



Open Controller Ethernet Interface Module

(1747-OCENET)

Installation Instructions

Before You Begin

The Ethernet interface module supports Ethernet communications to networks running at 10 Mbps or 100 Mbps.

You can install two Ethernet interface modules per 1746 I/O chassis.

Before you install the interface module, you must have already installed a PCI expansion bus and an open controller CPU in the I/O chassis.

What this package contains:

- 1747-OCENET interface module
- Ethernet drivers disks (two)

What You Need

- 1746 series B I/O chassis with a 1747-OCPCIx expansion bus and 1747OC-xxxx open controller CPU already installed
- a DOS, Microsoft® Windows NT® or a compatible operating system installed on the open controller (This document supports driver installation for DOS and Windows NT operating systems only.)
- twisted pair Ethernet cable (category 3, 4, or 5) with RJ-45 connector
- for 100 Mbps communication, a 100BASE-TX hub; for 10 Mbps communication, a 10BASE-T hub

Handling the Module

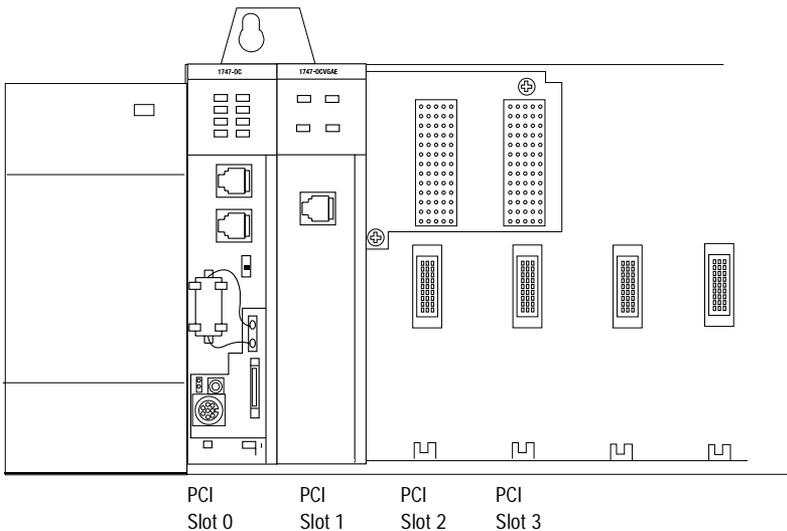
ATTENTION: ESD can cause internal circuit damage that might not be apparent during installation or initial use. Take these precautions to guard against ESD damage:

- Before handling the module, touch a grounding object to discharge any static charge that you may have built up
- Wear a grounding wriststrap
- Avoid touching backplane connector or connector pins
- If the module is not in use, store it in the anti-static packaging in which it was shipped

Installing the Interface Module

1. Turn off power to the open controller chassis.
2. Slide the interface module into slot 1, 2, or 3 of the PCI expansion bus. The open controller CPU must be in slot 0. Even if the PCI expansion bus has more than four slots, the interface module must still reside in slot 1, 2, or 3. (The interface module needs a PCI master slot and only the first four slots of the expansion bus are PCI master slots.)

Figure 1 Installing the Interface Module



The interface module must be installed in PCI Slot 1, 2, or 3 only

3. Attach the Ethernet cable from your network to the RJ-45 connector on the module.

Configuring the Card for Ethernet Communication

The PCI-based open controller automatically detects the presence of the Ethernet interface module when it boots. Since the IRQ level and I/O address of the module are set automatically each time you start the open controller, you do not have to configure these settings. The PCI controller will select the same IRQ level and I/O address each time the open controller is booted, as long as you do not make any changes to the open controller system.

