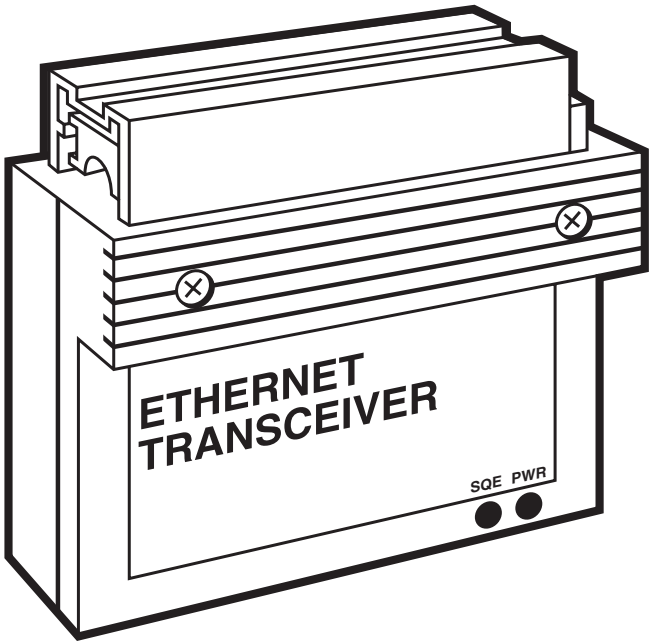
BLACK BOX®
NETWORK SERVICES

MAY 2001
LE003A, LE004A,
LE005A, LE006A,
LE1003A, LE1004A,
LE1005A

Ethernet Transceiver
BNC Transceiver
Remote AUI Monitor



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This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

TRADEMARKS USED IN THIS MANUAL

Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

Contents

NOTE

- **The Black Box Transceivers LE1003A, LE1004A, and LE1006A do not include a Remote AUI Monitor.**
- **All references to a Remote AUI Monitor apply only to models LE003A, LE004A, and LE006A.**

1.0 Specifications

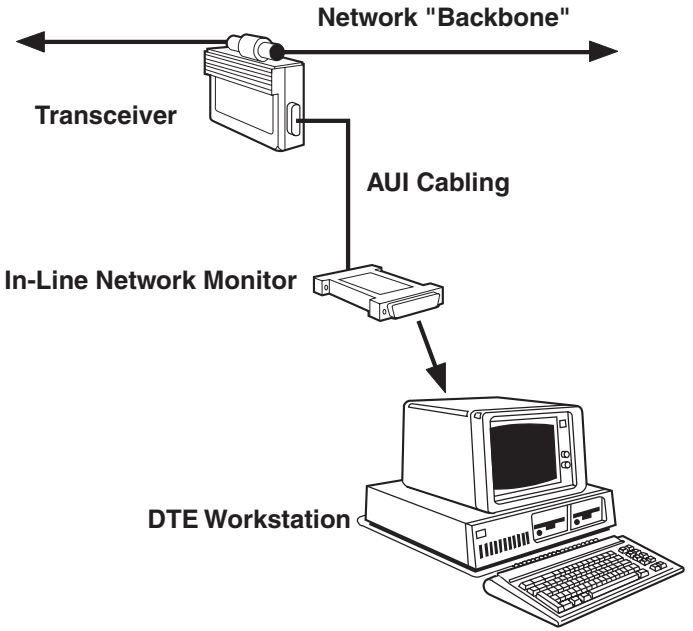
Standards —	IEEE 802.3
Power Requirements —	10 to 15V, 250 mA typical at 12 VDC, 350 mA maximum
Connectors—	LE003A: DB-15P Male connector with locking posts. Coaxial Cable Tap (“Vampire”/ piercing tap)
	LE004A: DB-15P Male connector with locking posts. Coaxial Cable Tap (“BNC” tap)
	LE005A: DB-15P Male connector with locking posts. DB-15S Female with slide latch.
Indicators —	LE003A, LE004A: Power, SQE
	LE005A: Power, Collision, Receive, Transmit
Operating Temperature —	0 to 131° F (0 to 55° C)
Storage Temperature —	-13 to +194° F (-25 to +90° C)
Operating Humidity —	5%-95% non-condensing
Dimensions —	LE003A, LE004A: 1.4”H x 3.1”W x 3.3”L
	LE005A: 1.6”H x 2.5”W x .75”L
Weight —	LE003A, LE004A: 12 oz.
	LE005A: 1.5 oz.

