Touch 1 Ultra

Getting Started Guide and User's Reference

Version 2008.4.0

November 26, 2008

CIRRIS®

Touch 1 Ultra Getting Started Guide and User's Reference

Version 2008 4.0

Cirris Systems Corporation
1991 W. Parkway Boulevard
Salt Lake City, Utah 84119
USA

High Voltage Warning and Safety Information

The Touch 1 Ultra produces voltages and currents that can cause harmful or fatal electric shock. To prevent accidental injury or death, the following safety procedures must be strictly observed when handling and using a Touch 1 Ultra analyzer.

Key Safety Points to Remember

- Keep unqualified and unauthorized personnel away from the test area.
  - Test areas should be marked **"DANGER – High Voltage Testing – Unauthorized Personnel Keep Away."**
  - Only properly trained personnel should operate this device.

- Arrange the test station in a safe and orderly manner.
  - Perform tests on a non-conductive surface.
  - All metal in the work area should be connected to a good ground.
  - Do not perform tests in a combustible atmosphere or where combustible materials are present.

- Never touch the device-under-test (DUT) or connections during a test.
  - Ensure the analyzer power is properly grounded.
  - Operators should not wear jewelry that could accidentally complete a circuit.
  - Personnel with heart ailments or medical devices should consult a physician before operating this equipment.

- If a problem occurs, turn off the high voltage first.

- At the completion of a test, any voltage is discharged from the device-under-test. If a device is removed during testing, it may retain a hazardous charge. Properly discharge these items before touching connections.

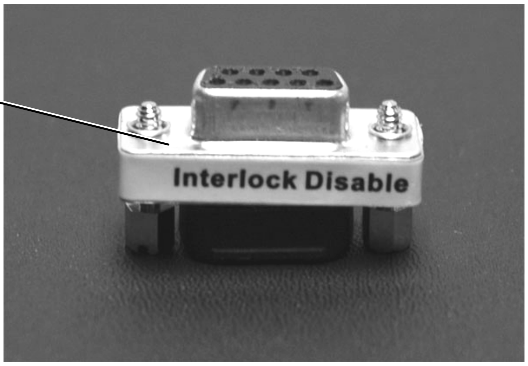
- Be sure to *never* perform a hipot test on energized equipment.

There are no serviceable user parts inside the external HV supply. Be sure to *never* remove the instrument cover or back panel of the external HV supply while the unit power is on.

Unauthorized user modifications will void your warranty. Cirris Systems Corporation will not be responsible for any injuries sustained due to unauthorized equipment modifications, use of parts not specified by Cirris Systems Corporation, or improper use of this equipment.

SAFETY WARNING

This is the **Safety Interlock Override Dongle**.



The Touch 1 Ultra will not function without some form of Safety Interlock detected.

We strongly recommend you construct a Safety Interlock to protect your operators from hazardous energy rather than utilizing the **Safety Interlock Override Dongle**.

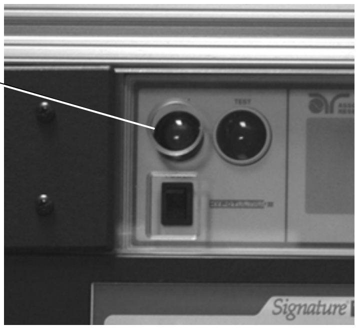
To see where to insert the **Safety Interlock Override Dongle** on your Touch 1 analyzer, see page 6.

Here are some suggested methods of how to implement a Safety Interlock:

- Dual Palm switches, normally open, wired in series. This works well for assemblies that are quick to test.
- A switch on a cover that, when enclosing the device-under-test, closes the switch. This works well for assemblies that take a long time to test.
- A light curtain that detects if an operator's hands enter the area of the device-under-test.

Wire your Safety Interlock to pins 4 and 5 of a female DB-9 connector. Replace the **Safety Interlock Override Dongle** with your DB-9 connector.

The Front Panel button will also abort the application of high voltage. Press the red button at any time during the application of high voltage to abort the test.



Chapter 1: Set up the Touch 1 Ultra

Make sure you have all the required items

The following items are supplied with every Touch 1 Ultra test system:

- The **Touch 1 Ultra Base** Assembly (see photo, pg. 4)
- **Touch 1 Ultra Scanner Assembly-**128 test points (see photo, pg. 5)
- Two **Power Cords** that match the electrical requirements of your country
- An **RS-232 Cable** (see photo, pg. 7)
- An **AR Signal I/O Cable** (see photo, pg. 6)
- An **HV Cable** (red) (see photo, pg. 7)
- An **HV Return Cable** (black) (see photo, pg. 6)
- A **9-pin Safety Interlock Override Dongle** (see photo, pg.2)
- A **64-pin Ribbon Cable** (see photo, pg. 7)
- A hand-held **Probe**
- The **Getting Started Guide and User Reference** (this document)

Optional items you may have purchased with the Touch 1 Ultra test system:

- **Scanner Assembly Expansion** - 128 additional test points (256 points max.)
- **Cirris HVI Plug Mating Adapters**
- **Touch 1 Ultra Performance Check Kit**
- A **Network Card,** which is pre-installed by Cirris
- The **Scripting** option, pre-installed and activated by Cirris
- The **SPC Data Collection** option, pre-installed and activated by Cirris.
- The **SPC Link** software for your PC, a data conversion and storage utility
- The **SPC Made Easy** software for your PC, a full featured data analysis tool

You may need some of the following items based on your test requirements:

- A parallel **Printer**. "Windows Only" printers and USB printers are not compatible
- A computer **Keyboard** for non-touch-screen control
- A **Video Monitor**
- A variety of **Digital Controls** such as external switches, relays, solenoids, etc.

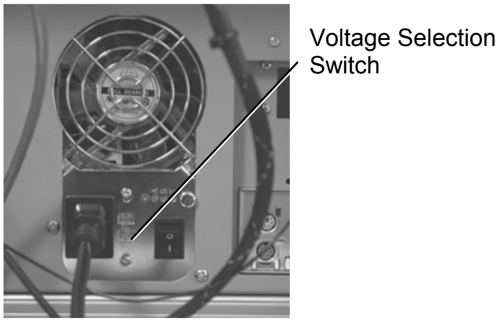
Before you plug in your Touch 1 Ultra analyzer

Warning!

If your Touch1 Ultra has a switchable power supply, make sure the Voltage Selection Switch is set for the appropriate electrical power voltage

Failure to do so will damage your analyzer!

If your Touch1 Ultra has an automatic switching power supply, you do not have to do anything.



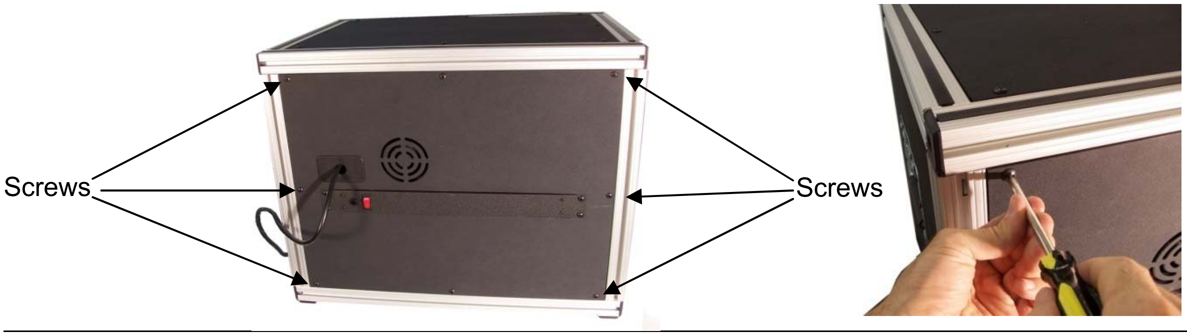
Install Scanner Assemblies and Cables

To install scanner assemblies in your Touch1 Ultra, you will need these tools:

Install the First Scanner Assembly

The Touch1 Ultra scanner assembly may have been shipped in a separate box. See the directions below to install scanner 1 in your Touch1 Ultra analyzer.

1. Remove the eight screws on the back of the base assembly, and remove the back panel.

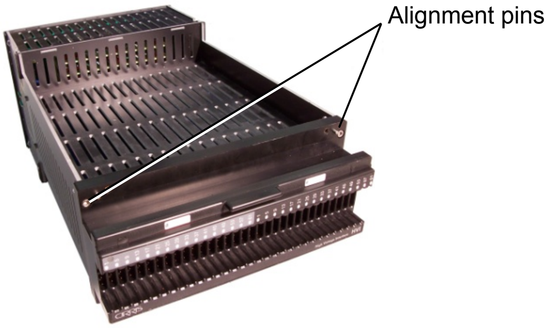


2. Locate the bottom center nut mount at the base of the back of the analyzer. Use a 3/16" Allen wrench to loosen the bottom center nut mount, and slide the nut mount to the left.

3. Make sure the scanner interface latch is closed on the scanner assembly. If not, push it to the closed position.

4. From the rear of the cabinet, place the scanner assembly onto the right side of the scanner shelf and push it towards the front of the cabinet.

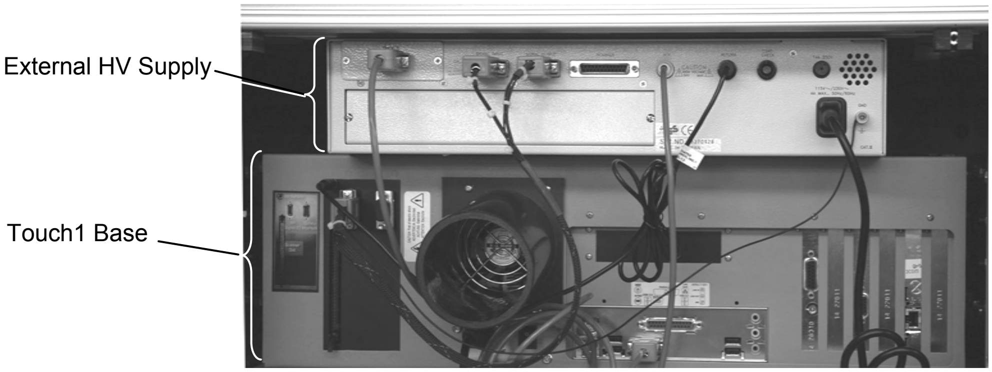
   Note: The scanner assembly must fully seat against the front panel of the scanner shelf so the alignment pins fully engage.



5. With the scanner assembly seated against the front panel, tighten the four thumb screws on the front of the scanner shelf.

Electrical Assembly

This is a photo of the installed cables. Please refer to this diagram while performing the steps.

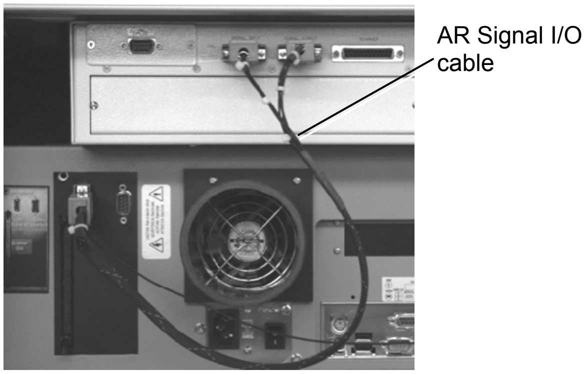


1. Install the **AR Signal I/O** cable.

   The single end connector plugs into the AR Signal I/O socket on the Touch 1 base.

   The double end connectors plug into the External HV supply. The female connector plugs into the left socket, and the male connector plugs into the right socket.

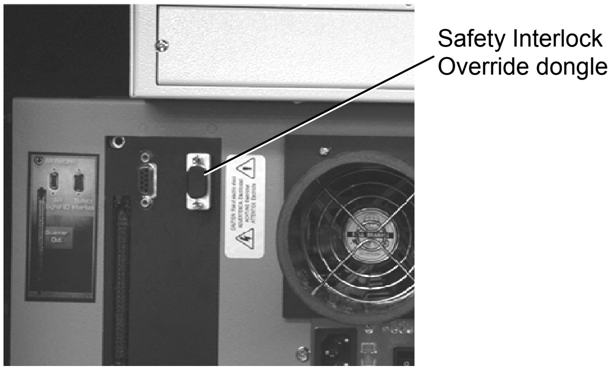
   The loose wire connects to the ground (GND) screw located on the far right side of the External HV Supply.



2. Install your safety interlock device or the **Safety Interlock Override** dongle.

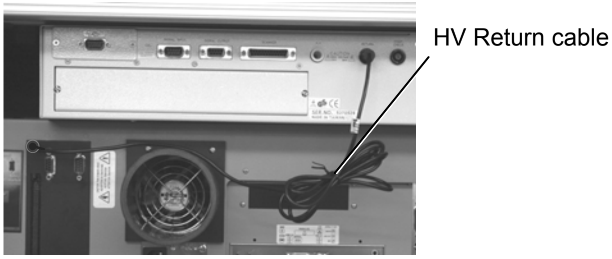
   Attach your safety interlock device to the 9-pin Safety Interlock Connector on the Touch1 Ultra base, or plug the Safety Interlock Override dongle into the 9-pin Safety Interlock Connector.

   Warning! If you choose not to use a safety interlock device, see the safety warning on page 2.



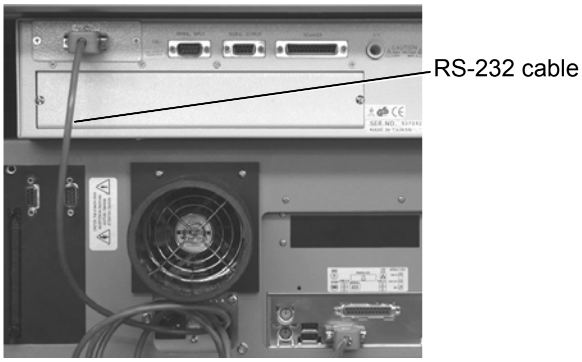
3. Install the **HV Return** cable.

   Plug one end of the HV Return cable into the socket marked RETURN on the External HV Supply. Plug the other end into the AR Return socket on the Touch1 Base.



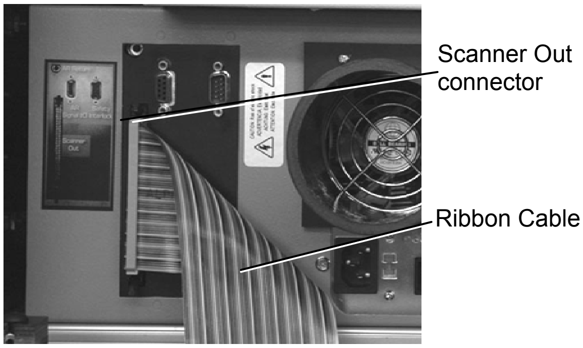
4. Install the **RS-232 cable.**

   One end plugs into the Touch1 Base in the center of the unit, near the bottom. The other side plugs into the External HV Supply on the far left side.

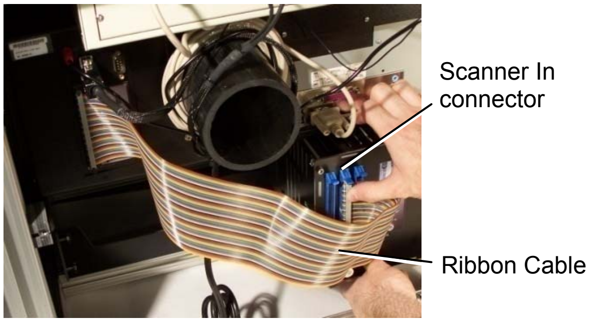


Important! If you are installing only one scanner assembly, continue on to step number 5. If you are installing two scanner assemblies skip to page 10.

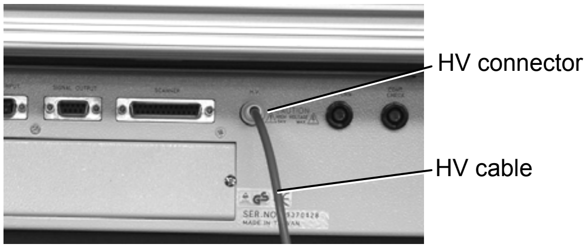
5. Connect one end of the ribbon cable to the **Scanner Out** connector on the Touch1 Base.



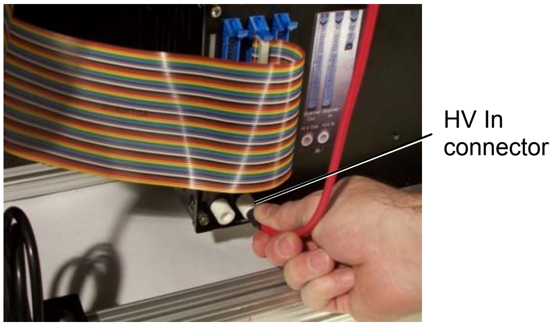
6. Connect the other end of the ribbon cable to the **Scanner In** connector on the scanner assembly.



7. Plug one end of the red HV cable into the **HV** connector on the External HV Supply.

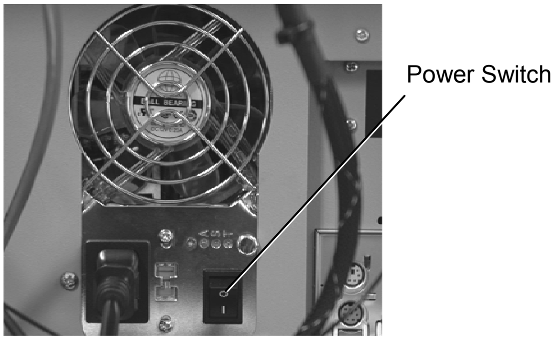


8. Plug the other end of the HV cable to the **HV In** connector on the scanner assembly.

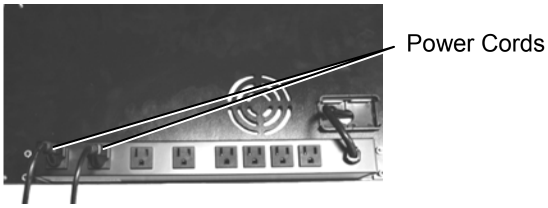


9. Connect the two Power Cords into the power sockets on the Touch1 base and the External HV Supply.

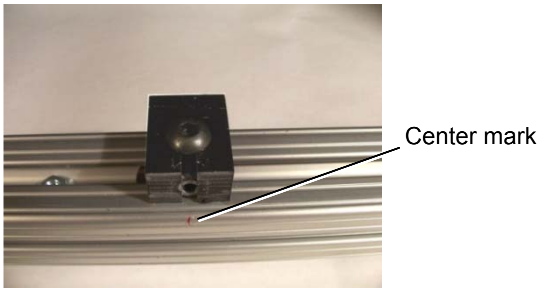
10. Make sure the **Power Switch** on the Touch1 Base is in the ON position.



11. Plug the **Power Cords** into the power sockets on the inside of the Base Assembly back panel.



12. Align the center nut mount to the **center mark** in the cabinet and re-tighten the nut mount.



13. Reattach the back panel if you are only installing one scanner assembly. If you are installing a second scanner assembly, leave the back panel off and skip to the next page.

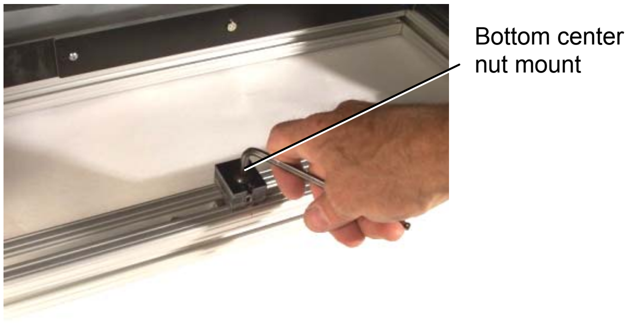
The Touch 1 Ultra is now assembled and ready for use.

Warning!
Be sure to connect all peripheral devices to the analyzer before turning on the power. The analyzer may not recognize the device being attached, or the device may be damaged in the process if the power is on when the device is plugged in to the back of the analyzer.

The next section explains how to install the second scanner assembly. If you are only using one scanner assembly, skip to page 16.

Install the Second Scanner Assembly

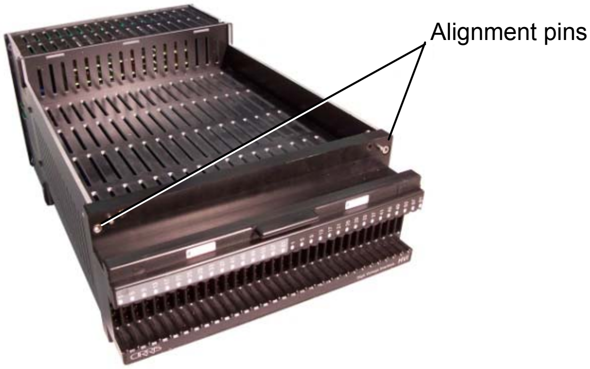
1. Use a 3/16" Allen wrench to loosen the bottom center nut mount, and slide the nut mount to the right.



2. Make sure the scanner interface latch is closed on the second scanner. If not, push it to the closed position.

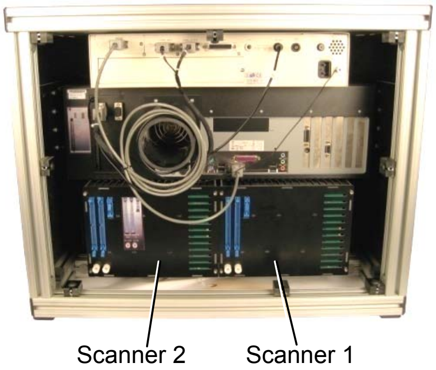
3. From the rear of the cabinet, place the second scanner assembly onto the left side of the scanner shelf and push it towards the front of the cabinet.

   Note: The scanner assembly must fully seat against the front panel of the scanner shelf so the alignment pins fully engage.

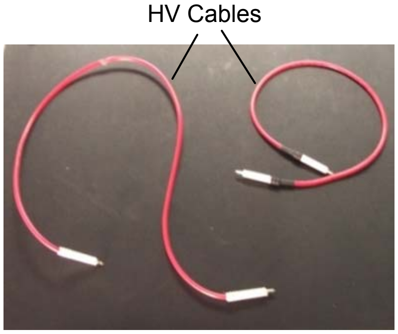


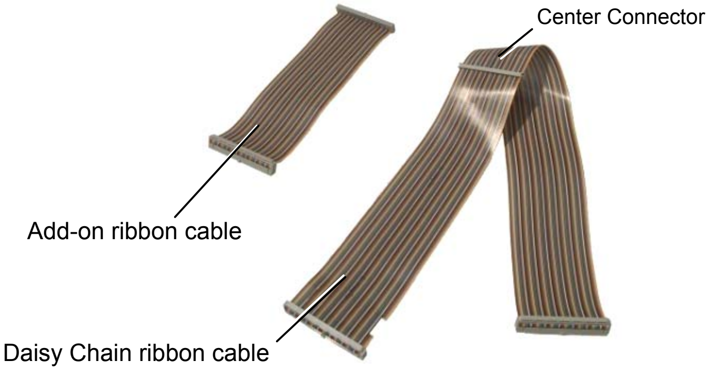
4. With the scanner seated against the front panel, tighten the four thumb screws on the front of the scanner shelf.

This is what the back of the tester should look like when both scanner assemblies are properly seated.

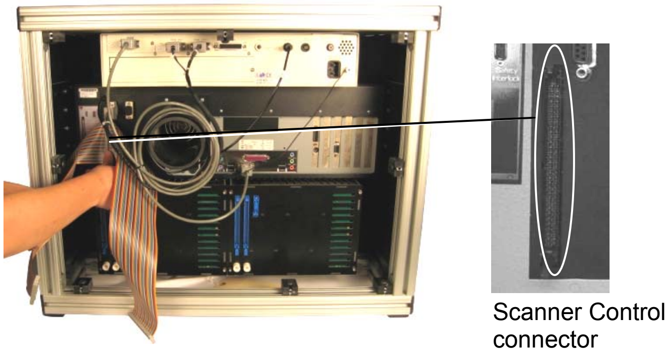


Additional cables required: Two high voltage (HV) cables and two ribbon cables.

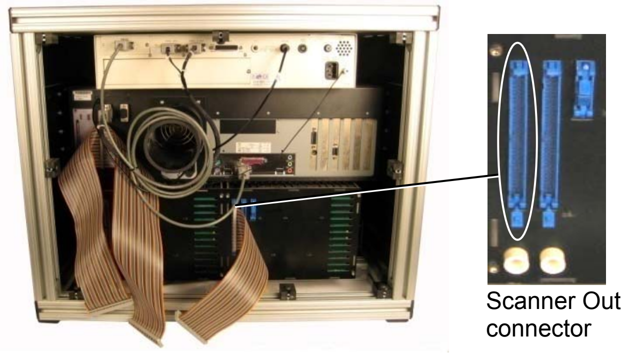




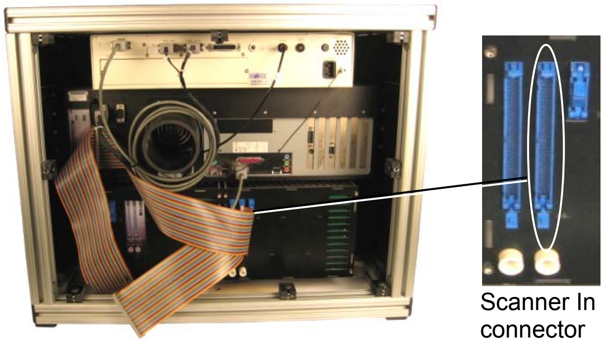
1. Connect the Center Connector of the Daisy Chain ribbon cable into the **Scanner Control connector.**



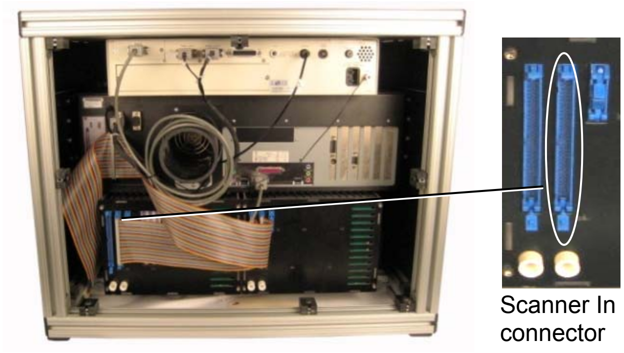
2. Connect one end of the Add-on ribbon cable into the **Scanner Out connector** on Scanner 1.



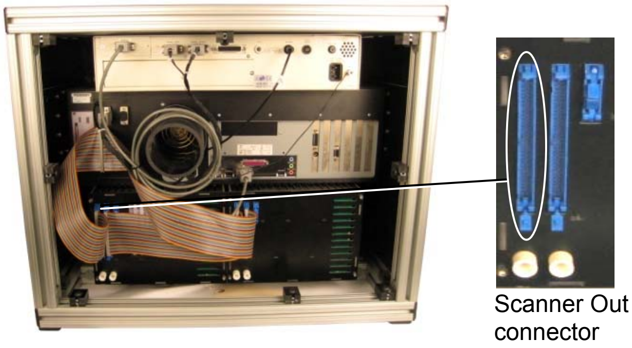
3. Connect the end of the Daisy Chain ribbon cable (right of the Center Connector) into the **Scanner In connector** on Scanner 1.



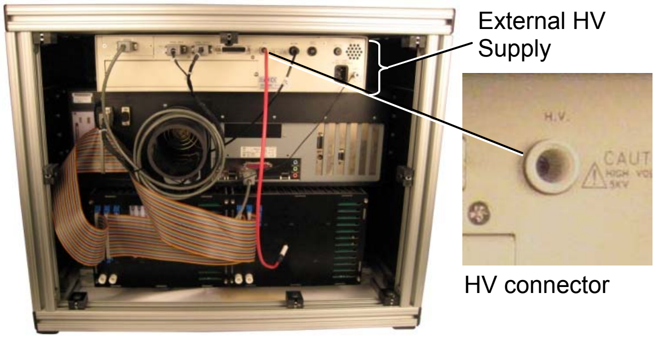
4. Connect the other end of the Add-on ribbon cable into the **Scanner In connector** on Scanner 2.



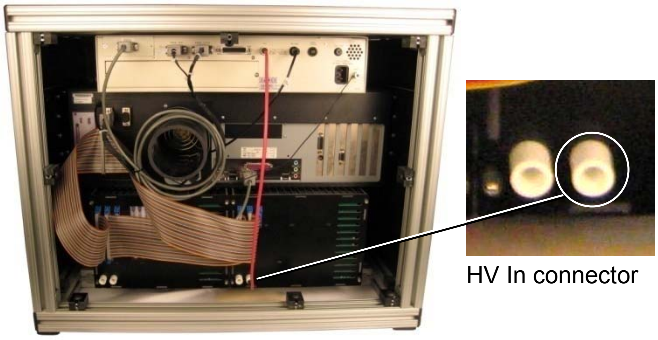
5. Connect the end of the Daisy Chain ribbon cable (left of the Center Connector) into the **Scanner Out connector** on Scanner 2.



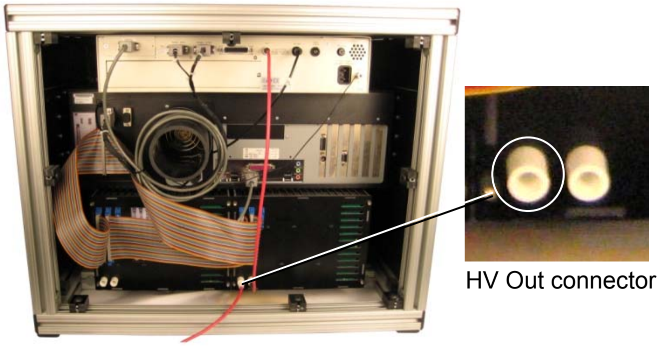
6. Plug one end of an HV cable (either cable) into the **HV connector** on the External HV Supply.



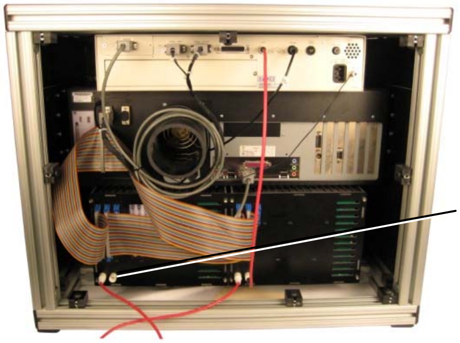
7. Plug the other end of the HV cable into the **HV In connector** on Scanner 1.



