

# Setup and Installation

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## ECOM Network Identifiers

This section describes the various methods of assigning a network identifier to the ECOM module. Each module must be assigned at least one unique identifier to make it possible for PCs or other ECOMs to recognize it on the network. Four methods of identifying the ECOM module give it the flexibility to fit most networking schemes.

The four ECOM identifiers are:

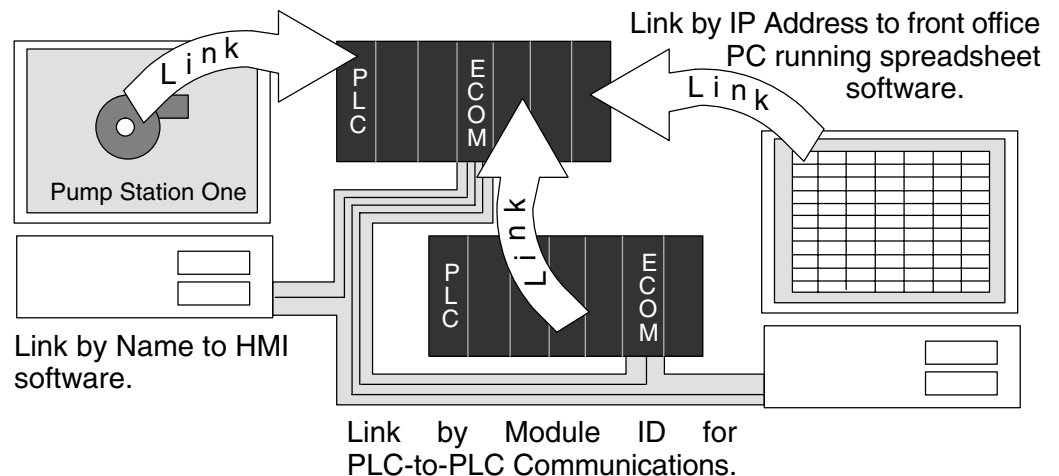
- Module ID
- Name
- IP (Internet Protocol) Address
- Ethernet Address

The first three are user-selectable. The last one is set at the factory. Each of the identifiers is discussed below (also see the chart on page 2-11). If you have more than a few ECOMs on your network, consider making a chart or spreadsheet of network IDs, as shown below:

Ethernet Address	Module ID	Name	IP Address
00 E0 62 20 01 20	3	PumpStationTwo	192.168.100.005
00 E0 62 20 01 58	8	Effluent	255.255.255.255
00 E0 62 20 01 8D	17	BldgThree	192.168.100.001
00 E0 62 20 01 94	2	PumpStationOne	192.168.100.002
00 E0 62 20 01 DE	61		192.168.100.003
00 E0 62 20 01 F1	33		192.168.100.004
00 E0 62 20 01 FB	1	Control Room	255.255.255.255
00 E0 62 20 01 F0	5	Mixer	192.168.100.006

The decision about which type of identifier to use is an important one. Much of the decision depends on the requirements of your particular application. PC-to-PLC communications are generally better accommodated with one type of identifier while PLC-to-PLC communications require a different type. Ease of maintenance and troubleshooting also must be considered before deciding which type to use.

The identifiers are used to **link** your PC to your PLC or one PLC to another PLC. The flexible design of the module allows you to use different identifiers for different links to the same module. This is particularly important if you require both PC-to-PLC and PLC-to-PLC communications on the same network.

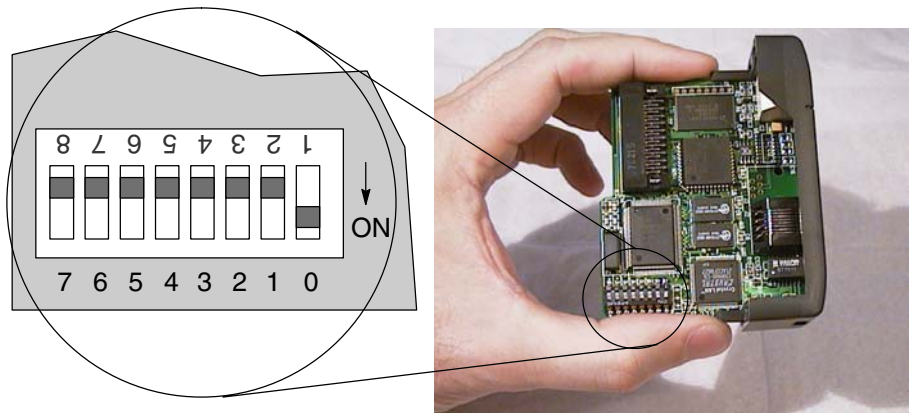


**Module ID**

A Module ID is *required* for PLC-to-PLC communications, and it can be set either of two ways. You can assign the Module ID:

- using the DIP switches on the module.
- using the configuration tools in NetEdit, **DirectSOFT32** or our DSData Server.

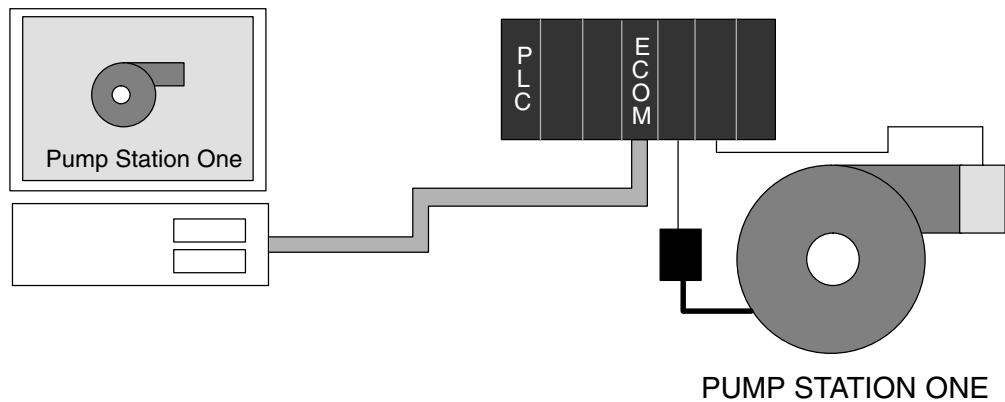
Use the DIP switch if you want the ability to install or change modules *without using a PC* to set the Module ID. Set the module's DIP switch, insert the module in the base, and connect the network cable. Your Module ID is set on powerup, and your ECOM is ready to communicate on the network. We step through setting the DIP switch on pages 2-5 and 2-6.



If you prefer to be able to set or change all Module IDs on your network from a single PC, use the tools in NetEdit, **DirectSOFT32** or our DSData Server software. Starting on page 2-7, we step through the use of NetEdit and the network identifier options.

**Name**

A Name makes it easy to recognize the PLC by its function. An example of a Name is "PumpStationOne." The Name can be up to 32 alphanumeric characters in length. A Name can be assigned using NetEdit, **DirectSOFT32** or our DSData Server. See page 2-10 to learn how to assign a Name to an ECOM module.



**NOTE:** Some HMI software products will not accept Names with numbers as the first character, spaces or certain other non-alphanumeric ASCII characters. Also, your HMI product may not accept Names longer than 16 characters. Consult your HMI product documentation about its naming conventions.

## IP Address IP Netmask

An IP Address can be assigned to the ECOM module if your network requires one. Usually, the IP Address is required in cases where PLCs are sharing the same network with PCs, and some of the PCs are carrying out functions unrelated to PLC control. Normally, a network administrator will assign an IP Address and to each device on the network. If you have a separate dedicated network for your PLCs, you do not have to use the IP Address, unless you are using the UDP/IP protocol (see page 2-8). You can use the Module ID or a Name for each communication link.

You can use NetEdit, *DirectSOFT32*, or our DSDData Server to give your ECOM module an IP Address. See page 2-10 to learn how to change an IP Address.

The module ships from the factory with an IP Address of 255.255.255.255. This is not a usable IP Address for normal communications. It only serves as a default setting which can be changed using NetEdit, *DirectSOFT32* or our DSDData Server. The **valid settings are 0 through 254**. You do not have to change the default IP Address unless you are using the IP Address to link to your ECOM module. The default setting does not cause conflicts with other network communications.

