CHAPTER 2

SETUP AND INSTALLATION

In This Chapter...

ECOM Network Identifiers

This section describes network identifiers that can be assigned 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 (MAC) Address

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

Ethernet (MAC) 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.

The following table summarizes Network Identifiers and their uses:

	How to Set	Format	Communication	Restrictions/Notes
Module ID	DIP Switch	Number 1–63	PLC to PLC or PC to PLC	Disables Module ID in NetEdit3
	NetEdit3	Number 1–90		DIP switch must be set to "0"
	NetEdit3	Number 1–999,999,999		>90 (Not for PLC to PLC)
Name	NetEdit3	32 Alphanumeric Characters	PC to PLC only	HMI software may have restrictions
IP Address	NetEdit3	4 Three-digit Numbers, xxx.xxx.xxx.xxx (See page 2-4)	PC to PLC; (PLC to PLC - Client/Server using TCP/IP or Modbus TCP protocol)	See you network administrator for IP address; (refer to pages 3-10 to 3-11, chapters 5 & 6)
Ethernet (MAC) Address	Set at Factory	12 Hex digits	PC to PLC only	Factory assigned, for IPX

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 NetEdit3
- HTML Configuration (after IP address is assigned to module using NetEdit3; described in Chapter 5; H0/H2/H4- ECOM100 only)

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.
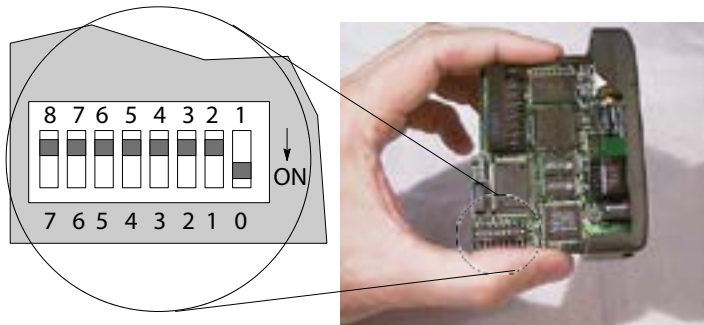
Name

If you prefer to be able to set or change all Module IDs on your network from a single PC, use the tools in NetEdit3, discussed in chapter 3.

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 NetEdit3.

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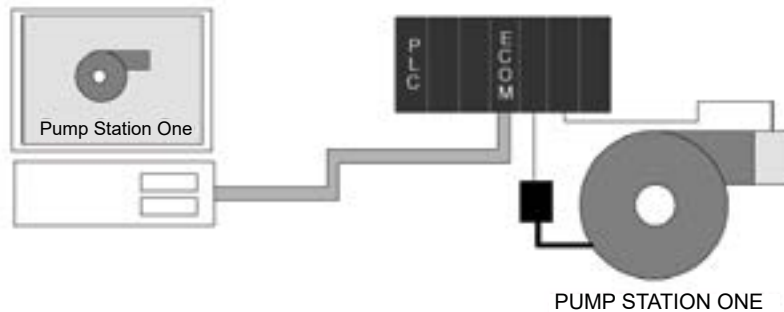
NOTE: *Some HMI software products will not accept Names with numbers as the first character, spaces or certain other non-alphanumeric ASCII characters. Also, your HMI product may not accept Names longer than 16 characters. Consult your HMI product documentation about its naming conventions*

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 to each device on the network. If you have a separate dedicated network for your PLCs, you can use the Module ID or a Name for each communication link. You must use an IP Address, if you are using the UDP/IP or MODBUS TCP protocol.

Use NetEdit3 to assign an IP address to the ECOM (refer to chapter 3).

The module ships from the factory with an IP Address of 0.0.0.0. This is not a usable IP Address for normal communications. It only serves as a default setting which can be changed using NetEdit3. **Valid settings are 1 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 "0" fields. If any field contains **the number 255 *and* other fields have been changed, the module will *not* be recognized on the network**.