8. Plug one end of the remaining HV cable into the **HV Out connector** on Scanner 1.

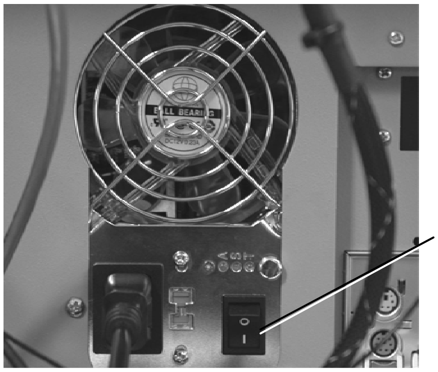


9. Plug the other end of the remaining HV cable into either of the **HV connectors** on Scanner 2.

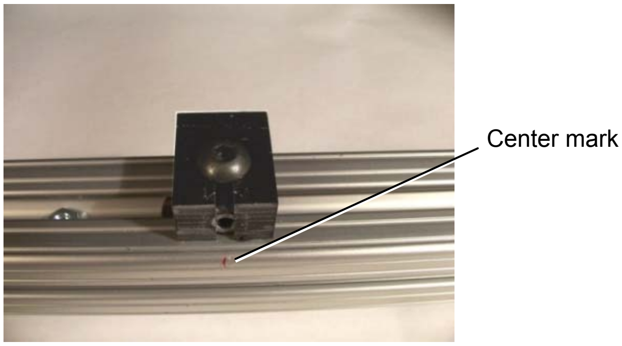


10. Connect the two power cords into the power sockets on the Touch1 Base and the External HV Supply.

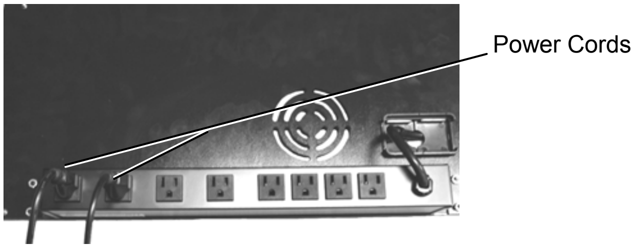
11. Make sure the **power switch** on the Touch1 Base is in the ON position.



12. Align the bottom center nut mount to the **center mark** in the cabinet and re-tighten the nut mount.



13. Plug the **Power Cords** into the power sockets on the inside of the Base Assembly back panel.



14. Reattach the back panel.

The Touch1 Ultra is now assembled and ready for use.

Warning!

Be sure to connect all of your peripheral devices to the analyzer before turning on the power. The analyzer may not recognize the device being attached, or the device may be damaged in the process if the power is on when the device is plugged in to the back of the analyzer.

Install and Remove the Touch1 Ultra

In the case that the Touch1 analyzer or the Ultra HV Supply needs to be removed, follow these instructions:

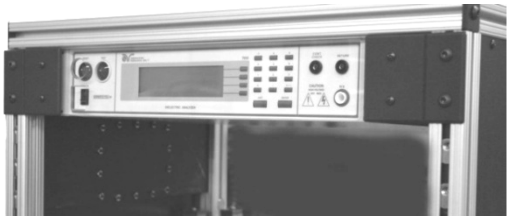
To Remove the Touch1 Analyzer:

1. Remove the eight screws on the back of the Base Assembly, and remove the Back Panel. Disconnect all rear cables.

2. Using an Allen wrench, remove the eight hex bolts holding the Touch1 in place.

3. Remove the Touch1 Analyzer.

   Note: The Ultra HV Supply will settle slightly as the Touch1 Analyzer is removed.



To Remove the Ultra HV Supply

Remove the eight screws on the back of the Base Assembly and remove the Back Panel. Disconnect all of the rear cables.

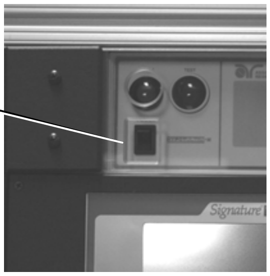
1. Remove the protective panel by removing the four OUTER hex bolts.

2. Remove the outer panel and the four bolts holding the Ultra in place.

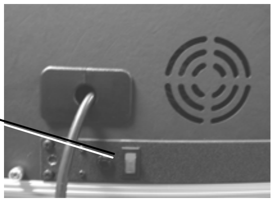
3. Remove the Ultra HV Supply.

Power up and Verify that the Software is Running

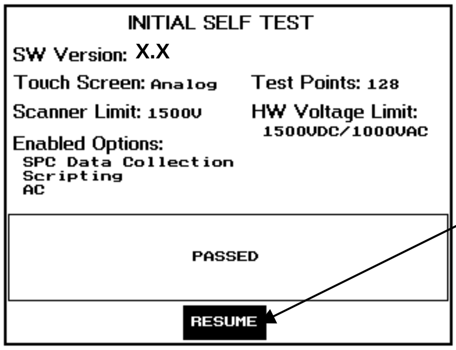
1. Make sure the Power Switch for the external HV supply on the front panel is in the ON position.



2. Turn on the Touch 1 Ultra analyzer by pressing the **power switch** on the back of the unit.



The current software version and options that are enabled are shown here.



INITIAL SELF TEST

SW Version: X.X

Touch Screen: Analog

Test Points: 128

Scanner Limit: 1500V

HW Voltage Limit: 1500VDC/1000VAC

Enabled Options:
SPC Data Collection
Scripting
AC

PASSED

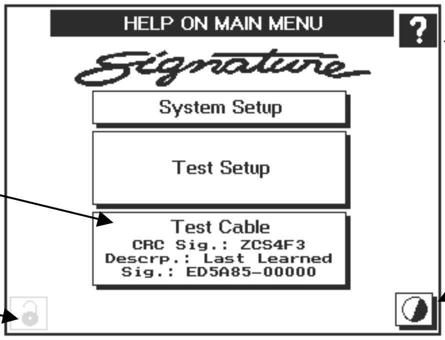
The power-up Self Test is automatic and will go away when it is finished.

To freeze this window, press and hold **Pause.** When you are ready to continue, press **Resume.**

If there are errors during the Self Test, write them down.

The system begins at the main menu with the wirelist that was last used, loaded, and ready for testing.

This button indicates whether the security system is active.



CRC Sig.: ZCS4F3
Descrp.: Last Learned
Sig.: ED5A85-00000

This button is the **Help** Icon. Use it wherever it is available to get help on nearly every aspect of your Touch 1 Ultra analyzer.

This button allows you to set the screen **Contrast**. This setting will affect all of the screens on this machine (also available in System Setup).

Use the Help System

There are two different kinds of Help:

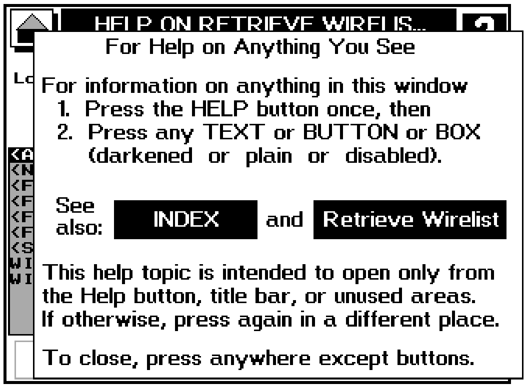
- **Index Help** – A wide array of topics that are selected from a master list accessible from anywhere in the system.
- **Context-sensitive Help** - Information on a specific item or task of your choosing in a specific window whether active or disabled - buttons, boxes, or text.

Using the Index Help System

You can open the index from any window that has a Help button. The help button is a "Question Mark" in the upper right hand corner of the screen. Press the Help Icon twice to open the index.

To exit the Help system, press the touch screen anywhere except on a button.

You will be returned to where you were before the Help system was accessed.

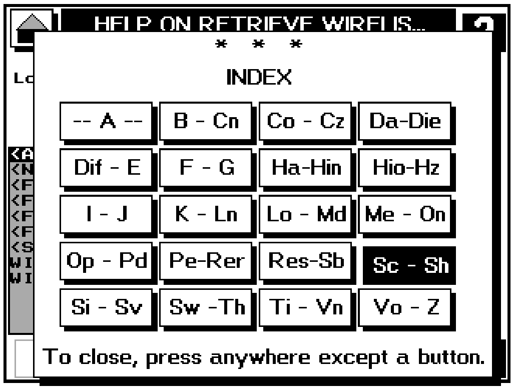

For Help on Anything You See

For information on anything in this window
1. Press the HELP button once, then
2. Press any TEXT or BUTTON or BOX (darkened or plain or disabled).

See also: INDEX and Retrieve Wirelist

This help topic is intended to open only from the Help button, title bar, or unused areas. If otherwise, press again in a different place.

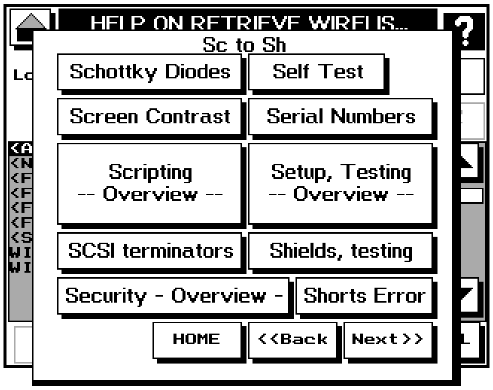
To close, press anywhere except buttons.



To close, press anywhere except a button.

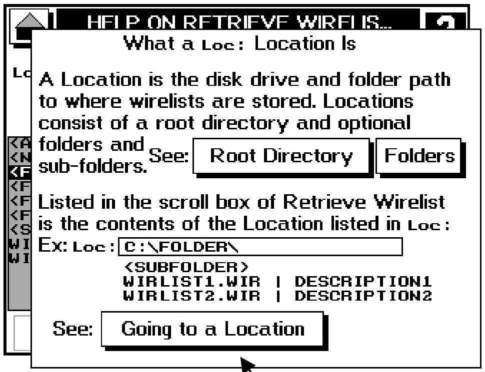
Choose from the alphabetical list to see a list of topics.

Many topics link to other related topics.



Use Context-Sensitive Help

You can get help on any item you see in a window whether it is text, a button, or a list.



HELP ON RETRIEVE WIRELIS...

What a Loc: Location Is

A Location is the disk drive and folder path to where wirelists are stored. Locations consist of a root directory and optional folders and sub-folders. See: Root Directory | Folders

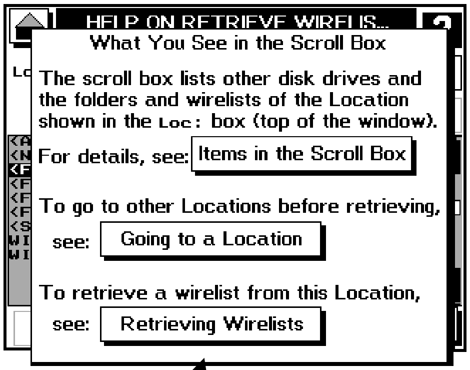
Listed in the scroll box of Retrieve Wirelist is the contents of the Location listed in Loc:

Ex: Loc: C:\FOLDER\

```
<SUBFOLDER>
WIRLIST1.WIR | DESCRIPTION1
WIRLIST2.WIR | DESCRIPTION2
```

See: Going to a Location

Text



HELP ON RETRIEVE WIRELIS...

What You See in the Scroll Box

The scroll box lists other disk drives and the folders and wirelists of the Location shown in the Loc: box (top of the window).

For details, see: Items in the Scroll Box

To go to other Locations before retrieving, see: Going to a Location

To retrieve a wirelist from this Location, see: Retrieving Wirelists

Scroll boxes

HELP ON RETRIEVE WIRELIS...

Loc: C:\

Scroll or FAST FIND to Highlight

FAST FIND | FIND NEXT

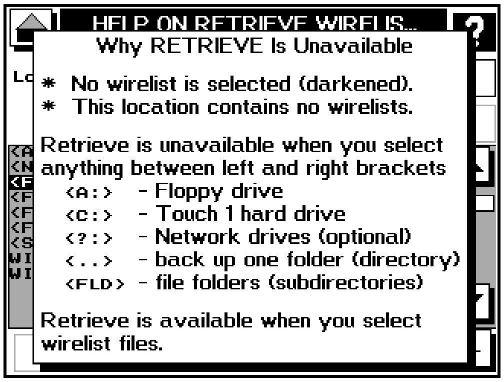
```
<A:>
<N:>
<FOLDER1>
<FOLDER2>
<FOLDER3>
<FOLDER4>
<SCRIPTS>
WIRLIST1.WIR | DESCRIP1
WIRLIST2.WIR | DESCRIP2
```

RETRIEVE | PRINT | OPEN LOC | CANCEL

Press the Help button once, and then press an area in the window where you would like more information.

Unavailable buttons

Available buttons



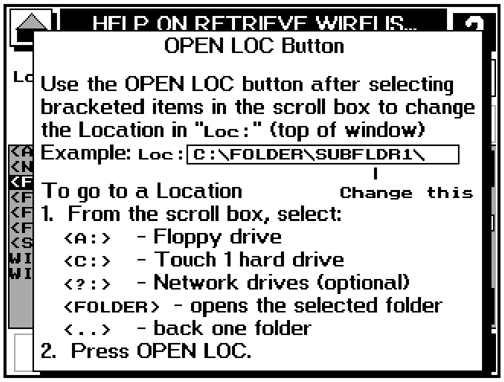
HELP ON RETRIEVE WIRELIS...

Why RETRIEVE Is Unavailable

* No wirelist is selected (darkened).
* This location contains no wirelists.

Retrieve is unavailable when you select anything between left and right brackets
<A:> - Floppy drive
<C:> - Touch 1 hard drive
<?:> - Network drives (optional)
<..> - back up one folder (directory)
<FLD> - file folders (subdirectories)

Retrieve is available when you select wirelist files.



HELP ON RETRIEVE WIRELIS...

OPEN LOC Button

Use the OPEN LOC button after selecting bracketed items in the scroll box to change the Location in "Loc:" (top of window)

Example: Loc: C:\FOLDER\SUBFLDR1\
Change this

To go to a Location
1. From the scroll box, select:
<A:> - Floppy drive
<C:> - Touch 1 hard drive
<?:> - Network drives (optional)
<FOLDER> - opens the selected folder
<..> - back one folder
2. Press OPEN LOC.

Press anywhere on the Help topic except on an option to close the Help system.

Use Cirris HVI Plug Adapters

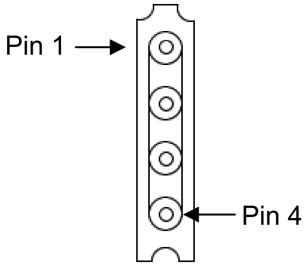
HVI Plug adapters insert directly into the HVI Blocks on the front panel of the analyzer and mate to the device-under-test (DUT). HVI Plugs come in a variety of configurations in multiples of four pins per plug. A single HVI Plug has four pins and a triple HVI Plug has twelve pins.

HVI Plugs can be combined in varying combinations to arrive at optimum pin usage. Contact Cirris for more information on what types of HVI Plugs are currently available.

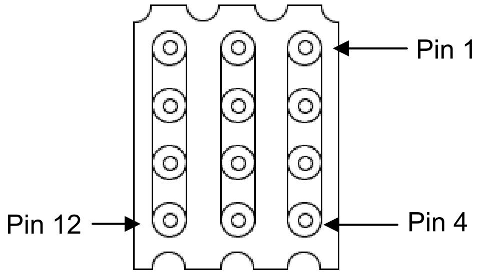
Wiring rules for HVI Plugs

In order for the HVI Plugs to be recognized by the analyzer, they need to be wired using the following rules:

- Wiring must begin with pin 1 of the HVI Plug
- Wiring within an HVI Plug must progress sequentially from pin 1 with no gaps in the sequence

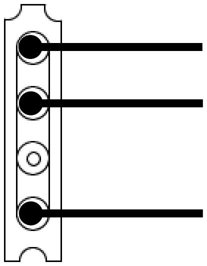


Single HVI Plug

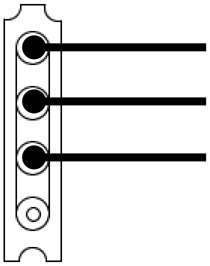


Triple HVI Plug

*As viewed from the mating side of the plug.



Incorrect Wiring



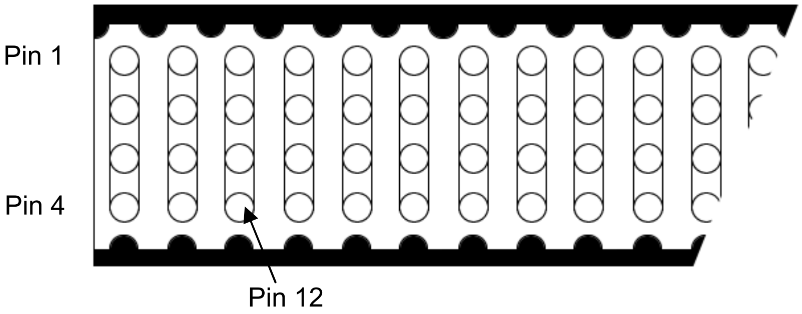
Correct Wiring

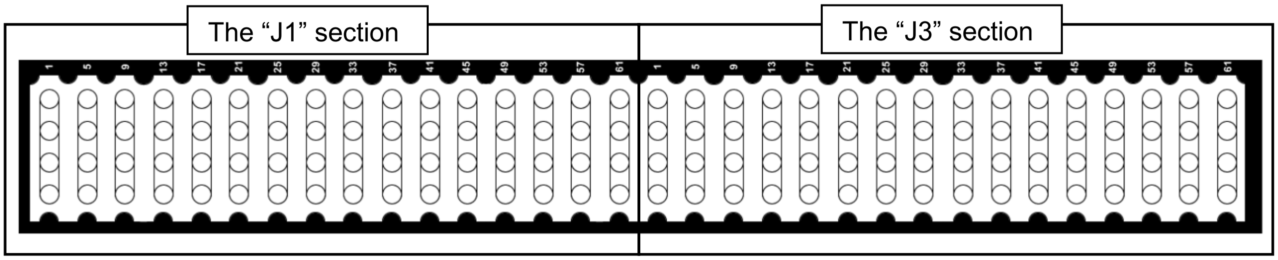
HVI Plug pin placement is verified during the learn process if the **New Adapter** or **Existing Adapter** button is selected. Verification also occurs at the beginning of the testing process when a test is first loaded.

HVI Plug pin presence is determined by capacitance. If your fixturing wiring is less than 24 inches, the analyzer may not detect the presence of a pin during the learn process. You can also learn using the probe for assemblies with short fixturing wiring.

An **HVI Block** is the mating receptacle for the HVI Plug.

System points count from top to bottom, left to right.





Each 64 points of a scanner represents a "J" section. The first set of 64 points is "J1", the second set is "J3", the third set is "J5," and the fourth set is "J7". All system points are referenced in this way.

If the fixturing violates any of the wiring rules, the following error will be displayed upon verification:

MISSING HVI CONNECTOR PINS

Missing Fixture Pin(s) on P$1

Description: 2-Pin Connector

Starting at Column: 1, Row: 2

Total Pins Missing: 1

Correct this error by following the wiring rules for HVI Plugs described above.

Chapter 2: Create a Wirelist (Learning)

Wirelists can be created by self learning from a sample cable, manual input, or importing. You can "learn" a wirelist using an existing device that can be connected to the analyzer or you can modify an existing wirelist to meet your testing requirements. To change an existing wirelist, see **Chapter 5: Editing Wirelists.**

Learning uses a group of settings you can adjust in order to meet your specifications. The Touch 1 Ultra will store your settings and use them for any subsequent learn.

Some of the learn settings are always in place, others must be enabled by you in order to be considered by the analyzer during the learning process. Even so, any facet of the wirelist can be modified after the learn to achieve the desired test.

The Default Learn

- Connections or wires whose resistance falls beneath the **Connection Resistance** setting.

What can be enabled or disabled before learning

- **Components** - resistors, diodes, capacitors, etc.
- **Child wirelists** (multi-pass testing) - See Appendix E for more information on Parent/ Child wirelists.
- **Four-wire implementations** - See Appendix B for more information on four-wire wirelists.
- **SPC** (statistical process control) data collection - See Appendix C for more information on SPC Data Collection.
- **Scripting** - See Appendix D for more information on scripting applications.

Learning vs. Testing Ranges

There are differences between the ranges used for learning and the ranges used for testing. Refer to the table below for a comparison of learning and testing capabilities.

Item	Learning Range	Testing Range
Wires	0.3Ω to 100KΩ, 500K, 1 M, 5 M (extendable to 0.001Ω with 4-Wire)	0.3Ω to 100KΩ, 500K, 1 M, 5 M (extendable to 0.001Ω with 4-Wire)
Capacitors	400nF to 100uF (Tolerance defaults to 10%)	5nF to 100uF Tolerance: 1-99 %
Diodes	Silicon – all, Zeners - limited detection	Silicon, Germanium, Zeners 4 to 19v requires the optional zener kit
Grounded points	Requires setting "High Cap Shield Allowed" and "Allow Grounded Points"	Yes
LEDs	LED's are not learned as LEDs. Some may be learned as diodes depending on their characteristics.	Yes
Resistors	0.3Ω to 100KΩ (Tolerance defaults to 10%)	0.3Ω to 1.0MΩ (extendable to 0.001Ω with four-wire) Tolerance: 1-99 %
Relays	Can learn both states (on or off) by using Multi-Pass Testing	Testing for both on and off states requires Multi-Pass Testing
SCSI Terminators	N/A	50-68 pin, powered or un-powered
Switches	Can learn all positions (on or off) by using Child Wirelists (Multi-pass testing).	Testing for all positions (on or off) requires Multi-Pass Testing
Twisted pairs	Min twisted length: 6 ft Min wires in cable: three	Min twisted length: 6 ft Min wires in cable: three
Note: Twisted pair testing depends greatly on the length of the device-under-test in relationship to the length of the fixturing wiring and the wiring present in the analyzer.		

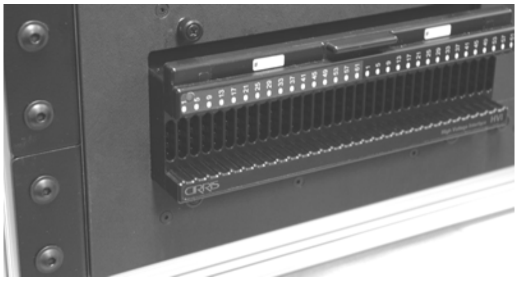
Install HVI Plugs Before a Learn

HVI Plugs must be installed in the same positions for testing as when the device was learned. If installed pin patterns do not match what was learned when you start a test, the analyzer will ask you to reposition them where they were in the original learn.

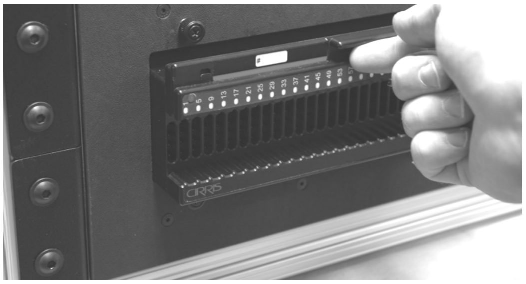
Note: The analyzer verifies correct pin pattern rather than complete adapter positions. There are cases where multiple plug connectors could be installed incorrectly without the analyzer identifying the incorrect configuration.

There are several methods used to learn a device for testing. You will be prompted when to install HVI Plugs and in what order to complete the learn process.

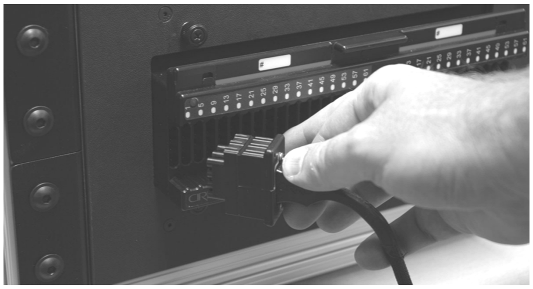
To install an HVI Plug into the HVI Block, …



1. Ensure that the retention slider is in the released position.

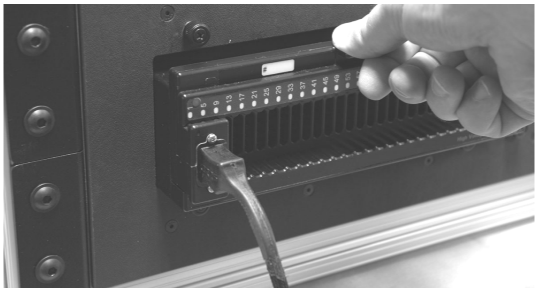


2. Align the pins of the HVI Plug with the desired position on the HVI Block.



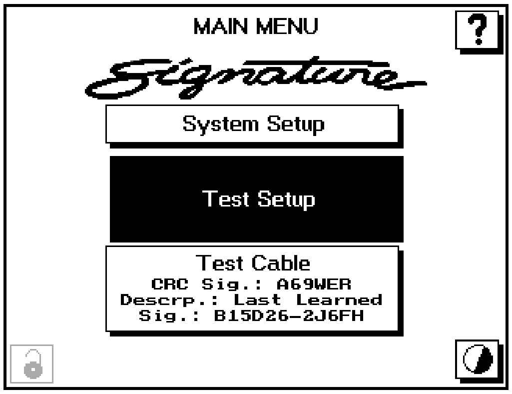
3. Carefully but firmly insert the HVI Plug into the HVI Block.

4. Slide the retention bar into the holding position.



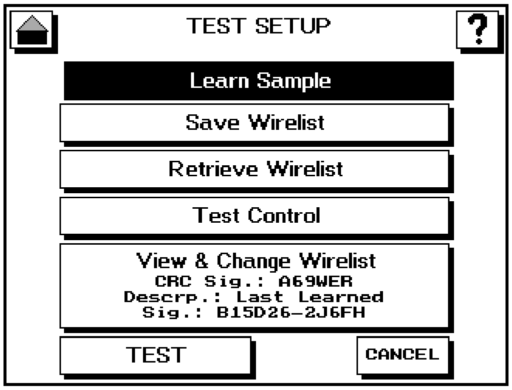
Set Up a Learn

From the **Main Menu,** press **Test Setup**.



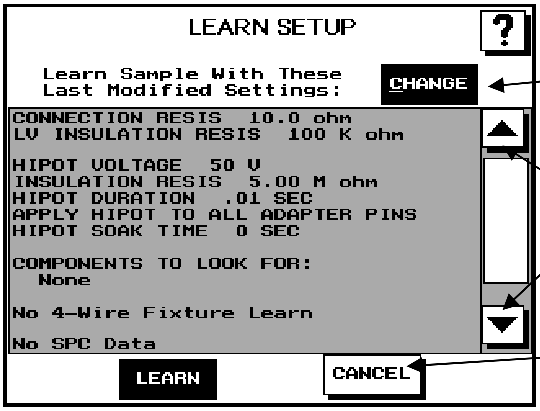
CRC Sig.: A69WER
Descrp.: Last Learned
Sig.: B15D26-2J6FH

In **Test Setup**, press **Learn Sample**



CRC Sig.: A69WER
Descrp.: Last Learned
Sig.: B15D26-2J6FH

In **Learn Setup**, press **LEARN** to begin learning, or change the learn settings.



Learn Sample With These
Last Modified Settings:

```
CONNECTION RESIS  10.0 ohm
LV INSULATION RESIS  100 K ohm

HIPOT VOLTAGE  50 V
INSULATION RESIS  5.00 M ohm
HIPOT DURATION  .01 SEC
APPLY HIPOT TO ALL ADAPTER PINS
HIPOT SOAK TIME  0 SEC

COMPONENTS TO LOOK FOR:
  None

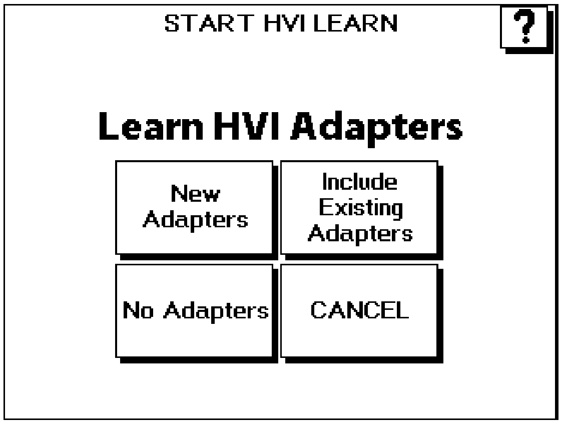
No 4-Wire Fixture Learn

No SPC Data
```

You can change any of the learn settings by pressing **CHANGE.** See **Change Learn Settings** for more information.

You can view the current learn settings by pressing the up or down arrows through the list.

You can abort the learn process by pressing **CANCEL.**



There are three ways to perform a learn with the Touch 1 Ultra.

New Adapters prompts you to attach adapters one HVI plug at a time in order to define how your adapter is configured. See Using Cirris HVI Plug Adapters for information on how to make HVI Plugs correctly.

Include Existing Adapters uses the Last Learned wirelist to derive its adapter definitions. You may add or remove plug definitions during this process as in **New Adapters**.

No Adapters bypasses the adapter process and creates a wirelist that only references system points. The absence of adapters causes the hipot test to perform on all pins, which can take a substantial period of time.

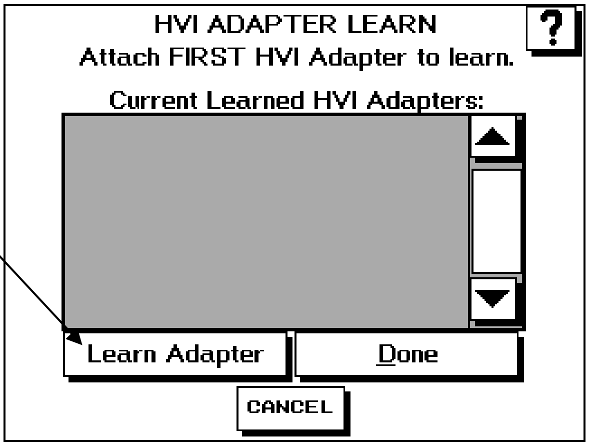
Learning with the **New Adapters** option, prompts you to remove any adapters that may be attached to the HVI Block.

Each HVI plug must be separately scanned as an adapter. Once a set of plugs has been learned as an adapter it can remain attached to the HVI Block for the rest of the learn process.

Attach the HVI plug into the lowest order points first (i.e. the left-most part of the HVI Block). Select **Learn Adapter** to learn the HVI Plug(s) as an adapter.

Attach subsequent HVI Plugs from left to right across the HVI Block.

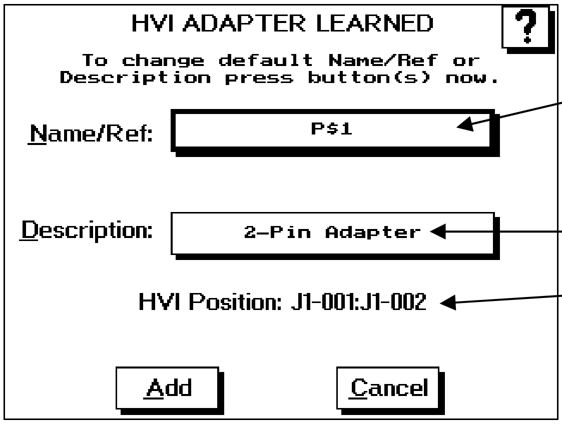
Once all of the HVI Plugs for this test have been learned, select **<u>D</u>one** to continue the Learn process.



HVI ADAPTER LEARN

Attach FIRST HVI Adapter to learn.

Current Learned HVI Adapters:



HVI ADAPTER LEARNED

To change default Name/Ref or Description press button(s) now.

Name/Ref: P$1

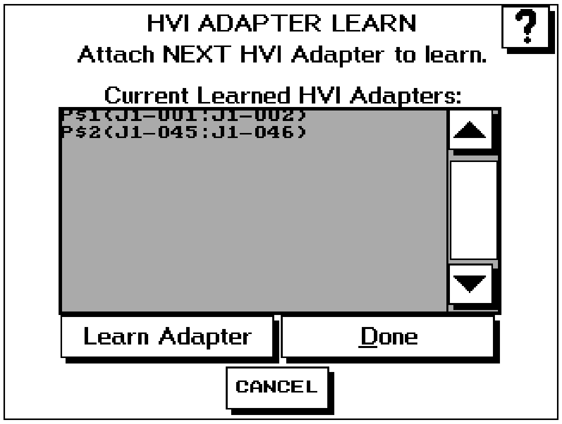
Description: 2-Pin Adapter

HVI Position: J1-001:J1-002

Each HVI Plug adapter has a unique identifier in the wirelist. Select **<u>N</u>ame/Ref** to change this identifier. The name can be up to 10 characters in length. The "J" identifier is reserved and cannot be used as the first character of a name.

