

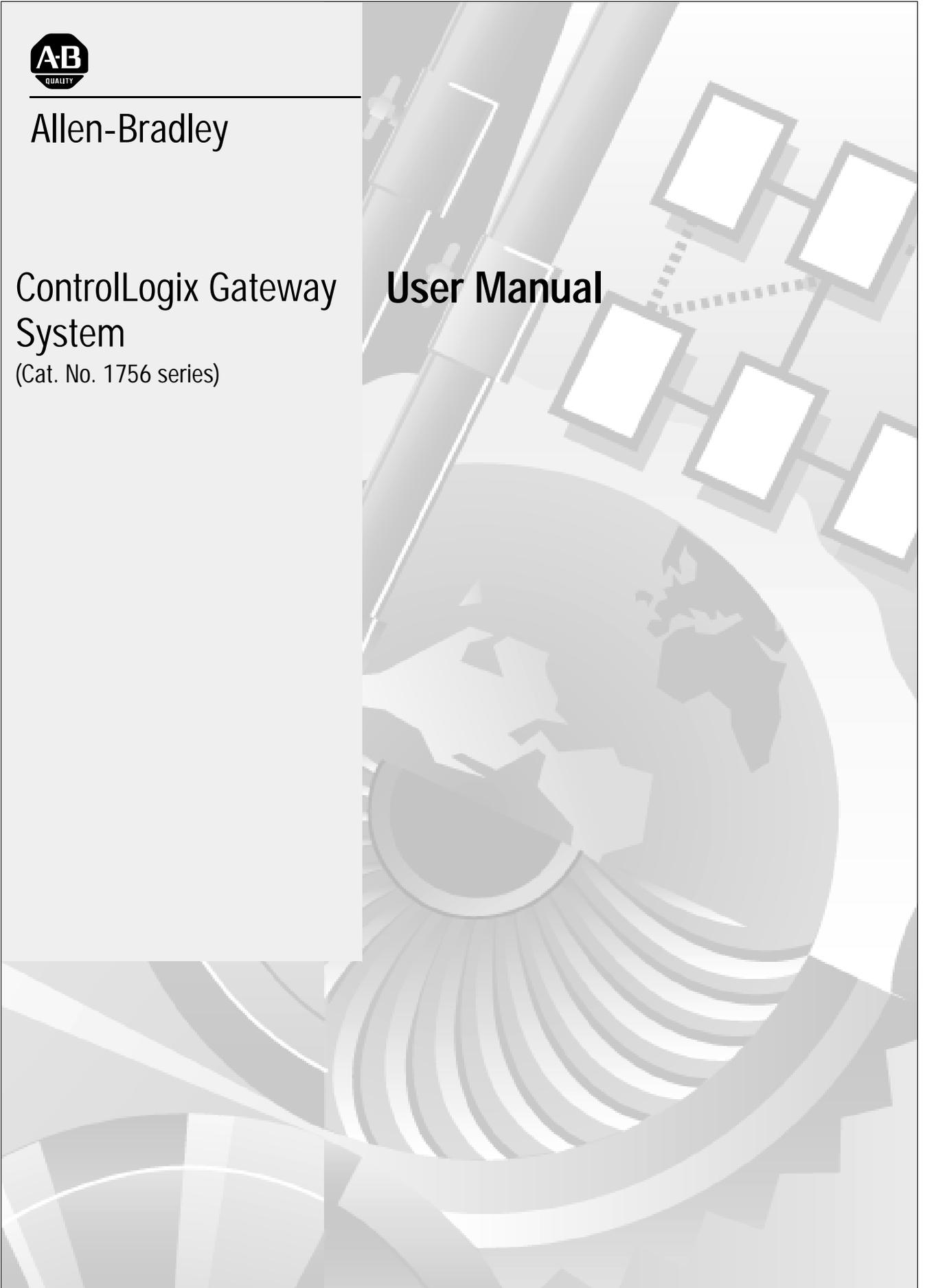


Allen-Bradley

ControlLogix Gateway System

(Cat. No. 1756 series)

User Manual



Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we use notes to make you aware of safety considerations:



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss

Attention statements help you to:

- identify a hazard
- avoid a hazard
- recognize the consequences

Important: Identifies information that is critical for successful application and understanding of the product.

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If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

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

This product is intended for use in an industrial environment.

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This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests. For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the Allen-Bradley publication Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1.

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

Using This Manual

This preface explains how to use this manual most effectively.

For information about:	See page:
who should use this manual	P-1
the purpose of this manual	P-1
where to find more information	P-2
common techniques used in this manual	P-3
Rockwell Automation support	P-4

Who Should Use This Manual

Use this manual if you are knowledgeable about ControlLogix Gateway products, but need information about integrating the products into a system. You should:

- be familiar with Microsoft® Windows® NT and with terms that describe what you should be doing when working in Windows NT, e.g., double click, dialog box, radio checkbox.
- understand Data Highway Plus, ControlNet, and Ethernet networking concepts.
- be familiar with routing concepts.

If you are not familiar with these concepts or would like additional information, refer to the documentation listed on the following page or contact your Rockwell Automation representative for information about available training.

Purpose of This Manual

This manual is for users of ControlLogix Gateway products. It:

- presents you with the basic information you need to get the example applications up and running
- provides “memory jogger” information, such as routing link numbers
- includes high-level procedures with references to other manuals for specific details

Where to Find More Information

Refer to the following publications for help with the ControlLogix Gateway system:

For information about:	See this publication:	Publication number:
the ControlLogix Ethernet Communication Interface Module	ControlLogix Ethernet Communication Interface Module Installation Instructions	1756-5.3
	ControlLogix Ethernet Communication Interface Module User Manual	1756-6.5.1
the ControlLogix Data Highway Plus Communication Interface Module	ControlLogix Data Highway Plus Communication Interface Module Installation Instructions	1756-5.4
	ControlLogix Data Highway Plus Communication Interface Module User Manual	1756-6.5.2
the ControlLogix ControlNet Bridge Module	ControlLogix ControlNet Bridge Installation Instructions	1756-5.32
	ControlLogix ControlNet Bridge User Manual	1756-6.5.3
the ControlLogix Chassis	ControlLogix Chassis Installation instructions	1756-5.2
ControlLogix power supplies	ControlLogix Power Supplies Installation Instructions	1756-5.1
PLC-5 programmable controllers	Enhanced PLC-5 Programmable Controller Quick Start	1785-10.4
	ControlNet PLC-5 Programmable Controller Quick Start	1785-10.7
	ControlNet PLC-5 Programmable Controller User Manual	1785-6.5.22
	Ethernet PLC-5 Programmable Controller Quick Start	1785-10.5
	Enhanced Ethernet PLC-5 Programmable Controller User Manual	1785-6.5.12
ControlLogix Gateway Configuration Software	ControlLogix Gateway Configuration Software User Manual	1756-6.5.7
PC communication interface cards	1784-KTX Communication Interface Card User Manual	1784-6.5.22
	Allen-Bradley Publication Index (for your specific communication interface card)	SD499
RSLogix5 programming software	Getting Results With RSLogix5	9399-RL53GR
RSLinx Lite	RSLinx Lite User's Guide	9399-WAB32LUG
grounding and wiring Allen-Bradley programmable controllers	Allen-Bradley Programmable Controller Wiring and Grounding Guidelines	1770-4.1
TCP/IP protocol and networking in general	Comer, Douglas E., <i>Internetworking with TCP-IP, Volume 1: Protocols and Architecture</i> , 2nd ed. Englewood Cliffs, N.J.:Prentice-Hall, 1995. ISBN 0-13-216987-8.	n/a
	Tannebaum, Andrew S. <i>Computer Networks</i> , 2nd ed. Englewood Cliffs, N.J.: Prentice-Hall, 1989. ISBN 0-13-162959-X.	n/a
current Allen-Bradley documentation, including ordering instructions	Allen-Bradley Publication Index	SD499
terms and definitions	Allen-Bradley Industrial Automation Glossary	AG-7.1

Many of these manuals are available online from the Automation Bookstore, <http://www.theautomationbookstore.com>.

Common Techniques Used in This Manual

The following conventions are used throughout this manual:

- Bulleted lists provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- Text in **bold font** indicates words or phrases you should type, programming windows, and menu selections.

▶ We use this symbol to call attention to helpful information.

EXAMPLE

We use this symbol to call attention to information you need to complete the example applications.

- Text in *Italic font* preceded by numerals like this **2** represents tasks you should complete (see the following figure).
- Pictures of keys and/or screens represent the actual keys you press or the screens you use (see the following figure).

Complete the instructions in sequential order:

1 Start the software:

- From the **Start** menu, select **Programs**.
- Select **Rockwell Software > RSLinx > RSLinx**.

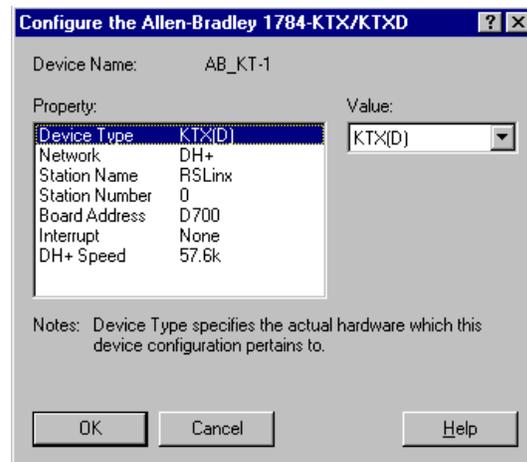
2 Configure the drivers:

- From the **Communications** menu, select **Configure Drivers**.
- Select the **1784-KTX(D)/PCMK** driver and click on **Add/New**.

3 Enter the following configuration:

Device Type:	KTX(D)
Network:	DH+
Station Name:	RSLinx
Station Number:	0
*Board Address:	D700
*Interrupt:	None
DH+ Speed	57.6k

* (must match switch settings on card)



you enter this information

on this screen

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Your Questions or Comments about This Manual

If you find a problem with this manual, please notify us of it on the enclosed Publication Problem Report (at the back of this manual).

If you have any suggestions about how we can make this manual more useful to you, please contact us at the following address:

Rockwell Automation, Allen-Bradley Company, Inc.
Control and Information Group
Technical Communication
1 Allen-Bradley Drive
Mayfield Heights, OH 44124-6118

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Overview

This manual is designed to provide you with enough information to get your ControlLogix Gateway system up and running. Use this manual if you are knowledgeable about ControlLogix Gateway products, but need information about integrating the products in a system.

The information provided is an overview; for more detailed instructions about particular tasks, see the appropriate product documentation. We have provided a listing of related documentation in the preface.

About the Applications

This manual presents six example applications in which you initiate communication as follows:

- from one DH+ network to another DH+ network using a single communication card
- from one DH+ network to another DH+ network using two communication cards
- from a DH+ network to an Ethernet network
- from one ControlNet network to another ControlNet network
- from one DH+ network to another DH+ network across an Ethernet network
- from a ControlNet network to a DH+ network across an Ethernet network

What You Need to Do

Here's an example of the type of system you'll be creating:

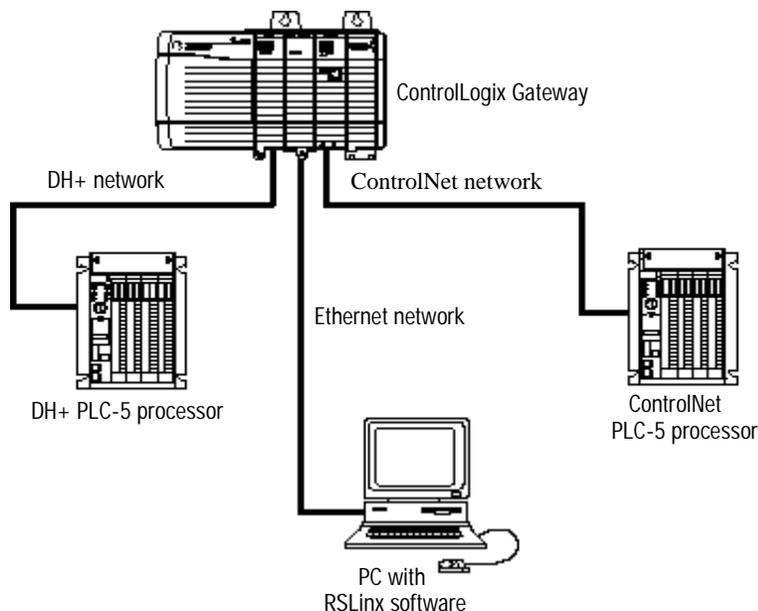
*Set up the hardware
(Chapter 2)*

*Set up the software
(Chapter 3)*

*Enter the basic ladder program
(Chapter 4)*

*Configure and run the example applications
(Chapters 5, 6, 7, 8, 9, and 10)*

*Troubleshoot the system
(Chapter 11)*



System Components

We used the following main components to set up our example applications:

Quantity:	Product Name:	Catalog Number:	Series	Firmware Revision:
Hardware				
2	ControlLogix DHRIO Communication Module	1756-DHRIO	B	2.17
2	ControlLogix Ethernet Communication Module	1756-ENET	A	1.16
2	ControlLogix ControlNet Communication Module	1756-CNBR, (or -CNB)	A	1.19
2	ControlLogix chassis	1756-A4, (or -A7, -A13, -A17)	A	-
2	ControlLogix power supply	1756-PA72, -PB72	A	-
2	PLC-5 processor, ControlNet version	1785 -L40C	F or above	-
1	Data Highway Plus Communication Interface Module	1784-KTX, -KTXD	-	-
1	Ethernet card	any commercial variety	-	-
1	personal computer that supports RSLogix software	any appropriate model	-	-
Software				
1	RSLogix5 programming software	9324-RL5300END	-	3.21
1	RSLinx software (RSLinx Lite comes with 1756-GTWY)	9355-WAB, -WABOEM, -WABC	-	2.10
1	ControlLogix Gateway configuration software	1756-GTWY	-	1.8

Understanding How Routing Tables Are Used

In some of the example applications, you will need to use routing tables to route messages between the PLC-5/40C processors if you include a 1756-DHRIO module in the path.

Important: You only need to create a routing table if the message path includes a 1756-DHRIO module. Ethernet and ControlNet modules do not require routing tables; however, if a message path contains a mix of Ethernet, ControlNet, and DH+ network segments, you must assign each of the network segments in the path (including ControlNet and Ethernet network segments) a link number.

Routing tables are stored in 1756-DHRIO modules. Each table contains all of the “links” (i.e., network segments) in the message path from the source of the message to the destination of the message. You assign a unique link number to each of the network segments in the path. Link numbers range from 1-199.

Important: Do not confuse link numbers with module port numbers or node numbers. You configure link numbers using software when you configure the system. These numbers appear only in 1756-DHRIO routing tables. Module port numbers are fixed for ControlLogix Gateway modules as follows:

1756-DHRIO Modules:	
Port Number:	Port:
1	backplane
2	channel A
3	channel B
1756-CNB Modules	
Port Number:	Port:
1	backplane
2	either of the two ControlNet media ports
1756-ENET Modules	
Port Number:	Port:
1	backplane
2	either of the two Ethernet media ports

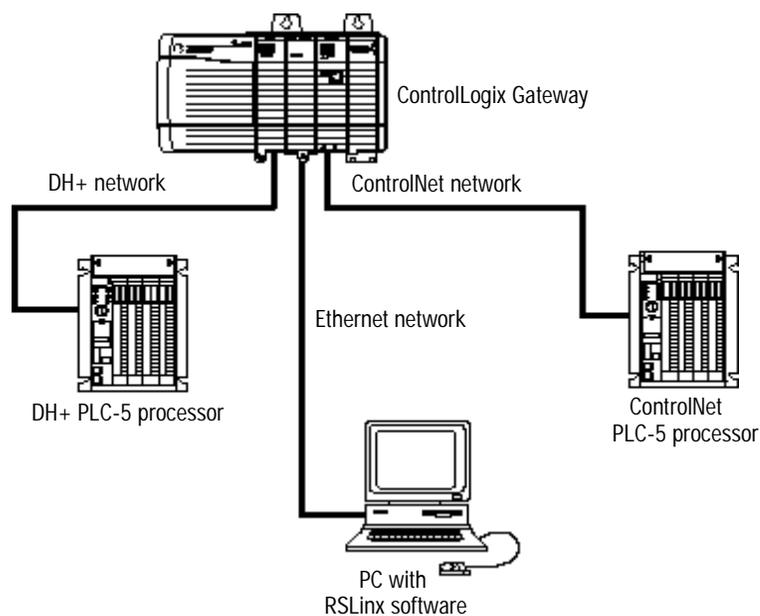
In the example applications, you set module node numbers by using the hardware switches on the 1756-CNB or -CNBR and on the 1756-DHRIO modules.

Set Up the Hardware

In this chapter, you'll set up a basic ControlLogix Gateway system that contains all of the main components you'll need to complete each example application. In the following chapters, you'll modify the connections within this system to initiate various types of communication.

Here's an example of the type of system you'll set up.

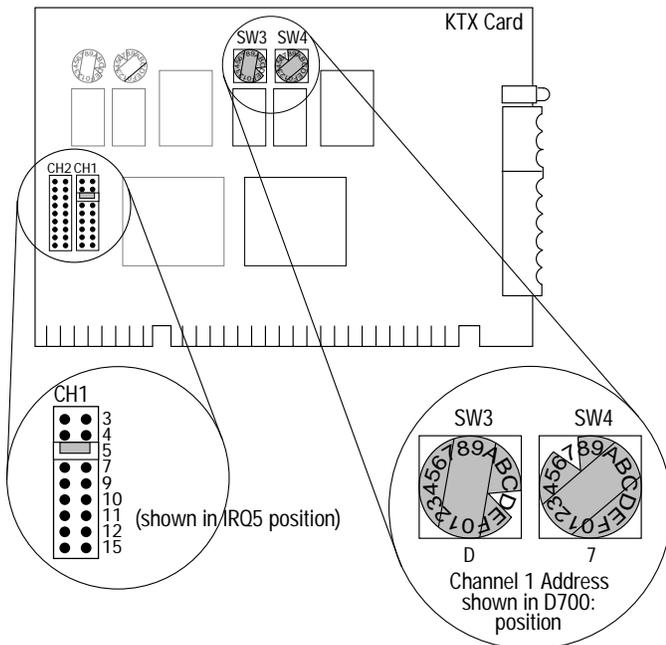
- 1** *Set up the personal computer*
(page 2-2).
- 2** *Configure the PLC-5 processors*
(page 2-3).
- 3** *Install and ground each chassis*
(page 2-4).
- 4** *Install the power supply* (page 2-5).
- 5** *Install the communication modules*
(page 2-7).



- Keep in mind that we've set up this system to illustrate the example applications. You may need to set up your system differently depending on your particular application.

Look for this symbol **EXAMPLE** for specific information about how to set up your system to complete the example applications.

Set Up the Personal Computer Install the 1784-KTX Card



1 Set the interrupt jumpers on the communication card (IRQ5 in this example).

2 Set the switches on the card. (D700 in this example)

Remember to record the 1784-KTX address:

Channel 1 Address: _____

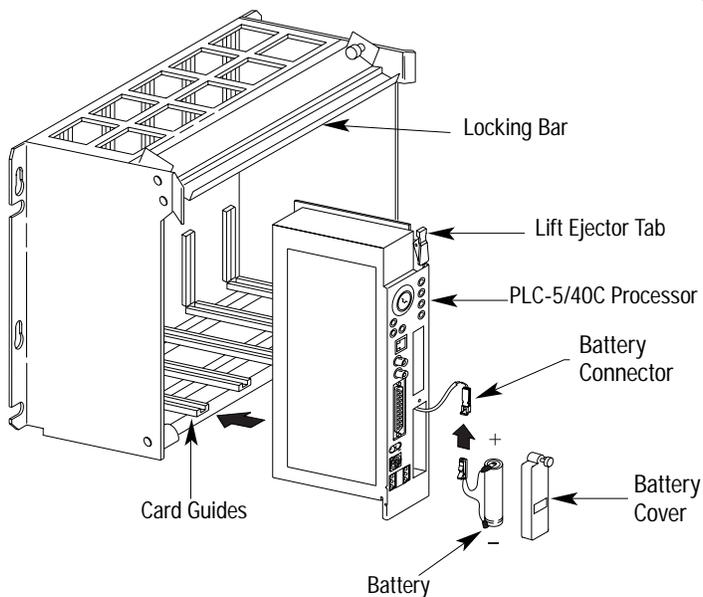
3 Insert the communication interface card into a vacant 16-bit ISA or EISA expansion slot and tighten the screw to secure the card.

► For more information, see the KTX Communication Interface Card User Manual, publication number 1784-6.5.22.

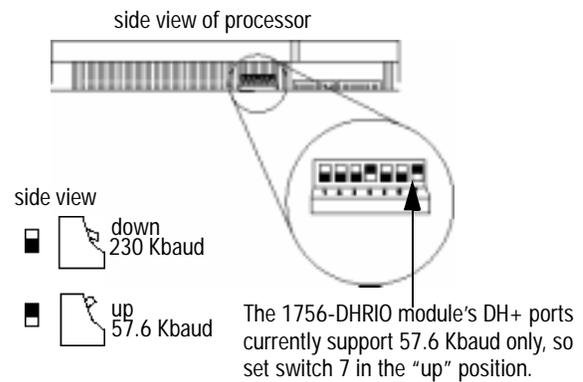
Install the Ethernet Card

Verify that your PC has an Ethernet card installed. If it does not, install any commercial variety. Make sure the Ethernet card has a unique IP address to prevent conflicts with other hardware. Verify also that you have assigned a subnet address. Then connect the Ethernet card to a hub. See page 3-2 for more details.

Configure the PLC-5 Processors



- 1 Define the DH+ station address of channel 1A by setting switch assembly SW-1 on the back of the processor. (See the side of the processor if you want to use another address.)



EXAMPLE To complete the example applications set the DH+ node address of one processor to node 10 and the other processor to node 1.

- 2 Set the controlNet network addresses using the two 10-digit rotary switches on top of the module.

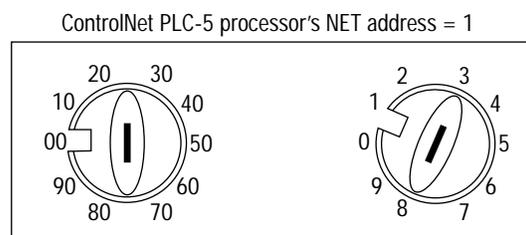
EXAMPLE To complete the example applications in chapters 8 and 10, set the ControlNet address of one processor to node 1 and the other processor to node 2.

- 3 Set the backplane switches on the I/O chassis for the PLC-5/40c processors.

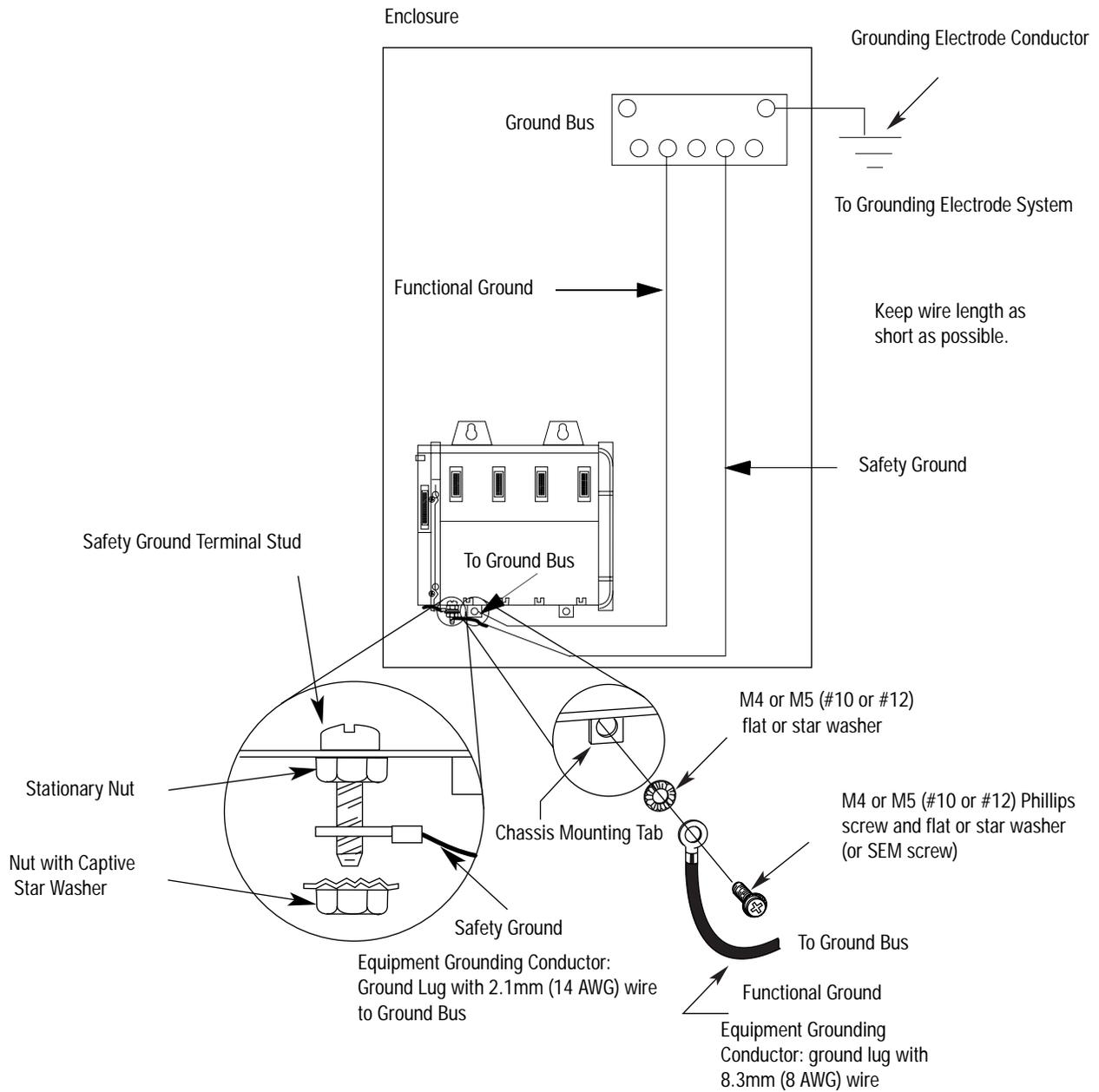
EXAMPLE Put switches 5 and 6 in the "on" position, then put all of the others in the "off" position. You need to set these switches so that you can download the ladder logic program in the example applications.