Example:

Client (PC/ECOM) Subnet Mask:	255.255.0.0	
Valid Client (PC/ECOM) IP Address:	192.168.50.2	
Valid Server ECOM IP Address:	192.168.**55.5**	**1–254 Valid settings for Bold number**
Valid Server ECOM IP Address:	192.168.**70.15**	**fields (Do not duplicate).**

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 (MAC) Address

A unique Ethernet (MAC) 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 (MAC) Address is recognized by NetEdit3. The Ethernet (MAC) 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 Identifies

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

The ECOM's DIP switches contain eight individual slide switches, but not all of these are active. The individual slide switches are labeled 1 through 8 on the body of the DIP switch (upside down in the following figures).

You will 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 table below shows the meaning of each dipswitch based on the version of the module being used.

Module Type	Release Version	Dipswitch							
		7	6	5	4	3	2	1	0
H0-ECOM	v1.0.354	RBE		Module ID					
	v1.0.364	RBE		Protect	Module ID				
H0-ECOM100	v4.0.49	RBE/IBox		Module ID					
	v4.0.167	RBE/IBox	Recover	Module ID					
	v4.0.320	RBE/IBox	Recover	Protect	Module ID				
H2-ECOM H2-ECOM-F H4-ECOM H4-ECOM-F	v1.0.7	RBE		Module ID					
	v1.0.147	RBE		Module ID					
	v1.0.227	RBE		Protect	Module ID				
H2-ECOM100 H4-ECOM100	v4.0.877	RBE/IBox		Module ID					
	v4.0.1237	RBE/IBox	Recover	Module ID					
	v4.0.1735	RBE/IBox	Recover	Protect	Module ID				

RBE (Report by Exception) - Dipswitch must be ON for this function.

IBox (Intelligent Boxes) - Dipswitch must be ON for the ECxxxxx IBoxes to Function.

Recover - Dipswitch used to reset IP settings back to factory default on power-up in case device is lot on network.

Protect - Dipswitch must be ON to write protect firmware and network, node, peer-to-peer, SMTP (email) configurations.

Module ID - Bit-weighted for manual setting of this parameter.

The dipswitch 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 following figures show the binary value of each switch in parentheses ( ).

You can use the DIP switch on the ECOM module to set the Module ID to a number from 1 to 63. 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.

H0 / H2 Series ECOM DIP Switch

If using the ECOM/ECOM100 module with Dataworx software, or the ECOM100 with IBox Communication instructions, then dipswitch 7 must be set to ON.
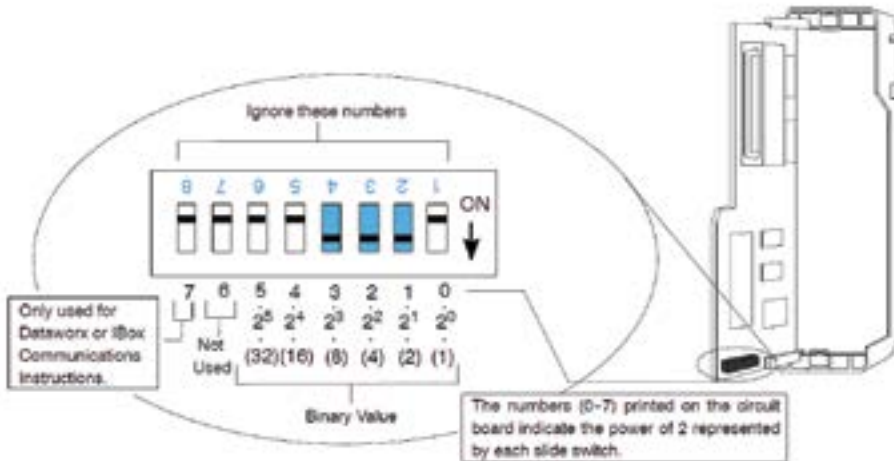
The Module ID equals the sum of the binary values of the slide switches set in the ON position. For example, if you set slide switches 1, 2, and 3 to the ON position, the Module ID will be 14. This is found by adding 8+4+2=14. The maximum value you can set on the DIP switch is 32+16+8+4+2+1=63. This is achieved by setting switches 0 through 5 to the ON position.

