B

Peer Master Example

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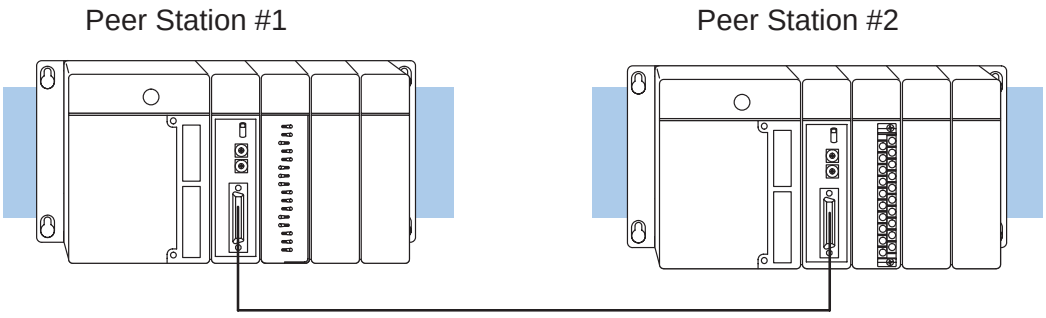
The Example

This chapter provides an example of a peer-to-peer network and is designed for the experienced user. This chapter does not provide detailed descriptions of network concepts and communications parameters. If you're unfamiliar with networking concepts, or if you want to know more detailed information about ***Direct***NET, you may want to read Chapters 2 – 5 before setting up the example network.

A DCM peer network utilizes two DCMs, with both configured as peer stations. You can only have two stations in this configuration. Either unit can initiate a communications request. (The DCMs automatically compensate for the possibility of data collisions.)

Example Equipment

This chapter provides an example that allows you to quickly and easily set up a peer network.



Peer Station #1

The following equipment is needed peer station #1.

- DL405 Base (4, 6, or 8 slot)
- DL430 or DL440 CPU
- D4–DCM Data Communications Module
- I/O modules, including at least one I/O simulator

Peer Station #2

The following equipment is needed in peer station #2.

- DL405 Base (4, 6, or 8 slot)
- DL430 or DL440 CPU
- D4–DCM Data Communications Module
- I/O modules, including at least one output module

Install the Equipment

Normally, you can install the modules in any manner. However, we'd like to keep our examples consistent between the different configurations. Install the equipment in the following order.

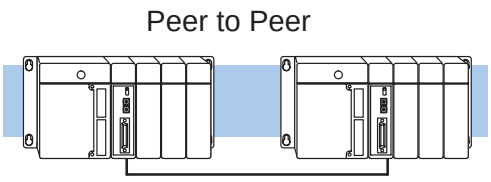
WARNING: To minimize the risk of electrical shock, personal injury, or equipment damage, always disconnect the system power before installing or removing any system component.

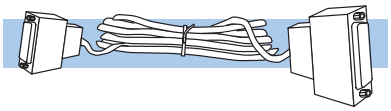
1. Install the CPU as described in the DL405 User Manual. You can connect the power wiring now (if it's not already connected), but don't connect the source power yet.
2. For both stations, reserve slot 0 for the DCM. (Slot 0 is the slot next to the CPU.) Set the DCMs aside for now. (You need to set the dipswitches and station addresses first.)
3. Install the I/O Simulator in slot 1 of peer station #1.
4. Install the output module in slot 1 of peer station #2.

Remember these Four Steps!

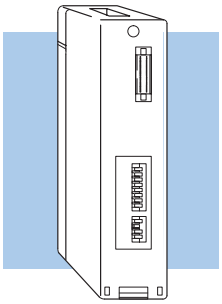
Use these steps to build your example network. The remainder of this chapter provides detailed explanations and examples of these steps.

1. Design the network by:
   - Selecting the configuration (this is a Peer as Master configuration)
   - Building the communication cables.

