Troubleshooting Guidelines

6

In This Chapter. . . .

Isolating a Communication Problem

If you are experiencing a problem communicating with an EBC module, the problem can usually be isolated to one of four components of the communication link:

- the EBC module itself (hardware or firmware)
- the communication program or the setup of the EBC module
- the cabling and connections
- other external influences, such as electrical noise, heavy communication traffic on the network or exceeding the power budget

Diagnostic Tools and Techniques

Several available tools and techniques can help you isolate a communication problem:

- The LEDs on the face of the module indicate the status of the link, the module, and the network communications.
- Replacing the module may determine whether the problem is in the module.
- NetEdit3 displays a list of the active modules on the network and their protocol and configuration settings.
- Cable testing devices can pinpoint short or open circuits or diagnose attenuation problems and other cabling problems.
- Diagnostic tools within your PC-based Control software.

Troubleshooting Chart

The following chart summarizes the different types of communication failures you could experience. In each case the power must be applied to the base, and you must be attempting to communicate with the EBC in question.

The meaning of the **diagnostic LEDs** is explained begining on page 6-4.

Troubleshooting Chart	
Legend: ☐ Off ■ On ⧄ Flash	
EBC Module LEDs	**Corrective Action**
LINKGD ☐ ACT ☐ ERROR ■ OR LINKGD ☐ ACT ☐ ERROR ⧄ **H2–EBC100** STATUS ■ LINKGD ☐ ACTIVE ☐ ERROR ■ OR **H2–EBC100** STATUS ■ LINKGD ☐ ACTIVE ☐ ERROR ⧄	1. Cycle power to the base. This will clear the ERROR if it was due to a transient condition. 2. Replace EBC module

| Troubleshooting Chart (Continued)	
Legend: ☐ Off ■ On ▨ Flash	
EBC Module LEDs	**Corrective Action**
H2–EBC100 STATUS ■ LINKGD ☐ LINKGD ☐ ACT ☐ ACTIVE ☐ ERROR ☐ ERROR ☐	1. Try another cable that you know works. Check pinouts (see page 2–8). 2. Try another port on the hub or another hub. 3. Replace EBC module.
H2–EBC100 STATUS ■ LINKGD ■ LINKGD ■ ACT ☐ ACTIVE ☐ ERROR ☐ ERROR ☐	1. Try another cable between PC and hub. 2. Try another port on the hub or another hub. 3. Make sure you have not exceeded the recommended cable length for your network cable. The link signal could arrive with sufficient strength even though the data transmission does not. 4. Could be related to Windows configuration. Consult Windows documentation.
Note: This is also the indication of proper operation! Troubleshoot only if you are failing to exchange data. LINKGD ■ LINKGD ■ ACT ▨ OR ACT ■ ERROR ☐ ERROR ☐ **H2–EBC100** **H2–EBC100** STATUS ■ STATUS ■ LINKGD ■ OR LINKGD ■ ACTIVE ▨ ACTIVE ■ ERROR ☐ ERROR ☐	1. Try another cable between PC and hub or EBC and hub. 2. Try another port on the hub or another hub. 3. Look for errors in the setup of the EBC module.

EBC Module Diagnostic LEDs

EBC LEDs The EBC module has three indicator lights which show the status of the following:

- signal path between the EBC and the hub
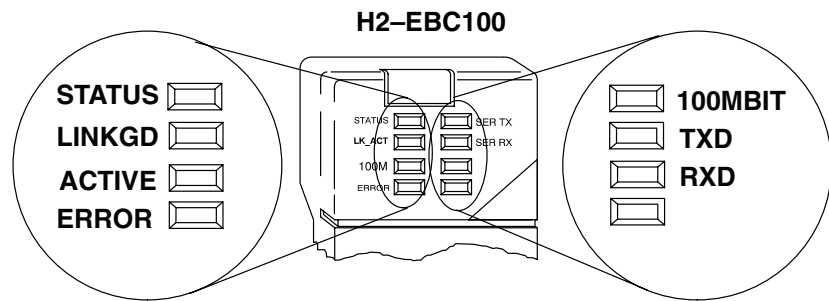- signal between a PC and an EBC
- EBC module hardware
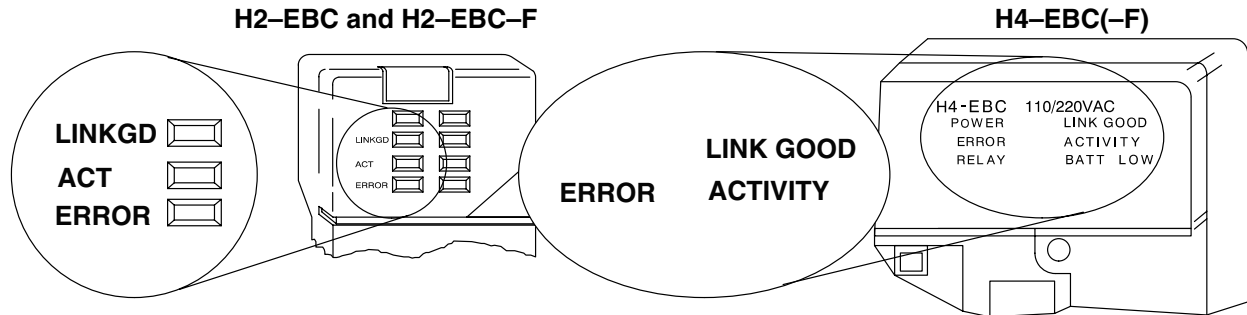
H2–EBC and H2–EBC–F **H4–EBC(–F)**