The description can be up to 20 characters in length.

The **HVI Position** displays which system points the analyzer identifies this HVI Plug adapter is connected to.



HVI ADAPTER LEARN

Attach NEXT HVI Adapter to learn.

Current Learned HVI Adapters:

P$1(J1-001:J1-002)
P$2(J1-045:J1-046)

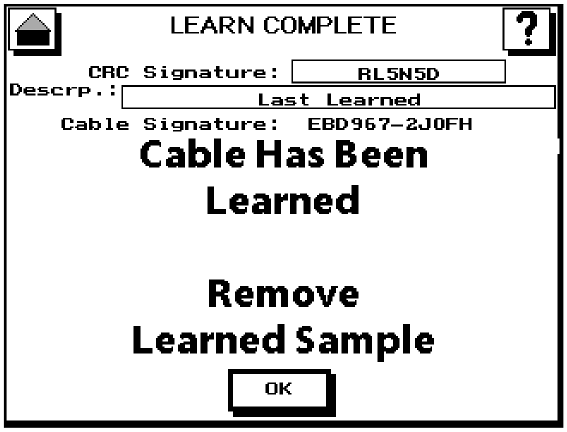
Learned HVI Plug Adapters appear in the list. Continue to learn HVI Plug Adapters until all HVI Plug Adapters have been learned.

If you are learning using the **Include Existing Adapters** option, this list will reflect the adapters contained in the Last Learned wirelist.

Pressing **<u>D</u>one** will cause the Touch 1 Ultra to learn the connections in the attached device based on the learn settings.

Verifying
HVI Adapters

The Verify process will check to make sure all learned adapters are installed.



CRC Signature: RL5N5D
Descrp.: Last Learned
Cable Signature: EBD967-2J0FH

Cable Has Been
Learned

Remove
Learned Sample

The Signatures shown are described in the Help Index under **Signatures: Overview**.

Relearning an assembly will place the wirelist in the Last Learned position.

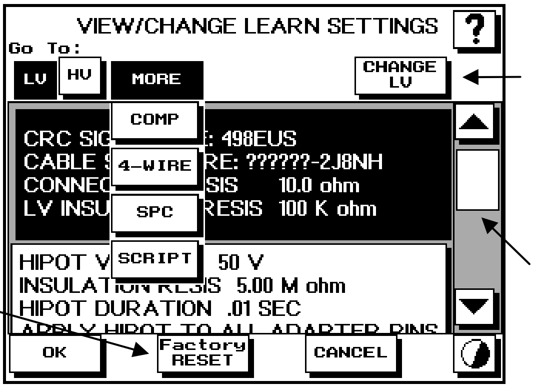
To save a wirelist you have learned, see the **Saving a Wirelist** section in **Chapter 6**.

You are now ready to test devices. See **Chapter 3: Testing a Device** for your next step.

Change Learn Settings

Pressing **CHANGE** in the Learn Setup window will provide access to all of the learn settings.

To view a specific section of the wirelist, use any of these buttons to highlight that area.



CRC SIG E: 498EUS
CABLE S RE: ??????-2J8NH
CONNEC SIS 10.0 ohm
LV INSU RESIS 100 K ohm
HIPOT V 50 V
INSULATION RESIS 5.00 M ohm
HIPOT DURATION .01 SEC

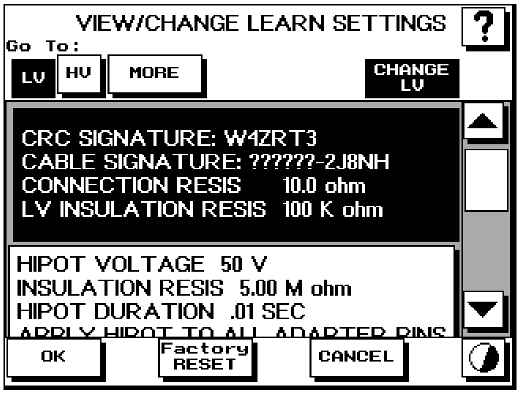
Use the **CHANGE LV** button to access the changeable items for the section that is highlighted.

You can return all of the learn parameters to the default settings by pressing **Factory RESET.**

You can use the arrows and slider to view the sections of the wirelist without selecting them.

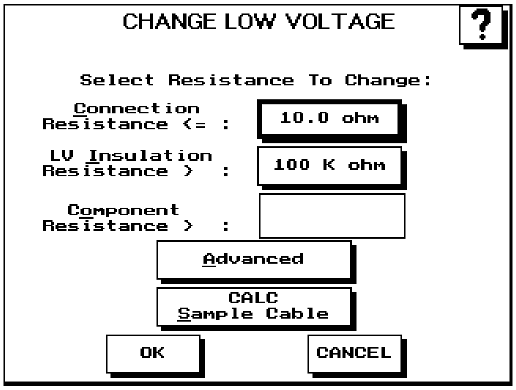
LV - Low Voltage Parameters

Low voltage parameters influence the continuity portion of the test, which is performed first. The Continuity Test evaluates wires for connection resistance, opens, and shorts. Components like resistors, diodes, and capacitors are learned and tested separately. For a complete description of the LV parameters, see **Chapter 5: Editing Wirelists – LV Parameters**.



CRC SIGNATURE: W4ZRT3
CABLE SIGNATURE: ??????-2J8NH
CONNECTION RESIS 10.0 ohm
LV INSULATION RESIS 100 K ohm

HIPOT VOLTAGE 50 V
INSULATION RESIS 5.00 M ohm
HIPOT DURATION .01 SEC
APPLY HIPOT TO ALL ADAPTER PINS



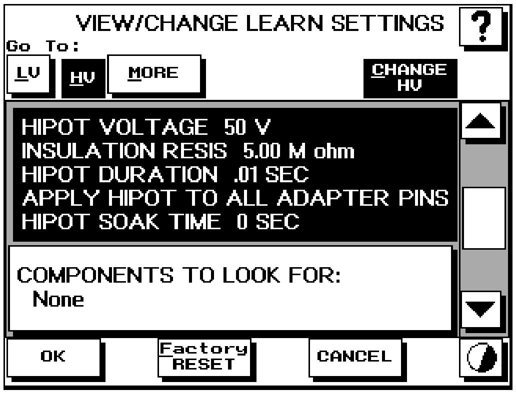
Select Resistance To Change:
Connection Resistance <= : 10.0 ohm
LV Insulation Resistance > : 100 K ohm
Component Resistance > :

The definition of a good wire is based on the settings of Low Voltage parameters. Good wires have resistance less than the Connection Resistance setting. Opens are intended connections with resistance greater than the Insulation Resistance setting. Shorts are unintended connections when resistance is below the Insulation Resistance setting.

Before creating a wirelist by learning a sample, you can get the Touch 1 Ultra to find the resistance of all the wires of the sample. **Calc Sample Cable** allows you to establish a reasonable connection resistance parameter by comparing several sample devices.

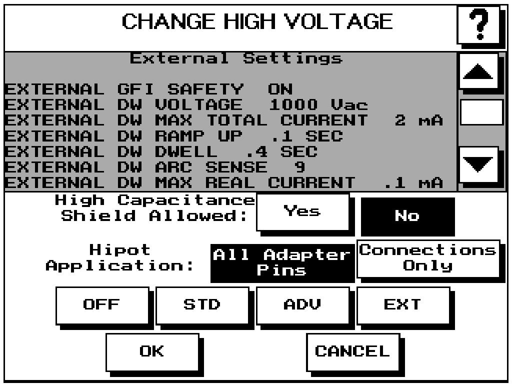
HV - High Voltage Parameters

The **High Voltage Parameters** govern the second part of a test where a specified voltage is applied to each net in the wirelist, one at a time, while all other nets are held at ground.



HIPOT VOLTAGE 50 V
INSULATION RESIS 5.00 M ohm
HIPOT DURATION .01 SEC
APPLY HIPOT TO ALL ADAPTER PINS
HIPOT SOAK TIME 0 SEC

COMPONENTS TO LOOK FOR:
None

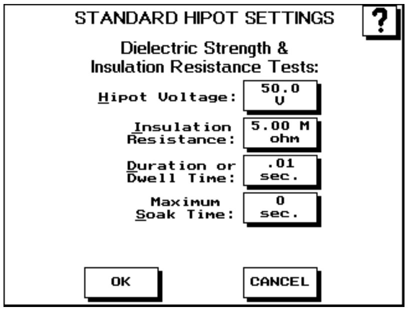


External Settings

EXTERNAL GFI SAFETY ON
EXTERNAL DW VOLTAGE 1000 Vac
EXTERNAL DW MAX TOTAL CURRENT 2 mA
EXTERNAL DW RAMP UP .1 SEC
EXTERNAL DW DWELL .4 SEC
EXTERNAL DW ARC SENSE 9
EXTERNAL DW MAX REAL CURRENT .1 mA

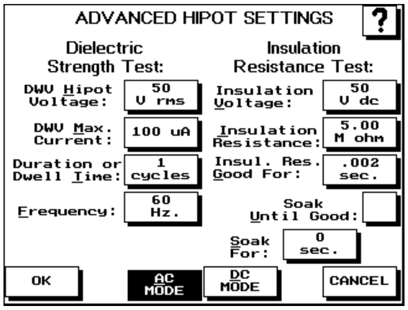
High Capacitance Shield Allowed: Yes [✓ No]
Hipot Application: [✓ All Adapter Pins] Connections Only

The High Voltage Test evaluates insulation for dielectric strength and insulation resistance. For a more detailed description refer to **Chapter 5: Editing Wirelists**. You can set up the High Voltage Test using one of three sets of parameters: Standard, Advanced, or External. The Standard test combines the Dielectric Strength test (DWV) and Insulation Resistance test (IR) into one test. The Advanced test separates the two with the DWV test being performed before the IR Test. The External mode utilizes portions of the capability provided by the external HV supply to increase the effective ranges of the Advanced tests. All tests are performed in succession on a net-by-net basis, such that each net has all tests performed before advancing to the next net.


STANDARD HIPOT SETTINGS

Dielectric Strength & Insulation Resistance Tests:

Hipot Voltage: 50.0 V
Insulation Resistance: 5.00 M ohm
Duration or Dwell Time: .01 sec.
Maximum Soak Time: 0 sec.

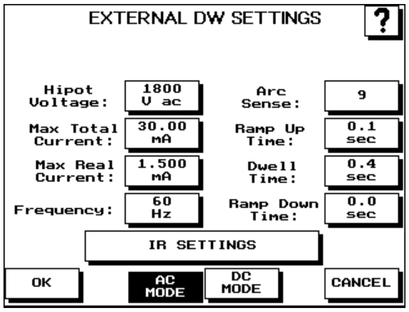

ADVANCED HIPOT SETTINGS

Dielectric Strength Test:

DWV Hipot Voltage: 50 V rms
DWV Max. Current: 100 uA
Duration or Dwell Time: 1 cycles
Frequency: 60 Hz.

Insulation Resistance Test:

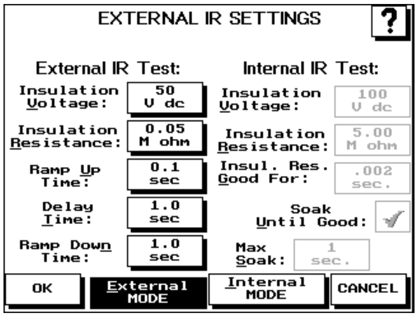
Insulation Voltage: 50 V dc
Insulation Resistance: 5.00 M ohm
Insul. Res. Good For: .002 sec.
Soak Until Good: ☐
Soak For: 0 sec.


EXTERNAL DW SETTINGS

Hipot Voltage: 1800 V ac
Max Total Current: 30.00 mA
Max Real Current: 1.500 mA
Frequency: 60 Hz
Arc Sense: 9
Ramp Up Time: 0.1 sec
Dwell Time: 0.4 sec
Ramp Down Time: 0.0 sec

The Touch 1 Ultra is capable of performing the IR test internally or externally, utilizing the External HV supply.

While the External options offer wider testing ranges, they generally require a longer test time to perform.


EXTERNAL IR SETTINGS

External IR Test:

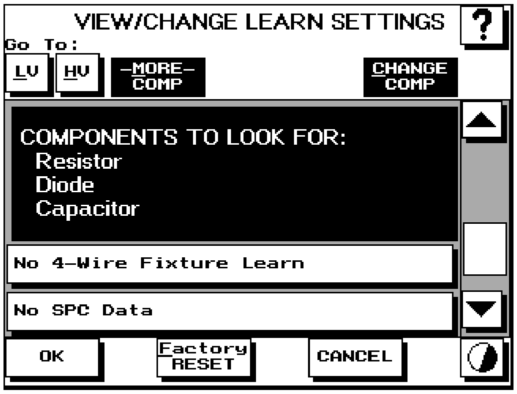
Insulation Voltage: 50 V dc
Insulation Resistance: 0.05 M ohm
Ramp Up Time: 0.1 sec
Delay Time: 1.0 sec
Ramp Down Time: 1.0 sec

Internal IR Test:

Insulation Voltage: 100 V dc
Insulation Resistance: 5.00 M ohm
Insul. Res. Good For: .002 sec.
Soak Until Good: ☑
Max Soak: 1 sec.

How HV parameter settings define insulation
Hipot voltage is applied to each net defined as part of an HVI Plug Adapter for the duration of Dwell Time, while all other nets and points are held at ground. If there are no HVI Plug Adapters in the wirelist, all pins will be hipotted. Leakage current through the insulation is then measured. Insulation leakage current is a function of the setting and any other factor that contributes to current flow, such as: (a) charge capacitance, (b) insulation resistance, (c) contaminants, (d) moisture, (e) arcing or corona, etc. If the insulation resistance of the DUT stays above the Insulation Resistance setting, the device passes the test. For descriptions of these advanced settings screens, please refer to **Chapter 5: Editing Wirelists.**

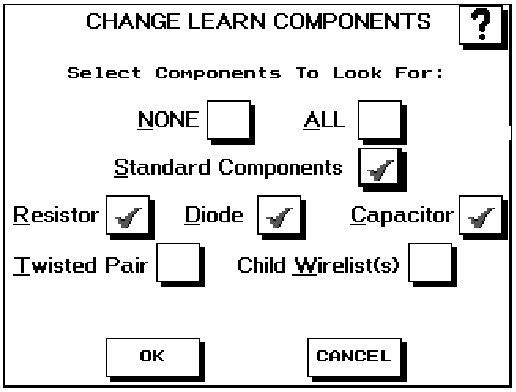
COMP - Learn Components



COMPONENTS TO LOOK FOR:
Resistor
Diode
Capacitor

No 4-Wire Fixture Learn

No SPC Data



NONE ☐ ALL ☐
Standard Components ☑
Resistor ☑ Diode ☑ Capacitor ☑
Twisted Pair ☐ Child Wirelist(s) ☐

Use **MORE COMP** to specifically enable the learning of components.

Item	**Learning Range**
Capacitors	400nF to 100uF (Tolerance defaults to 10%)
Child Wirelists	Multiple child wirelists can be learned under a single parent wirelist. Each child wirelist is learned along with a parent.
Diodes	Silicon – all, Germanium – no, LEDs – no, Schottky - maybe (call), Zeners - limited detection
Resistors	0.3Ω to 100KΩ (Tolerance defaults to 10%) unless using 4-wire
Twisted pairs	Min twisted length: 6 ft, Min wires in cable: three

4-WIRE Settings

Important! You must first build the fixture according to a set pattern. Use **MORE, 4-WIRE** to enable the learning of first the 4-wire fixture and then the DUT attached to the fixture. For more information, see **Appendix B: Four-Wire**, download a copy of the four-wire application note from the Cirris website, or search the Help Index under **Four-Wire Test - Overview**.

SPC Data Collection Settings

Use **MORE, SPC** to turn data collection on or off for each specific wirelist and to choose what data you want collected. For more information on SPC Data Collection, see **Appendix C: SPC Data Collection** or search the Help Index under **SPC**.

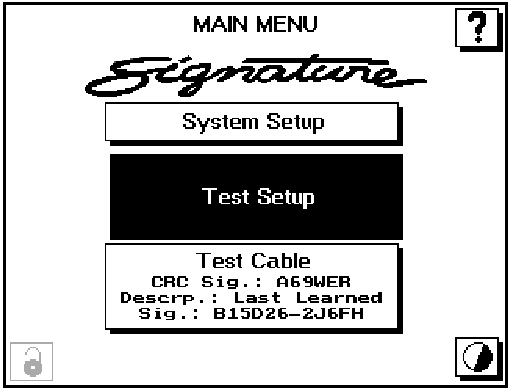
Scripting Settings

Use **MORE, SCRIPT** to attach Component scripts and Test Event scripts to a wirelist. "Attaching" refers to tying a specific script to a specific wirelist so the functionality of that script will be a part of that wirelist.

Important! In the case of .evt Test Event scripts and .cmp Components scripts, further setup is necessary. For more information, see **Appendix D: Scripting** or search the Help Index under **Scripting - Overview.**

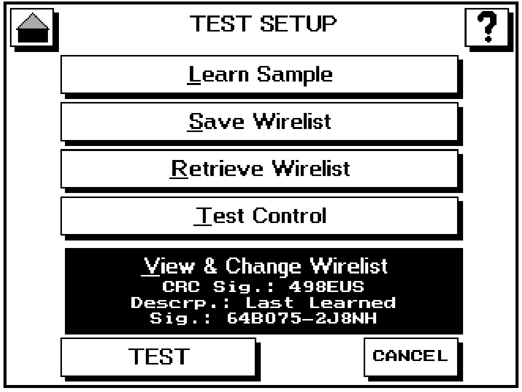
Verify the Wirelist

In the **Main Menu** press **Test Setup**.



CRC Sig.: A69WER
Descrp.: Last Learned
Sig.: B15D26-2J6FH

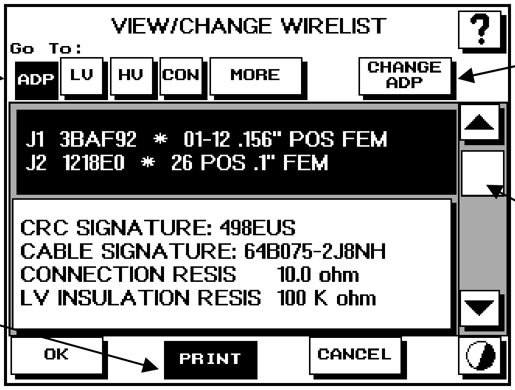
In **Test Setup**, press **View & Change Wirelist**



CRC Sig.: 498EUS
Descrp.: Last Learned
Sig.: 64B075-2J8NH

To view a specific section of the wirelist, use any of the buttons to highlight that area.

You can **PRINT** the wirelist for manual verification as required.



J1 3BAF92 * 01-12 .156" POS FEM
J2 1218E0 * 26 POS .1" FEM

CRC SIGNATURE: 498EUS
CABLE SIGNATURE: 64B075-2J8NH
CONNECTION RESIS 10.0 ohm
LV INSULATION RESIS 100 K ohm

Use the **CHANGE ADP** button to access the changeable items for the section that is highlighted.

You can use the arrows and slider to view the sections of the wirelist without selecting them.

A Note on Capacitance

Due to the characteristics of relays, capacitance, and high voltage, there is a maximum amount of capacitance that can be present in an assembly at a certain voltage in order to allow relays to function properly. The following diagram shows the levels of capacitance that can be sustained during testing.

EXTERNAL HV SUPPLY

VDC	Maximum Capacitance	VAC	Maximum Capacitance
100	5400 nf	100	716 nf
500	215 nf	500	108 nf
1000	54 nf	1000	27 nf
1500	24 nf	1500	12 nf
2000	13 nf	2000	6 nf
2500	8 nf		
2800	6 nf		

INTERNAL HV SUPPLY

VDC	Maximum Capacitance
100	315 nf
500	63 nf
1000	31 nf

Sample Wirelist Printout

```
                         TOUCH 1 ULTRA CABLE DOCUMENTATION

Filename: untitled.wir                               Date: 7/1/2005

CRC Signature:  498EUS
Cable Signature: 64B075
Parameter Signature: 2J8NH
Cable Description: Last Learned
```

Search the Help Index under *Signatures - Overview*.

```
Cable Serial Number:

Adapter Signature(s):           adapter Descriptions(s):
J1   D507F1                          64 pos. .1" Fem
J3   D507F1                          64 pos. .1" Fem
```

This is the adapter section.

```
Parameter Settings:
CONNECTION RESIS  10.0 ohm
LV INSULATION RESIS  100 K ohm
```

These are the Low Voltage parameters.

```
EXTERNAL GFI SAFETY  ON
EXTERNAL DW VOLTAGE  1000 Vac
EXTERNAL DW MAX TOTAL CURRENT  2 mA
EXTERNAL DW RAMP UP  .1 SEC
EXTERNAL DW RAMP DOWN 0 SEC
EXTERNAL DW DWELL  .4 SEC
EXTERNAL DW ARC SENSE  9
EXTERNAL DW MAX REAL CURRENT  .1 mA
EXTERNAL DW FREQUENCY  60 HZ
INSULATION VOLTAGE  50 V
INSULATION RESIS  5.00 M ohm
INSUL RESIS GOOD FOR  .002 SEC
SOAK UNTIL GOOD - MAX  0 SEC
APPLY HIPOT TO ALL ADAPTER PINS
```

These are the High Voltage parameters.

```
1  P$1-001  P$1-002
2  P$1-003  P$1-004
```

This is the Connection List.

```
HVI ADAPTER
VERIFY ON
P$1(J1-001:J1-004) "4-Pin Connector"
P$2(J1-045:J1-046) "2-Pin Connector"
```

This is the HVI Adapter List.

The Verify line indicates whether the tester will verify that all adapters are installed before testing.

```
LABELS
J1-001 = P$1-001
J1-002 = P$1-002
J1-003 = P$1-003
J1-004 = P$1-004
J1-045 = P$2-001
J1-046 = P$2-002
```

These are the Point Labels.

```
Notes:
________________________________________________________________
```

Chapter 3: Test a Device

Install HVI Plugs for a Test Session

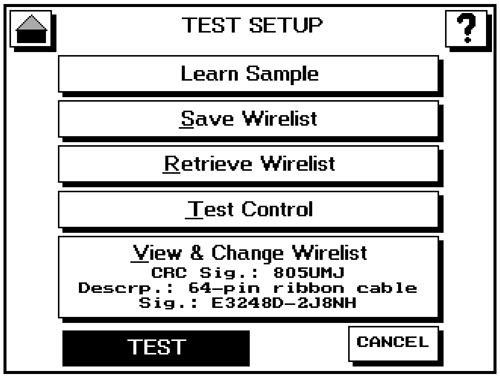
Before you begin a test session or a "run", the correct HVI Plugs must be installed in the correct position in the HVI Blocks. If you press **TEST** without the correct pin pattern, the Touch 1 Ultra will show a message describing the incorrect pin pattern.

Start a Test Run

Testing is performed using the currently loaded wirelist as shown in either the **Test Cable** button in the main menu or the **View & Change Wirelist** button in the Test Setup window. You can use the Last Learned wirelist, or you can retrieve a wirelist that you previously created and saved to a disk or to the network.

Note: If you power cycle the analyzer (turn it off and on again), the last-learned or last-retrieved wirelist will be ready to use for testing from the main menu.

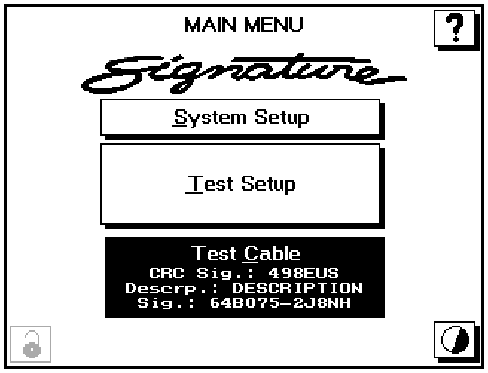
From TEST SETUP, press **TEST.**



CRC Sig.: 805UMJ
Descrp.: 64-pin ribbon cable
Sig.: E3248D-2J8NH

OR

From the MAIN MENU, press **Test Cable**.



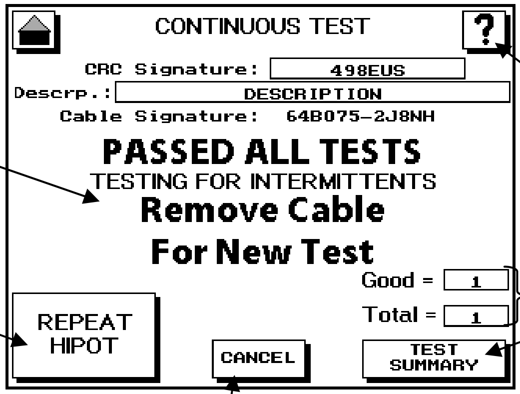
CRC Sig.: 498EUS
Descrp.: DESCRIPTION
Sig.: 64B075-2J8NH

Verifying
HVI Adapters

The HVI Plug configuration will be verified based on the HVI Adapter section of the wirelist.

Press **Skip** to ignore the configuration of the HVI Plugs currently installed in the HVI Blocks. The setting **VERIFY OFF** in the wirelist will also skip verification.

The test window will open displaying status messages and instructions about the testing process.



CRC Signature: 498EUS

Descrp.: DESCRIPTION

Cable Signature: 64B075-2J8NH

PASSED ALL TESTS

TESTING FOR INTERMITTENTS

Remove Cable For New Test

Good = 1

Total = 1

This area is used for messages regarding the status of the test.

This button is used to start the next test or other functions as they are available.

Use the **Help Index** under **Signatures: Overview** for more information.

These boxes indicate the number of good cables and the total number tested.

This button shows a printable summary of this run of tests including adapters, parameters, and the number of good tests.

To complete a test run and store SPC data, press the **CANCEL** button. See **Appendix C: SPC Data Collection** for more information.

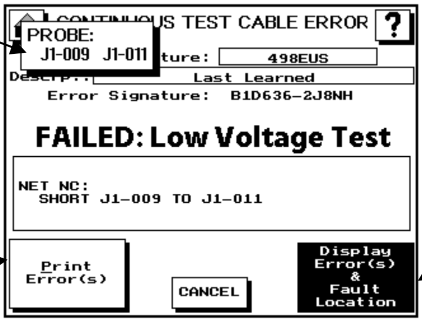
For more information on how to modify a test, see **Chapter 5: Editing Wirelists.**

Chapter 4: Analyze Test Errors

There are many features on the Touch 1 Ultra to help you find and resolve errors.

Probe the test points of the error with the hand-held probe.

Print a list of the errors to refer to during rework.



ture: 498EUS

Descrip.: Last Learned

Error Signature: B1D636-2J8NH

FAILED: Low Voltage Test

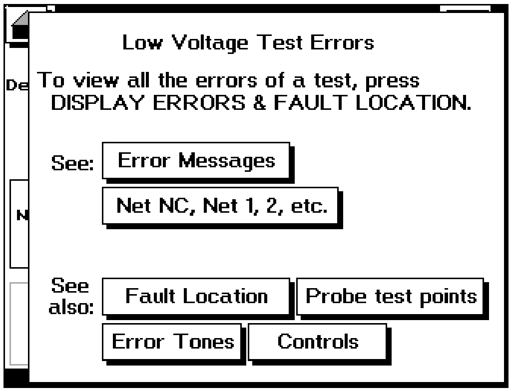
NET NC:
SHORT J1-009 TO J1-011

Error tones can be used to identify more common errors.

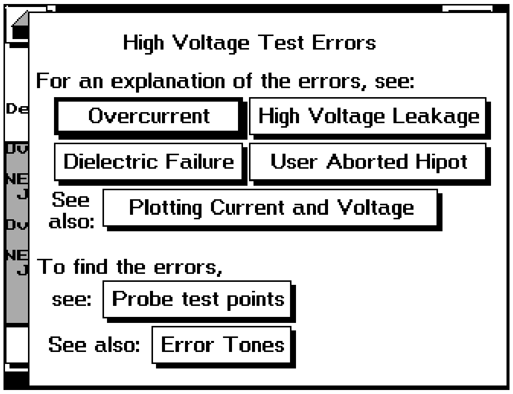
Find the location of the error using Which-End Fault Location

Help on Test Errors

To get online help on test errors, press the question mark in the upper right hand corner of the screen. Then press anywhere in the middle of the screen. One of the following help windows will appear.



To view all the errors of a test, press DISPLAY ERRORS & FAULT LOCATION.



For an explanation of the errors, see:

To find the errors,

Low Voltage Test Errors

Low Voltage Test Errors or Continuity Test errors represent the failure of a wire connection to meet the LV parameter settings. Continuity errors report first and must be corrected before component or high voltage tests are performed.

The following is a list of the most common errors that occur during testing and some causes or solutions that may help you correct the problem.

Open

An open indicates either a missing wire connection or the improper setting of test parameters.

Example:

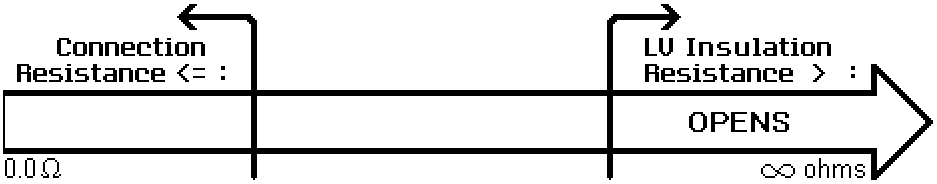
```
Net 1:
   Open J1-001 J1-015
```

Explanation

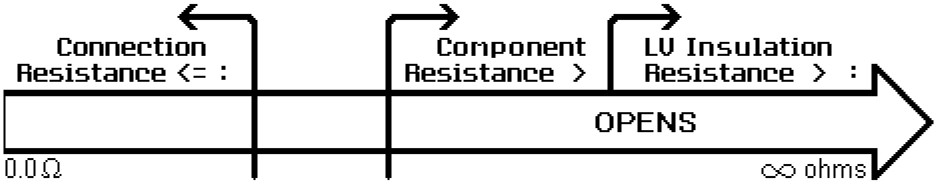
Net <n> refers to a connection of two or more test points where the test points listed in the error are members. Nets are named by an ascending number from the list of connections in the “Connections” part of the wirelist in the order they are scanned by the hardware.

How test parameter settings define opens

Wires Only



Components



Short

A Short indicates either unintended wire connections or improper settings of test parameters.

Example:

```
NET 1:
   SHORT J1-001 J1-015 TO
         J2-003 J2-004

NET NC:
   SHORT J1-012 J1-014
```

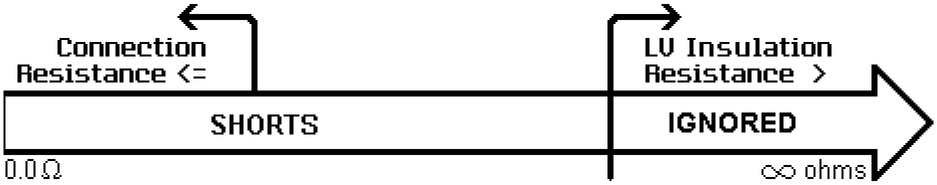
Explanation:

NET <n> refers to a connection of two or more test points of which the test points listed in the error are members. Nets are named by a serialized number and list in the “Connections” part of the wirelist in the order they are scanned by the hardware.

