

<b>SUBJECT:</b> Application Note	<b>PRODUCT:</b> CM092, CM093, SI-EN3, SI-EN3/V	<b>DOC#:</b> AN.AFD.22
<b>TITLE:</b> Using Yaskawa's EtherNet/IP Options with ControlLogix and CompactLogix Controllers		03/30/2011

## Application Note:

---

### Using Yaskawa's EtherNet/IP Options with ControlLogix and CompactLogix Controllers

---

Applicable Options(s): CM092, CM093, SI-EN3, SI-EN3/V  
Applicable Drive(s): E7, F7, G5, G7, P7, V7, A1000, V1000

## Table of Contents

<b>Table of Figures</b> .....	<b>ii</b>
<b>Table of Tables</b> .....	<b>ii</b>
<b>Overview</b> .....	<b>1</b>
Intended Audience .....	1
<b>Configure</b> .....	<b>1</b>
Drives.....	1
Network.....	1
<i>Hub/Switch</i> .....	2
<i>Cable/Wiring</i> .....	2
IP Addresses, Subnet Masks and Gateways.....	2
<i>PC Setup</i> .....	2
<i>CM092 &amp; CM093</i> .....	4
<i>SI-EN3 &amp; SI-EN3/V</i> .....	5
<i>BOOTP/DHCP</i> .....	5
<b>RSLinx</b> .....	<b>6</b>
<b>RSLogix 5000</b> .....	<b>7</b>
New Project.....	7
ControlLogix.....	7
Add Device.....	8
I/O Tags.....	9
I/O Assemblies .....	9
Explicit Messaging .....	10
<i>Class, Instance &amp; Attribute</i> .....	10
<i>CM092 &amp; CM093</i> .....	11
<i>SI-EN3 &amp; SI-EN3/V</i> .....	12
<i>Message Path</i> .....	12
<b>Appendix A - Reference Documentation</b> .....	<b>13</b>
<b>Appendix B - Drive Parameters</b> .....	<b>14</b>
F7, G7 and P7 Series Drives' Parameters .....	14
V7 Communication's Parameters.....	15
A1000 and V1000 Communication's Parameters.....	16

## Table of Figures

FIGURE 1 - EXAMPLE NETWORK SETUP .....	1
FIGURE 2 - PC SELECT NETWORK CONNECTION .....	2
FIGURE 3 - PC SELECT NETWORK CONNECTION .....	2
FIGURE 4 - SELECT INTERNET PROTOCOL.....	3
FIGURE 5 - ENTER IP ADDRESS AND SUBNET MASK .....	3
FIGURE 6 - MAIN WEB INTERFACE (CM092/CM093) .....	4
FIGURE 7 – IP ADDRESS SETTINGS AND CONFIGURATION.....	4
FIGURE 8 – POWER CYCLE DRIVE TO SAVE CHANGES .....	4
FIGURE 9 - ENTER LOCAL NETWORK SUBNET MASK.....	5
FIGURE 10 - ENTER DEVICE IP ADDRESS.....	5
FIGURE 11 - VERIFY IP ADDRESS .....	5
FIGURE 12 - SELECT NETWORK INTERFACE.....	6
FIGURE 13 - DRIVER RUNNING .....	6
FIGURE 14 - SELECT ETHERNET CONTROLLER.....	6
FIGURE 15 - SHOW NETWORK DEVICES .....	6
FIGURE 16 - DEFINE NEW PROJECT .....	7
FIGURE 17 - CONTROLLOGIX ADD NETWORK MODULE .....	7
FIGURE 18 - NETWORK MODULE SETTINGS .....	7
FIGURE 19 - ADD DEVICE – COMPACTLOGIX.....	8
FIGURE 20 - SELECT CONNECTION TYPE .....	8
FIGURE 21 - SET DEVICE IP ADDRESS AND CONFIGURATION.....	8
FIGURE 22 - I/O TABLE DISPLAY FOR CONFIGURED DEVICE WITH TAG GENERATOR UTILITY GENERATED I/O NAMES.....	9
FIGURE 23 - EXPLICIT MESSAGE LADDER LOGIC EXAMPLE.....	10
FIGURE 24 - MESSAGE CONFIGURATION.....	10
FIGURE 25 - MESSAGE PATH .....	12

## Table of Tables

TABLE 1 – BASIC INPUT AND OUTPUT ASSEMBLIES .....	9
TABLE 2 - TM.AFD.26 PARAMETER CLASS, INSTANCE, ATTRIBUTE.....	11
TABLE 3 - TM.AFD.26 YASKAWA COMMAND OBJECT .....	11
TABLE 3 - DOCUMENTATION REFERENCE .....	13
TABLE 4 - F7, G7 AND P7 SERIES DRIVES' PARAMETERS .....	14
TABLE 5 - V7 DRIVES' PARAMETERS.....	15
TABLE 6 - 1000 SERIES DRIVES' PARAMETERS .....	16
TABLE 7 - 1000 SERIES DRIVES' PARAMETERS (CONT'D) .....	17

## Overview

This document contains a basic description of configuring, connecting and controlling a Yaskawa AC Drive with either a ControlLogix or CompactLogix PLC on an EtherNet/IP network. Although the description uses a single Yaskawa AC Drive, the principle can be expanded to include a large number of devices. This document and the examples contained herein also do not purport to describe all possible methods of connectivity and programming.

## Intended Audience

This document assumes that the reader is familiar with Yaskawa AC Drives, Ethernet, EtherNet/IP, RSLogix 5000 programming ControlLogix PLCs and CompactLogix PLCs. Familiarity with the CM092, CM093, SI-EN3 and SI-EN3/V installation guides and technical manuals is highly recommended.<sup>1</sup>

## Configure

### Drives

Install the Yaskawa AC Drives according to their respective Installation Guides and Technical Manuals.<sup>1</sup> Verify that the drives have been correctly installed and tested. Set the drives' communications and alarm/fault action parameters.<sup>2</sup> Power off the drives and install the appropriate EtherNet/IP Option (CM092 for 7 series drives, CM093 for V7 drives, SI-EN3 for 1000 series drives and SI-EN3/V for V1000 drives). Power on the drives and verify that the option is operating properly and that there are no drive faults.

### Network

The figure below displays an example of an EtherNet/IP network and how devices are connected. Both the ControlLogix and CompactLogix PLCs are connected to the network in the same way.

