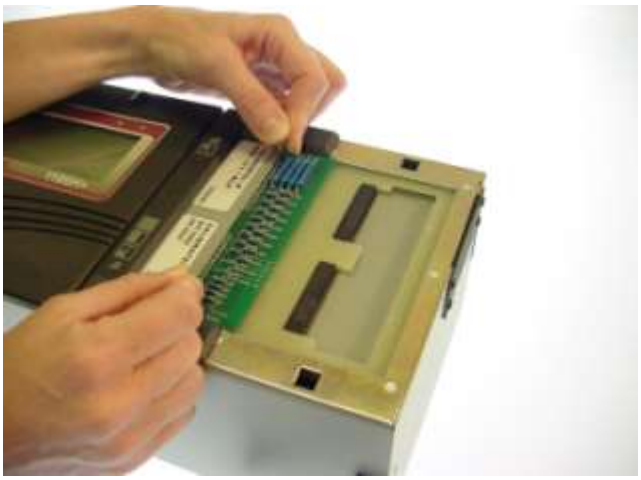
Correct Voltage	Minimum Limit	Maximum Limit
2000 Volts	1800 Volts	2200 Volts

23. At the PASSED ALL TESTS screen, press **STOP TEST RUN** to return to the Main Menu. The hipot test takes 60 seconds to complete. If the hipot test is still running, press **ABORT TEST** and then the Back button to return to the Main Menu.

24. Disconnect the voltmeter from the tester.

HV Insulation Resistance Detection System Test

1. Install the Resistor Leak Adapter in the J1-J2 position as shown.



2. From the Main Menu, press Set Up Test Program and then Create New Test. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	100k Ω
LV Insulation Resistance	5M Ω
Hipot Test	STANDARD
Hipot Voltage	1000 V
HV Insulation Resistance	500M Ω
Duration	0.1 sec
Hipot To	ALL PINS
High Cap Shield	NO
Maximum Soak	0 sec
Set Learn Components	Resistor ON OFF for all other components

3. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen. The tester should display TEST:166514-MULTI.

4. Press **TEST:166514-MULTI** to test the insulation threshold at 500M ohms.

5. At the PASSED LOW VOLTAGE screen, press **START HIPOT.**

6. The tester will display FAILED: HIPOT. Press **View Errors.** The tester will display ERROR: 166514-MULTI. Write the displayed error signature on the verification sheet under "HV Insulation Resistance Detection System Test". If the displayed error signature matches the correct signature, check off Pass, otherwise, check off Fail.

7. Verify the tester reports only the four high voltage errors below:

    - Verify there is a Dielectric Failure at J1A019.
    - Verify there is a Dielectric Failure at J1B020.
    - Verify there is a HV LEAKAGE error at J1B023 with a measured value around 400M ohms.
    - Verify there is a HV LEAKAGE error at J1B026 with a measured value around 400M ohms.

    If the four high voltage errors are displayed, check off Pass on the verification sheet under "HV Insulation Resistance Detection System Test"; otherwise, check off Fail.

Capacitance Measurement System Test

1. Install the Capacitance/4-Wire adapter in the J1-J2 position as shown here.



2. From the Main Menu, press Set Up Test Program and then Create New Test. Set the Learn Settings to the following values:

Learn Settings	
Setting	**Value**
Connection Resistance	1 Ω
LV Insulation Resistance	100k Ω
Hipot Test	OFF
Set Learn Components	Capacitor ON OFF for all other components

3. From the Main Menu, press **Set Up Test Program, Create New Test,** and then press **LEARN.** The tester will learn the cable and display the CABLE LEARNED screen.

4. The tester should display TEST:3F6323-MULTI. Write the displayed signature on the verification sheet under “Capacitance Measurement System Test”. If the displayed signature matches the correct signature, check off Pass; otherwise, check off Fail.