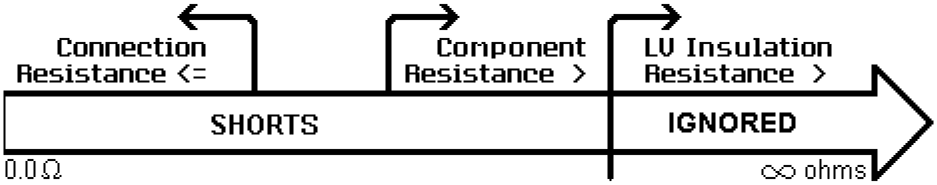
NET NC (No Connection) refers to unused pins in the connector.

How test parameter settings define shorts

Wires Only



Components



Miswire

Miswires are a combination of opens and shorts; at least one test point is correct, but others are open from where they *should* go and shorted to where they *should not* go.

Example:

```
NET 1:
  OPEN J1-001 TO J2-015
  MISWIRE J1-001 J2-005
```

Explanation

J1-001 should be connected to J2-015,
but J1-001 is miswired to J2-005.

High Resistance Error

High Resistance errors indicate detected resistance greater than what defines a good connection but less than what is either ignored or considered an open.

Example:

```
High Resistance Errors:
   NET 1: Measured 2.00 K ohm
    Detected at J1-001 J2-001
```

How test parameter settings define high resistance

Intermittents

Intermittents are defined by cables that test good, then bad, and then good again. The actual errors reported by an intermittent are: Opens, Shorts, Miswires, High Resistance errors, and missing components.

Component Errors

Component errors are both the connection and parameter errors of the various components.

Capacitor Errors

Capacitor errors indicate faulty components or improper test setup.

Example:

```
Bad Capacitor between
   J1-001 and J2-001
     Expected value: 4.7uF
     Measured value: 10.0uF

Bad Capacitor between
   J1-001 and J2-001
     Capacitor missing??
```

Diode Errors

Diode errors indicate faulty components or improper test setup.

Example:

```
REVERSED diode/LED between
   J1-001 and J2-001

MISSING diode/LED between
     J1-021 and J2-007

LEAKY diode/LED between
     J2-035 and J2-012
```

Resistor Errors

Resistor errors indicate faulty components or improper test setup.

Example:

```
Bad Resistor between
   J1-001 and J2-001
     Expected value: 47.0 ohm
     Measured value: 49.5 ohm

Bad Resistor between
     J1-001 and J2-001
       Resistor Missing??
```

Twisted Pair Errors

Twisted Pair errors indicate faulty wiring or improper test setup.

Example:

```
Pair connected to
   J1-001 and J2-001
    NOT twisted
```

Wire Component Errors

Wire Component errors indicate bad wiring or improper test setup. Wire Component errors are component test errors and not Continuity Test errors. The Continuity Test reports wiring errors with Opens, Shorts, and Miswires.

Example:

```
Bad Wire between
   J1-001 and J2-001
     Expected value: <5.0 ohm
     Measured value: 9.73 ohm
```

```
Bad Wire between
   J1-001 and J2-001
     Wire Missing??
```

High Voltage Errors

High Voltage errors represent failure of the insulation of a wire to meet the HV parameter settings.

The following is a list of the most common errors that occur during testing and some causes or solutions that may help you correct the problem.

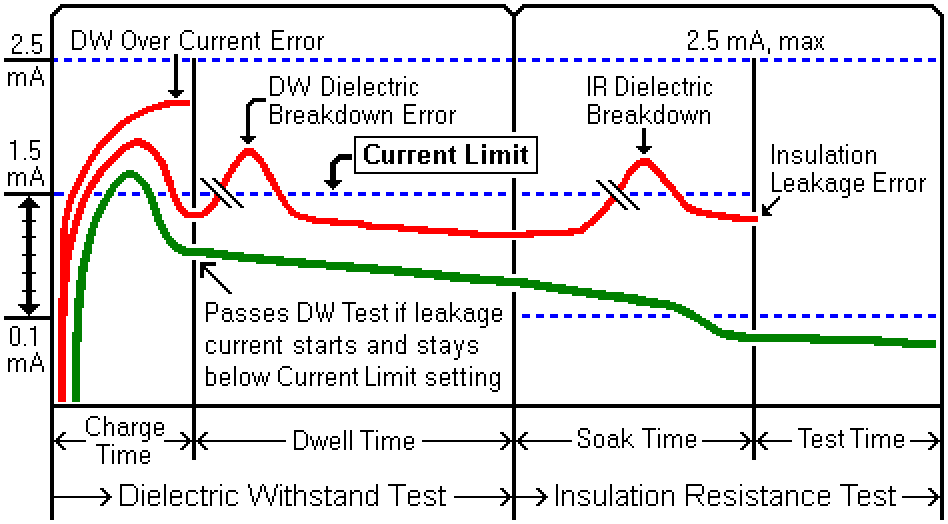
Dielectric Failure Error

Dielectric Failure errors are High Voltage Test errors that occur during the Dielectric Strength test and the part of the Insulation Resistance test controlled by Soak Time.

Example:	**Comments:**
`Dielectric Failure NET 1:` `J1-013  J1-053`	**NET 1:** Refers to a connection. Nets are numbered in the order listed under CON in the Editor and under Common Connections in the report Touch 1 Ultra Cable Documentation.
`Dielectric Failure NET NC:` `J1-026`	**NET NC:** Refers to test points not in nets such as the unused pins of a connector.

Note: Discharge paths and the number of separate errors are not always obvious:
One error = excessive capacitance
Two errors = discharge path is between two errors (but not always)
More than two errors = any combination of discharge paths - one error or several errors.

How test parameter settings define HV errors



High Voltage Leakage Error

High Voltage Leakage errors are High Voltage test errors that occur during the part of the Insulation Resistance Test controlled by the Soak Parameter.

Example:

```
High Voltage Leakage NET 1:
    J1-001  J1-014
     4.34 M ohm
High Voltage Leakage NET NC:
    J1-026
     5.68 M ohm
```

Comments:

NET 1: Refers to a connection. Nets are numbered in the order listed under CON in the Editor and under Common Connections in the report Touch 1 Ultra Cable Documentation.
NET NC: Refers to test points not in nets such as the unused pins of a connector.

Note: Leakage paths and the number of separate errors are not always obvious:
Two errors = leakage path is between two errors (but not always)
More than two errors = any combination of discharge paths - one error or several errors

How Test Parameter settings define High Voltage Leakage errors
Refer to the diagram for HV errors above for a graphical view of High Voltage Leakage errors.

Good insulation has less leakage current between unconnected points than the threshold defined by dividing the IR Voltage setting by the IR Resistance setting (I=V/R).

Though leakage current can start higher than the threshold at the beginning of Soak Time, leakage current must fall below the threshold at the end of Soak Time and remain below the threshold for the duration of IR Test Time. Current flow is a function of the applied IR Voltage over the Insulation Resistance of the device-under-test (Ohm's Law: I=V/R). Therefore, too high of an IR Voltage setting coupled with too high of an IR Resistance setting can make the allowable current flow too stringent for the test.

Over Current Error

Over Current errors are High Voltage Test errors that occur at the outset of the Dielectric Strength Test.

Example:

```
Overcurrent NET 1:
    J1-013  J1-053

Overcurrent NET NC:
    J1-026
```

Comments:

NET 1: Refers to a connection. Nets are numbered in the order listed under CON in the Editor and under Common Connections in the report Touch 1 Ultra Cable Documentation.
NET NC: Refers to test points not in nets such as the unused pins of a connector.

Note: Discharge paths and the number of separate errors are not always obvious:
One error = excessive capacitance
Two errors = discharge path is between two errors (but not always)
More than two errors = any combination of discharge paths - one error or several errors

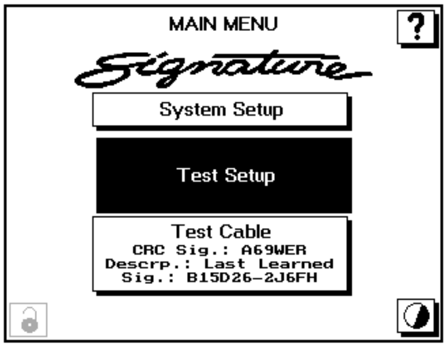
Chapter 5: Edit Wirelists

Use the Wirelist Editor

Purpose:

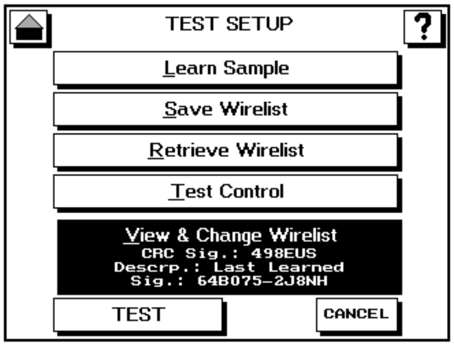
- View or print the wirelist (Touch 1 Ultra Cable Documentation)
- Add parts not learned, such as components
- Change existing parameter settings
- Create wirelists from templates

From the MAIN MENU press, **Test Setup.**



CRC Sig.: A69WER
Descrp.: Last Learned
Sig.: B15D26-2J6FH

In TEST SETUP, press **View & Change Wirelist.**

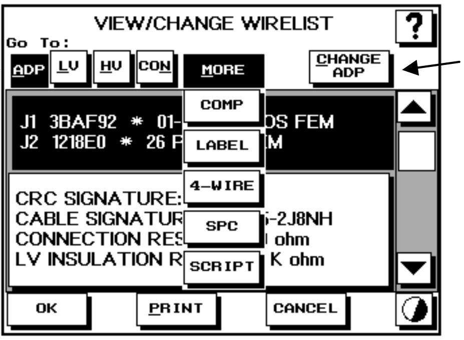


CRC Sig.: 498EUS
Descrp.: Last Learned
Sig.: 64B075-2J8NH

The wirelist loaded into the Editor is shown by Signature and Cable Description in the View & Change Wirelist screen. To edit a different wirelist, press Retrieve Wirelist.

In VIEW/CHANGE WIRELIST, press one of the **Go To** buttons, and then press **CHANGE ADP.**

Each of these **Go To** buttons represent a section of a wirelist. Choosing one of these buttons activates that section of the wirelist, allowing you to view or change the settings of that section.



Once the section you want to change is highlighted, the **CHANGE ADP** button will allow you to make changes to that section.

ADP – Adapters

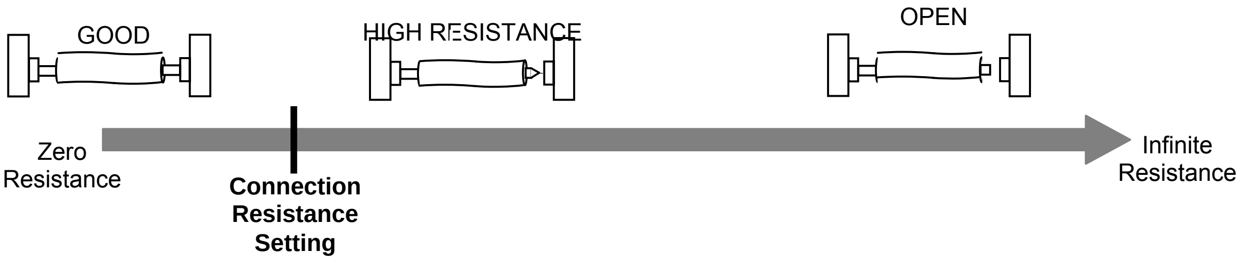
This option is not used in conjunction with the Touch 1 Ultra system.

LV - Low Voltage (Continuity) Test

Connection Resistance (Conn Res)

Selections	Factory Default
.3Ω-100KΩ, 500KΩ 1MΩ, 5MΩ	10.0Ω

How good are the connections in a cable? The **Connection Resistance** setting specifies the *maximum* resistance a connection can have and still be considered good as opposed to having high resistance.



When learning a cable, the connections in the cable must be lower in resistance than the **Connection Resistance** setting to be learned as connections. When testing a cable the connections in the cable must be lower than the **Connection Resistance** setting to pass the test.

Guidelines on Connection Resistance

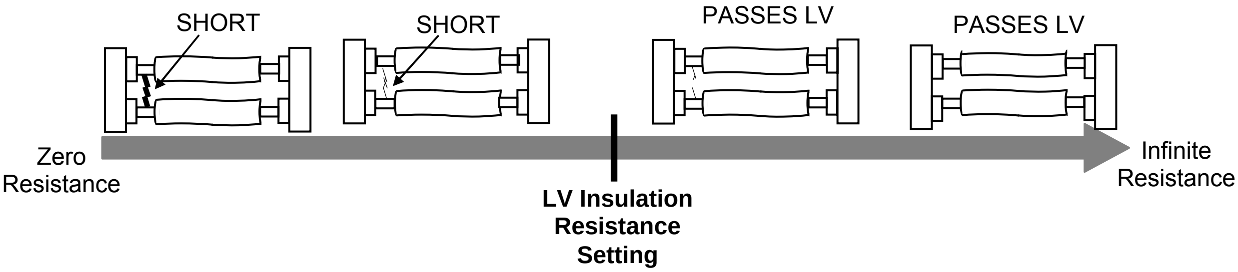
- To allow for cable and analyzer tolerances, you should generally select a connection resistance at least 20% or 0.2 ohms (whichever is greater) above the resistance of the actual connections.
- Over time, heavily used adapters can develop worn contacts, which will add to the connection resistance measurement. Cirris recommends replacing worn adapters before they affect the measured connection resistance and create high resistance errors. If you must use adapters with substantial wear, you will have to increase the **Connection Resistance** setting to get cables to pass.

The analyzer can measure the actual connection resistance and give you a suggested value for the **Connection Resistance** setting.

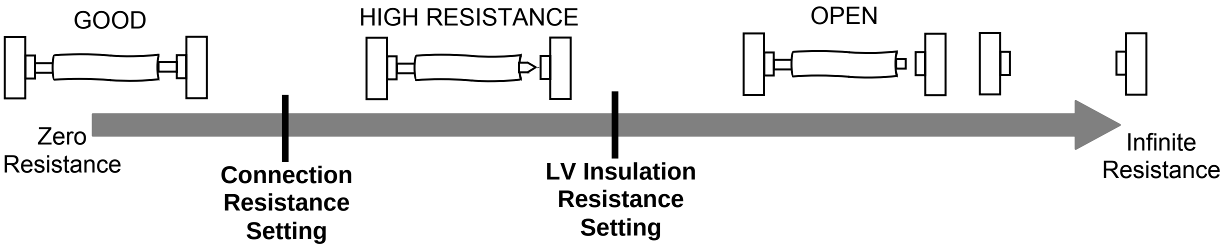
LV Insulation Resistance (LV Insul Res)

Selections	Factory Default
.3Ω-100KΩ, 500KΩ 1MΩ, 5MΩ	100kΩ

The **LV Insulation Resistance** setting only affects the low voltage test where the basic cable pattern and gross insulation problems are identified. This setting determines how high the insulation resistance must be between cable nets to pass the low voltage test. The analyzer displays SHORT for an unintended resistance between nets that is less than the **LV Insulation Resistance** setting.



In addition, the **LV Insulation Resistance** setting determines at what resistance intended connections are considered *open,* as opposed to having high resistance.



Guidelines on LV Insulation Resistance

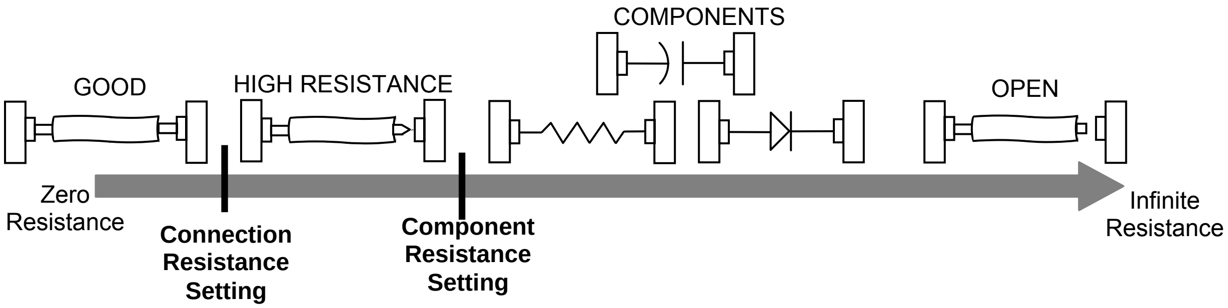
The factory default of 100KΩ should work well for most cable testing applications. The higher you raise the **LV Insulation Resistance** setting, the longer the analyzer takes to perform the low voltage test.

Note: Resistances above the **LV Insulation Resistance** setting will be ignored during a learn.

Component Resistance

Selections	Factory Default
Automatically set .3Ω-5MΩ	OFF

The **Component Resistance** is automatically determined when the **Learn Components** setting is turned ON and components are sensed in the cable. The analyzer sets component resistance to 20% less than the lowest resistor value found in the cable. The figure below shows the **Component Resistance** setting in relation to the other settings that affect the low voltage test.



When to Change Component Resistance
In some rare instances, you may need to change the component resistance by editing the loaded test. Change the component resistance:

- ☐ If you have components with resistance so low that you lose the "measurement window" between **Connection Resistance** and **Component Resistance** settings. In this case you potentially have two options:

  Option 1: You can raise the **Connection Resistance** and the **Component Resistance** settings to test components as connections.

  Option 2: If the cable connections have more than .1Ω of resistance, lower both the **Connection Resistance** and **Component Resistance** settings to below the cable connection resistance. Wires and components will be measured as components.

- ☐ If you have large capacitors (values greater than 10 microfarad). In this case, you may need to change the **Component Resistance** setting below 1KΩ so the capacitors will not be reported as shorts.

HV - High Voltage Test

This section explains each of the high voltage settings.

Hipot Test

Selections	Factory Default
OFF, STANDARD, ADVANCED, EXTERNAL	STANDARD

The **Hipot Test** setting determines whether the analyzer performs the hipot test and if so, what settings will be used.

- ☐ When **Hipot Test** is OFF, the analyzer does not perform a hipot test when the assembly is tested.
- ☐ When STANDARD is selected, the hipot settings are simplified. The same settings are used for the **Dielectric Withstand (DW) Test** and the **Insulation Resistance (IR) Test.**
- ☐ When ADAVANCED is selected, more hipot settings are available. The added settings allow increased and independent control over both parts of the hipot test - the **DW Test** and **IR Test.**
- ☐ When EXTERNAL is selected, control of portions of the hipot tests is passed to the external HV supply.

The chart below briefly contrasts the settings for Standard and Advanced Hipot Test.

Setting	Standard Setting	Advanced Setting
Hipot Mode	VDC	Allows operator to select either AC or DC for DWV test.
Frequency	N/A	Allows operator to select the frequency if a VAC is selected for DWV test.
DWV Current	N/A	Allows operator to select value from 100uA to 1.5mA
DWV Voltage and **HV Insul Voltage (HV Voltage)**	Sets the same high voltage for both DWV and IR tests.	Allows operator to select separate high voltages for DWV and IR tests.
Insulation Resistance Time	Allows operator to select from 0.1, .1, 1, 2, 5, 10, 30, 60, and 120 s	Allows operator to select period between 2 ms and 60 s.
Soak until good and **Soak for**	Only **Max Soak** period may be used.	Allows either a defined **Soak For** period or **Max Soak** period.

The EXTERNAL DWV settings are described below.

Setting	DC Mode	AC Mode
Hipot Voltage	Allows the user to set the VDC for the test	Allows the user to set the VAC for the test
Maximum Total Current	0 – 10,000 uA	0 – 30 mA
Maximum Real Current	N/A	0 – 1.5 mA
Frequency	N/A	Allows operator to select the frequency if a VAC is selected for DWV test. 50 or 60 hz
Arc Sense	An **Arc Sense** value of 1 indicates the least sensitive setting. A value of 9 indicates the most sensitive setting.	
Ramp Up Time	The **Ramp Up Time** indicates the amount of time to reach the set voltage. Range from 0.1 sec. to 999.9 sec.	
Ramp Down Time	The **Ramp Down Time** indicates the amount of time to dissipate the output voltage after the Dwell finishes. Range from 0 sec. to 999.9 sec.	
Dwell Time	**Dwell Time** indicates the amount of time the stated voltage is maintained. Range from 0.4 sec. to 999.9 sec.	

The EXTERNAL IR settings are described below.

Setting	Description	
Insulation Voltage	The **Insulation Voltage** is limited by system characteristics. The initial startup screen gives a rated voltage indicator.	
Insulation Resistance	Range from 0.05 MΩ – 50,000 MΩ	
Ramp Up Time	The **Ramp Up Time** indicates the amount of time to reach the set voltage. Range from 0.1 sec. to 999.9 sec.	
Ramp Down Time	The **Ramp Down Time** indicates the amount of time to dissipate the output voltage after the Dwell finishes. Range from 1 sec. to 999.9 sec.	
Delay Time	**Delay Time** indicates how long to wait before making a measurement once the ramp up time has finished. Range 1 to 999.9 sec.	

High Voltage (Internal)

Selections	Factory Default
1000V Unit: 50V, 100V, 200V, 300V, 400V, 500V, 630V, 800V, 900V, 1000V **1500V Unit:** 50V, 100V, 200V, 300V, 400V, 500V, 630V, 800V, 900V, 1000V, 1100V, 1200V, 1300V. 1400V, 1500V	50 V

The **High Voltage** setting determines the voltage applied to the cable during the hipot test. A higher setting of **High Voltage** allows you to test higher levels of insulation resistance between nets; however, there are limits to the amount of high voltage you should use on a cable assembly.

Guidelines on Changing High Voltage

The **High Voltage** setting may be dictated by a customer or engineering specification. If you do not have a specification, here are some general guidelines:

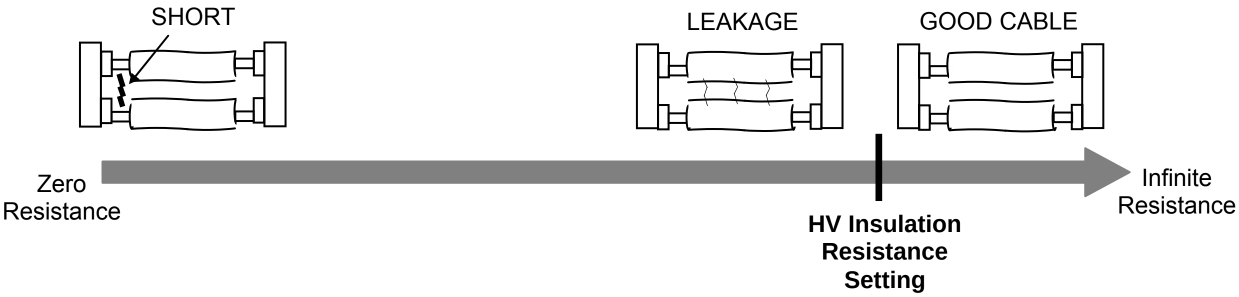
- The spacing between the pins in a connector, as well as the separation of the conductors in a cable, limits the amount of voltage that can be applied to a cable.
- You can use the manufacturer's specifications for the wire and connectors used in a cable.
- The **High Voltage** setting affects the available selections for the Insulation Resistance settings. For more information see the table Available HV Insulation Resistance settings on the next page.
- Highly capacitive cables may limit the amount high voltage that can be applied to the cable.

HV Insulation Resistance (Internal)

(HV Insul Res)

Selections	Factory Default
(Available selections limited by High Voltage Setting) 5MΩ,10MΩ, 20MΩ, 50MΩ, 100MΩ, 200MΩ, 500MΩ, 1GΩ	5.0MΩ

How well isolated are the nets in a cable? The **HV Insulation Resistance** setting determines the minimum resistance allowed between nets in the cable. Nets with insulation resistance less than the Insulation Resistance setting are considered to have leakage and fail the hipot test. Nets with insulation resistance higher than the Insulation Resistance setting pass the hipot test.



The **HV Insulation Resistance** settings you can select are limited by the high voltage settings. The table below shows the available Insulation Resistance settings at each of the high voltage settings.

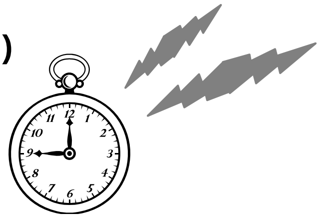
High Voltage	Available HV Insulation Resistance Settings							
	5.00MΩ	10.0 MΩ	20.0 MΩ	50.0 MΩ	100.0 MΩ	200.0 MΩ	500.0 MΩ	1.00 GΩ
50 V	✓	✓	✓	✓				
100 V	✓	✓	✓	✓	✓			
200 V	✓	✓	✓	✓	✓	✓		
300 V	✓	✓	✓	✓	✓	✓		
400 V	✓	✓	✓	✓	✓	✓		
500 V	✓	✓	✓	✓	✓	✓	✓	
630 V	✓	✓	✓	✓	✓	✓	✓	
800 V	✓	✓	✓	✓	✓	✓	✓	
1000 V		✓	✓	✓	✓	✓	✓	✓

Guidelines on HV Insulation Resistance

Specifications may dictate the Insulation Resistance setting, which may be based on some of the following factors:

- The allowed contamination. Cables in high voltage and sensitive electronic equipment must have a stringent test because of their ultimate use. Other cables may be tested at lower levels to allow for contamination, such as finger prints and mold release.
- The length of the cable. Long cables may need a lower Insulation Resistance setting to accommodate the cumulative effect of small current leakages along their length.
- Humidity in the environment. A humid environment can aggravate the effects of contamination between cable contacts and affect cable insulation. For more information, see **Max Soak** on page 50.

Duration (internal)



Selections	Factory Default
VDC .01, .1, 1, 2, 5, 10, 30, 60, 120 seconds	.01 seconds
VAC 1, 10, 60, 300, 3600, or 7200 cycles	1 cycle

The **Duration** setting sets the amount of time the high voltage is applied to each net during the Dielectric Withstand Test, which occurs during the hipot test. If using an AC test voltage for the Dielectric Withstand Test, the duration (typically referred to as **"**Dwell") is set in cycles rather than seconds. If you do not have a **Duration Specification,** use the following guidelines:

Guidelines for Changing Duration

- The default setting for this parameter of 0.010 s (10 ms) should be adequate to test most of your cables. A longer duration will increase the total hipot test time.
- A shorter duration without soak time is better for detecting humidity related problems, since absorbed moisture may not have time to be "dried out" of the cable before the Insulation Resistance Test (see **Max Soak** on pg. 47, for more information).
- A longer duration provides a more stringent test for predicting dielectric failures (exhibited as sudden arcs). However, equivalent dielectric errors can be found by compensating a shorter duration with a higher High Voltage setting.
- A longer duration may be better for predicting some types of insulation failures, and increase the chance you'll detect a breakdown condition.

Hipot To (internal)

Selections	Factory Default
ALL PINS, or CONNECTIONS ONLY (Limited to ALL PINS if **High Capacitance Shield** is YES)	ALL PINS

The **Hipot To** setting determines which test points the analyzer applies high voltage to.

- When **Hipot To** is set to ALL PINS, the analyzer applies high voltage to all adapter test points regardless of whether they have connections to other points under test.
- When **Hipot To** is set to CONN ONLY, the analyzer applies high voltage only to adapter test points that have connections to other test points on the cable under test.

If unused connector pins have contacts loaded (metal in the holes); you should use the ALL PINS selection. This ensures the analyzer will catch high voltage shorts between unconnected contacts. If not, using CONN ONLY can save test time.

If the High Capacitance Shield setting is set to YES, the **Hipot To** setting is forced to ALL PINS and cannot be changed. This ensures the analyzer catches a condition where leakage occurs from a high capacitance shield to an unused pin.

High Capacitance Shield (internal)

Selections	Factory Default
YES, NO	NO

(High Cap Shield)

The **High Capacitance Shield** setting allows a cable to pass with *one* net too capacitive to pass a hipot test. This setting is often used when a shielded cable is hipot tested. Cable shields usually have substantially higher capacitance, because the shield surrounds, and has capacitance to, all wires in a cable. To avoid an unsafe shock hazard during a hipot test, the analyzer will *not* continue to charge a highly capacitive net. If **High Capacitance Shield** is set to NO, the analyzer reports an Overcurrent Error when it stops charging a highly capacitive net. However, if **High Capacitance Shield** is set to YES, the analyzer will ignore a single Overcurrent Error generated by a cable shield.

Guidelines for Using High Capacitance Shield

- ☐ A single-net hipot failure can be an indication of a net with high capacitance. Normally, hipot failures show up with at least two failed nets.
- ☐ By turning on the **High Capacitance Shield** setting, you can successfully test a cable with a highly capacitive shield.

Advanced Settings (internal)

Max Soak (internal)

Selections	Factory Default
0, .01, .1, 1, 10, 30, 60, 120 seconds	0 seconds

In some cables, the current flow stabilizes quickly when high voltage is applied. In other cables the current flow may take longer to stabilize due to the effects of humidity, dielectric absorption, temperature, residual charges, and other factors. To help compensate for cables that take longer to reach a steady-state, Cirris analyzers have a SOAK capability. SOAK applies voltage to the cable for a period of time to help "dry out" or stabilize the current flow so the analyzer can make an accurate Insulation Resistance test. When using the **Max Soak** setting, the analyzer monitors the insulation resistance for a selected period of time. If the I.R. becomes "good" (i.e. actual I.R. reading becomes greater than the Insulation Resistance setting), the I.R. test is deemed "good" for that net; the test immediately stops for that net and moves onto the next net. The SOAK feature allows you to meet the required procedure of Mil-Std-202F method 302 paragraph 1.3 which states: "...When electrification time is a factor, the insulation resistance measurements shall be made immediately after a 2-minute period of uninterrupted test voltage application, unless otherwise specified. **However, if the instrument reading indicates that an insulation resistance meets the specified limit, and is steady or increasing, the test may be terminated before the end of the specified period."** If you want to force voltage to be applied for a specific period of time before the I.R. test is finished, you must use Advanced Hipot settings and uncheck the box marked **Soak Until Good.** You can then set a **Soak For** time that will apply voltage for the entire time specified before performing the I.R. test (see p. 48 for more information).

Guidelines for Using Max Soak

- ☐ **Max Soak** is useful for diagnosing some failures. If your cables are failing with a voltage leakage error, you might increase **Max Soak.** If the problems disappear, the cable likely has a dielectric absorption or moisture absorption problem.
- ☐ If a cable must exhibit rigorous high voltage resistance in humid environments in actual use, you should not use this setting.
- ☐ Use a longer **Max Soak** setting for measuring best-case insulation resistances, or for testing the physical properties of insulation independent of environmental degradation.
- ☐ Use a shorter **Max Soak** setting for detecting corona (small current spikes that occur as moisture dissipates from the cable) and other humidity-related problems in a cable.

Soak Until Good (internal)

Selections
OFF, ON

For a detailed description of the SOAK capability, see **Max Soak,** p. 47.

In the **Advanced Hipot** settings, you can turn **Soak Until Good** ON or OFF.

- When **Soak Until Good** is turned ON, the analyzer displays the Max Soak setting and will apply voltage to each net in the cable until it either, a) passes the I.R. test, or b) the Max Soak time is complete (this is the same behavior you get when using the Standard hipot setting).
- When **Soak Until Good** is turned OFF, the analyzer displays the **Soak For** setting, see the next section for details.