If you change the default IP Address for linking to other network devices, you must change all four "255" fields. If any field contains **the number 255 and other fields have been changed, the module will not be recognized on the network.**

### Example

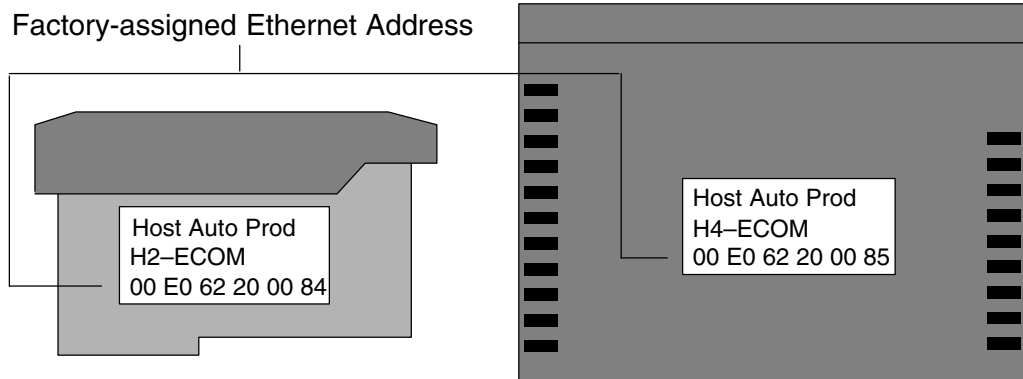
Valid IP Address:	192.168.100.002
No!	<del>255.168.100.002</del>



**WARNING:** It is extremely important not to have duplicate IP Addresses on your network. If you are using the IP Address to link the ECOM to **any** network devices (PCs or PLCs), the ECOM must have a unique number.

## Ethernet Address

A unique Ethernet Address is assigned to each module at the factory and will not change. It is printed on a label attached to each ECOM module. The Ethernet Address is recognized by NetEdit, *DirectSOFT32* and our DSDData Server. The Ethernet Address is a twelve digit number with no deliberate relationship to your network or functional areas of your plant. It does not usually serve as a convenient and easily remembered identifier for your ECOM.



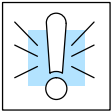
## Using Multiple Network Identifiers

You can use the IP Address to satisfy network requirements, a Name for PCs running HMI software and the Module ID for PLCs to share data among themselves. Using one type of identifier does not limit your use of the other identifier types.

## Setting the Module ID with the DIP Switch

You can use the DIP switch on the ECOM module to set the Module ID to a number from one to sixty-three. Each module on a given network must be assigned a **unique** Module ID if the Module ID is to be used for communications. Do not use Module ID "0" for communications.

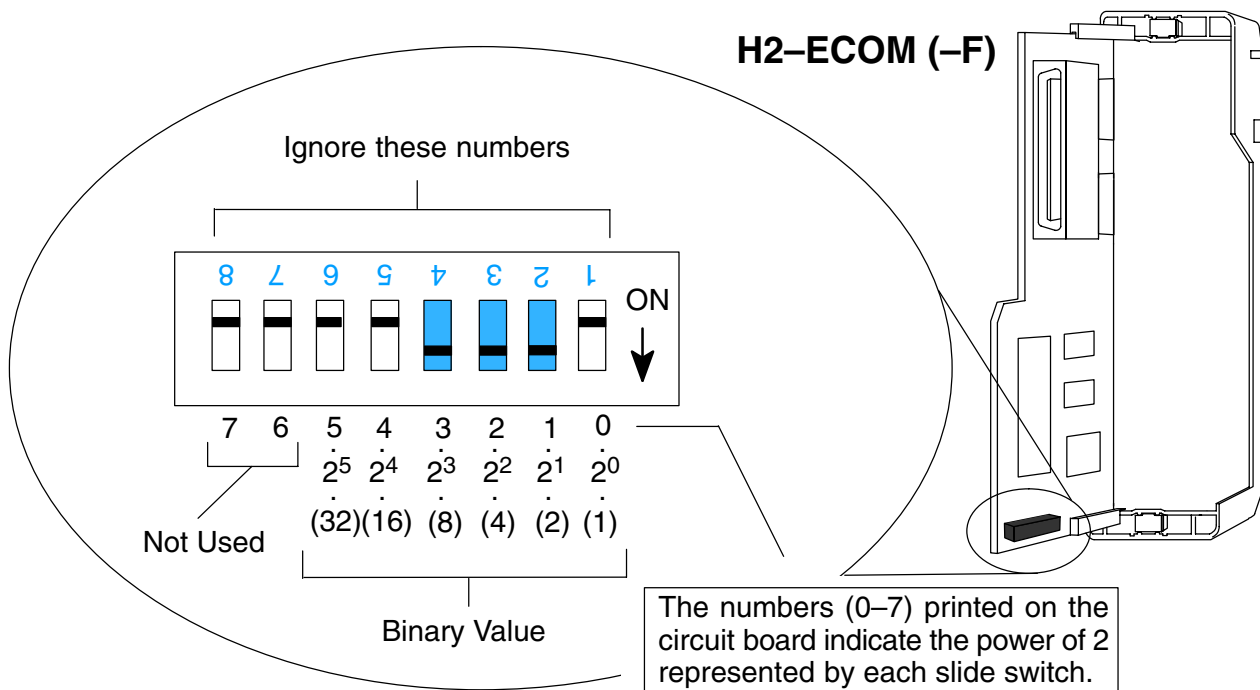
If the DIP switch is set to a number greater than 0, the software tools are disabled from setting the Module ID. The software tools will only allow changes to the Module ID if the DIP switch setting is 0 (zero, all switches OFF). The DIP switch settings are read at powerup. You *can* use the software tools to set the Name and IP Address even if you use the DIP switch for setting the Module ID.



**WARNING:** Using duplicate Module IDs on a single network will cause unreliable PLC-to-PLC communications.

### The H2-ECOM (-F) DIP Switch

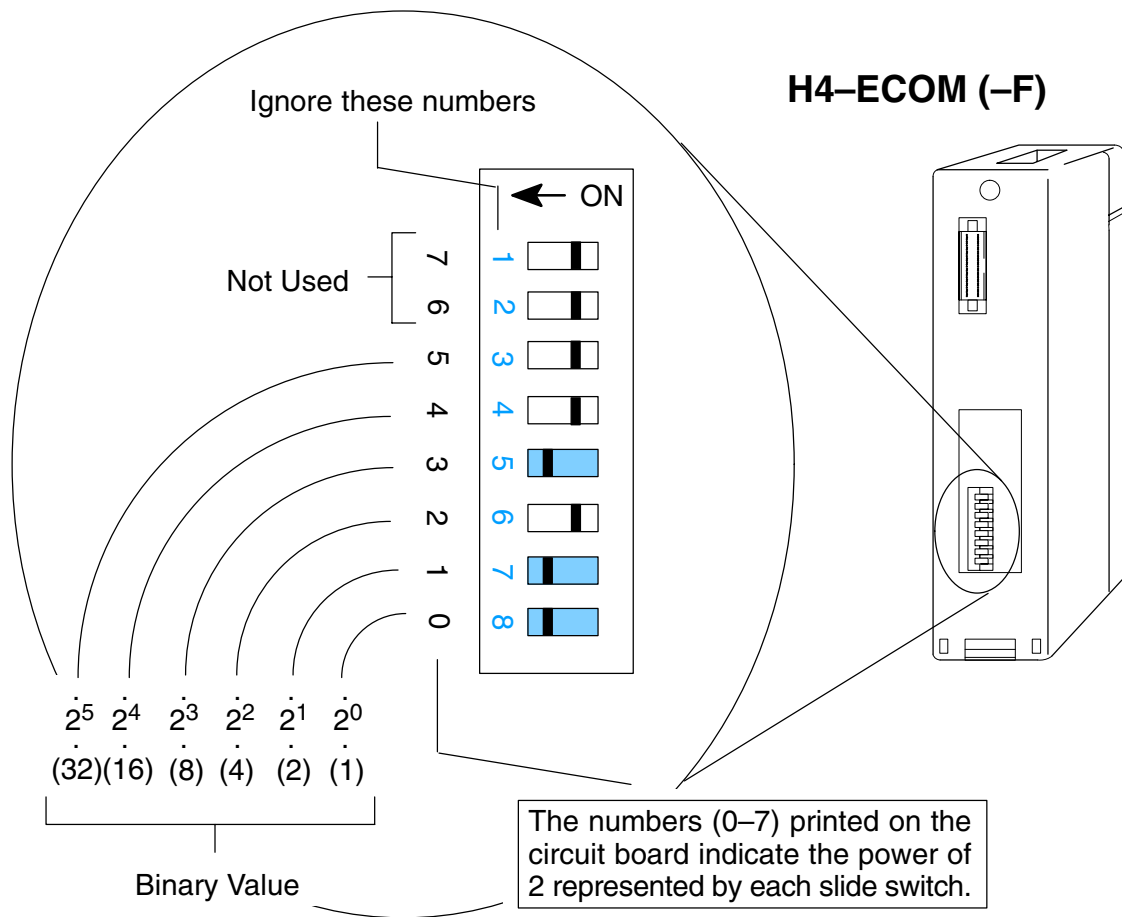
The H2-ECOM DIP switch contains eight individual slide switches, but only six of these are active. Two are not used. Notice that the individual slide switches are labeled 1 through 8 on the body of the DIP switch (upside down in the figure below). You will also find that the printed circuit board is labeled 0 (zero) through 7. We use the labeling *on the printed circuit board* in describing how to set the switch. The numbers on the printed circuit board indicate the power of 2 represented by each slide switch. For example, switch 0 represents  $2^0$  (or 1), switch 1 is  $2^1$  (or 2), switch 2 is  $2^2$  (or 4), and so on. The figure below shows the binary value of each switch in parentheses ( ).



