Signature™ 500
User's Guide

Version 1.0
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Electronic version January 2003

The Signature 500™ exists because of the efforts of a lot of talented people. A partial list of these people includes:

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Version 1.0
Minor revision June, 1993
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Contents

Quick Start!

In this section, we'll get the Signature™ 500 up and running with a set of "no frills" instructions. We'll include page references on each of the major topics we touch on here. If you need details on something, go to the appropriate section in the manual.

Connect the power supply

(See page 5, figure 4 for details)

To set up the 500 for operation using the wall transformer power supply:

1. Plug the power supply's cord into the power port at the back of the analyzer.

2. Plug the power supply's "cube" into a standard outlet. (Must be 60 Hz. 110 VAC.)

Install the adapters

(See page 7 for details)

Before you can learn or test cables, you must install adapters that will allow the cables you intend to test to mate with the connectors (J I and J2) on the analyzer.

1. Open the adapter clamp by sliding it downward and to the right as far as it will go.

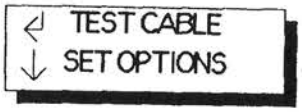
2. Carefully plug the adapters into the analyzer's connectors by aligning the pins, then pushing each adapter to the left until it's well seated.

3. To secure the adapters, close the adapter clamp by sliding it upward and to the left as far as it will go.

Learn a sample cable

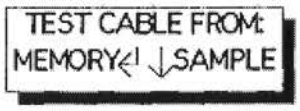
(See page 9 for details)

Before you can test cables, you must load the analyzer's memory with cable data from a sample cable (a cable that you know is built correctly). To do this:



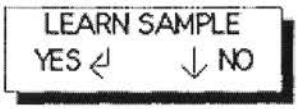
1. Attach a sample cable to the analyzer.
2. Turn the analyzer on. (The analyzer will prompt "Test Cable Set Options."

3. Press the Enter button to choose "Test Cable."



The analyzer will prompt "Test Cable From Memory Sample."

4. Press the List button to choose "Sample." The analyzer will prompt" Learn Sample? Yes No."

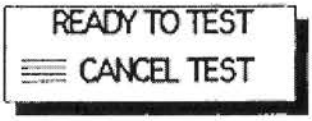


5. Press the Enter button to choose "Yes." The analyzer will learn the sample cable.

The analyzer will learn the connections in the sample cable, then store this information in memory.

Begin testing cables

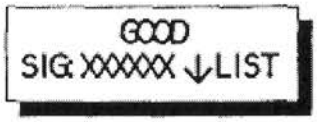
The analyzer will find the connections in the cable you're testing, then compare them with the sample cable data in its memory. To test a cable:



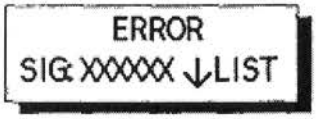
1. If you haven't already done so, remove the sample cable (you don't have to turn off the analyzer before you do this). The analyzer will prompt "Ready to Test Cancel Test."

2. Attach the cable you want to test.

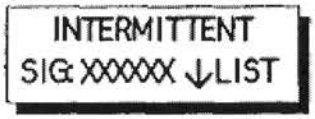
The analyzer begins to test automatically. When finished, it will prompt the following:



- If the analyzer prompts "Good," this means that the new cable electrically matches the sample cable stored in memory. The analyzer produces a series of clicks, and displays a signature identical to that of the sample cable.



- If the analyzer prompts "Error Sig: XXXXXX," the cable has a connection error. The analyzer will beep, and display a signature different than that of the sample cable.



- If the analyzer prompts "Intermittent," there is an intermittent change in the cable after about 4 test loops. The analyzer will click or beep depending on the current state of the cable test. To "clear" this screen during testing, press the Change button.

The Signature™ 500 Analyzer

The Signature™ 500 is a versatile, easy-to-use cable analyzer.

Test capacity and power options

The analyzer can test cables having up to 64 points. You can double this capacity (to 128 points) by linking two analyzers together (64 points on "host" unit, 64 more on "remote" unit). The analyzer can test any pattern of interconnections, jumpers, or crossed wires. The analyzer's power options let you use it on the production floor where an AC source is available, or in the field using its NiCad battery.

Warning about live cables!

Cables connected to a voltage source or a current source ("live" cables) should never be tested on the analyzer. *Testing live cables will severely damage the analyzer, and void its warrantee!*

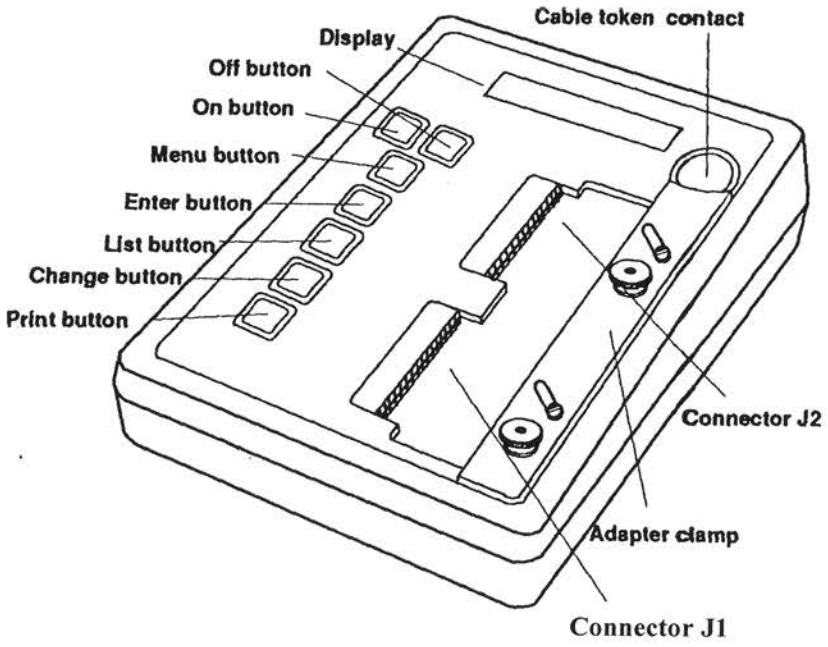


Fig. 1 Top view of the Siganture ™ 500 Analyzer

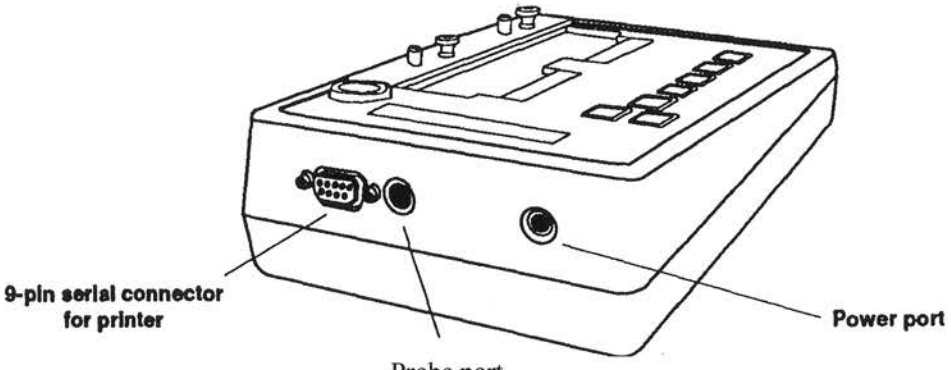


Fig. 2
Rear view of the Signature™ 500 analyzer showing location of connectors for the probe, a printer, and the wall transformer.

Test point Identification

On the analyzer's top panel, you'll find two connectors (labeled J1 and J2) which mate to Signature™ adapters that have up to 64 test points (pins). The analyzer identifies these points by connector location and pin number. Figure 3 shows an example of the analyzer displaying a pin identification. The display shows the probe touching connector J1, pin number 13 on a 25 pin D-sub adapter. You can identify any of the 64 points the same way.