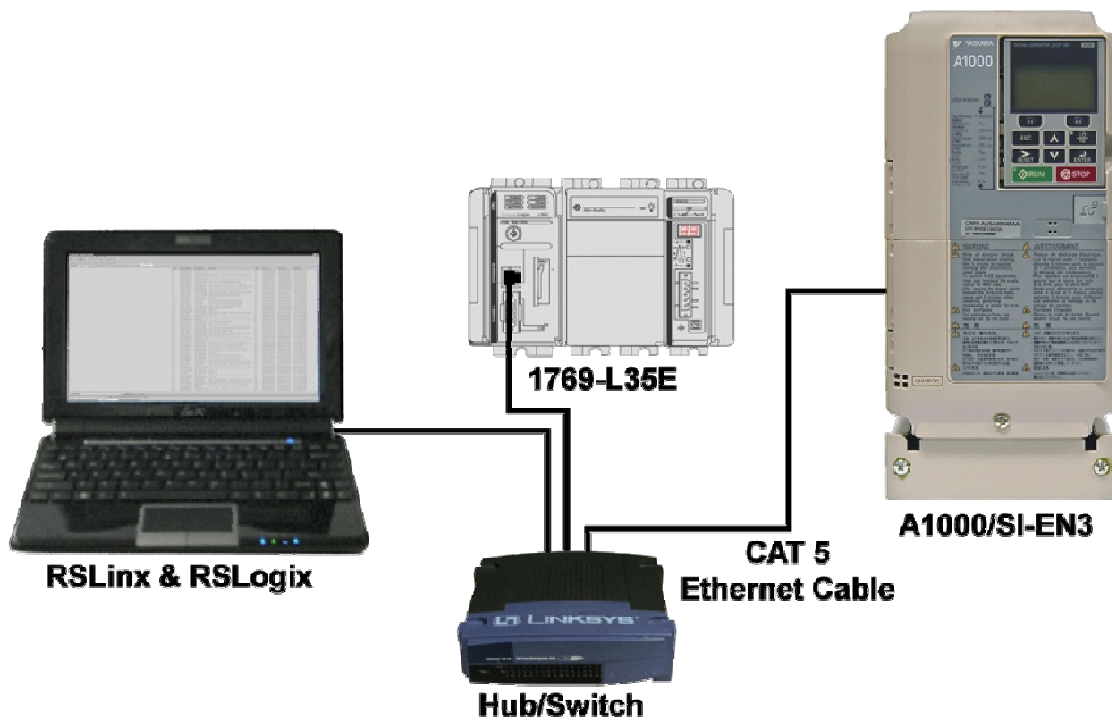


Figure 1 - Example Network Setup

<sup>1</sup> Refer to Appendix A for document information

<sup>2</sup> Refer to Appendix B for parameter information

## Network (cont'd)

### Hub/Switch

Typically a switch is used to connect the PLC to devices. A switch eliminates the possibility of collisions on the EtherNet/IP network. A switch routes the messages only to those devices to which the messages are addressed.

- Strongly Recommended
  - **IGMP Snooping** (reduces multi-cast message traffic) (check controller's EtherNet/IP module for version compatibility)
  - Port Mirroring (network/device diagnostics)
  - Port Diagnostics
  - Web Browser Support
- Dependent on controller's EtherNet/IP Module
  - Auto-negotiation
  - Forced Speed and Duplex

### Cable/Wiring

**Shielded CAT 5 cable** is strongly recommended. It is also very important to route the cables correctly:

- Route the Ethernet cable several inches away from any high voltage or current source cables.
- If the Ethernet cable must cross any power cable, cross the power cable at a 90° angle.
- Do not route Ethernet cable in any tray or conduit that contains any conductor capable of producing electro-magnetic interference.

## IP Addresses, Subnet Masks and Gateways

All devices on an EtherNet/IP network must have a unique IP address. IP addresses are in the form of four decimal numeric fields separated by a period (###.###.###.###). Each field must contain a value between 0 and 255. These addresses will be determined and supplied by the network administrator or system designer. In this document the addresses assigned are

- **192.168.1.250** PC
- **192.168.1.50** PLC
- **192.168.1.20** A1000 drive

### PC Setup

In order for a PC to talk to another device on the network, it must be on the same local network as the device. The local network address will be one or more of the first three fields of the IP address. In our example the **local network address** is **192.168.1**.

From the Start Menu  
Select

Settings

Network Connections

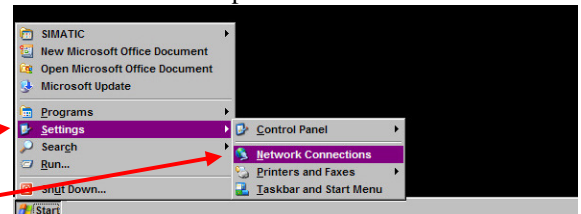


Figure 2 - PC Select Network Connection

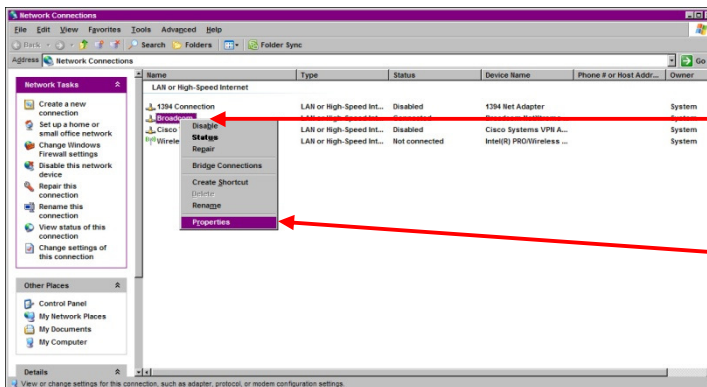


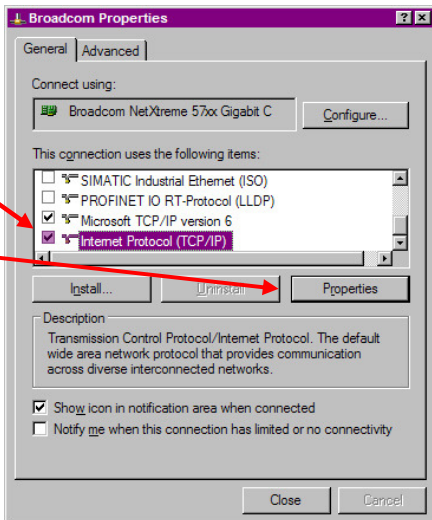
Figure 3 - PC Select Network Connection

Select the network interface that is to be used  
In this case it is **Broadcom**.

Right click on the network interface and select **Properties**

From the network **Properties** dialog box

Select  
**Internet Protocol (TCP/IP)**  
**Properties**



**Figure 4 - Select Internet Protocol**

From **Internet Protocol (TCP/IP) Properties**

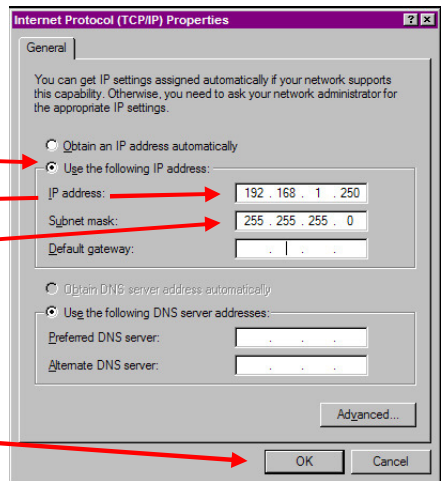
Select  
**Use the following IP address**

Enter **192.168.1.250** for the IP Address

Enter **255.255.255.0** for the Subnet Mask

The **Gateway** and **DNS server** entries can be left blank

Select **OK**.



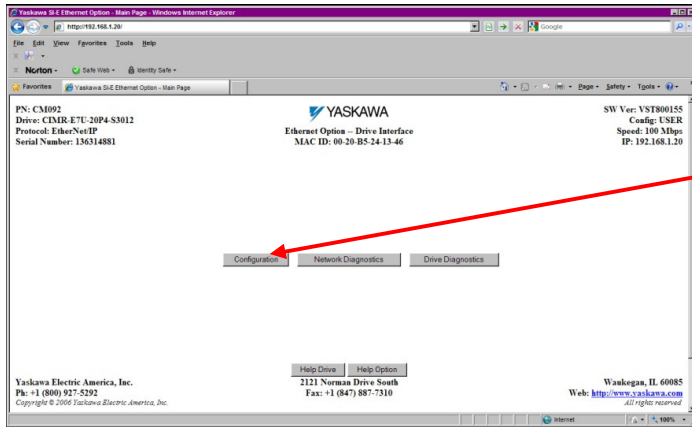
**Figure 5 - Enter IP Address and Subnet Mask**

## CM092 & CM093

The CM092 and CM093 are EtherNet/IP options for Yaskawa's 7 series AC Drives. The CM092 is the option for the F7, G7 and P7 AC Drives while the CM093 is the option for the V7 AC Drives. Refer to the CM092/CM093 installation guides and/or technical manuals<sup>1</sup> for detailed information on setting addressing mode and IP addresses.