H4 Series ECOM DIP Switch
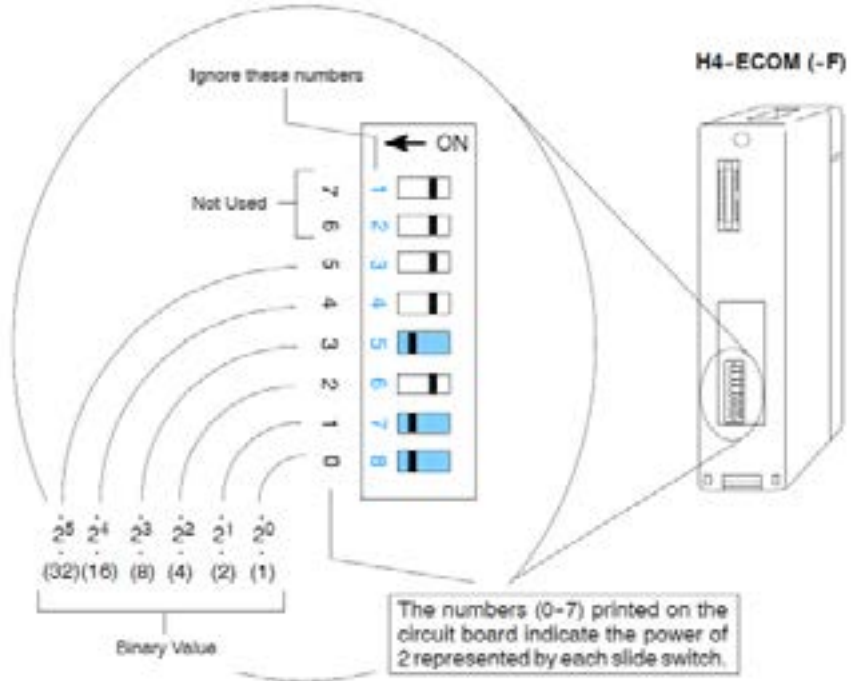
The Module ID equals the sum of the binary values of the slide switch set in the ON position. For example, if you set slide switches 0, 1, and 3 to the ON position, the Module ID will be 11. This is found by adding 8+2+1=11. The maximum value you can set on the DIP switch is 32+16+8+4+2+1=63. This is 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 DirectSOFT. 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*

Inserting the ECOM Module in the PLC Base

H0 Series ECOM Module Installation

Before installing the option module in the DL05 option slot or any of the DL06 option slots, set the Module ID dip switch (if your application requires this) on the H0 Series ECOM module. Verify power to the PLC is turned off. The next step is to remove the protective option slot cover. Remove the cover by squeezing the pinch tabs and lifting the cover off

Pinch Tabs
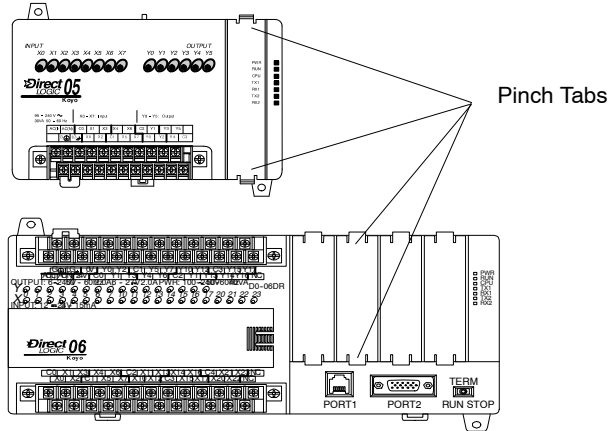
Now, insert the module into the open slot on the DL05 or into any one of the four slots in the DL06. Locate the module so the printed information is oriented in the same direction as the markings on the PLC. Be careful to align the female connector on the printed circuit board of the module with the male connector on the PLC mother board. Press the module into the slot until the front of the module is flush with the front of the PLC. Check the DL06 power budget to be sure that it remains within the power supply limits before installing more modules.