2.0 Introduction

The Ethernet and BNC Transceivers enable you to attach servers, computers, workstations, and other forms of data terminal equipment to any Ethernet or IEEE 802.3 network.

Each transceiver draws its power from the attached LAN device. A green power LED located on the front panel indicates that power is present. The other LED displays the status of the SQE (Signal Quality Error) test function.

The Remote AUI Monitor is located between the DTE and the Transceiver. Four LEDs display the Transmit, Receive, Collision and Power status of the LAN. Figure 2-1 shows a sample setup using a Remote AUI Monitor and a BNC Transceiver.



NOTE

The In-line Monitor applies only to models LE003A, LE004A, and LE006A.

Figure 2-1. Typical Setup With Remote AUI Monitor and BNC Transceiver.

2.1 Transceiver Features

The following features of the Transceivers and Monitor add to the functionality of your LAN.

- The Ethernet and BNC Transceivers transmit and receive data at a rate of 10 Mbps.
- The Ethernet and BNC Transceivers contain a circuit which constantly monitors the signals on the coaxial cable for packet collisions. When a collision occurs, the Transceivers send a SQE signal to the host controller. The Collision LED on the Remote AUI Monitor lights when a collison takes place.
- The Transceivers' circuit also performs an SQE Test to ensure that the station to which the Transceiver is connected can detect packet collisions. The test is performed on each successful transmission. A switch on the circuit board allows you to enable or disable the SQE Test. If you disable the test, you can connect an IEEE 802.3 repeater (or any other device unable to tolerate the test) to the coaxial cable.
- The Transceiver's circuitry provides "jabber control" to protect the network from a continuously transmitting station.

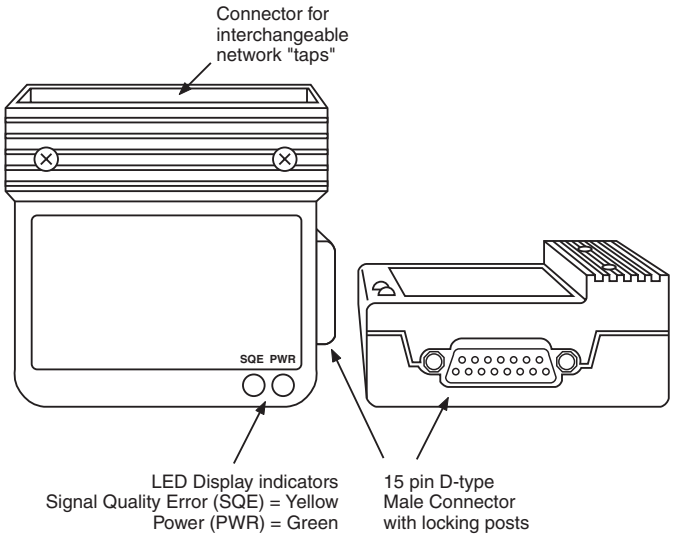


Figure 2-2. Ethernet and BNC Transceiver Features.

- The Remote AUI Monitor allows you to perform diagnostics on Transceivers hidden from view (LE003A, LE004A, LE006A only)s.
- The Monitor does not require any external power. Its power is provided by the AUI interface on the connected DTE device.

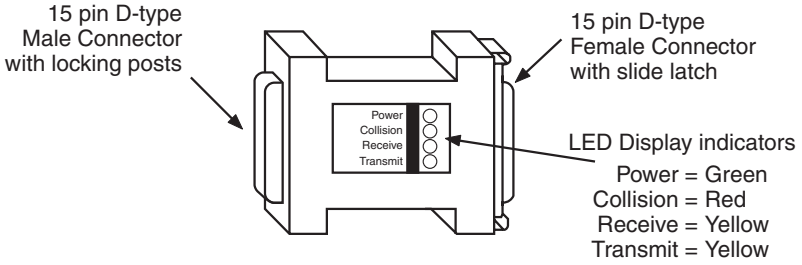


Figure 2-3. Remote AUI Monitor Features.