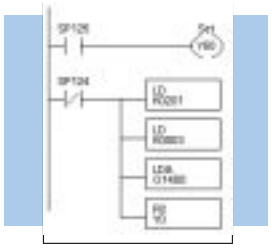




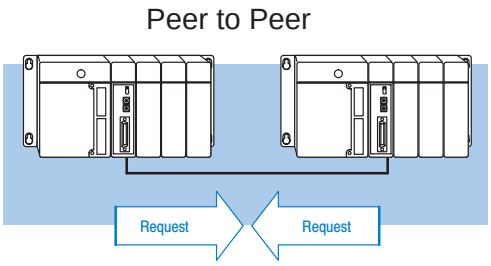
2. Select the communication settings by:
   - Setting the Peer Master switches



3. Write the communication control program.
   - RLL program is used with PLC master



4. Start the network operation.



Step 1: Design the Network

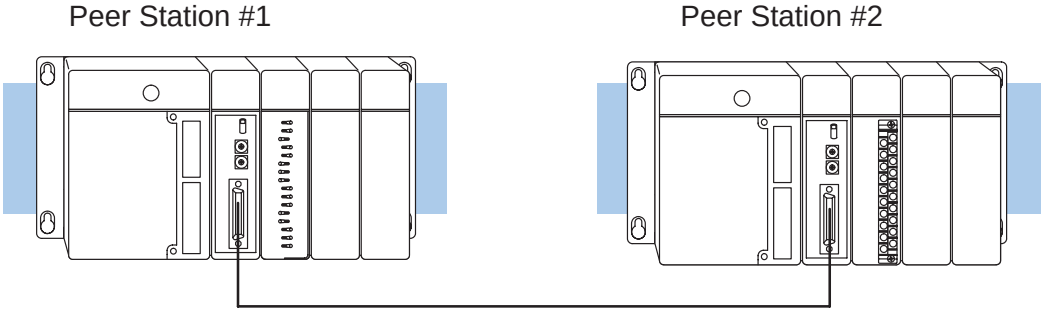
The Example Configuration

In this chapter we'll use the following example configuration to create a simple peer network.

WARNING: These examples are for illustration purposes only and are not intended for use in actual applications. This is because there may be many aspects of your system safety precautions that are not addressed in the examples. If you use these examples in actual applications, you are increasing the risk of personal injury and/or property damage.

Goal:

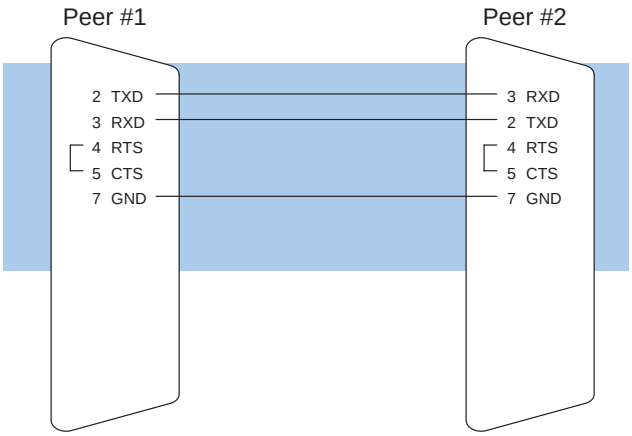
1. Peer #1 – write a bit pattern from an input module (X0 – X7) to station #2.
2. Peer #2 – read 1 V memory location from station #1.



The Example Cable

In our example configuration we have a DCM in each station. Since we only have two stations (point-to-point) we can use RS232C communications.