If the IP address is unknown it may be necessary to reset the option. Refer to the appropriate installation guide for details on resetting the EtherNet/IP option. After an option reset or if the CM092/CM093 had not been previously programmed, read the section BOOTP/DHCP below prior to continuing this section.

Setting the IP address and addressing mode on the CM092 and CM093, is done via the option's web interface. Open a browser on the PC and enter the IP address of the EtherNet/IP option in the address line. The web page shown in the figure below should appear.



Main web page  
Select **Configuration**

Figure 6 - Main Web Interface (CM092/CM093)

Select addressing mode  
**DHCP/BOOTP** for *dynamic* IP addresses  
**USER** for *static* IP addresses

Enter **IP address, subnet** and **gateway**

Select **Submit** to accept settings

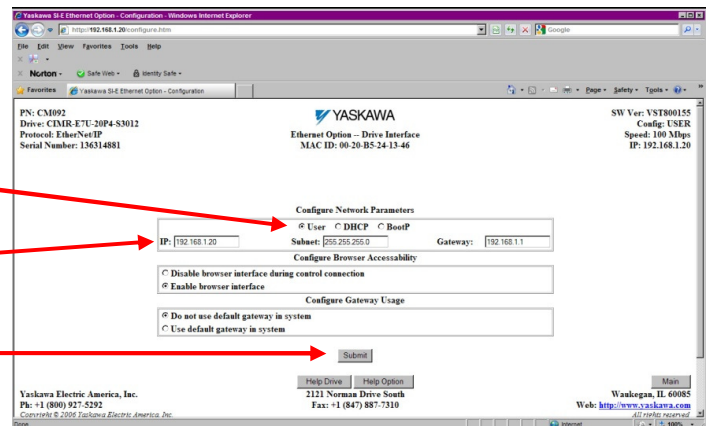
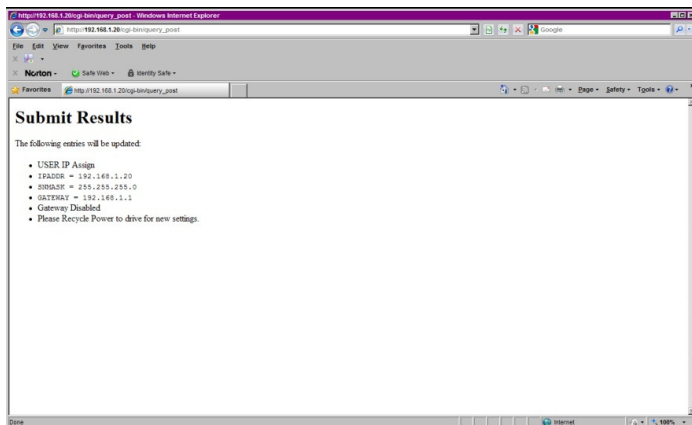


Figure 7 – IP Address Settings and Configuration



Check **Submit Results**  
**Power cycle the drive to save the changes**

The settings can be changed prior to power cycling the drive by returning to the **Configuration** page.

Figure 8 – Power Cycle Drive to Save Changes

<sup>1</sup> Refer to Appendix A for document information

## SI-EN3 & SI-EN3/V

The SI-EN3 and SI-EN3/V are the EtherNet/IP options for Yaskawa's 1000 series AC Drives. The SI-EN3/V is the option for the V1000 AC Drives and the SI-EN3 is the option for all other 1000 series AC Drives.

The IP address and other EtherNet/IP specific settings for 1000 series AC Drives may be set by parameters<sup>1</sup>. DHCP may be used for "out of the box" configuration. For detailed information refer to the SI-EN3 or SI-EN3/V installation guides and/or technical manuals.<sup>2</sup>

## BOOTP/DHCP<sup>3</sup>

A BOOTP or DHCP server<sup>2</sup> allows the setting of an IP address via the network. The device sends a request for an IP address that is picked up by either a BOOTP or DHCP server. The server then responds with an IP address to the device. Only one BOOTP or DHCP server may reside on the network.

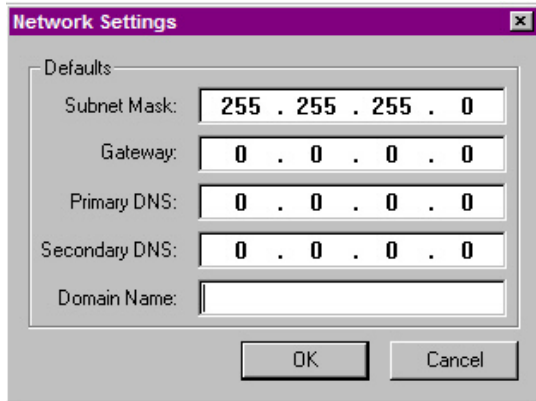


Figure 9 -Enter Local Network Subnet Mask

At the first time use set the DHCP Server' subnet mask. For our local network the typical subnet mask is 255.255.255.0.

Select the MAC ID of the device.

Select Add to Relation List

Enter the IP address for the device.

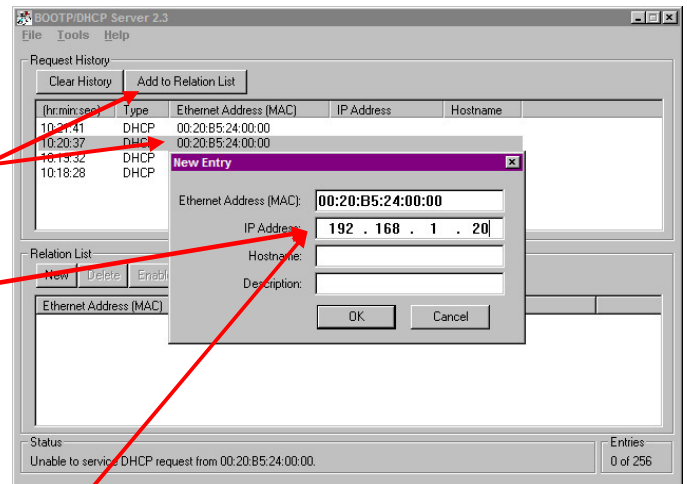


Figure 10 - Enter Device IP Address

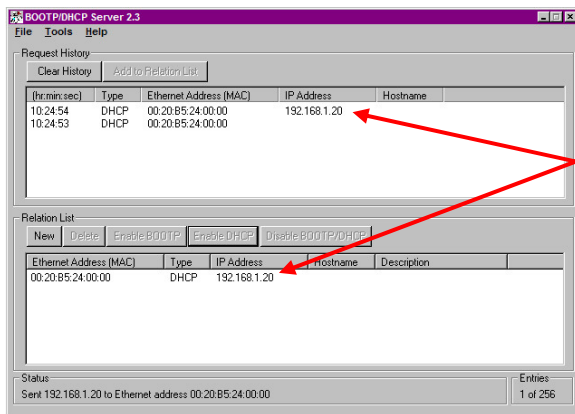


Figure 11 - Verify IP Address

Verify that the assigned IP address is correct.

