

16 Troubleshooting Cables

16.1 Testing RS232 Cables

We offer several ideas and suggestions that may help you locate cable problems, or conclude that the problems are not cable-related in serial interface cables. If you encounter a difficulty that you cannot resolve immediately using CableEye, you should take some notes to document what you have done thus far and review this section. As with debugging any technical problem, people who are *patient* and *methodical* will always succeed more quickly than those who let their frustration get the better of them. Remember always that when you are debugging *equipment*, hasty action may create new problems that did not exist in the first place.

The Usual Symptoms –

- The equipment does not respond and behaves as if there were no cable attached at all.
- There is some response from the equipment, but it is not the correct response.

The Usual Problems –

- You are using the wrong cable for your equipment.
- You are using the right cable for your equipment, but it is defective.
- You are using the right cable for your equipment and it is a good cable, but the protocol is incorrect.

Before Assuming There is a Cable Problem –

- Be sure that power and interface cables are securely connected (thumbscrews fully turned until tight) and that power is *on*.
- Check the Baud rate and protocol to be sure that both devices are set to the same values. A typical setting for EIA232 devices is 9600 Baud, 8 data bits, no parity, and one stop bit. Some software packages also let you specify the handshaking method.
- If you are using a PC, check to be sure that the interface cable is connected to the right COM port and that the software is sending data to that port. The COM port connectors on the back of the computer are *male DB25* or *DB9*, whereas the parallel printer port is a *female DB25*.

- Printers often include several switch or pushbutton controls. Be sure that the printer is set for *on-line*, and that the paper-out switch is not accidentally active (this may happen if the paper is loaded incorrectly, or if a paper tray is not fully inserted).
- If an EIA232 peripheral device is connected to a computer through a network, assume that there is a problem with the network interface *before* assuming that the cable is at fault. Temporarily remove the peripheral from the network and drive it directly from the serial port of a computer to determine whether the problem is in the network.

To Check for a Wrong Cable –

- 1 – Mount the cable on CableEye and execute TEST CABLE to acquire its wiring function.
- 2 – Use SEARCH DISK FOR MATCH with the EXACT MATCH option chosen. If the cable is recorded in the database, the Match Data Notes should tell you something about it, including the equipment for which it is intended. If there is no match, try reversing the cable left-to-right, retest, and search again.
- 3 – If there is no exact match in the database, search again with MATCH ON CONNECTORS ONLY chosen. You should find several matches; if you don't, try reversing the cable, retest, and search again. The first 20 characters of the Match Data Notes are shown for each match in the DESCRIPTION column. See if you can find your equipment listed here. It may be necessary to select a file and open it to read all the Match Data Notes.
- 4 – If you cannot find any close match in the database or if the Match Data Notes did not help, use PRINT/FULL SPECS to print a wiring diagram, and consult the manuals for the equipment you are using.