3.0 Installation

To install your Ethernet or BNC Transceiver, you will need a Transceiver Installation Kit (LN012). Figure 3-1 displays the components of the Installation Kit.

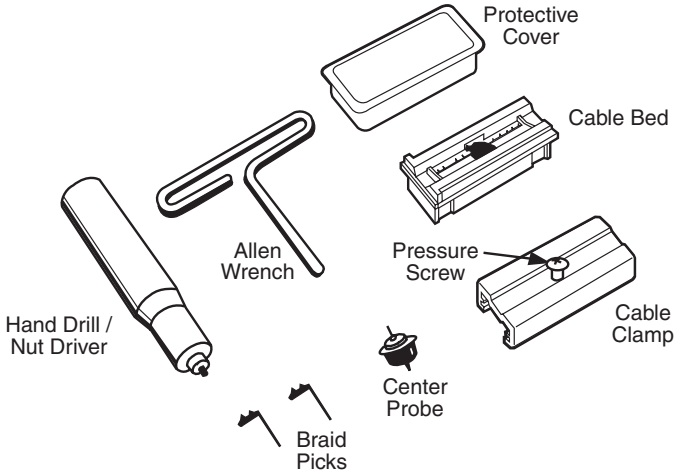


Figure 3-1. Transceiver Installation Kit.

3.1 Unpacking

After unpacking, be sure to inspect your Transceiver or Monitor for any signs of damage which may have occurred during shipping.

3.2 Setting The SQE Test Switch

The SQE Test Switch is located on the Transceiver printed circuit board. The yellow SQE LED is located next to the Power LED on the Transceiver. When the LED is lit, the SQE test is enabled. After you disable the SQE test, the LED goes out.

The default setting of the SQE Test jumper is On. To change the setting, follow the steps below:

1. If a tap is connected to the Transceiver, remove it.

2. Locate the jumper (see Figure 3-2). Set the jumper to 0 to disable the test. To enable the test, set the switch to 1.

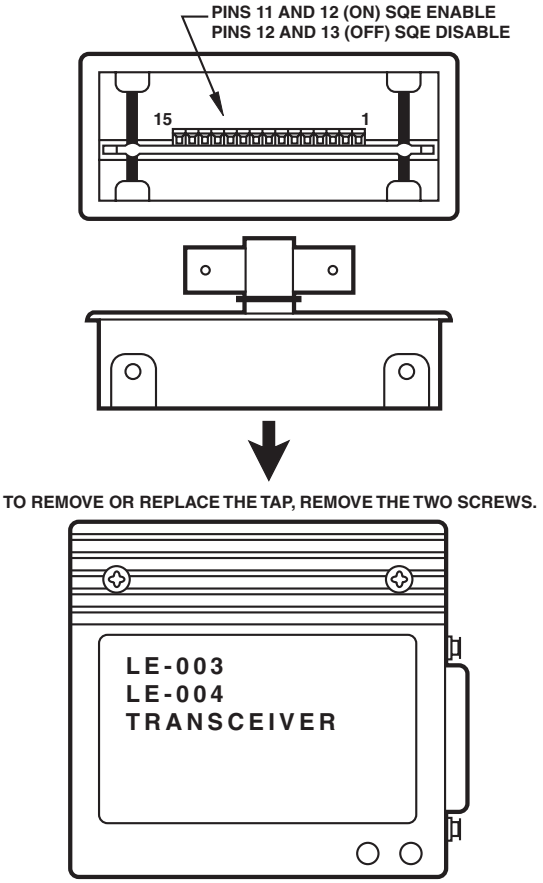


Figure 3-2. Disabling The SQE Test.

3.3 Installation Procedure for the Ethernet Transceiver

Figure 3-3 shows the installation of an Ethernet Transceiver. You can install the Transceiver while the network is in operation or while it is down. Follow steps 1-13 to install the Transceiver. For steps 2-5, refer to Figure 3-4.