- 4 Install the processor module.

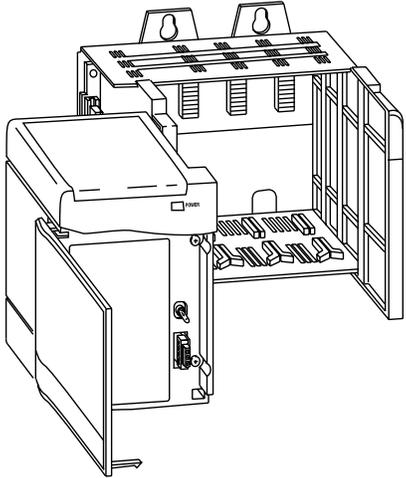
- ▶ Install the PLC-5 processor in an appropriate I/O chassis. If you need help, see the ControlNet 1.5 PLC-5 Programmable Controller User Manual, publication 1785-6.5.22.



Install and Ground Each Chassis

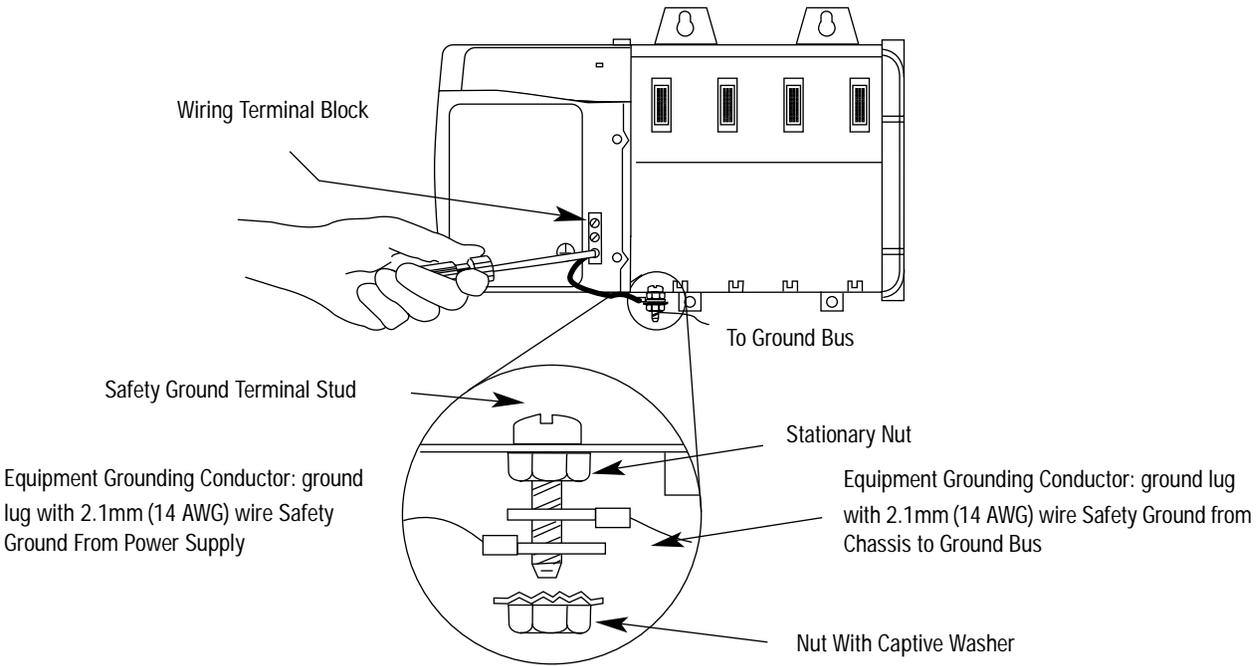


Install the ControlLogix Power Supply



- 1** *If you are using a series A power supply only, set the line voltage jumper as shown on page 3 of the ControlLogix Power Supplies Installation Instructions, publication number 1756-5.1.*
- 2** *Align the circuit board of the power supply with the card guides on the left side of the chassis.*
- 3** *Slide the power supply in until it is flush with the chassis.*
- 4** *Fasten the power supply to the chassis using a screwdriver.*

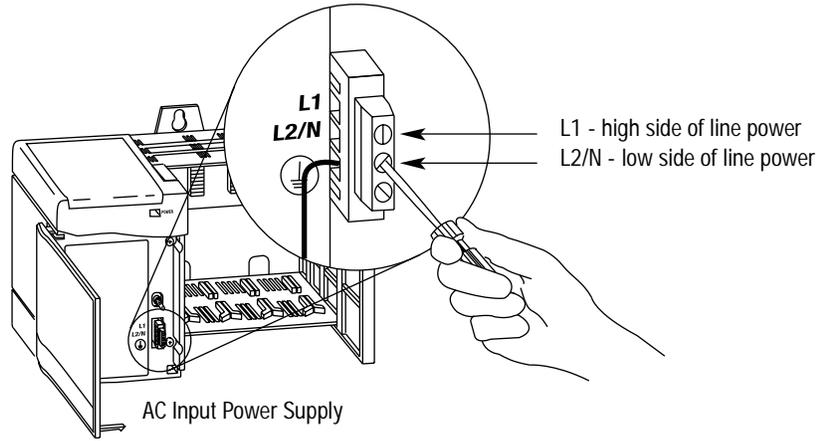
Ground the Power Supply



Important: Tighten the nut on the safety ground terminal stud to a torque of 12 inch-pounds.

Connect Power

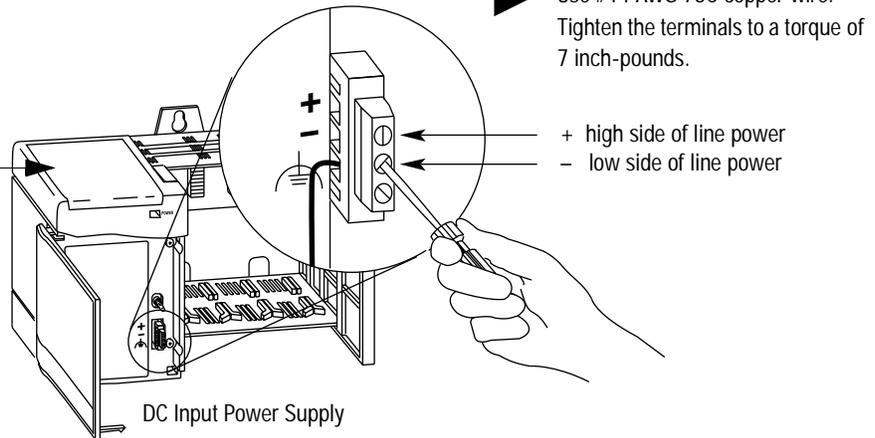
1756-PA72



ATTENTION: Make sure the chassis is mounted and all panel fabrication is complete before you remove the protective label. This label protects the power supply from metal shavings falling inside and damaging it during operation.

After you connect power, remove the protective label.

1756-PB72



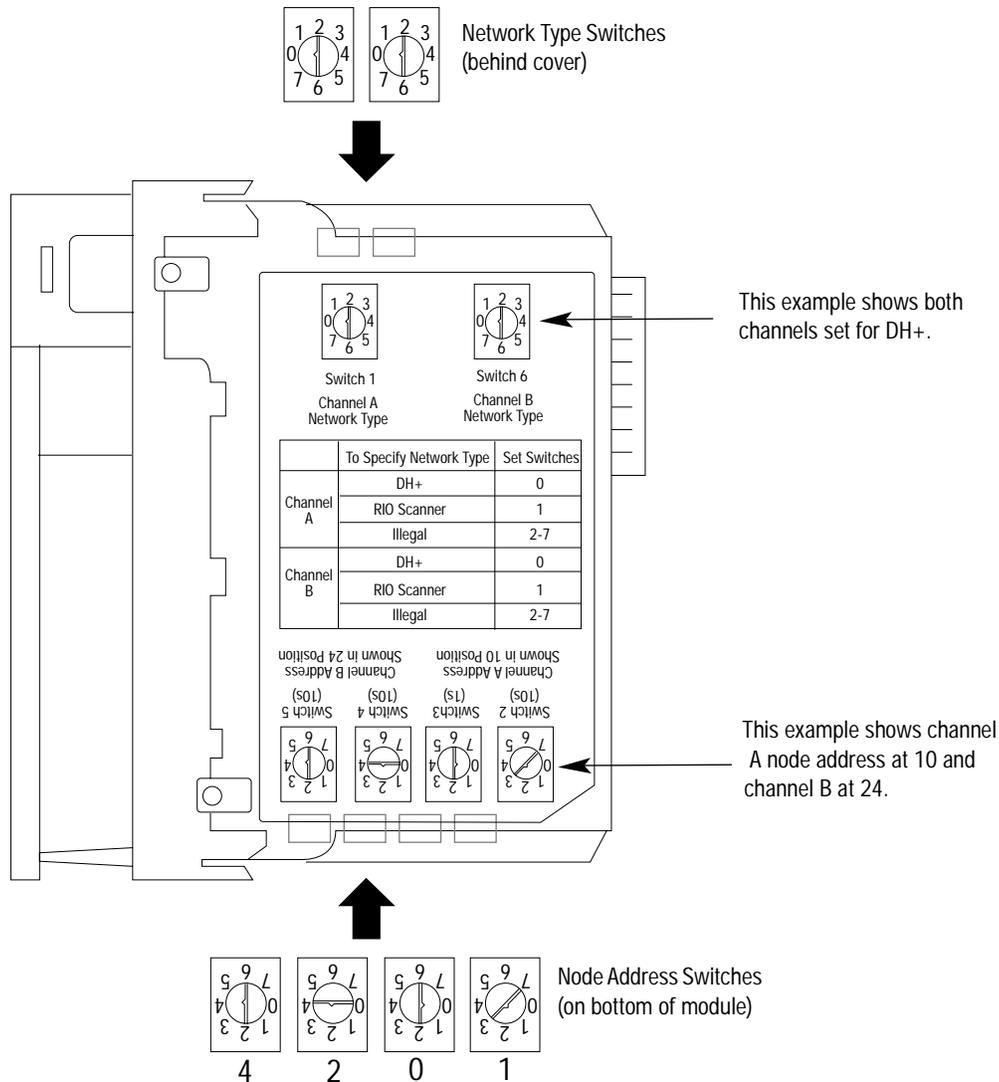
Install the Communication Modules

To complete all of the example applications, you will need to install two of each of the following modules.

Install the Data Highway Plus Communication Modules

1 Set the network type and node address switches.

Important: For the series A release of the module, you must select the DH+ network type (position 0) for both channels.



▶ You can install the modules into any slot, but you need to remember the slot into which you place each module

▶ For each channel node address, you can select within the range of 00-77. This example shows channel A node address at 10 and channel B at 24.

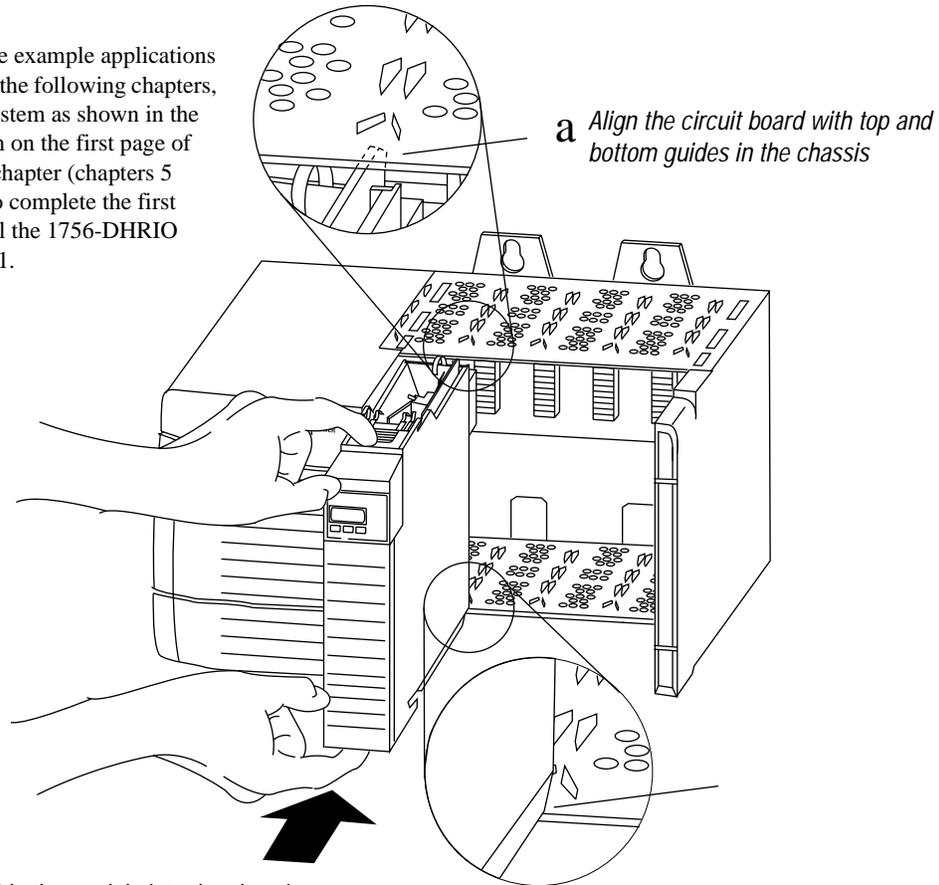
EXAMPLE For the example applications, set both channels to DH+. Set channel A to node address 3 and channel B to node address 4.

2 Install the module.

▶ Install the module in any slot.

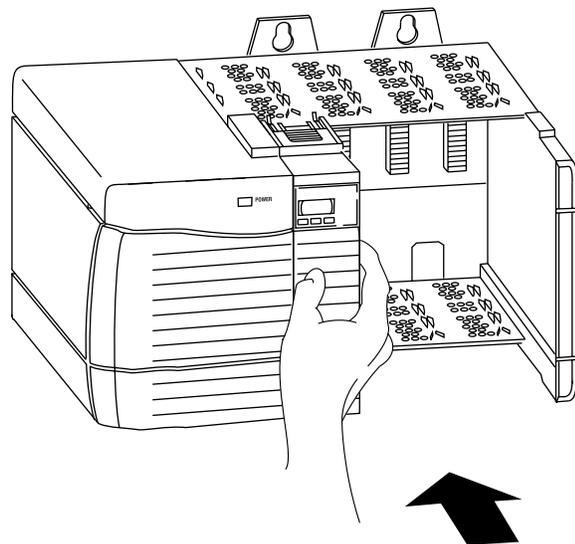
EXAMPLE

To complete the example applications as described in the following chapters, modify your system as shown in the system diagram on the first page of each example chapter (chapters 5 through 10). To complete the first example, install the 1756-DHRIO module in slot 1.



a Align the circuit board with top and bottom guides in the chassis

b Slide the module into the chassis. Make sure the module properly connects to the chassis backplane.



c The module is fully installed when it is flush with the power supply or other installed modules.

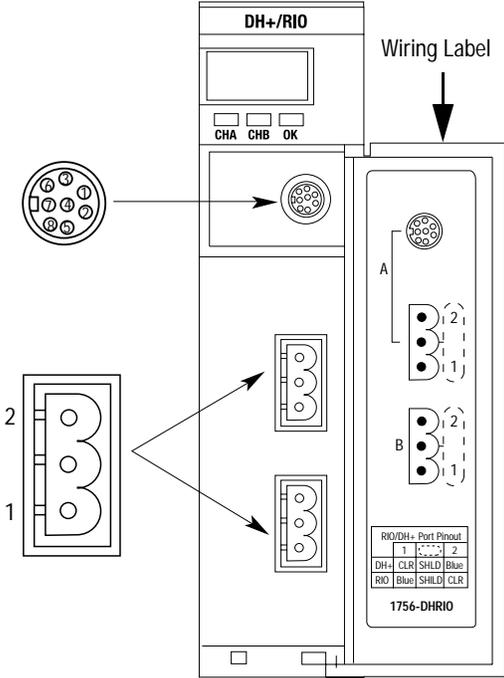


ATTENTION: When you insert or remove a module while backplane power is applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's actuators causing unintended machine motion or loss of process control.
- causing an explosion in a hazardous environment.

Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance that can affect module operation.

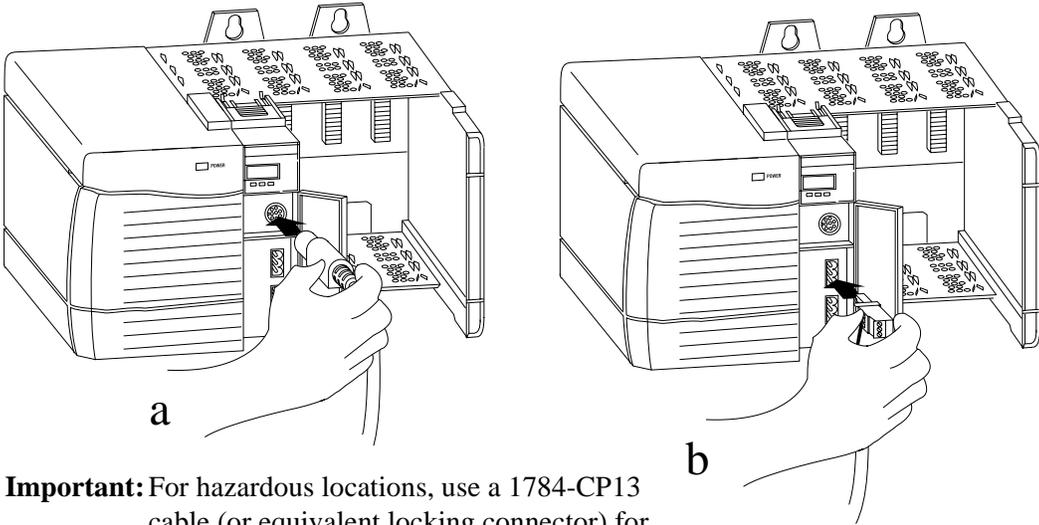
3 Wire the connectors to the module channels.



Pin Assignments for Channel A and B DH+ Connectors

Pin Number:	Description:
1	Clear
	Shield
2	Blue

4 Connect the module to the 1784-KTX card in the PC workstation.



Important: For hazardous locations, use a 1784-CP13 cable (or equivalent locking connector) for the connection.

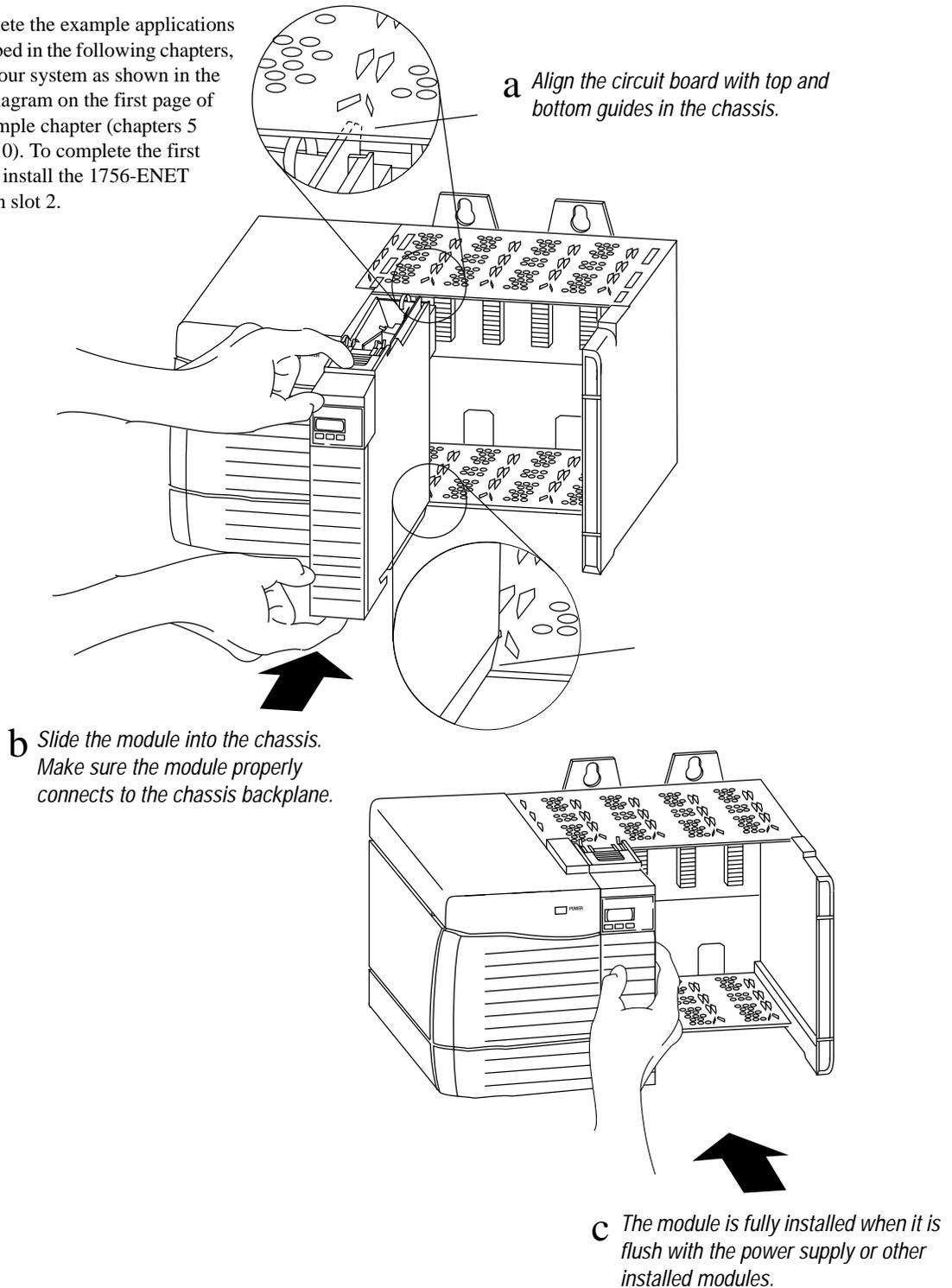
Install the Ethernet Communication Modules

1 *Install the modules.*

▶ Install the module in any slot.

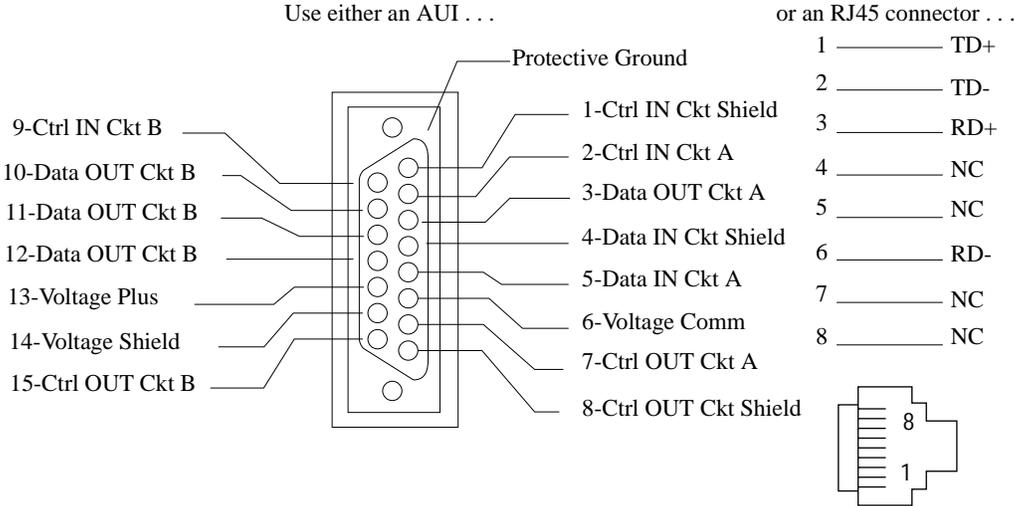
EXAMPLE

To complete the example applications as described in the following chapters, modify your system as shown in the system diagram on the first page of each example chapter (chapters 5 through 10). To complete the first example, install the 1756-ENET module in slot 2.



2 Connect to the Ethernet network.

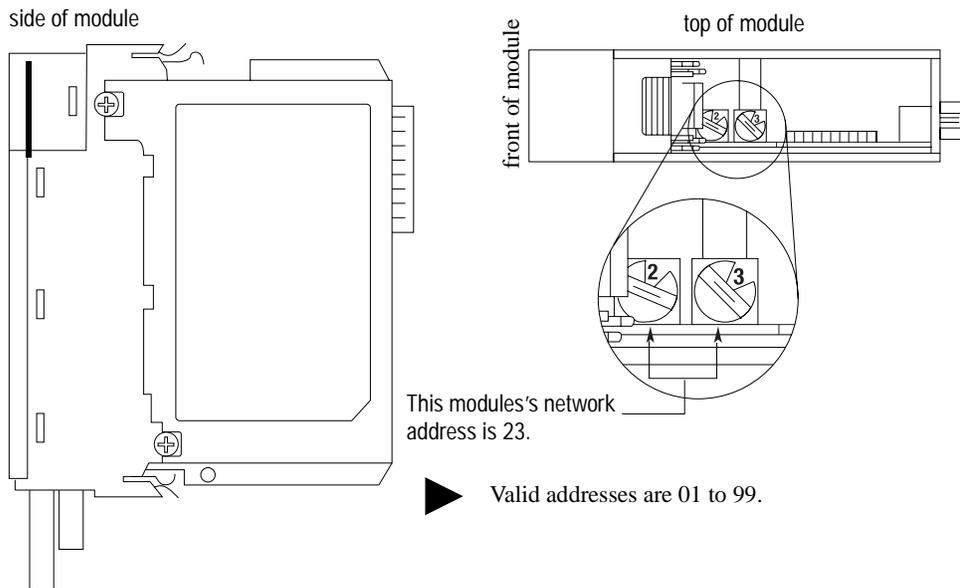
For this connection, you can use either a twisted pair cable connection (RJ45 connector) to a hub or an AUI cable (we recommend Allen-Bradley catalog numbers 1756-TC02 or TC15) connected to a transceiver for media other than twisted pair (i.e., fiber or thickwire).