Installing an Ethernet Driver

You need to copy the drivers from the floppy disk provided with the interface module, to the open controller. Use the following table to select the correct procedure:

Floppy drive module ¹ installed in chassis?	Operating System	Refer to procedure on:
No	Windows NT or DOS	page 4
Yes	Windows NT	page 7
Yes	DOS	page 8

¹For more information about the open controller floppy drive module, contact Automation Value, LLC, at sales@avllc.com

Using a PC to Copy Drivers from Floppy Disk to the Open Controller

If you do not have a floppy drive module installed in the open controller system, you can copy the drivers to the open controller using a personal computer connected to the COM2 port on the open controller. Properly connected, the PC emulates a floppy drive for the open controller.

To perform this procedure you need:

- a monitor connected to a 1747-OCVGA1 or 1747-OCVGAE module
- a keyboard connected to the open controller
- a PC, laptop or desktop
- remote boot-up utility (hostsvr.exe) on the PC (the remote boot-up utility is included on the diagnostic/utility disk that comes with the open controller)
- 1747-OCSBC or compatible 9-pin null modem serial cable
- bootable floppy disk in the floppy drive of the PC

Important: This procedure provides access only to the floppy drive of the PC, not the hard drive. The PC keyboard and monitor are inactive.

ATTENTION: You perform the steps in the procedure using the monitor and keyboard that are connected to the open controller. Using the PC keyboard breaks the host/server connection.

To boot the open controller from the floppy drive on the PC:

1. Connect the serial port of your PC to COM2 of the open controller. You can use the 1747-OCSBC serial cable.
2. Place a DOS-bootable floppy disk in the floppy disk drive on the PC running `hostsvr.exe`.
3. Run `hostsvr /comn` on the PC, where *n* is the COM port on the PC that is running `hostsvr`.

If the PC is running Windows 95 or Windows NT you must reboot to standard MS-DOS to use `hostsvr`. This utility won't run reliably using the DOS shell within a Windows application.

This utility displays status information on the screen on the PC. Once you escape from the display, the remote connection ends.

ATTENTION: Don't use the PC keyboard to run any application. Doing so would interrupt the connection to the PC.

4. Make sure that COM2 on the open controller is configured for RS-232. For information about configuring COM2, refer to the open controller user manual, publication 1747-6.16.
5. Change BIOS settings on the open controller using the information in the following table.

This BIOS area	requires these settings
Advanced CMOS Setup	Bootup Sequence: a:, c:, CDROM

6. Cycle power to the open controller.

During system boot, the open controller monitor displays this message underneath the AMIBIOS system configuration screen:

```
COM2: Emulating Drive A:
```

The open controller sees the floppy drive on the PC as its own.

ATTENTION: The `hostsvr` utility makes the PC emulate a floppy drive. You only have access to the floppy drive on the PC, not to the keyboard or other drives of the PC running `hostsvr`.

If there is not a bootable floppy disk in drive A: of the PC, the open controller will boot from its own C: drive as long as the C: drive is bootable. If the open controller boots from the C: drive, you can still access the A: drive of the PC as long as `hostsvr` is running on the PC.

7. Continuing the procedure to install Ethernet drivers to the open controller, create a directory on the open controller hard drive called `c:\temp`.
8. On the remote computer, remove the bootable floppy and insert one of the Ethernet drivers disk.
9. Using the `xcopy` command, copy all the files on the disk to the `temp` directory on the open controller hard drive.

Important: Choose the directory that matches the open controller that you are using. For example, if you are running Windows NT, copy all the files in the NT subdirectory to the `c:\temp` directory on the open controller.

10. Repeat steps 8 and 9 for the second Ethernet drivers disk.

Installing the Windows NT Driver with a Floppy Drive Module Installed in the Chassis

ATTENTION: For Novell and NetWare Clients running under DOS, go to the procedure on page 8.

Create a directory on the open controller hard drive called `C:\temp`. Copy the contents of the Ethernet drivers disks to this temp directory.