5. At the CABLE LEARNED screen, press **Verify Test.** Verify the tester reports only the five connections below:

   J1A001 J1A002 J1A003 J1A004
   J1A005 J1A006
   J1A007 J1A008
   J1A009 J1A010
   J1A011 J1A012

   If the five connections are displayed, for each connection, check off Pass on the verification sheet under “Capacitance Measurement System Test”; otherwise, check off Fail.

6. Continue scrolling to verify the tester reports the correct capacitance measurement. Write the displayed capacitance value on the verification sheet under “Capacitance Measurement System Test”. If the displayed capacitance falls between the Maximum and Minimum limits shown below, check off Pass; otherwise, check off Fail.

Correct Capacitance	Minimum Limit	Maximum Limit
1.41 µF	1.27 µF	1.55 µF

4-Wire Measurement System Test

1. Install the Capacitance/4-Wire adapter in the J1-J2 position on the tester as shown.



2. In the Main Menu, press **Set Up Test Program,** press the down button, and then press **Load 4W Cal Test.** The tester will display TEST RETRIEVED.

3. At the TEST RETRIEVED screen, the tester should display TEST:7427A0-MULTI. Write the displayed signature on the verification sheet under “4-Wire Measurement System Test”. If the displayed signature matches the correct signature, check off Pass; otherwise, check off Fail.

4. To test the 4-wire measurement system test, from the Main Menu, press **TEST:7427A0-MULTI** .

5. The tester should display FAILED: LOW VOLTAGE. Press the **View Errors** button to view points that failed.

6. Verify that the tester reports a BAD 4W RESISTOR error between J1A001 and J1A003. The tester expects a measured value of 0.2 ± 0.001 ohm ±2%. If the measured value is between 0.180 and .220 ohms, check off Pass on the verification sheet under “4-Wire Measurement System”; otherwise, check off Fail.

Appendix

The following information can be used 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 the 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, 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 for the calibration industry 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 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 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 calibrate 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 insturment 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. An 1100H+ Performance Verification Certificate is provided on the next page.

Verification Data Report
How accurate is the calibrated test instrument in relation to its published specifications? Some organizations require the measured values of a calibrated instrument to be written down when that instrument is calibrated. 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 be recorded in relation to the instrument specifications. A verification data report can fill this requirement. You can photocopy the 1100H+ Verification Data Report from the Appendix and fill it out.

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 calibration 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 Cirris can provide a copy of the position paper from the National Conference of Standards Laboratories.

1100H+ Performance Verification Certificate

Name and Address of Organization:	
Certificate Number:	**Performed by:**
Date:	**Due Date:**
Applicable Quality Standard(s):	**Procedure:** 1100H+ Performance Verification Version _____
Temperature:	**Relative Humidity:**
Tester Serial Number:	

Instruments used:	**Serial Number**	**Cal. Date**	**Due Date**
Zero Ohm Adapter			
Resistor Leak Adapter			
Capacitance/Fourwire Adapter			
Voltmeter			

Statement of Traceablility:

Certified by:

1100H+ Verification Data Sheet

Date: _____
Tester Serial Number: _____
Tests Performed By: _____

Signal Routing System Test

J Position for Adapter	Correct Signature	Displayed Signature	Pass	Fail
J1-J2	7F5527-6N030			
J3-J4	94C424-6N030			
J5-J6	5CC1A1-6N030			
J7-J8	D3A34A-6N030			
J9-J10	51A15E-6N030			
J11-J12	C50EFB-6N030			
J13-J14	E93078-6N030			
J15-J16	719A99-6N030			
J17-J18	8CE799-6N030			
J19-J20	18483C-6N030			
J21-J22	3476BF-6N030			
J23-J24	B5D5D5-6N030			
J25-J26	1E83A5-6N030			
J27-J28	8A2C00-6N030			
J29-J30	A61283-6N030			
J31-J32	3BA461-6N030			