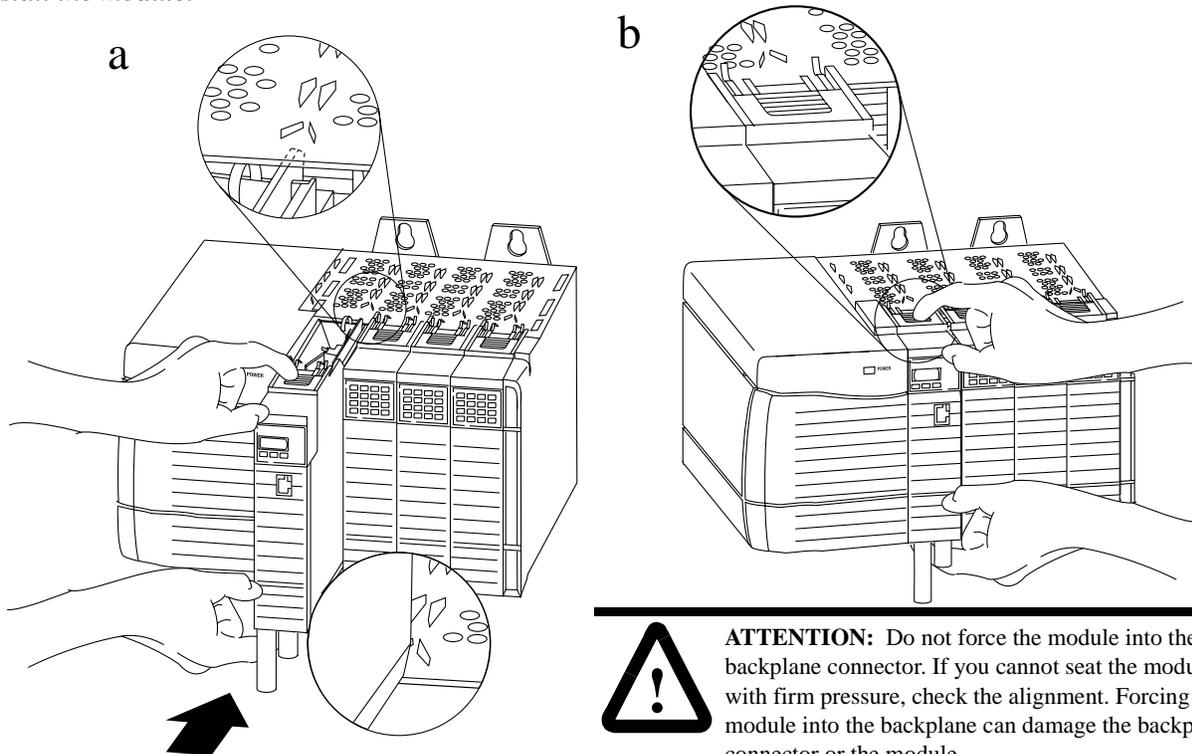
► For more detailed information, see the ControlLogix Ethernet Communication Interface Module Installation instructions, publication number 1756-5.3, or chapter 2 of the ControlLogix Ethernet Communication Module User Manual, publication 1756-6.5.1.

Install the ControlNet Communication Modules

1 Set the node address switches on the 1756-CNBR or -CNB module.



2 Install the module.

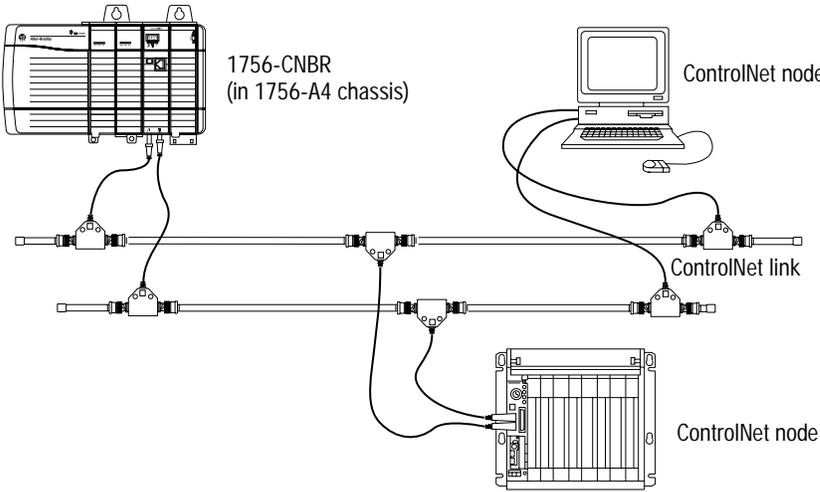


EXAMPLE

To complete the example applications as described in the following chapters, modify your system as shown in the system diagram on the first page of each example chapter (chapters 5 through 10). To complete the first example, install the 1756-ENET module in slot 2.

3 *Connect the module to the network.*

The following figure shows an example of how to connect to the ControlNet network.

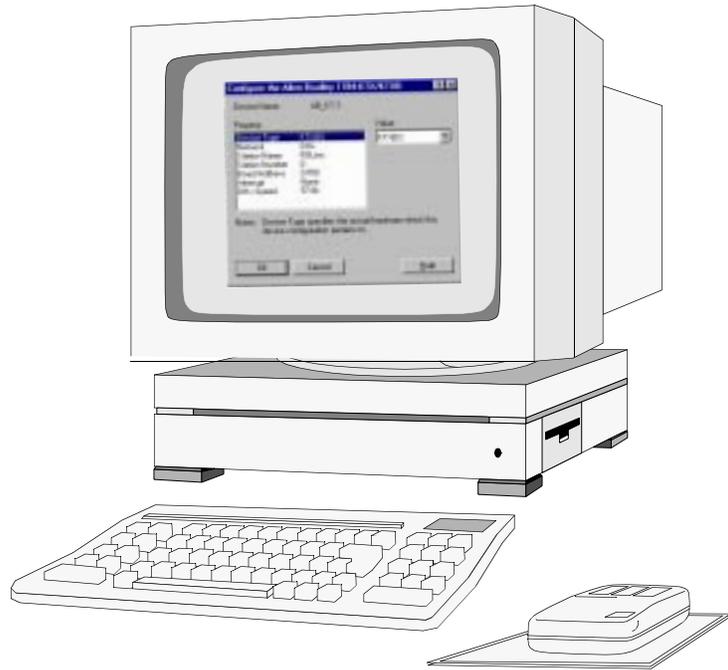


Set Up the Software

1 Install the software (page 3-1).

2 Configure the communication cards (page 3-2).

3 Start the configuration software (page 3-2).



Install the Software

Install RSLogix5, RSLinx, and ControlLogix Gateway Configuration software as follows:

To use these software packages, you need:

- computer with a Pentium 166 MHz or greater processor
- at least 32MBytes of RAM
- hard drive with adequate free space (25 MBytes or greater)
- 3.5 inch, 1.44 MByte disk drive
- VGA or higher-resolution adapter/monitor (640x480, 800X600, 1024x786 modes supported)
- Windows-supported pointing device
- Microsoft Windows NT version 4.0 or later
- RSLinx version 2.10 or later (included with catalog number 1756-GTWY)
- an Ethernet card

Install the software:

For each of the three software packages:

- a. From the **Start** menu, select **Run**.
- b. Enter **a:\setup**.

Configure the Communication Drivers

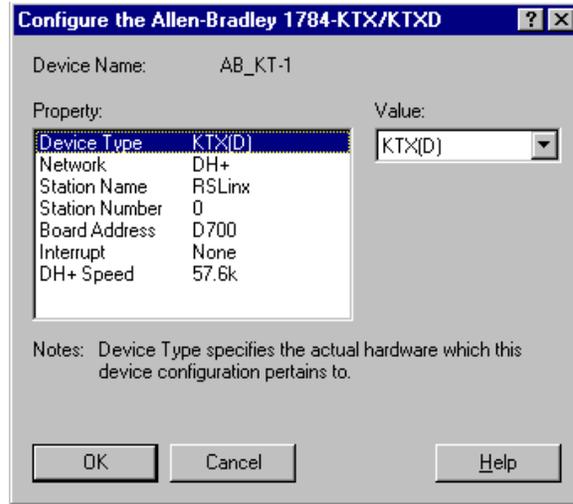
- 1** *Start the software:*
 - a. From the **Start** menu, select **Programs**.
 - b. Select **Rockwell Software > RSLinx > RSLinx**.
 - c. From the **Communications** menu, select **Configure Drivers**.

2 *Configure the KTX driver:*

- a. Select the **1784-KT/KTX(D)/PKTX(D)** driver from the pull-down list and click on **Add/New**.
- b. When prompted for a name for the new driver, select the default name assigned by the system, i.e., **AB_KT-1**.
- c. Enter the following configuration:

Device Type:	KTX(D)
Network:	DH+
Station Name:	RSLinx
¹ Station Number:	0
Board Address:	D700
¹ Interrupt:	None
DH+ Speed	57.6K

¹ Must match switch settings on card.



3 *Configure the Ethernet driver:*

- a. From the **Communications** menu, select **Configure Drivers**.
- b. Select **Remote Devices via Linx Gateway** as the driver and click on **Add/New**.
- c. Enter the following configuration:

Device Name	TCP-1 (default assigned)
¹ Server's IP Address or Host name	130.130.130.2

¹ This is the IP address of the 1756-ENET module, not the PC running RSLinx.



▶ If you are setting up your own local Ethernet network, you can use any IP address you wish. If your PC workstation is already connected to a network, you must obtain a unique IP address from your network administrator or disconnect your PC from the network to avoid a conflict.

Configuring the Example Applications

In the following chapters you will use the Gateway Configuration software with RSLinx to set specific configurations for the example applications. For more information on configuring with RSLinx/RSLinx Lite refer to publication 9399-WAB32LUG or visit the Rockwell Software website at <http://rsi-webcorp.software.rockwell.com>.

Enter the Basic Ladder Program

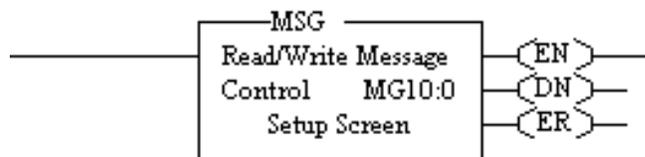
1 Start RSLogix5 software (page 4-1).

2 Configure the processor (page 4-1).

3 Enter the ladder logic (page 4-2).

4 Save the program (page 4-2).

In this chapter, you enter a PLC-5 ladder program that sends the value of the processor's internal seconds timer using a message instruction. You will use this message instruction in the example applications to communicate between processors. We will show you how to set up and modify the message instruction for each application in the following chapters.



Start RSLogix5 Software

1 From the *Start* menu, select *Programs*.

2 Select *Rockwell Software > RSLogix5 English*.

OR

Double click on:



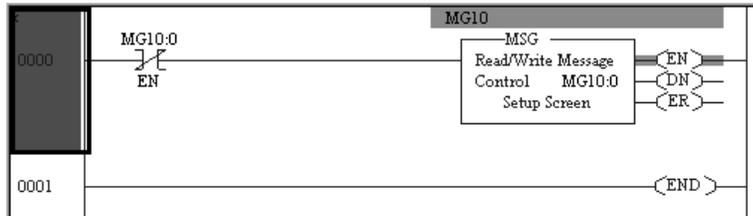
Configure the Processor

When you start a new program in RSLogix5 software, you need to configure the processor to specify processor type, communication settings, etc. For information about how to do this, see *Getting Results With RSLogix5*, publication number 9399-RL53GR.

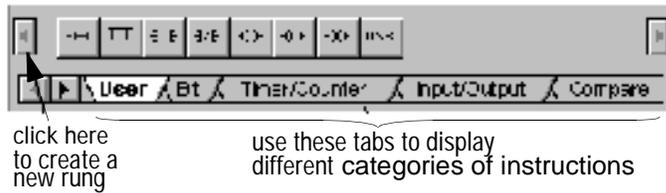
Enter the Ladder Logic

- 1 *Open a new program file.*
- 2 *Use the options on the user toolbar to enter the example program.*

Enter the following ladder logic.



▶ With RXLogix5 software:



The MSG configuration entered in the Setup Screen will vary depending upon the application example.

Save the program as “example.rsp”, then minimize the RSLogix5 software.

Save the Program

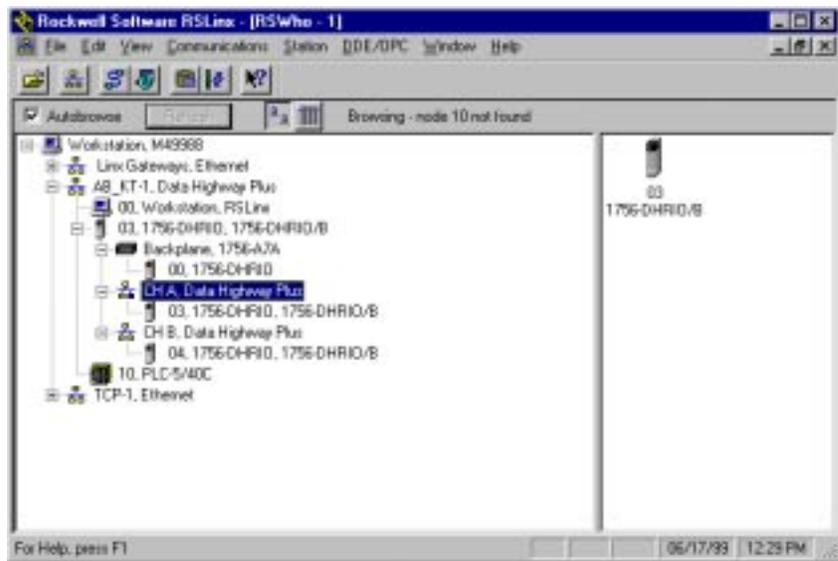
- ▶ To save the program, you must enter a dummy configuration in the Setup Screen so that RSLogix5 software can verify the project. See page 5-6 for an example.
- ▶ For more information about entering ladder logic, see the PLC-5 Programming Software Instruction Set Reference Manual, publication number 1785-6.1 or Getting Results With RSLogix5, Rockwell Software publication number 9399-RL53GR.

Test the KTX Driver and System Hardware Setup

1 Start the *RSLinx* software.

2 From the *Communications* menu in *RSLinx*, select *RSWho*:

- a. Select the **1756-DHRIO** module from the AB_KT-1 driver. Drill down the backplane until you see the channel A and channel B configurations displayed. Expand the tree under the driver. You should see a display similar to that below (channel A configured as node 3, channel B configured as node 4, etc.):



- b. If you do not see the correct display, check the faceplate indicators to ensure the DHRIO module is functioning properly. Verify that all modules and cables are properly connected and that switch settings are correct. See page 2-7.

▶ If you are still experiencing difficulty verify that the 1784-KTX driver is configured properly. Make sure there is no conflict with other hardware in your PC workstation.

3 Minimize *RSLinx*.

Configure the Routing Table in the 1756-DHRIO Module

1 Start the configuration software:

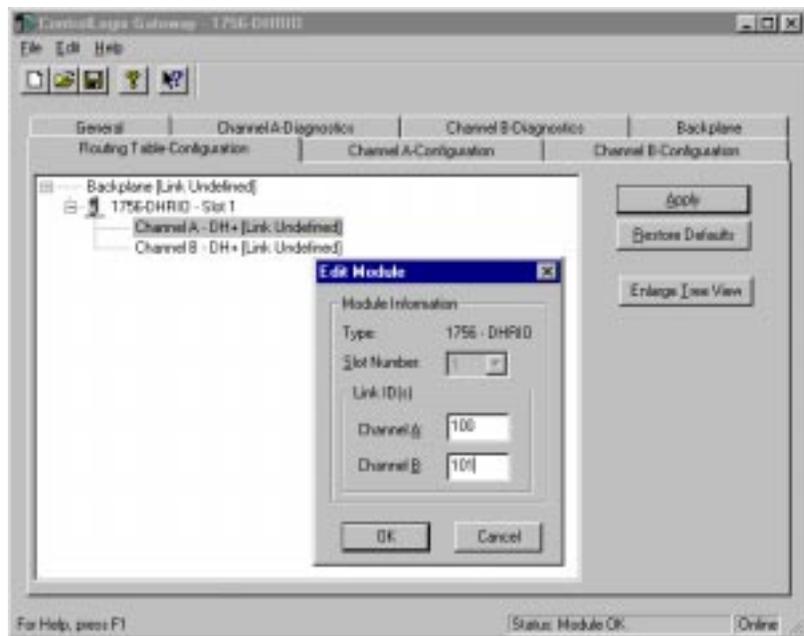
- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **ControlLogix Gateway > 1756gtwy**.

2 Edit the routing table:

- a. From the **File** menu in the configuration software, select **Browse Network**. RSLinx starts.
- b. Select the **AB_KT_1** Data Highway Plus driver and double-click on the 1756-DHRIO module.



- c. Select the **Routing Table Configuration** tab.



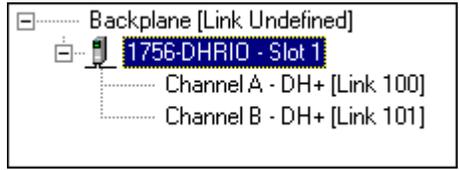
- If you have previously configured any routing tables, click on **Restore Defaults** to remove any previous configuration and restore the default values.

- d. Double-click on the 1756-DHRIO module and enter the following link IDs:

Channel A	Link 100
Channel B	Link 101

- e. Click on **OK**.

The routing table configuration should now appear as follows:



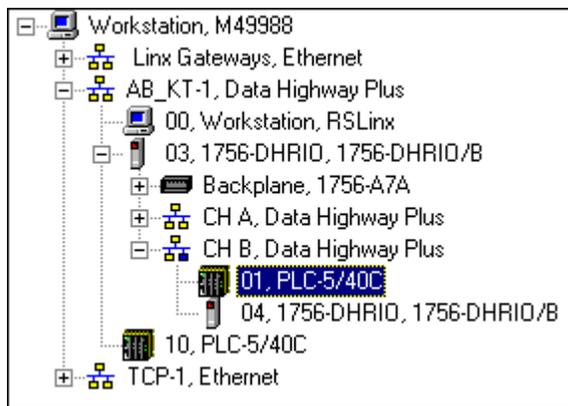
- f. Click on **Apply** to download the routing table to the 1756-DHRIO module.

It is not necessary to save the configuration to a file.

3 Verify the configuration:

- a. From the **Communications** menu in **RSLinx**, select **RSWho**.
- b. Select the **AB_KT_1, Data Highway Plus** driver and drill down the backplane.
- c. Double-click on **CH B, Data Highway Plus**.

You should now see the PLC-5/40C processor at node 1 connected to channel B (node 4) of the DH+.



- ▶ If the PLC-5/40C processor does not appear, then verify the switch settings in the 1756- DHRIO module and PLC-5/40C processors and check that the cables are properly connected.

If you are still experiencing difficulty, reconfigure the routing table as described previously.

Test the Application

To test the application, send a message from one PLC-5/40C processor to the other PLC-5/40C processor.

1 Start the RSLogix5 software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **Rockwell Software > RSLogix5 English**

OR

Double-click on:



2 Load the example program:

- a. From the **File** menu, open the program “example.” See page 4-2.
- b. In the MSG instruction, double-click on **Setup Screen**.

This message writes the value of the seconds clock (S:23) in the PLC-5/40C at node 10 into data file N7:0 of the PLC-5/40C processor at node 1.



c. Enter the following configuration.

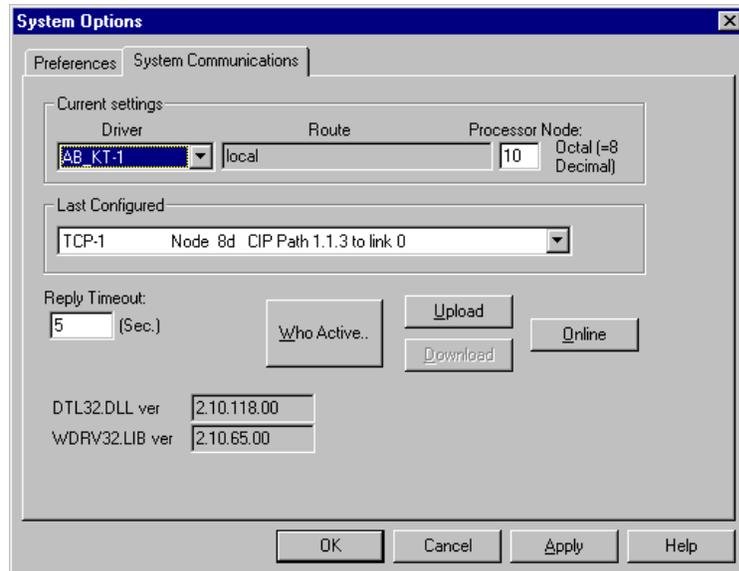
		This PLC-5:		
		Communication Command	PLC-5 Typed Write	
		Data Table Address	S:23	
		Size in Elements	1	
		Port Number	1A	
		Target Devices:		
		Data Table Address	N7:0	
This is the node number of the 1756-DHRIO module on the local link.	→	Local DH+ Node	3	
		Local / Remote	Remote	
		Remote Link Type	Data Highway	
This is the DH+ node number of the target PLC-5/C processor configured in chapter 2.	→	Remote Station Address	1	
		Remote Bridge Link ID	101	← This is the link ID that you assigned in the configuration software

d. Close the Setup Screen.

3 Download the program to the PLC-5/40C processor at DH+ node 10:

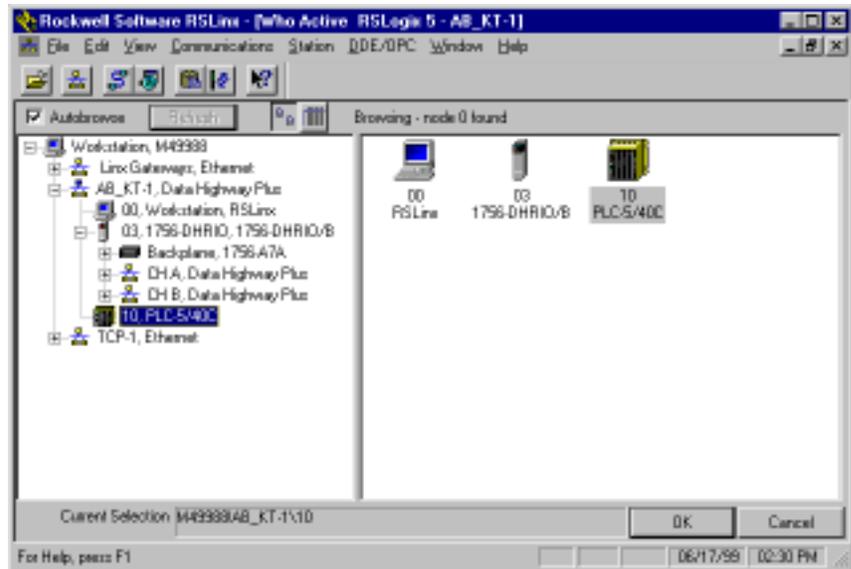
a. From the **Comms** menu in RSLogix5 select **System Comms**

The System Options window will appear with the System Communications tab open.



b. Select the **AB_KT-1** Driver and click on **Who Active**.

The RSWho window will appear.

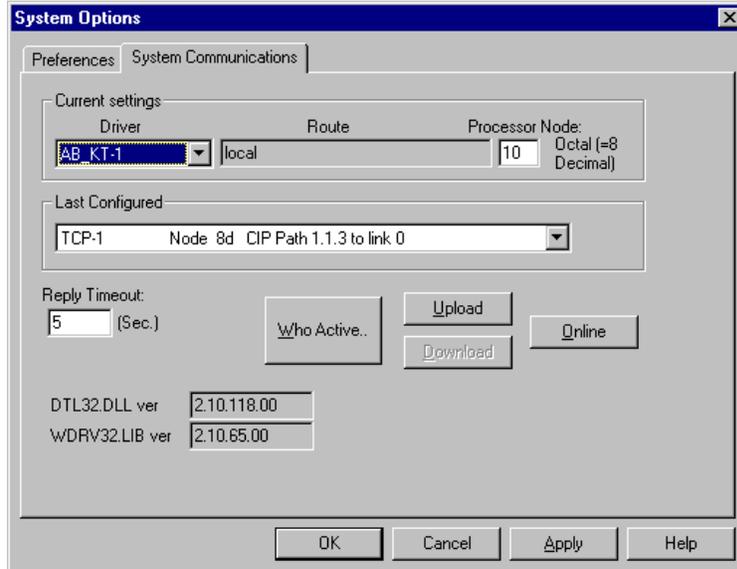


- c. Drill down the tree and double-click on the PLC-5/40C processor at node 10.
- d. When the System Communications tab reappears, click on the **Download** button.
Disregard any warnings about Control Net devices.
- e. Save the program if prompted.
- f. Go Online and change the processor mode to **Run**.

4 Verify the communications to the PLC-5/40C processor at node 1:

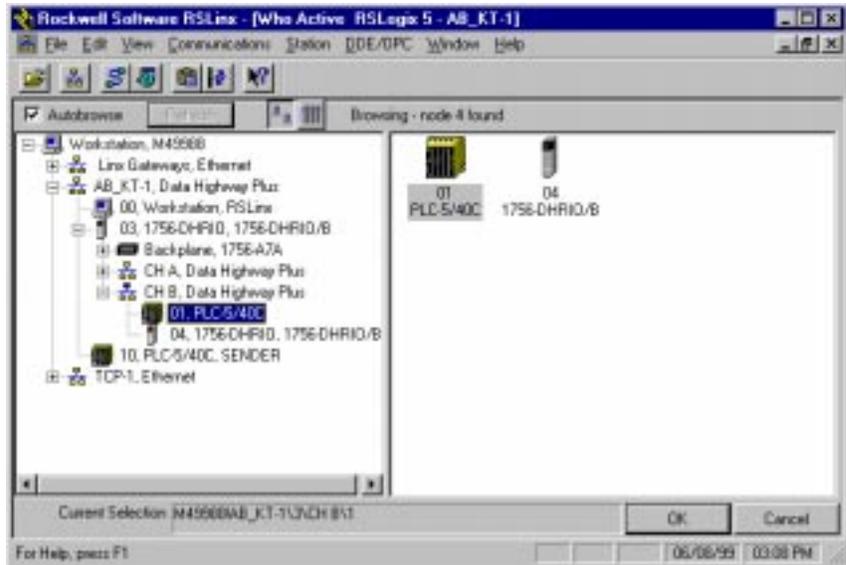
- a. Start a new session of RSLogix5 software.
- b. From the **Comms** menu in RSLogix5, select **System Comms**.

The System Options window will appear with the System Communications tab open.



- c. Select **AB_KT-1** as the Driver and click on **Who Active**.

The RSWho window will appear.