Likely Explanations When a Wrong Cable is Used –

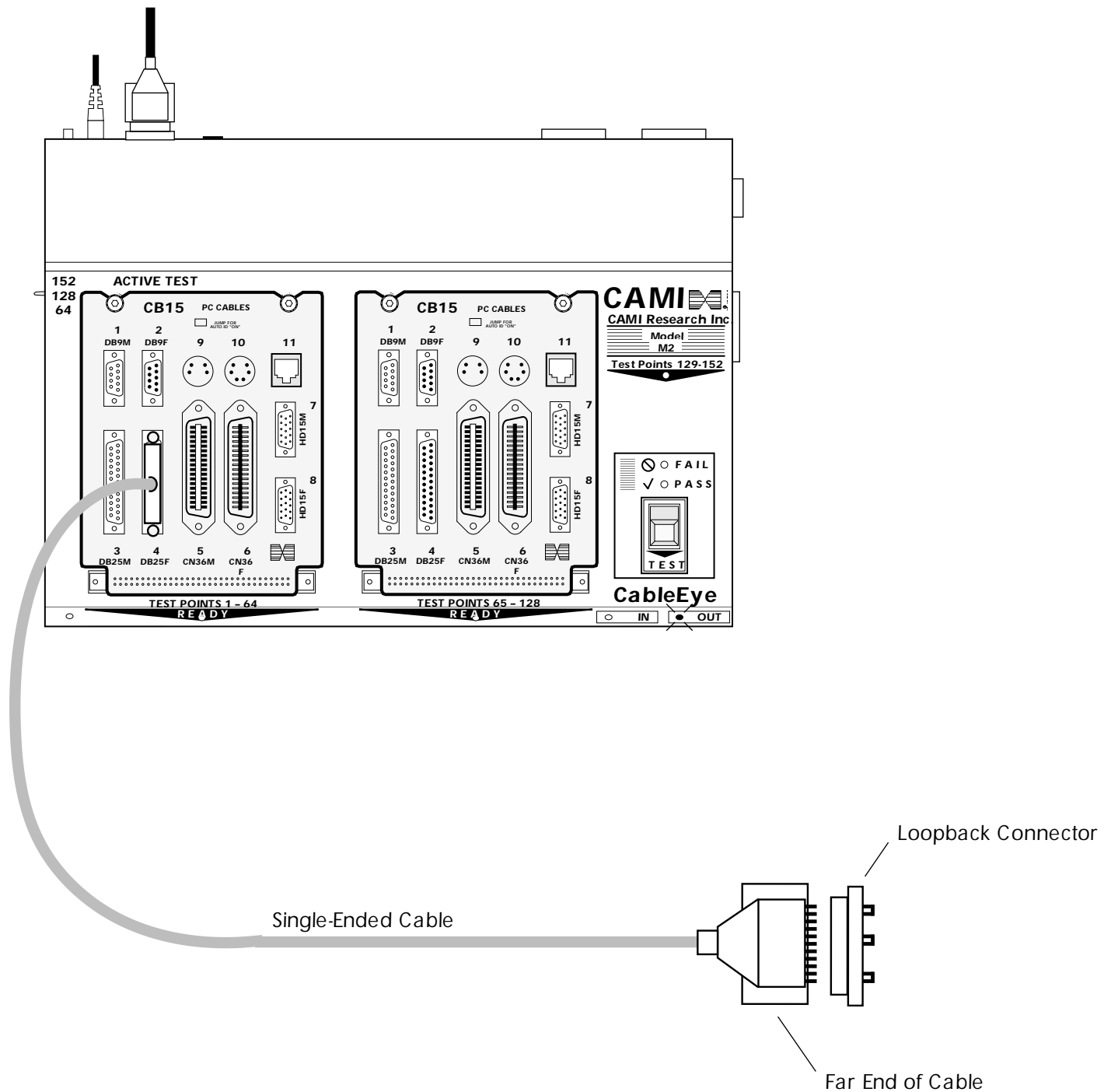
- The cable is intended for a DCE-to-DTE link, and you are connecting two DCE or two DTE devices. If you cannot obtain the correct cable, try inserting a Null Modem adapter or Null Modem cable between the existing cable and one of the devices.

- The cable may be installed backwards. If you are connecting two devices whose I/O connectors are the same gender, the cable may have self-connects on one side but not the other. Try reversing the two ends of the cable. If this fixes the problem, be sure to label the correct end of the cable to correspond with the proper equipment.
- Handshake signals are not getting through. If the data is being exchanged correctly at first but then errors begin to appear or the equipment halts, it is likely that handshaking (flow control) signals are not being received. When information can be delivered to a device faster than it is capable of using it, that device will send a handshake signal back to the source telling it to stop sending temporarily. If this signal does not reach the source because of an incorrect cable, incoming data will overflow and produce errors. Try inserting an EIA232 signal monitor between the cable and the device, and watch the RTS (Request-To-Send) and CTS (Clear-To-Send) signals. Refer to "The RS232 Standard" on our web site (www.camiresearch.com) for a description of the EIA232 standard with signal and pin definitions. If this is the problem, you must use a different cable or internally change the cable's wiring.
- Handshake signals have the wrong polarity. Sometimes handshake signals are wired to the correct pins but are asserting complemented logic signals. In this case, a peripheral may produce a positive handshake signal to signify that it is ready for data, but the computer assumes a positive handshake signal means "wait". In this case, the system will lock up and no data will ever be exchanged even though all cable wiring appears to be correct. This kind of problem can be rectified by rewiring the cable to use a different handshake signal, or by disabling handshaking entirely and always sending at a low enough Baud rate to ensure that the peripheral never overflows. Consult the peripheral manufacturer before making any changes to the cable.
- Unused handshake signals are unconnected. Any handshake or control signal inputs that are not used must be held in an inactive state by an internal cross-connect wire or pull-up resistor. Inputs that are unconnected are electrically floating and may react to static electricity, electrical noise, or variations in line voltage, causing sporadic errors or suddenly disabling the serial interface for no apparent reason. Consult the peripheral manufacturer before making any changes to the cable.

16.2 Testing Single-Ended Cables

CAUTION: Before testing any single-ended cable, be sure the cable contains no live conductors before testing (they should be unpowered and completely disconnected). You will damage CableEye if voltage is applied to the tester from an external source!