The Module ID equals the *sum* of the binary values of the slide switches set in the ON position. For example, if you set slide switches 1, 2, and 3 to the ON position, the Module ID will be 14. This is found by adding  $8+4+2=14$ . The maximum value you can set on the DIP switch is  $32+16+8+4+2+1=63$ . This is achieved by setting switches 0 through 5 to the ON position.

**The H4-ECOM (-F) DIP Switch**

The H4-ECOM DIP switch contains eight individual slide switches, but only six of these are active. Two are not used. Notice that the individual slide switches are labeled 1 through 8 on the body of the DIP switch. You will also find that the printed circuit board is labeled 0 (zero) through 7 (as shown in the figure below). We use the labeling *on the printed circuit board* in describing how to set the switch. The numbers on the printed circuit board indicate the power of 2 represented by each slide switch. For example, switch 0 represents  $2^0$  (or 1), switch 1 is  $2^1$  (or 2), switch 2 is  $2^2$  (or 4), and so on. The figure below shows the binary value of each switch in parentheses ( ).



The Module ID equals the *sum* of the binary values of the slide switch set in the ON position. For example, if you set slide switches 0, 1, and 3 to the ON position, the Module ID will be 11. This is found by adding  $8+2+1=11$ . The maximum value you can set on the DIP switch is  $32+16+8+4+2+1=63$ . This is achieved by setting switches 0 through 5 to the ON position.



**NOTE:** When all the switches are set to OFF (Module ID = 0), the Module ID can be set using the software utilities in NetEdit and *DirectSOFT32*. **Do not use Module ID "0" for normal communications.** It is okay to leave the Module ID set at zero if you are using the Name or IP Address for communications.

## Running NetEdit Software

NetEdit is a software utility that can be used to set network identifiers (Module ID, Name, and IP Address) for the ECOM modules, and it can be used for diagnostic and troubleshooting tasks. NetEdit came prepackaged with this manual on 3.5" floppy disk. When **DirectSOFT32** programming software is installed on your PC, NetEdit installs into the PLC>Tools menu directly from the **DirectSOFT32** CD. It is also available for download from Host Engineering's web site [www.hosteng.com](http://www.hosteng.com). You can also use **DirectSOFT32** programming software or DSData Server Link Wizard to set network identifiers, but these products lack the troubleshooting aids of NetEdit.

### Operating System Requirements

You can run NetEdit on Windows 98/NT/2000/XP. There are several ways to run NetEdit:

1) To run the NetEdit program, insert the NetEdit 3.5" floppy disk into drive A: (or the appropriate drive if you are not using drive A:). Click on the **Start** button and select **Run...** from the pop-up menu. Within the **Run** window, enter the letter of the drive, colon, backslash and the name NetEdit, and click OK.



2) If you prefer, you can copy the NetEdit files from the 3.5" floppy disk to your hard drive. In Explorer, locate the following three files on the floppy disk:

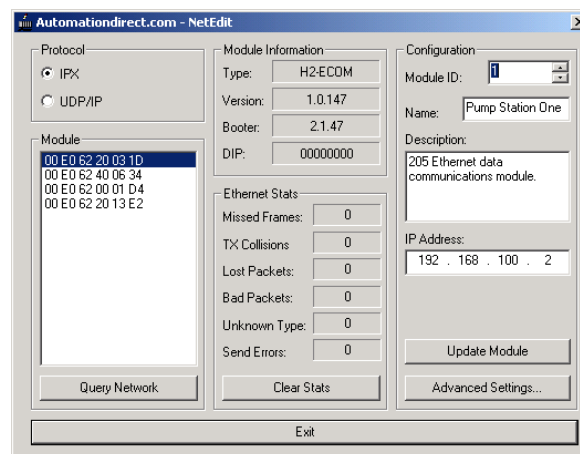
- Hei32\_2.dll
- Netedit.exe
- Netedlib.dll

Copy all three files to a single directory on your hard drive, and start NetEdit by double clicking on NetEdit.exe.

3) NetEdit can also be launched from **DirectSOFT32** by clicking on PLC>Tools>NetEdit.

### The NetEdit Screen

Either method of starting NetEdit brings up this screen. All NetEdit functions are accessed from this one screen. We examine each portion of this screen in the pages that follow.



## Features of the NetEdit Screen

In this section, we will step through the features of the NetEdit screen. To see the full screen, you can start NetEdit as described on page 2-7, or you can refer to the figure at the bottom of page 2-7. If you examine the NetEdit screen, you will find five boxes on the screen outlined in gray:

- Protocol
- Module
- Module Information
- Ethernet Stats
- Configuration

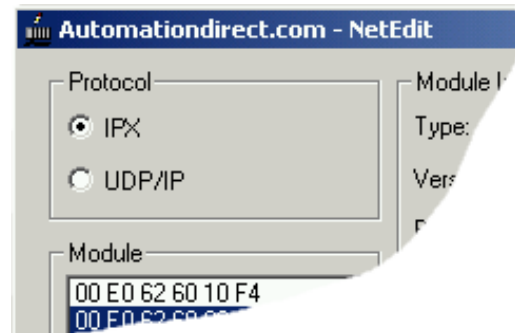
We describe the function of each box below.

### Protocol

In the upper left corner of the NetEdit screen, you will find a box labeled Protocol. In the box, there are two choices: IPX and UDP/IP. The ECOM module understands IPX *and* UDP/IP protocols. Both protocols are *permanently resident* in the firmware of the module. Select the protocol you want your PC to use to communicate with the ECOM module. IPX is a Novell standard in widespread use, and UDP/IP is a popular protocol supported by the TCP/IP suite of protocols in your PC.

One network device can send a message in IPX protocol to the ECOM module, and another device can send a message in UDP/IP protocol. The ECOM module understands both messages without changing the configuration of the module.

The figure to the right shows the Protocol selection box in the upper left corner of the NetEdit screen. The choice you make here tells **your PC** which protocol to send to the ECOM to link NetEdit to the module. You are not selecting which protocol the ECOM understands. It understands both. You could use IPX protocol to link NetEdit or **DirectSOFT32** to your ECOM module, and you could use UDP/IP to link an HMI software product. The ECOM would understand both transmissions.