LINK GOOD Indicator The **green LINKGD** (LINK GOOD) LED is **on steady** when the EBC module is connected properly to an active device on the network and is receiving 5VDC operating voltage from the PLC power supply. The LINKGD LED verifies that the proper cables are connected, and the EBC module is functioning correctly. If a mismatch with the 10BaseT or 10BaseFL connections occurs this LED will not be illuminated.

ACTIVITY Indicator The **red ACT** (ACTIVITY) LED **flashes** to indicate that the module is detecting data on the network. If any network device is sending or receiving data, the ACT LED will be illuminated. In idle mode (no network traffic) this LED is OFF. During heavy communication loads this LED will be **on steady**.

ERROR Indicator If the EBC module's **red ERROR** indicator is **flashing** or **on steady**, a fatal error has occurred. The error may be in the EBC module itself, or a network problem may be causing this symptom. The ERROR indication can be caused by a faulty ground, an electrical spike or other types of electrical disturbances. Cycle power to the system to attempt clearing the error.

H2–EBC100

STATUS
LINKGD
ACTIVE
ERROR

STATUS   SER TX
LK_ACT   SER RX
100M
ERROR

100MBIT
TXD
RXD

STATUS Indicator	The **green STATUS** LED is **on steady** when the EBC module is receiving 5VDC operating voltage from the PLC power supply and self diagnostics indicates the module is functioning properly.
LINK GOOD Indicator	The **green LINKGD** (LINK GOOD) LED is **on steady** when the EBC module is connected properly to an active device on the network and is receiving 5VDC operating voltage from the PLC power supply. The LINKGD LED verifies that the proper cables are connected, and the EBC module is functioning correctly. If a mismatch with the 10BaseT or 10BaseFL connections occurs this LED will not be illuminated.
ACTIVITY Indicator	The **green ACT** (ACTIVITY) LED **flashes** to indicate that the module is detecting data on the network. If any network device is sending or receiving data, the ACT LED will be illuminated. In idle mode (no network traffic) this LED is OFF. During heavy communication loads this LED will be **on steady**.
ERROR Indicator	If the EBC module's **red ERROR** indicator is **flashing** or **on steady**, a fatal error has occurred. The error may be in the EBC module itself, or a network problem may be causing this symptom. The ERROR indication can be caused by a faulty ground, an electrical spike or other types of electrical disturbances. Cycle power to the system to attempt clearing the error.
100MBIT Indicator	The **green 100M** (100MB) LED is **on steady** when Ethernet data is detected at 100BaseT frequency.
Serial TXD Indicator	The **green** TXD (Serial TXD) LED flashes when the EBC's serial port is transmitting data.
Serial RXD Indicator	The **green** RXD (Serial RXD) LED flashes when the EBC's serial port is receiving data.

Using NetEdit3 for Troubleshooting

NetEdit3 is a software utility which came with this manual. To review the procedures for running and using NetEdit3, see Chapter 3. NetEdit3 allows you to:

- See active modules on the network.
- Examine and change the modules' configuration settings.
- See the firmware revision number.
- Review statistical information about communication errors by type.

You can also use your PC's DOS "Ping" command to verify communications with a network server. The PC's NIC must have the TCP/IP protocol enabled and the server must have a valid IP address. Visit www.microsoft.com for inforamtion on the "Ping" command.

Select a Module

The Module box shows the Ethernet Addresses of all modules which are currently linked to the NetEdit3 utility. If your EBC module is not on this list, try the following:

- Change Protocol selection and click on Query Network. See **Change Protocol** on the next page.

- Confirm that your PC has IPX or TCP/IP protocol loaded.

- Confirm that the EBC module's Link Good LED is on.
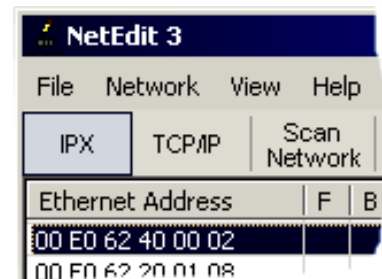
NOTE: The Ethernet Address (MAC) is permanently assigned at the factory, and it is printed on a label on the side of the EBC module. See page 3–13 if you need help locating the label.