RS232C DCM to DCM Cable

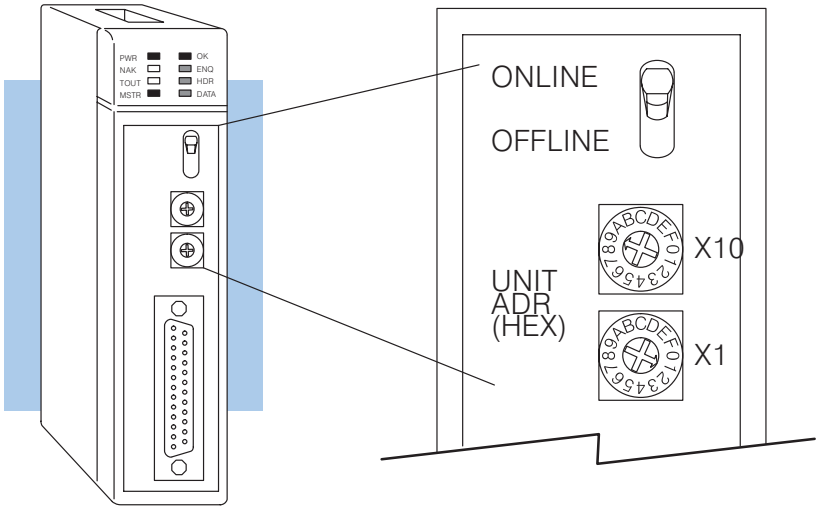


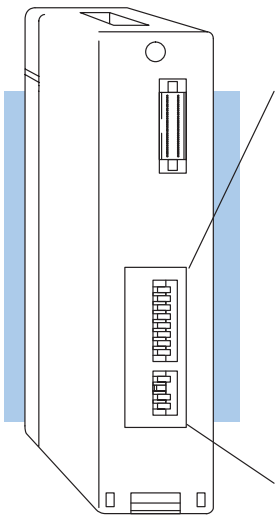
Step 2: Select the Communication Settings

Set the DCM Switches for Peer #1

The next step is to set the communications parameters for the DCM in peer station #1. We will use the following settings in our example.

- On-line / Off-line — On-line position
- Address — 1 (hexadecimal)
- Baud Rate — 38.4K
- Parity — None
- Response Delay Time — 0
- Network Protocol — ***Direct***NET Peer
- Mode — HEX



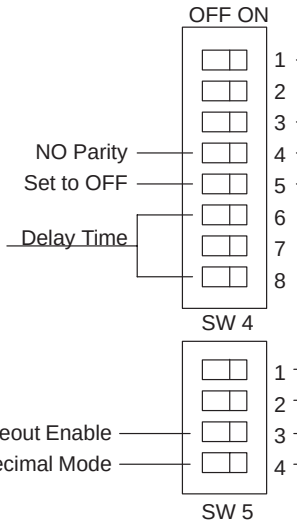


DCM Rear View

Switch Positions

Time*	6	7	8
0	OFF	OFF	OFF
2	ON	OFF	OFF
5	OFF	ON	OFF
10	ON	ON	OFF
20	OFF	OFF	ON
50	ON	OFF	ON
100	OFF	ON	ON
500	ON	ON	ON

*Delay time in milliseconds



Switch Positions

Baud	1	2	3
300	ON	OFF	OFF
600	OFF	ON	OFF
1200	ON	ON	OFF
2400	OFF	OFF	ON
4800	ON	OFF	ON
9600	OFF	ON	ON
19200	ON	ON	ON
38400	OFF	OFF	OFF

Switch Positions

Protocol	1	2
DirectNET Slave	OFF	OFF
DirectNET Master	OFF	ON
DirectNET Peer	ON	OFF
Modbus® RTU Slave	ON	ON

Set the DCM Switches for Peer #2

The next step is to set the communications parameters for the DCM in peer station #2. Notice the settings are exactly the same, with the exception of the address.

- On-line / Off-line — On-line position
- Address — 2 (hexadecimal)
- Baud Rate — 38.4K
- Parity — None
- Response Delay Time — 0
- Network Protocol — ***Direct***NET Peer
- Mode — HEX

Install the DCMs and Connect the Cables

Install the DCMs in the slots next to the CPU for both peer stations and connect the communication cable.