**NOTE:** We strongly recommend you load IPX protocol on your PC and use it for your PLC links. Use UDP/IP in your application, if required, but also add IPX to your list of active protocols. Having IPX loaded on your PC gives you a backup for troubleshooting communication problems.

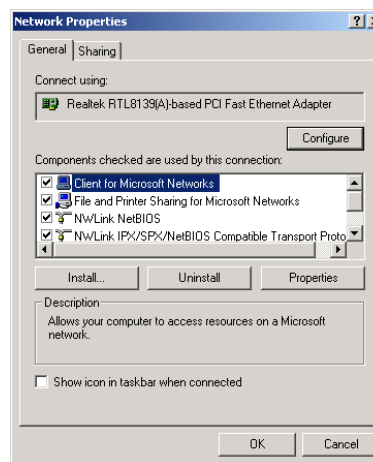


## Adding Network Protocol Support to Your PC

You may have already set up your PC with selected networking protocols for Ethernet communications. If not, you will need to select the protocols now for communication with the ECOM module. We strongly recommend that you include the IPX protocol. The description below applies to Windows 2000 (Windows 98/NT have slightly different steps). If you are not familiar with this procedure, you may need to have your Network Administrator perform this task.

For Windows 2000, go from My Computer on your Windows desktop to Control Panel. Double click on Network and Dial-up Connections, then double click on the desired Network Device to see the installed Protocols. If IPX is not listed among the protocols already loaded, add it now by clicking on the Install button. For Windows XP, go from Start>Settings>Control Panel. The steps are the same as Windows 2000 from this point.

Add the TCP/IP protocol if it is necessary for your application. Choose the TCP/IP selection to get UDP/IP support. Also add the IPX protocol if it is not already active.

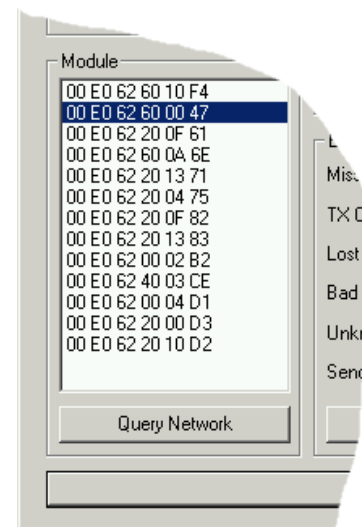


## Module

The lower left corner of the NetEdit screen displays the Ethernet Address of the modules currently on the network.

If modules are added or removed from the network, click on the Query Network button to update the list. Notice that the Ethernet Address is the factory-assigned address that is on the permanent label on the module. See page 2-4.

Select a specific module here by clicking on the Ethernet Address or by using the arrow keys. The selected module is highlighted.



**NOTE:** The Module box lists the Ethernet Addresses of ECOM modules and Ethernet Base Controllers (EBCs).



## Module Information

The Module Information box gives the ECOM module Type, firmware Version, Booter firmware version and the address DIP switch setting.

Module Information	
Type:	H4-ECOM
Version:	1.0.197
Booter:	3.0.92
DIP:	00000000

**NOTE:** The module information and settings on this page apply to the selected (highlighted) module. To select a module, click on its Ethernet Address in the Module box. See page 2-9 for more information about selecting a module.



## Ethernet Stats

The Ethernet Stats are statistics related to communication errors. These statistics are explored in Chapter 4, Maintenance and Troubleshooting.

Click on the Clear Stats button to reset all categories to 0 (zero).

Ethernet Stats	
Missed Frames:	0
TX Collisions:	0
Lost Packets:	0
Bad Packets:	0
Unknown Type:	0
Send Errors:	0
Clear Stats	

## Configuration

The Configuration box allows you to assign network identifiers and a description to the ECOM module. Use the up/down buttons to set the **Module ID** to a number between one and ninety (if you are using the ECOM for PLC-to-PLC communications). Module IDs must be unique for each PLC, but they do not have to be in sequence.

The **Name** field accepts 32 alphanumeric characters and can be used by most HMI software packages to identify the ECOM module.

The Description field accepts 32 alphanumeric characters of free-form descriptive information.

To set an **IP Address**, highlight the number in each of the four boxes, and overwrite the number. Use the number assigned to the ECOM module by your network administrator.

The Update Module button sends all entries to the module's flash memory. The Advanced Settings button displays a pop-up window described on the next page.

Configuration	
Module ID:	2
Name:	PumpStationOne
Description:	DL405 Ethernet Module
IP Address:	192 168 100 2
Update Module	
Advanced Settings...	

See pages 2-2 through 2-4 for more information about **Module IDs**, **Names** and **IP Addresses**.

The following table summarizes NetEdit's Network Identifiers and their uses:

	How to Set	Format	Communication	Restrictions/Notes
<b>Module ID</b>	DIP Switch	Number 1-63	PLC-to-PLC or PC-to-PLC	Disables Module ID in NetEdit, <b>DirectSOFT32</b> , DSDData Server
	NetEdit or <b>DirectSOFT32</b>	Number 1-90	PLC-to-PLC or PC-to-PLC	DIP Switch must be set to "0"
	NetEdit or <b>DirectSOFT32</b>	Number 1-999,999,999	PC-to-PLC Only	> 90 (Not for PLC-to-PLC )
<b>Name</b>	NetEdit or <b>DirectSOFT32</b>	32 Alphanumeric Characters	PC-to-PLC Only	HMI Software may have restrictions
<b>IP Address</b>	NetEdit or <b>DirectSOFT32</b>	4 Three-digit Numbers xxx.xxx.xxx.xxx (See Page 2-4)	PC-to-PLC Only	See Your Network Administrator, Only for UDP/IP
<b>Ethernet Address</b>	Set at Factory	12 Hex digits	PC-to-PLC Only	Factory-assigned, for IPX

## RX/WX Settings

The Advanced Settings button in the Configuration box of Net Edit (page 2-10) brings up the ECOM Advanced Settings window.

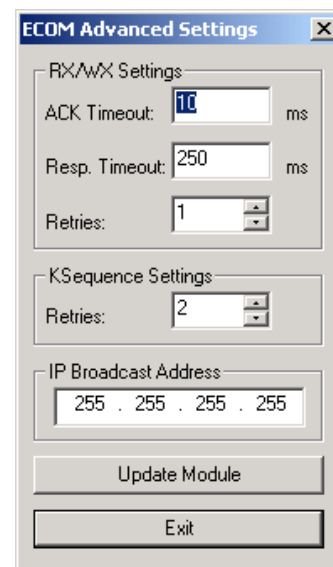
**RX/WX** – Settings box in this window provides a place to make changes that affect PLC-to-PLC communications.

**ACK Timeout** – sets the time limit for receiving the acknowledge (ACK) response to an RX or WX instruction. The ECOM sends a message across the LAN. The acknowledge response comes back directly from the ECOM module receiving the transmission. This timeout is the maximum for transmission and acknowledgement from ECOM to ECOM across the LAN. It is not dependent on the PLC scan time.

**Resp. Timeout** – sets the maximum time for the receiving PLC CPU to respond to the ECOM that initiated the communication. The instruction has travelled from the initiating PLC CPU to the initiating ECOM, across the Ethernet LAN to the receiving ECOM, then to the receiving PLC CPU, and back again to the initiating ECOM. Multiple PLC scans may be required to execute an RX/WX instruction so the Resp. Timeout should allow for multiple scans. Also, communication errors may result in retries which require more time. Your response timeout setting must accommodate retries as well.