Note: Unless specifications require otherwise, leaving this setting ON can save test time.

Soak For (internal)

Selections
0 - 120 Seconds

Available only when **Hipot Test: Advanced** is selected.

The **Soak For** setting will apply voltage to each net in the cable for the specified **Soak For** time BEFORE performing the I.R. test. **Note:** Using **Soak For** will generally result in a slower hipot test as each net will be "soaked" for the entire time of the **Soak For** period.

Hipot Mode (internal)

Selections
(May be changed to AC only when the analyzer is equipped with the AC option) AC, DC

Available only when **Hipot Test: Advanced** is selected.

Hipot Mode allows you to select whether the analyzer will apply alternating current (AC) or direct current (DC) in the Dielectric Withstand Test. If you select AC, the Frequency setting is displayed, and the Duration setting is set in cycles rather than time.

Guidelines for Changing this Setting
Whenever possible use DC for safety and test reliability. In many cases you may be allowed to substitute an equivalent VDC for a VAC specification as explained on the next page.

Substituting VDC for a VAC Specification

Testing with VDC is generally considered safer to the tested assembly. MIL STD 202F (April 1980) on testing electronic components states:

> *When either alternating current or direct current test voltages are used, care should be taken to be certain that the test voltage is free of recurring transients or high peaks. Direct potentials are considered less damaging than alternating potentials, which are equivalent in detecting flaws in design or construction. However the latter are usually specified because high alternating potentials are more readily obtainable.*

Additionally using VDC hipot may provide more reliable hipot test results. The General Military Specification for wiring harness, space vehicle, design, and testing (DOD-W-83575A USAF, December 1977) states regarding the high potential withstand test:

> *This test shall be performed using either a 60 Hz ac test potential or a dc potential. Because the wiring capacitance results in higher ac currents that may give erroneous indication of breakdown, only the dc test is recommended for cables longer than 3 meters.*

If a VDC is to be used in place of a VAC, the equivalent VDC should be at least 1.4 times the VAC (RMS) specification. As stated in DOD-W-83575A USAF, December 1977:

> *When a DC potential is used, the test shall be performed in the same manner as described for the ac test except that the dc potential used shall not be less than 1.4 times the appropriate ac test potential.*

To arrive at a DC duration setting that relates to the AC dwell specification, divide the AC dwell specification (number of cycles) by the AC frequency specification in hertz (cycles per second). This will give you an equivalent DC Duration setting in seconds.

Frequency (internal)

Available only when **Hipot Mode: AC** is selected.

Selections
25, 30, 50, 60 Hz.

The **Frequency** setting defines the frequency of AC waveform cycle when AC is selected for the **Hipot Mode**. This setting is often dictated by a customer or engineering specification.

DWV Voltage (internal)

Available only when **Hipot Test: Advanced** is selected.

DC Selections
1000V Unit: 50V, 100V, 200V, 300V, 400V, 500V, 630V, 800V, 900V, 1000V

The **DWV Voltage** setting determines the voltage the analyzer applies to each net in the Dielectric Withstand test. This test is where gross hipot failures, such as arcs and breakdown conditions, are detected. The **DWV Voltage** setting is often dictated by a customer or engineering specification. If you do not have a specification, the guidelines for the High Voltage settings (p. 44) are applicable to this setting.

DWV Max Current (internal)

Selections
100uA (.1mA), 200uA (0.2mA), 500uA (0.5mA), 1mA, and 1.5mA

Available only when **Hipot Test: Advanced** is selected.

The **DWV Max Current** setting determines the maximum current the analyzer will allow to flow out of each net during the Dielectric Withstand Test. If current flow exceeds this setting, the analyzer will fail the tested assembly and display a dielectric error, indicating an arc or insulation breakdown.

Guidelines for Maximum Current Setting
The **DWV Voltage** setting is often dictated by a customer or engineering specification. If you do not have a specification, here are some general guidelines:

- ☐ Using a lower setting provides a more stringent test, but too low of a setting may cause false failures.
- ☐ Testing cables with higher internal capacitance may necessitate using a higher setting, especially if you are testing with a VAC, where current surges occur throughout the test period proportionally to the capacitance in the tested device.

HV Insulation Voltage (internal)

(HV Insul Voltage)

Selections
1000V Unit: 50V, 100V, 200V, 300V, 400V, 500V, 630V, 800V, 900V, 1000V

Available only when **Hipot Test: Advanced** is selected.

The **Insulation Voltage** setting determines the voltage the analyzer applies to each net during the Insulation Resistance test. **Note:** The analyzer does not permit you to set this voltage higher than the equivalent DWV Voltage. This setting always specifies a DC voltage. If you do not have a specification for this setting, the guidelines for the High Voltage setting are applicable.

Insulation Resistance Time (internal)

(Insul Res Time)

Selections
.002, .017, .02, 1, 10, 30, 60 Seconds

Available only when **Hipot Test: Advanced** is selected.

The **Insulation Resistance Time** setting specifies the time period that the Insulation Resistance Measurement must remain below the Insulation Resistance setting during the Insulation Resistance test. Unless otherwise specified, the default setting of .002 second (2ms) is typically sufficient.

External Settings

Using the Internal IR test in conjunction with the external DWV test can dramatically reduce the amount of time required to test a device.

Test time includes the following components:

	DW Ramp	DW Dwell	IR Ramp	IR Delay
External	0.1 – 999.9	0.4 – 999.9	0.1 – 999.9	1 – 999.9
Internal	0.1 – 120	0.1 – 120	0.1 – 120	0.1 – 120

The total test time is the DW Ramp + the DW Dwell + the IR Ramp + the IR Delay. Using the external DW Ramp and DW Dwell in conjunction with the internal IR test will dramatically improve test time.

High Voltage (external)

Selections	Factory Default
The maximum AC and DC voltages are system dependent.	50 V

The **High Voltage (external)** setting determines the voltage that the analyzer allows the Ultra to apply to the cable during the hipot test. A higher **High Voltage** setting allows you to test higher levels of insulation resistance between nets; however, there are limits to the amount of high voltage you should use on a cable assembly.

Maximum Total Current (external)

This is an AC only option.

Selections
0 – 30 mA

The **Total Current** is a combination of the **Real Current** and the **Reactive Current**. As in a right triangle, the Total Current is the square root of the sum of the squares of the Real and Reactive currents.

The **Real Current** is the portion of the current directly related to the DUT and not the capacitive element. Of the two, the **Real Current** is often much smaller than the **Reactive Current.** Increasing the **Real Current** increases the **Total Current** by only a small amount. Therefore a doubling of the **Real Leakage Current** could go virtually undetected by a **Total Current Measurement**.

Maximum Real Current (external)

Selections
0 – 1.5 mA

Available only when **Hipot Mode: AC** is selected.

The **Real Current** is the portion of the current directly related to the DUT and not the capacitive element. Of the two, the **Real Current** is often much smaller than the reactive current. Increasing the **Real Current** increases the **Total Current** by only a small amount. Therefore a doubling of the **Real Leakage Current** could go virtually undetected by a **Total Current Measurement.**

Frequency (External)

Selections
50, 60 Hz.

Available only when **Hipot Mode (External): AC** is selected.

The **Frequency** setting defines the frequency of AC waveform cycle when AC is selected for the Hipot Mode. This setting is often dictated by a customer or engineering specification.

Arc Sense (External)

Selections
1 - 9

During a Hipot test, some low current arcing may occur. The **Arc Sense (External)** setting represents how sensitive the system is to this low current arcing. A value of 1 is the least sensitive; a value of 9 is the most sensitive.

Ramp Up Time (External)

Selections
0.1 – 999.9 seconds

Ramp Up Time is the amount of time allowed for the voltage to rise from 0 to the set value.

Ramp Down Time (External)

Selections
0 – 999.9 seconds

Ramp Down Time indicates the amount of time to dissipate the output voltage after the Dwell finishes. The range is from 0 sec. to 999.9 sec.

Dwell Time (External)

Selections
0.4 – 999.9 seconds

Dwell Time (External) is the amount of time allowed for the voltage to be applied. A failure during this time frame is detected by the analyzer.

Insulation Voltage (External)

Selections
Limited by system configuration.

The initial startup screen indicates what the system voltage capabilities for each specific system are.

Insulation Resistance (External)

Selections
0.05 – 50,000 MΩ

The **HV Insulation Resistance** setting determines the minimum resistance allowed between nets in the cable. Nets with insulation resistance less than the Insulation Resistance setting are considered to have leakage and fail the hipot test. Nets with insulation resistance higher than the **Insulation Resistance** setting pass the hipot test. See **HV Insulation Resistance (Internal)** for more information.

Ramp Up Time (External) (IR Test)

Selections
0.1 – 999.9 seconds

The **Ramp Up Time (External)** is the amount of time allowed for the voltage to rise from 0 to the set value.

Ramp Down Time (External) (IR Test)

Selections
1 – 999.9 seconds

The **Ramp Down Time** indicates the amount of time to dissipate the output voltage after the Dwell finishes. It ranges from 1 sec. to 999.9 sec.

Delay Time (External)

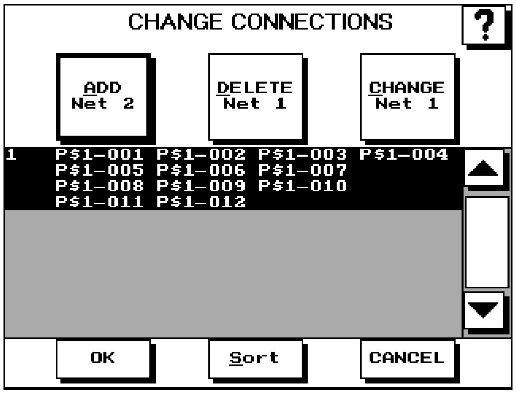
Selections
1 – 999.9 seconds

The **Delay Time (External)** is the amount of time before the parameters are tested. Failures related to the DUT are ignored during this time until the **Delay Time** is concluded.

CON - Wire Connections (Net List)

Use the CON button to view, add, change, or delete nets in the connections list. The list of available points is based on the adapters listed in the ADP section.

Each increasing number indicates a separate net.



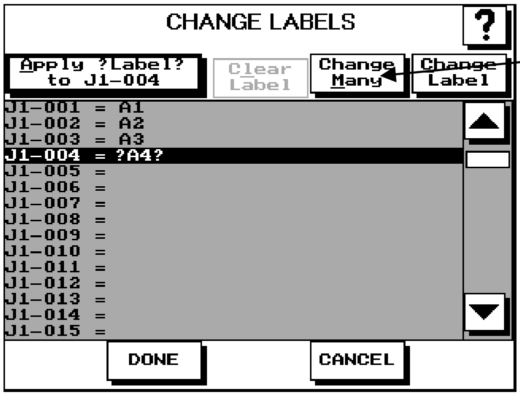
```
1    P$1-001 P$1-002 P$1-003 P$1-004
     P$1-005 P$1-006 P$1-007
     P$1-008 P$1-009 P$1-010
     P$1-011 P$1-012
```

Components like resistors and capacitors are listed in the COMP section.

LABEL - Custom test point labels

The LABEL button allows you to re-name the default test point labels.

If your labels end in a number, the Touch 1 Ultra will try to increment the label for you. You can touch here to use the generated label or input your own for each point.



```
J1-001  = A1
J1-002  = A2
J1-003  = A3
J1-004  = ?A4?
J1-005  =
J1-006  =
J1-007  =
J1-008  =
J1-009  =
J1-010  =
J1-011  =
J1-012  =
J1-013  =
J1-014  =
J1-015  =
```

Labels can be loaded from another file and applied to points in this wirelist.

You can use the probe to help speed the labeling process. When you touch a point with the probe, the software highlights that point as the next to be labeled.

COMP - Components (resistors, diodes, capacitors, etc.)

For information on editing Component parameters, refer to **Chapter 2: Creating a Wirelist** in the **COMP-Learning Components** section or in the Help Index search for **Components**.

4-WIRE – Four Wire wirelists

Please refer to **Appendix B: Four Wire “Kelvin” Testing** for information on four-wire applications.

SPC – Statistical Process Control

Please refer to **Appendix C: SPC Data Collection** for information on statistical process control.

SCRIPT – Test Event and Custom Components

Please refer to **Appendix D: Scripting** for information on scripts and custom components.

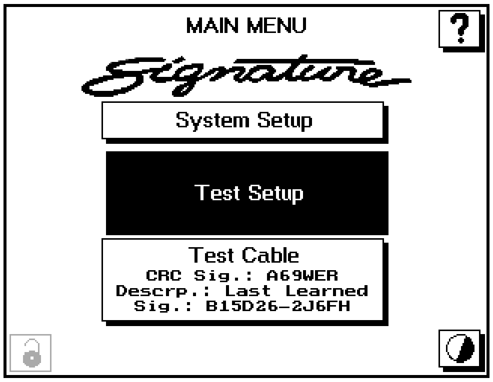
Chapter 6: Save and Retrieve Wirelists and Scripts

Wirelists and Scripts are files stored on a floppy disk, hard drive, or on your network. You can manage them much the same way you manage other files on your computer, such as Word "docs" or spreadsheet files.

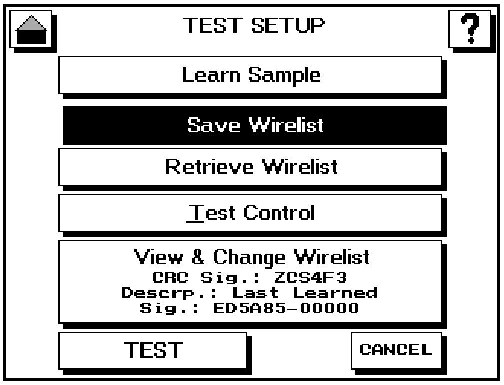
Saving a Wirelist

You can save a wirelist to the Touch 1 Ultra's internal hard drive, a floppy disk, or to your network.

In the Main Menu press Test Setup.

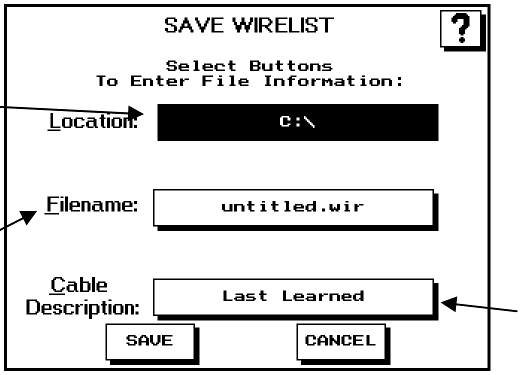


In Test Setup, press Save Wirelist



Choose a location where you want to save the wirelist. If the location is where you want it, no action is necessary.

You can give the wirelist a unique name up to 8 characters. The file extension **.wir** is required.



Location: C:\

Filename: untitled.wir

Cable Description: Last Learned

You can add new locations (folders) to further organize your wirelists. Choose Location then Add. The last learned wirelist is overwritten anytime a learn is performed or a wirelist is retrieved.

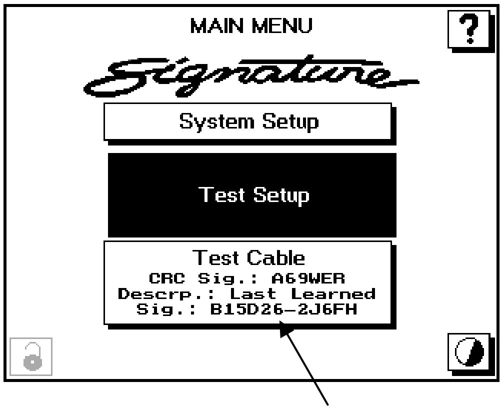
A 32 character description of the wirelist can be added to the wirelist displayed in buttons and screens throughout the analyzer.

Retrieve a Wirelist

Wirelists are files that are loaded into the analyzer to create a test setup for a specific cable or harness. They configure everything necessary to test the device except Test Controls and System Options, which are global to all wirelists.

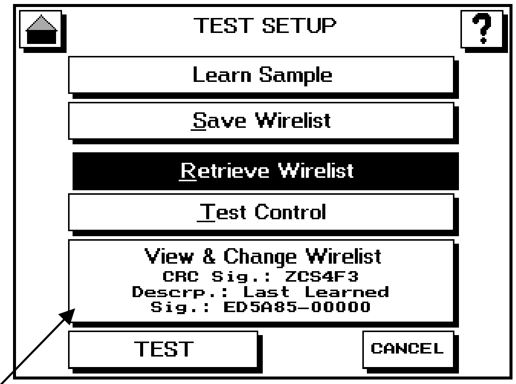
Wirelists can be retrieved from floppy disk, the hard drive in the Touch 1 Ultra and from your network. Retrieving a wirelist replaces the Last Learned wirelist. The last retrieved wirelist will remain loaded even if power is interrupted.

In the **Main Menu**, press **Test Setup**.



CRC Sig.: A69WER
Descrp.: Last Learned
Sig.: B15D26-2J6FH

In **Test Setup** press **Retrieve Wirelist**.

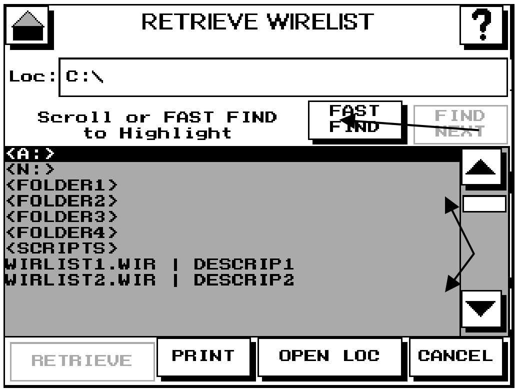


CRC Sig.: ZCS4F3
Descrp.: Last Learned
Sig.: ED5A85-00000

Testing is performed according to the presently loaded wirelist as shown in the **Test Cable** button in the **Main Menu** or in the **View & Change Wirelist** button in the **Test Setup** screen.

When a valid wirelist has been selected with the black cursor bar, the option to **RETRIEVE** will become available.

Change Locations by moving the black cursor line to the new location then press **OPEN LOC**. Network drives will show in the list when they are available.



Loc: C:\

Scroll or FAST FIND to Highlight

```
<A:>
<N:>
<FOLDER1>
<FOLDER2>
<FOLDER3>
<FOLDER4>
<SCRIPTS>
WIRLIST1.WIR | DESCRIP1
WIRLIST2.WIR | DESCRIP2
```

Search a long list of wirelists using **Fast Find.** Fast Find only searches in the current Location.

Choose an available wirelist from the list using the scroll arrows.

Note: When a wirelist is retrieved, the Touch 1 Ultra will evaluate the wirelist and report any error in syntax as it is loaded. If there are no messages while retrieving a wirelist, the syntax of the wirelist is correct.

Change Cable Descriptions

Changing **Cable Descriptions** refers to editing the text description entered on creating and saving a wirelist file. Changing **Cable Descriptions** consists of retrieving the wirelist and editing the description when saving the wirelist back to disk.

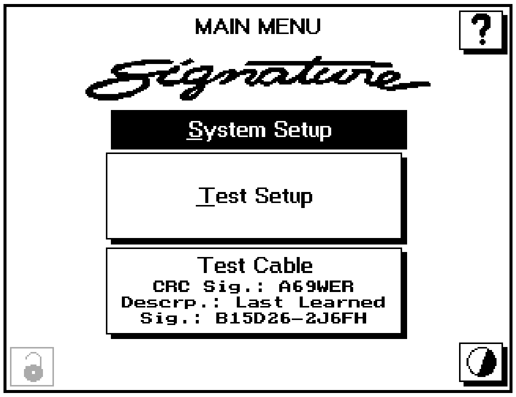
For more information on **Cable Descriptions**, search the **Help Index** under **Cable Description.**

Chapter 7: Set Up System Options and Test Controls

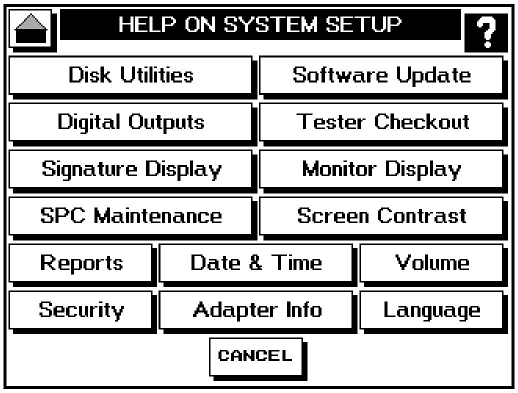
Set up System Options

Because System Options are global, they are set independently of the wirelist options.

In the **Main Menu** press **System Setup**.



Test Cable
CRC Sig.: A69WER
Descrp.: Last Learned
Sig.: B15D26-2J6FH

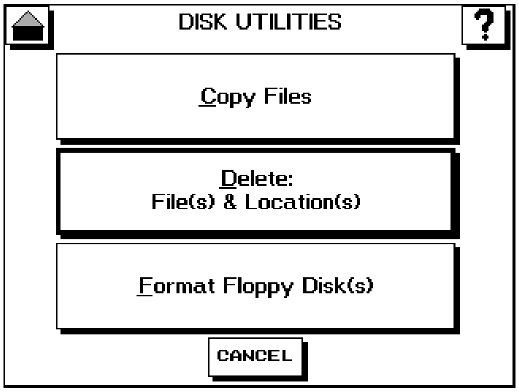


Disk Utilities

Disk Utilities allow you to copy and delete files as well as format floppy disks for use in your Touch 1 Ultra analyzer.

Files may be copied or deleted singly or as a group to any location on a floppy disk, the hard drive in the Touch 1 Ultra or on your network.

You must have network rights to copy and delete files on your network from the Touch 1 Ultra.



It is not possible to copy a wirelist to the same location as the original.

Once files are deleted they are not recoverable.

Formatting a floppy disk erases all of the previous data, if any, on the floppy disk.

Moving Wirelists and Scripts

Moving wirelists or script files refers to changing the "Locations" (folders or drives) where they are stored. Moving consists of: (a) copying wirelists or scripts to a new location, and (b) deleting the original files at the old location.

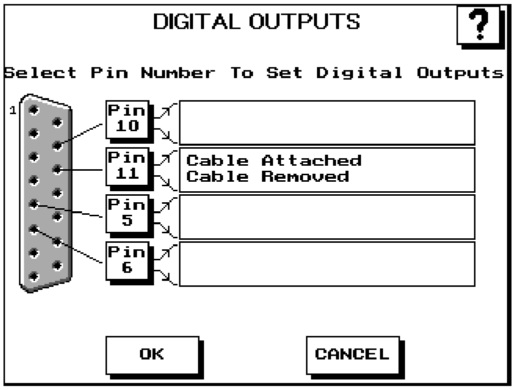
For details, search the Help Index under **Wirelists, File Management - Overview.**

Renaming Wirelists and Script Files

Re-naming wirelists and script files refers to changing the name of the file. Renaming consists of: (a) making it the active wirelist (retrieving or just learned, (b) saving it to a new name, and (c) deleting the old one.

Digital Outputs

Digital I/O is based upon events. There are a variety of events that occur as the analyzer operates. You can select which event will cause a transition from a low state to a high state, as well as from a high state to a low state for a total of four pins on the digital I/O connector.



Select Pin Number To Set Digital Outputs

Pin 11: Cable Attached / Cable Removed

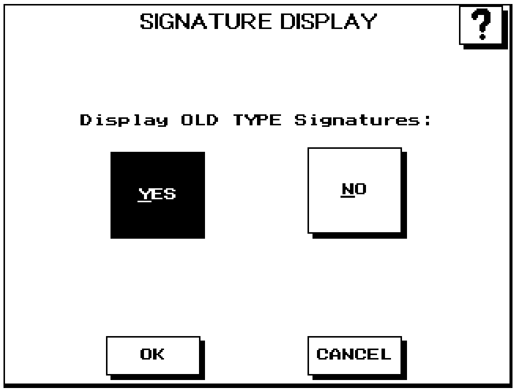
For a detailed example, see **Appendix F: Digital I/O** or the Help Index under **Digital I/O**.

The digital I/O pins are open collector transistor ports that can operate at up to 24 volts and 300 milliamps.

Use of these pins may require a pull up resistor to operate properly.

Signature Display

The Touch 1 Ultra uses a CRC signature. You can choose to display the "old" style of signature from the Cirris 1000R+/H+ series in addition to the new CRC signature.

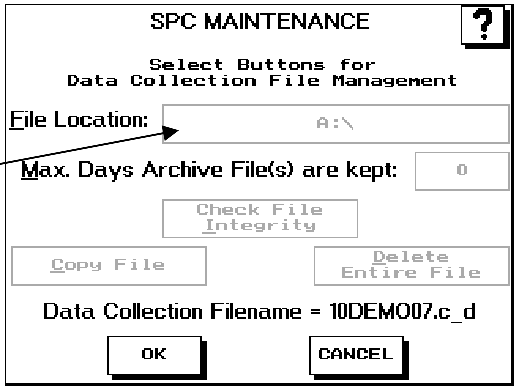


Display OLD TYPE Signatures: YES

SPC Maintenance

SPC Maintenance helps you manage your collected data.

If your analyzer is connected to a network, the storage location of the SPC data files can be specified.



Select Buttons for Data Collection File Management

File Location: A:\

Max. Days Archive File(s) are kept: 0

Data Collection Filename = 10DEMO07.c_d

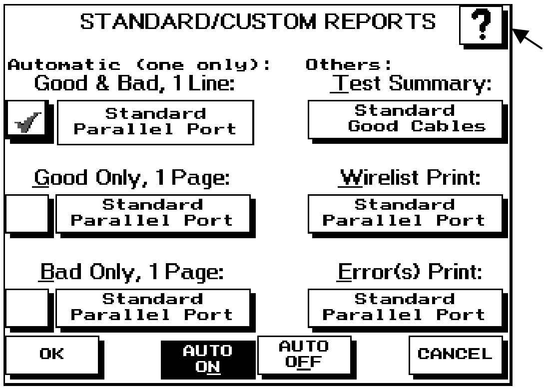
See **SPC Data Collection** in the Help Index or **Appendix C: SPC Data Collection** for more information.

The integrity of an existing data file can be verified.

You can also copy or delete the SPC data file.

Reports

The Touch 1 Ultra analyzer can automatically print the test status in several formats.



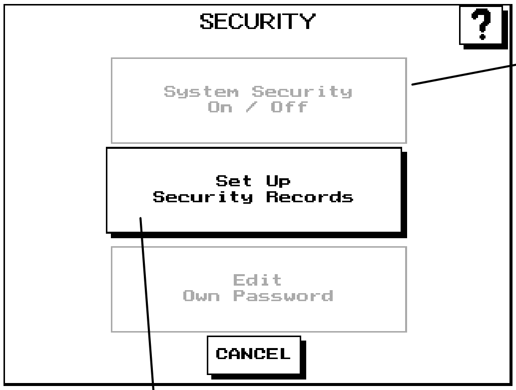
Use the Help button for more information.

With the scripting option, you can design custom reports that can be used in many different areas in the analyzer.

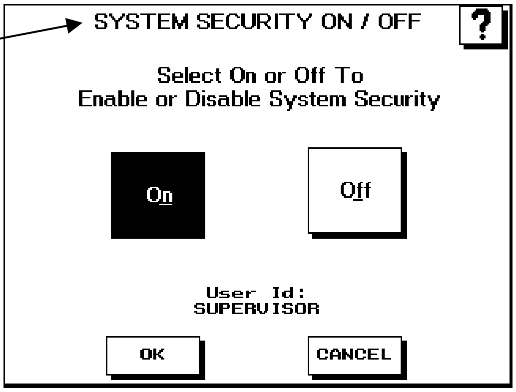
Security

Security allows you to limit access to certain analyzer functions via password control. Before you can use security, it is necessary to create Security Records and turn the Security system on. For complete details on Security, search the **Help Index** under **Security - Overview**.

Set Up Security

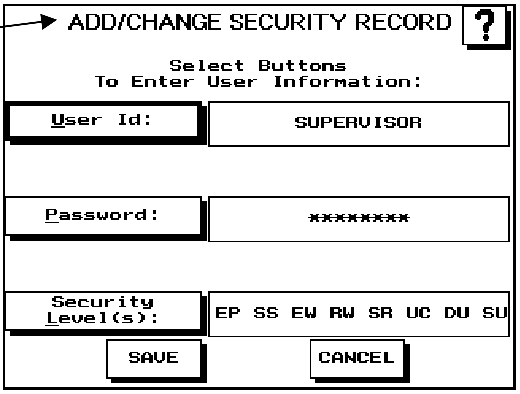


Enable and Disable Security



User Id: SUPERVISOR

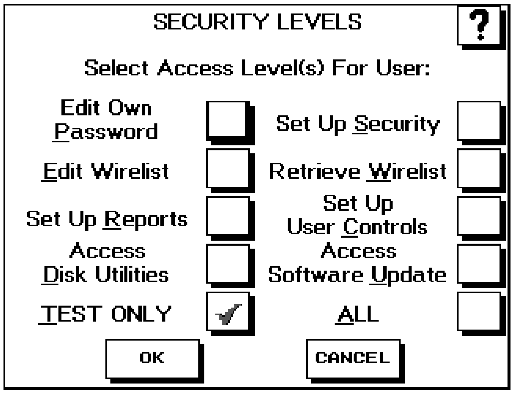
LINE 1
Level(s): RW
SUPERVISOR
Level(s): EP SS EW RW SR UC DU SU



User Id: SUPERVISOR
Password: ********
Security Level(s): EP SS EW RW SR UC DU SU

The user that is logged in is stored with the SPC data that can be collected during testing.

Each user can be allowed different levels of access by choosing from the list.



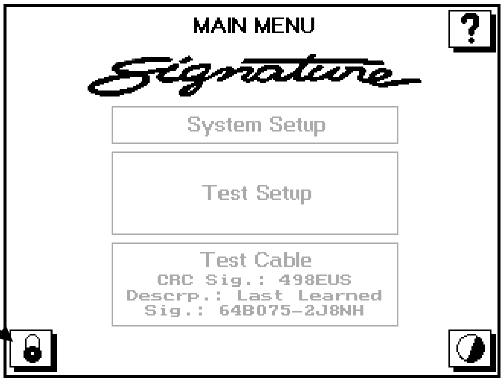
Edit Own Password ☐
Set Up Security ☐
Edit Wirelist ☐
Retrieve Wirelist ☐
Set Up Reports ☐
Set Up User Controls ☐
Access Disk Utilities ☐
Access Software Update ☐
TEST ONLY ☑
ALL ☐

Selecting **ALL** or **Set Up Security** will give you access to the security system for that user.

One user must be set up as an administrator with the **ALL** security levels enabled.

Logging in (unlocking) with a Security Password

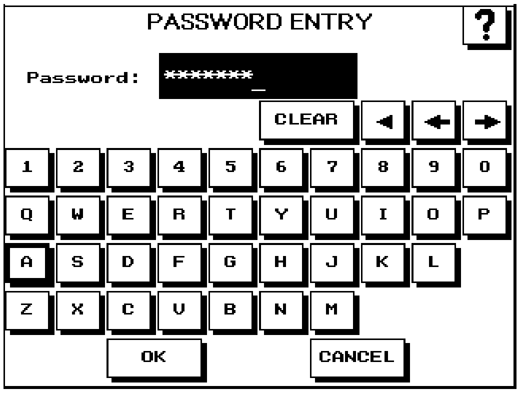
From the Main Menu, press the **Lock** icon.