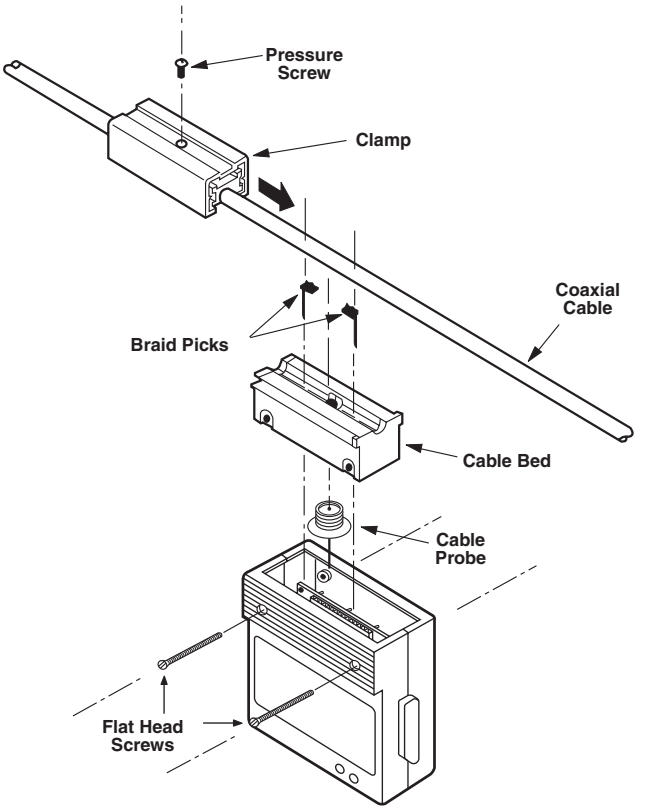


Figure 3-3. Installing the Ethernet Transceiver.

1. Remove the cable bed and braid picks from the blister-pack card. Remove and save the safety cover from the cable bed.

2. Insert the braid picks into the holes in the cable bed. Make sure the long dimension of the top of the braid pick is parallel to the direction of the cable.

3. Determine the Transceiver's mounting position on the coaxial cable. Orient the cable bed in the position you want it to assume after the Transceiver is attached.

4. Press the coaxial cable firmly down into the cable bed.

5. Slide the clamp along the cable and into the guide slots in the cable bed. Make sure the clamp is as far into the slots as possible.

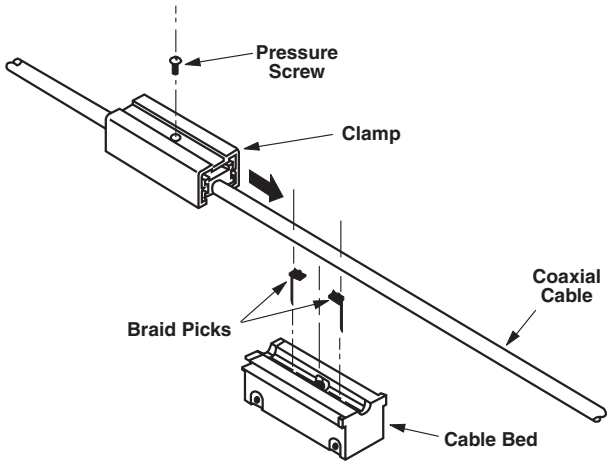


Figure 3-4. Installing the Cable.

6. Insert the black pressure screw into the hole in the top of clamp. Grasp the Allen wrench (see Figure 3-5) and tighten the pressure screw until it is snug. When the wrench begins to bend under pressure where your thumb is resting, you have tightened the screw enough. Do not overtighten the screw.

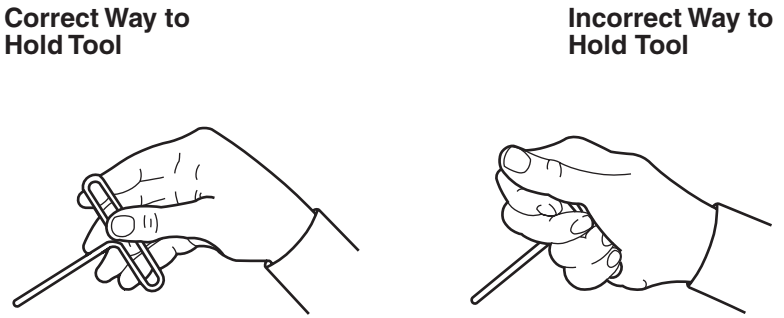


Figure 3-5. Allen Wrench Usage.