- d. Drill down the tree and double-click on the PLC-5/40C processor at node 1.
- e. When the System Communications tab reappears, click on the **Online** button.

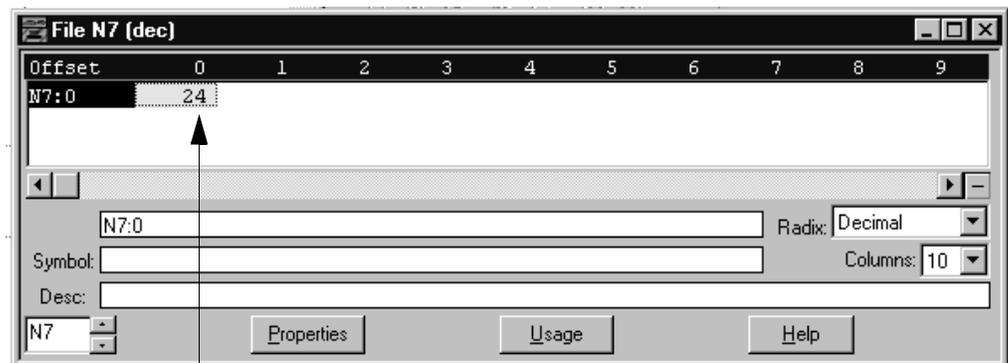
- f. If no program is loaded in the PLC-5/40C processor, a pop-up window will appear with the message “You cannot go Online to DEFAULT program.” Enter a new processor name of your choice (e.g., “Receiver”) and click on OK.



- It is not necessary to save the program.
- Disregard any warnings about Control Net devices.

- g. Double-click on **N7** in the data file list.

You should see the following screen:



Verify that this value is being updated.

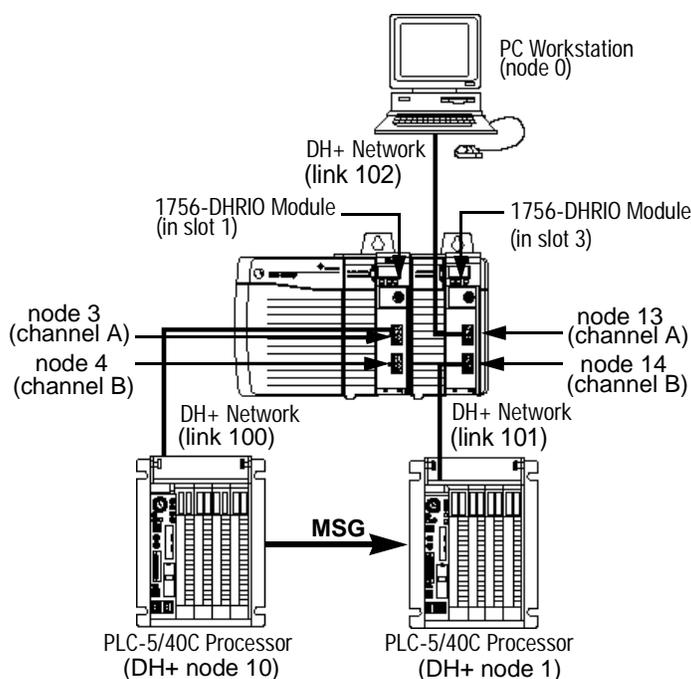
When you see N7:0 being updated at one second intervals the message is being sent successfully from the PLC-5/40C processor at node 10 to the PLC-5/40C processor at node 1.

Initiate DH+ to DH+ Communication Via Two Gateway Modules

What You Need To Do

- 1** Verify the 1756-DHRIO module node addresses (page 6-1).
- 2** Verify the 1784-KTX driver configuration (page 6-1).
- 3** Test the KTX driver (page 6-2).
- 4** Configure the routing table (page 6-3).
- 5** Test the application (page 6-6).

In this application, you will establish communication between the two PLC-5/40C processors over two 1756-DHRIO modules. Change your existing system to the following configuration.



In this example, you send a PLC-5 Typed Write message from the PLC-5/40C processor at DH+ node 10, link 100, through the 1756-DHRIO module in slot 1, the backplane of the Control Logix chassis, and the 1756-DHRIO module in slot 3 to the PLC-5/40C processor at DH+ node 1, link 101.

Verify the 1756-DHRIO Module Node Addresses

Verify that the node addresses for the 1756-DHRIO modules are 3 and 4 and 13 and 14, respectively, as shown. Refer to chapter 2 as necessary.

Verify the KTX Driver Configuration

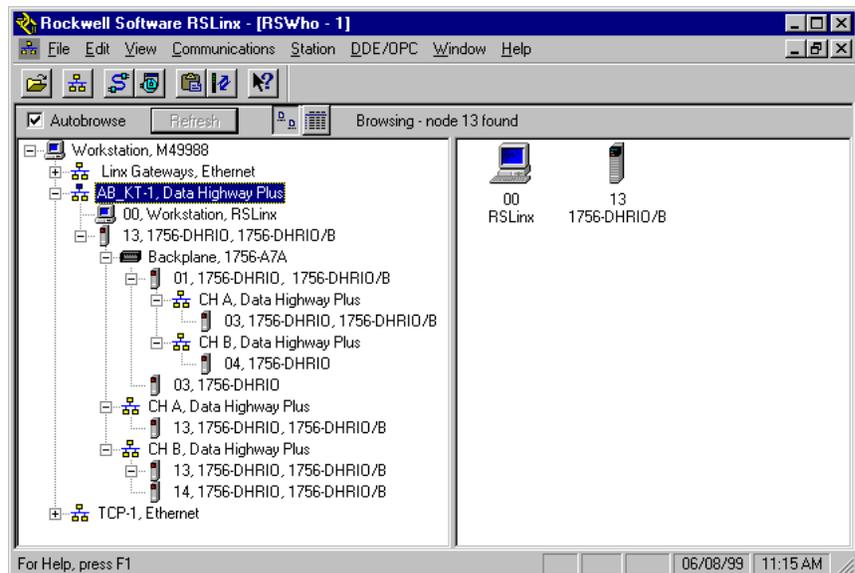
Verify that the KTX driver is configured as directed on page 3-2.

Test the KTX Driver and System Hardware Setup

1 Start the *RSLinx* software.

2 From the *Communications* menu in *RSLinx*, select *RSWho*.

- a. Select the **AB_KT-1** driver. Drill down until you see the 1756-DHIO modules in slots 1 and 3 displayed. Expand the view to verify the channel A and channel B configurations for both modules. You should see a display similar to that below:



- b. If you do not see the correct display, check the faceplate indicators to ensure the DHRIO modules are functioning properly. Verify that the modules and cables are properly connected and the switch settings on the modules are correct. See page 2-7.

▶ If you are still experiencing difficulty verify that the 1784-KTX driver is configured properly. Make sure there is no conflict with other hardware in your PC workstation.

3 Minimize *RSLinx*.

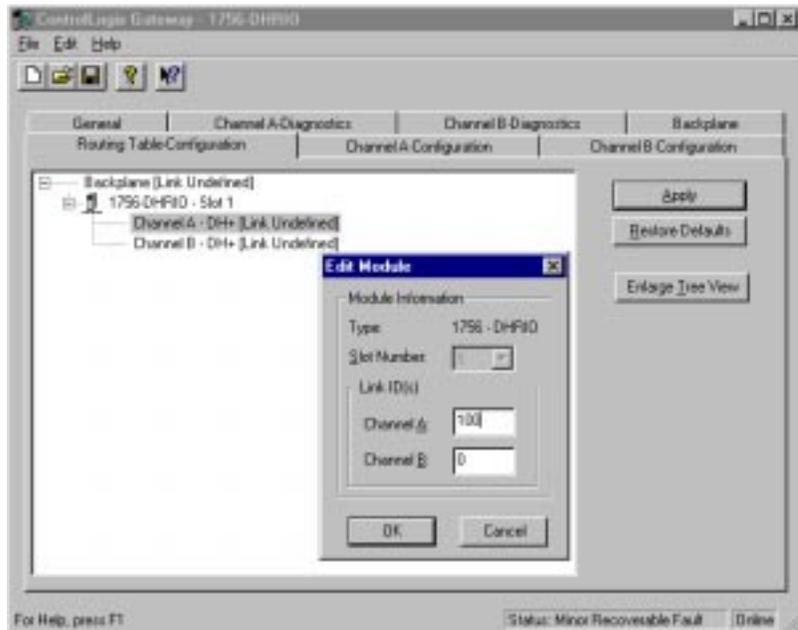
Configure the Routing Table in the 1756-DHRIO Modules

1 Start the configuration software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **ControlLogix Gateway > 1756gtwy**.

2 Edit the routing table:

- a. From the **File** menu in the configuration software, select **Browse Network**. RSLinx starts.
- b. Select the **AB_KT_1** Data Highway Plus driver and double-click on the DHRIO module in slot 1.
- c. Select the **Routing Table Configuration** tab.



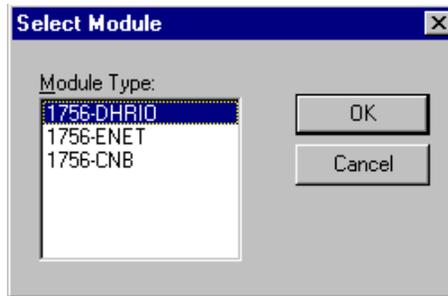
- d. Double-click on the 1756-DHRIO module and enter the following link IDs:

Channel A	Link 100
Channel B	Link 0

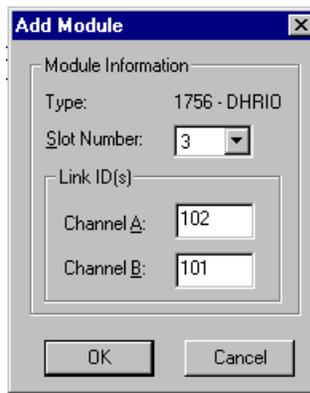
- Since no device is connected to channel B of the 1756 DHRIO module in slot 1, no link number is necessary. We are using 0, which is not a valid link ID.

- e. Click on **OK**.
- f. Right click on **Backplane [Link Undefined]** and select **Add Module**.

The following pop-up window will appear.



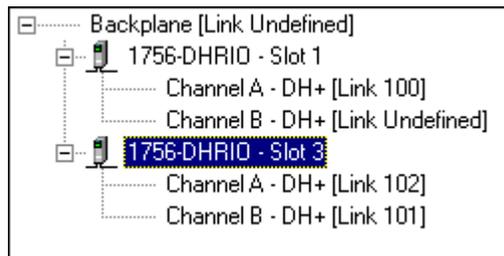
- g. Select another 1756-DHRIO module and click on **OK**. The Add Module pop-up window will appear.



- h. Add the 1756-DHRIO module in slot 3 to the routing table by entering the following information. Then click on **OK**:

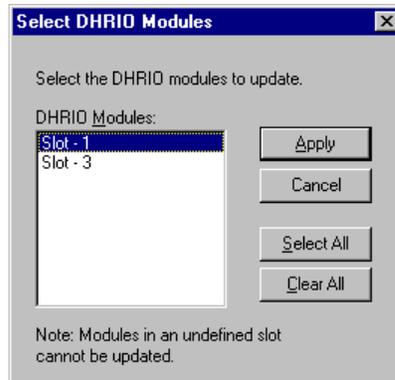
Slot Number	3
Channel A	Link 102
Channel B	Link 101

- i. The routing table configuration should now appear as shown below:



- j. Click on **Apply**.

The following pop-up window will appear.



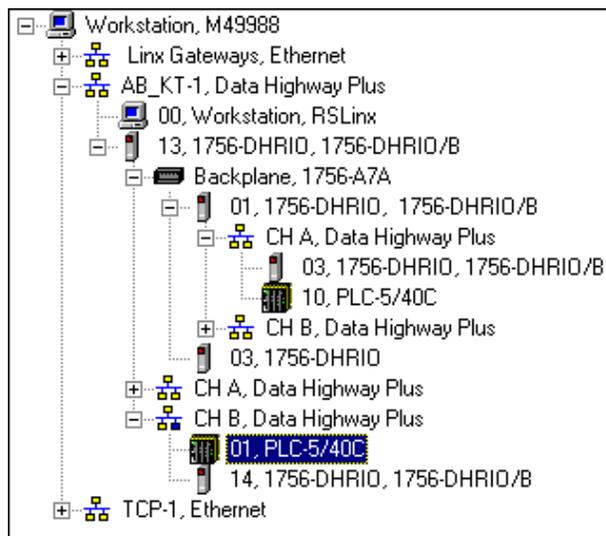
- k. Click on **Select All**, then **Apply** to download the routing table to both of the 1756-DHRIO modules.

It is not necessary to save the configuration to a file.

3 Verify the configuration:

- a. From the **Communications** menu in **RSLinx**, select **RSWho**.
- b. Select the **AB_KT_1** Data Highway Plus driver and drill down the backplane.

You should now see the PLC-5/40C processor at node 10 connected to channel A (node 3) of the DHRIO+ module in slot 1 and the PLC-5/40C processor at node 1 connected to channel B (node 14) of the DHRIO+ module in slot 3.



- ▶ If the PLC-5/40C processors do not appear, then verify the switch settings in the 1756 DHRIO modules and PLC-5/40C processors and check that the cables are properly connected.

If you are still experiencing difficulty, reconfigure the routing table as described previously.

Test the Application

1 Restore or start the RSLogix5 software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **Rockwell Software > RSLogix5 English**

OR

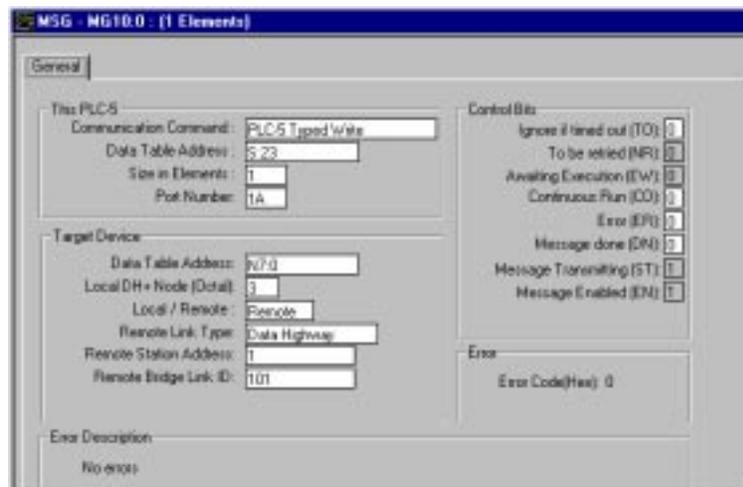
Double-click on:



2 Load the example program for the PLC-5/40C processor at DH+ node 10:

- a. From the **File** menu, open the program “example.” See page 4-2.
- b. In the MSG instruction, double-click on **Setup Screen**.

This message writes the value of the seconds clock (S:23) in the PLC-5/40C at node 10 into data file N7:0 of the PLC-5/40C processor at node 1.



- c. Enter the following configuration.

This PLC-5:	
Communication Command	PLC-5 Typed Write
Data Table Address	S:23
Size in Elements	1
Port Number	1A
Target Devices:	
Data Table Address	N7:0
Local DH+ Node	3
Local / Remote	Remote
Remote Link Type	Data Highway
Remote Station Address	1
Remote Bridge Link ID	101

This is the node number of the 1756-DHRIO module on the local link. →

This is the DH+ node number of the target PLC-5/C processor configured in chapter 2. →

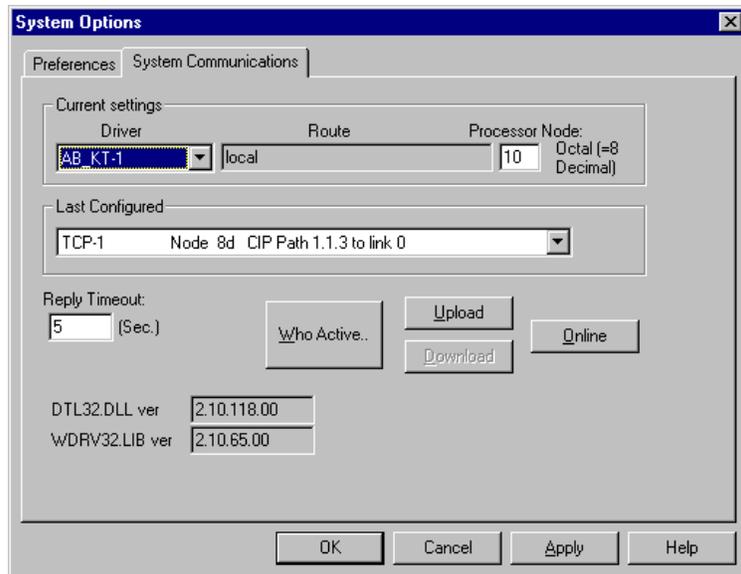
This is the link ID that you assigned in the configuration software ←

- d. Close the Setup Screen.

3 Download the program to the PLC-5/40C processor at DH+ node 10.

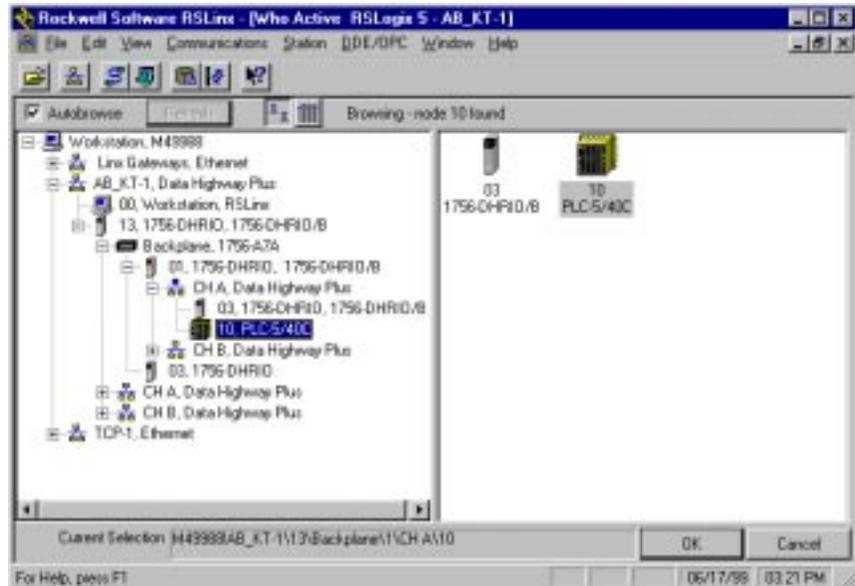
- a. From the **Comms** menu in RSLogix5 select **System Comms**.

The System Options window will appear with the System Communications tab open.



- b. Select the **AB_KT-1** Driver and click on **Who Active**.

The RSWho window will appear.

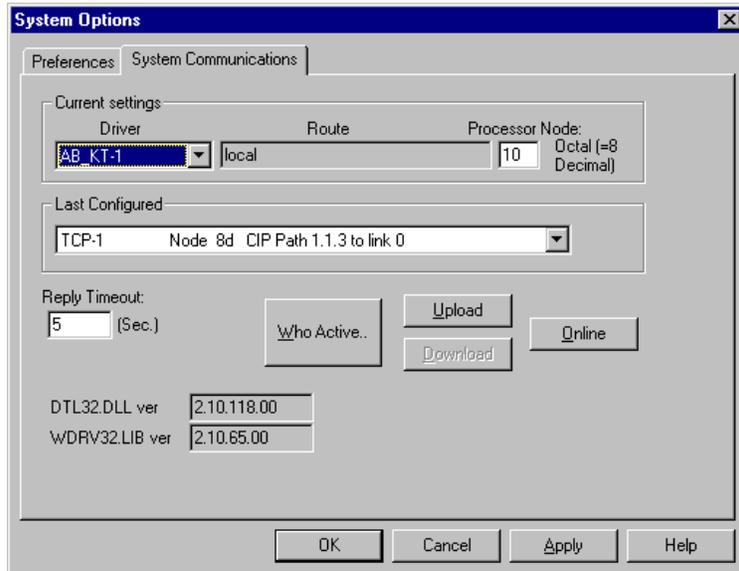


- c. Drill down the tree and double-click on the PLC-5/40C processor at node 10.
- d. When the System Communications tab reappears, click on the **Download** button.
Disregard any warnings about Control Net devices.
- e. Save the program if prompted.
- f. Go **Online** and change the processor mode to **Run**.

4 *Verify the communications to the PLC-5/40C processor at node 1.*

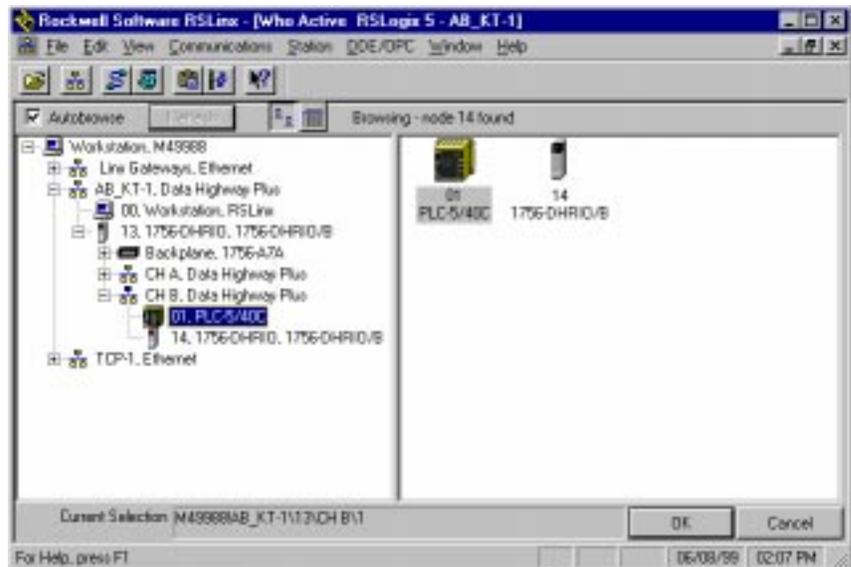
- a. Start a new session of RSLogix5 software.
- b. From the **Comms** menu in RSLogix5, select **System Comms**.

The System Options window will appear with the System Communications tab open.



- c. Select the **AB_KT-1** Driver and click on **Who Active**.

The RSWho window will appear.



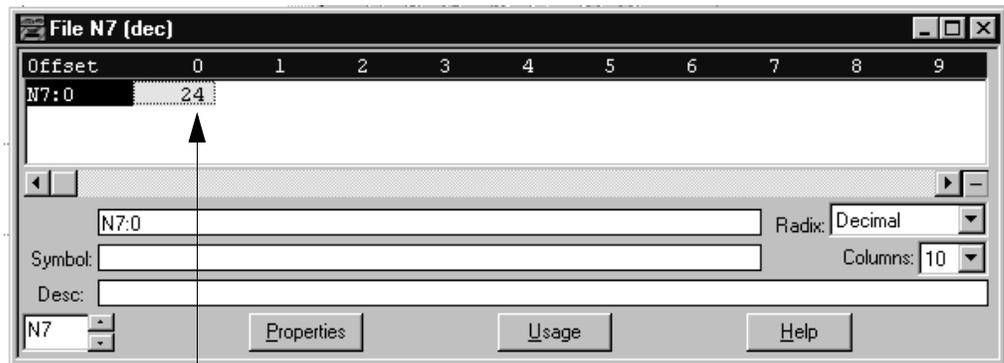
- d. Drill down the tree and double-click on the PLC-5/40C processor at node 1.
- e. When the System Communications tab reappears, click on the **Online** button.

- f. If no program is loaded in the PLC-5/40C processor, a pop-up window will appear with the message “You cannot go Online to DEFAULT program.” Enter a new processor name of your choice (e.g., “Receiver”) and click on **OK**.



- Disregard any warnings about Control Net devices.
 - It is not necessary to save the program.
- g. Double-click on **N7** in the data file list.

You should see the following screen:



Verify that this value is being updated.

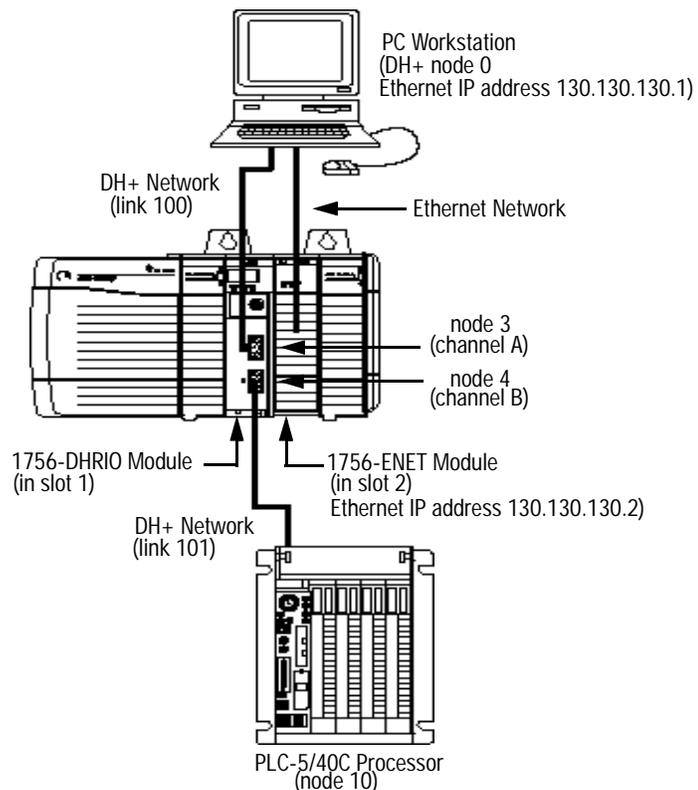
When you see N7:0 being updated at one second intervals the message is being sent successfully from the PLC-5/40C processor at node 10 to the PLC-5/40C processor at node 1.

Initiate Ethernet to DH+ Communication

What You Need To Do

- 1** *Verify the communication driver configurations (page 7-1).*
- 2** *Test the KTX driver and system hardware (page 7-2).*
- 3** *Configure the communication modules (page 7-3).*
- 4** *Connect to the PLC-5/40C processor (page 7-6).*

In this application, you will establish communication between the PC workstation and the PLC-5/40C processor bridging across Ethernet and DH+. Change your existing system to the following configuration.



In this example, you communicate with a PLC-5/40C processor on a DH+ network via an Ethernet gateway.