<sup>1</sup> Refer to Appendix B for parameter information

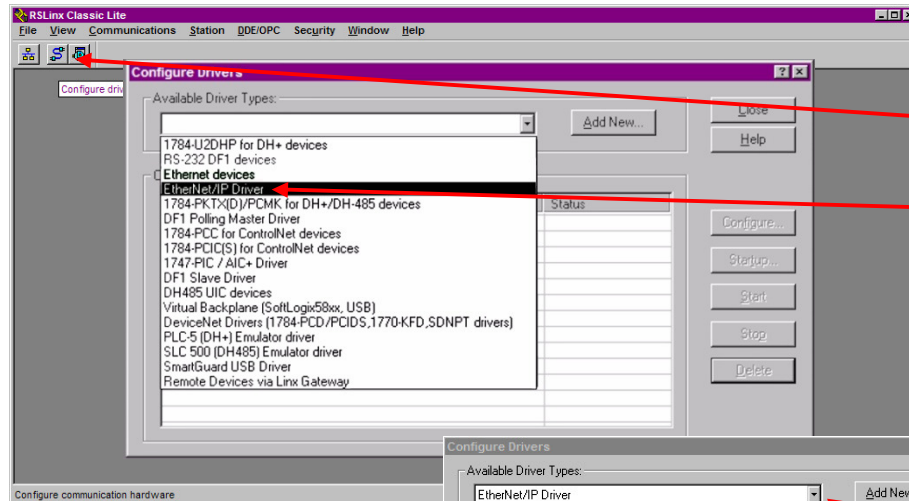
<sup>2</sup> Refer to Appendix A for document information

<sup>3</sup> BOOTP\_DHCP Server 2.3.2.0 is shown



## RSLinx

RSLinx is a software communications product that provides a gateway to connect a PC to the network<sup>1</sup>.



From the RSLinx main screen select **Configure Drivers**

Select **EtherNet/IP** from the driver's dialog box

Figure 12 - Select Network Interface

Select **Add New**

The new network name

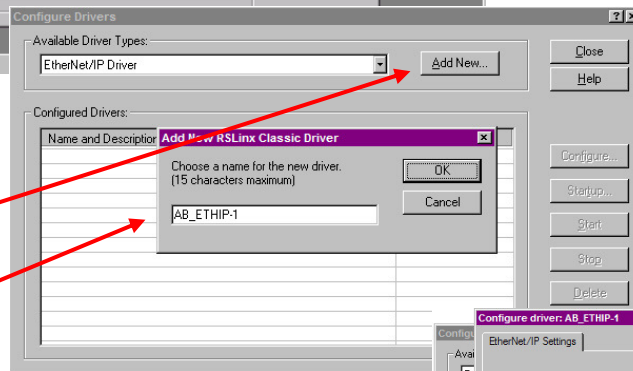


Figure 13 - Driver Running

Select the PC's Ethernet controller

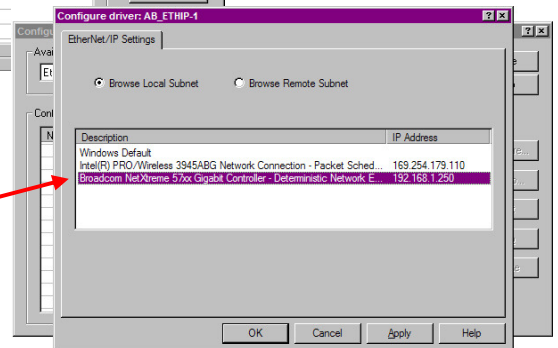
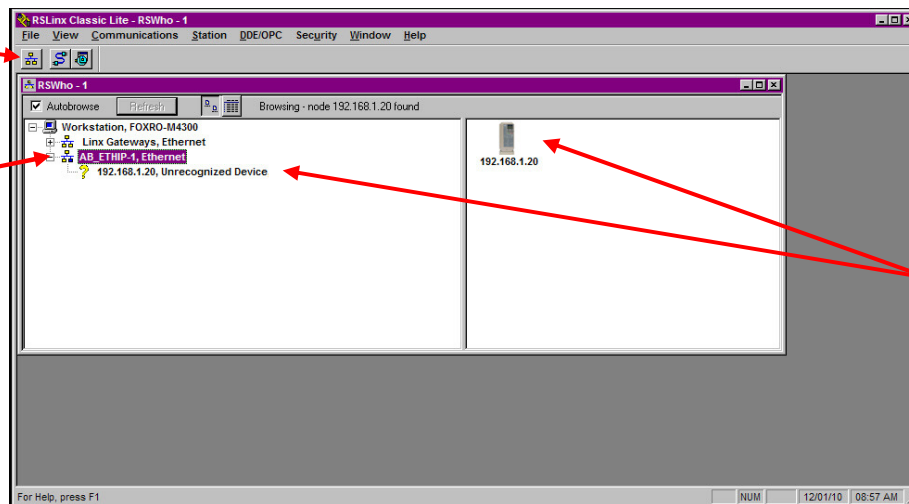


Figure 14 - Select Ethernet Controller

From the RSLinx main screen select **RSWho**

Select the installed driver



Network devices found

Figure 15 - Show Network Devices

<sup>1</sup> RSLinx is Copyright Rockwell Automation Technologies Inc ©2010

Refer to the RSLinx documentation for information on RSLinx setup and operation

## RSLogix 5000

This section refers to setting up either a CompactLogix or ControlLogix controller with RSLogix 5000. With an existing project open the project then go directly to the **Add Device** section below.

## New Project

Start RSLogix 5000.

Select **New** from the menu bar

Select the **controller model**

Select the **controller firmware version**

Enter a **project name**

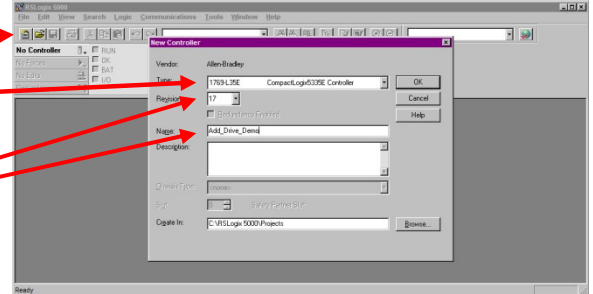
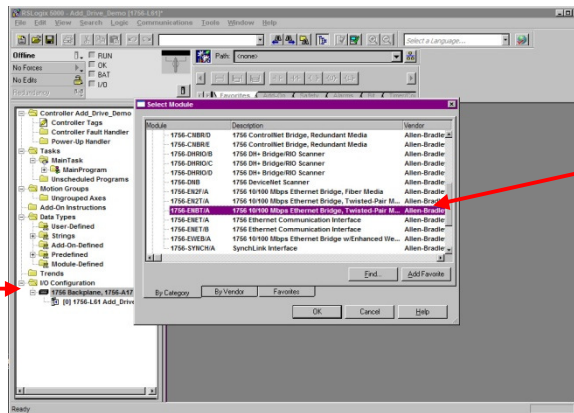


Figure 16 - Define New Project

## ControlLogix

For ControlLogix controllers, a network module must be added to the I/O Configuration before a device can be added..