NOTE

Overtightening the black pressure screw may cause the threaded hole in the tap's clamp to dislodge. If this happens, you can not use the tap.

7. Insert the hand drill clockwise, and drill a hole into the cable (see Figure 3-6). When the drill begins to turn easily, remove it and check the hole. The hole must be clean and free of debris; use a tweezer to remove any dirt. (If there is any debris present, stray pieces of shield braid may short to the center conductor when you install the center probe.)

The hole should go through the outer yellow jacket, through the metal-braid inner shield, and into the white inner insulation of the cable. This hole allows allows the probe to contact hte cable's center conductor, located below the white insulation.

8. Use your fingers to push the probe into the threaded space in the cable bed (see Figure 3-6). Turn the probe clockwise.

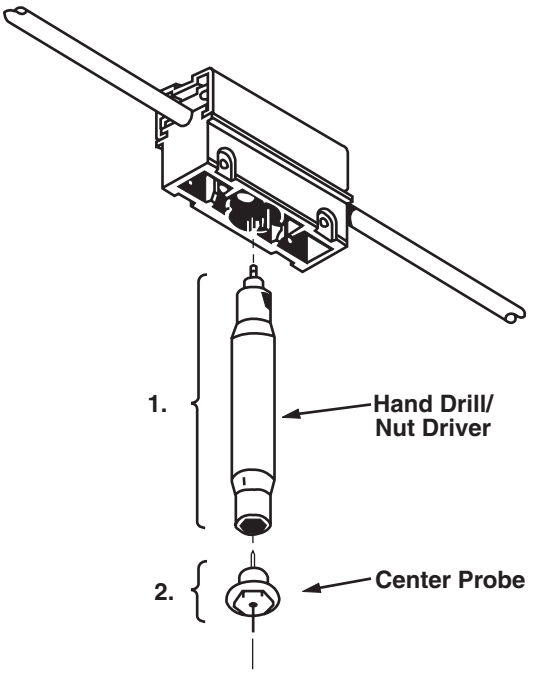


Figure 3-6. Cable Installation.

9. Use the nut driver to tighten the center probe. Do not overtighten.

10. If the network is not in operation, use an ohmmeter to check that the center probe is inserted properly.

NOTE

Use of an ohmmeter while the network is operating will disrupt communication. Do not perform this test during network operation.

To perform the test, attach one lead of the ohmmeter to a braid pick post and the other lead to the center probe post as shown in Figure 3-7. This tests the resistance between the cable's center conductor and outer shield. The correct reading should be between 23 and 28 ohms (if the cable has 50-ohm terminators on each end).

If the reading is near 0 ohms, the center probe has a short circuit. Correct the circuit by drilling out the hole more. The hole must be free of loose braid wires.

If the reading is much greater than 28 ohms, the center probe is not in contact with the center conductor of the coaxial cable. To correct this problem, tighten the clamp with the Allen wrench and measure again. If the reading is still too high, check the probe. If it is bent or broken, replace it.

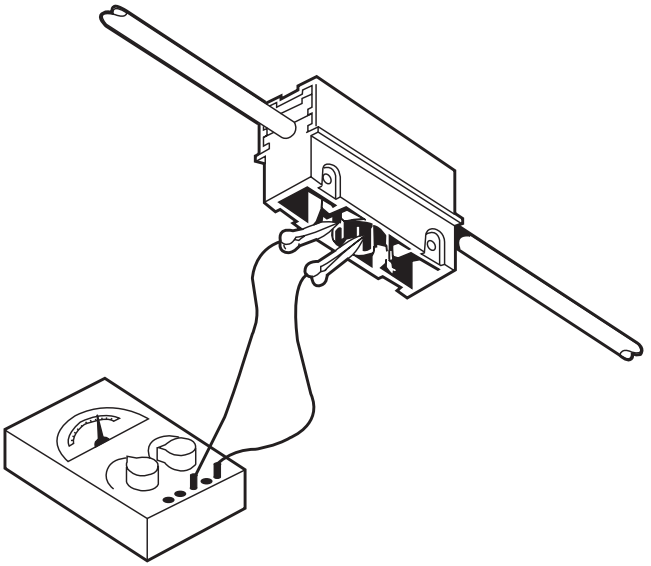


figure 3-7. Ohmmeter Test.