CRC Sig.: 498EUS
Descrp.: Last Learned
Sig.: 64B075-2J8NH

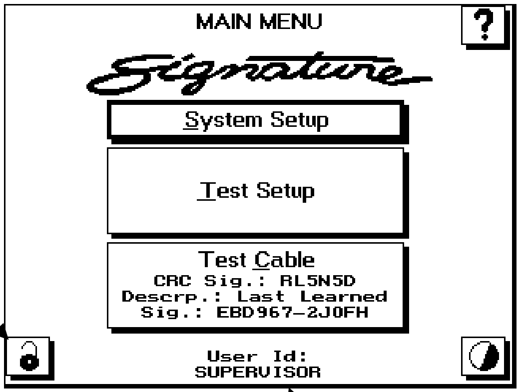
For complete details on Security, search the Help Index under **Security - Overview**.

In **PASSWORD ENTRY**, enter your password and click **OK.**



Password: *******_

The analyzer is now unlocked.



CRC Sig.: RL5N5D
Descrp.: Last Learned
Sig.: EBD967-2J0FH

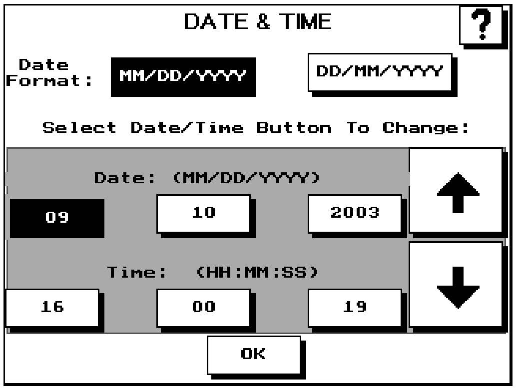
User Id: SUPERVISOR

The current user login is displayed on the MAIN MENU.

Date & Time

DATE & TIME is used when storing SPC Data as well as when saving files, wirelists, and scripts.

DATE & TIME can also be used by Custom Scripts for timing.



Date Format: MM/DD/YYYY

Select Date/Time Button To Change:

Date: (MM/DD/YYYY)
09 10 2003

Time: (HH:MM:SS)
16 00 19

Choose the **Date** format and set the date and time by pressing the appropriate buttons.

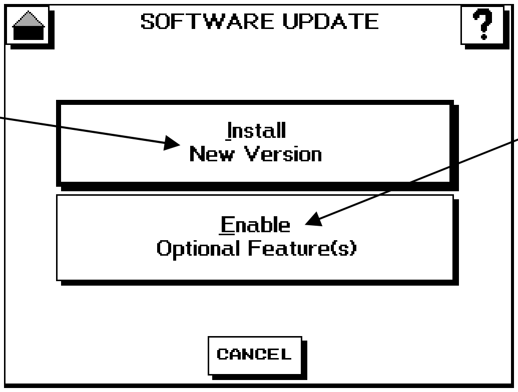
Adapter Info

This option is not utilized in conjunction with the Touch 1 Ultra.

Software Update

New versions of software can be installed using the **Install New Version** option.

The process will prompt you for the materials needed to complete the install.



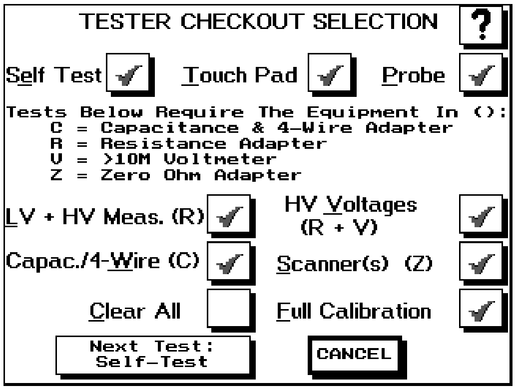
Additional features can be enabled on your analyzer, such as SPC Data Collection and Scripting.

Contact Cirris for a complete list of the available optional features.

Tester Checkout Selection

Many facets of the analyzer can be verified by you in the work area.

Utilizing a **Performance Check Kit** and the **Tester Checkout** options, you can verify the calibration of your analyzer.



Self Test ☑ Touch Pad ☑ Probe ☑

Tests Below Require The Equipment In ():
C = Capacitance & 4-Wire Adapter
R = Resistance Adapter
V = >10M Voltmeter
Z = Zero Ohm Adapter

LV + HV Meas. (R) ☑ HV Voltages (R + V) ☑
Capac./4-Wire (C) ☑ Scanner(s) (Z) ☑
Clear All ☐ Full Calibration ☑

Next Test: Self-Test

Simply choose the test you would like to perform and the analyzer will do the rest.

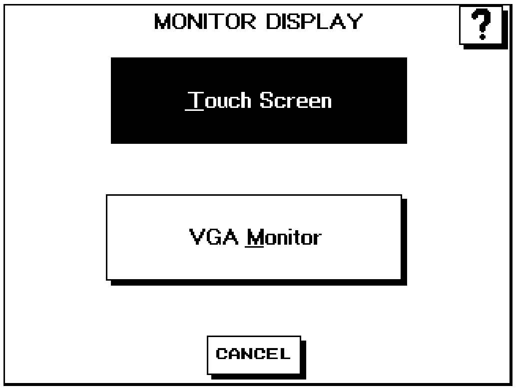
Some of the tests require parts from the **Performance Check Kit.**

If you choose to verify high voltages, a voltmeter that can withstand high voltages is necessary.

Monitor Display

If you connect an external monitor to your analyzer, you can choose to view the screen contents in a larger format.

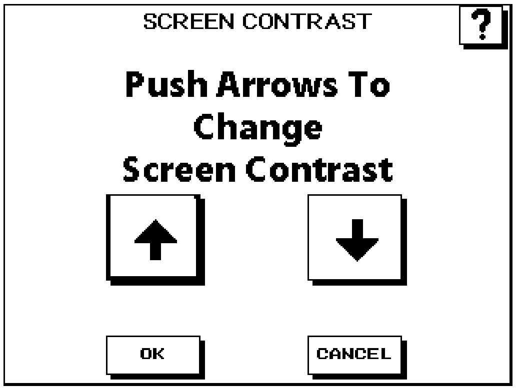
Choosing the VGA Monitor option changes the screen viewing properties for the external monitor.



Using the **VGA Monitor** option renders the touch screen inoperable.

A keyboard must also be attached to the analyzer in order to issue commands to the analyzer while in VGA Monitor mode.

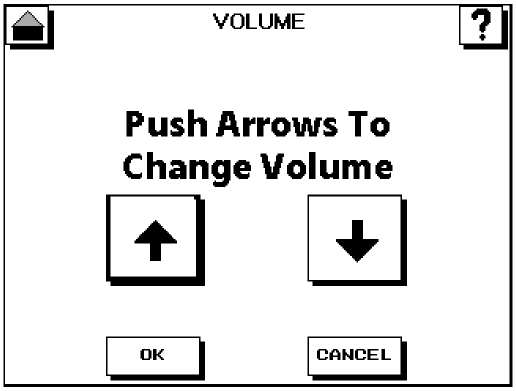
Screen Contrast



Push Arrows To Change Screen Contrast

Screen contrast allows you to adjust the viewing characteristics of the touch screen based on the viewing angle and available lighting.

Volume



Push Arrows To Change Volume

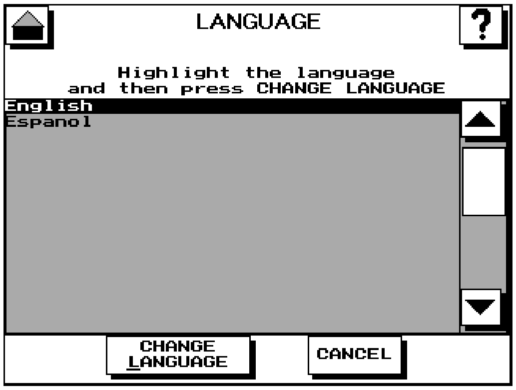
The volume of the tones generated by the analyzer can be adjusted to fit your work environment.

Language

Different languages are available for the Touch 1 Ultra.

Simply choose the language you require from the list and select **CHANGE LANGUAGE**.

The language will immediately change.



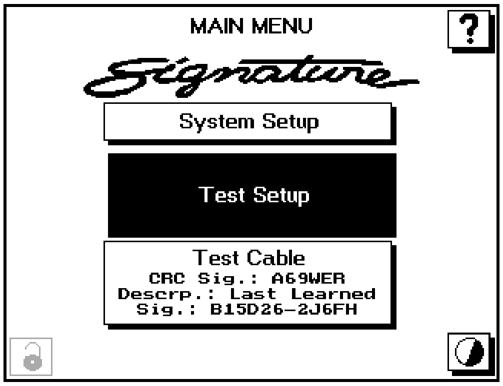
Highlight the language and then press CHANGE LANGUAGE

English
Espanol

Set Test Controls

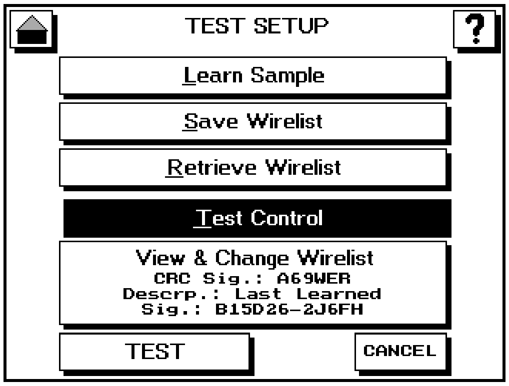
Test Controls such as **Single Test/Continuous Test** and **Automatic/Manual Hipot** are global; they are not stored as part of the wirelist. To record the settings, write them on the same wirelist printout you use to document the wirelist filename and required adapters.

From the MAIN MENU, press **Test Setup**.



CRC Sig.: A69WER
Descrp.: Last Learned
Sig.: B15D26-2J6FH

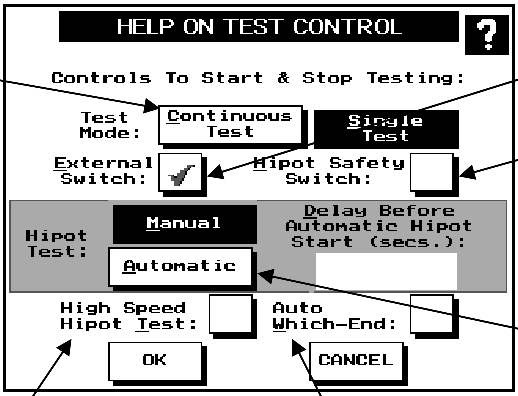
In TEST SETUP, press **Test Control**



CRC Sig.: A69WER
Descrp.: Last Learned
Sig.: B15D26-2J6FH

In **HELP ON TEST CONTROL** , select the following:

Select **Continuous Test** to have the test start automatically when an assembly is attached and to scan continuously for intermittents. Select **Single Test** to perform one test each time you press the TEST button.



An external switch can be attached to the analyzer to start a test.

Hipot Safety Switch requires a switch closure before a hipot test can be performed.

The hipot test can be set to start automatically after the low voltage portion of the test is complete or require a button press to start. If you are using external voltages, this option is not available for safety reasons.

The **High Speed Hipot Test** option allows multiple nets to be tested simultaneously, increasing the speed of the test. This option may not be available if you are using Internal AC voltages or External DC voltages due to capacitance and voltage fluctuation issues.

The **Auto Which-End** function attempts to determine which end of the cable has an open or short in the event of these types of errors.

Appendix A: Specifications

CAPACITY: 128 to 256 points in 128-point increments

TEST LEVELS: Low Voltage Tests: 5 volts @ 6mA max current

SENSITIVITY: Connection Resistance: 0.3 ohm to 100k ohm ± 1% ± 0.3 ohm
also: 500k ohm, 1M ohm, 5M ohm ± 10%
4-wire Resistance: 0.001 ohm to 10 ohm ± 2% ± 0.001 ohm
High Voltage Tests Internal (Touch 1)
I.R: 50 to 1000VDC in 1 volt steps ± 5%, 5Mohm to 1000Mohm ± 10%
DWV: 50 to 1000VDC ± 5%, 0.1mA to 1.5 mA leakage current threshold
Dwell: DWV Dwell: 10 msec to 120 sec

High Voltage Tests External (external HV supply)
I.R: 1 to 1000VDC in 1 volt steps ± 2% ±5V, 0.05Mohm to 50,000Mohm
DC DWV: 1 to 2800VDC ± 2% ± 5V, 0 mA to 10 mA leakage current threshold
AC DWV: 1 to 2000VAC ± 2% ± 5V, 0 mA to 1.5 mA leakage current threshold
(Real)
0 mA to 30mA leakage current threshold (Total)
Dwell: DWV Ramp: 0.1 to 999.9 sec
DWV Dwell: 0.4 to 999.9 sec
IR Ramp: 0.1 to 999.9 sec
IR Dwell: 1 sec to 999.9 sec

CAPACITANCE: 5nF to 100µF ± 10% ± .02nF (relative measurements to 10pF)

COMPONENTS
TESTED: Resistors, diodes, capacitors, wires, 4-wire wire, 4-wire resistor, and custom components

TEST RATE: Connection Test: 128 points .25 seconds (typical)
Hipot Test (internal): 10ms to 120 seconds dwell per net. High speed hipot test user selectable on/off. See the Dwell specifications to calculate test rate for external tests.

MAX CAPACITANCE PER NET:

External HV Supply			
VDC	**Maximum Capacitance**	**VAC**	**Maximum Capacitance**
500	215 nf	500	108 nf
1000	54 nf	1000	27 nf
1500	24 nf	1500	12 nf
2000	13 nf	2000	6 nf
2500	8 nf		
2800	6 nf		

Internal HV supply	
VDC	**Maximum Capacitance**
100	315 nf
500	63 nf
1000	31 nf

CONTROLLER:	Built-in Pentium-class PC with 1 floppy and 1 hard drive. Serial, parallel, keyboard, monitor, auxiliary digital I/O ports standard. Ethernet port optional	
POINT LABELING:	User-definable labels of up to 30 characters; also custom file descriptions of up to 30 characters	
POWER:	105-135VAC 60Hz or 210-260VAC 50Hz – switchable	
DISPLAY:	3 1/2" x 4 1/2" Graphical Touch Screen	
DIMENSIONS:	Base Assembly	26” (66.04 cm) wide, 13 5/8” (34.61 cm) tall, 21” (53.34 cm) deep
	Scanner Assembly	26” (66.04 cm) wide, 10 3/8” (26.35 cm) tall, 21” (53.34 cm) deep

Warranty

Cirris Systems Corporation warrants the Touch 1 Ultra Cable Analyzer to be free of defects in materials and workmanship for a period of one (1) year from the date of delivery to you, as evidenced by receipt of your warranty registration form. In the event a defect develops due to normal use during the warranty period, Cirris Systems will repair or replace the analyzer with a new or reconditioned unit of equal value. For this warranty to be valid you must complete and return the warranty registration card.

In the event of replacement with a new or reconditioned model, the replacement unit will continue the warranty period of the original analyzer. Replacement units will be returned by the same method shipped; generally within one (1) working day.

If analyzer failure results from accident, abuse, or misapplication, Cirris Systems Corporation shall have no responsibility to replace the analyzer or refund the purchase price. Defects arising from such causes will be considered a breach of this warranty. Cirris Systems Corporation is not responsible for special, incidental, or consequential damages resulting from any breach of warranty, or under any other legal theory, including lost profits, downtime, goodwill, damage to or replacement of equipment and property, and any costs of recovering materials used with the Cirris Touch 1 Ultra Analyzer.

ANY IMPLIED WARRANTIES ARISING OUT OF SALES OF THE TOUCH 1 ULTRA ANALYZER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO THE ABOVE STATED ONE (1) YEAR PERIOD. Cirris Systems SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGE, EXPENSES, OR ECONOMIC LOSS.

Some states do not allow limitations on length, or implied warranty, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

Cirris Systems Corporation
Salt Lake City, Utah.

PLEASE RECORD PURCHASE DATE AND SERIAL NUMBER BELOW.

DATE: ________________________________
SERIAL NUMBER: ______________________

Appendix B: Four-wire “Kelvin” Testing

What is 2-wire and 4-wire?

If you have used an ohmmeter to make resistance measurements, you have probably heard terms such as "2-wire measurement" and "4-wire Kelvin measurement." This document explains how ohmmeters measure resistance, how 2-wire resistance measurements work, how 4-wire resistance measurements work, and the special considerations for each measurement type.

How do ohmmeters work?

When you use an ohmmeter to measure the resistance of a wire, you touch one meter lead to each end of the wire and you get a resistance measurement (Figure 1). How does the meter measure resistance? What resistance is it really measuring? To understand how ohmmeters work, start with Ohm's law; Resistance = Voltage / Current. This equation says "Put a current through the wire, measure the voltage drop along the wire, and you can calculate the resistance of the wire."

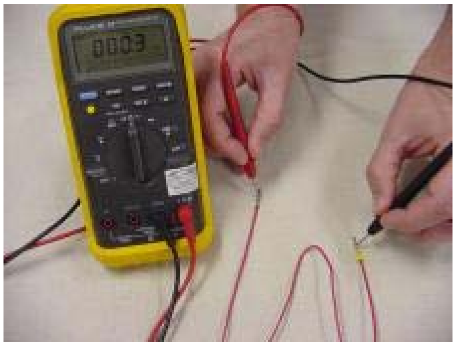


Figure 1. A 2-wire resistance measurement.

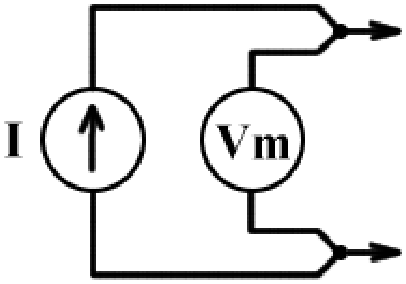


Figure 2. Meters contain a current source (I) and a volt meter (Vm).

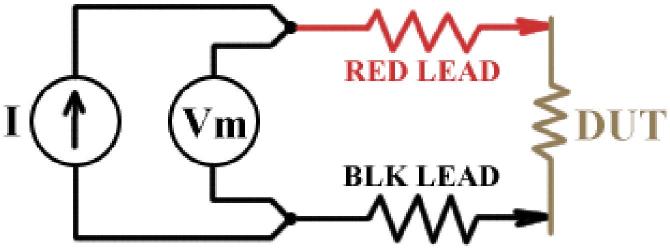
An ohmmeter forces a current through the wire, measures the voltage that develops, calculates the resistance, and displays the result. To do all this ohmmeter must have a current source and volt meter (see figure 2). What's important is where the current source and volt meter get connected together.

2-wire measurements

When you make a 2-wire resistance measurement your meter uses only two leads to connect to the device under test (DUT). Figure 1 shows a normal 2-wire test set up. This setup has the advantage of using just two wires to connect to the DUT but what is the actual resistance it is measuring? To measure just the resistance of the DUT you would want to measure just the voltage across the DUT. Figure 3 shows that the voltmeter is really measuring the voltage across the DUT *and* the test leads.

Two-wire measurements actually measure the DUT resistance plus the test lead resistance. What should you do when you really want to measure only the DUT resistance?

Figure 3. A 2-wire measurement measures the DUT resistance plus the meter lead resistance.



4-wire measurements

Some ohmmeters have four connections; two come from the current source (sometimes called the "force" leads), and two come from the voltmeter (usually called the "sense" leads). With an ohmmeter like this you can do a 4-wire measurement as shown in figure 4. With four connections *you* choose where to connect the voltmeter so you are in control over exactly what resistance you want to measure (see figure 5). If you connect the meter directly to your DUT you will only measure the resistance of the DUT.

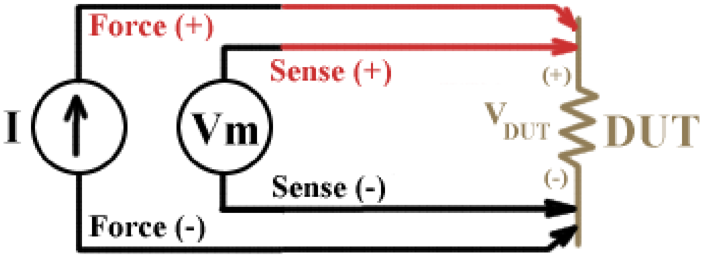


Figure 4. A 4-wire measurement. Notice the meter has four connections.
Figure 5. A 4-wire measurement gives you control of where the volt meter connects.

The disadvantage of 4-wire testing is that it takes four connections to do the test, but it gives you an accurate resistance measurement of the DUT without the resistance of the test leads.

Resistance measurements in your cable analyzer

Your cable analyzer contains a high-speed ohmmeter with a current source and a voltmeter. Normally you perform 2-wire measurements using two test points per measurement. More advanced analyzers allow you to additionally make 4-wire measurements using four test points per measurement. To make a 4-wire measurement on your analyzer, you generally need to create custom 4-wire test fixturing that combines the force and sense lines near your DUT, canceling the fixturing resistance.

You may not need 4-wire with the Touch 1 Ultra analyzer

Many continuity analyzers require 4-wire testing to accurately measure resistances less than 1 ohm. The Cirris Touch1 analyzer uses internal four-wire connections to reduce the fixturing (lead) resistance of the analyzer. All Cirris analyzers that measure resistance have this feature. Also, adapters that plug directly into Signature series analyzers eliminate much of the fixturing resistance that often occurs with adapting cables. If you need your resistance measurement to be accurate to only 0.3Ω, you won't need to use 4-wire on your Cirris analyzer.

What does 4-wire testing buy you?

4-wire testing eliminates the resistance of your interface cabling. If fixturing resistance is a significant part of the total resistance, then using 4-wire will greatly improve accuracy.

It allows you to measure lower resistance values than 2-wire testing. On Cirris hipot analyzers, we use a higher current (up to 1Amp) when performing 4-wire Kelvin tests. This allows us to more accurately measure lower resistances all the way down to 1 mΩ (0.001Ω). Our low voltage analyzers that are 4-wire capable (CR, 1100R+) can measure down to 5 mΩ, but can still resolve to 1 mΩ. (You lose mΩ resolution once the DUT resistance is > 10Ω)

If you make 4-wire connections on the DUT, not just the connector that mates to the DUT, you can eliminate all sources of fixturing resistance. This extra effort however may not be feasible.

What 4-wire testing will cost you

- Complexity in fixturing, more wiring, more work building, and maintaining the test fixture
- Twice the number of test points is required in the analyzer
- Increased complexity in setting up a test that performs these specific measurements
- Slower testing speed

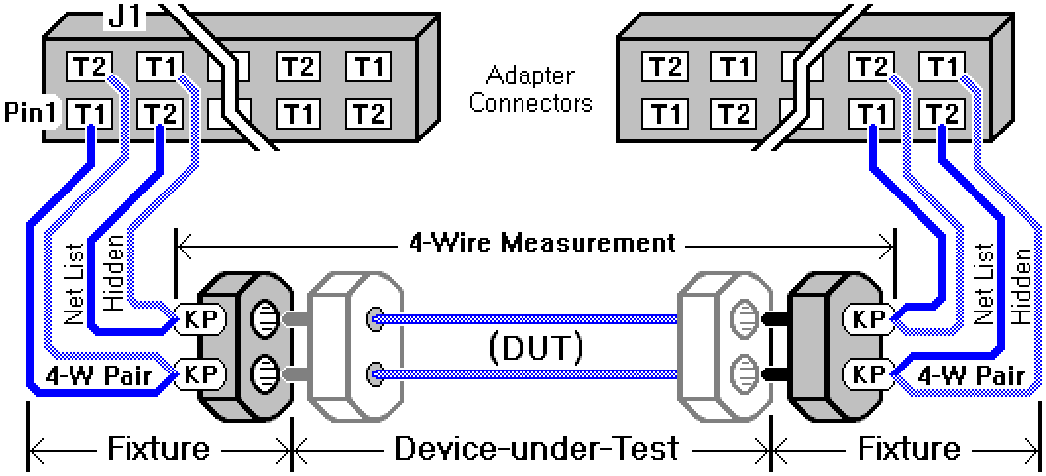
Build 4-Wire Test Fixtures

Using four wires in two pairs per measurement, 4-wire fixtures connect each pair T1 and T2 points at the Touch1 to a Kelvin point (KP) as close as possible to the device-under-test. **Note:** You can mix 2-Wire Testing with 4-Wire Testing in any combination.

Important! Before you begin building 4-wire fixtures, it is necessary to identify which pins of an HVI Plug Adapter are T1 and T2 points. Every 4-wire pair must have one of each.

This is an example of a four-wire implementation.

Use the following instructions to build your own system.

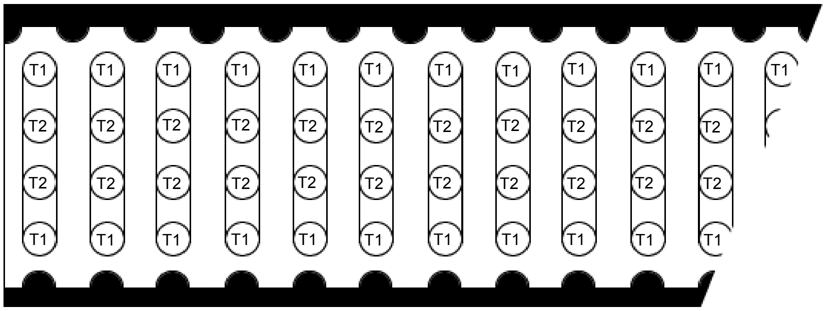


Example of a Fixture and Device-Under-Test

Map T1 and T2 points to the HVI Block

The following diagram shows which points are T1 and T2 types on the HVI Block.

Four wire pairs must contain one T1 point and one T2 point in each pair.



Find T1 and T2 Points Automatically

Why find T1 and T2 points? For a 4-wire measurement, each 4-wire pair must be wired to one Type1 point and one Type2 point. The location of these T1 and T2 points on the adapter pins is determined by internal wiring. The Touch 1 Ultra can locate Type 1 and Type 2 pins automatically. To locate the T1 and T2 points, follow these steps:

1. Install the HVI Plug Adapters you intend to use for your 4-wire measurement.
2. In **Test Setup**, press **Learn Sample**.
3. In **Learn Setup**, press **Change**.
4. In **View/Change Learn Settings**, press **More, 4-Wire**, and then **Change 4-Wire**.
5. In **Change Learn Four-Wire**, check **Learn Four-wire Fixturing** and then press **OK** twice to get back to the **Learn Setup** window.
6. In **Learn Setup**, press **Learn**.
7. While in the **Four-Wire Fixture Learn** screen, probe the adapter pins to locate the Type1 and Type2 points.

Important! The design of the hardware determines which pins are Type 1 or Type 2 and every 4-wire pair must be wired to one of each.

For each 4-wire pair, one wire goes to the Net List; the other "hides" in the 4-Wire Pairs List. The Net List wire can be either T1 or T2 as long as the Hidden point is the other wire.

When learning, the first-scanned point of each 4-wire pair goes to the Net List. Scanning starts at J1-001 and continues sequentially through the HVI Block(s).

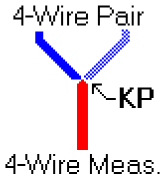
Place Kelvin Points

The two wires in each 4-wire pair must physically join to one test point of the device-under-test in a manner that creates a Kelvin point (KP).

DEFINITION - KELVIN POINTS (KP)

A Kelvin point is a place that makes a "Y" junction by joining three parts:

- One of the end points of the 4-wire measurement.
- First wire of a 4-wire pair.
- Second wire of a 4-wire pair.

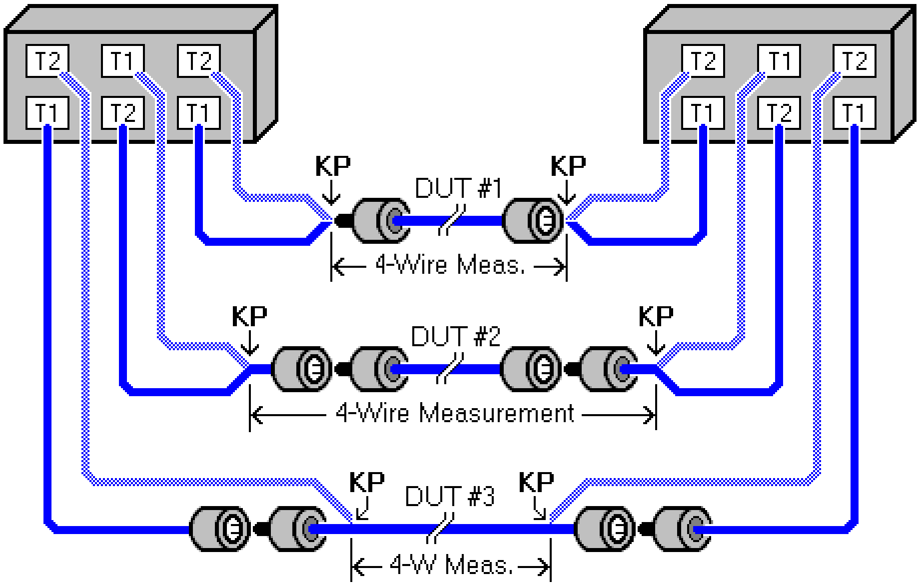


Note: The "Y" junction can be a solder joint or it can be where a paired wire on one side of the measurement is closest to a paired wire on the other side (see below—DUT #3).

REQUIREMENTS - KELVIN POINTS (KP)

Each 4-wire measurement requires two Kelvin points; one at each end. The Kelvin points should be placed as close to the device under test as possible. This is because the 4-Wire Test measures from Kelvin point to Kelvin point, so any contact and lead resistance between the Kelvin points is added to the resistance measurement of the device-under-test (DUT).

How Kelvin Point (KP) Placement affects the 4-Wire Measurement



DUT #1: The measurement is only of the device-under-test. This is the ideal, but in real-world situations it may be nearly impossible.

DUT #2: The measurement includes part of the fixture. **Warning!** If a lot of the fixture is between a Kelvin point and the device-under-test, the 4-Wire Test will be considerably compromised.

DUT #3: The measurement tests only part of the device-under-test. For example, by using probe pins, you can eliminate the resistance of a connector from the measurement.

Create 4-Wire Pair Lists and Net Lists in the Wirelist

A four-wire wirelist requires a list of all 4-wire pairs, a list of the wire connections of the device-under-test, and 4-Wire components. There are two ways to create a 4-Wire pairs list and a Net List.

Method #1:	Learn the fixture and sample to automatically detect 4-wire pairs and 4-Wire components. This is the easiest way.
Method #2:	Convert an existing 2-wire wirelist by hand-entering 4-wire pairs and adding 4-Wire components.

Learn a Fixture & Cable to Create a 4-Wire Test

You can automatically detect 4-wire pairs in the fixture, and then learn the interconnections of the device under test to create the Net List and the 4-wire components. **Note:** During fixture learning, the first-scanned point of each 4-wire pair goes to the Net List. Scanning is in the same counting order as an AHED adapter.

Enable Fixture Learning

1. In the **Main Menu**, press **Test Setup**.
2. In **Test Setup**, press **Learn Sample**.
3. In **Learn Setup**, press **Change**.
4. In **View/Change Learn Settings**, press **More, 4-Wire**, and then **Change 4-Wire**.
5. In **Change Learn Four-Wire**, put a **check** in the box, and press **OK**.
6. In **View/Change Learn Settings** set other parameters if necessary.
   Then press **OK**.
7. In **Learn Setup**, press **Learn** to learn 4-wire fixturing.