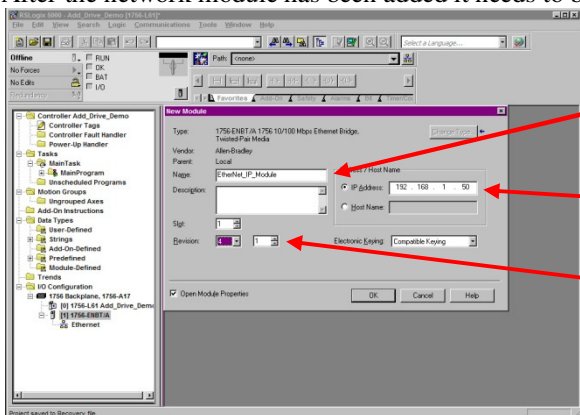
Right click on the **controller module** in the I/O Configuration and select **New Module**.



Select **Communications** Category and select the appropriate network module from those listed.

Figure 17 - ControlLogix Add Network Module

After the network module has been added it needs to be configured.



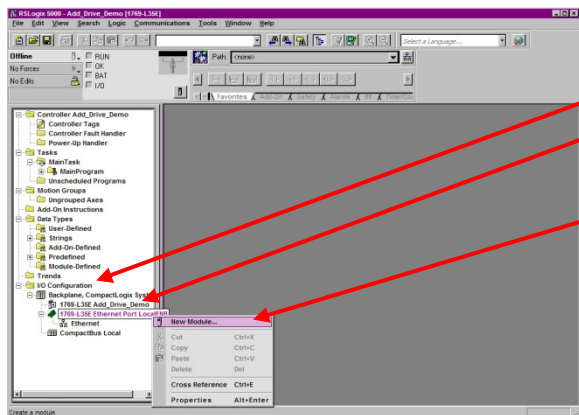
Enter a name for the network module. This is the name that will be used as the I/O Tag name for the module.

Enter the **IP address** of the network module

Enter the **slot number** containing the network module and its **firmware version**.

Figure 18 - Network Module Settings

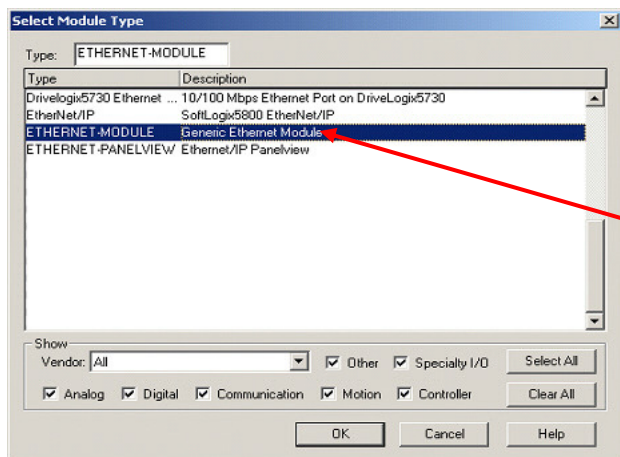
## Add Device



From the **I/O Configuration** folder in the project tree, right click on the **Controller EtherNet/IP** module to be used

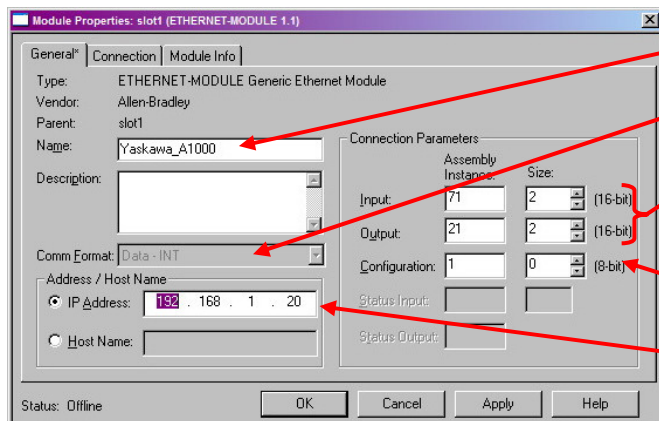
Select **New Module**

Figure 19 - Add Device – CompactLogix



Select **ETHERNET-MODULE Generic Ethernet Module**

Figure 20 - Select Connection Type



Enter a **name** and **description** for the added device

Select the **I/O Datatype** (INT is recommended)

Select the **Input and Output assemblies** and set their size in bytes (based on the Datatype selected)

Set the **Configuration** to 1 with a size of 0 (The Datatype selects the Assembly size in bytes)

Enter the **IP Address** of the device to be added

Figure 21 - Set Device IP Address and Configuration

## I/O Tags

The I/O for the added device is automatically added to the **Controller Tags** (global scope). Yaskawa\_A1000 tags are shown below. These tags represent the polled I/O. The data in the tags correspond directly with the input and output assemblies selected. In order to use the I/O in a program it is useful to have meaningful names for each I/O point. Yaskawa has a **Tag Generator Utility**<sup>1</sup> designed to automate naming the I/O associated with Yaskawa AC Drives.

The screenshot shows a window titled "Controller Tags - Add\_Drive\_Demo(controller)". The "Scope" is set to "Add\_Drive\_Demc". The table below lists the tags:

Name	Alias For	Base Tag	Data Type	Style	Desc
Yaskawa_A1000:C			AB:ETHERNET_MODULE:C:0		
Yaskawa_A1000:I			AB:ETHERNET_MODULE_INT_4Bytes:I:0		
Yaskawa_A1000:O			AB:ETHERNET_MODULE_INT_4Bytes:O:0		
Yaskawa_A1000_GetActSpd	Yaskawa_A1000:I.Data[1]	Yaskawa_A1000:I.Data[1]	INT	Decimal	
Yaskawa_A1000_GetAlarmSt	Yaskawa_A1000:I.Data[0].1	Yaskawa_A1000:I.Data[0].1	BOOL	Binary	
Yaskawa_A1000_GetDrvRdySt	Yaskawa_A1000:I.Data[0].4	Yaskawa_A1000:I.Data[0].4	BOOL	Binary	
Yaskawa_A1000_GetDrvSt	Yaskawa_A1000:I.Data[0].8	Yaskawa_A1000:I.Data[0].8	BOOL	Binary	
Yaskawa_A1000_GetFltSt	Yaskawa_A1000:I.Data[0].0	Yaskawa_A1000:I.Data[0].0	BOOL	Binary	
Yaskawa_A1000_GetInputSt	Yaskawa_A1000:I.Data[0]	Yaskawa_A1000:I.Data[0]	INT	Binary	
Yaskawa_A1000_GetNetCtrlSt	Yaskawa_A1000:I.Data[0].5	Yaskawa_A1000:I.Data[0].5	BOOL	Binary	
Yaskawa_A1000_GetNetRefSt	Yaskawa_A1000:I.Data[0].6	Yaskawa_A1000:I.Data[0].6	BOOL	Binary	
Yaskawa_A1000_GetRunFWDSt	Yaskawa_A1000:I.Data[0].2	Yaskawa_A1000:I.Data[0].2	BOOL	Binary	
Yaskawa_A1000_GetRunREVSt	Yaskawa_A1000:I.Data[0].3	Yaskawa_A1000:I.Data[0].3	BOOL	Binary	
Yaskawa_A1000_GetSpdAgreeSt	Yaskawa_A1000:I.Data[0].7	Yaskawa_A1000:I.Data[0].7	BOOL	Binary	
Yaskawa_A1000_SetFltRst	Yaskawa_A1000:O.Data[0].2	Yaskawa_A1000:O.Data[0].2	BOOL	Binary	
Yaskawa_A1000_SetFreqRef	Yaskawa_A1000:O.Data[1]	Yaskawa_A1000:O.Data[1]	INT	Decimal	
Yaskawa_A1000_SetNetCtrl	Yaskawa_A1000:O.Data[0].5	Yaskawa_A1000:O.Data[0].5	BOOL	Binary	
Yaskawa_A1000_SetNetRef	Yaskawa_A1000:O.Data[0].6	Yaskawa_A1000:O.Data[0].6	BOOL	Binary	
Yaskawa_A1000_SetOutputs	Yaskawa_A1000:O.Data[0]	Yaskawa_A1000:O.Data[0]	INT	Binary	
Yaskawa_A1000_SetRunFWD	Yaskawa_A1000:O.Data[0].0	Yaskawa_A1000:O.Data[0].0	BOOL	Binary	
Yaskawa_A1000_SetRunREV	Yaskawa_A1000:O.Data[0].1	Yaskawa_A1000:O.Data[0].1	BOOL	Binary	