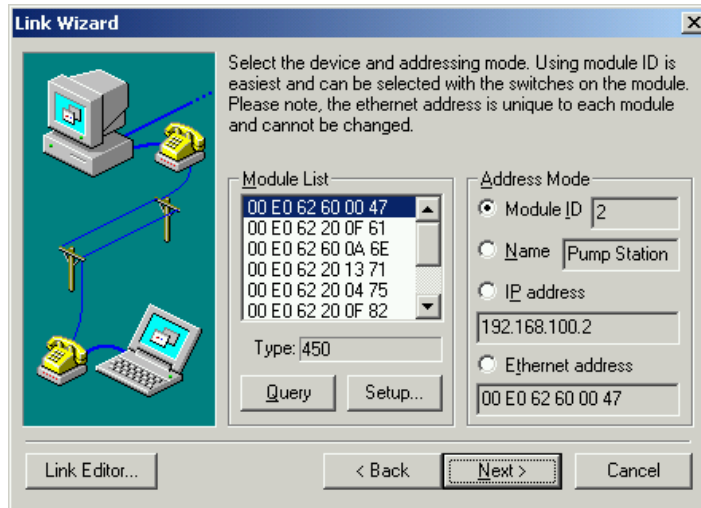
The **Retries** field shows the number of times the transmission is to be retried if the first attempt is unsuccessful. The Update Module button loads the communication settings in the ECOM module's flash memory. The Exit button takes you back to the main NetEdit screen.

The **IP Broadcast Address** field is used to allow for non-standard broadcast address configurations. Some older Unix based systems did not use 255.255.255.255 for their broadcast address. This would prevent ECOMs from responding to network broadcast queries. Only change this value when using something other than 255.255.255.255 for broadcasts.

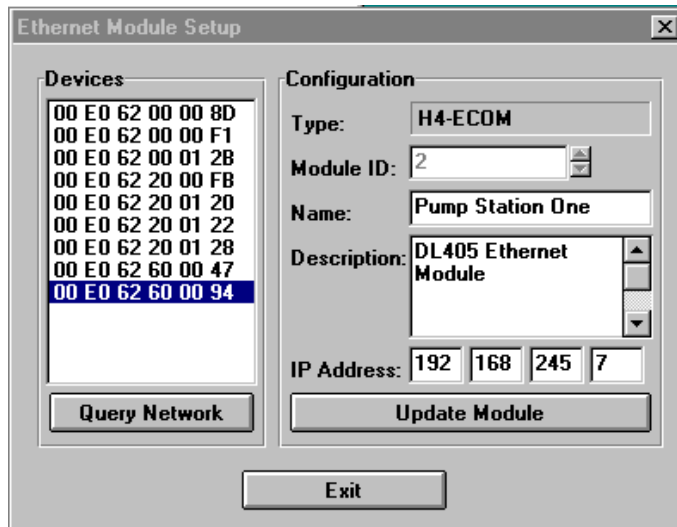


### Using DirectSOFT32 for ECOM Setup

If you are planning to use **DirectSOFT32** to set network identifiers in your ECOM module, refer to the **DirectSOFT32 User Manual** for more information. Briefly, you can begin by right clicking on Comm Links at the Launch Window>Add Link. Use Link Wizard to select the Ethernet port. Click on **Next >**. Select your Transport and Transport Protocol. Again, click on **Next >**. You will see the screen below. Now, click on the **Setup...** button, and you will see a screen that looks like the one at the bottom of this page.



To make changes, select a module in the Devices box. Make the desired changes, and click on **Update Module**. When you have finished setting the network identifiers and updating the module, click on **Exit** to return to the Link Wizard. Click on **Next >**, and name your Link, then click on **Finish**.

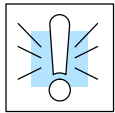
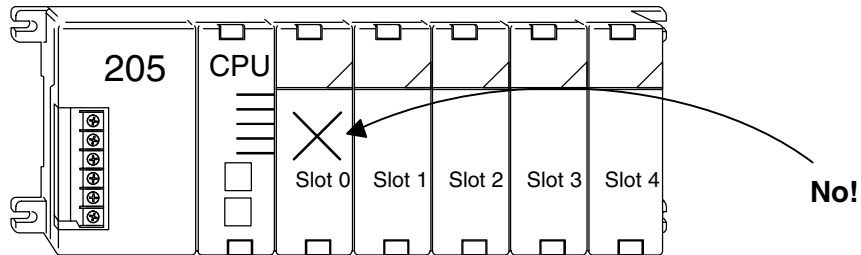


**NOTE:** When all the slide switches on the DIP switch are set to OFF (Module ID = 0), the Module ID can be set using the software utilities in NetEdit and **DirectSOFT32**. **Do not use Module ID "0"** for normal communications. See pages 2-5 and 2-6 for more information about the DIP switches.

## Inserting the ECOM Module in the PLC Base

### DL205 Slot Choices

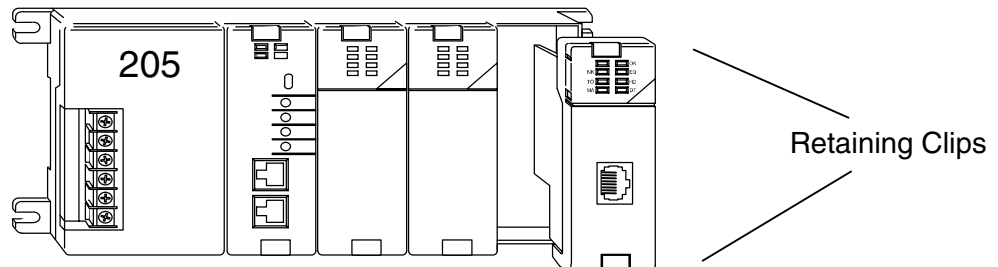
The DL205 system supports placement of the ECOM module in the **CPU-base only** (not in local expansion bases or remote I/O bases). It does not support installation of the ECOM in remote bases. The number of usable slots depends on how many slots your base has. The module does not work in slot 0 of the DL205 series PLCs, the slot next to the CPU. The D2-240, D2-250-1 and DL260 CPUs support the ECOM modules. The D2-230 CPU does not.



**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.

Module Type	CPU	CPU-Base	Usable Slots
H2-ECOM (-F)	DL240 DL250-1 DL260	D2-03B-1, D2-03BDC1-1, D2-03BDC-2	1
		D2-04B-1, D2-04BDC1-1, D2-04BDC-2	1, 2
		D2-06B-1, D2-06BDC1-1, D2-06BDC2-1	1, 2, 3, 4
		D2-06B-1, D2-06BDC1-1, D2-06BDC2-1	1, 2, 3, 4, 5, 6, 7

### H2-ECOM (-F) Module Installation



To install the ECOM module, line up the module's printed circuit board with the grooves in the base and push the module until it is flush with face of the DL205 base power supply. If you feel more than moderate resistance when you push the module into the base, the circuit board may not be aligned with the grooves in the base. When the module is firmly seated in the slot, depress the top and bottom retaining clips to lock the module in place.

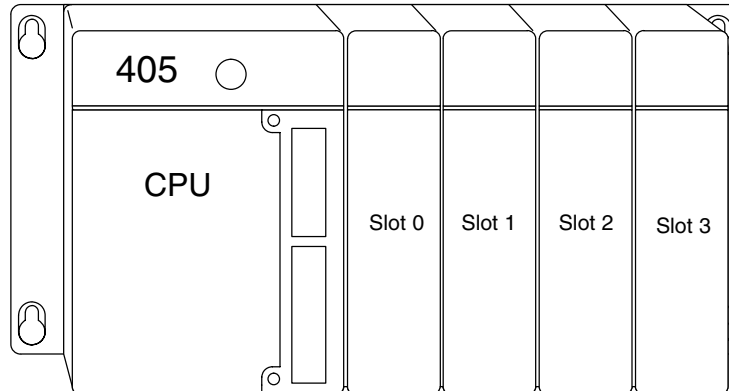


**NOTE:** When adding modules to your PLC always confirm that your **power budget** will accommodate the added module. See the User Manual for your PLC for more information about calculating the power budget. See Appendix A for the power consumption of the ECOM modules.

### DL405 Slot Choices

For PLC systems with D4-430 and D4-440 CPUs, the ECOM modules can reside in any I/O slot but **only** in the CPU-base. The D4-450 CPU allows the installation of the ECOM module in the CPU-base or in **local expansion** bases.