To install the Windows NT driver:

1. Double-click the Network icon in the Control Panel.
2. Click the Adapters tab.
3. Click Add. You'll see a list of adapters.
Do not select an adapter from this list.
4. Click Have Disk and load the drivers from the temporary directory that you created when you copied the drivers from the Ethernet drivers disk.
5. Follow the instructions on the screen to install the drivers. After adding the Ethernet interface module, you will see it listed in the Network adapters list.
6. Select the interface module and click Properties to run PROSet. (PROSet is a utility that tests the board for proper hardware settings and performs diagnostics.) Hardware diagnostics are available only when drivers aren't loaded (before you restart the open controller). Driver diagnostics are available after the drivers have been loaded.

PROSet is an enhanced utility that you can use to easily configure and test the interface module in the Windows NT operating system.

7. Click OK in the main PROSet window to return to operating system.

The interface module appears on the list in the Network window. Click Close to finish.

8. Restart the operating system when prompted.

ATTENTION: If you ever need to run PROSet software again, go to the Adapters tab in the Network control panel and click Properties.

Installing Network Drivers for Novell and NetWare Clients with a Floppy Drive Module Installed in the Chassis

ATTENTION: If you are using NetWare Client 32, refer to the NetWare README files.

Create a directory on the open controller hard drive called `C:\temp`. Copy the contents of the Ethernet drivers disks to this temp directory.

Running Setup to Install Network Drivers

Setup can automatically install NetWare DOS ODI client drivers for you or display a README file with installation instructions for other network operating system (NOS) drivers.

1. If the open controller already has other network drivers installed, restart without reloading them. If the drivers are loaded from the `AUTOEXEC.BAT` or `CONFIG.SYS` file, type `REM` in front of each line in those files that loads the network driver. You can also bypass the drivers with DOS 6.x systems by pressing `F5` as DOS starts.
2. Switch the DOS prompt to the temp directory that you previously created and run `SETUP.EXE`.
3. Select Automatic Setup from the Main menu, then follow the instructions on the screen.

Setup displays the module's configuration and then runs a series of diagnostic tests that make sure the adapter and network are functioning properly. If Setup finds a problem, it displays the results and some possible solutions.

4. When Setup finishes the tests, you'll see the Install Network Drivers screen.
5. Select the driver you want to install. Setup can install a NetWare client driver for you. If you're installing other drivers, Setup displays a README file with installation instructions.

Troubleshooting

If you can't connect to a server, try the suggestions listed here, then turn to "Technical Information" on page 16.

- Make sure that you are using the drivers for this module.
The driver file name contains the letter **B**, i.e. E100**B**ODI.COM.
- If you are replacing an existing module, make sure that the LINK statement in your NET.CFG is correct for the new module. For example, the LINK statement for a NetWare client should be:

```
LINK DRIVER E100BODI
```

- Verify the frame type in your NET.CFG file matches your network.
- If setting up a server, check your LOAD and BIND statements.
- Test the module by running diagnostics in Setup.
- Check the README files.

Selecting Duplex Mode

Duplexing is a performance option that lets you choose how the module sends and receives data packets over the network. The module can operate at full duplex only when connected to a full duplex 10BASE-T or 100BASE-X switching hub, or another full duplex device. The 1747-OCENET module supports three duplexing modes:

- **Auto** (This mode requires a full duplex device or switching hub with auto-negotiation capability.) The module negotiates with the hub to send and receive packets at the highest rate. This is the default setting. If the hub does not provide auto-negotiation, the module runs at half-duplex.
- **Full duplex** (This mode requires a full duplex switch or device.) The module can send and receive packets at the same time. This mode can increase adapter performance capability. If the full duplex switch provides auto-negotiation, the module runs at full duplex. If the full duplex switch does not provide auto-negotiation, you need to set the module duplex mode manually because it defaults to half duplex.

- **Half duplex** The module performs one operation at a time; it either sends or receives.

Note: If your module is running at 100 Mbps and half-duplex, the potential bandwidth is still higher than running 10 Mbps and full duplex.

Manually Configuring for Full Duplex

If your network hub supports auto-negotiation with the N-way standard, the duplex configuration is automatic and no action is required on your part. However, few network hubs in the current installed base support auto-negotiation. Check with your network system administrator to verify. Most installations will require manual configuration to change to full duplex.