Red arrows and brackets on the left categorize the tags:

- Yaskawa\_A1000 Control I/O:** Points to the top three rows (Yaskawa\_A1000:C, Yaskawa\_A1000:I, Yaskawa\_A1000:O).
- Yaskawa\_A1000 Input I/O:** Points to the next seven rows (Yaskawa\_A1000\_GetActSpd through Yaskawa\_A1000\_GetFltSt).
- Yaskawa\_A1000 Output I/O:** Points to the bottom seven rows (Yaskawa\_A1000\_GetInputSt through Yaskawa\_A1000\_SetRunREV).

Figure 22 - I/O Table Display for Configured Device with Tag Generator Utility Generated I/O Names

## I/O Assemblies

Table 1 – Basic Input and Output Assemblies		
Controller Tag Name (Example)	Assembly Data	Description
Yaskawa_A1000:I.Data[0]	Assembly 71 (Bytes 1 & 2)	Drive Status Word: Bit 0: Faulted Bit 1: Warning Bit 2: Running Forward Bit 3: Running Reverse Bit 4: Drive Ready Bit 5: Controlling from Network Bit 6: Frequency Reference from Network Bit 7: At Speed Commanded Bit 8-15: Not Used
Yaskawa_A1000:I.Data[1]	Assembly 71 (Bytes 3 & 4)	Actual Speed Example (3000 = 30.00 Hz), CM092 If o1-03 = 4 Speed is in RPM (1750 = 1750 RPM) CM093 If n035 = 4 Speed is in RPM (1750 = 1750 RPM)
Yaskawa_A1000:O.Data[0]	Assembly 21 (Bytes 1 & 2)	Drive Command Word: Bit 0: Run Forward Command Bit 1: Run Reverse Command Bit 2: Fault Reset Bit 3: Not Used Bit 4: Not Used Bit 5: Network Control Bit 6: Network Frequency Reference Bit 7: Not Used Bit 8-15: Not Used
Yaskawa_A1000:O.Data[1]	Assembly 21 (Bytes 3 & 4)	Commanded Speed Example (3000 = 30.00 Hz), CM092 If (o1-03 = 4) Speed is in RPM (1750 = 1750 RPM) CM093 If n035 = 4 Speed is in RPM (1750 = 1750 RPM)

<sup>1</sup> Refer to Appendix A

## Explicit Messaging

Device I/O as shown above is updated on a polled basis. Explicit messaging is a way to control or query a device on an as needed basis. Explicit messages are controlled by PLC logic and MSG program blocks. A MSG program block must be named and I/O space allocated.

The ladder logic below is an example of using an explicit message. Once the MSG block is enabled (Rung 1) it is ignored until either the done bit (**MSG1.DN**) or the error bit (**MSG1.ER**) is set (Rung 2). The MSG block is not guaranteed to process in one PLC scan. This starts the processing of the explicit message information which is inserted between rungs 2 and 3. Rung 3 signals that MSG1 processing has completed and starts the next message.

To configure the MSG block select **Message Configuration**.

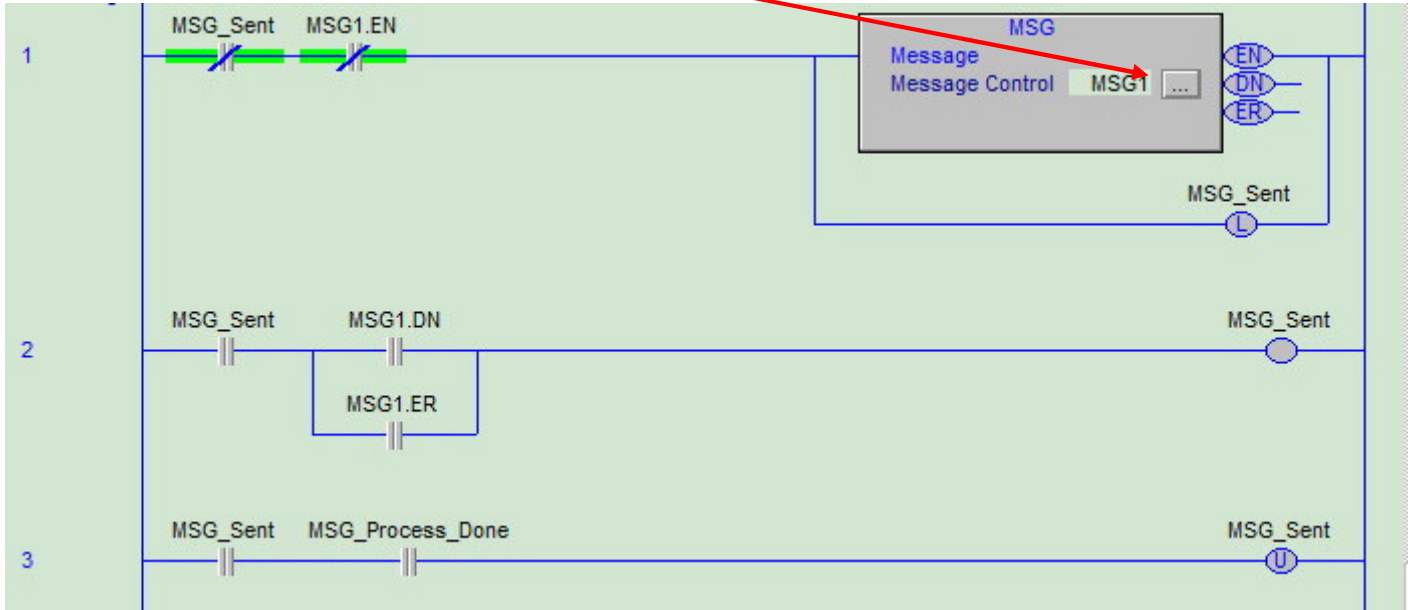
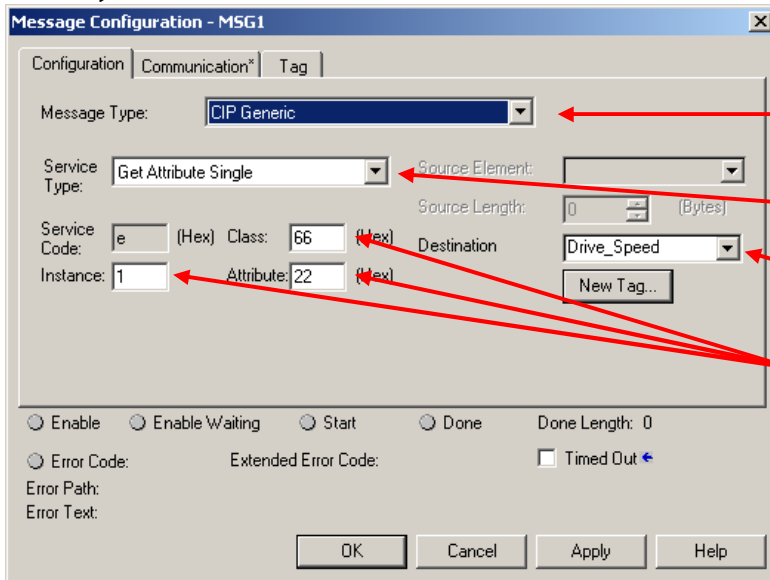


Figure 23 - Explicit Message Ladder Logic Example

## Class, Instance & Attribute



Select **CIP Generic** for the type of message

Select the desired service

Select an I/O Tag that holds the data

Select the **class**, **instance** and **attribute** of the information desired. All registers and parameters are expanded to **4 hexadecimal digits** by pre-pending 0s to the address until 4 digits is reached.