11. Position the Transceiver case below the tap. The rectangular hole in the case must be aligned with the tap. Also, make sure the pins in the tap (center pins and braid pins) line up with the connector on the circuit board inside the case.

12. Slide the tap into the Transceiver case. The tap should slide into the case easy. If it does not, don't force it. Make sure the pins in the tap are lined up properly.

13. Insert and tighten the flat-head screws as shown in Figure 3-8. They should fit snugly into the tap.

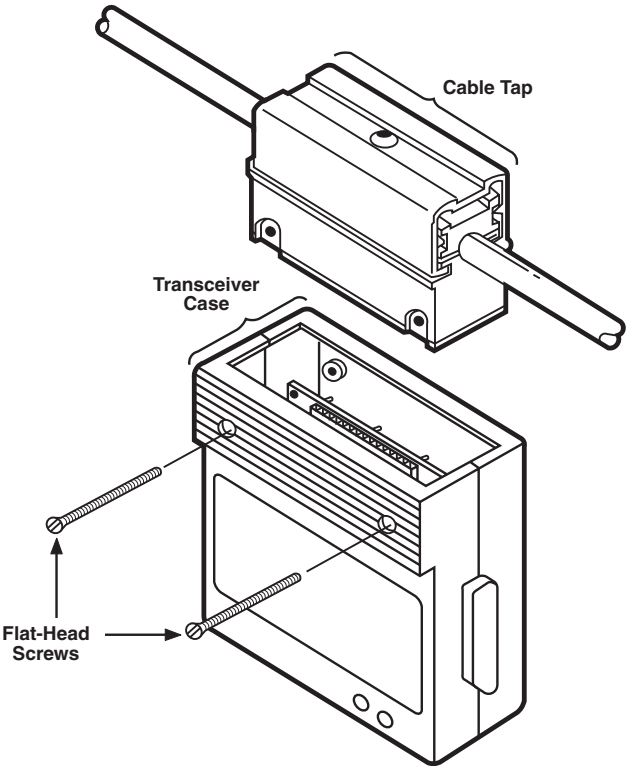


Figure 3-8. Inserting the Flat-Head Screws.

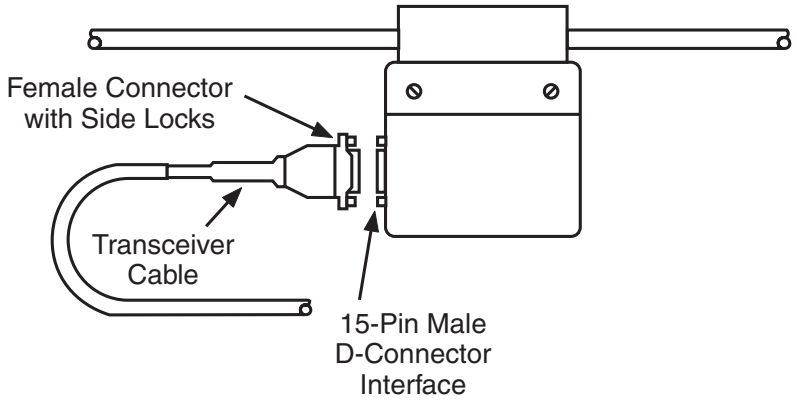


Figure 3-9. Connecting the Etherent Transciever to a Controller.

Stand-alone controllers have a 15-pin connector to mate with the transceiver cable.

NOTE

The transceiver receives its power through the transceiver cable. If the transceiver cable is connected to a board-level controller in a host system, the current surge caused by the transceiver's power up may disrupt the system's operation.

Follow the steps below to install the special interface cable on the host system (see Figure 3-10).

1. Choose the location on the system bulkhead where you will mount the cable.

2. Fasten the mounting bracket to the system bulkhead with mounting screws to ground the cable's connector shield to the system bulkhead.