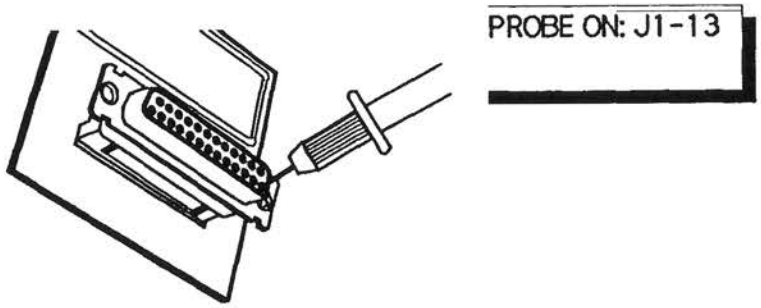


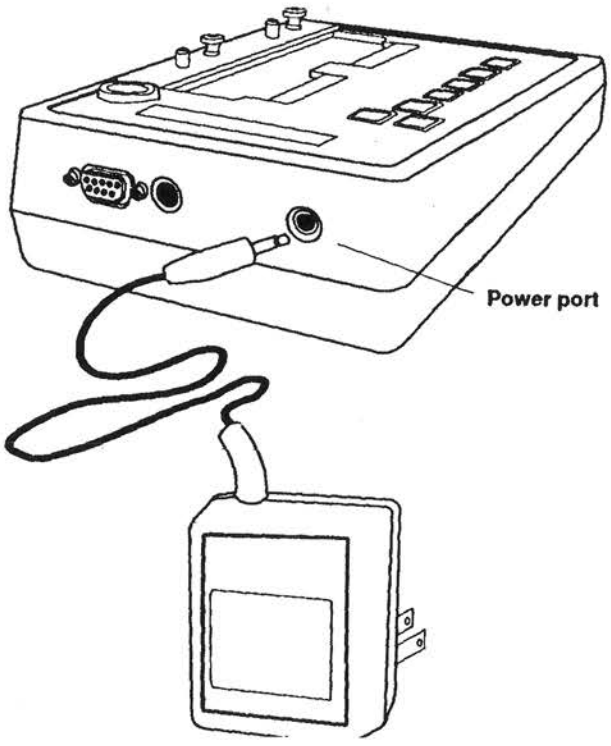
Fig. 3
View showing the probe touching pin 13 on connector J1.
The analyzer prompts "Probe on J1-13."

The AC Adapter

How to Install the AC Adapter

Install The Signature™ 500 comes with an AC adapter (and a NiCad battery all ready installed). To connect the adapter, simply plug its power cord into the power supply port on the analyzer's rear panel. Plug the adapter itself into a wall outlet (110-135 VAC, 50-60 Hz).

The analyzer's internal NiCad battery recharges when you have the wall transformer connected to the analyzer and plugged into a wall outlet. To fully recharge a "dead" NiCad takes about eight hours.



Plug "cube" into wall outlet (110-135 VAC, 50-60Hz).

Fig. 4
View showing the power port and the AC adapter

Symbols and Buttons

What they are and how they work

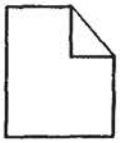
The Cirris Signature™ 500 uses five different symbols to guide you through learning and testing cables. Each of these symbols corresponds to a button. The following describes each button, and how to use it.

Menu symbol Pressing this button causes the analyzer to return to its "Use Last Cable" prompt. This allows you to prepare to test a cable using information all ready stored in the analyzer's memory. You can return to the "Use Last Cable" prompt at any time by pressing the Menu button. This will cancel whatever operation you've been doing.

Enter symbol This button initiates an action. It is a sort of "do it" button. It serves in much the same way as an enter or return key does on a computer's keyboard.

List symbol Press this button to display wire list data or advance to the next menu item.

Change symbol Press this button when you're setting the analyzer's options. Once you've set them to the values you want, press the Enter button to accept the settings. It's also used to clear the "Intermittent" prompt during testing.

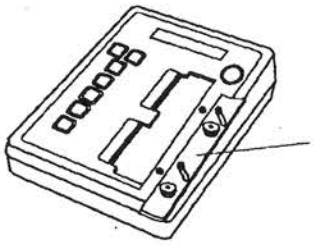


Print symbol Press this button to print test results, or to document a cable when you have a printer connected to the analyzer. Also, you can print a wire list for the last cable stored in the analyzer's memory. If you don't have a printer, you'll have to transcribe displayed information to paper.

Installing Adapters

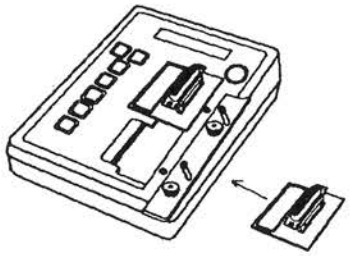
How to install adapter cards:

1. Slide the adapter clamp to the right and downward as far as it will go.

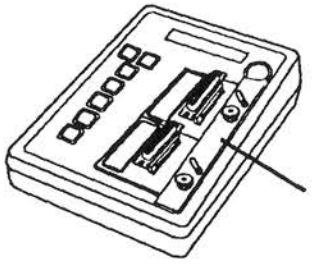


Adapter clamp in open position

2. Carefully plug the adapters into the analyzer's connector(s) by aligning the pins, then pushing each adapter to the left until it's seated.



3. Secure the adapter(s) by sliding the adapter clamp closed (to the left and upward) as far as it will go. The clamp will cover the right-hand edge of each adapter card, and hold it firmly in place.



Adapter clamp in closed position

Learning and Testing Cables

A note about adapters

Before you can begin testing, you'll need to install adapters in the analyzer that mate with the connectors on the cable you intend to test. Cirris Systems has adapters for nearly all standard connector types. For instructions on installing adapters, see "Installing Adapters," page 7.

Adapters have signatures

Your connector adapters have their own unique, six-character signatures. These adapter signatures help you verify your test setups. They'll appear on the documentation that the 500 produces, right along with cable signatures (see "Interpreting Printed Documentation," page 28).

How the analyzer works

First, you install adapters that mate to the type of cable you intend to test into the connector positions labeled J 1 and J2. You then attach a sample cable to these adapters (a sample cable is one that is accurately built to specifications and that you know is good).

It learns a sample cable

When you set up the analyzer to learn a sample cable, it scans that cable and learns its pattern of interconnections. If the twisted pair option is turned on, the analyzer also learns the twisted pair pattern.

It calculates signature

Next, the analyzer calculates a six-digit hexadecimal "signature" for the data. This signature is a form of short hand. It represents the sample cable's pattern of interconnections and twisted pairs in a simple, easy-to-check form.

It stores the cable data

The analyzer records the sample cable's signature and interconnection data in memory. This data remains in the analyzer's memory until you replace it by learning another sample cable or by reading new data from a cable token. (An explanation of how to use cable tokens begins on page 20.)

It compares the data to cables you test

You remove the sample cable, and then attach a cable you want to test. The analyzer scans the pattern of interconnections of the new cable and compares it to the pattern for the sample cable stored in memory. If the interconnection data matches, the analyzer prompts "Good" and displays the same signature as for the sample cable. If the data does not match, the analyzer prompts "Error" and a different signature.

Learning a sample cable

Before you can test a cable, you must load the analyzer's memory with data from a sample cable. You can do this by learning a sample cable (as discussed here), or by reading data from a cable token (see Cable Tokens, page 20).

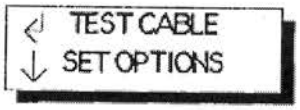
The analyzer's behavior during the learning process changes depending upon the testing option settings you've selected. (For instructions on setting the testing option, see page 23.)

It's possible to set the analyzer to test only the *connections* in a cable, to test both the *connections and the twisted pairs* in a cable, or to test for only the twisted pairs in a cable.

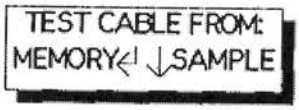
The learning process for sample cables changes to accommodate any of these options. Here, we'll discuss how the analyzer behaves in each of these learning situations.

With "Test Connections" turned on:

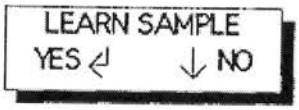
To learn a sample cable for testing only connections (the "Test Connections" option turned on):



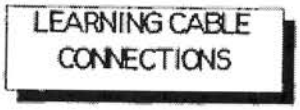
1. **Install the correct adapters to allow your cables to mate with the connectors** (J1 and J2) on the Signature 500.



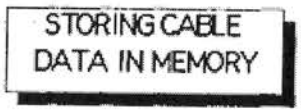
2. **Attach the sample cable to the analyzer**. If you don't, "Connections Not Found" will appear later.



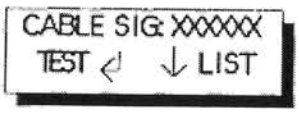
3. **Turn on the analyzer.** (The analyzer will prompt "Test Cables Set Options.")



4. **Press the Enter button to choose "Test Cable."** (The analyzer will prompt "Test Cables From Memory Sample.")

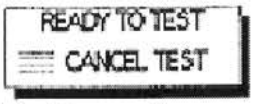


5. **Press the List button to choose "Sample."** (The analyzer will prompt "Learn Sample Yes No.")



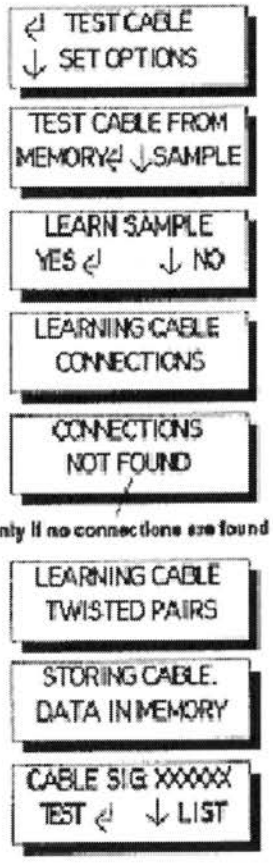
6. **Press the Enter button to choose "Yes."** (The analyzer will prompt "Learning Connections," then "Storing Cable Data In Memory," and finally a cable signature with test or list options.)