Figure 24 - Message Configuration

## Explicit Messaging (cont'd)

### CM092 & CM093

For the CM092 and CM093 registers and parameters are divided into groups based on their application. For example Class 66h contains the monitor parameters. Class 68h contains the Application Object parameters, all the b parameters. Since the addressing of specific parameters differs between drive models is necessary that either the CM092 or CM093 technical manuals be used.

Example: Accessing Reference Frequency

Table 2 - TM.AFD.26 Parameter Class, Instance, Attribute						
Class 66h, Instance 1 – Monitor Parameters 1						
Monitor	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
	Fault Register 1	21(15h)				21(15h)
	Fault Register 2	22(16h)				22(16h)
	Fault Register 3	23(17h)				23(17h)
	Fault Register 4	24(18h)				24(18h)
	Fault Register 5	25(19h)				25(19h)
U1-01	Frequency Reference	65(41h)	65(41h)	65(41h)	65(41h)	33(21h)
U1-02	Output Frequency	66(42h)	66(42h)	66(42h)	66(42h)	34(22h)
U1-03	Output Current	67(43h)	67(43h)	67(43h)	67(43h)	35(23h)

Select the class, instance and attribute of the drive used and the parameter desired. In this example the F7U was chosen for the drive and U1-01 for the parameter (Frequency Reference).

To return the current Reference Frequency:

- Service Code: Get Attribute Single
- Class: 66
- Instance: 1
- Attribute: 41
- Destination: Drive\_Speed

The Reference Frequency will be returned when the MSG#.DN bit is set.

Table 3 - TM.AFD.26 Yaskawa Command Object					
Class	Instance	Attribute	Description	Low Limit	Hi Limit
64h	1h	1	Operation Command		
		2	Frequency Reference	0	1770h
		3	Torque Reference		
		4	Torque Compensation		
		5	Reserved		
		6	Analog Output 1		
		7	Analog Output 2		
		8	Digital Output		
		FEh	Save to RAM		
		FFh	Save to NVRAM		

Example: Setting Frequency Reference

- Service Code: Set Attribute Single
- Class: 64
- Instance: 1
- Attribute: 2
- Source: Drive\_Speed (value between 0h and 1770h (60Hz))

The Frequency Reference will be set. The MSG#.DN bit set signifies the correct completion of the MSG#.

## SI-EN3 & SI-EN3/V

For registers addressed above 100h the class is 64h, the instance is the MSB of the address and the attribute is the LSB of the address. For example: the address of b1-01 is 180h (0180h). To access that parameter the class is 64h, the instance is 01h and the attribute is 80h.

For registers with addresses below 100h, the class is 7Dh and the instance is 1. The attribute is the LSB of the register address. For example: the LSB of register 23h (0023h) is 23h. Instances of 0 are not allowed, so all registers with addresses below 100h have instances of 1.

Refer to Figure 24 above.

Example: Reference Frequency: (Parameter U1-01 address 0040h)

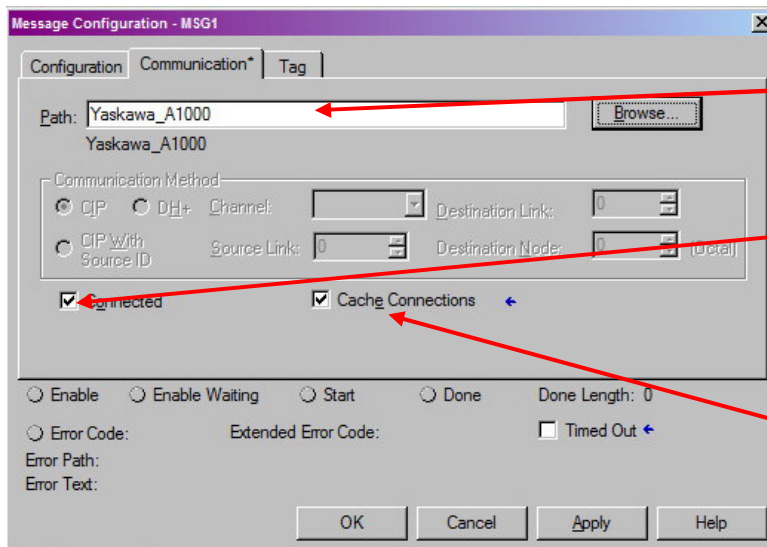
- Service Code: Get Attribute Single
- Class: 7D
- Instance: 1
- Attribute: 40
- Destination: Drive\_Speed

Example: Setting Frequency Reference: (Register 0002h)

- Service Code: Set Attribute Single
- Class: 7D
- Instance: 1
- Attribute: 2
- Source: Drive\_Speed (value between 0h and 1770h (60Hz))

The Frequency Reference will be set. The MSG#.DN bit set signifies the correct completion of the MSG#.

## Message Path



Enter either the path to the device or **Browse** for the device to which the message is to be sent. Browsing is recommended to eliminate errors in defining the device path.

If the message is to be a connected message, check **Connected**. This means that for each message a connection will be opened and closed.

If **Cache Connections** is not checked, a new connection will be opened each time the explicit message is enabled. If **Cache Connections** is checked, a connection will be opened the first time the message is enabled and remain open. It will not be closed at the end of the message.

Figure 25 - Message Path

## Appendix A - Reference Documentation

The references listed in the table below may provide additional useful information concerning Yaskawa AC Drives, Ethernet and EtherNet/IP. There are also many internet sites that contain supplementary information on both Ethernet and EtherNet/IP.