Configuration is specific to the driver that you're loading for your network operating system (NOS).

To set up the duplex mode, refer to the section below that corresponds to your operating system.

ATTENTION: Module performance may be affected, or the module may not operate if your network hub doesn't support full duplex and you configure the module for full duplex. Always set the speed when setting the duplex.

DOS, ODI, NDIS 2.01 Clients

Edit the NET.CFG or PROTOCOL.INI file.

Add these keywords to the Link Driver section

```
FORCEDUPLEX 2
```

```
SPEED 100 (or 10 if 10BASE-T)
```

NetWare Server

In AUTOEXEC.NCF load E100B.LAN and add the following statement. For servers, you must include the equal sign.

```
FORCEDUPLEX=2
```

```
SPEED=100 (or 10 if 10BASE-T)
```

For more information, see the README file for NetWare servers.

Windows NT Operating System

While running the Windows NT operating system:

1. From the Control Panel, double-click the PROSet icon.

PROSet examines your system and displays the Adapter Setup window.

2. From the window that appears, click Settings.
You'll see the Adapter Setup window.
3. Click the menu for Network Speed.
4. Click 100 or 10 Mbps, depending on the hub speed.
5. Click the menu for Duplex Mode.
6. Click Full.
7. Click OK when finished.
8. Click Restart Windows NT.

Troubleshooting

If the adapter can't connect to the network:

1. Make sure the cable is installed properly

The network cable must be securely attached at both RJ-45 connections (module and hub). The maximum allowable distance from the module to the hub is 100 meters. If the cable is attached and the distance is within acceptable limits, but the problem persists, try a different cable.

If you're directly connecting two modules (no hub), use a crossover cable. Most hubs require a straight-through cable, while most switches require a crossover cable (see your hub or switch documentation to verify this information).

2. Check the LED lights on the module

The interface module has four diagnostic LEDs above the cable connector. These lights help indicate if there's a problem with the connector, cable, or hub. The following table describes the LEDs:

Table 1: LED Descriptions

LED	Indication	Description
POWER	On	The module and the hub or switch are receiving power.
	Off	The module and the hub are not receiving power.
ENET LINK	On	The cable connection between the hub and the module is good.
	Off	The cable connection between the hub and the module is faulty, or you have a driver configuration problem.
ENET ACTIVITY	On or Flashing	The module is sending or receiving network data. The frequency of the flashes varies with the amount of network data.
	Off	The module is not sending or receiving network data.
ENET SPEED 100	On	Operating at 100 Mbps
	Off	Operating at 10 Mbps

3. Make sure you are using correct drivers

Make sure that you are using the drivers that are included with this module. The driver file name contains the letter B (for example, E100BODI.DOS).

4. Make sure switch port and adapter have the same duplex setting

If you configured the module for full duplex, make sure the switch port is also configured for full duplex. Setting the wrong duplex mode can degrade performance, cause data loss, or result in lost connections.

Running Diagnostics

DOS

Run Setup from the Ethernet drivers disk:

1. Switch the DOS prompt to the temp directory that you previously created and run `SETUP.EXE`.
2. Select Automatic Setup from the Main menu, then follow the instructions on the screen.

Setup displays the module's configuration and then runs a series of diagnostic tests that make sure the adapter and network are functioning properly. If Setup finds a problem, it displays the results and some possible solutions.

Windows NT

Run PROSet by double-clicking the PROSet icon in the Control Panel. Click Help from the main PROSet window to get complete diagnostics information and instructions.

Common Problems and Solutions

SETUP.EXE reports that the module is "Not enabled by BIOS."

- The PCI BIOS isn't configuring the module correctly. Refer to "Technical Information" on page 16.

The computer hangs when the drivers are loaded.

- Change the PCI BIOS interrupt settings. Refer to "Technical Information" on page 16.
- If you are using EMM386, it must be version 4.49 or newer (this version ships with MS-DOS 6.22 or greater).

Diagnostics pass, but the connections fail or errors occur.