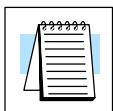
If the ECOM module is used in a local expansion base, *all bases in the system* must be the “-1” type bases. The valid part numbers for these bases are D4-04B-1, D4-06B-1, and D4-08B-1. The “-1” on the end of the part number indicates that the base supports specialty modules including the ECOM. The “-1” bases can be connected as **local expansion** bases or **remote** bases. They are not the same thing. Remote bases **do not** support the ECOM modules!



**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.

Module Type	CPU	Base	Usable CPU-Base Slots	Usable Expansion Base Slots
H4-ECOM (-F)	D4-430/440	D4-04B, D4-04B-1	0, 1, 2, 3	N/A
		D4-06B, D4-06B-1	0, 1, 2, 3, 4, 5	N/A
		D4-08B, D4-08B-1	0, 1, 2, 3, 4, 5, 6, 7	N/A
H4-ECOM (-F)	D4-450	D4-04B	0, 1, 2, 3	N/A
		D4-06B	0, 1, 2, 3, 4, 5	N/A
		D4-08B	0, 1, 2, 3, 4, 5, 6, 7	N/A
H4-ECOM (-F)	D4-450	D4-04B-1	0, 1, 2, 3	0, 1, 2, 3*
		D4-06B-1	0, 1, 2, 3, 4, 5	0, 1, 2, 3, 4, 5*
		D4-08B-1	0, 1, 2, 3, 4, 5, 6, 7	0, 1, 2, 3, 4, 5, 6, 7*

\* You must use the “-1” base for the CPU-base and all local expansion bases.

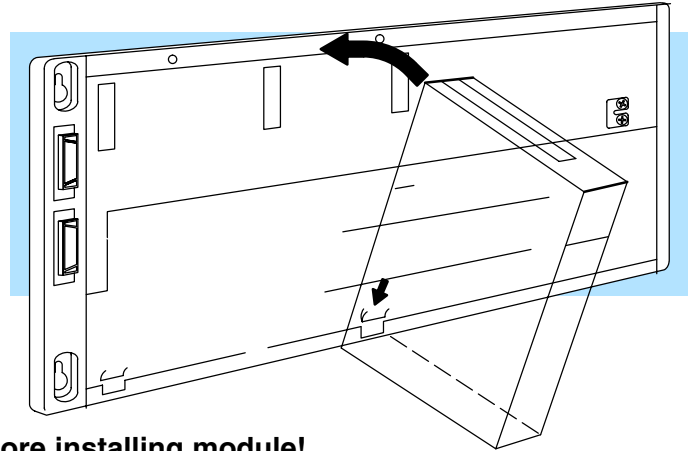


**NOTE:** Before installing the ECOM module, confirm that your **power budget** will accommodate the added module. See the **DL205** or **DL405 User Manual** for your PLC for more information about calculating the power budget. See Appendix A for the power consumption of the ECOM modules.

### H4-ECOM (-F) Module Installation

To insert the ECOM module in a DL405 base, place the bottom tab of the module into the notch at the bottom of the base. Pivot the module toward the base as shown below. Ensure that each module is tightly seated and secured with the captive screw at the top of the module.

DL405 Base

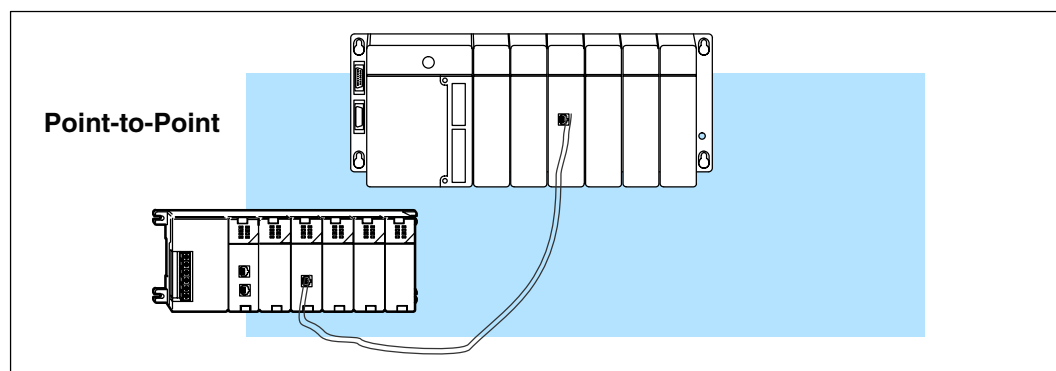


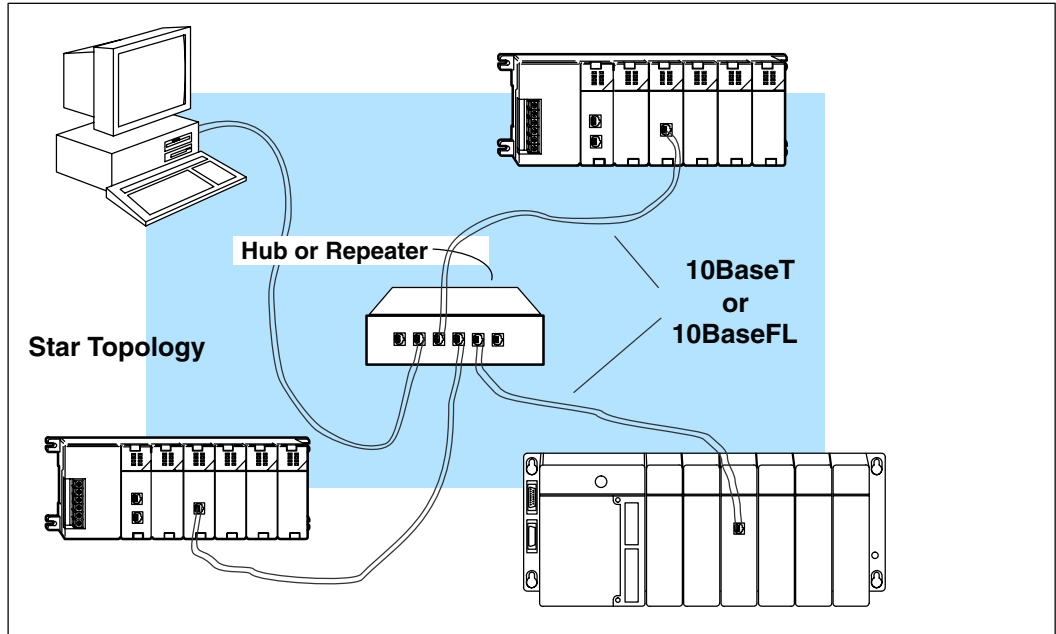
**Disconnect power before installing module!**

## ECOM Network Layouts

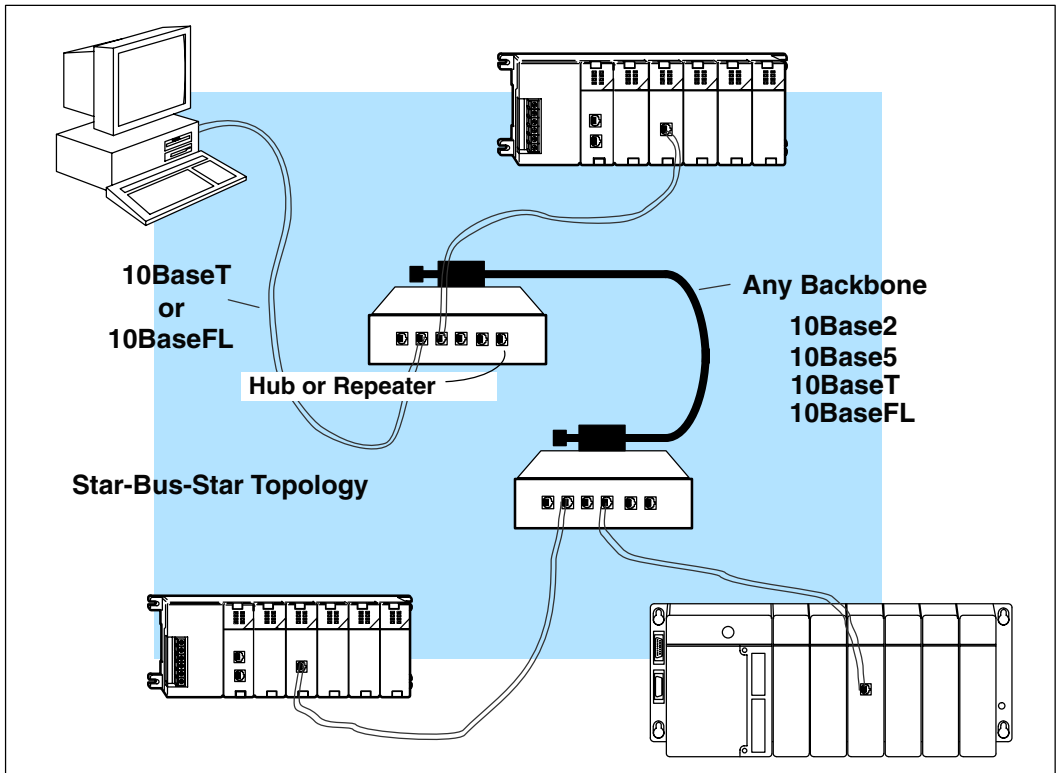
The ECOM Ethernet network is a peer-to-peer network. Using Read or Write instructions, any PLC on the network can initiate communications with any other PLC on the network. A PC running our DSData Server can also initiate communications with any ECOM that is on the same network, but a PLC cannot initiate communication with the PC. A PLC cannot literally broadcast to all other PLCs at the same time, but a PLC can sequence through communication connections with each other PLC on the network, one at a time.