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. 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, D2-260 and D2-262 CPUs support the ECOM modules. The D2-230 CPU does not support the ECOM modules.
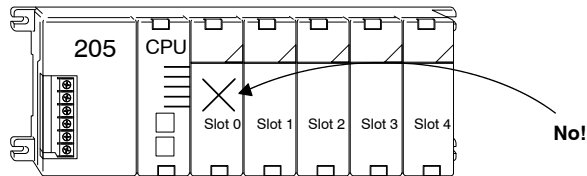
WARNING: Your system can be damaged if you install or remove system components before disconnecting the system power. To minimize the risk of equipment damage, electrical shock, or personal injury, always disconnect the system power before installing or removing any system

H2 Series ECOM Module

Module Type	CPU	CPU - Base	Usable Slots
H2-ECOM	D2-240	D2-03B-1, D2-03BDC1-1, D2-03BDC-2	1
H2-ECOM100	D2-250-1	D2-04B-1, D2-04BDC1-1, D2-04BDC-2	1, 2
H2-ECOM-F	D2-260	D2-06B-1, D2-06BDC1-1, D2-06BDC-1	1, 2, 3, 4
	D2-262	D2-09B-1, D2-09BDC1-1, D2-09BDC-1	1, 2, 3, 4, 5, 6, 7

Retaining Clips
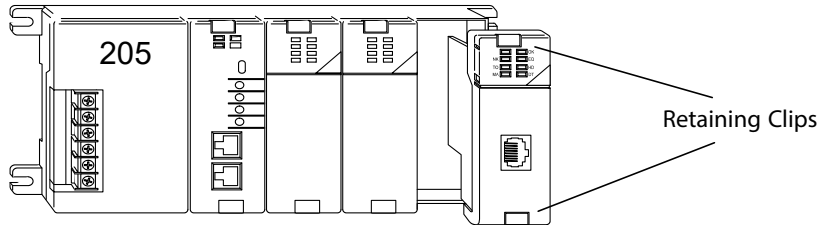
Before installing the module, verify power to the PLC is turned off. To install the ECOM module, line up the module's printed circuit board with the grooves in the base and push the module until it is flush with face of the DL205 base power supply. If you feel more than moderate resistance when you push 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.
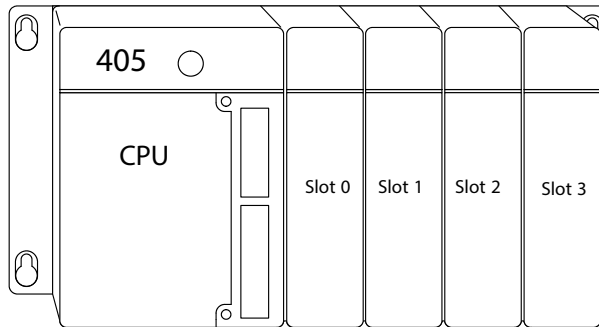
NOTE: *When adding modules to your PLC always confirm that your power budget will accommodate the added module. See the User Manual for your PLC for more information about calculating the power budget. See Appendix A for the power consumption of the ECOM modules.*

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 and D4-454 CPUs allows the installation of the ECOM module in the CPU-base or in local expansion bases. However, it is still recommended the ECOM be installed on the CPU base.

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.

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┌─────────────────────────────────────────────────────┐
│  405  ○                                              │
│                                                      │
│  CPU      Slot 0  Slot 1  Slot 2  Slot 3            │
└─────────────────────────────────────────────────────┘
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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.

| Module Type	CPU	Base	Available CPU-Base Slots	Available Expansion Base Slots
H2-ECOM **H2-ECOM100** **H2-ECOM-F**	D4-430/D4-440	D4-04B, D4-04B-1	0, 1, 2, 3	N/A
		D4-06B, D4-06B-1	0, 1, 2, 3, 4, 5	
		D4-08B, D4-08B-1	0, 1, 2, 3, 4, 5, 6, 7	
	D4-450/D4-454	D4-04B	0, 1, 2, 3	
		D4-06B	0, 1, 2, 3, 4, 5	
		D4-08B	0, 1, 2, 3, 4, 5, 6, 7	
		D4-04B	0, 1, 2, 3	0, 1, 2, 3*
		D4-06B	0, 1, 2, 3, 4, 5	0, 1, 2, 3, 4, 5*
		D4-08B	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 Series ECOM

Before installing the ECOM module, verify power to the PLC is turned off. To insert the ECOM module in a DL405 base, place the bottom tab of the module into **Module Installation** 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
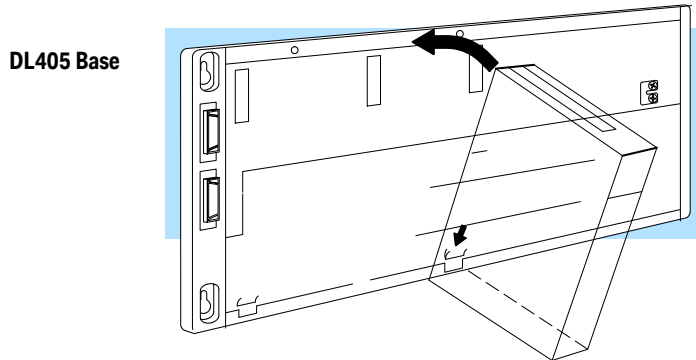
Disconnect power before installing module!