If only one end of a cable is available, you need to provide a return path for test signals



by attaching a *loopback connector* to the far end. The loopback connector should be wired so that jumpers at the far end of the cable bridge all the conductors you are testing and expect to be present. This will establish a closed-circuit loop between the CableEye end and the far end of the cable. If you find the connection present, you know that both conductors that make up the bridge are functioning.

After the loopback is attached to the far end, join the near end of the cable to a left-sided connector on CableEye, and execute TEST CABLE. The program may ask you what kind of connector is used. Select the appropriate one for the left. On the right, where there will be no connections, the program inserts a dummy Centronics 36-pin connector which can be ignored.

In any case, be sure any installed cables are completely disconnected from any signal sources before testing with CableEye.

Of course, you can always route a return cable from the far end back to CableEye. If possible, this is the best solution since no loopback is necessary. We have tested cables as long as 2000 feet with no problems, and the upper limit is likely to be even longer.

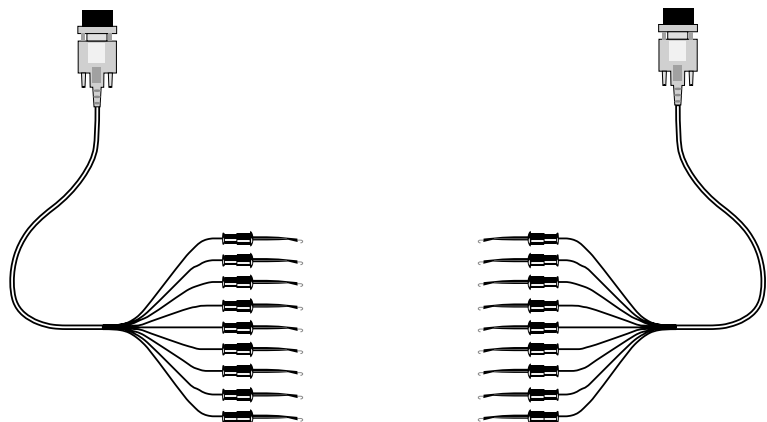
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16.3 Testing Bare Wire Terminations

When a cable or harness terminates in bare wires (no connector at either or both ends), you need a probe with which to hold each wire while under test. CAMI Research supplies MiniHook Cables (Item 710) as an option for CableEye for just this purpose. Alternatively, you may build your own using color-coded minihook grabbers (made by ITT/Pomona and other sources).

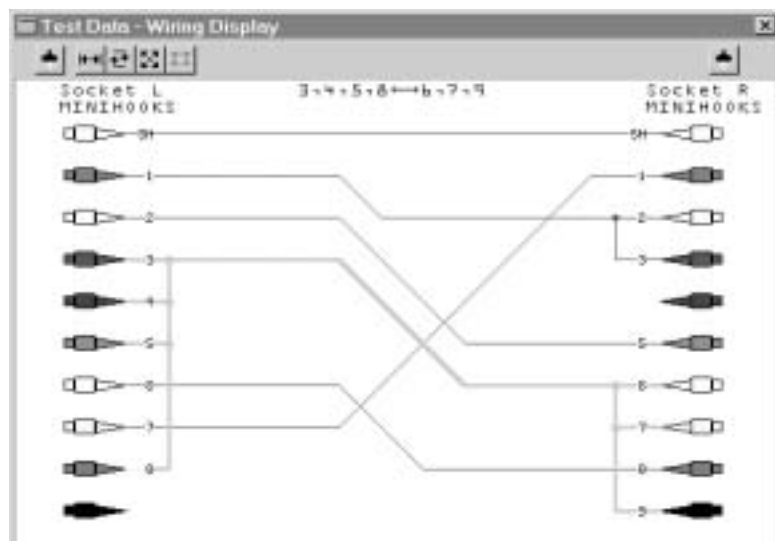
In this case, each test point terminates in a minihook which is then clipped to one wire of the harness.

The MiniHook cables supplied by CAMI Research consist of a set of two cables, each of which has ten color-coded hooks (black, brown, red, orange, yellow, green, blue, violet, gray, white). Thus, a total of twenty test points can be accommodated.



Each MiniHook cable joins to CableEye via a DB9 female connector as shown above. When wiring is scanned using the minihooks, all standard CableEye features are available. If you display wiring, ten discrete color-coded hooks are shown on each side of the screen and wiring is drawn between them to depict the harness wiring.

If the bare-wire harness under test requires more than 20 test points, you may use multiple Minihook cables with a junction box to transition the DB9 connectors to the 64-conductor flat cable, and then display wiring using the dual-row headers.



Alternatively, you may test 20 test points at a time with the same minihook set until all points are measured. Note that when you check a harness a few test points at a time, you must choose the test points carefully because of the inability to detect shorts across two group of wires measured at different times.