Learn the Fixture

1. Attach **only** the fixture.
2. In **Four-Wire Fixture Learn**, press **OK**.
3. If there were errors on learning the fixture, skip to **Troubleshooting** for Learning Fixtures.
   or
   If the fixture learned correctly, continue…

Learn the Sample Cable or Harness

1. Attach the sample cable assembly to the fixture just learned.
2. In **Start Learn**, press **OK**. OK is disabled until the sample is attached.
3. In **Learn Complete**, press **OK**.

Editing a Wirelist to Create a 4-Wire Test

You can edit a 4-wire wirelist or convert an existing 2-wire wirelist into a 4-wire wirelist by manually selecting the 4-Wire Pairs List and Net List.

Load a 2-wire wirelist so it is the active test setup

1. From the **Main Menu**, press **Test Setup**.
2. In **Test Setup**, press **Retrieve Wirelist**.
3. In **Retrieve Wirelist**, select the desired wirelist, and then press **Retrieve**.
4. In **Test Setup**, press **View & Change Wirelist**.
5. Optional: If you are converting a 2-wire wirelist to 4-wire by adding fixture wires to a new adapter, add the adapter to the wirelist now.
   a. In **View/Change Wirelist**, press **ADP**, and then press **Change**.
   b. In **Change Adapters**, press **Add**.
   c. In **Add Adapter Position**, select (highlight) the position where the **Hidden Point** adapter is located (J2, J3, etc.), and press **Add**.
   d. In **Add Adapter**, select (highlight) the new adapter, and press **Add**.
   e. In **Change Adapters**, press **OK**.
6. Optional: To help identify test points, see **Re-labeling Test Points.**

Identify the four wires of matching 4-wire pairs from a printout

You can assign either wire in a 4-wire pair to the Net List, and consequently, the other wire to the hidden point. It largely depends on how the fixture is built.

1. In **View/Change Wirelist**, press **Print**.
2. Locate the Net List (connections) in the Touch1 Cable Documentation printout.
   a. Mark from each net the two Net List points of each 4-wire measurement (Applies only to connections below the Connection Resistance).
   b. Add the two matching Hidden points from the fixture build list to each net.

Example of the original test points of two nets

```
Connections:

     1  J1-001  J3-063
     2  J1-003  J3-061
            ↑         ↑
         Net List   Net List
```

Example of All Four Wires of Two 4-Wire Measurements

```
Connections:

     1  J1-001 J1-002  J3-063 J3-064
     2  J1-003 J1-004  J3-061 J3-062
            ↑       ↑       ↑       ↑
       Net List  Hidden  Net List  Hidden
                 4W Pair           4W Pair
```

Note: If the fixture and sample are learned together in a 2-Wire mode, all four wires of the fixture will be in the Net List similar to the second example.

SELECT THE NET LIST TEST POINT

1. In **View/Change Wirelist**, press **More**, **4-Wire**, then **Change**.
2. In **Four-Wire Pairs**, press **Add**.
3. In **Four-Wire Pair**, press **Net List Point**.
4. In **Add/Change Four-Wire Point**, select (highlight) a Net List point using:
   - Up/down arrows
   - Scroll bar (gray between arrows)
   - Hand-held probe.
5. Press **OK**.

SELECT THE HIDDEN POINT

1. In **Four-Wire Pair**, press **Hidden Point**.
2. In **Add/Change Four-Wire Point**, select the hidden test point of the *same* 4-wire pair for which you just selected the Net List point.

   Why are not all test points available for the hidden point?
   Each 4-wire pair requires one T1 and one T2 point (pages 3-4). Selecting the Net List point has used one of the types, so only the unused points of the other type are available for the hidden point.

3. Press **OK** to return to the **Four-Wire Pair** window.
4. In **Four-Wire Pair**, if both points of the pairs are displayed.
5. Press **OK**.

Example:

```
Four-Wire Kelvin Pairs Listing
 J3-063  J3-064 }
 J1-001  J1-002 } one 4-wire measurement
    ↑       ↑
 Net List  Hidden
```

COMPLETE THE 4-WIRE PAIRS LIST

1. In **Four-Wire Pairs**, press **Add** to add more 4-wire pairs. Each 4-wire measurement requires two pairs!
2. After adding pairs, press **OK** for one of three possible outcomes:
   - If a **Four-Wire Setup Warning** screen opens to add 4-Wire Components:
     - Press **Ignore** to identify measurement locations.
     or
     - Press **Add 4-Wire Comp** if you know the **From & To** points.
   - If a **Four-Wire Pair Warning** screen opens:
     Press **Add a Pair** to complete 4-Wire Pair selection.
   - If a **Remove Points From Net List** screen opens continue on to the next step.

REMOVE HIDDEN POINTS FROM THE NET LIST, IF NECESSARY

1. In **Remove Points From Net List**, press **Delete Points**.
2. Press **OK**.
3. In **Four-Wire Setup Warning** — to add 4-Wire Components:
   - Press **Ignore** to identify measurement locations or custom-label test points.
   or
   - Press **Add 4-Wire Comp** if you know the **From & To** points.

WARNING! It is absolutely necessary to add 4-Wire Components.

PURPOSE OF 4-WIRE COMPONENTS

Defines the resistance parameter of *each* 4-wire measurement.
Identifies the location of *each* measurement (**From & To** test points).

SPECIFICATIONS: TWO KINDS OF 4-WIRE COMPONENTS

4-W WIRE

Sets the maximum allowable resistance a wire segment can have between two Kelvin Points (KP).
RANGE: 0.001Ω to 1.0MΩ ±4% ±0.001Ω
TOLERANCE: Threshold—good if less than.

4-W RESISTOR

Sets the resistance value and tolerance for resistors or wire segments between two Kelvin Points (KP).
RANGE: 0.001Ω to 1.0MΩ ±4% ±0.001Ω
TOLERANCE: 1-99%

Important!

- A 4-Wire Component is required for *each* 4-wire measurement.
- Resistance is measured from Kelvin point to Kelvin point (KP).

Identify From and To Points–the Location of the Measurement

The window used to select **From & To** points does not match the points for you. However, by referring to a Net List, you can easily find the **From & To** test points for each 4-Wire Component because the two points are always in the same net.

Note: Using the Net List for reference applies only to connections with resistance below the Connection Resistance at the time of creating the wirelist.

PRINT OUT A NET LIST TO IDENTIFY THE LOCATION OF EACH MEASUREMENT

1. In **View/Change Wirelist**, press the **Print** button.
2. Locate the Net List (connections) in the Touch1 Cable Documentation printout.

Mark test points from one net (example: **`J1-001 J1-063`**) for **From & To.**

"FROM" & "TO" USING DEFAULTS:

```
Connections:
1  J1-001  J3-063
2  J1-003  J3-061
```

"FROM" & "TO" USING CUSTOM LABELS:

```
Connections:
1  PLUG_PIN-1  SOCKET_PIN-1
2  PLUG_PIN-2  SOCKET_PIN-2
```

SELECT THE KIND OF 4-WIRE COMPONENT

1. In **View/Change Wirelist**, press **More-Comp**, and press **Change**.
2. In **Change Components**, press **Add**.
3. In **Add Components**, select one of the following:
   - **Four-Wire Wire** - test wires to a threshold (good if less than).
   - **Four-Wire Resistor** - test wires or resistors to a value & tolerance.

Note: These buttons disable if there is no 4-Wire pairs list.

ENTER THE LOCATION – FROM & TO – OF THE 4-WIRE MEASUREMENT

1. In **Add/Change 4-Wire Wire** [or] **Resistor**, press the **From** box.
2. In **Add/Change Component**, select (highlight) a test point using:
   • Up/down arrows • Scroll bar (gray between arrows) • Hand-held probe.
3. Press **OK**.
4. Press the **To** box and repeat Step 2.

Note: Only test points in the 4-Wire Pairs List display.

ENTER A 4-WIRE COMPONENT VALUE (AND TOLERANCE)

1. In **Add/Change 4-Wire Wire** [or] **Resistor**, press **Component Value**.
2. In **Enter 4-Wire…Value**, enter the **Component Value** using:
   • Touch screen • User-supplied computer keyboard.
3. Press **OK**.
4. If for a 4-Wire Resistor, also press **Tolerance Level**, and then press **OK** when done.
5. Press **OK** to return to the Change Components window.

Note: Delete Resistor Components if 4-W Resistors are replacing them.

VERIFY THE 4-WIRE COMPONENTS BEFORE COMPLETING SETUP

1. In **Change Components**, do one of the following:
    a. Press **Add** to create more 4-Wire Components.
    or -
    b. Press **OK** to save your work. **Warning,** pressing Cancel is like “undo.”
2. In **View/Change Wirelist**, **Print** the wirelist:

```
Four-Wire Kelvin Pairs:   Components:
   J3-061  J3-062         1 4W_RESIS J1-001 J3-063 0.33 ohm 1%
   J1-003  J1-004         2 4W_WIRE  J1-003 J3-061 < 0.05 ohm
   J3-063  J3-064                      ↑      ↑
   J1-001  J1-002                     From    To
     ↑
   From & To
```

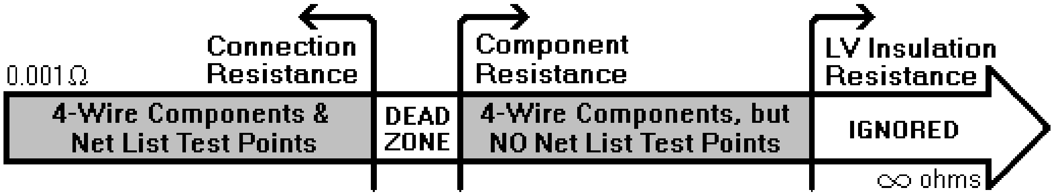
3. Verify the test points in the left column of **`Four-Wire Kelvin Pairs`** are used as intended for the **From & To** points in the **Components** list.
    - If not, press **More-Comp**, then **Change** to complete 4-W Components.
    or
    - If 4-Wire Components are complete, verify the wirelist before testing.

Verify Setup and Troubleshooting

An otherwise good 4-Wire Test setup can cause LV Continuity Errors if:

- **Connection Resistance** is set too low or **Component Resistance** is set too high.
- Net List test points are missing for components set below the **Connection Resistance** or are unnecessarily present for components set above the **Component Resistance.**

Relationship of LV Continuity Settings to 4-Wire Component Values



Connection Resistance should be at least 20% higher than the resistance value of any 4-Wire Components used in this region.
From & To test points of 4-Wire Components in this region should also be in the Net List.

Component Resistance should be at least 20% lower than the resistance value of any 4-Wire Components used in this region. **From & To** test points of 4-Wire Components in this region should NOT be in the Net List.

ADJUST CONTINUITY (LOW VOLTAGE) SETTINGS, IF NECESSARY

1. Open the **Change Low Voltage** window one of two ways:
   - Fixture/sample learning: In **View/Change Learn Settings**,
   - Editing an existing wirelist: In **View/Change Wirelist**, press **LV**, then **Change**.

2. In **Change Low Voltage**, press either or both:
   - **Connection Resistance** - to set at least 20% higher than any 4-Wire Components intended below this setting.
   - **Component Resistance** - to set at least 20% lower than any 4-Wire Components intended above this setting.

3. Press **OK**.

EDIT THE NET LIST, IF NECESSARY

1. In **View/Change Wirelist**, press **Con**, then **Change**.
2. In **Change Connections**, press either or both:
   - **Add** - to add test points identical to the **From & To** points of 4-Wire Components set lower than the Connection Resistance.
   - **Delete** - to remove test points identical to the **From & To** points of 4-Wire Components set higher than the component resistance.
3. Press **OK**.

SAVE THE WIRELIST TO DISK

1. In **View/Change Wirelist**, press **OK**. (pressing **Cancel** is like "Undo")
2. In Test Setup, press **Save Wirelist.**

TEST A SAMPLE CABLE TO VERIFY THE SETUP

1. Install a cable you have reason to believe is good.
2. In the **Main Menu**, press **Test Cable** or in **Test Setup**, press **Test**.
3. If the cable tested correctly—test setup is complete.

   or

   If there were errors during the test—continue to **Troubleshooting.**

Troubleshooting: Learning 4-Wire Fixture Errors

ERROR MESSAGE:

```
Invalid 4-Wire Kelvin Pair:
  More than two points connected
  J1-001  J1-002  J3-063  J3-064
```

Possible Causes:

- The sample cable was not removed before learning the fixture.
- A 4-wire pair(s) is shorted to other pairs or has more than two wires.

Solutions:

Do one of the following:

- Remove the sample from the fixture.
  or
- **Print** the error for reference, then remove and re-wire the fixture.

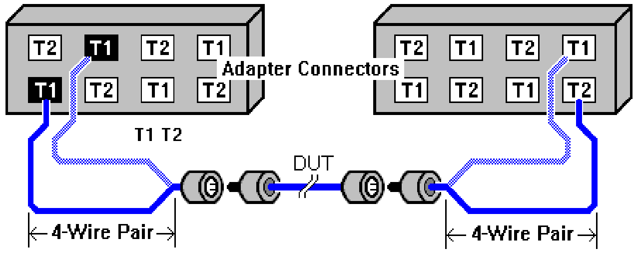
1. In **Four-Wire Fixture Error(s)**, press **Cancel**.
2. In **Learn Setup**, press **Learn** to start over, or **Cancel** to quit the learn.

ERROR MESSAGE:

```
Invalid 4-Wire Kelvin Pair:
  Both points J1-001 and J1-004
  are Type 1 [or 2] points.
```

Possible Causes:

Four-wire pair(s) lacks one Type 1 and one Type 2 point each.



The 4-wire pair on the left duplicates T1; the pair on the right is correct.

Solutions:

1. In **Four-Wire Fixture Error(s)**, **print** the error for reference.
2. Press **Cancel**.
3. Remove the fixture.
4. Re-wire the fixture at the adapter connector so each 4-wire pair has one T1 and one T2 point. (See pages 3-4 for a map of T1 & T2 points).

In **Learn Setup**, press **Learn** to start over, or **Cancel** to quit the learn.

Troubleshooting: Continuity Test Errors

ERROR MESSAGE:

```
High Resistance Errors:
NET 1: Measured 2.9 ohm
  Detected at J1-001 and J1-063
```

Possible Causes:	Solutions:
▪ Setup Error: **Connection Resistance** is set lower than the detected resistance of a good connection. ▪ Defective Cable: Detected resistance is higher than **Connection Resistance.**	▪ Raise **Connection Resistance** so it is 20% higher than the 4-Wire Component value describing the connection causing the error. ▪ Repair or test another cable.

ERROR MESSAGE:

```
NET 1:
  OPEN J1-001 and J1-063
```

Possible Causes:	Solutions:
▪ Setup Errors: Component Resistance is set lower than the detected resistance of a good connection intended to be in the Net List. ▪ Unnecessary test points are in the Net List corresponding to 4-Wire Components set higher than Component Resistance. ▪ Defective Cable: Intended connection is missing.	▪ Raise both Connection Resistance & Component Resistance for wires to be tested by 4-Wire Components set below the Connection Resistance. ▪ Delete from the Net List corresponding test points of 4-Wire Components set above Component Resistance. ▪ Repair or test another cable.

ERROR MESSAGE:

```
NET 1:
  SHORT J1-001 and J1-063
```

Possible Causes:	Solutions:
▪ Setup Errors: Test points are missing from the Net List for 4-Wire Components set below Connection Resistance. ▪ Component Resistance is set too high for a 4-Wire Component set above Connection Resistance. ▪ Defective Cable: Unintended connection. Resistor - detected resistance is less than Component Resistance.	▪ Add to the Net List corresponding test points of 4-Wire Components set below Connection Resistance. ▪ Lower Component Resistance—to 20% less than the Component Value. ▪ Repair or test another cable.

Troubleshooting: 4-Wire Test Errors

ERROR MESSAGE:

```
4-Wire Kelvin Pair Error
  J1-002 and J3-064
    not connected
```

Possible Causes:

- Hidden Point wires are not connected at the Touch1.
- Defective fixture—opens.
- Incorrect 4-Wire Pairs List.

Solutions:

- Re-connect or repair the fixture.
- Test with the correct 4-wire fixture.
- Edit Hidden points.

ERROR MESSAGE:

```
Bad 4-W Resistor between:
  J1-001 and J3-063
   [also: Resistor Missing]
  Expected value 1.00 ohm 1%
  Measured value: 1.30 ohm
```

Possible Causes:

- Setup Errors: Incorrect or unrealistic settings: Component Value or Tolerance. Incorrect “From” & “To” points. (reports “Resistor Missing”)
- Fixture not built correctly.
- Defective Cable: Missing wire or resistor. Detected resistance out of range (Value or Tolerance or both).

Solutions:

- Edit the 4-Wire Resistor reporting the error.
- Reduce unwanted lead resistance.
- Repair or test another cable.

ERROR MESSAGE:

```
Bad 4-W Wire between:
  J1-003 and J3-061
   [also: Wire Missing]
  Expected value < 0.05 ohm
  Measured value: 1.22 ohm
```

Possible Causes:

- Setup Errors: Incorrect or unrealistic setting: Component Value. Incorrect “From” & “To” points (reports “Wire Missing”).
- Fixture not built correctly
- Defective Cable: Missing wire. Detected resistance over threshold (Component Value).

Solutions:

- Edit the 4-Wire Wire reporting the error.
- Reduce unwanted lead resistance.
- Repair or test another cable.

Optional: Re-Labeling Test Points

By default, the Touch1 labels test points in a Net List (`Connections`) according to the fixture adapter connector(s). It uses the location of the adapters (J1, J2, etc.) and the adapter's connector pin names (001, 002, etc.). Custom labeling allows you to re-label the Net List and Components List to match the device-under-test.

Benefits of Custom Labels

- Wirelist documentation and error reporting will match the connector and pin names of connectors on the device-under-test (DUT).
- When creating 4-Wire Components, it will be easier to identify the **From & To** points required to identify the location of the 4-wire measurement.
- When creating the 4-Wire Pairs List using Method #2 (page 8) it will be easier to identify the Net List and Hidden points of each 4-wire pair.

NET LIST USING DEFAULT TEST POINTS:

(documents Fixture Adapter connectors)

```
Connections:
1  J1-001  J3-063
2  J1-003  J3-061
```

SAME NET LIST USING CUSTOM LABELS:

(documents the Device-under-Test)

```
Connections:
1  PLUG_PIN-1  SOCKET_PIN-1
2  PLUG_PIN-2  SOCKET_PIN-2
```

Re-Label Default Test Points to Match the Device under Test (DUT)

1. In **View/Change Wirelist**, press the **Print** button.
2. Locate the Net List (Connections) in **Touch1 Cable Documentation.**
3. From the Net List, match the fixture (default) test points to the DUT.
4. In **View/Change Wirelist**, press **More-Label**, and then **Change.**
5. In **Change Labels**, select (highlight) a Net List test point using:
   • Up/down arrows • Scroll bar (gray between arrows) • Hand-held probe.
6. Press **Change Label.**
7. Enter a label from the touch screen or a user-supplied computer keyboard.

Format: 30 characters, maximum.

First character:	A to Z and underscore.
All others:	A to Z, 0 to 9, dash, #, underscore.

Note: Lower case is available by using a user-supplied computer keyboard.

Appendix C: SPC Data Collection

SPC Data Collection allows you to store information specific to a test or a run of tests and retrieve that information later for analysis. With very little effort, a wide range of statistics is available to you. With a little more effort, you can store custom information specific to your applications.

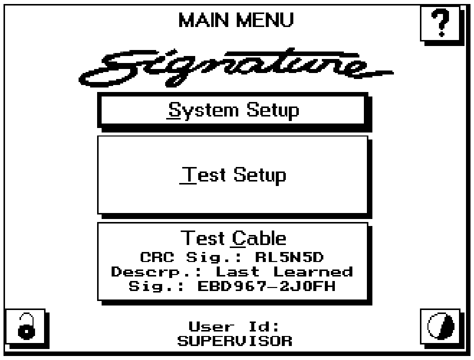
In order to use SPC Data Collection, follow these steps:

1. Activate SPC Data Collection on your analyzer.
2. Add SPC Data Collection to a wirelist.
3. Store SPC Data by performing tests.
4. Retrieve SPC Data for future analysis.
5. Analyze SPC Data.

Activate SPC Data Collection on your Analyzer

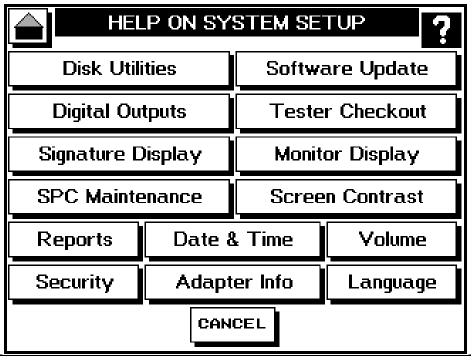
Note: SPC Data Collection is sold as an option on the Touch 1 Ultra.

From the MAIN MENU, select **System Setup**.

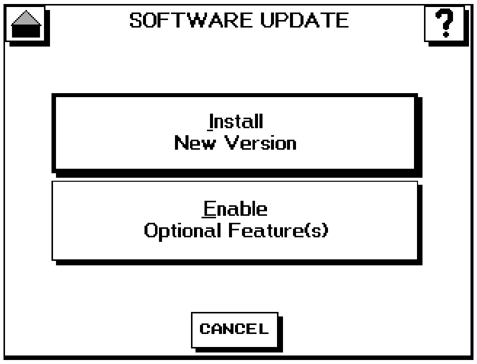


CRC Sig.: RL5N5D
Descrp.: Last Learned
Sig.: EBD967-2J0FH
User Id:
SUPERVISOR

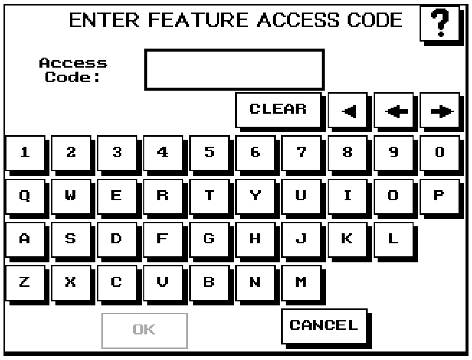
From HELP ON SYSTEM SETUP, select **Software Update**.



From the SOFTWARE UPDATE menu, select **Enable Optional Feature(s).**



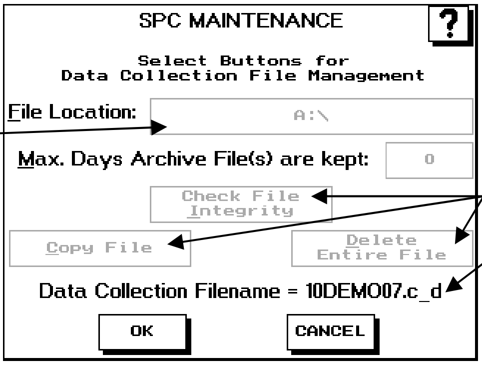
Enter the **Feature Access Code**, obtained from Cirris and press **OK**.



SPC Data Collection is now available on this analyzer.
You may select where the data collection files are stored if the analyzer is connected to a network. To see where your data collection files are being stored, select **SPC Maintenance** from the **System Setup** menu.

The **File Location** box shows where the SPC Data Collection files are being stored. This can only be changed if the analyzer is connected to a network.

You must have Create and Modify rights on the network drive for SPC Data to be stored.



File Location: A:\

Max. Days Archive File(s) are kept: 0

Data Collection Filename = 10DEMO07.c_d

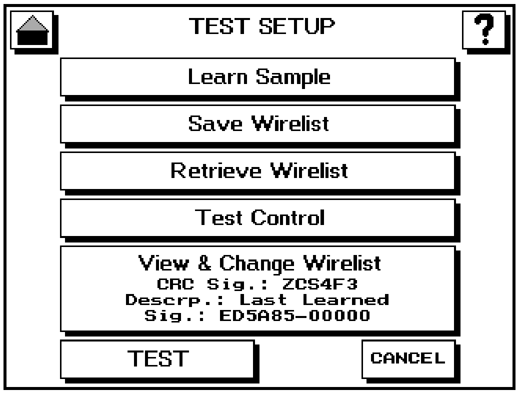
Once a data file has been created, you can verify the integrity of the file, copy the file, or delete the file.

The **Data Collection Filename** is based on the serial number of the analyzer.

Add SPC Data Collection to a Wirelist

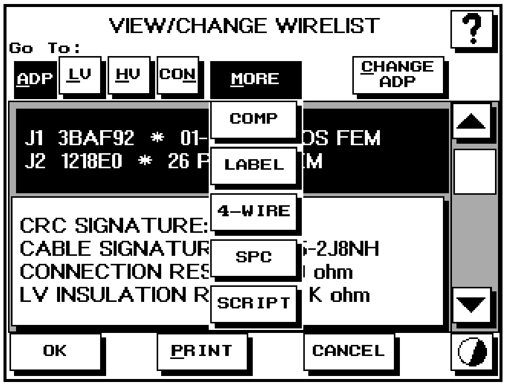
Each wirelist can store SPC Data differently. Therefore, **SPC Data Collection** must be defined for each wirelist independently.

Modify a current wirelist by selecting **View & Change Wirelist** from the Test Setup menu.



CRC Sig.: ZCS4F3
Descrp.: Last Learned
Sig.: ED5A85-00000

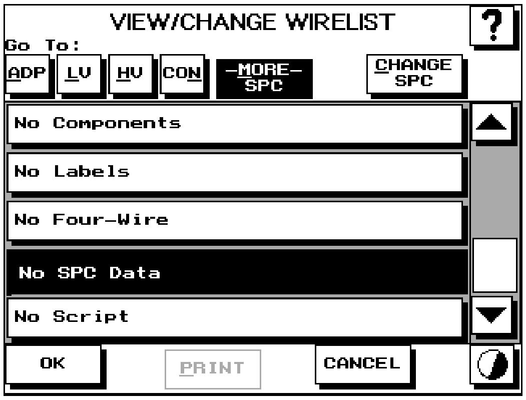
Select **More**, and then **SPC.**



J1 3BAF92 * 01- DS FEM
J2 1218E0 * 26 P M

CRC SIGNATURE:
CABLE SIGNATUR -2J8NH
CONNECTION RES ohm
LV INSULATION R K ohm

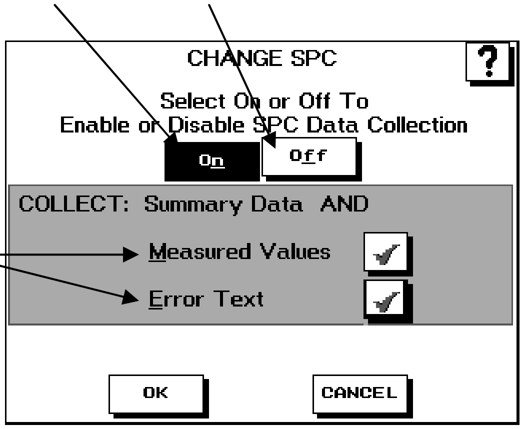
Select **Change SPC.**



No Components
No Labels
No Four-Wire
No SPC Data
No Script

You can also select the extent of the data to be collected.

Enable or **Disable** SPC Data Collection.



COLLECT: Summary Data AND
Measured Values ☑
Error Text ☑

The wirelist will then reflect the changed SPC Data Collection options.

Store SPC Data

SPC Data is stored in a temporary archive as each test is performed on the analyzer. The SPC Data is stored in the **File Location** when the run is complete, indicated by returning to the **Main Menu**. Do **NOT** remove the floppy disk until the drive light goes off. Large amounts of SPC Data may take up to a minute to send to the floppy disk.

Subsequent runs of SPC Data do not overwrite the older data. Newer SPC Data is appended to the end of the data file.

These data elements are always stored as part of **SPC Data Collection**

- Run Number
- Tester Serial number
- Cable Description (if defined)
- Cable File Name
- Operator Name (if defined)
- Date and Time tested
- Signature

These data elements are stored as part of **Summary** data.

- Total Tested
- Total Good
- Total Bad
- Error Types Summary
- Custom, per group (if stored in Scripting)
- Custom, per Cable (if stored in Scripting)

These data elements are stored if **Measured Values** is selected.

- Net or Instruction Label
- Net or Instruction Measurement

These data elements are stored if **Error Text** is selected.

- Error Number
- Error Code
- Error Type
- Error Text

Additional data elements may be stored using **Scripting** in conjunction with **SPC Data Collection**.

Retrieve and Analyze SPC Data

Cirris SPC Data can be read and stored by SPCLink, software that comes with your SPC Data Collection package. Your data can then be exported in a delimited format for use with spreadsheet or data analysis software packages. Instructions for use are included with the PC software.

SPC Made Easy not only reads and stores SPC Data like SPCLink but it graphs and charts your data for you as well, making analysis quick and easy. A demonstration of SPC Made Easy can be obtained from Cirris by calling 1-800-441-9910.

Appendix D: Scripting

Scripting is sold as an option on the Touch 1 Ultra.

Activate Scripting on your Analyzer

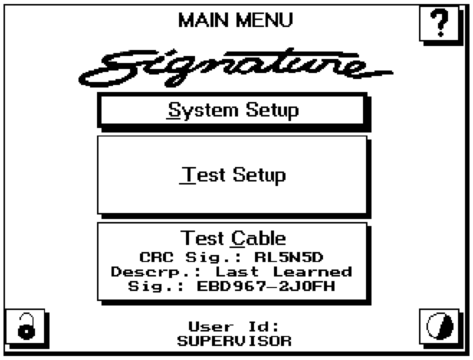
Scripting allows you to implement a wide variety of custom functionality to your analyzer. Think of Scripting as having a multi-point Volt ohmmeter where you can specify what measurements you want to make, where to put the leads, and what to do with the results, all controlled automatically.

Scripting can be used to:

- Store Custom SPC Data.
- Override the analyzer's standard testing mode to suit your own special applications.
- Create custom labels/reports/graphics for printers.
- Communicate with other devices.
- Create "custom components" that can be imbedded into a standard test program.
- Embed the Touch 1 Ultra into automated machine applications.
- Test multiple parts at the same time and discriminate which one is bad.
- Use serial numbers and bar code scanners.
- Put Operator Comments into the test program.
- Whatever you can imagine (call us and we'll help you imagine it).

To add the scripting option to your analyzer, start at the **Main Menu**.

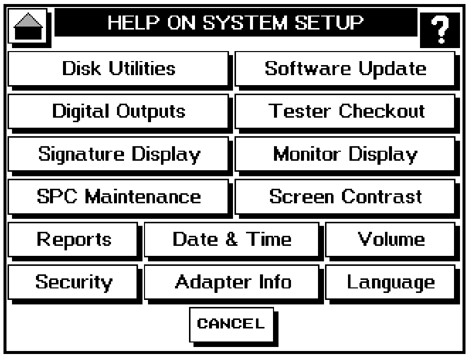
From the MAIN MENU, select **System Setup**.



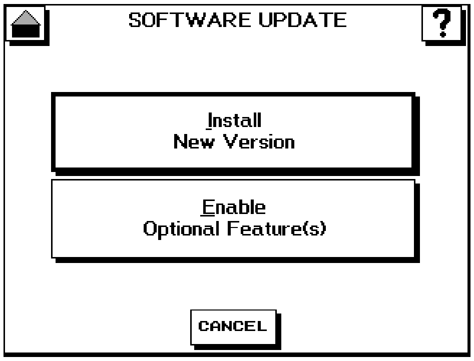
CRC Sig.: RL5N5D
Descrp.: Last Learned
Sig.: EBD967-2J0FH

User Id: SUPERVISOR

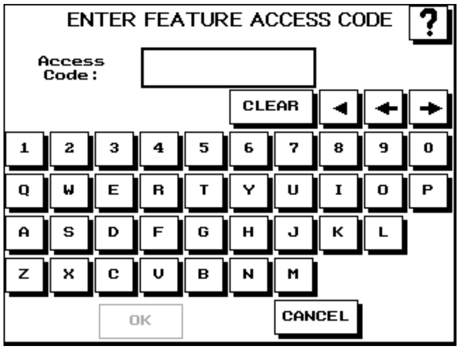
From the Setup Menu, select **Software Update**.