- At 100 Mbps use Category 5 wiring and make sure the network cable is securely attached.
- For NetWare clients, make sure you specify the correct frame type in your NET.CFG file.
- Make sure the duplex mode setting on the module matches the setting on the hub.
- At 100 Mbps, connect to a 100BASE-TX hub only (not 100BASE-T4).

The ENET LINK LED doesn't light.

- Make sure that you've loaded the network drivers.
- Check all connections at the module and the hub.
- Try another port on the hub.
- Make sure the duplex mode setting on the module matches the setting on the hub.
- Make sure you have the correct type of cable between the module and the hub. 100BASE-TX requires two pairs. Some hubs require a crossover cable while others require a straight-through cable. See the Cabling README file for more information on cabling.

The ENET ACTIVITY LED doesn't light.

- Make sure that you've loaded the network drivers.
- Check all connections at the module and the hub.
- Try another port on the hub.
- Make sure the duplex mode setting on the module matches the setting on the hub.
- Make sure you have the correct type of cable between the module and the hub. 100BASE-TX requires two pairs. Some hubs require a crossover cable while others require a straight-through cable. See the Cabling README file for more information on cabling.

The module stopped working without apparent cause.

- Run the diagnostics.
- Try reseating the module first, then try a different slot if necessary.
- The network driver files may be corrupt or defective. Delete and then reinstall the drivers.

Technical Information

Power Supplies

This module can be used with these Allen Bradley power supplies:

1746-P1, -P2, -P3 or -P4

Always verify that modules installed in your chassis don't exceed the rating of your selected power supply.

PCI Installation

The open controller is designed to automatically configure add-in modules each time the controller starts. The open controller sets the I/O address and IRQ level for the interface module when the open controller starts. These values cannot be changed by the module's software. If you experience a problem when the computer starts, additional configuration steps may be required.

On the open controller, manual configuration is possible through the computer's PCI BIOS set up utility. Refer to your open controller user manual, publication 1747-6.16 for more information. You may need to verify or change some BIOS settings.

A common PCI solution is to reserve interrupts (IRQs) and/or memory addresses for ISA adapters. This prevents PCI cards from trying to use the same settings the ISA cards are using. Check your PCI BIOS setup. There are IRQ options in the plug-and-play sections of the BIOS.

Fast Ethernet Wiring: 100BASE-TX Specification

The 100BASE-TX specification supports 100 Mbps transmission over two pairs of Category 5 twisted-pair Ethernet (TPE) wiring. One pair is for transmit operations and the other for receive operations. Segment lengths are limited to 100 meters with 100BASE-TX for signal timing reasons. This complies with the EIA 568 wiring standard.

Faster Ethernet hubs and switches

The two basic types of hubs are shared hubs (hubs) and switching hubs (switches). The interface module can be used with either type of hub for 10 Mbps communication. At 100 Mbps, a TX hub or switch is required.

Shared Hubs In a shared network environment, computers are connected to hubs called repeaters. All parts of the repeater hub share fixed amount of bandwidth, or data capacity. On a 100 Mbps shared hub, all nodes on the hub must share the 100 Mbps of bandwidth. As stations are added to the hub, the effective bandwidth available to any individual station gets smaller. Shared hubs do not support full duplex.

You can think of a shared repeater hub as a single-lane highway that everyone shares. As the number of vehicles on the highway increases, the traffic becomes congested and transit time increases for individual cars.

On a shared hub, all nodes must operate at the same speed, either 10 Mbps or 100 Mbps. Fast Ethernet repeaters provide 100 Mbps of available bandwidth, ten times more than what's available with a 10BASE-T repeaters.

Repeaters use a well-established, uncomplicated design, making them highly cost-effective for connecting PCs with a workgroup. These are the most common type of Ethernet hubs in the installed base.

Switching Hubs In a switched network environment, each port gets a fixed dedicated amount of bandwidth. In the highway scenario, each car has its own lane on a multi-lane highway and there is no sharing.