7. **Verify the cable by comparing the displayed signature to the signature shown in the cable's documentation**. You can use the List button to display the cable's connections one by one or (if you have a printer connected) press the Print button to print a list of the sample cable's connections.



8. **Remove the sample cable.** The analyzer will prompt "Ready To Test Cancel Test."

With "Test Connections and Twisted Pairs" turned on:



To learn a sample cable for testing both connections and twisted pairs (the "Test Connections and Twisted Pairs" option turned on):

1. **Install the connector adapters that mate to your cables in connector positions J1 and J2.**

2. **Attach the sample cable to the analyzer.**

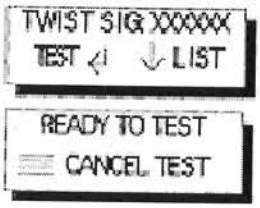
3. **Turn on the analyzer.** (The analyzer will prompt "Test Cables Set Options.")

4. **Press the Enter button to choose "Test Cable."** (The analyzer will prompt "Test Cables From Memory Sample.")

5. **Press the List button to choose "Sample:** (The analyzer will prompt "Learn Sample Yes No.")

6. **Press the Enter button to choose "Yes."** (The analyzer will prompt "Learning Connections," then "Learning Twisted Pairs," then prompt a cable signature with test or list options.)

7. **Verify the cable by comparing the displayed signature to the signature shown in the cable's documentation**. You can use the List button to display the cable's connections one by one, or (if you have a printer connected) press the Print button, to print a list of the connections



8. **If you have the twisted pair option turned on**, pressing the List button again will bring up the cable's twisted pair signature.

9. **Remove the sample cable.** The analyzer will prompt "Ready To Test Cancel Test."

Regardless which testing option you've selected, there are a few things which you should remember:

- When you learn a sample cable, the analyzer will prompt with signature(s), and give you the option of either testing the cable or displaying its wire or twisted pair list. The very first time you learn a cable, step through the data lists stored in the analyzers memory by repeatedly pressing the List button. Compare the displayed analyzer signatures and the data lists to those in the cable's documentation. If all displayed information matches the documentation, the cable has been learned correctly. You should write the displayed signature into the documentation.

- Verify the lists once. If they're correct, in the future you'll only need to verify the signatures to be sure that a sample cable has been learned correctly.

Note: If you're learning a cable with the testing option set to "Test Connections," and you attempt to learn a sample cable in which no connections are found, you'll see the "Learn Sample? Yes No" prompt, then "Learning Cable Connections," and finally "Connections Not Found." If no twisted pairs are found, you'll see the "Attach Cable To Tester" prompt. If no cable was attached to the tester when you attempted to learn a cable, or if there were no connections present in the cable (perhaps the cable has only twisted pairs and no connections) you may get the "Learn Sample? Yes No" prompt. If this happens, you should change the options to test the cable appropriately.

Testing a Cable:

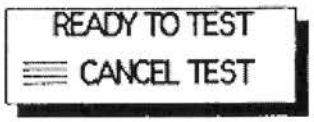
After the analyzer has learned a sample cable, you can begin testing.

The analyzer's behavior during testing will vary depending upon whether you've chosen to test only connections or to test both connections and twisted pairs. For instructions on how to set the testing option, see "Setting the Testing Option," page 23.

Here we'll discuss testing cables using each of the possible testing options.

Testing only for a cable's connections:

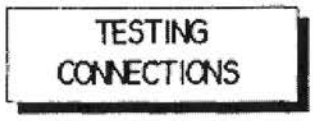
To test a cable only for its connections (with the "Test Connections" option selected):

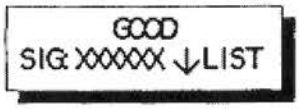


1. If you haven't already done so, remove the sample cable from the adapter(s). (The analyzer prompts "Ready To Test Cancel Test.")

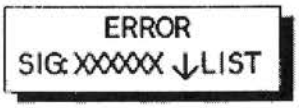
2. Attach the cable you want to test.

The analyzer begins to test. When finished, it will prompt the following:

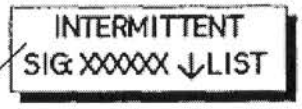




- If the analyzer prompts "Good," this means that the new cable electrically matches the sample cable data stored in memory. The analyzer produces a series of clicks, and displays a signature identical to that of the sample cable.



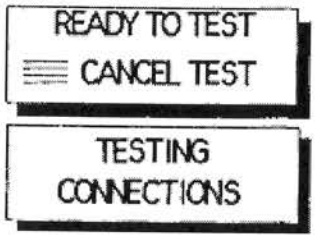
- If the analyzer prompts "Error, Sig: XXXXXX," this means that the cable has a connection error.



- If the analyzer prompts "Intermittent," there is an intermittent change in the cable after about 4 test loops. The analyzer will click or beep depending on the state of the cable test.

You can clear this message by pressing the Change button.

Testing for connections and twisted pairs:

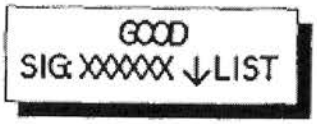


To test a cable for both its connections and twisted pairs (the "Test Connections and Twisted Pairs" option is selected):

1. If you haven't already done so, remove the sample cable from the adapter(s). (The analyzer prompts "Ready To Test Cancel Test.")

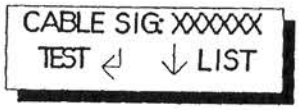
2. Attach the cable you want to test.

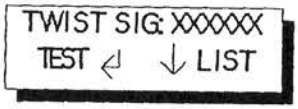
The analyzer begins to test. When finished, it will prompt the following:

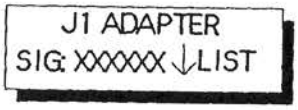


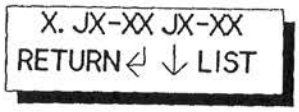
- If the analyzer prompts "Good," this means that the new cable electrically matches the sample cable data stored in memory. The analyzer produces a series of clicks, and displays a signature identical to that of the sample cable.

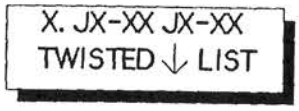
Listing cable information on the display











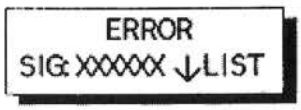
- You can use the List key to step through the test results. First, you'll see the cable signature, next you'll see the twisted pair signature (if the twisted pair option is selected), third you'll see the adapter signatures, fourth you'll see a list of the cable's connections (if any), and finally, you'll step through a list of any twisted pairs present in the cable. Note: If the analyzer detects errors, when you press the List key to list the errors, the analyzer will analyze the faults its detected. When the error list is displayed, the pin numbers of any pins that the analyzer has found have no wires connected to them will blink on the display.

The Sorted Wires option affects how the analyzer displays test results.

If the Sort Wires option is turned on, the wire lists display in pin-sorted order. If the Sorted Wires option is turned off, the pins in the wire lists display in the order they're learned.

If the analyzer prompts "Error":

Depending on how you've set the analyzer's test options, it will detect connection errors, twisted pair errors, or both.

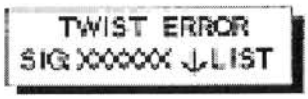


If the analyzer detects a connection error, it displays the usual "Error" prompt.

Whether or not the cable passes the connection test (if the cable information isn't changing), the analyzer proceeds to test for twisted pair errors. These errors can be either of two kinds:

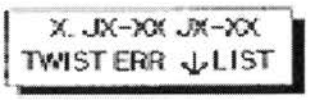
1. Twist errors. The analyzer has detected at least one pair of wires, which is twisted together in the cable under test and should *not* be twisted together according to the sample cable data stored in the analyzer's memory.

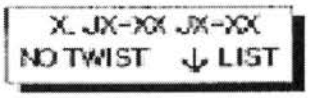
2. No-Twist errors. At least one pair of wires that *should* be twisted together according to the sample cable data in memory is *not* twisted together in the cable under test.



If the analyzer detects a twisted pair error (and a "good" set of connections), it will prompt "Twist Error, Sig: XXXXXX." The signature will reflect the twisted pair error, and can indicate either a twist error or a no-twist error. This is a general error message. To get details:

Press the List button.





- If the error is a twist error, the analyzer will prompt "Twist Error," and allow you to list the errors using the List button as usual.
- If the error is a no-twist error, the analyzer will prompt "No Twist," and allow you to list the errors using the List button as usual.
- When you've finished listing all of the errors, pressing the list button again will take you back to the prompt at the beginning of the testing process.

Error lists?

There are a few things you should remember about errors and error lists in general:

You can use the List button to display any errors that the analyzer detects (shorts, opens, miswires, twist errors) when the appropriate "List" prompt is showing.

If you have a printer connected to the analyzer, you can print the error list by pressing the Print button.

To avoid relearning sample cables unnecessarily....