Step 3: Create the Communications Programs

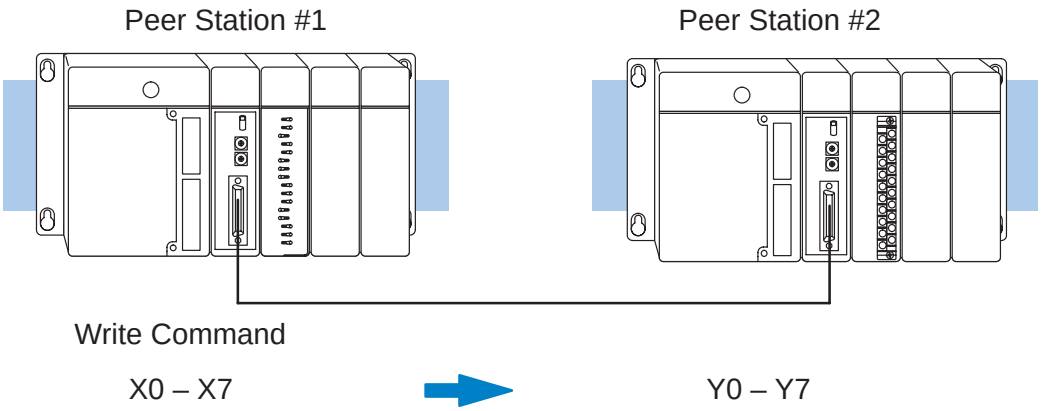
Two Programs are Required

With peer networks, you need a communications program in both stations. Each program contains the necessary instructions to initiate the data requests.

Peer Station #1 Program Description

For peer station #1, we'll use 8 switches on the input simulator to set a bit pattern that will be written to an output module on peer station #2.

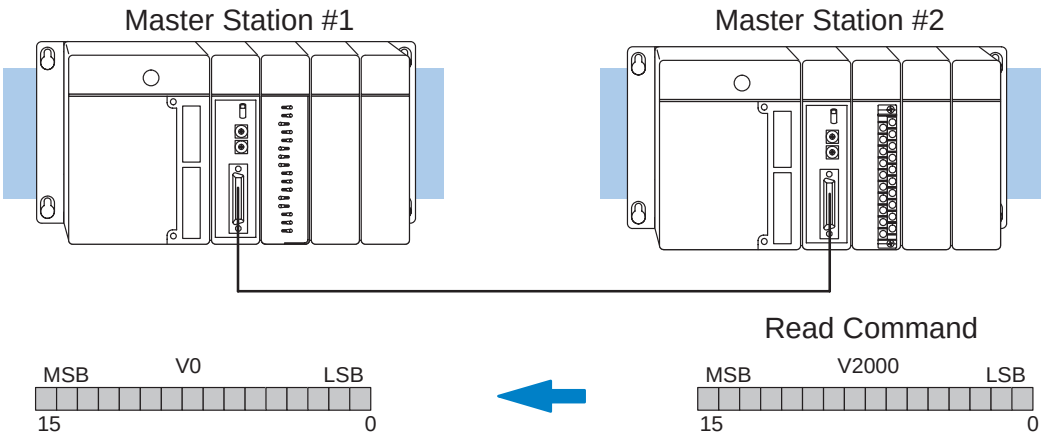
Goal: Write a bit pattern from an input module (X0 – X7) to peer station #2.



Peer Station #2 Program Description

For peer station #2, we want to read a V memory location from peer station #1.

Goal: Read 1 V memory location from peer station #1.



Connect the Programing Device

The example provides the instructions needed for the ***Direct***SOFT programming package and for the DL405 Handheld Programmer. In either case, you should connect the programming device to the top port on the DL405 CPU. We assume you understand how to use the ***Direct***SOFT Programming Package and/or the Handheld Programmer. If you aren't familiar with these, you should probably review those product manuals prior to trying to enter these programs.