<b>Table 4 - Documentation Reference</b>	
<b>Drives</b>	
F7 Drive Users Guide	TM.F7.01
F7 Drive Programming Guide	TM.F7.02
G7 Drive Users Guide	TM.G7.01
G7 Drive Programming Guide	TM.G7.02
P7 Drive Users Guide	TM.P7.01
P7 Drive Programming Guide	TM.P7.02
V7 Drive Users Guide	TM.V7.01
V7 Drive Programming Guide	TM.V7.02
<b>CM092, CM093</b>	
CM092 Installation Guide	IG.AFD.25
CM092 Technical Manual	TM.AFD.25
CM093 Installation Guide	IG.V7.25
CM093 Technical Manual	TM.V7.25
<b>1000 Series Drives</b>	
V1000 Drive Technical Manual	SIEP C710606
A1000 Drive Technical Manual	SIEP C710616
<b>SI-EN3, SI-EN3/V</b>	
SI-EN3 Installation Guide	TOEPYEACOM04
SI-EN3/V Installation Guide	TOEPYEACOM02
SI-EN3 Technical Manual	SIEPYEACOM04
SI-EN3/V Technical Manual	SIEPYEACOM02
<b>Hardware</b>	
CompactLogix	Both controllers are products of Rockwell Automation
ControlLogix	<a href="http://www.RockwellAutomation.com">http://www.RockwellAutomation.com</a>
<b>General</b>	
Yaskawa's Web Site	<a href="#">Latest Drive Information</a>
Introduction to Ethernet	<a href="#">Ethernet Introduction</a>
Information on EtherNet/IP	<a href="#">ODVA Organization</a>
<b>Software</b>	
Yaskawa's Tag Generator Utility	SW.YEA.01.EXE <a href="http://www.yaskawa.com">http://www.yaskawa.com</a>
RSLinx	RSLinx is Copyright Rockwell Automation Technologies Inc ©2010, <a href="http://www.RockwellAutomation.com">http://www.RockwellAutomation.com</a>
RSLogix 5000	RSLogix 5000 is Copyright Rockwell Automation Technologies Inc ©2010, <a href="http://www.RockwellAutomation.com">http://www.RockwellAutomation.com</a>
BOOTP/DHCP Server	BOOTP_DHCP Server 2.3.2.0 is Copyright Rockwell Automation Inc ©2003, <a href="http://www.RockwellAutomation.com">http://www.RockwellAutomation.com</a>
<b>Capture &amp; Analysis Software</b>	
Wireshark (network capture/analysis)	<a href="http://www.wireshark.org/download.html">http://www.wireshark.org/download.html</a>
Packetyzer (network capture/analysis)	<a href="http://sourceforge.net/projects/packetyzer/files/packetyzer/Packetyzer%205.0.0/PacketyzerSetup_5_0_0.exe/download">http://sourceforge.net/projects/packetyzer/files/packetyzer/Packetyzer%205.0.0/PacketyzerSetup_5_0_0.exe/download</a>



## Appendix B - Drive Parameters

There are no parameters in the F7, G7 and P7 that directly affect the setup of the EtherNet/IP option. The parameters in the table below set the response to communication errors and/or faults. All parameters are set by the user according to the system requirements. Parameters changes become active after a drive power cycle.

### F7, G7 and P7 Series Drives' Parameters

Table 5 - F7, G7 and P7 Series Drives' Parameters				
Item	Address	Name	Description	Default
b1-01	180h	Reference Source	0: Operator 1: Terminals 2: Serial Communication <b>3: Option PCB (CM092)</b> 4: Pulse Input 5: CASE Reference	1
b1-02	181h	Run Source	0: Operator 1: Terminals 2: Serial Communication <b>3: Option PCB (CM092)</b> 4: EWS 5: CASE Reference	1
F6-01	3A2h	Communication bUS Fault	0: Ramp to Stop 1: Coast to Stop 2: Fast Stop 3: Alarm Only	1
F6-02	3A3h	EF0 Detection	0: Always Detected 1: Only During Run	0
F6-03	3A4h	EF0 Fault Action	0: Ramp to Stop 1: Coast to Stop 2: Fast Stop 3: Alarm Only	1

## V7 Communication Parameters

There are no parameters in the V7 that directly affect the setup of the EtherNet/IP option. All parameters are set by the user according to the system requirements. Parameters changes become active after a drive power cycle.

Table 6 - V7 Drives' Parameters				
Item	Address	Name	Description	Default
n003		Run Source	0: Operator 1: Terminals 2: Serial Communication <b>3: Option PCB (CM093)</b>	
n004		Reference Source	0: Operator POT 1: Operator 2: Voltage Ref (0 – 10vdc) 3: Current Ref (4 – 20ma) 4: Current Ref (0 – 20ma) 5: Pulse Train 6: Serial Communications 7: Multi-Function Analog Input (0 – 10vdc) 8: Multi-Function Analog Input (4 – 20ma) <b>9: Option PCB (CM093)</b>	

## A1000 and V1000 Communication Parameters

If DHCP or BOOTP are not to be the default method of determining the IP Address, F7-13 must be set to 0. Parameters shown only take affect after a drive power cycle.

Table 7 - 1000 Series Drives' Parameters				
Item	Address	Name	Description	Default
b1-01	180h	Reference Source	0: Operator 1: Terminals 2: Serial Communication <b>3: Option PCB (SI-EN3, SI-EN3/V)</b> 4: Pulse Input 5: CASE Reference	1
b1-02	181h	Run Source	0: Operator 1: Terminals 2: Serial Communication <b>3: Option PCB(SI-EN3, SI-EN3/V)</b> 4: EWS 5: CASE Reference	1
F6-01	3A2h	Communication bUS Fault	0: Ramp to Stop 1: Coast to Stop 2: Fast Stop 3: Alarm Only	1
F6-02	3A3h	EF0 Detection	0: Always Detected 1: Only During Run	0
F6-03	3A4h	EF0 Fault Action	0: Ramp to Stop 1: Coast to Stop 2: Fast Stop 3: Alarm Only	1
F6-04	3A5h	bUS Error Detection Time	0.0s – 5.0s	2.0s
F6-08	036Ah	Reset Communications Parameters	0: <i>Do NOT Reset on a A1-03 Reset<sup>1</sup></i> 1: Reset on a A1-03 Reset	0
H5-11	043Ch	Communications Enter Function Selection	0: RAM or ROM Enter Required 1: <i>Enter Not Required<sup>1</sup></i>	1

<sup>1</sup> The text in italics represents recommended settings. WARNING – these settings may differ from the system requirements.

**A1000 and V1000 Communication Parameters (cont'd)**

<b>Table 8 - 1000 Series Drives' Parameters (cont'd)</b>				
<b>Item</b>	<b>Address</b>	<b>Name</b>	<b>Description</b>	<b>Default</b>
F7-01	03E5h	IP Address 1 (###.____.____)	0-255	192
F7-02	03E6h	IP Address 2 (____.###.____)	0-255	168
F7-03	03E7h	IP Address 3 (____.____.###.____)	0-255	1
F7-04	03E8h	IP Address 4 (____.____.____.###)	0-255	20
F7-05	03E9h	Subnet Mask 1 (###.____.____.____)	0-255	255
F7-06	03EAh	Subnet Mask 2 (____.###.____.____)	0-255	255
F7-07	03EBh	Subnet Mask 3 (____.____.###.____)	0-255	255
F7-08	03ECh	Subnet Mask 4 (____.____.____.###)	0-255	0
F7-09	03EDh	Gateway Address 1 (###.____.____.____)	0-255	192
F7-10	03EEh	Gateway Address 2 (____.###.____.____)	0-255	168
F7-11	03EFh	Gateway Address 3 (____.____.###.____)	0-255	1
F7-12	03E0h	Gateway Address 4 (____.____.____.###)	0-255	1
F7-13	03F1h	Address Mode at Start	0: Static (User) 1: BOOTP 2: DHCP	2
F7-14	03F2h	Duplex at Start	0: Half Duplex 1: Auto Negotiate 2: Full Duplex	1
F7-15	03F3h	Communications Speed at Start	10: 10 Mbps 100: 100 Mbps	10
F7-16	03F4h	Communications Loss Timeout	0: Disabled 0.1 – 30.0s	0

**USE OF TECHNICAL INFORMATION!**

Technical content and illustrations are provided as technical advice to augment the information in manual, not supercede it. The information described in this document is subject to change without notice. Yaskawa assumes no responsibility for errors or omissions or damages resulting from the use of the information contained in any technical document. All warnings, cautions and product instruction for product use must be followed. Qualified personnel should carry out installation, operation and maintenance.