If the analyzer has learned a cable and then you've switched it off (or it has switched itself off after being left idle), you can resume testing by:

1. Turning the analyzer back on.

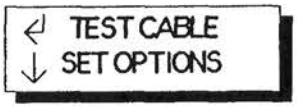
2. Using the "Test cable from Memory" feature. The information stored in the analyzer's memory will be used for testing cables.

Note: The analyzer will not switch itself off if you're powering it from the wall transformer. This feature operates only to conserve battery power.

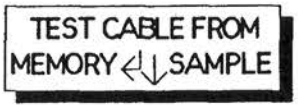
Testing cables from memory

This feature lets you use the data from the last sample cable when you turn on the analyzer, without having to attach the sample cable and relearn it. The analyzer always "remembers" the last cable stored in its memory, until you replace it by learning another sample cable or by reading data from a cable token.

To use the last sample cable stored in the analyzer's memory:

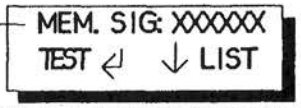


1. Attach the cable you want to test.



2. Turn the analyzer on. (The analyzer will prompt "Test Cable Set Options.")

3. Press the Enter button. (The analyzer will prompt, "Test Cable From Memory Sample.")

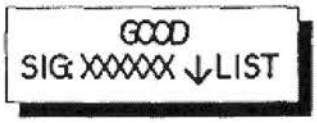


If the last signature is read from a memory token, this will read "TOKEN SIG: XXXXXX"

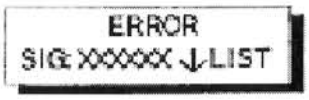
4. Press the Enter button to choose "Memory." (The analyzer will prompt with the signature of the sample cable in memory.)

5. Press the Enter button to choose "Test."

The analyzer begins to test. When finished, it will prompt the following:



- If the analyzer prompts "Good," it means that the new cable electrically matches the sample cable data stored in memory. The analyzer produces a series of clicks and displays a signature identical to that of the sample cable.



- If the analyzer prompts "Error," it means that the new cable does not match the sample cable data stored in memory. There are *connection* errors present. The analyzer produces a series of beeps and displays a signature different than that of the sample cable.

- If you have either "Test Connects and Twisted Pairs" or " Test Twisted Pairs" turned on and you see a -Twist Error" prompt this means that the connections test result was "good" and that there are *twisted pair* errors in the cable you're testing.

The Remote Test Feature

Do you have to test a cable that's already been "fished" through walls or under floors so that you can't bring the two ends together to connect them to a single analyzer? No problem. Use *two* Signature™ 500's. Connect one to each end of the cable. The only connection you'll need between the two analyzers is the cable you're testing. That cable must contain at least *two* wires.

When you link the two analyzers into a system (one analyzer acting as the host, the other acting as the remote unit) the test point capacity of the system doubles to 128 points. You control the testing from the host unit. The remote unit acts as a "smart" adapter.

You conduct twisted pair testing on one end of the cable at a time. You may need to test each end individually (the remote can be left attached, but should be turned off) to be certain that connections and pairing are correct. Test with the first unit as host, then turn both units off. Test again using the second unit as the host.

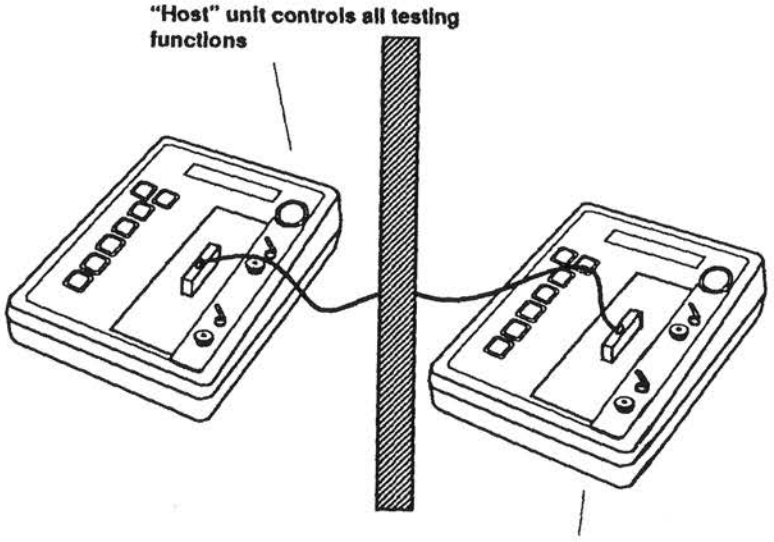


Fig. 5
Two Signature™ 500's set up for remote test

Setting up for remote tests

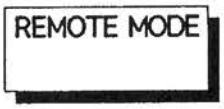
To set up a pair of 500's for remote test:

Make sure you don't connect powered ("live") cables to either analyzer.

1. Make sure *both* units are switched off.
2. Install the correct adapters in both analyzers to allow them to mate to the cable you intend to test.
3. To the 500 that you intend to use as "host" connect one end of the cable. Connect the remaining end of the cable to the other 500.

Learn and test as usual

Once you connect the two analyzers together, you can proceed to learn and test the cable just as if you were using a single analyzer. You control all the testing from the host analyzer. The remote unit can be left unattended during remote testing operations. *Don't turn the remote unit on!* The host unit will turn it on for you during testing. You'll notice that testing slows down when you're testing long cables. This is normal.



The display will blink when "Remote Mode" is showing. The blinking rate may be erratic when the "host" is communicating with the "remote" unit

The remote unit's display will prompt "Remote Mode" whenever it is operating under the control of the "host" analyzer.

Remember these things:

There are some things you'll want to remember when you use two analyzers for remote testing:

- In remote test configuration, the two connectors on the host analyzer remain labeled as J1 and J2. The two connectors on the remote unit become J3 and J4. The front panel of the analyzer is marked to remind you of this change. The analyzer will display information for all four positions correctly (J1, J2, J3, J4).
- When you set up two analyzers for remote test, either unit can serve as host or remote. You can control the testing process from whichever unit is most convenient.

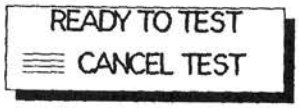
- • If you're using a printer when doing remote testing, *connect the printer to the host unit only!* Connecting a printer to the remote unit may cause errors.

- If you change the error tones or baud rate options at the host unit, there will be no changes at the remote unit. The option settings on the remote unit remain unchanged.

- Learning a cable changes only the host unit's memory; the remote unit's memory is not affected. Any cable data you've stored previously in the remote analyzer's memory (during stand-alone testing, or during a test where it was used as host) will remain there.

- When you use memory tokens during a remote test, use them on the host unit's cable token contact. Placing a token on the remote unit's contact will accomplish nothing. The token will be ignored.

- Remember that the cable you're testing must contain at least *two* wires for remote test to work. If the minimum two-wire connection is lost at any point, the host analyzer will be unable to communicate with the remote unit and will proceed to learn and test only its local connections. If there are no local connections to test, the analyzer will prompt "Attach Cable Cancel Test."



If the minimum two-wire remote connection is lost and there are no local connections to test, the analyzer will display this prompt.

- If you turn off the remote unit while it is still actively communicating with the host unit, you'll see a momentary "Error" (and an altered signature) prompt at the host unit's display. The host unit will automatically switch the remote unit back on, and bring up the usual prompts to let you resume learning and testing.

- The remote analyzer will remain silent during remote test. It will also power down automatically after the host unit has stopped communicating with it.

Cable Tokens

The analyzer can store data for only one cable at a time. To free the analyzer's memory without losing the data for a cable that's already been learned, you can record the data (including twisted pair data and option settings) stored in the memory to a cable token. These tokens are available from Cirris Systems and other distributors.

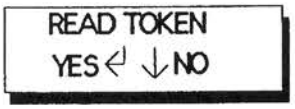
Why use cable tokens?

Cable tokens allow you to store a library of cable data in a simple, easy-to-carry form. There's no need to carry lots of sample cables with you on field service calls, or onto the production floor.

How cable tokens work

Each token contains the data for one cable. Before you can use this data to test cables, you have to read the data stored on the cable token into the analyzer's memory. When you do this, you replace the data stored in the analyzer's memory with the data from the cable token.

To avoid losing the data that's already been learned from a sample cable, you should store it on a cable token. To do this:



1. Turn the analyzer on.
2. Place a blank cable token on the analyzer's cable token contact, and hold it firmly in place.

The analyzer prompts "Read Token."

3. Press the List button to change the prompt to "Write Token."

4. Press the Enter button to start the writing sequence.

When the writing sequence is complete, the analyzer prompts "Cable Data Write Complete." When you remove the token from the contact, the analyzer returns to where it was before the writing sequence.

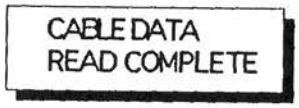
Note: If you move the cable token on the cable token contact or remove it from the contact during the writing sequence, the analyzer prompts "Write Error!" You must hold the token firmly in place during the writing sequence.