ECOM Network Layouts

The ECOM Ethernet network is a peer-to-peer network. Using Read (RX) or Write (WX) instructions, any PLC on the network can initiate communications with any other PLC on the network. A PC running our KEPDirect for PLCs software 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 other PLCs 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 network capable 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.

Point-to-Point
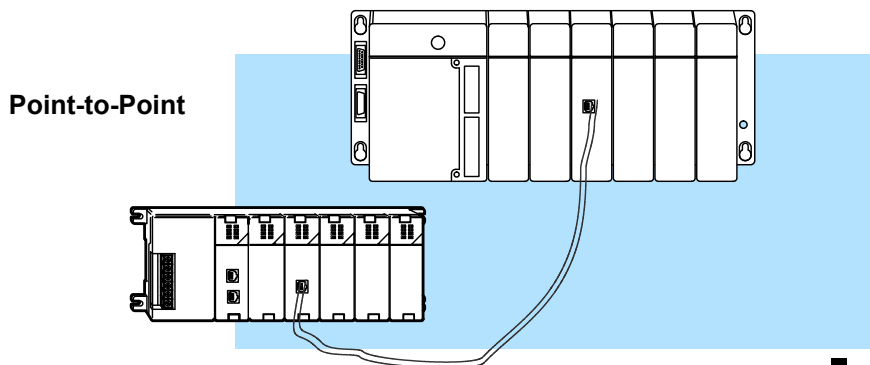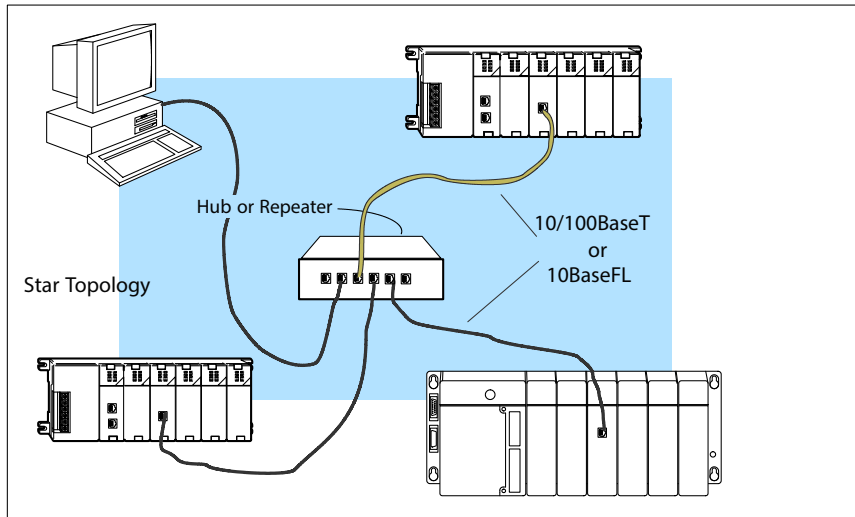
Hubs or repeaters can connect together to make it possible to connect more devices to the network or to extend the range of the network
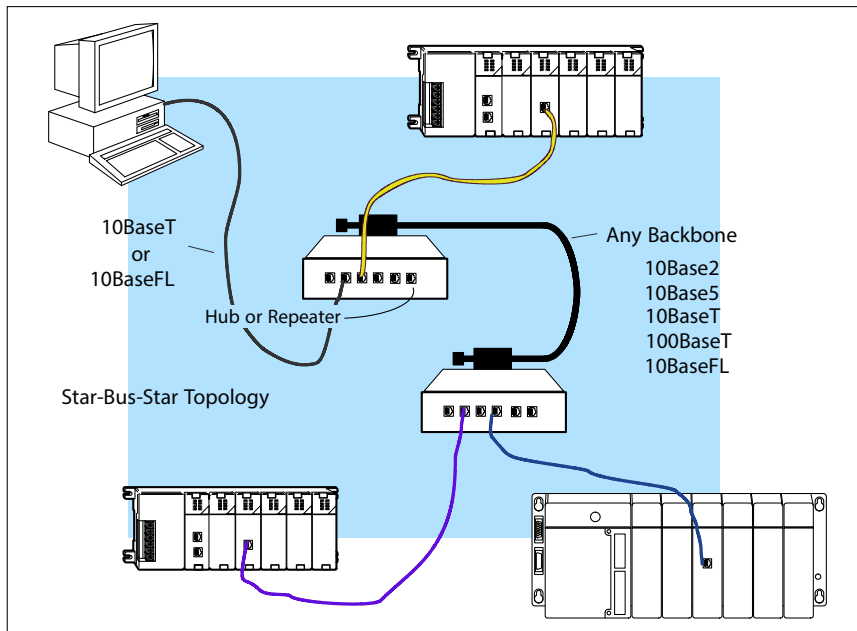
NOTE: Hubs or repeaters often designate one port for uplink to another hub. This port may not be able to be used to connect to a PLC. If the uplink port is used to connect to another hub, it may disable the adjacent port. Use of the uplink port may require the use of a crossover cable.