Resistance Measurement System Test

Resistor Positions	Correct Resistance	Minimum Limit	Maximum Limit	Displayed Value	Pass	Fail
J1B002-J1B004	10.00 Ω	9.80 Ω	10.20 Ω			
J1B003-J1B005	100.0 Ω	98.9 Ω	101.1 Ω			
J1B006-J1B008	1,000 Ω	989.9 Ω	1,010.1 Ω			
J1B007-J1B010	9,090 Ω	8,999K Ω	9,181 Ω			
J1B013-J1B015	85.00K Ω	84.15K Ω	85.85K Ω			
J1B016-J1A016	404.1K Ω	363.69K Ω	444.51K Ω			
J1A020-J1A021	3.806M Ω	3.4254M Ω	4.1866M Ω			
J1A022-J1A023	592.0K Ω	532.8K Ω	651.2K Ω			

Resistance Threshold System Test

- **500k Ω**

Correct Signature	Displayed Signature	Pass	Fail
EB4F69-6J6F0			

High Resistance Error between:	Pass	Fail
J1B016 and J1A016		

- **1M Ω**

Correct Signature	Displayed Signature	Pass	Fail
75698A-6L6J0			

High Resistance Error between:	Pass	Fail
J1A022 and J1A023		

- **5M Ω**

Correct Signature	Displayed Signature	Pass	Fail
CEF39B-6N6L0			

High Resistance Error between:	Pass	Fail
J1A020 and J1A021		

HV System Test

- **50 Volt**

Correct Signature	Displayed Signature	Pass	Fail
577188-3X6FT			

Correct Voltage	Minimum Voltage	Maximum Voltage	Displayed Value	Pass	Fail
50 V	45 V	55 V			

- **630 Volt**

Correct Signature	Displayed Signature	Pass	Fail
577188-FR6FT			

Correct Voltage	Minimum Voltage	Maximum Voltage	Displayed Value	Pass	Fail
630 V	567 V	693 V			

- **1000 Volt**

Correct Signature	Displayed Signature	Pass	Fail
577188-LN6FT			

Correct Voltage	Minimum Voltage	Maximum Voltage	Displayed Value	Pass	Fail
1000 V	900 V	1100 V			

- **1500 Volt Test**

Correct Signature	Displayed Signature	Pass	Fail
577188-00000			

Correct Voltage	Minimum Voltage	Maximum Voltage	Displayed Value	Pass	Fail
1500 V	1350 V	1650 V			

- **2000 Volt Test**

Correct Signature	Displayed Signature	Pass	Fail
577188-00000			

Correct Voltage	Minimum Voltage	Maximum Voltage	Displayed Value	Pass	Fail
2000 V	1800 V	2200 V			

HV Insulation Resistance Detection System Test

Correct Error Signature	Displayed Signature	Pass	Fail
166514-MULTI			

Dielectric Failure at:	Pass	Fail
J1A019		

Dielectric Failure at:	Pass	Fail
J1B020		

HV Leakage at:	Pass	Fail
J1B023 (measured value: ~ 400M Ω)		

HV Leakage at:	Pass	Fail
J1B026 (measured value: ~400M Ω)		

Capacitance Measurement System Test

Correct Signature	Displayed Signature	Pass	Fail
3F6323-MULTI			

Connection List	Pass	Fail
1 J1A001 J1A002 J1A003 J1A004		
2 J1A005 J1A006		
3 J1A007 J1A008		
4 J1A009 J1A010		
5 J1A011 J1A012		

Correct Capacitance	Minimum Capacitance	Maximum Capacitance	Displayed Value	Pass	Fail
1.41 µF	1.27 µF	1.55 µF			

4-Wire Measurement System Test

Correct Signature	Displayed Signature	Pass	Fail
7427A0-MULTI			

Bad 4W Resistor Error between J1A001 and J1A003	Minimum Value	Maximum Value	Pass	Fail
0.2 Ω ± 2% ± 0.001 ohm	0.195 Ω	0.205 Ω		

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