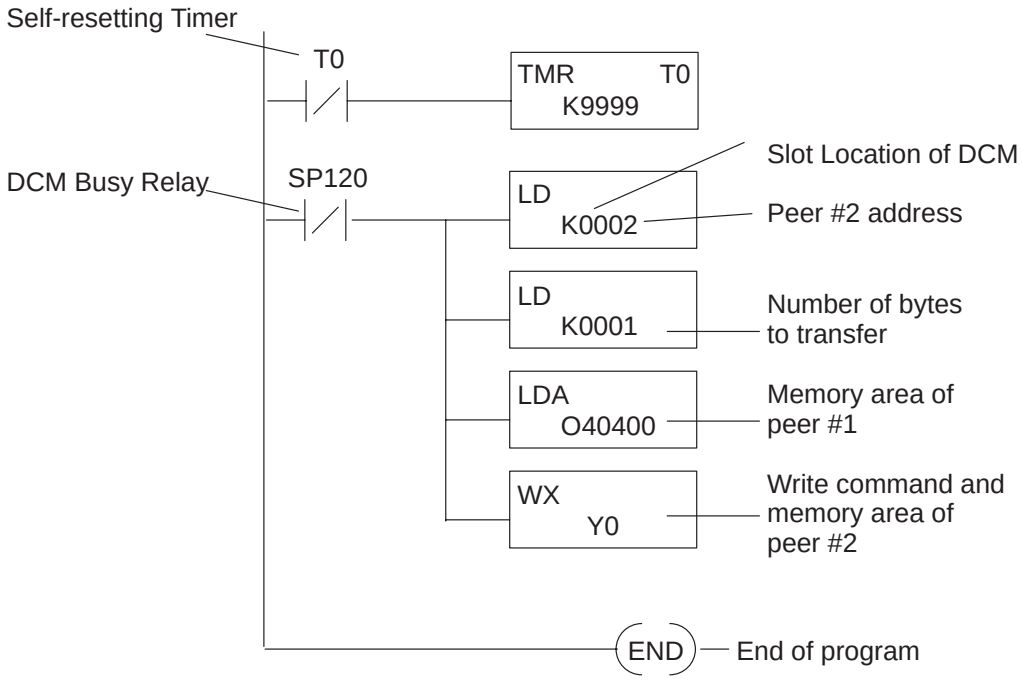
The program examples on the following pages show both RLL and RLL*PLUS* examples. The RLL*PLUS* approach eliminates the need for the interlocking relays and is generally a much more straightforward programming method.

Peer Station #1 RLL Instructions

The following diagram shows the RLL instructions used in the communications program for peer station #1. Chapter 5 provides detailed descriptions of the instructions. Since we also plan to use peer station #2 to read a V memory location from peer station #1, we're using a self-resetting timer to provide a data value. This will make it easier to verify our example is working correctly.

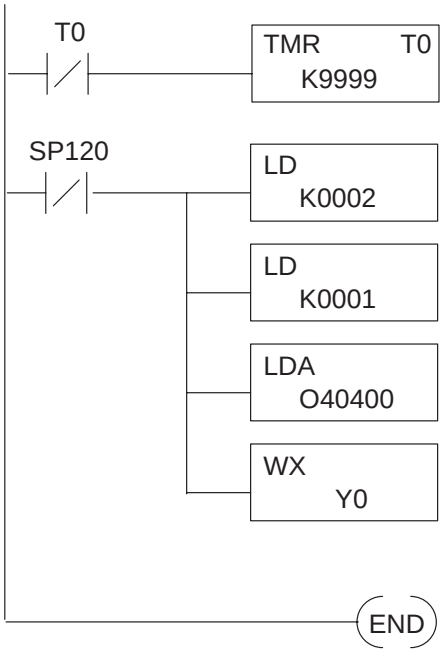
NOTE: This example does not have multiple communications requests in each station. If you need multiple requests in your application, you should use the interlocking relays to ensure the DCM has adequate time to finish a communication task. See Chapter 4 for more detailed information.