Important: To establish communication between the PC workstation and the PLC-5/40C via ethernet, you must first configure the 1756-ENET module. The configuration can be sent to the 1756-ENET module over another network, such as ControlNet. In this example, you will do the configuration over the DH+ network.

Verify the KTX Driver Configuration

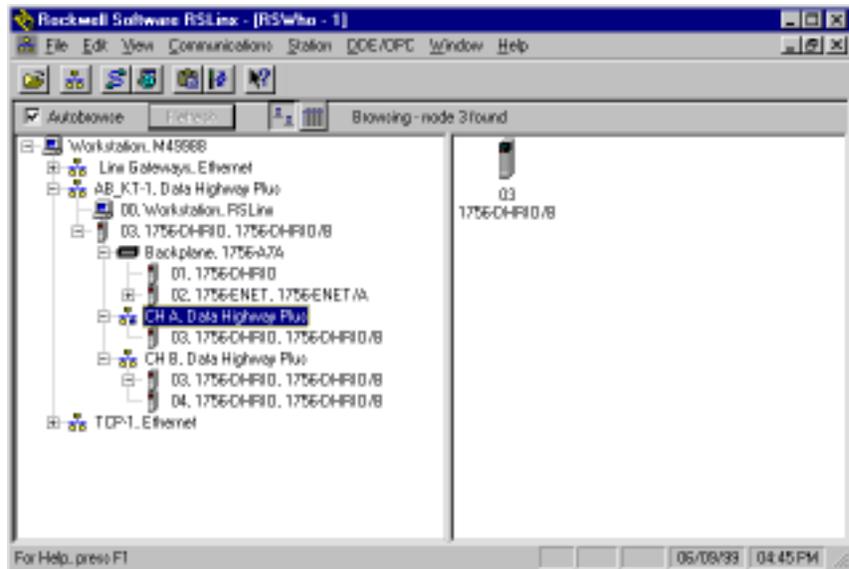
Verify that the KTX driver and ethernet driver are configured as directed on page 3-2.

Test the KTX Driver and System Hardware

1 Start the *RSLinx* software.

2 From the *Communications* menu in *RSLinx*, select *RSWho*:

- a. Select the **AB_KT-1** driver. Drill down until you see the 1756-DHIO module in slot 1 and the 1756-ENET module in slot 2. Expand the view to verify the channel A and channel B configurations. You should see a display similar to that below:



- b. If you do not see the correct display, check the faceplate indicators to ensure the DHRIO and ENET modules are functioning properly. Verify that modules and cables are properly connected and that switch settings on the 1756-DHRIO module are correct. See page 2-7.

► If you are still experiencing difficulty, verify that the 1784-KTX driver is configured properly. Make sure there is no conflict with other hardware in your PC workstation.

3 Minimize *RSLinx*.

Configure the Communication Modules

1 Start the configuration software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **ControlLogix Gateway > 1756gtwy**.

2 Configure the Ethernet module:

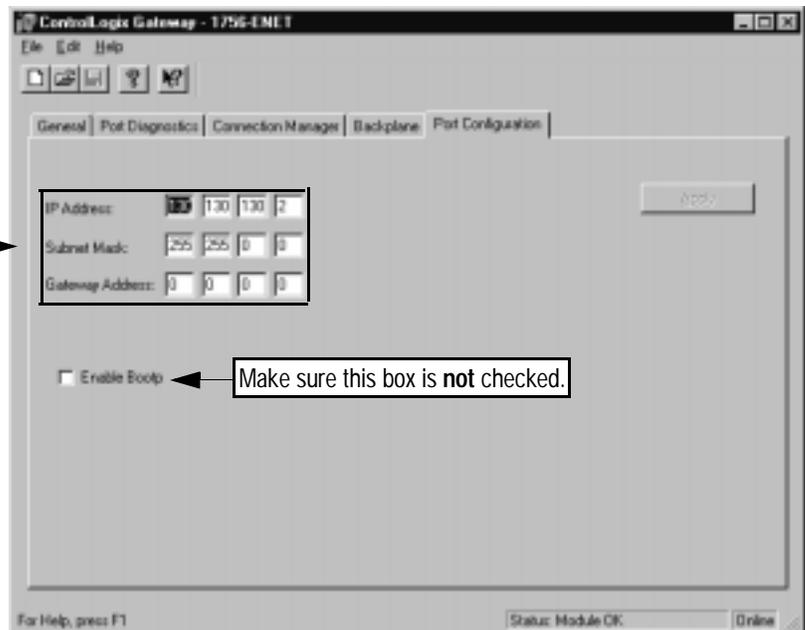
- a. From the **File** menu in the configuration software, select **Browse Network**. RSLinx starts.
- b. Select the **AB_KT_1 Data Highway Plus** driver and drill down the backplane.
- c. Double-click on the Ethernet module.
- d. Select the Port Configuration tab and enter the following configuration:

▶ An **IP Address** is an Ethernet node's network address and denotes the network where the 1756-ENET module is located. **Before you begin, check the IP address.** Make sure your entry is in the form *xxx.xxx.xxx.yyy*, where each *xxx* is a number between 0-255 and *yyy* is a number between 0-254.

A **Subnet Mask** identifies the bits of the internet address that correspond to the network and subnetwork portions of the address. Before you begin, retrieve your subnet mask. Make sure your entry is in the form *xxx.xxx.xxx.yyy*, where each *xxx* is a number between 0-255 and *yyy* is a number between 0-254.

A gateway is a shared connection between two networks. It consists of hardware and software which provides protocol conversions. An Ethernet **Gateway Address** is the IP address of the Ethernet gateway you want the 1756-ENET module to use. Before you begin, retrieve your Ethernet gateway address, if you are using one. Make sure your entry is in the form *xxx.xxx.xxx.yyy*, where each *xxx* is a number between 0-255 and *yyy* is a number between 0-254.

Bootp (Bootstrap protocol) is used to boot diskless nodes, such as 1756-ENET. The Bootp server supplies the IP address, subnet mask, and Ethernet gateway. In this example you are providing the IP address, so make sure Bootp is **not** enabled.



Enter this configuration:

IP Address:	130.130.130.2
Subnet Mask:	255.255.0.0
Gateway Address:	0.0.0.0

Make sure that each Ethernet device has a unique IP address.

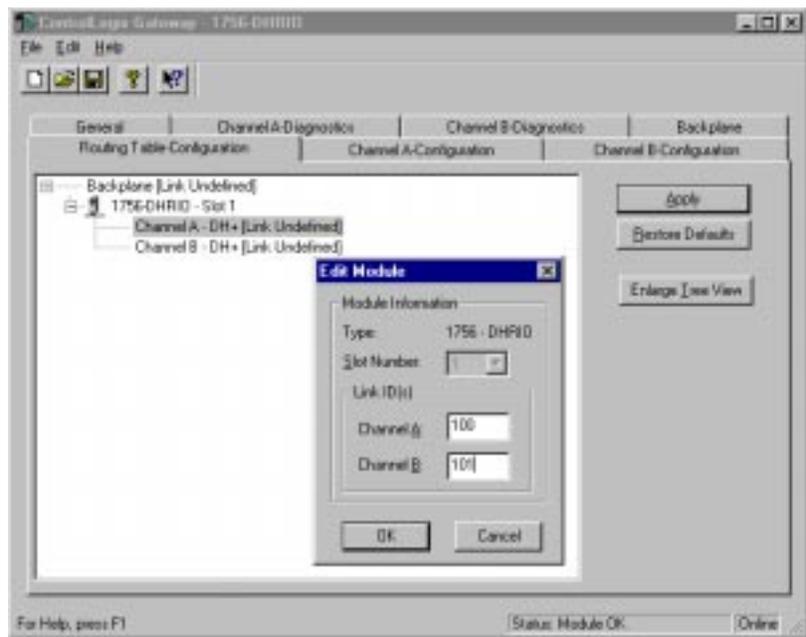
- e. Click on **Apply** to download the configuration to the module.

3 Configure the routing table in the 1756-DHRIO module:

- a. From the **File** menu in the configuration software, select **Browse Network**.
- b. Select the **AB_KT_1** Data Highway Plus driver and double-click on the 1756-DHRIO module.



- c. Select the **Routing Table Configuration** tab.



▶ If you have previously configured any routing tables, click on **Restore Defaults** to remove the configuration and restore the default values.

- d. Double-click on the 1756-DHRIO module. Enter the following link IDs and click on **OK**.

Channel A	Link 100
Channel B	Link 101

The routing table configuration should now appear as shown below:

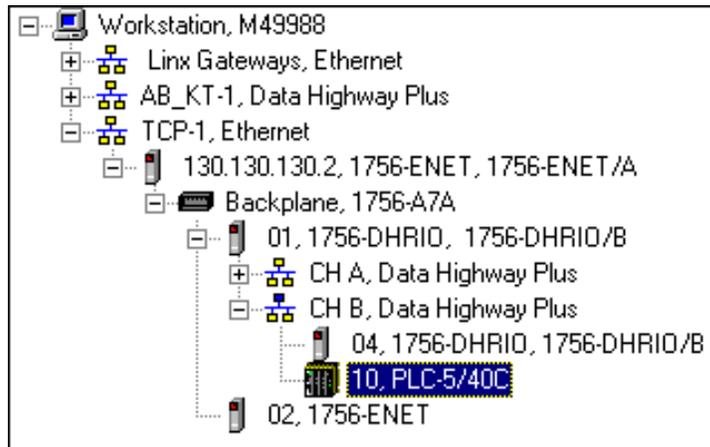


- e. Click on **Apply** to download the routing table to the 1756-DHRIO module.

It is not necessary to save the configuration to a file.

4 Verify the configuration:

- a. From the **File** menu, select **Browse Network**.
- b. Select the **TCP-1, Ethernet** driver and drill down the backplane.
- c. If you continue to drill down you should now see the PLC-5/40C processor at node 10 connected the Ethernet driver via the backplane and channel B (node 4) of the DH+.



- If the PLC-5/40C processor does not appear, then verify the switch settings in the 1756 DHRIO module and PLC-5/40C processor and check that the cables are properly connected.

If you are still experiencing difficulty, reconfigure the routing table and Ethernet module as described previously.

Connect to the PLC-5/40C Processor

Connect to the PLC-5/40C processor at node 10 to upload or download programs or to go on line with the processor.

1 Start the *RSLogix5* software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **Rockwell Software > RSLogix5 English**

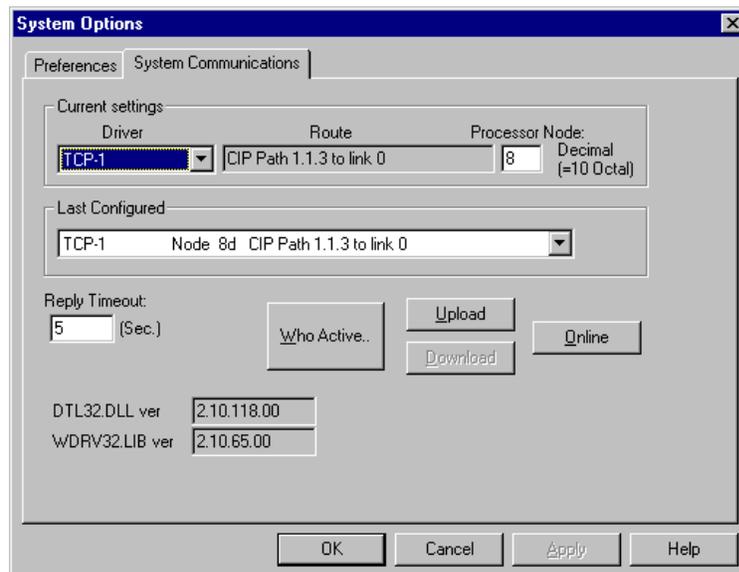
OR

Double-click on:



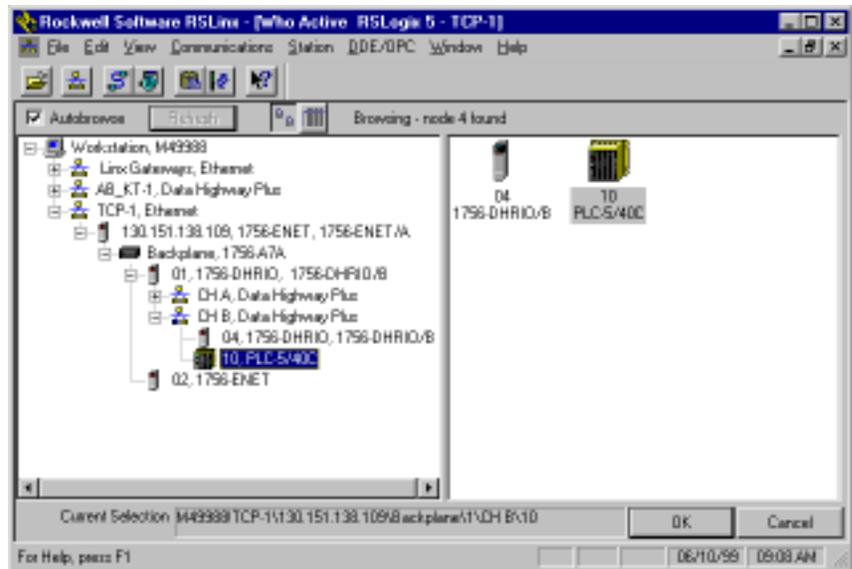
- c. From the **Comms** menu in RSLogix5, select **System Comms**.

The System Options window will appear with the System Communications tab open.

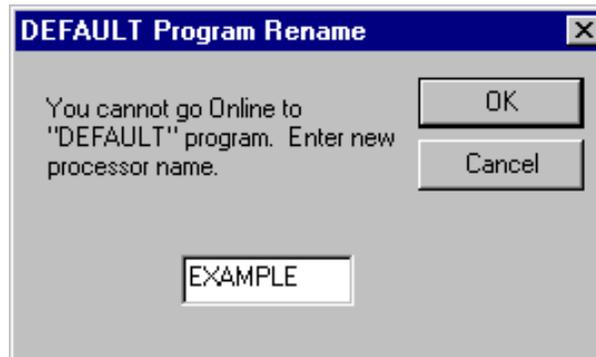


- d. Select **TCP-1** as the Driver and click on **Who Active**.

The RSWho window will appear.



- e. Drill down through the TCP-1 Ethernet driver and double-click on the PLC-5/40C processor.
- f. When the System Communications tab reappears, click on the **Online** button.
- g. If no program is loaded in the PLC-5/40C processor, a pop-up window will appear with the message “You cannot go Online to DEFAULT program.” Enter a new processor name of your choice (e.g., “Example”) and click on OK.



- Disregard any warnings about Control Net devices.
- It is not necessary to save the program.

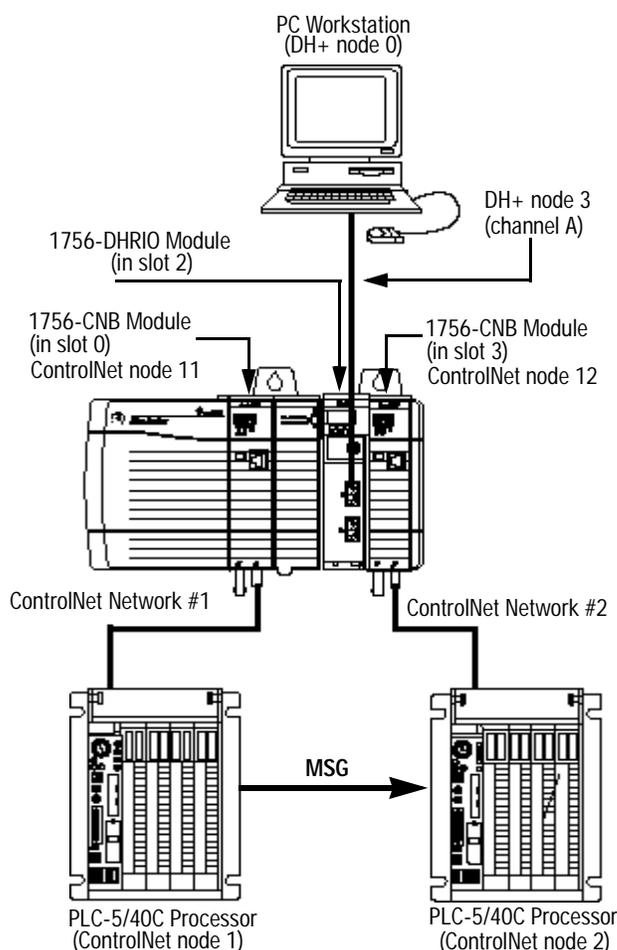
You are now online and can program or run the PLC-5/40C processor via the remote Ethernet link.

Initiate ControlNet to ControlNet Communication

What You Need To Do

- 1** Verify the communication module node addresses (page 8-2).
- 2** Verify the PLC-5/40C processors' node addresses (page 8-2).
- 3** Verify the KTX driver configuration (page 8-2).
- 4** Test the hardware (page 8-2).
- 5** Routing table considerations (page 8-3).
- 6** Edit the message instruction (page 8-3).
- 7** Test the application (page 8-6).

In this chapter, you will establish communication between two PLC-5/40C processors, bridging over two ControlNet networks. Change your existing system to the following configuration.



In this example, you send a PLC-5 Typed Write message from the PLC-5/40C processor at ControlNet node 1, network 1, to the PLC-5/40C processor at ControlNet node 2, network 2.

Note that the multi-hop feature described in this chapter requires series E/D.1 or F/A.1 processors and RSLogix5 software, version 3.2 or greater.

Verify the Communication Module Node Addresses

Verify that the node addresses for the 1756-CNB modules are 11 and 12 as shown. Verify that the channel A node address for the 1756-DHRIO module is 3 as shown.

Verify the PLC-5/40C Processor Node Addresses

Verify that the ControlNet node addresses for the PLC-5/40C processors are 1 and 2 as shown.

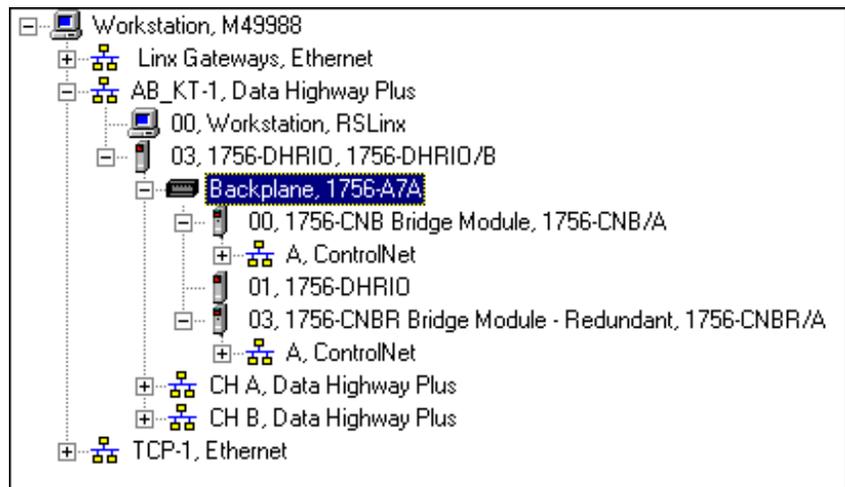
Verify the KTX Driver Configuration

In this example application, we use the Data Highway Plus KTX driver to download the program from the PC workstation to the PLC-5/40C processor. You can also download the program over ControlNet if you have a KTCX driver card configured in your PC workstation.

To follow this example, verify that the KTX driver is configured as described on page 3-2.

Test the KTX Driver and System Hardware Setup

- 1** Start the *RSLinx* software.
- 2** From the *Communications* menu in *RSLinx*, select *RSWho*:
 - a. Select the **AB_KT-1** driver. Drill down the backplane until you see the 1756-DHRIO module in slot 1 and the 1756-CNB modules in slot 0 and slot 3.
 - b. You should see a display similar to that below:



- c. If you do not see the correct display, check the faceplate indicators to ensure the DHRIO and CNB modules are functioning properly. Verify that the modules and cables are properly connected and that the switch settings on the modules are correct. See chapter 2.

- ▶ If you are still experiencing difficulty verify that the 1784-KTX driver is configured properly. Make sure there is no conflict with other hardware in your PC workstation.

3 *Minimize RSLinx.*

Routing Table Considerations

You do not need a routing table in this example because the 1756-DHRIO module is not included in the path between the PLC-5/40C processors. For further explanation about routing paths, see “Understanding How Routing Tables Are Used” on page 1-3.

Edit the Message Instruction

1 *Restore or start the RSLogix5 software:*

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **Rockwell Software > RSLogix5 English**

OR

Double-click on:

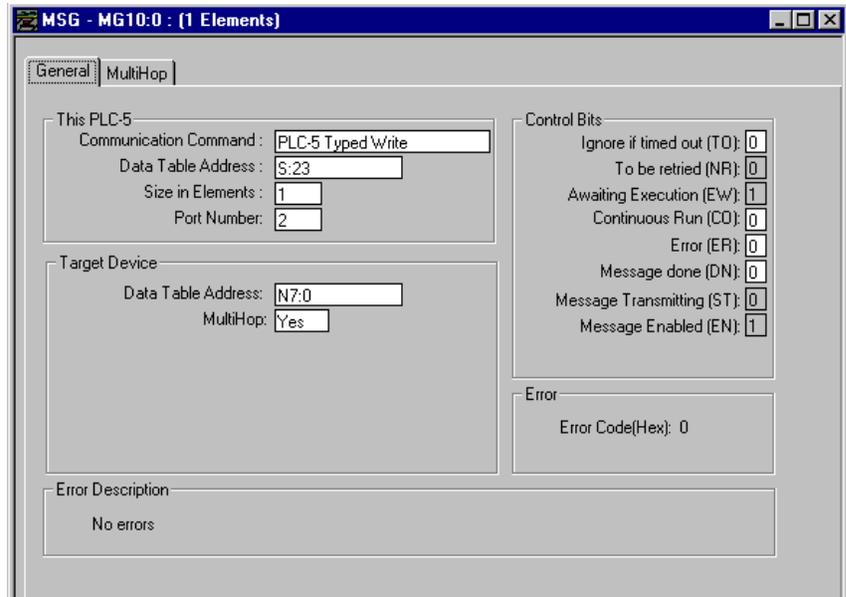


2 *Load the example program:*

- a. From the **File** menu, open the program “example.” See page 4-2.
- b. In the MSG instruction, double-click on **Setup Screen**.

c. Select the **General** tab (default).

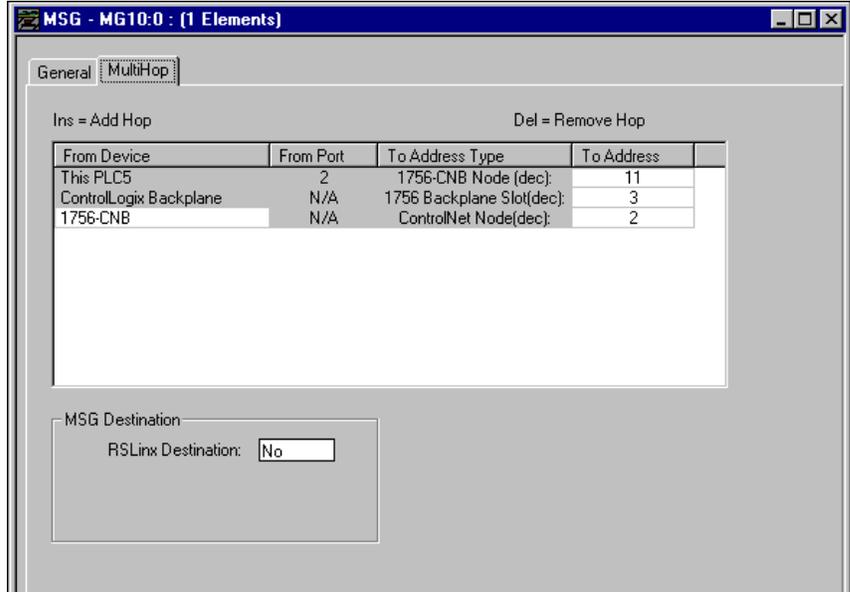
This message writes the value of the seconds clock (S:23) in the PLC-5/40C at node 1 into data file N7:0 of the PLC-5/40C processor at node 2.



d. Enter the following configuration:

This PLC-5:	
Communication Command	PLC-5 Typed Write
Data Table Address	S:23
Size in Elements	1
Port Number	2
Target Devices:	
Data Table Address	N7:0
MultiHop	Yes

- e. Select the **MultiHop** tab.



- f. Enter the following MultiHop configuration:

From Device	From Port	To Address Type	To Address
This PLC5	2	1756-CNB Node (dec):	11
Control Logix Backplane	N/A	1756 Backplane Slot (dec):	3
1756-CNB	N/A	ControlNet Node (dec)	2

MSG Destination	
RS Linx Destination	No

► For older releases of RSLogix5 software (no multihop function) the path of "11 3 2" can be placed in the ControlNet path field to accomplish the same function.

- g. Close the Setup Screen.

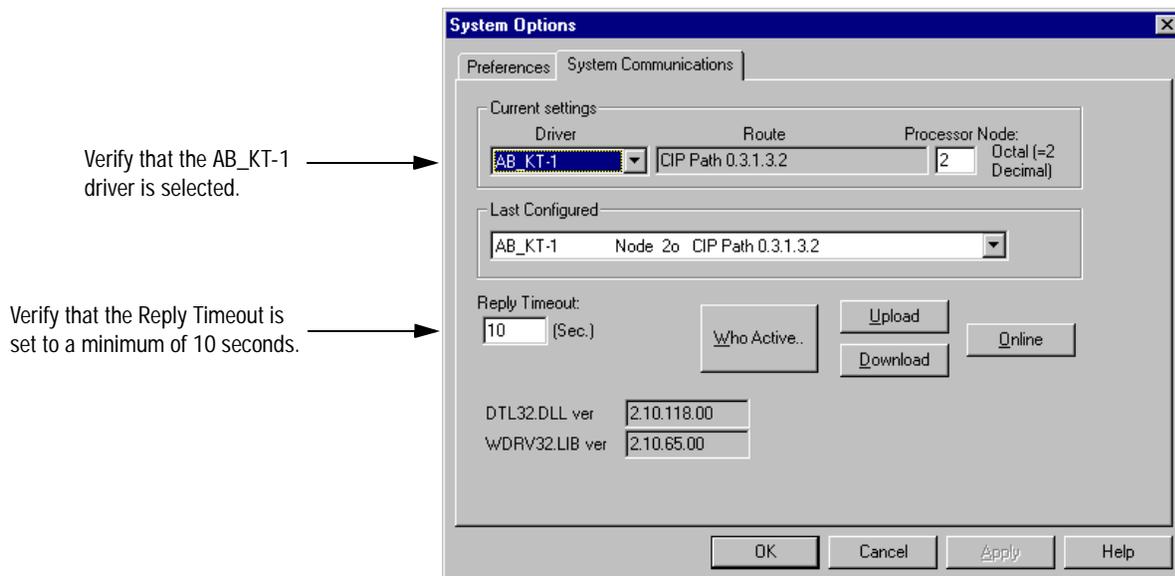
Test the Application

To test the application, download the program to the PLC-5/40C processor at ControlNet node 1 to send the message to the PLC-5/40C processor at node 2.