The ECOM products inherently support two network layouts: point-to-point and star. The point-to-point layout can be used to link together two PLCs or a PC and a PLC. A hub or repeater connects multiple networkable devices into a star topology. Multiple hubs or repeaters are used to modify the star topology so that it becomes a star-bus-star topology. See the figures below and on the next page.





Hubs or repeaters can connect together to make it possible to connect more devices to the network or to extend the range of the network.



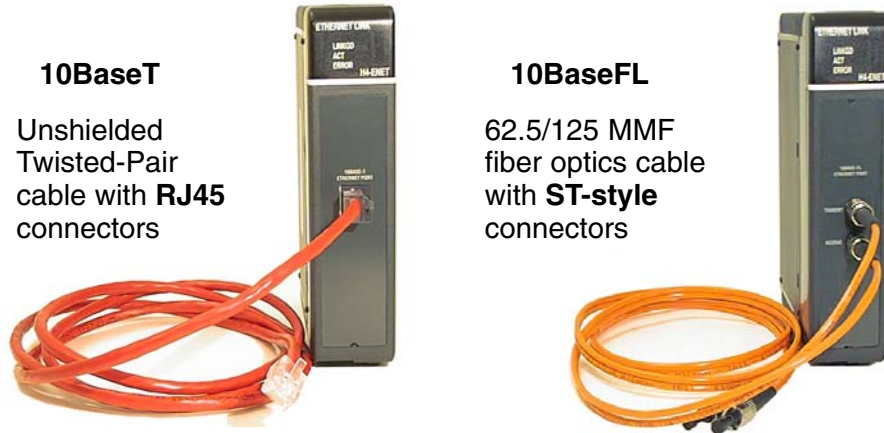
**NOTE:** Hubs or repeaters often designate one port for *uplinks* to another hub. This port cannot be used to connect to a PLC. If the uplink port is used to connect to another hub, it may disable the adjacent port.



# Network Cabling

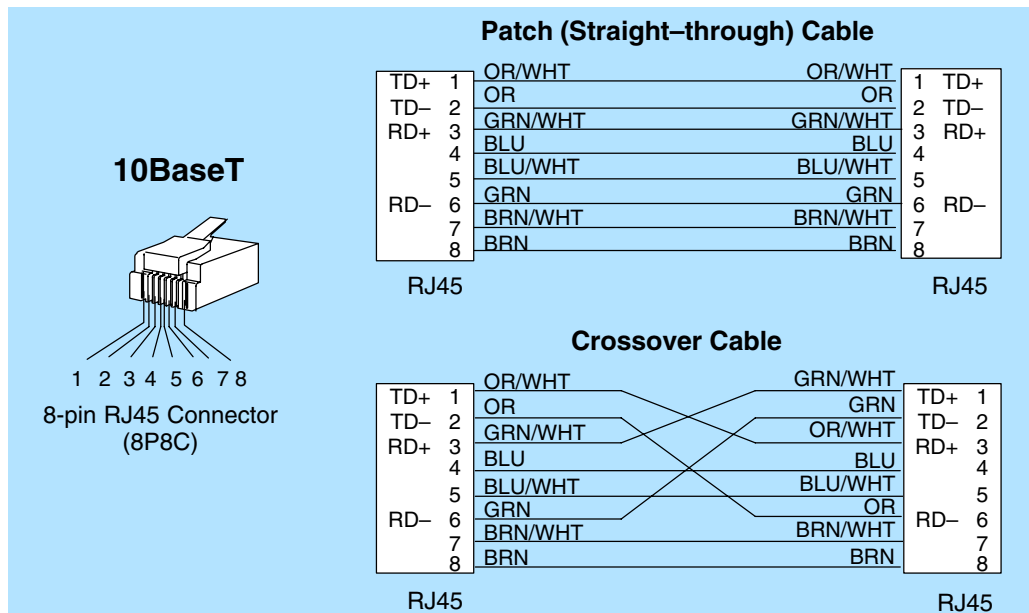
## ECOM Supports Two Standards

Two types of ECOMs are available. One type supports the 10BaseT standard, and the other supports the 10BaseFL standard. The 10BaseT standard uses twisted pairs of copper wire conductors, and the 10BaseFL standard is for fiber optic cabling.



Setup and Installation

**10BaseT Networks** The cable used to connect a PLC (or PC) to a hub or repeater is called a **patch** (straight-through) **cable**. The cable used to connect together two PLCs, or a PC and a PLC or two hubs is a **crossover cable**. We recommend that you purchase cables pre-assembled with connectors for convenient and reliable networking.



This diagram illustrates the standard wire positions in the RJ45 connector. We recommend all ECOM 10BaseT cables to be **Category 5**, UTP cable.

### 10BaseT Connections

Most 10BaseT hubs or repeaters use a **patch** (straight-through) cable for connecting the network devices (PLCs or PCs). For hub-to-hub connections a **crossover** type cable is commonly required. The figures on page 2-17 show pin assignments and insulation color codes for patch (straight-through) and crossover type Ethernet cables.

### UTP Cable

The ECOM has an eight-pin modular port that accepts RJ45 type connectors. UTP (Unshielded Twisted-Pair) cable is rated according to its data-carrying ability (bandwidth) and is given a “category” number. We strongly recommend using a category 5 cable for all ECOM connections.



**NOTE:** See page 2-19 for 10BaseT distance limitations.

### 10BaseFL Connections

Each module has two bayonet ST-style connectors. The ST-style connector uses a quick release coupling which requires a quarter turn to engage or disengage. The connectors provide mechanical and optical alignment of fibers.

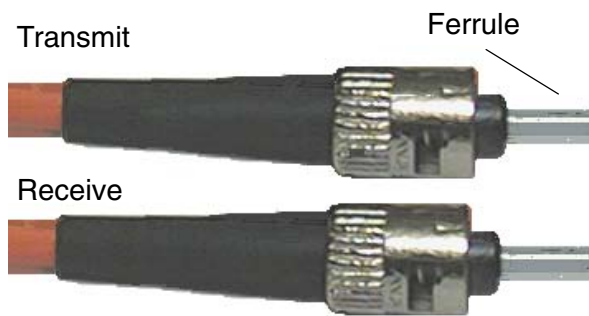
Each cable segment requires two strands of fiber: one to transmit data and one to receive data. The ST-style connectors are used to connect the H2-ECOM-F or H4-ECOM-F module to another H2-ECOM-F or H4-ECOM-F module or a fiber optic hub or repeater.

### Fiber Optic Cable

The H2-ECOM-F and H4-ECOM-F modules accept 62.5/125 multimode fiber optic (MMF) cable. The glass core diameter is 62.5 micrometers and the glass cladding is 125 micrometers. The fiber optic cable is highly immune to noise and permits communications over much greater distances than 10BaseT.