Network Cabling

ECOM Supports Two Standards

Two types of ECOMs are available. One type supports the 10/100BaseT cabling standard, and the other supports the 10BaseFL connection standard. The 10/100BaseT standard uses twisted pairs of copper wire conductors, and the 10BaseFL standard is for fiber optic cabling.

10/100BaseT

Unshielded Twisted-Pair cable with **RJ45** connectors

10BaseFL

62.5/125 MMF fiber optics cable with **ST-style** connectors

10/100BaseT 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.
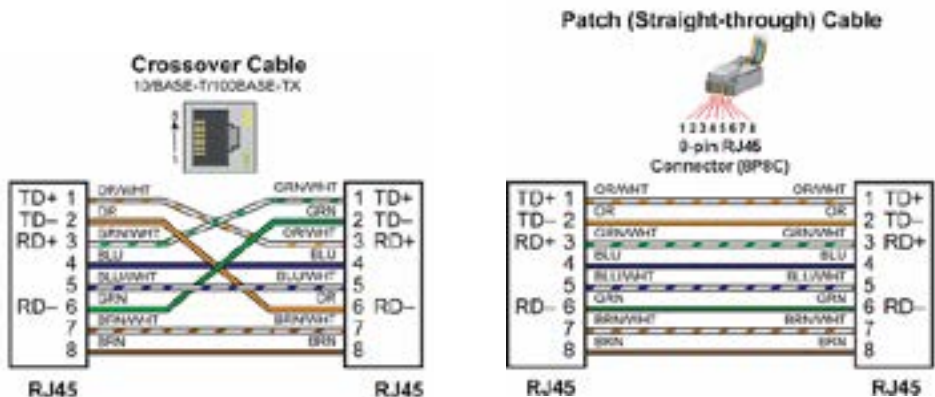
The above diagrams illustrate the standard wire positions in the RJ45 connector. We recommend all ECOM 10/100BaseT cables to be Category 5, UTP cable.

10/100BaseT Connections

Most 10/100BaseT 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 the previous page 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 2-14 for 10/100BaseT cable distance limitations.
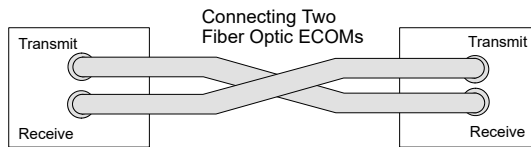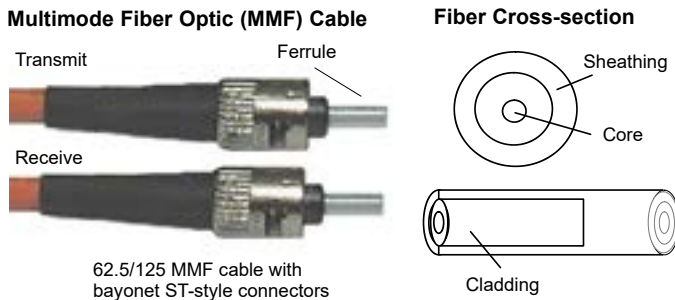
10BaseFL Connections