From the SOFTWARE UPDATE menu, select **Enable Optional Feature(s)**.



Enter the **Feature Access Code** obtained from Cirris and press **OK**.

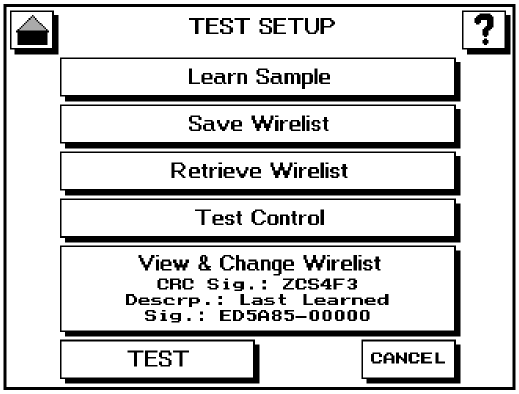


The Scripting option is now available on your analyzer.

Attach a Script to a Wirelist

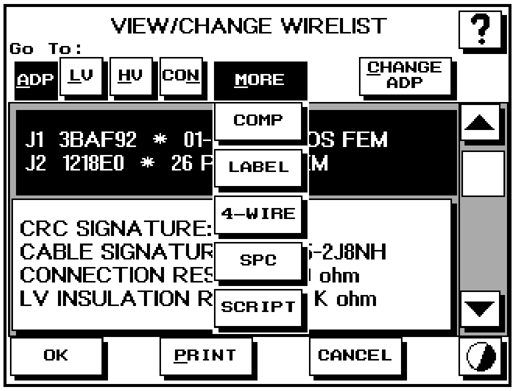
Each wirelist can utilize scripts differently. Therefore, Scripting must be defined for each wirelist independently.

Modify a current wirelist by selecting **View & Change Wirelist** from the Test Setup menu.



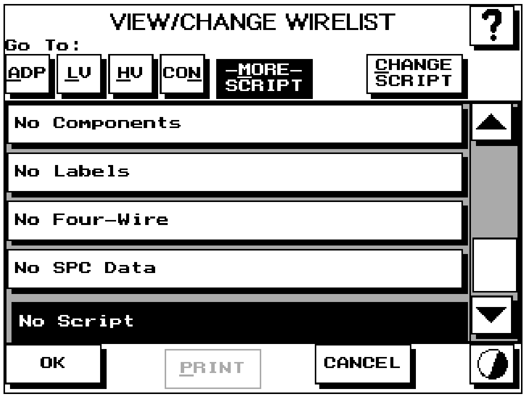
CRC Sig.: ZCS4F3
Descrp.: Last Learned
Sig.: ED5A85-00000

Select **MORE**, and then **SCRIPT.**



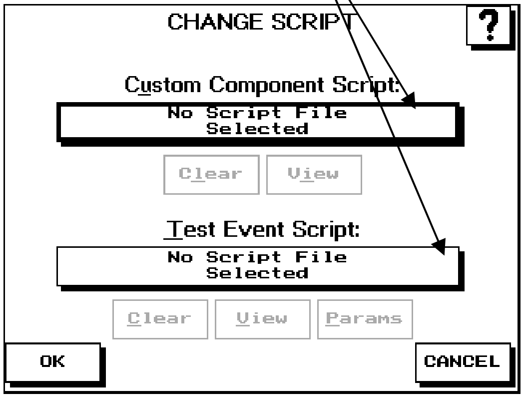
J1 3BAF92 * 01- OS FEM
J2 1218E0 * 26 F M
CRC SIGNATURE:
CABLE SIGNATUR -2J8NH
CONNECTION RES ohm
LV INSULATION R K ohm

Select **CHANGE SCRIPT.**



No Components
No Labels
No Four-Wire
No SPC Data
No Script

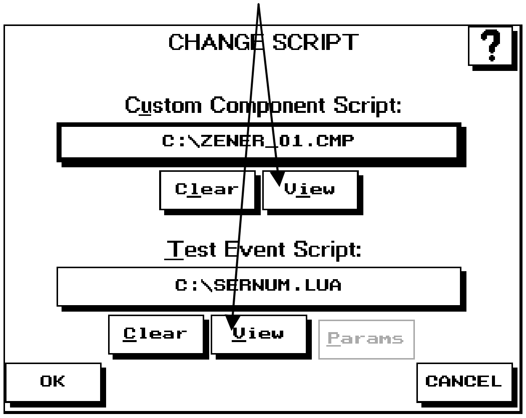
Add or Remove scripts by pressing the bar under the type of script you want to add.



Custom Component Script:
No Script File Selected

Test Event Script:
No Script File Selected

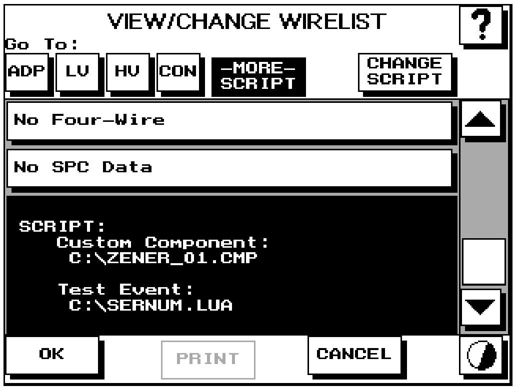
Once a script is added you can see the contents of the script by pressing **V̲iew.**



Custom Component Script:
C:\ZENER_01.CMP

Test Event Script:
C:\SERNUM.LUA

The wirelist will then reflect the changed Scripting options.



```
No Four-Wire
No SPC Data

SCRIPT:
    Custom Component:
      C:\ZENER_01.CMP

    Test Event:
      C:\SERNUM.LUA
```

Custom Components (.cmp)

Custom Components are a type of script that allows special measurements and types of testing to be performed. Once a custom component is created and attached to a wirelist, any number of them can be added to the wirelist. For example, if you had a custom component that would test a Zener diode, you could add any number of Zener diode tests to the wirelist, each with its own set of parameters.

More information on Scripting can be found in the **Help System** under **Scripting – Overview**.

Cirris can write your Custom Component for you. Call us at 1-800-441-9910 for a quote.

Event Scripts (.evt)

An event script differs from a custom component in that there is only one event script for each wirelist. Event scripts perform command functions that alter the way that testing is performed.

Event scripts can allow you to store custom SPC Data like unique cable serial numbers or pop up screens for users to read and respond to during a test. With an event script nearly any implementation is possible.

Some users have integrated with PLCs to control external devices. Others do mathematical calculations as part of their scripts.

Scripts can range from simple to complex. Let us help you with your scripting. Call us at 1-800-441-9910 for a quote. We can write your script for you or point you in the right direction.

More information on Scripting can be found in the **Help System** under **Scripting – Overview**.

Not all problems require scripting for a solution.

Appendix E: Parent / Child Wirelists

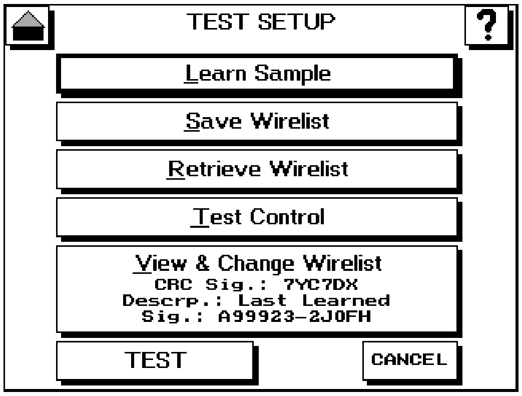
What are Parent / Child Wirelists?

Parent / Child Wirelists are separate tests that are strung together so that all individual tests run but only one final result is returned at the end of all of the tests, either Pass or Fail. The Parent test is the starting point or entry into a set of tests. Child tests are the individual pieces that can be arranged and if used with the Scripting option, rearranged to provide enormous flexibility.

The starting point for using Parent / Child Wirelists is the Learn.

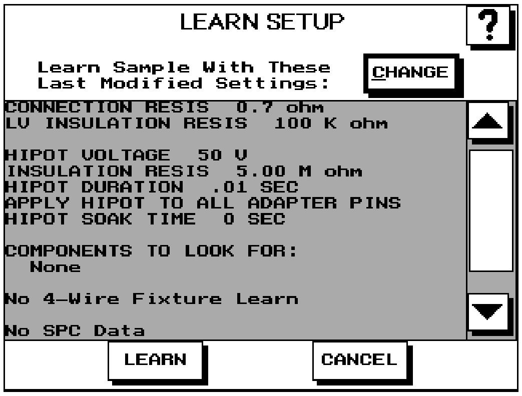
Learn a Parent / Child Wirelist(s)

From the Main Menu select **Test Setup** then **Learn Sample.**



CRC Sig.: 7YC7DX
Descrp.: Last Learned
Sig.: A99923-2J0FH

In LEARN SETUP select **CHANGE.**



Learn Sample With These
Last Modified Settings:

CONNECTION RESIS 0.7 ohm
LV INSULATION RESIS 100 K ohm

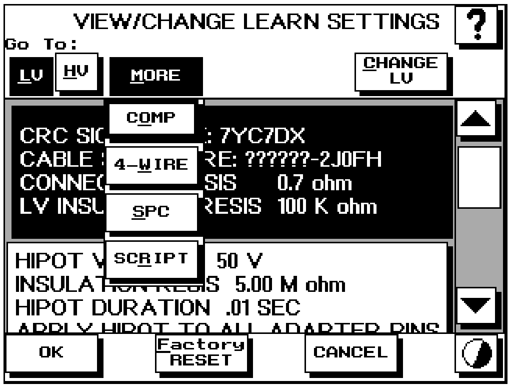
HIPOT VOLTAGE 50 V
INSULATION RESIS 5.00 M ohm
HIPOT DURATION .01 SEC
APPLY HIPOT TO ALL ADAPTER PINS
HIPOT SOAK TIME 0 SEC

COMPONENTS TO LOOK FOR:
None

No 4-Wire Fixture Learn

No SPC Data

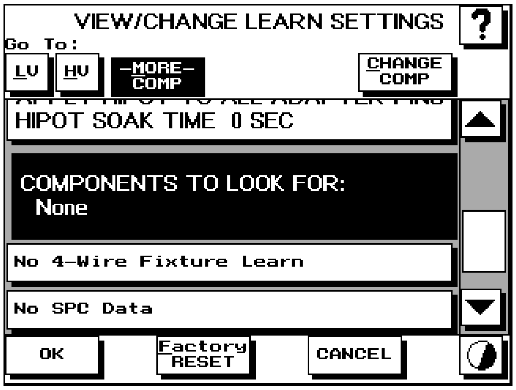
In VIEW/CHANGE LEARN SETTINGS select **MORE** and then **COMP.**



CRC SIC : 7YC7DX
CABLE RE: ??????-2J0FH
CONNEC SIS 0.7 ohm
LV INSU RESIS 100 K ohm

HIPOT V 50 V
INSULAT S 5.00 M ohm
HIPOT DURATION .01 SEC

In VIEW/CHANGE LEARN SETTINGS select **CHANGE COMP.**



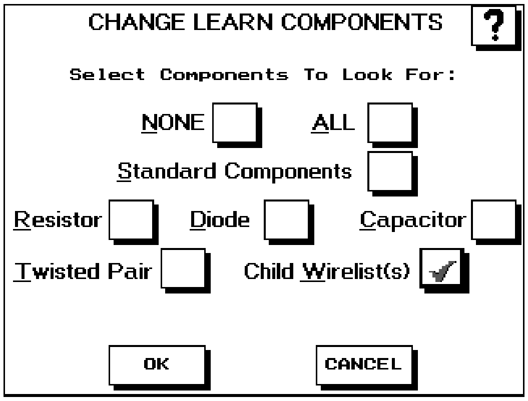
HIPOT SOAK TIME 0 SEC

COMPONENTS TO LOOK FOR:
None

No 4-Wire Fixture Learn

No SPC Data

In CHANGE LEARN COMPONENTS select **Child Wirelist(s).**


CHANGE LEARN COMPONENTS

Select Components To Look For:

NONE ☐ ALL ☐

Standard Components ☐

Resistor ☐ Diode ☐ Capacitor ☐

Twisted Pair ☐ Child Wirelist(s) ☑

Now select **OK.**

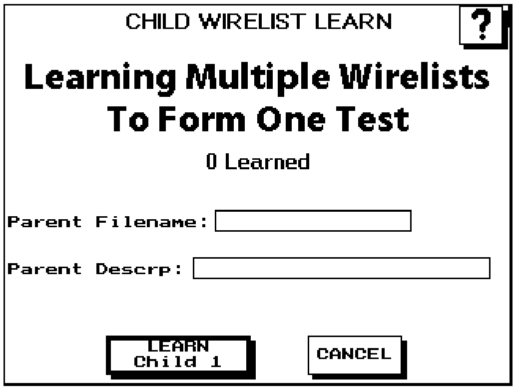
You will return to the View/Change Learn Settings screen.

Select **OK** again.

You will now return to the Learn Setup screen.

Select **LEARN.**

In CHILD WIRELIST LEARN select **LEARN Child 1**.


CHILD WIRELIST LEARN

Learning Multiple Wirelists To Form One Test

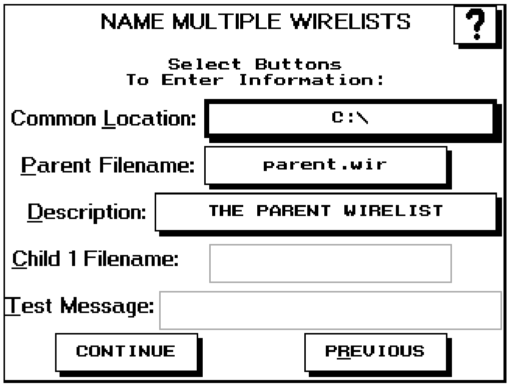
0 Learned

Parent Filename:

Parent Descrp:

The parent filename and description will show in the test window at the start and end of all tests.

In NAME MULTIPLE WIRELISTS fill in the boxes and select **CONTINUE.**


NAME MULTIPLE WIRELISTS

Select Buttons To Enter Information:

Common Location: C:\

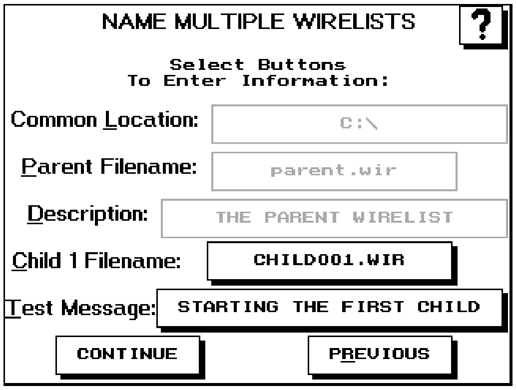
Parent Filename: parent.wir

Description: THE PARENT WIRELIST

Child 1 Filename:

Test Message:

Now fill in the boxes for the first Child wirelist and select **CONTINUE.**


NAME MULTIPLE WIRELISTS

Select Buttons To Enter Information:

Common Location: C:\

Parent Filename: parent.wir

Description: THE PARENT WIRELIST

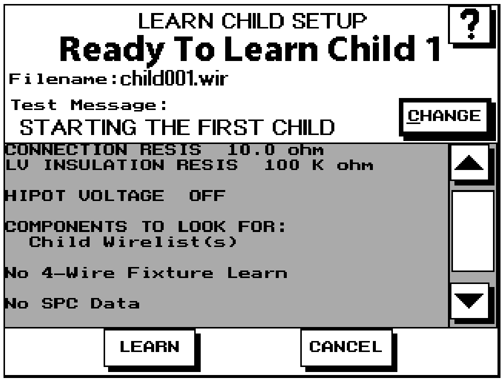
Child 1 Filename: CHILD001.WIR

Test Message: STARTING THE FIRST CHILD

The child Filename and description will show in the test window as the test begins and executes.

Learn parameters can be changed for each child wirelist.

In LEARN CHILD SETUP attach the part of the device to be tested then select LEARN.


LEARN CHILD SETUP

Ready To Learn Child 1

Filename:child001.wir

Test Message:
STARTING THE FIRST CHILD

```
CONNECTION RESIS   10.0 ohm
LV INSULATION RESIS   100 K ohm

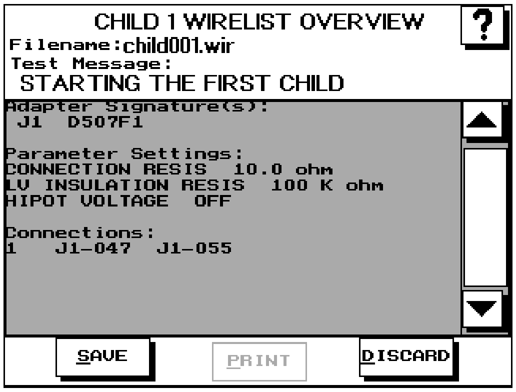
HIPOT VOLTAGE   OFF

COMPONENTS TO LOOK FOR:
  Child Wirelist(s)

No 4-Wire Fixture Learn

No SPC Data
```

After learning, in the CHILD 1 WIRELIST OVERVIEW, select **SAVE.**



CHILD 1 WIRELIST OVERVIEW

Filename:child001.wir

Test Message:

STARTING THE FIRST CHILD

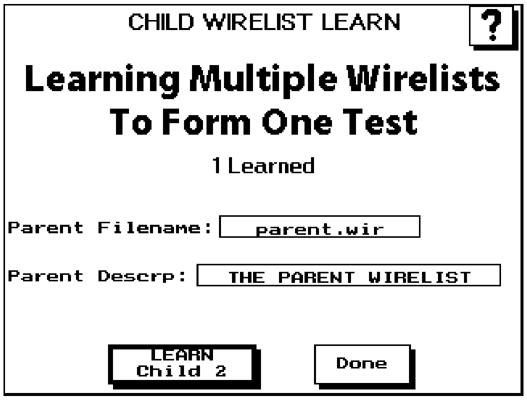
```
Adapter Signature(s):
 J1  D507F1

Parameter Settings:
CONNECTION RESIS   10.0 ohm
LV INSULATION RESIS   100 K ohm
HIPOT VOLTAGE   OFF

Connections:
1   J1-047   J1-055
```

You can discard the learn and try again if the results were not as expected.

In Child Wirelist Learn, either LEARN the next Child or select DONE.



CHILD WIRELIST LEARN

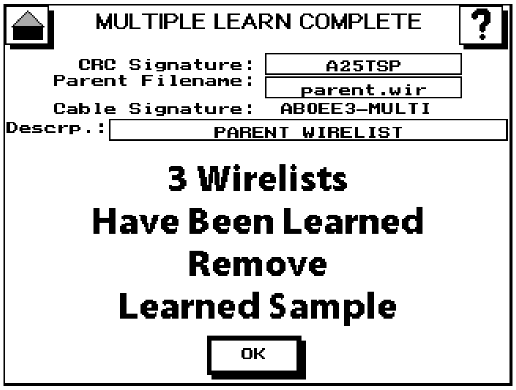
Learning Multiple Wirelists To Form One Test

1 Learned

Parent Filename: parent.wir

Parent Descrp: THE PARENT WIRELIST

Selecting **DONE** will show how many wirelist were learned. Select **OK.**



MULTIPLE LEARN COMPLETE

CRC Signature: A25TSP

Parent Filename: parent.wir

Cable Signature: AB0EE3-MULTI

Descrp.: PARENT WIRELIST

3 Wirelists Have Been Learned Remove Learned Sample

To execute the test, load the Parent Wirelist and select **TEST.**

All learned child wirelists will execute in the order they were learned.

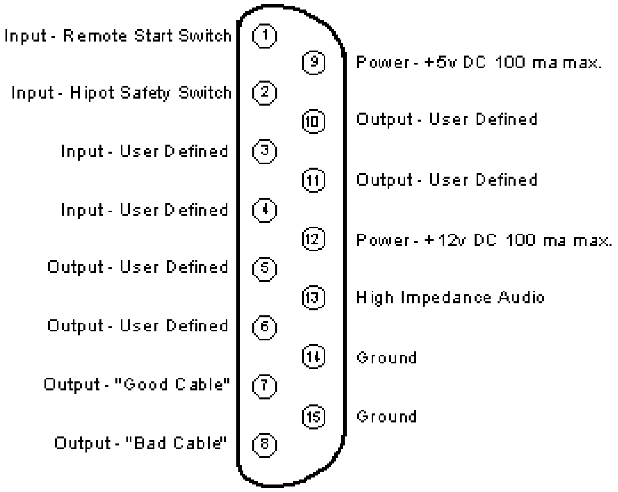
Appendix F: Digital I/O

What is Digital I/O?

The Touch 1 Ultra can send and receive triggered events through the 15 pin digital I/O port on the back of the analyzer. External devices like stampers, markers, and locking devices can be activated and deactivated as necessary to enhance your testing requirements.

There are:

- A Remote Start Switch Input
- A Hipot Safety Switch Input
- Two User Defined Inputs
- A "Good Cable" Output
- A "Bad Cable" Output
- Four User Defined Outputs
- 5V and 12V power
- High Impedance Audio Output
- Two Grounds

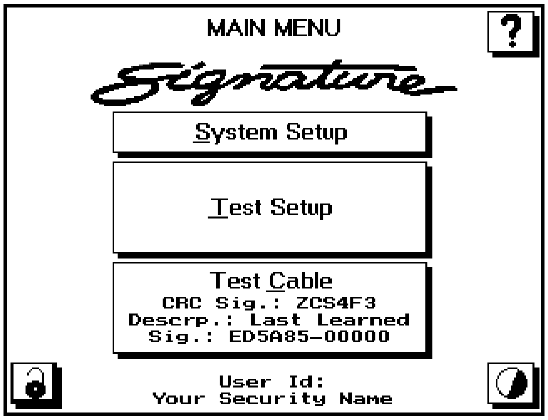


Setting up Digital I/O

The two defined inputs, External Switch and Hipot Safety Switch, are enabled in the **Test Controls** area. See **Chapter 7: Setting Test Controls** for more information. User Defined Inputs are accessed through Scripting.

The four User Defined outputs are configured from the System Setup Menu.

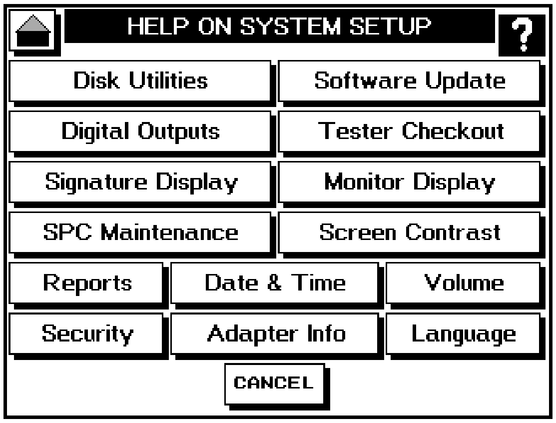
From the **Main Menu**, select **System Setup**.



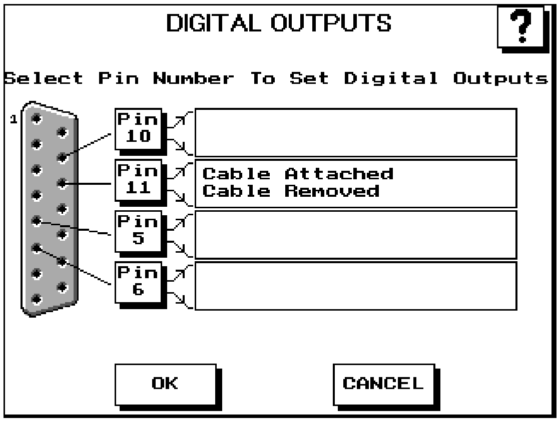
CRC Sig.: ZCS4F3
Descrp.: Last Learned
Sig.: ED5A85-00000

User Id:
Your Security Name

From **System Setup**, select **Digital Outputs**.



Select the output pin to attach events.



DIGITAL OUTPUTS

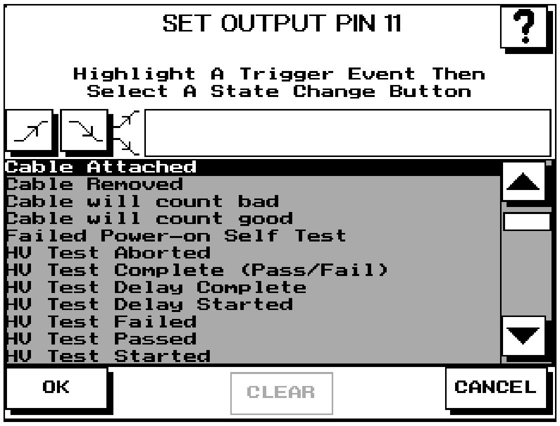
Select Pin Number To Set Digital Outputs

Pin 11: Cable Attached / Cable Removed

The digital I/O pins are open collector transistor ports that can operate at up to 24 volts and 300 milliamps.

Use of these pins may require a pull up resistor to operate properly.

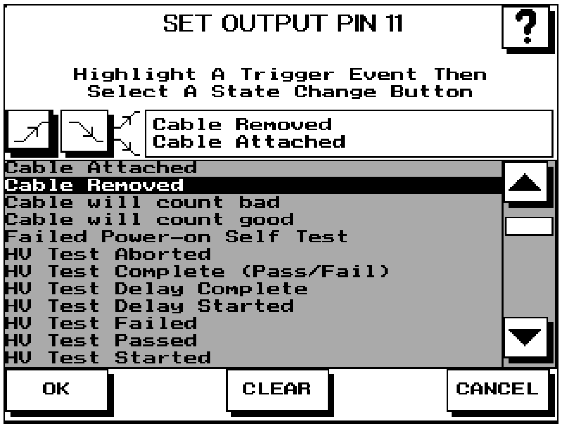
Select trigger events for the RISING and FALLING positions. FALLING events turn a device on and RISING events turn a device off. Both events must be defined and they must be different events.



SET OUTPUT PIN 11

Highlight A Trigger Event Then Select A State Change Button

- Cable Attached
- Cable Removed
- Cable will count bad
- Cable will count good
- Failed Power-on Self Test
- HV Test Aborted
- HV Test Complete (Pass/Fail)
- HV Test Delay Complete
- HV Test Delay Started
- HV Test Failed
- HV Test Passed
- HV Test Started



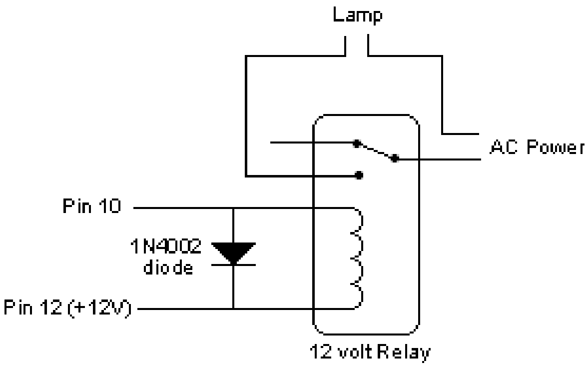
SET OUTPUT PIN 11

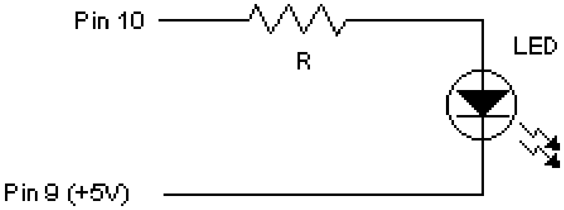
Highlight A Trigger Event Then Select A State Change Button

Cable Removed
Cable Attached

- Cable Attached
- Cable Removed
- Cable will count bad
- Cable will count good
- Failed Power-on Self Test
- HV Test Aborted
- HV Test Complete (Pass/Fail)
- HV Test Delay Complete
- HV Test Delay Started
- HV Test Failed
- HV Test Passed
- HV Test Started

The following schematics are examples of how to connect external devices to the Touch 1 Ultra using the **Digital I/O** function.





The value of R is determined based on the characteristics of the LED. A 20 milliamp LED would use a 150 Ohm resistor as R = 3V / 0.020a.

Appendix G: External HV Ground Fault and GFI Protection

External HV Ground Fault, GFI Protection, and Grounded Return Operation

This appendix describes the GFI feature of the Touch 1 Ultra as it relates to an External HV Ground Fault and other safety concerns relating to AC testing.

When using AC voltage, it is possible to have an External HV Ground Fault even though the device under test has been confirmed to not be grounded or may not even be connected to the analyzer.

Rationale

The Touch 1 Ultra has a protection circuit built into the external HV supply that monitors the HV current to earth ground. This is known as GFI or ground fault interrupt. Leakage current greater than 450 uA will cause the GFI circuit to engage which will shut off the HV current in less than 1 ms and display the External HV Ground Fault error. The shut off point varies from tester to tester, which can be less than the stated 450 uA.

Several factors can contribute to this error.

1. The internal capacitance of the relay matrix contributes to the leakage threshold, making a failure mode more likely.
2. A device under test in close proximity to earth ground, as well as fixturing, can create capacitive coupling, contributing to the leakage threshold.
3. Higher AC voltages create higher AC currents for all sources of capacitive coupling to ground.

It is possible, with no device under test attached, for this error to occur at higher voltage levels.

Solution

The Touch 1 Ultra can be operated in a "grounded return" mode. This mode ties earth ground to the HV return inside the analyzer. By grounding the return, the GFI circuit is disabled. When the analyzer is operating in grounded return mode, the external HV supply will shut down when the current exceeds the AC Real current limit.

WARNING

Operating the Touch 1 Ultra in grounded return mode is more hazardous than when the GFI is enabled since a grounded operator touching a live connection will receive a shock at the real current setting rather than the 450 uA GFI current setting. Cirris strongly recommends the use of a proper safety interlock to protect against accidental electrical shock in every case where the GFI is turned off.

Application

The grounded return mode can be activated in a Touch 1 Ultra wirelist by turning off the External GFI Safety option. When the External GFI Safety option is enabled, the GFI circuitry is enabled. When the External GFI Safety option is disabled, the analyzer is operating in grounded return mode. When operating in grounded return mode, AC tests will include the AC current consumed by the scanner assembly (test points) in the measurements.

This wirelist option can only be modified in a text editor.

1. Save the wirelist to a floppy disk or onto the network if available.
2. Modify the wirelist to include a parameter line either
   a. External GFI Safety on
   b. External GFI Safety off
3. Save the wirelist on the Touch 1 Ultra.

The final wirelist will look like the following:

```
…
Parameter Settings:
CONNECTION RESIS  10.0 ohm
LV INSULATION RESIS  100 K ohm
EXTERNAL GFI SAFETY  ON
EXTERNAL DW VOLTAGE  1000 Vac
EXTERNAL DW MAX TOTAL CURRENT  2 mA
EXTERNAL DW RAMP UP  .1 SEC
EXTERNAL DW RAMP DOWN 0 SEC
EXTERNAL DW DWELL  .4 SEC
…
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