Reading data from a Token into memory

To load the sample cable data from a cable token into the analyzer's memory prior to testing cables:

1. Turn the analyzer on.

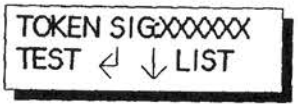
2. Place the cable token that contains the data for the cable you wish to test onto the cable token contact, and hold it firmly in place.



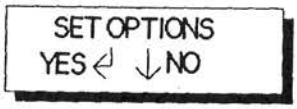
The analyzer prompts "Read Token"

3. Press the Enter button to start the reading sequence.

When the reading sequence is complete, the analyzer prompts "Cable Data Read Complete."



When you remove the token from the contact, the analyzer will prompt "Storing Cable Data In Memory," then prompt the signature of the cable loaded from the token. Be sure it's the signature of the cable you intended to load.



Note: If you move the cable token on the cable token contact, or remove it from the contact during the reading sequence, the analyzer prompts "Read Error!" You must hold the token firmly in place during the reading sequence until the analyzer prompts "Cable Data Read Complete."

Token read and write functions do not work when the analyzer displays "Set Options."

Whenever the analyzer is turned on, it can sense the presence of a token touching the cable token contact. Once the correct prompt appears in the display, the procedure you follow to read from or write to a token is the same as that given above. When you remove the token from the contact, the analyzers prompt will return to what it was before you placed the token on the contact. The cable token read and write functions will not work when the analyzer displays "Set Options."

Your analyzer package includes a probe. Use it to identify points in your cables and adapters. When you touch a point with the probe, the analyzer identifies it and prompts it in the display.

Installing the probe

Plug it into the port marked "PROBE" at the rear of the analyzer (see Figure 6).

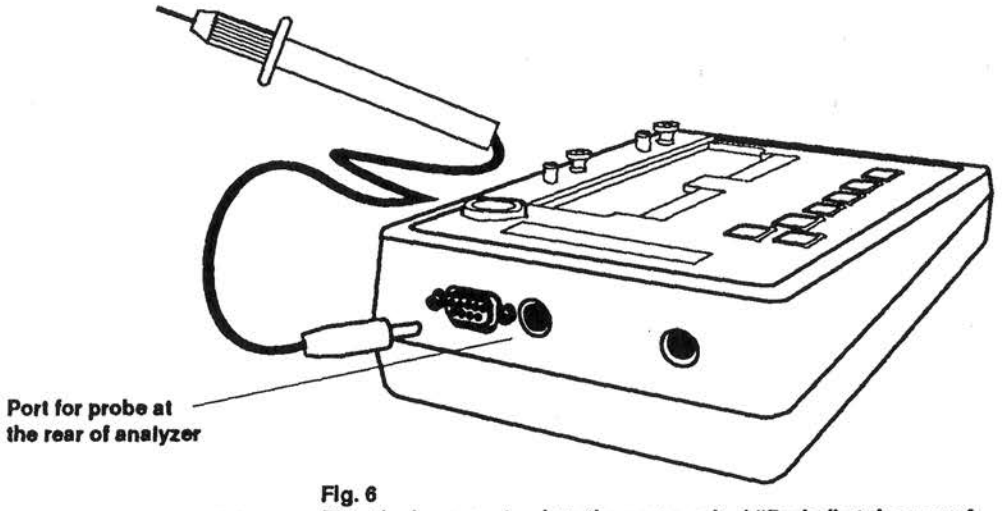
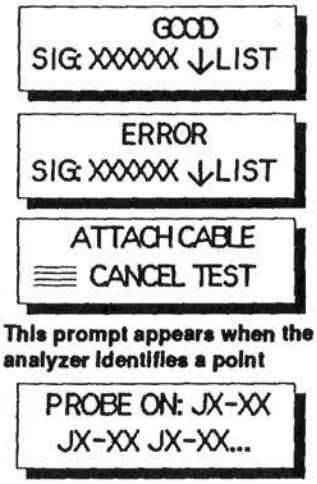


Fig. 6
Plug the banana plug into the port marked "Probe" at the rear of the analyzer.

The probe works when any of these prompts are showing.



This prompt appears when the analyzer identifies a point

If you prefer, you can substitute a standard static control wrist strap and identify points by touching them with your fingertip instead of the probe. Simply connect the strap's 0.175" banana plug into the same port as if it were the probe.

The probe works when the analyzer is in the test mode ("Good" or "Error" flashing on the analyzer's display), or when the analyzer prompts "Attach Cable."

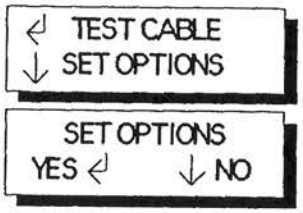
When you touch the probe to a test point, the analyzer (local unit *only)* identifies that point, and displays it (see Figure 3 on page 4). The analyzer *displays* only the first three interconnected points in any single group of interconnected points.

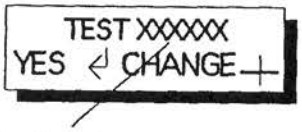
Setting the Options

The analyzer has four options: Testing, Error Tones, Sort Wires, and Serial Port Baud Rate. In this section, we'll discuss each option briefly, and tell you how to set it.

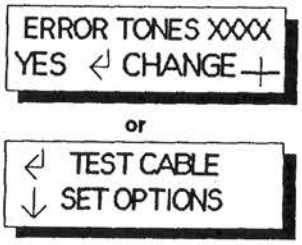
Setting the Testing option

The test option allows you set the analyzer to test only the connections within a cable, or to test both the connections and the twisted pairs in a cable.





"Connections" or "Conn & TWPR" are possible.



To set the Testing Option:

1. Turn the analyzer on. (The analyzer will prompt "Test Cable Set Options.")

2. Press the List button to choose "Set Options." (The analyzer will prompt "Set Options Yes No.")

3. Press the Enter button to choose "Yes." 4.

Select the setting you wish to use.

- If you wish to accept the displayed setting, press the Enter button to choose "Yes."

- If you wish to change the setting ("Test Connections" and "Test Connections and Twisted Pairs" are the possible settings) press the Change button.

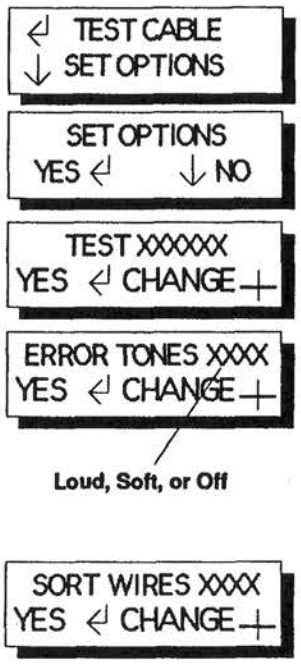
4. Press either the Enter or the Menu button.

- Pressing the Enter ("Yes") button displays the "Error Tones" option. (Soft, Loud, and Off are possible.)

- Pressing the Menu button exits to the "Test Cable Set Options" prompt.

Setting Error Tones

Error tones give you audible feedback on test results, and can be set to Loud, Soft, or Off.



To set the Error Tones option:

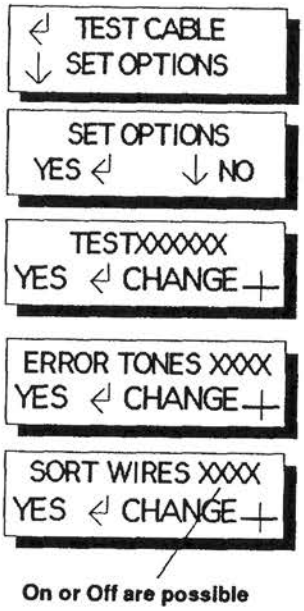
1. Turn the analyzer on. (The analyzer will prompt "Test Cable Set Options.")
2. Press the List button to choose "Set Options." (The analyzer will prompt "Set Options Yes No.")
3. Press the Enter button to choose "Yes." (The analyzer will prompt with the Test option setting.)
4. Press the Enter button to choose "Yes." (The analyzer will prompt with the "Error Tones" option.)
5. Press either the Change or the Enter button.

   - Pressing the Change button changes the setting. (Loud, Soft, or Off are the possible settings.)
   - Pressing the Enter button ("Yes") accepts the Error Tones setting, and displays the "Sort Wires" option.

Setting the Sort Wires option

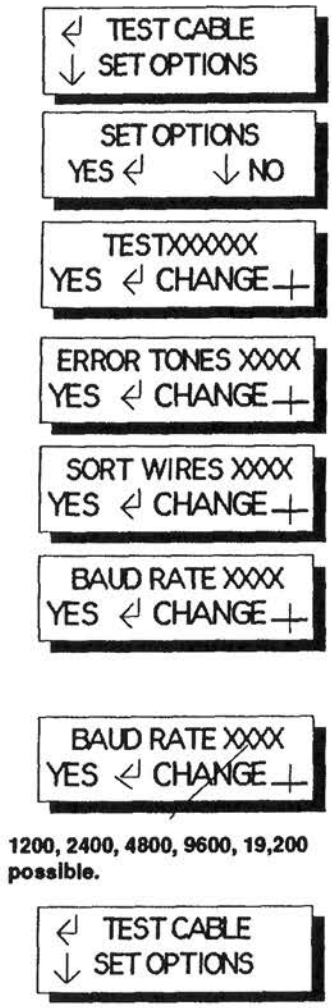
The Sort Wires option allows you to choose how you wish the analyzer to display connection information. If the Sort Wines option is set to Off, the pin numbers display in the order that the analyzer scans them. If the Sort Wires option is turned on, pin numbers display in numerical order.