1 Download the program to the PLC-5/40C processor at ControlNet node 1:

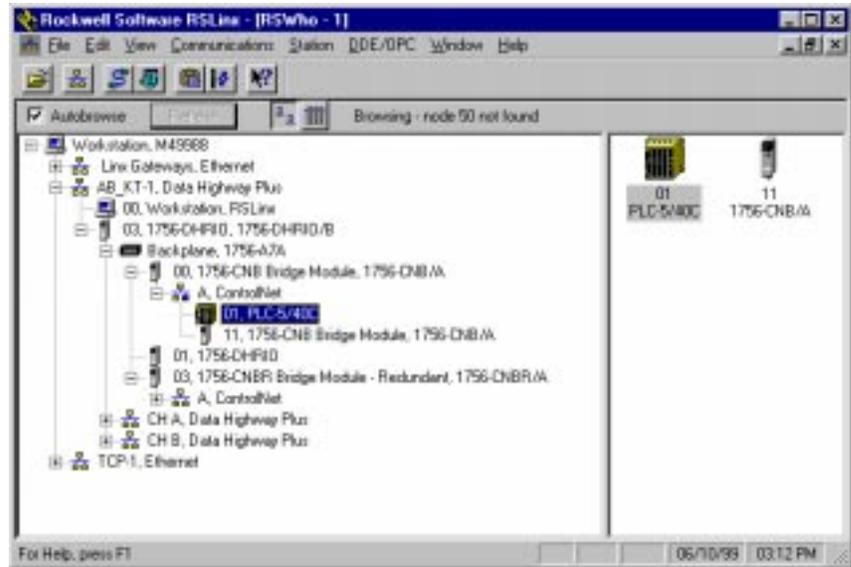
- a. From the **Comms** menu in RSLogix5 select **System Comms**.

The System Options window will appear with the System Communications tab open.



-
- b. Click on **Who Active**.

The RSWho window will appear.

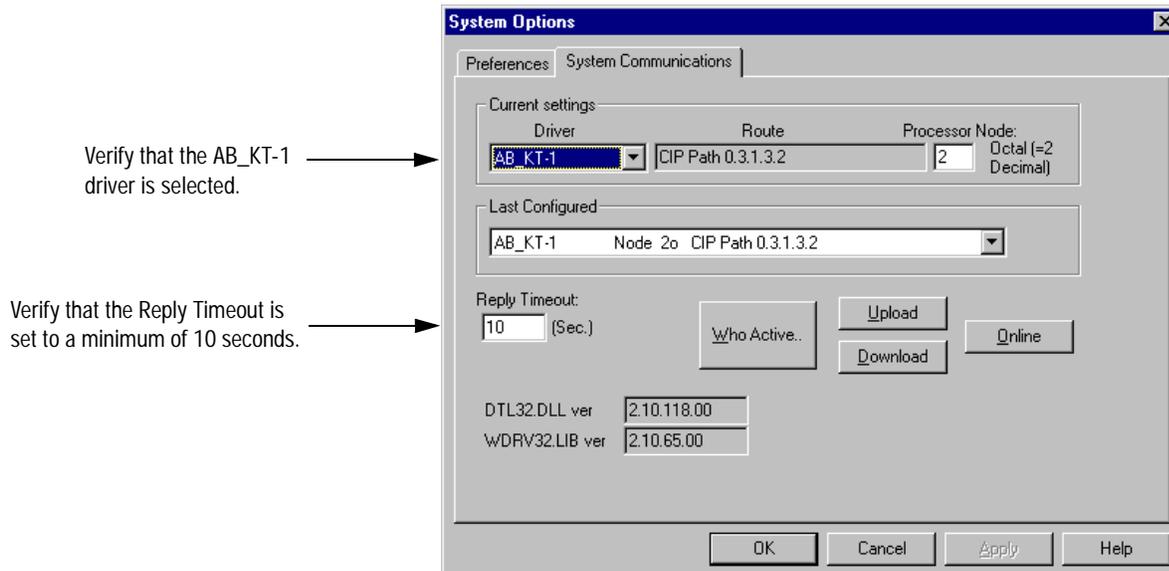


- c. Drill down the tree and double-click on the PLC-5/40C processor at ControlNet node 1.
- d. When the System Communications tab reappears, click on the **Download** button.
Disregard any warnings about Control Net devices.
- e. Save the program if prompted.
- f. Go **Online** and change the processor mode to **Run**.

2 Verify the communications to the PLC-5/40C processor at ControlNet node 2:

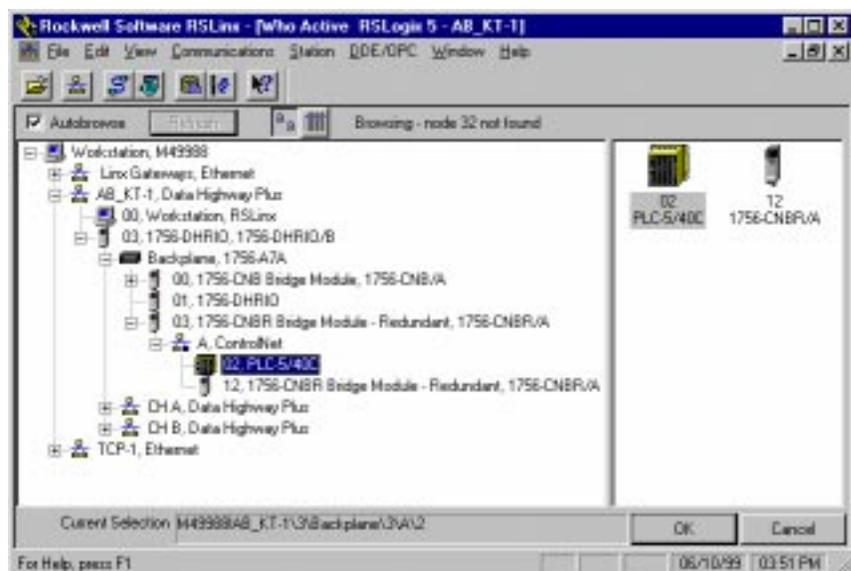
- a. Start a new session of RSLogix5 software.
- b. From the **Comms** menu in RSLogix5, select **System Comms**.

The System Options window will appear with the System Communications tab open.



- c. Click on **Who Active**.

The RSWho window will appear.



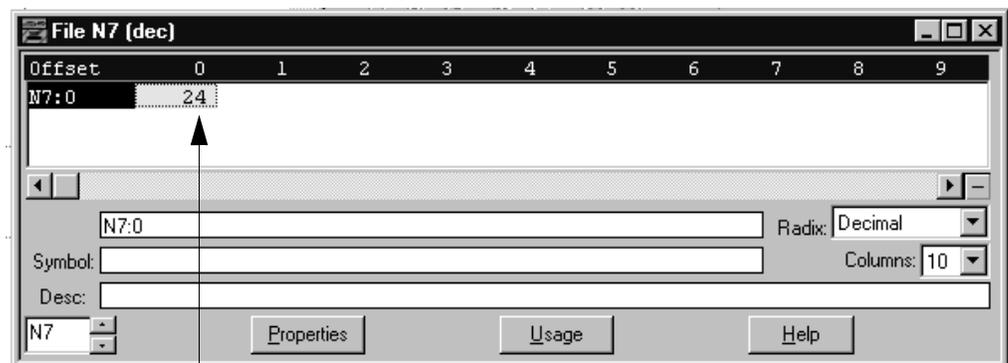
- d. Drill down the tree and double-click on the PLC-5/40C processor at ControlNet node 2.

- e. When the System Communications tab reappears, click on the **Online** button.
- f. If no program is loaded in the PLC-5/40C processor, a pop-up window will appear with the message “You cannot go Online to DEFAULT program.” Enter a new processor name of your choice (e.g., “Receiver”) and click on **OK**.



- Disregard any warnings about ControlNet devices.
 - It is not necessary to save the program.
- g. Double-click on **N7** in the data file list.

You should see the following screen:



Verify that this value is being updated.

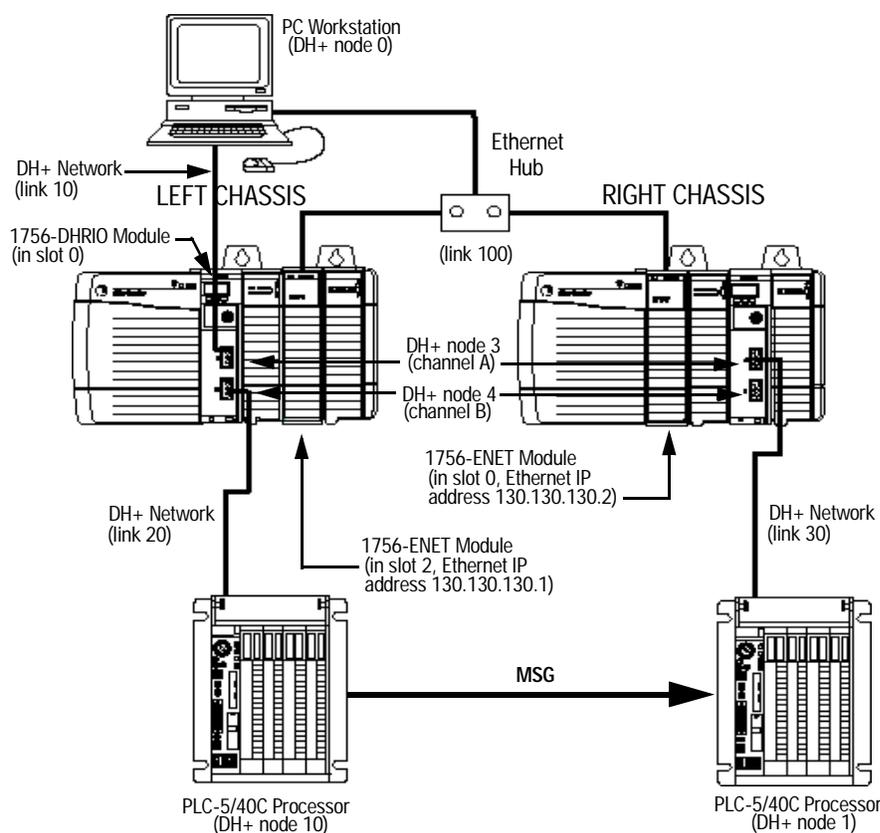
When you see N7:0 being updated at one second intervals the message is being sent successfully from the PLC-5/40C processor at ControlNet node 1 to the PLC-5/40C processor at ControlNet node 2.

Initiate DH+ to DH+ Communication With an Ethernet Backbone

What You Need To Do

- 1** *Verify the communication driver configurations (page 9-1).*
- 2** *Test the hardware (page 9-2).*
- 3** *Configure the communication modules in the left chassis (page 9-3).*
- 4** *Configure the communication modules in the right chassis (page 9-8).*
- 5** *Test the application (page 9-14).*

In this application, you will establish communication between two PLC-5/40C processors over two DH+ gateways using an Ethernet backbone. Change your existing system to the following configuration:



In this example, the PLC-5/40C processor in the left chassis at DH+ node 10 initiates a PLC-5 Typed Read message from the PLC-5/40C processor in the right chassis at DH+ node 1, via an Ethernet link.

Verify the Communication Driver Configurations

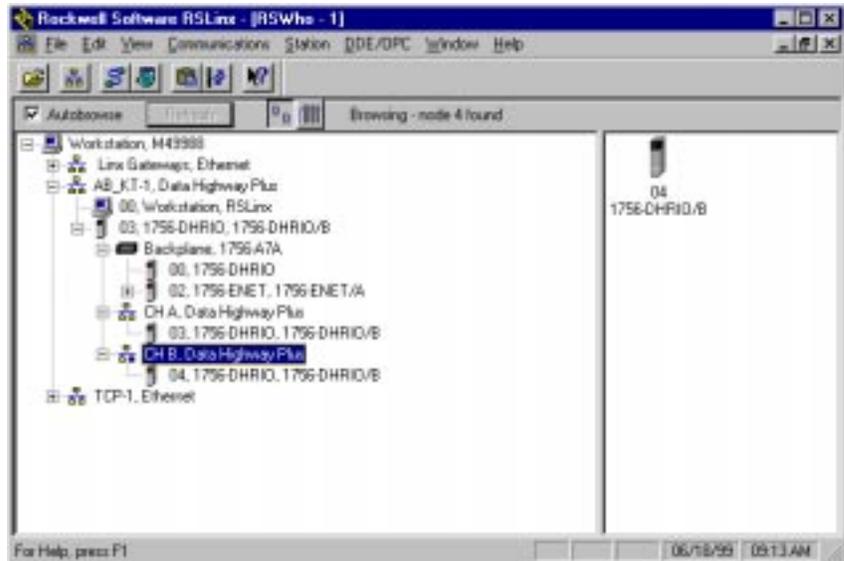
Verify that the KTX driver and ethernet driver are configured as directed on page 3-2.

Test the KTX Diver and System Hardware Setup

1 Start the *RSLinx* software.

2 From the *Communications* menu in *RSLinx*, select *RSWho*:

- a. Select the **AB_KT-1** driver. Drill down until you see the 1756-DHIO module in slot 0 and the 1756-ENET module in slot 2. Expand the view to verify the channel A and channel B configurations. You should see a display similar to that below:



- b. If you do not see the correct display, check the faceplate indicators to ensure the DHRIO and ENET modules are functioning properly. Verify that modules and cables are properly connected and that switch settings on the 1756-DHRIO module are correct. See page 2-7.
 - ▶ If you are still experiencing difficulty verify that the 1784-KTX driver is configured properly. Make sure there is no conflict with other hardware in your PC workstation.

3 Minimize *RSLinx*.

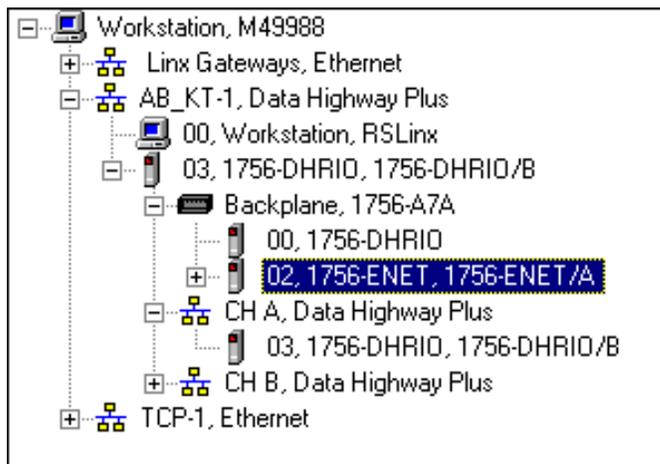
Configure the Communication Modules in the Left Chassis

1 Start the configuration software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **ControlLogix Gateway > 1756gtwy**.

2 Configure the Ethernet module in the left chassis:

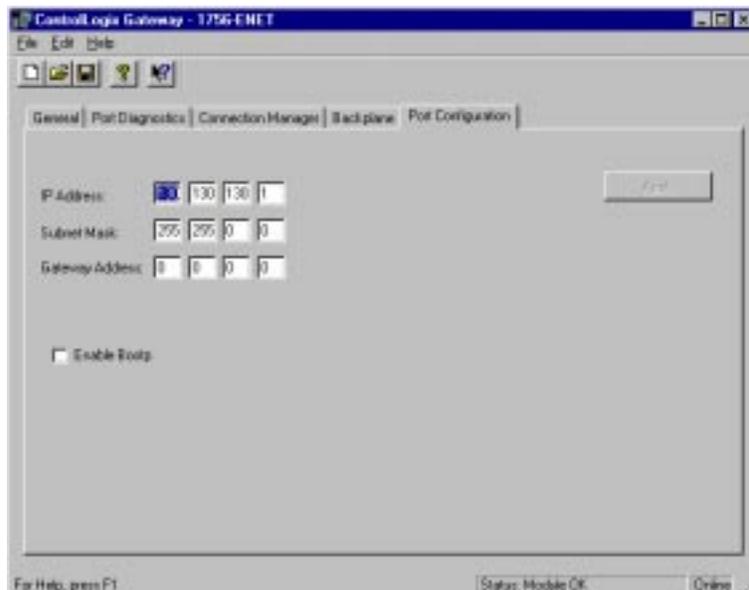
- a. From the **File** menu in the configuration software, select **Browse Network**. RSLinx starts.
- b. Select the **AB_KT_1 Data Highway Plus** driver and drill down the backplane.



- c. Double-click on the Ethernet module.
- d. Select the **Port Configuration** tab.

You must make sure that each Ethernet device has a unique IP address. For more information, see page 7-3.

Make sure Bootp is disabled.



e. Enter the following configuration:

IP Address	130.130.130.1
Subnet Mask	255.255.0.0
Gateway Address	0.0.0.0
Enable Bootp	Unchecked (disabled)

f. Click on **Apply** to download the configuration to the module.

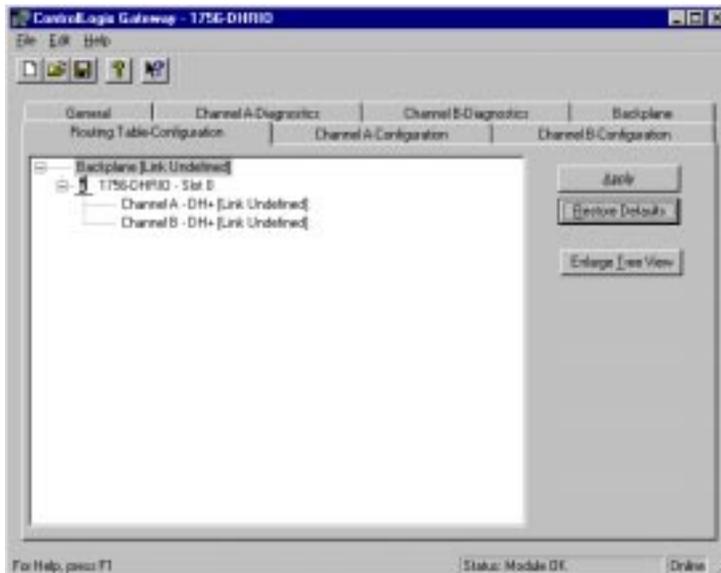
You need to configure a routing table to specify the path from the left PLC-5/40C processor to the right PLC-5/40C processor.

3 *Configure the routing table in the 1756-DHRIO module in the left chassis:*

- a. From the **File** menu in the configuration software, select **Browse Network**.
- b. Select the **AB_KT_1** Data Highway Plus driver and double-click on the 1756-DHRIO module.



c. Select the **Routing Table Configuration** tab.



► If you have previously configured any routing tables, click on **Restore Defaults** to remove the configuration and restore the default values.

d. Double-click on the 1756-DHRIO module in the routing table.

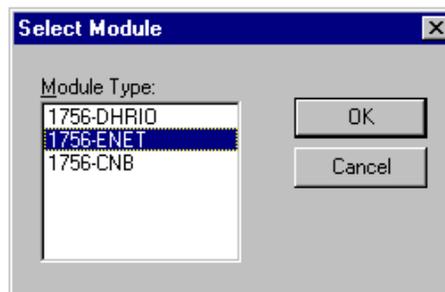
The Edit Module pop-up window will appear.



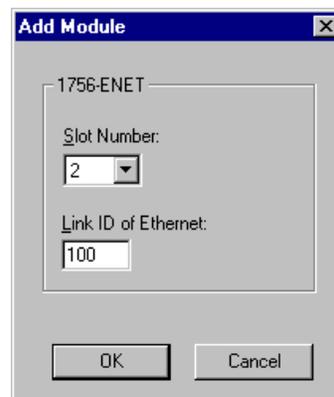
- e. Enter the following link IDs and click on **OK**:

Channel A	Link 10
Channel B	Link 20

- f. Right click on **Backplane [Link Undefined]**.
g. Select **Add Module**.



- h. Select **1756-ENET** and click on **OK**.



- i. Enter the following configuration and click on **OK**:

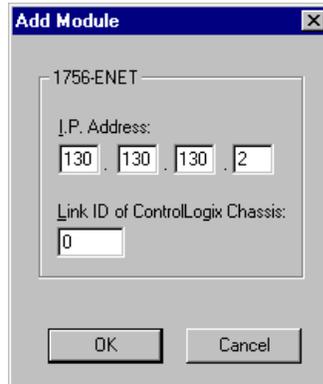
Slot Number	2
Link ID of Ethernet	100

- j. Right click on **ENET [Link 100]** in the routing table.

k. Select **Add Module**.

You select this to include the 1756-ENET module in the right chassis in the routing table.

l. Select **1756-ENET** and click on **OK**.



In the next section we describe how to configure the 1756-ENET module in the right chassis.

m. Enter the following configuration and click on **OK**:

IP Address	130.130.130.2
Link ID	0

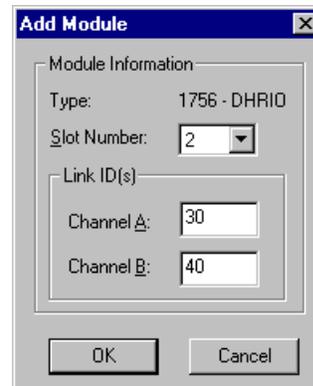
This is the backplane of the right chassis. Look for this just below the new 1756-ENET entry (address 130.130.130.2).

n. Right click on the new **Backplane [Link Undefined]**.

o. Select **Add Module**.

p. Select **1756-DHRIO** and click on **OK**.

You add this to include the 1756-DHRIO module in the right chassis in the routing table.



q. Enter the following link IDs and click on **OK**:

Slot Number	2
Channel A	Link 30
Channel B	Link 40

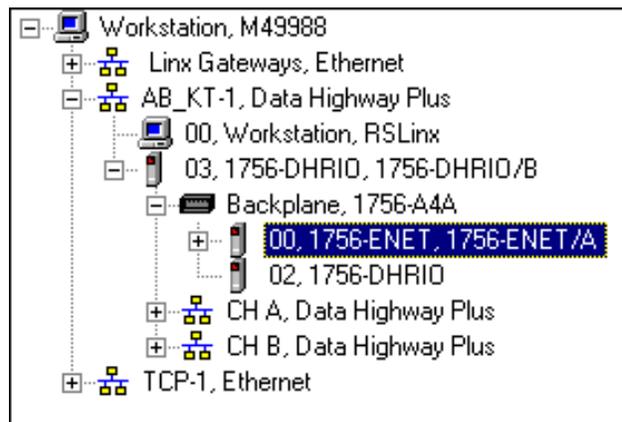
Configure the Communication Modules in the Right Chassis

1 Start the configuration software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **ControlLogix Gateway**, select **1756gtwy**.

2 Configure the Ethernet module in the right chassis:

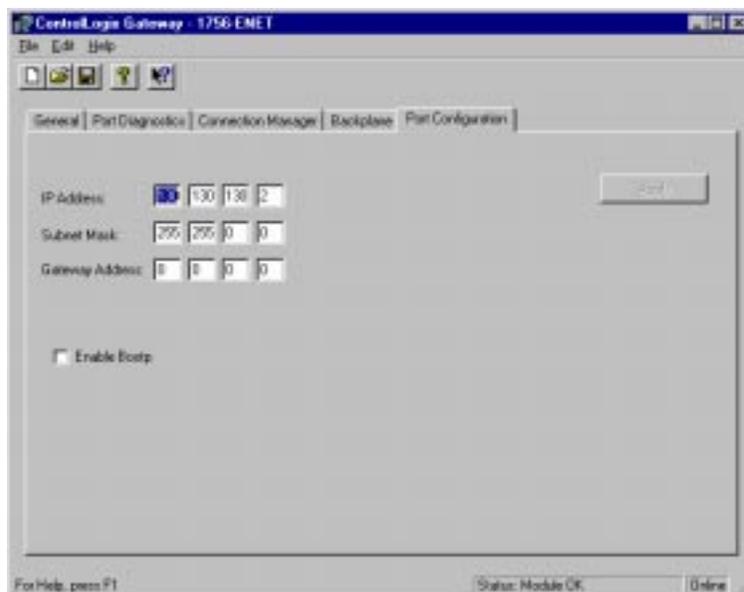
- a. From the **File** menu in the configuration software, select **Browse Network**. RSLinx starts.
- b. Select the **AB_KT_1 Data Highway Plus** driver and drill down the backplane.



- c. Double-click on the Ethernet module.
- d. Select the **Port Configuration** tab.

You must make sure that each Ethernet device has a unique IP address. For more information, see page 7-3.

Make sure Bootp is disabled.



- e. Enter the following configuration:

IP Address	130.130.130.2
Subnet Mask	255.255.0.0
Gateway Address	0.0.0.0
Enable Bootp	Unchecked (disabled)

- f. Click on **Apply** to download the configuration to the module.

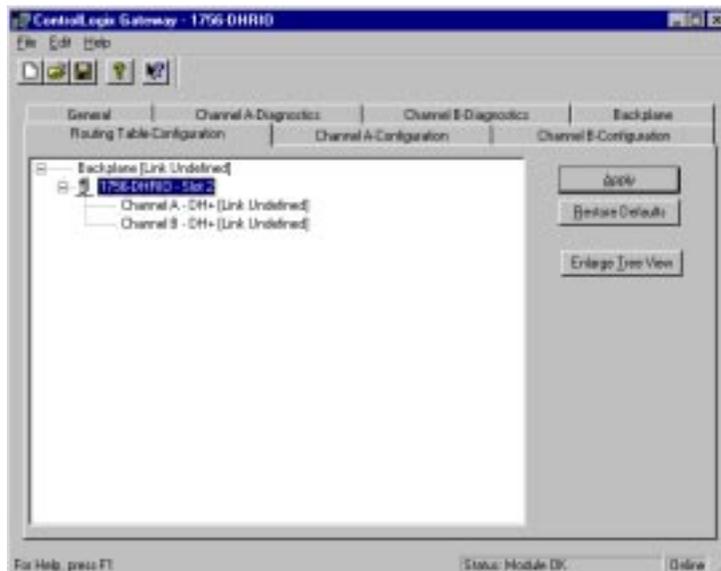
You need to configure a routing table to specify the path from the right PLC-5/40C processor to the left PLC-5/40C processor.