In a switched environment, data is sent only to the port that leads to the proper destination station. Network bandwidth is not shared among all stations, and each new station added to the switch gets access to the full bandwidth of the network.

If a new user is added to a 100 Mbps switching hub, the new station receives its own dedicated 100 Mbps link and doesn't impact the 100 Mbps bandwidth of another station. Switching hubs can effectively increase the overall bandwidth available on the network, significantly improving performance. Switching hubs can also support full duplex.

European Directive Compliance

If this product is installed within the European Union or EEA regions and has the CE mark, the following regulations apply.

EMC Directive

This apparatus is tested to meet Council Directive 89/336 Electromagnetic Compatibility (EMC) using a technical construction file and the following standards, in whole or part:

- EN 50081-2 EMC - Generic Emission Standard, Part 2 - Industrial Environment
- EN 50082-2 EMC - Generic Immunity Standard, Part 2 - Industrial Environment

The product described in this manual is intended for use in an industrial environment.

Low Voltage Directive

This apparatus is also designed to meet Council Direct 73/23 Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests.

For specific information that the above norm requires, see the appropriate sections in this manual, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1
- Automation Systems Catalog, publication B111

CUL Hazardous Location Approval

CUL certifies products for general use as well as for use in hazardous locations. Actual CUL certification is indicated by the product label as shown below, and not by statements in any user documentation.

Example of the CUL certification product label:



CL I, DIV 2
GP A,B,C,D
TEMP



To comply with CUL certification for use in hazardous locations, the following information becomes a part of the product literature for this CUL-certified industrial control product.

- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or non-hazardous locations only.
- The products having the appropriate CUL markings (that is, Class I, Division 2, Groups A, B, C, D) are certified for use in other equipment where the suitability of combination (that is, application or use) is determined by the CUL or the local inspection office having jurisdiction.

Important: Due to the modular nature of a programmable control system, the product with the highest temperature rating determines the overall temperature code rating of a programmable control system in a Class I, Division 2, location. The temperature code rating is marked on the product label as shown.

Temperature code rating:



CL I, DIV 2
GP A,B,C,D
TEMP



Look for temperature code rating here.

The following warnings apply to products having CUL certification for use in hazardous locations.

WARNING: Explosion hazard--



- Substitution of components may impair suitability for Class I, Division 2.
- Do not replace components unless power has been switched off or the area is known to be non-hazardous.
- Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- Do not disconnect connectors unless power has been switched off or the area is known to be non-hazardous. Secure any user-supplied connectors that mate to external circuits on this equipment by using screws, sliding latches, threaded connectors, or other means such that any connection can withstand a 15 Newton (3.4 lb.) separating force applied for a minimum of one minute.
- Batteries must only be changed in an area known to be non-hazardous.

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Pour satisfaire à la certification CUL en environnements dangereux, les informations suivantes font partie intégrante de la documentation des produits de commande industrielle certifiés.

- Cet équipement ne convient qu'à une utilisation dans des environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux.
- Les produits portant le marquage CUL approprié (c'est-à-dire Classe 1, Division 2, Groupes A, B, C, D) sont certifiés pour une utilisation avec d'autres équipements, les combinaisons d'applications et d'utilisation étant déterminées par la CUL ou le bureau local d'inspection.

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Code de température :



CL I, DIV 2
GP A,B,C,D
TEMP



Le code de température est indiqué ici.

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AVERTISSEMENT : Risque d'explosion --



- La substitution de composants peut rendre ce matériel inadapté à une utilisation en environnement de Classe 1, Division 2.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de remplacer des composants.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs fournis par l'utilisateur pour se brancher aux circuits externes de cet appareil à l'aide de vis, loquets coulissants, connecteurs filetés ou autres, de sorte que les connexions résistent à une force de séparation de 15 Newtons (1,5 kg - 3,4 lb.) appliquée pendant au moins une minute.
- S'assurer que l'environnement est classé non dangereux avant de changer les piles.

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Asia Pacific Headquarters, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846



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