When the interface cable and/or external transceiver cable connections are complete, the green PWR LED on the External Transceiver is illuminated. Figure 3-10 shows a board level controller cabled to an Ethernet Transceiver.

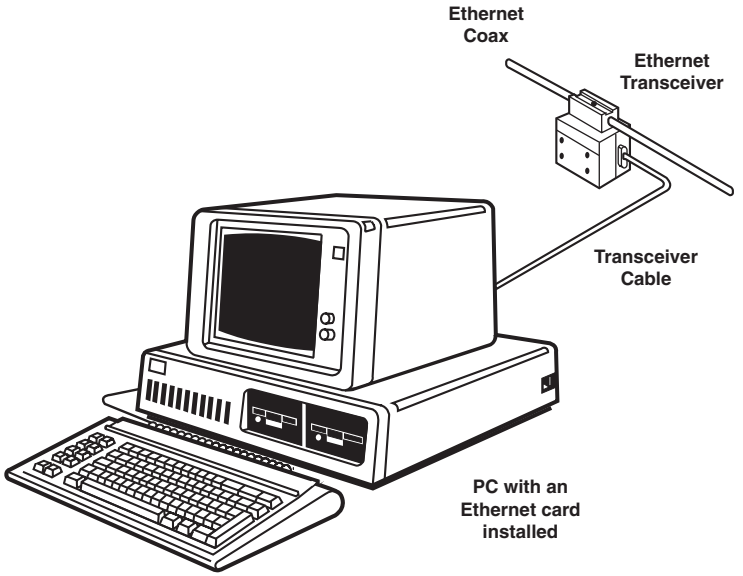


Figure 3-10. Ethernet Controller Cabled to an Ethernet Transceiver.

3.4 Connecting The BNC Transceiver

To install the BNC Transceiver follow the steps below:

1. The SQE Test default setting is On. If you want to disable this test, remove the tap assembly and set the switch according to the instructions given in Section 3.2. To remove the tap assembly, remove the flat-head screws (Figure 3-8) and pull the tap from the unit.

2. Locate the place of installation. If a barrel connector is present in the coaxial cable, you can install the BNC Transceiver in place of it. If there is no barrel connector present, you must install a pair of BNC-type plugs. The Transceiver is equipped with BNC-type receptacles.

3. Cut the cable and terminate the ends with a BNC-type plug. Follow the procedure appropriate to the type of plug used. Note that the network will not be usable while the cable is cut, so plan the installation to minimize network disruption.

4. After installing the plugs on the cable ends, thread them onto the connector adapter of the transceiver unit.

5. Slide the protective boot (if used) over each connector to prevent accidental contact with building metal.

3.5 Installing the Remote AUI Monitor (LE003A, LE004A, LE006A only)

To install the Remote AUI Monitor, follow the steps below:

1. Connect the male DB15 end of the Monitor to the AUI port of the Ethernet controller on the device to be monitored.

2. Connect the male DB15 end of the AUI (transceiver) cable to the female end of the Remote AUI Monitor.

3. Connect the female end of AUI cable to the Ethernet or BNC Transceiver.

3.6 Removal

3.6.1 Removing The Ethernet Transceiver

To remove the Ethernet Transceiver (see Figure 3-12), you must first remove the transceiver body from the transceiver tap. Then, remove the transceiver tap from the coaxial cable. It is safe to remove the Transceiver while the network is in operation.