3 Configure the routing table in the 1756-DHRIO module in the right chassis:

- From the **File** menu in the configuration software, select **Browse Network**.
- Select the **AB_KT_1** Data Highway Plus driver and double-click on the 1756-DHRIO module.



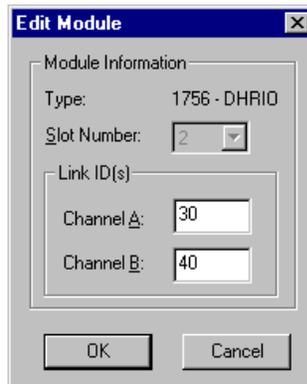
- Select the **Routing Table Configuration** tab.



- If you have previously configured any routing tables, click on **Restore Defaults** to remove the configuration and restore the default values.

- Double-click on the 1756-DHRIO module in the routing table.

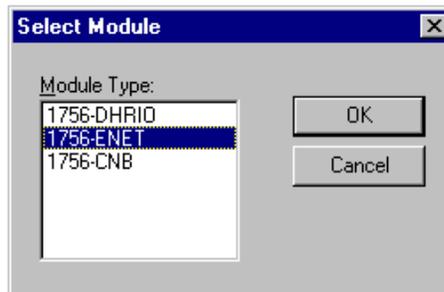
The Edit Module pop-up window will appear.



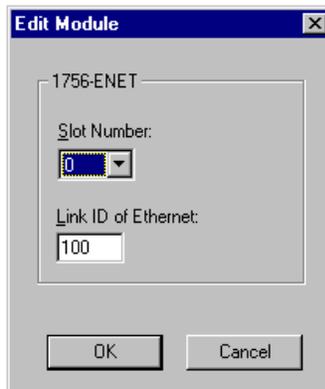
- e. Enter the following link IDs and click on **OK**:

Channel A	Link 30
Channel B	Link 40

- f. Right click on **Backplane [Link Undefined]**.
- g. Select **Add Module**.



- h. Select **1756-ENET** and click on **OK**.



- i. Enter the following configuration and click on **OK**:

Slot Number	0
Link ID of Ethernet	100

- j. Right click on **ENET [Link 100]** in the routing table.

k. Select **Add Module**.

You select this to include the 1756-ENET module in the left chassis in the routing table.

l. Select **1756-ENET** and click on **OK**. The Add Module pop-up window will appear.

m. Enter the following configuration and click on **OK**:

IP Address	130.130.130.1
Link ID	0

This is the backplane of the left chassis. Look for this just below the new 1756-ENET entry (address 130.130.130.1).

n. Right click on the new **Backplane [Link Undefined]**.

o. Select **Add Module**.

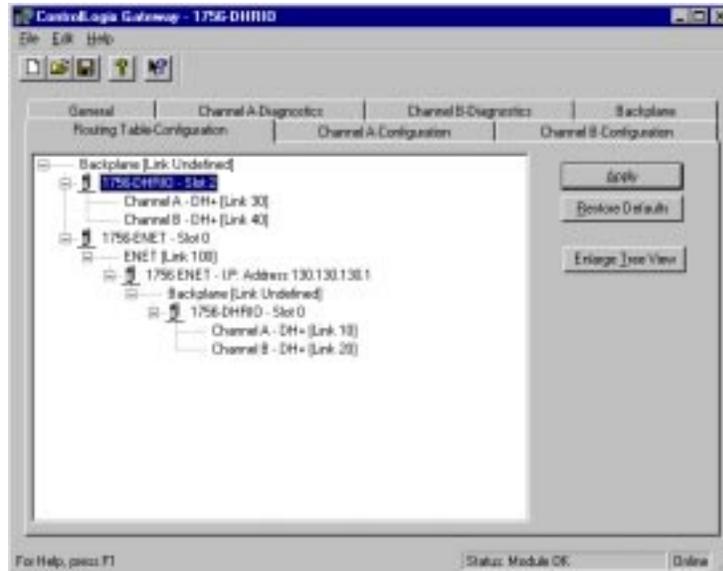
p. Select **1756-DHRIO** and click on **OK**.

You add this to include the 1756-DHRIO module in the left chassis in the routing table.

q. Enter the following link IDs and click on **OK**:

Slot Number	0
Channel A	Link 10
Channel B	Link 20

You should now see the following completed routing table:



- r. Click on **Apply** to download the routing table to the 1756-DHRIO module.
- s. Close the configuration software.

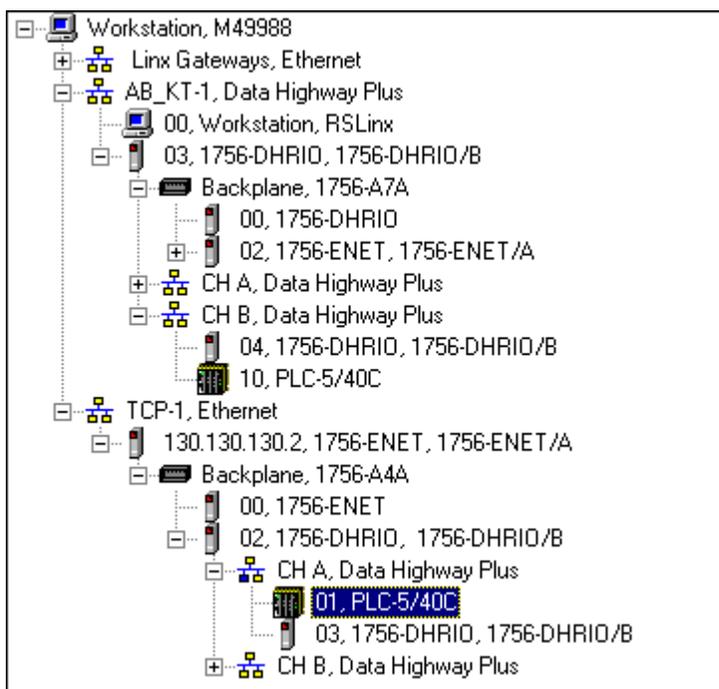
It is not necessary to save the configuration to a file.

Replace the cables to reflect the system drawing shown on the first page of this chapter.

4 *Verify the configuration:*

- a. Open or restore the **RSLinx** software.
- b. From the **Communications** menu, select **RSWho**.
- c. Select the **AB_KT_1, Data Highway Plus** driver and drill down to channel B of the 1756-DHRIO module in the left chassis.
- d. Select the **TCP-1, Ethernet** driver and drill down to channel A of the 1756-DHRIO module in the right chassis.

Your display should appear similar to that below. You should see the PLC-5/40C processor at node 10 connected to channel B of the left DHRIO module and the PLC-5/40C processor at node 1 connected to channel A of the right DHRIO module.



- ▶ If the PLC-5/40 processors do not appear, then verify the switch settings in the 1756 DHRIO modules and PLC-5/40 processors and check that the cables are properly connected.

If you are still experiencing difficulty, reconfigure the routing tables and Ethernet modules as described previously.

Test the Application

1 Start the RSLogix5 software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **Rockwell Software > RSLogix5 English**.

OR

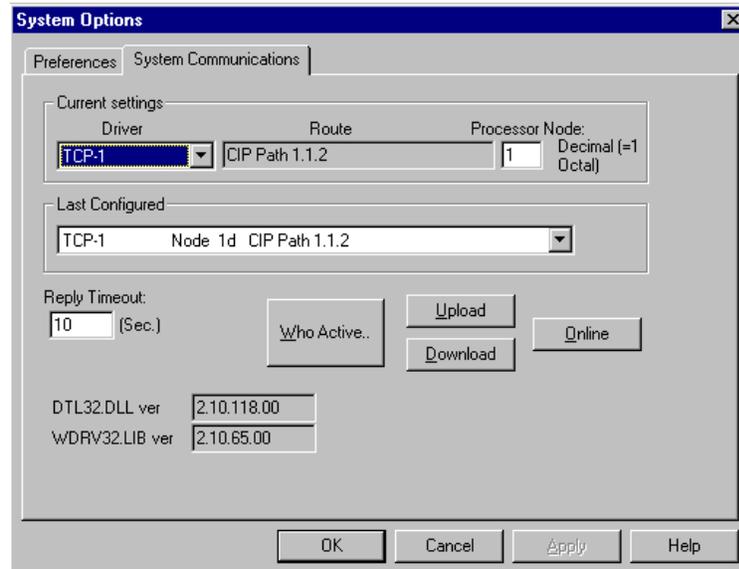
Double-click on:



2 Verify the PLC-5 Processor Connected to the Right Chassis is Active:

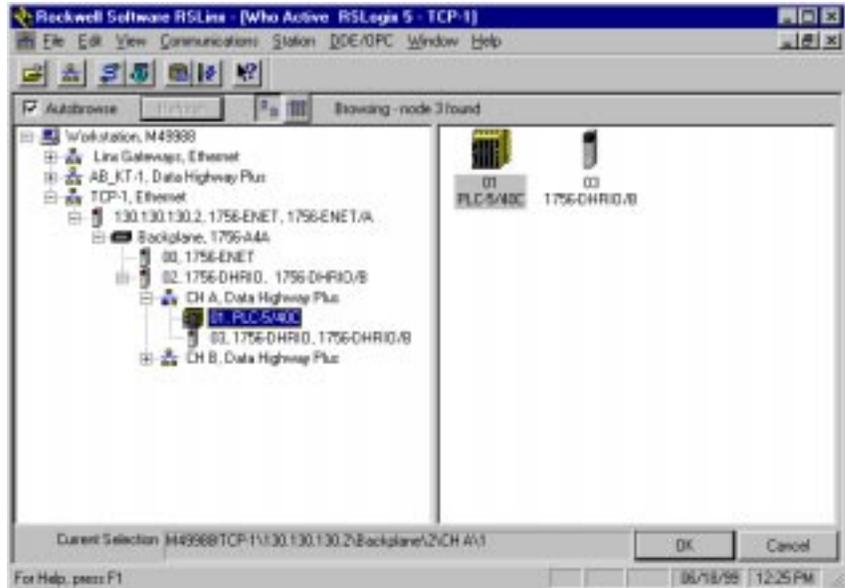
- c. From the **Comms** menu in RSLogix5, select **System Comms**.

The System Options window will appear with the System Communications tab open.

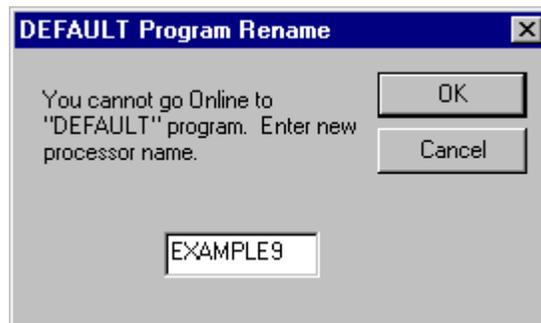


- d. Select **TCP-1** as the Driver and click on **Who Active**.

The RSWho window will appear.



- e. Drill down the tree and double-click on the PLC-5/40C processor in the right chassis at DH+ node 1.
- f. When the System Communications tab reappears, click on the **Online** button.
- g. If no program is loaded in the PLC-5/40C processor, a pop-up window will appear with the message “You cannot go Online to DEFAULT program.” Enter a new processor name of your choice (e.g., “EXAMPLE9”) and click on OK.

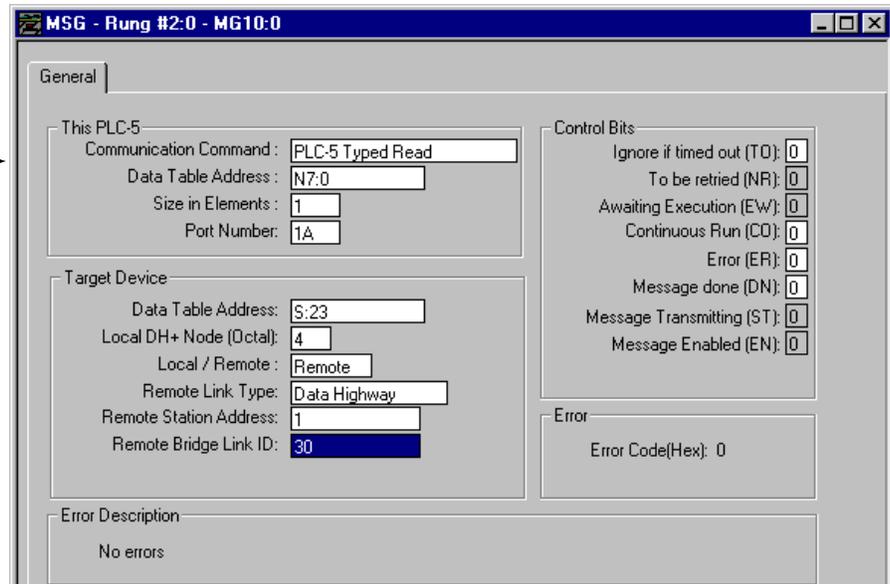


- It is not necessary to save the program.
- Disregard any warnings about Control Net devices.

3 Load the example program:

- a. Start another session of RSLogix5.
- b. From the **File** menu, open the program “example.” See page 4-2.
- c. In the MSG instruction, double-click on **Setup Screen**.

This message reads the value of the seconds clock (S:23) in the PLC-5/40C processor in the right chassis into data file N7:0 of the PLC-5/40C processor in the left chassis.



- d. Enter the following configuration.

This PLC-5:	
Communication Command	PLC-5 Typed Read
Data Table Address	N7:0
Size in Elements	1
Port Number	1A
Target Device:	
Data Table Address	S:23
Local DH+ Node	4
Local/Remote	Remote
Remote Link Type	Data Highway
Remote Station Address	1
Remote Bridge Link ID	30

This is the node number of the DH+ channel on the local link (link 20).

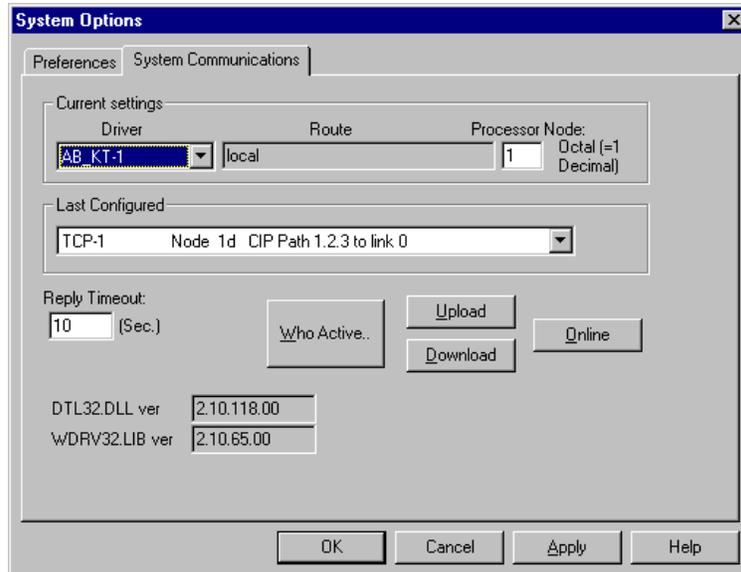
This is the node number of the target PLC-5/C processor.

- e. Close the Setup Screen.

4 Download the program to the PLC-5/40C processor at DH+ node 10:

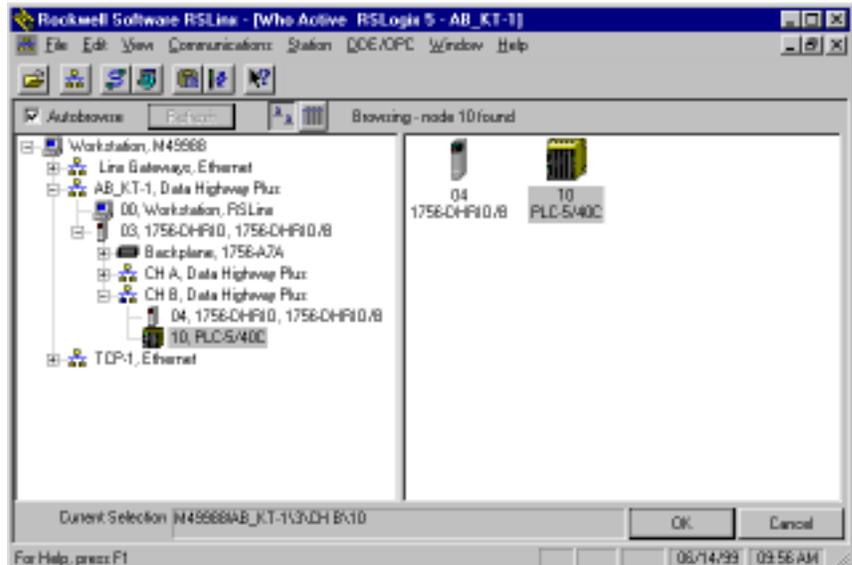
- a. From the **Comms** menu in RSLogix5 select **System Comms**

The System Options window will appear with the System Communications tab open.



- b. Select the **AB_KT-1** Driver and click on **Who Active**.

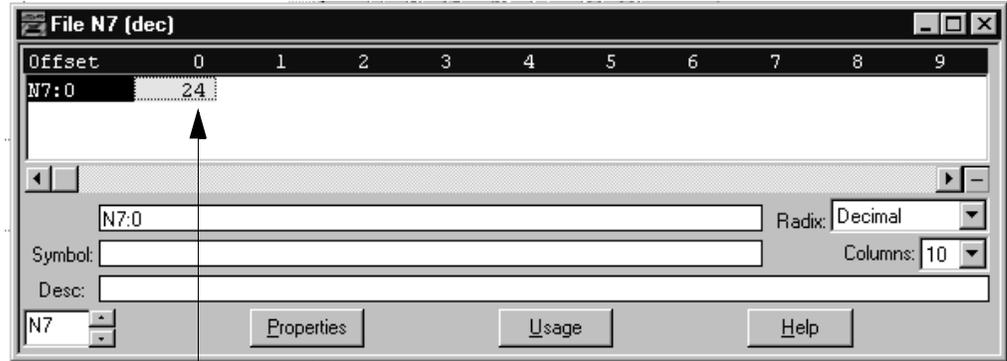
The RSWho window will appear:



- c. Drill down the tree and double-click on the PLC-5/40C processor at node 10.
- d. When the System Communications tab reappears, click on the **Download** button.

- Disregard any warnings about Control Net devices.
- e. Save the program if prompted.
 - f. Go **Online** and change the processor mode to **Run**.
 - g. Double-click on **N7** in the data file list.

You should see the following screen:



Verify that this value is being updated.

When you see N7:0 being updated at one second intervals the message from the PLC-5/40C processor in the right chassis is being read successfully by the PLC-5/40C processor in the left chassis.

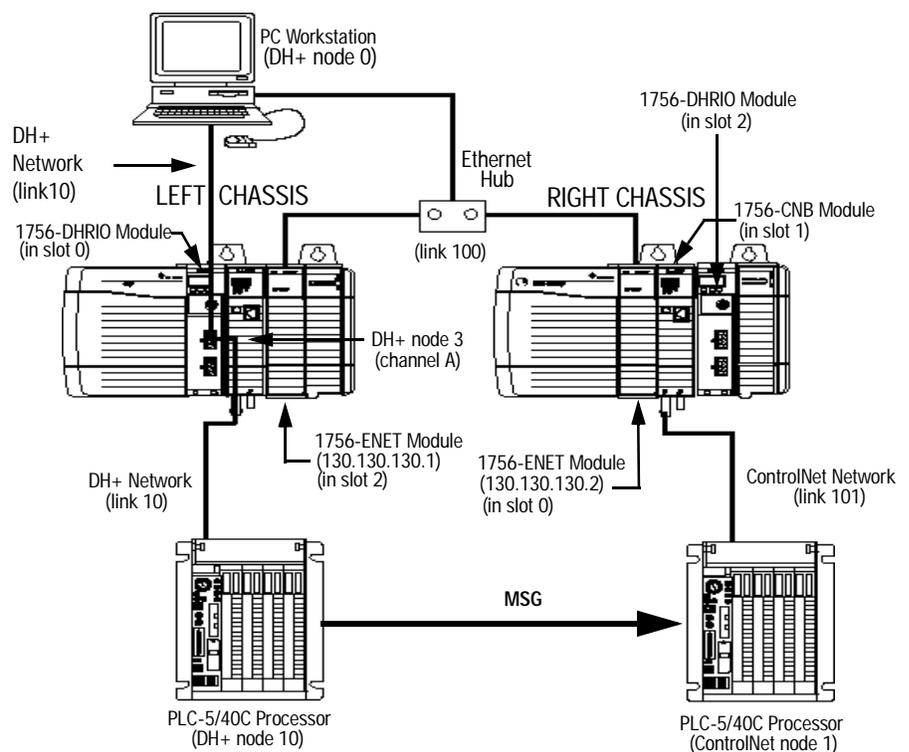
Initiate ControlNet to DH+ Communication With an Ethernet Backbone

What You Need To Do

In this application, you will establish communication from one PLC-5/40C on a ControlNet network to another PLC-5/40C on a DH+ network, bridging across ControlNet, Ethernet, and DH+ networks.

Change your existing system to the following configuration:

- 1** *Verify the communication driver configurations (page 10-1).*
- 2** *Test the KTX driver and system hardware (page 10-2).*
- 3** *Configure the communication modules in the left chassis (page 10-3).*
- 4** *Configure the Ethernet module in the right chassis (page 10-8).*
- 5** *Test the application (page 10-10).*



In this example, the PLC-5/40C processor in the left chassis at DH+ node 10 initiates a PLC-5 Typed Read message from the PLC-5/40C processor in the right chassis at ControlNet node 1.

Verify the Communication Driver Configuration

Verify that the KTX driver and ethernet driver are configured as directed on page 3-2.

Test the KTX Driver and System Hardware Setup

1 Start the *RSLinx* software.

- a. From the **Communications** menu in RSLinx, select **RSWho**:
- b. Select the **AB_KT-1** driver. Drill down until you see the 1756-DHIO module in slot 0 and the 1756-ENET module in slot 2. Expand the view to verify the channel A and channel B configurations. You should see a display similar to that below:



- c. If you do not see the correct display, check the faceplate indicators to ensure the DHRIO and ENET modules are functioning properly. Verify that modules and cables are properly connected and that switch settings on the 1756-DHRIO module are correct. See page 2-7.
 - ▶ If you are still experiencing difficulty verify that the 1784-KTX driver is configured properly. Make sure there is no conflict with other hardware in your PC workstation.

2 Minimize *RSLinx*.

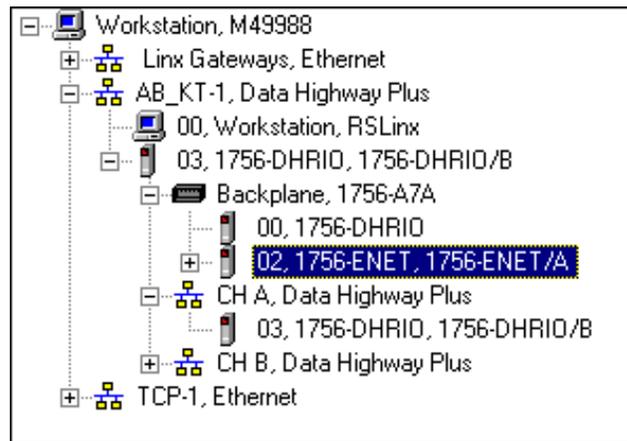
Configure the Communication Modules in the Left Chassis

1 Start the configuration software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **ControlLogix Gateway > 1756gtwy**.

2 Configure the Ethernet module in the left chassis:

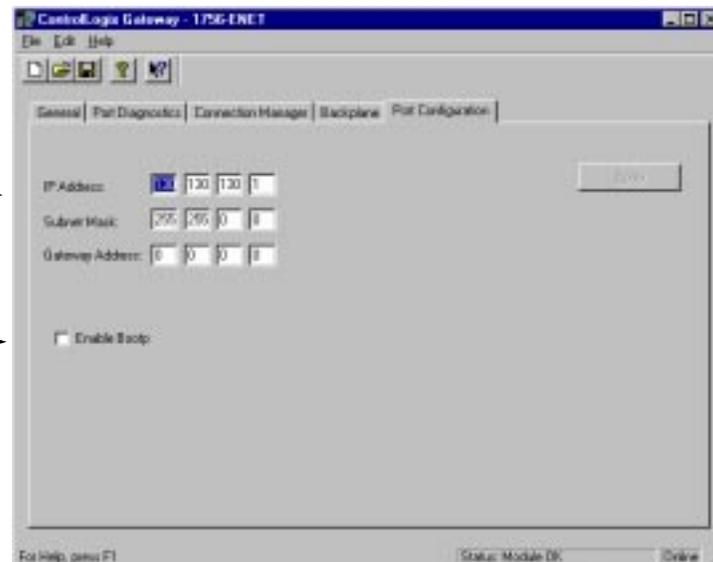
- a. From the **File** menu in the configuration software, select **Browse Network**. RSLinx starts.
- b. Select the **AB_KT_1 Data Highway Plus** driver and drill down the backplane.



- c. Double-click on the Ethernet module.
- d. Select the Port Configuration tab.

You must make sure that each Ethernet device has a unique IP address. For more information, see page 7-3.

Make sure Bootp is disabled.



e. Enter the following configuration:

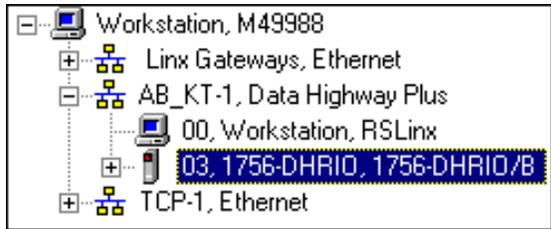
IP Address	130.130.130.1
Subnet Mask	255.255.0.0
Gateway Address	0.0.0.0
Enable Bootp	Unchecked (disabled)

f. Click on **Apply** to download the configuration to the module.