To set the Son Wires option:



1. **Turn the analyzer on.** (The analyzer will prompt "Test Cable Set Options.")
2. **Press the List button to choose "Set Options."** (The analyzer will prompt "Set Options Yes No.")
3. **Press the Enter button to choose "Yes."** (The analyzer will prompt with the Test option setting.)
4. **Press the Enter button to choose "Yes."** (The analyzer will prompt with the "Error Tones" option.)
5. **Press the Enter button to choose "Yes"** (The analyzer will prompt with the "Sort Wires" option.
6. **Press either the Change or the Enter button.**
    - Pressing the Change button changes the setting. (On or Off are the possible settings.)
    - Pressing the Enter button ("Yes") accepts the Sort Wires setting, and displays the "Baud Rate" option

Setting the Serial Port Baud Rate



The Baud Rate option controls the rate at which the analyzer sends information to your printer.

To set the baud rate option:

1. **Turn the analyzer on.** (The analyzer will prompt "Test Cable Set Options!)
2. **Press the List button to choose "Set Options."** (The analyzer will prompt "Set Options Yes No.")
3. **Press the Enter button to choose "Yes."** (The analyzer will prompt with the Test option setting.)
4. **Press the Enter button to choose "Yes."** (The analyzer will prompt with the "Error Tones" option.)
5. **Press the Enter button to choose "Yes."** (The analyzer will prompt with the "Sort Wires" option.
6. **Press the Enter button to choose "Yes."** (The analyzer will prompt with the "Baud Rate" option.)
7. **Press the Change or the Enter button.**
    - Pressing the Change button changes the setting (1200, 2400, 4800, 9600,19,200 baud are possible).
    - Pressing the Enter button exits to the "Test Cable Set Options" prompt.

Printing Problems?

If your printer prints garbled characters, check the printer's controls and the cable connections at the printer and the analyzer. If all of the controls and connections appear to be set up correctly, try resetting the analyzer's baud rate. For more help see "Setting Up a Printer," page 27, and `Troubleshooting," page 34.

Compatibility?

You can only use a serial printer with your Signature™ 500.
Parallel printers will not work.

Serial port pin out

The analyzer's serial printer port is configured as a standard 9 pin RS-232 interface:

Pin 2 = TX data to printer (transmit line)
Pin 3 = RX data from printer (receive line)
Pin 4 = DTR/BUSY (busy from printer)
Pin 5 = ground

The receive and transmit lines must *not* be reversed.

Some printers require connections to their CTS or RTS lines, or setting changes. For example, an Okidata 182 requires a jumper wire between pin 6 and pin 20. An Okidata 320 requires no jumper wires, but does require the following setting changes: Serial Data 8 bits, Protocol Ready/Busy, Diagnostic Test No, Busy Line DTR, Baud Rate 1200 BPS, DSR Signal Invalid, DTR ready on power up, Busy Time 200 ms., Parity None. See your printer's manual for specifics on your equipment.

Baud rates

You can set baud rates to 1200, 2400, 4800, 9600, 19,200 baud. If you don't set the baud rate to match the rate at which your printer is supposed to receive data, printing won't work correctly. For instructions on setting the analyzers baud rate, see "Setting the Serial Port Baud Rate," page 26.

The printer should be set for 8 data bits, no parity. Your printer should be selected (on-line), with the DTR signal ready on power up (hardware handshaking on).

Other settings

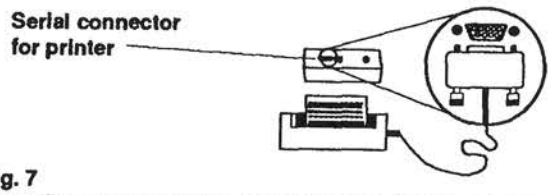


Fig. 7
Rear view of analyzer showing location of connector for serial printer

Interpreting Printed Documentation

When you have a printer connected to your Signature™ 500, you'll be able to print out cable documentation. We'll discuss how to interpret this printed information here:

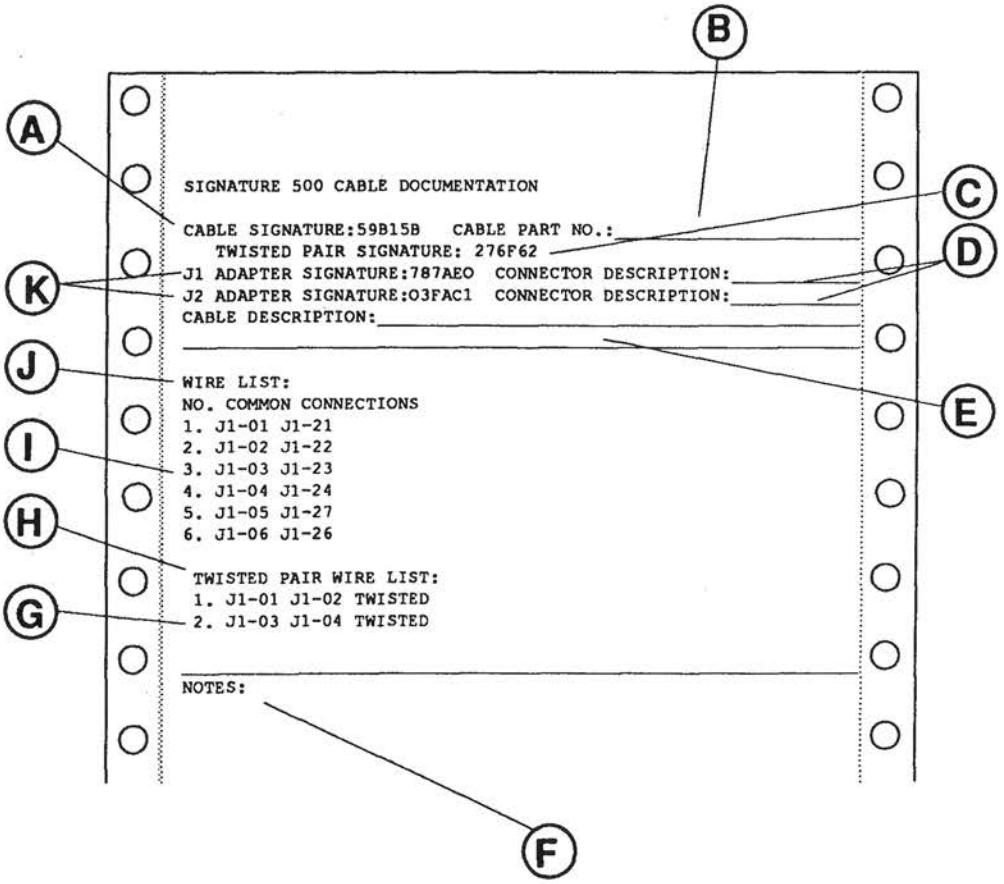


Fig. 8
An explanation of how the Information In a printout Is shown

General description of this printout:

Figure 8 shows cable documentation printed with the analyzers "Test Connections and Twisted Pairs" option turned on. This printout does *not* show any errors!

If you've pressed the Print button just after learning a sample cable, the printout will show the information for the sample cable stored in memory.

Ifyou re documenting a cable you've just tested, the printout will show the information for that cable.

What Information appears with the various test option settings?

The twisted pair signature and twisted pair wire list appear *only* if the twisted pair option is turned on. If you've set the analyzer to test *only* for connections, the twisted pair information will not appear in the printed documentation.

Contents of a printout:

Here's an item-by-item description of a typical printout from the analyzer:

A. Cable Signature

This is the cable signature. It's a six-digit hexadecimal signature calculated by the analyzer that represents the cable's wiring pattern. Questions? See "It calculates a signature," on page 8.

B. Cable part number

Use this space to record the cable's part number. Remember that you should identify or organize your cables by their part numbers, and verify the electrical correctness of their construction based on their signatures.

C. Twisted pair signature

This is the twisted pair signature for the cable. It appears in the documentation only if you've set the Testing option to test for twisted pairs.

D. Connector descriptions

Use these spaces to write in descriptions for each of the connectors that correspond to the adapters you're using

E. Cable Description

Write a description of the cable here. Use this space to write down vital information concerning the cable and your test setup.

F. Notes

Use this space to make more extensive notes about the cable. Remember, good documentation is a critical part of the quality assurance process!

G. An example from the twisted pair wire list:

Here, we see the second twisted pair that the analyzer has found in the cable. The wire running from connector J 1 pin 3 is twisted with the wire running from connector J I pin 4.