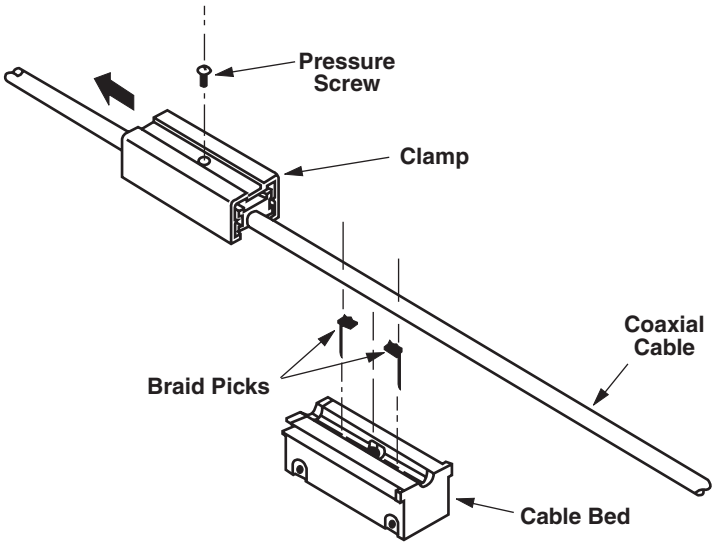


Figure 3-11. Removing the Ethernet Transceiver

Follow the steps below to remove the transceiver body from the transceiver tap:

1. Remove the two flat-head screws on the side of the transceiver case.

2. Pull the tap up and out of the case. The tap body should disengage from the circuit board, located inside the Transceiver's case.

Follow the steps below to remove the transceiver tap from the coaxial cable:

1. Cover the pins with the protective cover to prevent them from getting bent or damaged.

2. Use the Allen wrench to loosen the pressure screw on the top of the tap.

3. Slide the tap's clamp along the coaxial cable until it is free of the cable bed.

4. Gently pull the cable from the cable bed.

5. Remove the braid picks from the cable.

NOTE

When re-installing an Ethernet Transceiver, drill a new hole in the cable. Cover the old hole with electric tape. You should also replace the old braid picks with new ones. Make sure the center probe is not bent or damaged. If it is, replace it.

3.6.2 Removing The BNC Transceiver

To remove the BNC Transceiver, remove the two screws in the side of the body and slide the transceiver away from the adapter. You may leave the connector adapter in the cable without disrupting the network. However, it is recommended that you remove the adapter and put a BNC female barrel connector in its place.

NOTE

Removing the BNC Transceiver will disrupt the network. Try to plan the removal so as to minimize the effect on network users.

Follow the steps below to remove the BNC Transceiver.

1. Cover the pins with the protective cover to prevent them from getting bent or damaged.

2. To rmove the BNC tap assembly from the coaxial cable, twist the body of the BNC connectors and remove the thin coaxial cable from the BNC tap assembly.

3. Re-connect the two pieces of coaxial cable with a BNC female-to-female barrel connector.

4.0 Troubleshooting

4.1 No LEDS Are Lit

If none of the Transceiver LEDs are lit, there could be a problem with the Transceiver, the internal or external transceiver cables, or the attached controller. Follow the procedures below to isolate the problem.

- Check all of the internal and external transceiver cable connections to make sure they are correct.
- Substitute a Transceiver that you are positive is working properly. If the problem disappears, the original Transceiver must be replaced.
- Check the controller for visible signs (the LEDs) to be sure it is receiving power.

4.2 The Controller is not Responding

If the Transceiver's LEDs are lit, but the controller will not respond, follow the procedures below to isolate the problem:

- If you have recently installed the controller in your system, check its configuration.
- If you determine that the controller is not the source of the problem, power down the network. Use an ohmmeter to determine if a short exists between the tap's center probe and the cozxial cable's center conductor.

4.3 System Crash

The Transceiver receives its power from the attached controller. When the Transceiver powers up, it may cause a surge in current that disrupts the operation of the host system. If this occurs, cycle the host system's power supply and reboot the operating system.

4.3 Remote AUI Monitor Troubleshooting for the LE003A, LE004A, & LE006A

Use the table below as a guide for determining problems with the Remote AUI Monitor.

Table 4-1. Remote AUI Monitor Troubleshooting

LED Status				SQE	Problem
Power	Collision	Receive	Transmit	Status	
Off	Off	Off	Off		DTE or DTE card bad
On	Off	Off	Pulsed		Transceiver or AUI cable bad
On	Off	Off	On		Transmit side of DTE
On	Off	Off	Off		Transmit side of DTE
On	On	On	Off		Tap not terminated Properly or backbone is inoperative
On	On	Off	Pulsed	On	SQE On
On	Off	On	Pulsed	Off	SQE Off

NOTE

If there is a short in the backbone cable and the SQE is on, the Remote AUI Monitor indicates normal activity.

NOTES

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