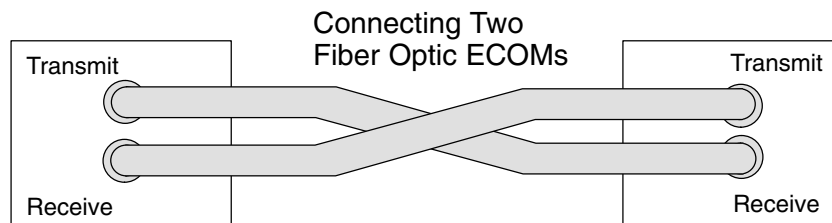
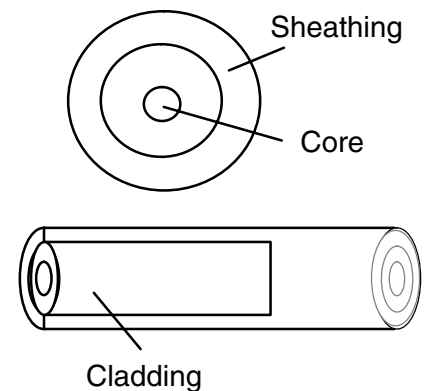
### Fiber Optic Module ST Connector

#### Multimode Fiber Optic (MMF) Cable



62.5/125 MMF cable with bayonet ST-style connectors

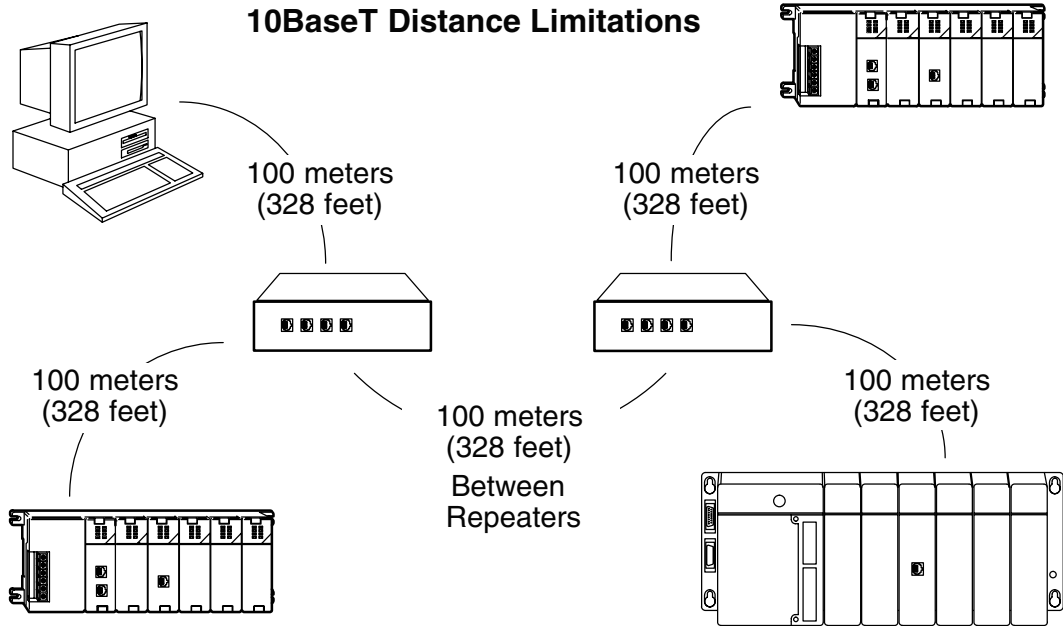
#### Fiber cross-section



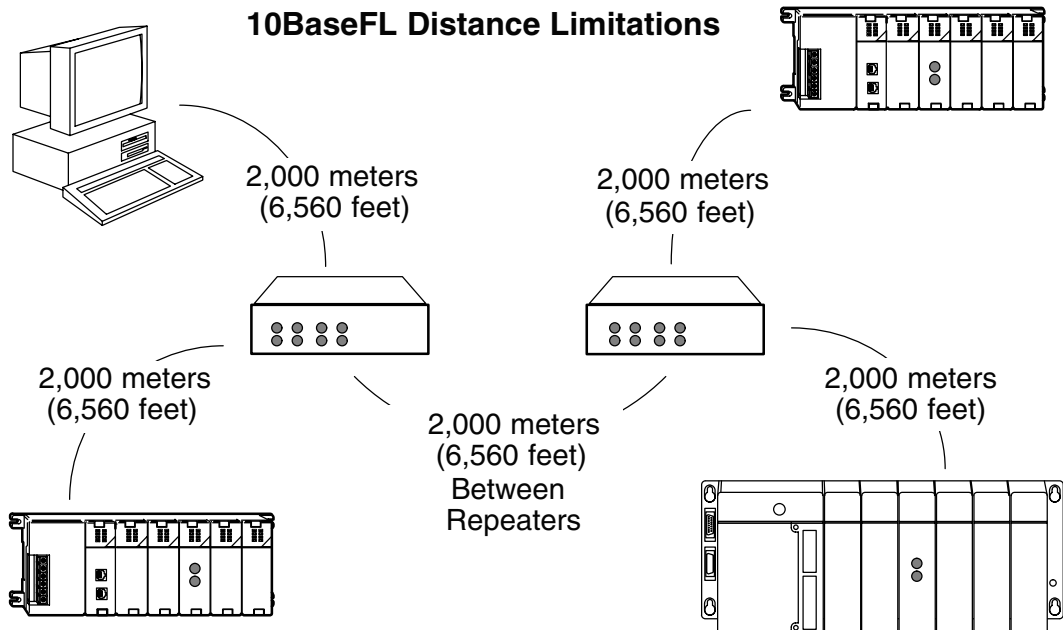
**NOTE:** See page 2-19 for 10BaseFL distance limitations.

# Maximum Cable Length

The **maximum distance** per **10BaseT** cable segment is **100 meters** or **328 feet**. Repeaters extend the distance. Each cable segment attached to a repeater can be 100 meters. Two repeaters connected together extend the total range to 300 meters.



The **maximum distance** per **10BaseFL** cable segment is **2,000 meters** or **6,560 feet**. Repeaters extend the distance. Each cable segment attached to a repeater can be 2,000 meters. Two repeaters connected together extend the total range to 6,000 meters.



## Maximum Number of ECOM Modules on the Network

The maximum number of nodes that can be connected to a 10BaseT or 10BaseFL network is a function of the topology used in constructing the network. Therefore, it is not possible to state an absolute maximum number of nodes that would apply in all cases.

The IEEE 802.3 specification defines the maximum node limit for an Ethernet *segment* in terms of the ability to detect and avoid data collisions. A “legal” network can have any number of devices provided that they can:

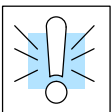
- detect all data collisions that may occur during the communication process *and*
- respond to these collisions appropriately.

You must take into consideration the network limitations imposed by all cabling and network devices. Consider the limitations imposed on your network if your network uses:

- a combination of cabling standards, such as 10BaseT and 10Base2, or
- intermediate devices, such as switches or routers.

Each ECOM module can be assigned a Module ID ranging from 1 to 999,999,999. Theoretically, you could have this many Ethernet modules coexisting on a single network. Other network limitations would restrict the network size before reaching this limit. For the majority of network PLC applications there is practically no limit to the number of ECOM modules you can access from the **DirectSOFT32** Programming software or the **DirectSOFT32** DSData Server.

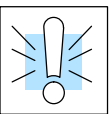
There *is* a node limit for PLC-to-PLC communications. The network Read and Write instructions performed by the initiating (master) PLC are only capable of accessing PLCs with Module IDs of 1 through 90. This effectively sets the maximum number of nodes available for PLC-to-PLC communications at 90.



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**WARNING:** We recommend against connecting Ethernet modules to the same network that serves as your primary office network. While Ethernet networks can handle a very large number of data transmissions, and normally handle them very quickly, heavy Ethernet traffic can adversely affect the reliability and speed of the network.

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**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.

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