H. Twisted pair wire list

This is the twisted pair wire list. Remember, twisted pair information appears only if you've set the analyzer to test for twisted pairs!

I. An example from the connections list

Here we see that connector J1 pin 3 is connected to connector J1 pin 4.

J. The connections list

This is the cable's connections list. Each net's connections are shown. When you're testing cables, this wire list is the readout from the *connections* test. If you've left the "Sorted Wire List" option turned off, the connections may not be listed in numerical order. If "Sorted Wires" is turned on, the connections will be listed in numerical order.

K. Adapter signatures

These are the unique signatures for the adapters you've installed in the analyzer. Questions? See "A note about adapters," on page 8.

If the printout shows errors...

Remember that the analyzer can detect three kinds of connection errors (opens, shorts, miswires) and two kinds of twisted pair errors (twist, and no twist). Twisted pair errors appear *only* if you've set the analyzer's Testing option to test for twisted pairs.

Printout shows a cable error signature?

First, we'll look at a printout showing a cable error signature. This indicates that the analyzer has detected a connection error (open, short, miswire) in the cable.

Note: Remember, if you've turned on both connection and twisted pair testing, and the analyzer detects a connection error, it will still proceed to test twisted pairs.

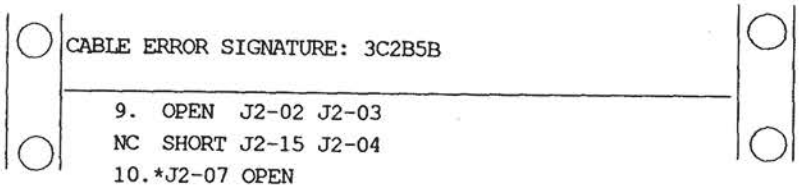


Fig. 9

Message explains what the asterisks on the printout mean

In this case, the analyzer has detected three errors during the connections test:

In net number 9, connector J2 pin 2 should be connected to connector J2 pin 3, according to the sample cable data stored in memory. The analyzer has found that these two pins are not connected in the cable you're testing.

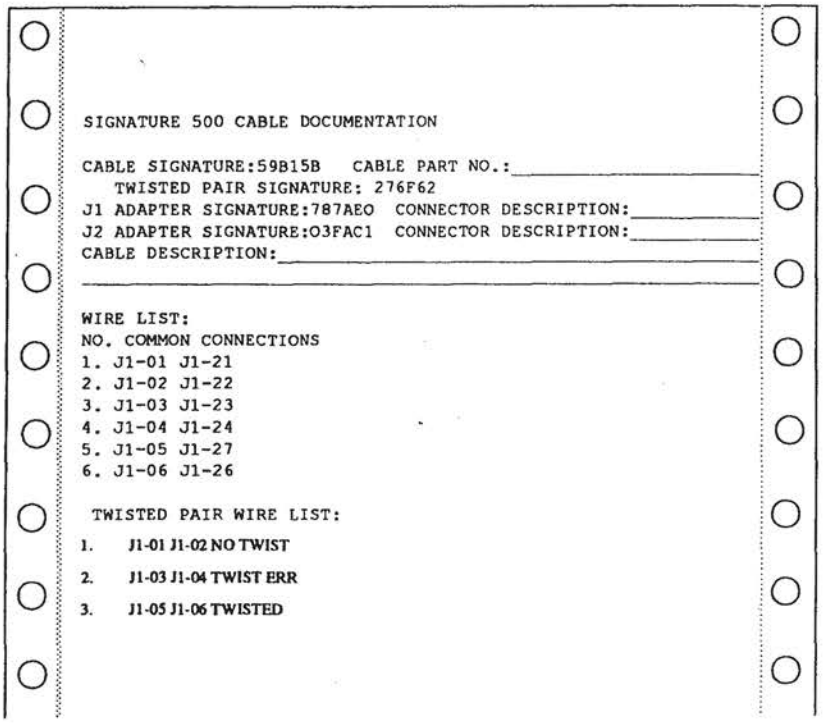
The analyzer has found that connector J2 pin 15 is shorted to connector J2 pin 4. According to the sample cable data stored in memory, this connection should not exist.

The analyzer has also found that connector J2 pin 7 (marked with an asterisk) has no wires connected to it. This should not be the case.

If the printout shows twisted pair errors...

Here, we'll look at a printout, which shows twisted pair errors.

Remember, these errors appear only if you've set the analyzer to test for twisted pairs.



```
SIGNATURE 500 CABLE DOCUMENTATION

CABLE SIGNATURE:59B15B   CABLE PART NO.:_____
   TWISTED PAIR SIGNATURE: 276F62
J1 ADAPTER SIGNATURE:787AE0  CONNECTOR DESCRIPTION:_____
J2 ADAPTER SIGNATURE:03FAC1  CONNECTOR DESCRIPTION:_____
CABLE DESCRIPTION:_____
_____

WIRE LIST:
NO. COMMON CONNECTIONS
1. J1-01 J1-21
2. J1-02 J1-22
3. J1-03 J1-23
4. J1-04 J1-24
5. J1-05 J1-27
6. J1-06 J1-26

 TWISTED PAIR WIRE LIST:
1.    J1-01 J1-02 NO TWIST
2.    J1-03 J1-04 TWIST ERR
3.    J1-05 J1-06 TWISTED
```

Fig. 10

What does this twisted pair information mean?

In figure 10, the analyzer has found two twisted pair errors, and one correctly twisted pair.

The analyzer has found that J1 pin one's wire should be twisted with J1 pin 2's wire. It is not.

J1 pin 3's wire is twisted with J1 pin 4's wire. This should not be the case.

J1 pin 5's wire is twisted with J1 pin 6's wire. This arrangement is correct.

Error Messages

There are a number of error messages, which the Signature™ 500 may display. Here we'll discuss what they are, what their causes may be, and what corrective action to take when you see them.

ATTACH CABLE

The analyzer doesn't detect a cable attached to it for learning or testing. Attach a cable to the analyzer.

WARNING LOW BATTERY

The analyzer detects a low operating voltage. The voltage is low, but the analyzer will still operate. If you re using battery power, plug the analyzer's wall transformer into a wall outlet (110-135 VAC, 50-60 Hz) to recharge the battery. You can operate the analyzer during the recharging process. If you're using the wall transformer, be sure it's plugged into a live electrical outlet. If this error persists when all of the connections are correct and the wall outlet is working properly, the wall transformer or the analyzer itself is probably defective. Call Cirris Systems for assistance.

REPLACE BATTERY

The battery is dangerously low. Recharge it or replace it with a fully changed battery immediately. The unit may not power up at all, and may appear dead if the battery gets any lower.

ERROR ON J1XX WILL NOT GO LOW

The analyzer cannot make the displayed test point go logic low. Remove the cable from the analyzer, and see if the problem disappears. If the error does disappear, the defect is somewhere in the cable. Look for possible connections from this point to some voltage source. If it doesn't, call Cirris Systems

ERROR ON J1XX WILL NOT GO HIGH

The analyzer cannot make the displayed test point go logic high. Remove the cable from the analyzer, and see if the problem disappears. If the problem does disappear, the defect is somewhere in the cable. Look for possible connections to ground, or to a negative voltage source. If it doesn't, call Cirris Systems.

Note: The "Will Not Go High" and "Will Not Go Low" errors may occur when a "host" unit is plugged into a "remote" unit. If this happens, try unplugging the cable and turning the "host" unit on again. If it works normally, repeat this process with the "remote" unit. This will tell you whether the fault is in an analyzer, or the cable.

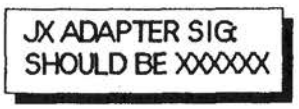
ROM DEVICE CHECKSUM ERROR

The analyzer's internal ROM has failed. Call Cirris Systems for assistance.

Having trouble with the printer

When you trouble-shoot a printing problem, first check the printers controls, and the cable connections at the printer and the analyzer. All OK? Try resetting the analyzers baud rate (see "Setting the Serial Pert Baud Rate," page 26). Still have problems? See "Setting Up a Printer," page 27. *Trouble-shooting tip:* If your printer prints garbled characters when you attempt to get a printout, the baud rate probably isn't set correctly. If data is missing, look for DTR (XOn/ XOff) problems.

Adapter signature problem



If you've inadvertently installed the wrong adapter in the analyzer, you'll see the "Adapter Sig Should Be" prompt. To clear this problem:

1. Remove the incorrect adapter, then install the correct one.
2. Press the menu button, then learn a sample cable attached to the adapters.

Basic Maintenance

Treat the Signature™ 500 with reasonable care

Your Cirris Signature™ 500 cable analyzer is designed to be a reliable, easy-to-use piece of test equipment. It should be treated with the same care that you'd give a digital multimeter (DMM), or similar device.

Never test "live" cables!

You should *never* test cables that are connected to a power source ("live" cables) using the analyzer. Testing live cables can *severely damage the analyzer, and will void its warranty.*

Never immerse the analyzer

The analyzer should never be immersed in water or other solvents.