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

Transmit

Ferrule

Receive

62.5/125 MMF cable with
bayonet ST-style connectors

Fiber Cross-section

Sheathing

Core

Cladding

Connecting Two
Fiber Optic ECOMs

Transmit

Receive

Transmit
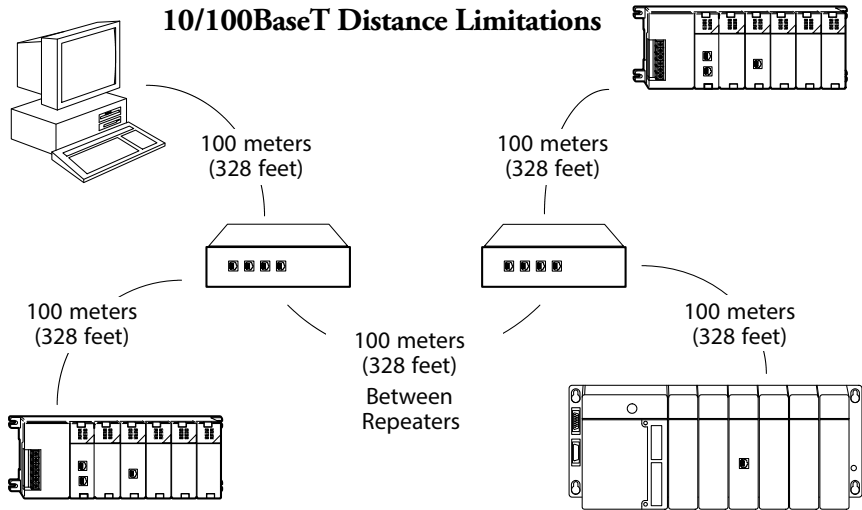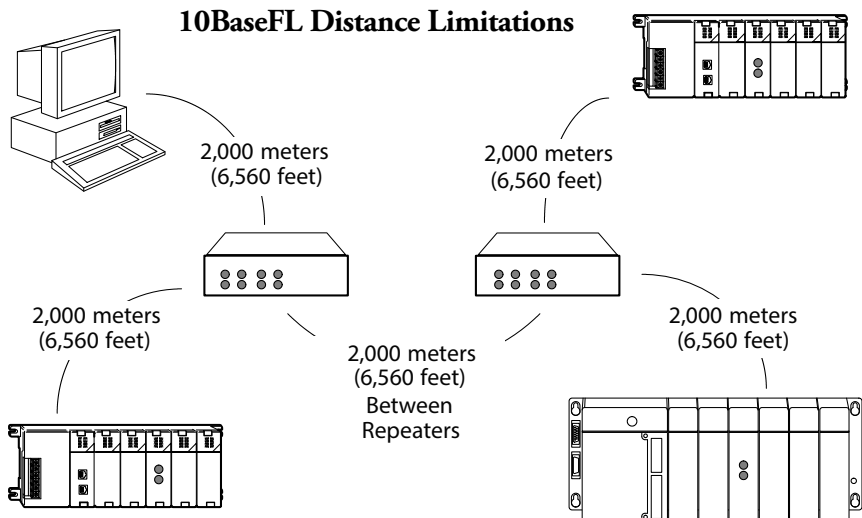
Receive

NOTE: See page 2-14 for 10BaseFL distance limitations

Maximum Cable Length

The **maximum distance per 10/100BaseT** 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.

10/100BaseT Distance Limitations

100 meters
(328 feet)

100 meters
(328 feet)

100 meters
(328 feet)

100 meters
(328 feet)
Between
Repeaters

100 meters
(328 feet)

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.

10BaseFL Distance Limitations

2,000 meters
(6,560 feet)

2,000 meters
(6,560 feet)

2,000 meters
(6,560 feet)

2,000 meters
(6,560 feet)
Between
Repeaters

2,000 meters
(6,560 feet)

Maximum Number of ECOM Modules on the Network

The maximum number of nodes that can be connected to a 10/100BaseT 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 10/100 BaseT 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 NetEdit3, *Direct*SOFT Programming Software or the KEP*Direct* for PLCs software.

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.

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.