**Module Info> General Information**

When the Module Info tab is selected, the *General Info* box lists the selected module's Firmware Revision, Booter Revision, DIP Switch Setting, PWB Revision, PLD Revision and CPU Revision.
This box is in the lower left section of the NetEdit3 screen.
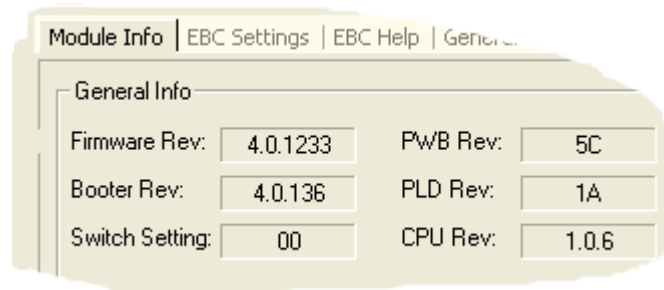
Change Protocol

If you are experiencing a problem communicating from your PC to a module that *does not* appear on the list of active modules, try changing the protocol and clicking on **Scan Network**. You may be able to link to your module with the other protocol.
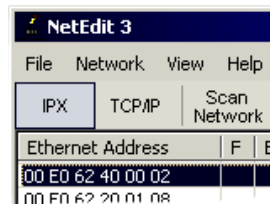
If you are not sure which protocol driver is loaded on your PC, refer to page 3–4, as well as your Windows documentation.

Ethernet Stats

If you are able to see the *problem* module on the list of modules currently active on the network, you can **select** the module to see the *Ethernet Stats* for that module. Select the module by clicking on the Ethernet Address in the Module box.
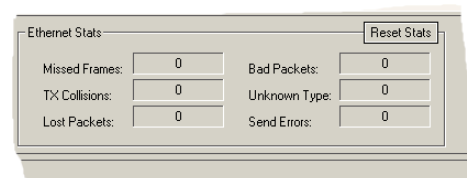
To begin a new statistical record, click the **Clear Stats** button.

The diagnostic information available in the *Ethernet Stats* box is:

- Missed Frames – frames lost due to unavailability of buffer space.

- TX Collisions – detected when RXD+ and RXD– become active during a data transmission. Two devices are trying to communicate at the same time.

- Lost Packets – packets that overflow the queue.

- Bad Packets – packets that fit the Ethernet standard but are not in the right format for the EBC module.

- Unknown Type – a foreign command was received and could not be interpreted. This will probably happen only during software driver development.

- Send Errors – the Ethernet standard number of retries were attempted for a transmission.

Replacing the EBC Module

If you are replacing an existing EBC module with a new one, you need to set up the new module with the same **Module ID** as the module you are replacing. If you used the **DIP switch** to set the Module ID, you will need to set the DIP switch on the replacement module to the same Module ID. See page 2–3 or 2–4 to review the procedure for setting the Module ID using the DIP switch.

If you set up your original EBC module using NetEdit3, you will need to duplicate the settings in the new module using the same procedures. See page 3–5 through 3–12 to review the procedures for using NetEdit3.

If you set up your original EBC module using your PC-based Control software, you will need to refer to the appropriate documentation.
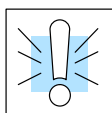
WARNING: Your system can be damaged if you install or remove system components before disconnecting the system power. To minimize the risk of equipment damage, electrical shock, or personal injury, always disconnect the system power before installing or removing any system component.

Diagnosing Network Cable Problems

If you are experiencing communication problems, swapping cables is one of the simplest diagnostic procedures you can perform. If the network operates correctly with a different cable, you have isolated and cured the problem. If possible, use a short run of cable to test the network because problems with longer cable runs can be more difficult to diagnose and are more often intermittent.

If you are unable to swap cables, verify the proper operation of all other network components. You probably have a cable problem if you have verified that your:

- EBC module is working correctly.
- EBC module configuration is correct.
- RLL program or PC program is correct.
- hubs are working correctly.
- Windows configuration is correct.
- network adapter card is the correct type, and it is working correctly.

It is a good maintenance practice to test network cables periodically and maintain a permanent record of cable characteristics. A number of cable test instruments are available to test 10/100BaseT and 10BaseFL networks. These instruments will check the electrical or optical characteristics of your cabling, including:

- Continuity – This is a check to make sure the communication pairs are wired correctly, and that the wires are continuous from end to end. In the case of fiber optic network this is a test to be sure light is transmitted from one end of the cable to the other.
- Attenuation – This refers to the amount of signal loss over the cable segment at the signal frequency of interest. The 10/100BaseT specification allows for a maximum signal loss of 11.5 decibels (dB) for the entire link at the signal frequency used by 10/100Mbps Ethernet. The 10BaseFL specification calls for the optical loss in link segment to be no greater than 12.5 dB.
- Crosstalk – Crosstalk occurs when a signal in one pair of wires is electromagnetically coupled to an adjacent pair. This is critical for10BaseT networks which are susceptible to noise interference. 10BaseFL networks are virtually immune to noise interference.

NOTE: Any significant difference between the cable characteristics of the transmitter and receiver can cause communication errors.

Ethernet devices continually monitor the "receive data" path for activity as a means of verifying their link is working correctly. When the network is idle, each network device (including the EBC module) sends a periodic *link test* signal to verify that the network is working. If the link test signal or other network activity is not received periodically, the Link Good LED on the EBC module is turned off.