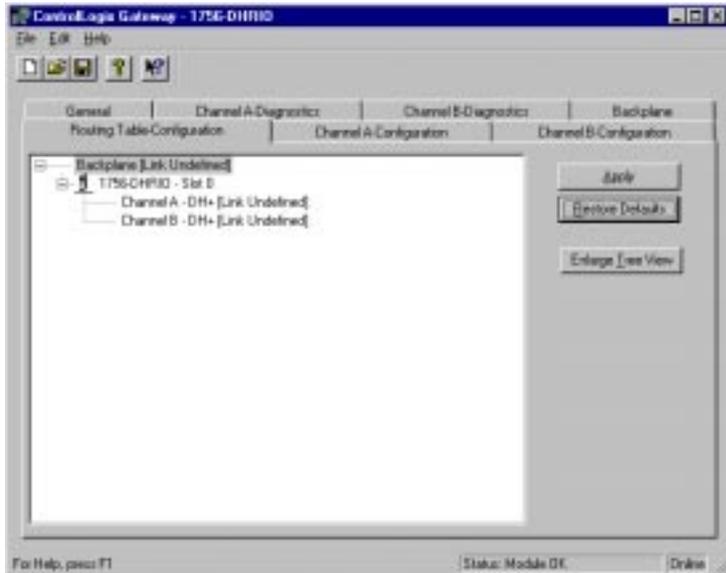
You need to configure a routing table to specify the path from the left PLC-5/40C processor to the right PLC-5/40C processor.

3 Configure the routing table in the 1756-DHRIO module in the left chassis:

- a. From the **File** menu in the configuration software, select **Browse Network**.
- b. Select the **AB_KT_1** Data Highway Plus driver and double-click on the 1756-DHRIO module.



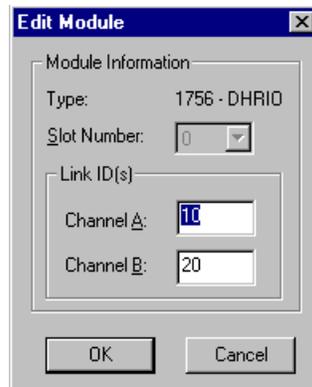
c. Select the **Routing Table Configuration** tab.



► If you have previously configured any routing tables, click on **Restore Defaults** to remove the configuration and restore the default values.

d. Double-click on the 1756-DHRIO module in the routing table.

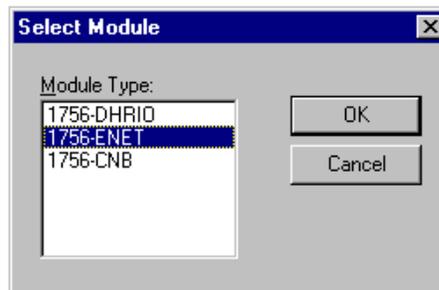
The Edit Module pop-up window will appear.



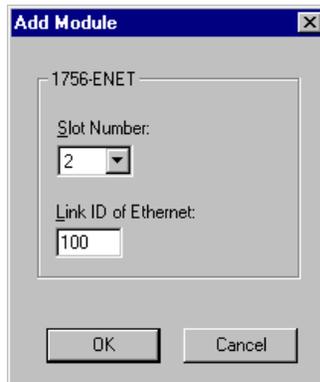
- e. Enter the following link IDs and click on **OK**:

Channel A	Link 10
Channel B	Link 20

- f. Right click on **Backplane [Link Undefined]**.
 g. Select **Add Module**. The Select Module pop-up window will appear.



- h. Select **1756-ENET** and click on **OK**. The Add Module pop-up window will appear.



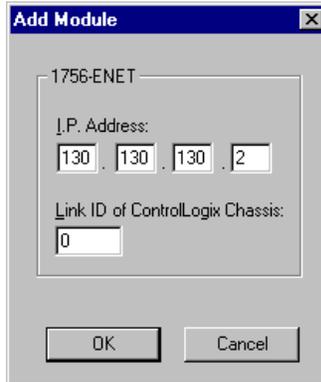
- i. Enter the following configuration and click on **OK**:

Slot Number	2
Link ID of Ethernet	100

- j. Right click on **ENET [Link 100]** in the routing table.
- k. Select **Add Module**.

You select this to include the 1756-ENET module in the right chassis in the routing table.

- l. Select **1756-ENET** and click on **OK**.



In the next section we describe how to configure the 1756-ENET module in the right chassis.

- m. Enter the following configuration and click on **OK**:

IP Address	130.130.130.2
Link ID	0

This is the backplane of the right chassis. Look for this just below the new 1756-ENET entry (address 130.130.130.2).

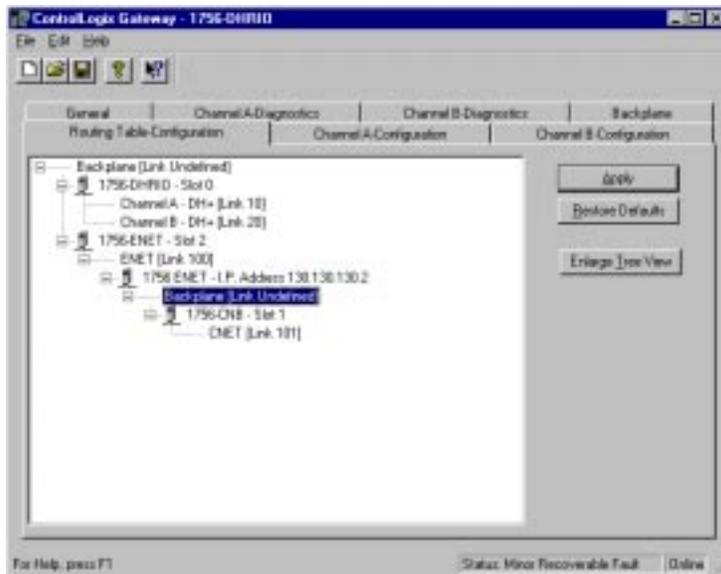
- n. Right click on the new **Backplane [Link Undefined]**.
- o. Select **Add Module**.
- p. Select **1756-CNB** and click on **OK**.



- q. Enter the following configuration and click on **OK**:

Slot Number	1
Link ID of ControlNet	101

You should now see the following completed routing table:



- r. Click on **Apply** to download the routing table to the 1756-DHRIO module.
- s. Close the Gateway configuration software.

It is not necessary to save the configuration to a file.

Next, you need to configure the 1756-ENET module in the right chassis. To do this, connect your PC (KTX card) to node 3 (channel A) of the 1756-DHRIO module local to the 1756-ENET module in the right chassis. Doing this provides you with access to the 1756-ENET module in the right chassis via the backplane.

Configure the 1756-ENET Module in the Right Chassis

1 Start the configuration software:

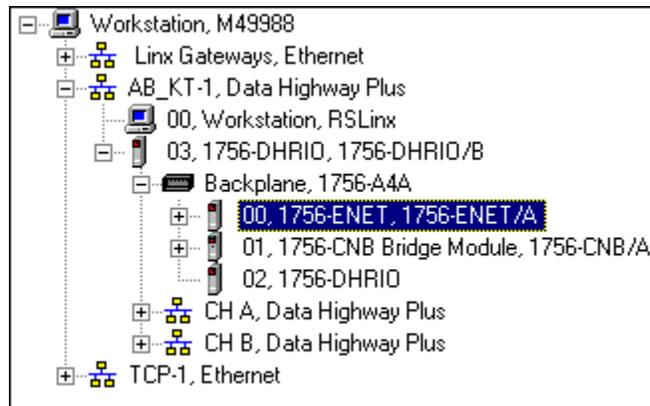
- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **ControlLogix Gateway**, select **1756gtwy**.

2 Configure the IP address:

- a. From the **File** menu in the configuration software, select **Browse Network**.

RSLinx starts.

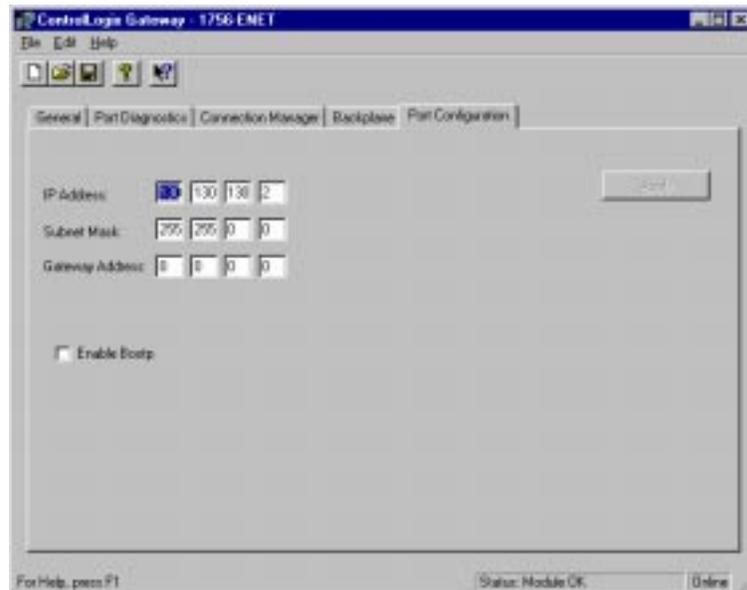
- b. Select the **AB_KT_1 Data Highway Plus** driver and drill down the backplane.



- c. Double-click on the Ethernet module.
- d. Select the **Port Configuration** tab.

You must make sure that each Ethernet device has a unique IP address. For more information, see page 7-3.

Make sure Bootp is disabled.



- e. Enter the following configuration:

IP Address	130.130.130.2
Subnet Mask	255.255.0.0
Gateway Address	0.0.0.0
Enable Bootp	Unchecked (disabled)

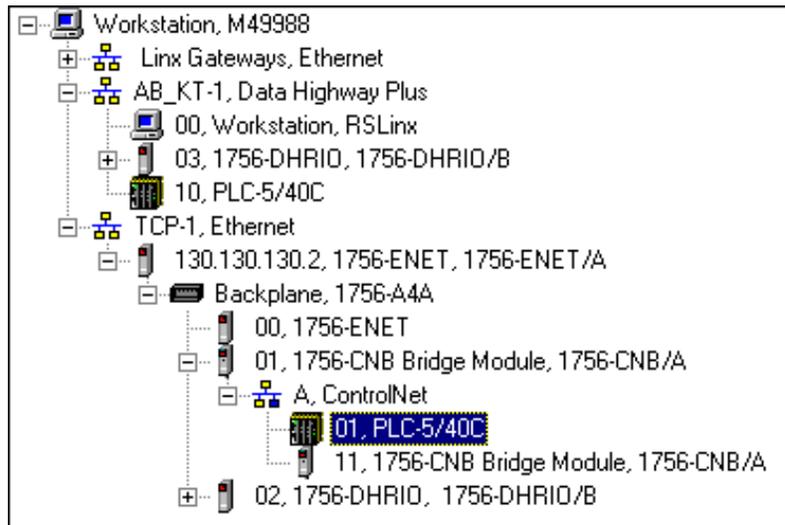
- f. Click on **Apply** to download the configuration to the module.

Now replace the cables to reflect the system drawing shown on the first page of this chapter.

3 Verify the configuration:

- Open or restore the **RSLinx** software.
- From the **Communications** menu, select **RSWho**.
- Select the **AB_KT_1, Data Highway Plus** driver and drill down to channel B of the 1756-DHRIO module in the left chassis.
- Select the **TCP-1, Ethernet** driver and drill down through the backplane of the right chassis to ControlNet channel A.

Your display should appear similar to that below. You should see the PLC-5/40C processor in the left chassis at DH+ node 10 and the PLC-5/40C processor in the right chassis at ControlNet node 1.



- If the PLC-5/40C processors do not appear, then verify the switch settings in the communication modules and PLC-5/40C processors and check that the cables are properly connected.

If you are still experiencing difficulty, reconfigure the routing table and Ethernet modules as described previously.

Test the Application

1 Start the RSLogix5 software:

- a. From the Windows NT **Start** menu, select **Programs**.
- b. Select **Rockwell Software > RSLogix5 English**

OR

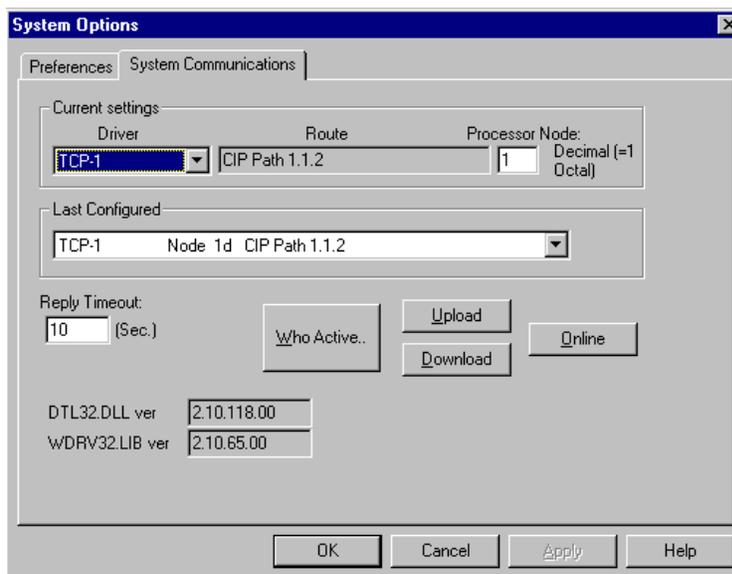
Double-click on:



2 Verify the PLC-5 Processor at ControlNet Node 1 is Active:

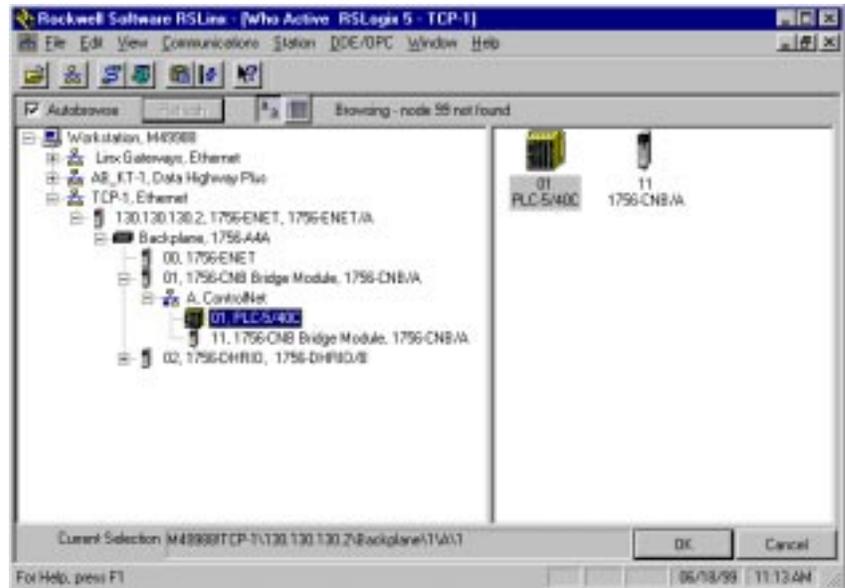
- c. From the **Comms** menu in RSLogix5, select **System Comms**.

The System Options window will appear with the System Communications tab open.

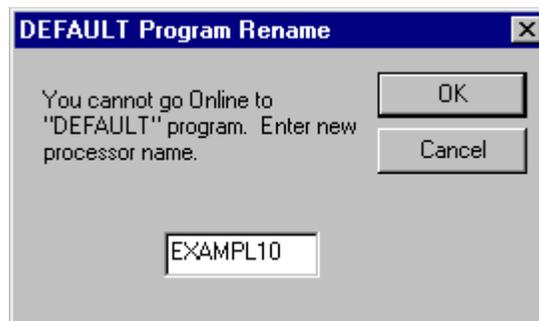


- d. Select **TCP-1** as the Driver and click on **Who Active**.

The RSWho window will appear.



- e. Drill down the tree and double-click on the PLC-5/40C processor at ControlNet node 1.
- f. When the System Communications tab reappears, click on the **Online** button.
- g. If no program is loaded in the PLC-5/40C processor, a pop-up window will appear with the message “You cannot go Online to DEFAULT program.” Enter a new processor name of your choice (e.g., “EXAMPL10”) and click on **OK**.



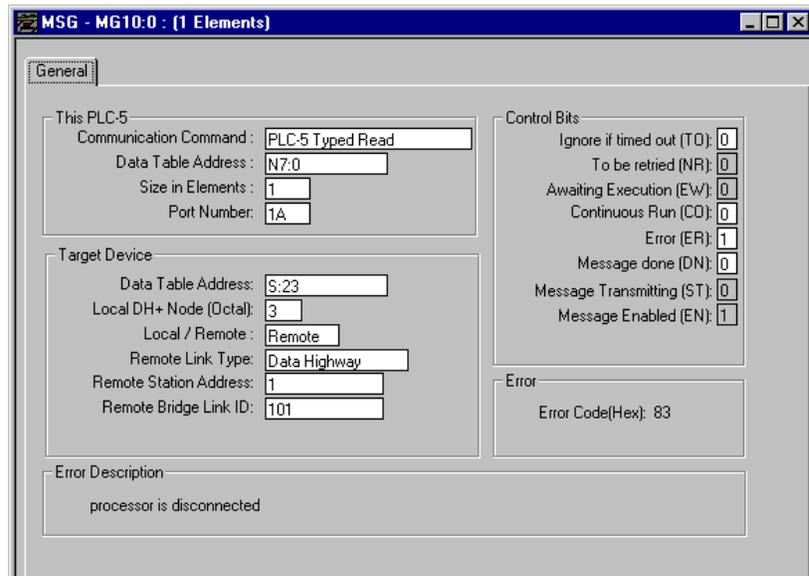
- It is not necessary to save the program.
- Disregard any warnings about Control Net devices.

3 Load the example program:

- a. Start another session of RSLogix5.
- b. From the **File** menu, open the program “example.” See page 4-2.
- c. In the MSG instruction, double-click on **Setup Screen**.

The MSG window will appear with the General tab open.

This message reads the value of the seconds clock (S:23) in the PLC-5/40C processor at ControlNet node 1 into data file N7:0 of the PLC-5/40C processor at DH+ node 10.



- d. Enter the following configuration.

This PLC-5:	
Communication Command	PLC-5 Typed Read
Data Table Address	N7:0
Size in Elements	1
Port Number	1A
Target Device:	
Data Table Address	S:23
Local DH+ Node	3
Local/Remote	Remote
Remote Link Type	Data Highway
Remote Station Address	1
Remote Bridge Link ID	101

This is the node number of the DH+ channel on the local link (link 10).

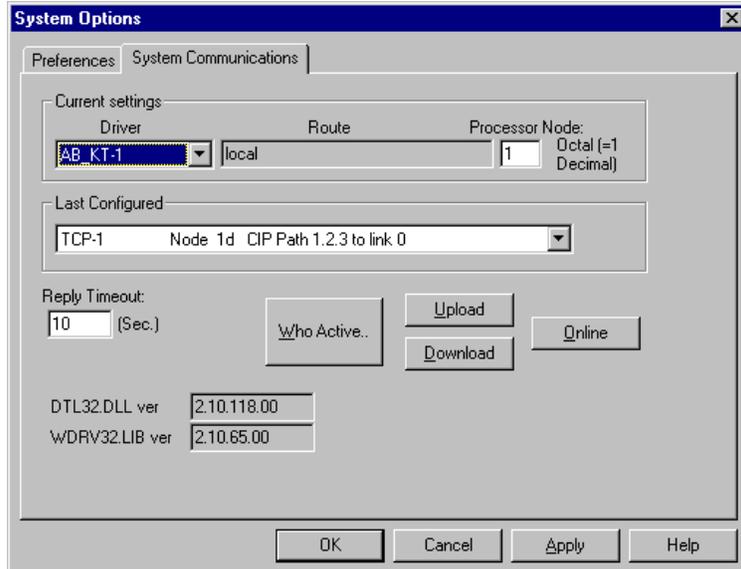
This is the ControlNet node number of the target PLC-5/C processor.

- e. Close the Setup Screen.

4 Download the program:

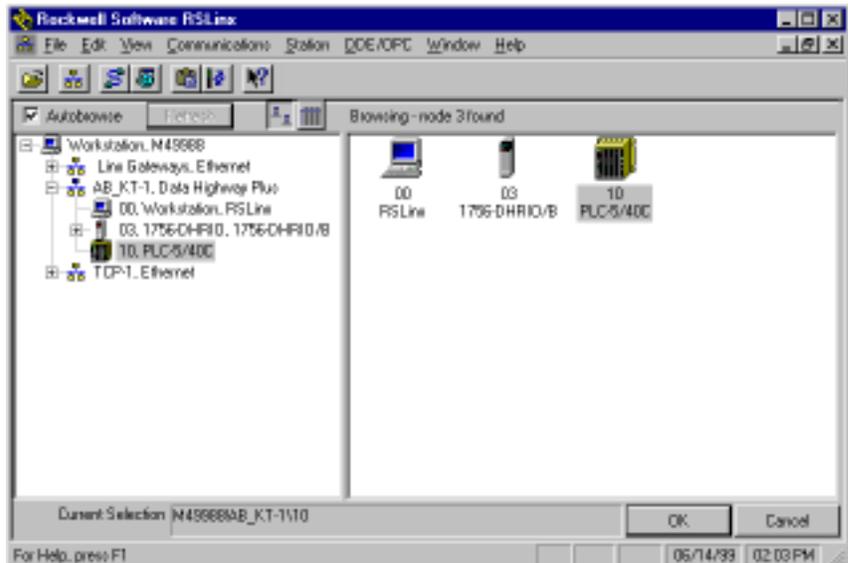
- a. From the **Comms** menu in RSLogix5 select **System Comms**.

The System Options window will appear with the System Communications tab open.



- b. Select the **AB_KT-1** Driver and click on **Who Active**.

The RSWho window will appear:

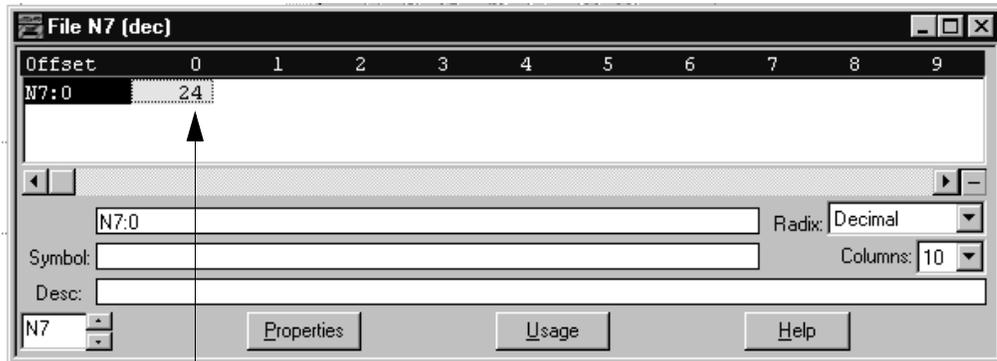


- c. Drill down the tree and double-click on the PLC-5/40C processor at node 10.
- d. When the System Communications tab reappears, click on the **Download** button.

Disregard any warnings about Control Net devices.

- e. Save the program if prompted.
- f. Go **Online** and change the processor mode to **Run**.
- g. Double-click on **N7** in the data file list.

You should see the following screen:

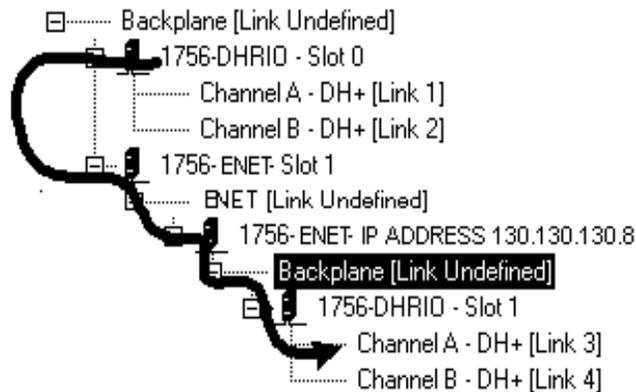


Verify that this value is being updated.

When you see N7:0 being updated at one second intervals the message from the PLC-5/40C processor at ControlNet node 1 is being read successfully by the PLC-5/40C processor at DH+ node 10.

Troubleshoot the System

- 1** *Verify the module hardware (page 11-1).*
- 2** *Verify the communication links (page 11-2).*
- 3** *Verify the routing tables (page 11-2).*
- 4** *If all else fails... (page 11-2).*



Verify the Module Hardware

Check each module's hardware to ensure it is what you expect. Specifically, verify the following:

- Are they all powered?
- Are the switch settings correct? Was the module correctly oriented when you set the switches so you didn't mix up any left to right ordering?
- Are the "OK" LEDs all green (blinking or solid)? Do the displays indicate any errors?
- Are they in the correct slot location? (ControlLogix slots are numbered from the left starting with zero.)
- Is the wiring correct? Are the channel indicators correct?

Verify the Communication Links

1. Perform an RSWho to determine which devices are on line.
2. Examine the diagnostic counters. If you notice CRC errors, they might indicate noise or intermittent connection problems.
3. Verify that each link is properly terminated.

Verify the Routing Tables

Compare your routing table with those shown in the example applications. Do they look similar? If they do not, try the following:

1. Verify the paths in the routing tables, in both forward and reverse directions.

Do the paths go far enough to reach the destination?

Are the paths complete?

Do the paths include the link ID for the local port?

Are all of the node numbers and slot assignments correct?

2. Verify the link IDs in the source MSG instruction, in each of the 1756-DHRIO modules, and in the destination's channel configuration.

If All Else Fails. . .

1. Verify the channel configuration.
2. Check the MSG instruction. Ensure that the parameters are correct. Examine the status bits to verify that the instruction is actually trying to send a message.
3. Examine the error codes in the device sending the message. Keep the following in mind:
 - “local link timeout” indicates that the PLC processor cannot find the first bridge
 - “application timeout” often indicates a problem in the return route
 - “D0” indicates that the first bridge is not correctly configured or that it has other problems in trying to reach its destination
4. Examine the diagnostic counters. Specifically, look at the “requests sent” and “replies received” counters in the device sending the message. Compare these with the values in the “requests received” and “replies sent” counters in the destination device.

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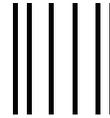
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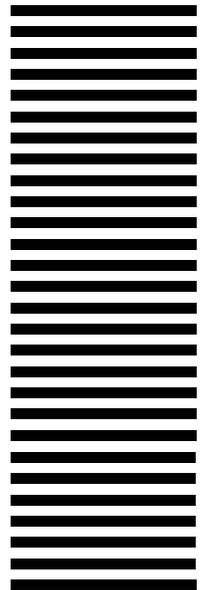
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