Clean the case with nonpetroleum-based solvents

The analyzer's outer case can be cleaned using a cloth dampened with mild soap and water, rubbing alcohol, or other nonpetroleum-based solvents.

Don't let solvents run inside the case

Be sure that solvents are never allowed to run inside the analyzer's case.

Petroleum based solvents can cause damage

Petroleum-based solvents may damage or dissolve the plastic case.

Store adapters carefully

Adapters should be stored where they're not likely to be damaged.

Quality: Helpful Hints

Use a consistent, commonsense approach

Consistency, completeness, and a common-sense approach are the keys to maintaining quality in the cables you build.

Set your analyzer up carefully according to the instructions in the manual. The analyzer self-verifies its own performance each time it is powered up.

The analyzer also automatically checks to see that you have installed the correct adapters for the cables you intend to test.

Pay attention to documentation

You should document your cables carefully. Include a complete wire list. Describe the cable's physical characteristics (connectors and other hardware, wire or cable type, etc.) fully. You can also store a copy of the wire list on a "master" cable token. Store this token along with the written documentation. All of the documentation should be stored where you can't lose or alter it. These documents become the standards against which all cables are compared.

Testing: the beginning

Testing is only part of the process you should follow in building good-quality cables.

Electrical vs. full equivalence

Just because two cables (a sample cable, and a cable being tested) are *electrically* equivalent (as verified using the analyzer) they aren't necessarily *fully* equivalent.

For two cables (a sample cable and a cable being tested) to be fully equivalent, they must also be:

- Electrically equivalent (verified with a correctly programmed and maintained analyzer).
- Physically equivalent. The same hardware (connectors, cable type, etc.) must be used in both cables. You must inspect the cable you're testing carefully to make sure that there is a good "hardware match" between it and the cable described in the documentation.

Suggestions for maintaining quality

Here are a few suggestions for avoiding some common pitfalls in the process of building good, quality cables:

Maintain your equipment

1. Keep your analyzer clean and ready to work.

Document cables carefully

2. Document your sample cables fully. Include a complete wire list (with drawings if possible), the correct signature as shown by the analyzer, a complete list of any hardware used to make up the cable, and notes on such things as soldering or cleaning methods, or special cautions that you should exercise when you build the cable. You can also store a copy of the cable's wire list on a cable token. Store this token along with the written documentation.

Keep valid "master" documents available

3. Store a "master" copy of the cable's documentation where you won't lose it. You might store your master copy in a file cabinet. Take the documentation from this cabinet only long enough to make photocopies for use at the bench or in the field. This way, you'll always have a clean, complete original available if you have questions about a cable.

Check each sample cable's signature regularly

4. Check each sample cable's displayed signature against that shown in its documentation each time you learn a sample cable. If a sample cable's signature changes (so that it no longer matches the documented signature), the cable has changed in some way. Repair, or replace it with a cable whose signature does match the signature shown in the documentation.

Inspect components <u>before</u> assembly

5. Inspect materials as they come into your facility. There's no profit in assembling cables using the wrong components, only to find that they have to be reworked or discarded when they don't meet specifications.

Cables have to be "good" electrically and physically

6. Do careful inspections on cables. Even though two cables may test as being electrically equivalent, they may not be physically equivalent. A cable must match its build list or spec sheet in all respects before it can truly be considered "good."

"Good" and "bad" Isn't enough

7. Don't stop at merely sorting cables as "good" or "bad." Examine the assembly process carefully. If you correct an ongoing problem, the number of "bad" cables coming off the assembly line can be sharply reduced. Correcting a problem might be as simple as changing a connector's position during soldering to avoid contaminating the connector's pins with flux, or keeping the components cleaner during assembly. Small changes in your procedures can yield big dividends in the number of "good" cables your facility produces.

Don't get 'em confused!

8. Once you identify a cable as "bad," make certain that you keep it separated from "good" cables, or cables that haven't been tested and inspected. The "bad" cables should immediately be reworked and rechecked, or labeled as scrap

Organize cables by part number, verify by signature

9. Identify or organize your cables by their part numbers.

10. Verify the electrical correctness of your cable's construction based on signatures.

Specifications

Test point capacity: 64 points (local, or stand-alone configuration), 128 points when linked with another Signature ™ 500. The Signature ™ 500 supports as many as two standard single-high Signature ™ Series adapters, or one standard double-high Signature ™ Series adapter with appropriate pin labeling.

Test voltage: 9 volts DC (current limited to 2 mA).

Sensitivity: Interconnections (connections, open circuits, short circuits) are detected at a single threshold between 2 and 6 Kohms

Maximum capacitance: 0.1 microfarad.

Testing rate: 0.7 seconds per test for cables shorter than ten feet (when in stand-alone configuration). Testing time will increase when working in conjunction with a remote Signature ™ 500. Testing time may also increase when testing long cables.

Signature: A six-digit hexadecimal number representing a cable's pattern of interconnections

Display: SuperTwist 16x2 LCD

Memory: Internal memory stores data for one cable (with backup). External memory is "infinite" using cable tokens, one cable per token.

Printer output: Serial baud rates of 1200, 2400, 4800, 9600, 19,200 are available. Set for 8 data bits, no parity, hardware handshaking (Xon/ Xoff) on.

Probe: For point identification on *local tester* only. Input port supports standard 0.175" banana plug.

Temperature range for operation: 40 to 110 F, 5 to 45 C.

Power options: A 9-volt wall transformer (110-135 VAC, 50-60 Hz.). A 7.2 volt 100 mA hour NiCad battery (factory-installed) gives about 2.5 hours analyzer-operating time per charge (longer when not testing with a "remote" analyzer). NiCad can be recharged in place using the wall transformer. To save power, the analyzer will power down after being left idle (unless you're using the wall transformer).

Size: 8.5"w X 5.5"d X 2.2"h
21w X 13.5d X 5.5h cm

Weight: 1.2 pounds
0.44 kilograms

Warranty: One year on all parts and labor.

Glossary

Adapter signature
Connector adapters have their own unique signatures. These signatures identify each adapter type, and appear on printed cable documentation when you use a printer with your analyzer.

Automatic shutdown
The analyzer will shut itself down (to conserve power) if it's left idle for a few minutes. An analyzer in "host" mode will power itself down the same way.

Baud rate
The number of *signal events* per second at which data is sent. For example, at 1200 baud the analyzer sends about 120 characters to your printer each second.

Cable data
The learned pattern of interconnections that the analyzer sees as representing a cable.

Cable signature
A six-digit hexadecimal code that changes with any change in a cable's interconnection pattern. Valid characters include the numbers 0 through 9, and the letters A through F.

Connector positions
The analyzer has two connectors (J1 and J2) **on** its top panel. These two connectors (with the appropriate adapters) provide a total of 64 points for stand-alone testing. When a Signature™ 500 is linked with another Signature™ 500 (for "remote" testing), the point capacity doubles to 128 points. Connector J1 becomes J3, and connector J2 becomes J4 with respect to the "host" Signature ™ 500.

Documentation, build list, spec sheet
Written material (wire lists, diagrams, etc.), which defines precisely how a cable should be constructed.

Interconnection
Continuity between two connector pins, usually with a wire connecting them.

Logic low
In digital logic, that voltage level which the system uses to represent a zero.

Logic high
In digital logic, that voltage level which the system uses to represent a one.

Memory token A small memory device, which can store data for one cable. The Signature™ 500's cable token contact is used to do read/write operations on tokens. Tokens look like "button" batteries.

Miswire An interconnection error where a pin is connected to the wrong pin.

Net Any group of pins connected together. The analyzer assigns a number to each group of interconnected pins (called a "net").

NiCad battery A special 9-volt battery that can be recharged repeatedly in place using the analyzer's internal charging circuit and the wall transformer.

No-twist error A twisted pair error where a pair of where a pair of wires, which should be twisted together, is *not* twisted together.

Open An error where there is no continuity between two connector pins that were defined as being connected in the documentation.

Pin An electrical contact within a connector. In this manual, "pin" is used in place of "point," "contact," "socket," "termination," etc.

Remote testing Two Signature™ 500's are needed for remote testing. One of the units becomes the "host" unit. All testing is controlled from this unit. The other unit becomes a "remote" unit (its display prompts "Remote Mode") essentially acting as a "smart" adapter. When two 500's are used in this way, the test point capacity of the system doubles to 128 points. The remote unit will power down automatically within a few minutes after the host unit has last "talked" to it.

Sample cable A cable that has been carefully built to specifications. The analyzer learns the pattern of interconnections in this cable, stores the data, and then compares the data from the cables you're testing against this data. If the data is the same, the cable is "good." If the data is different, the cable is "bad."

Short A type of interconnection error where there is continuity between two connector pins that is not shown in the cable's documentation.

Test set up Preparing to use the analyzer for testing cables using the documentation as a guide.

Twist error A twisted pair error where a pair of wires, which should not be twisted together, *are* twisted together.

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