Goal: Write a bit pattern from an input module (X0 – X7) to peer station #2.



Peer Station #1 RLL Example

***Direct*SOFT**



DL405 HP Mnemonics

```
$0
STRN T0
$1
TMR 0
$2
K9999
$3
STRN SP120
$4
LD K0002
$5
LD K0001
$6
LDA O40400
$7
WX Y0
$8
END
```

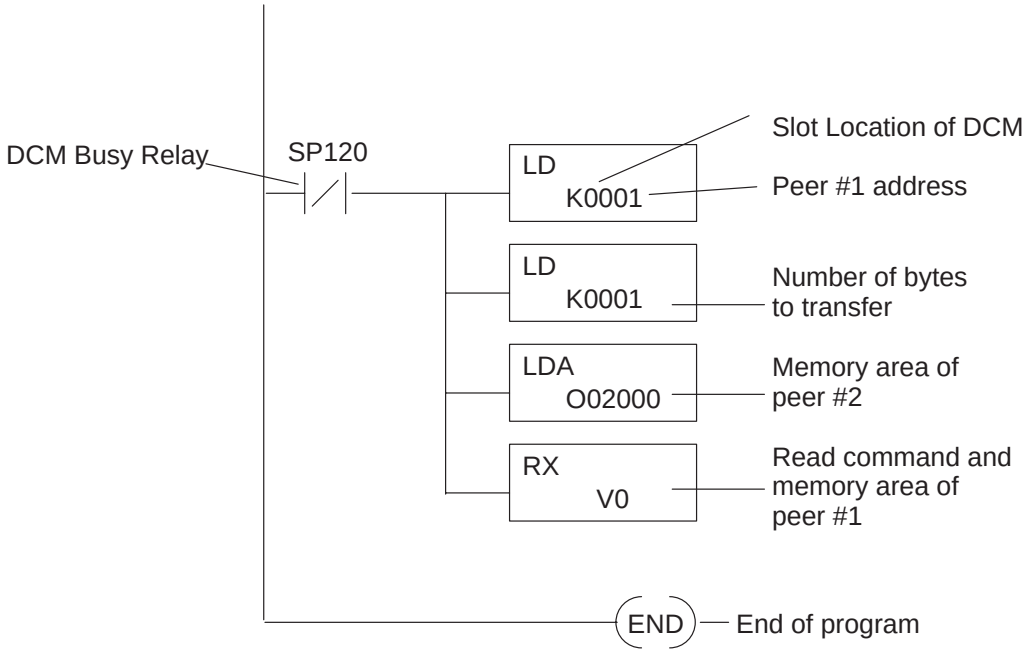
NOTE: To create this program in RLL*PLUS*, just add an initial stage (ISG 0) to the beginning of the program.

Peer Station #2 RLL Instructions

The following diagram shows the RLL instructions used in the communications program for peer station #2. Chapter 5 provides detailed descriptions of the instructions.

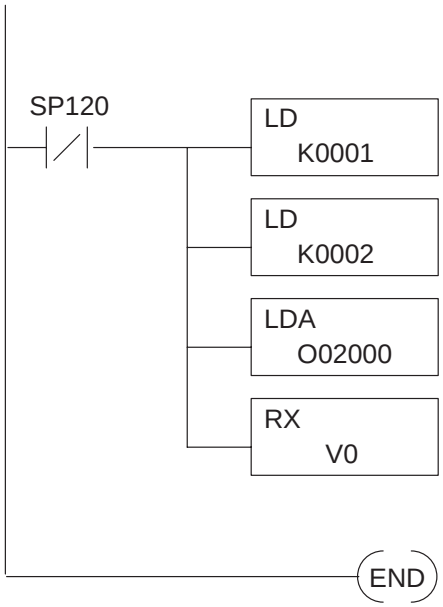
NOTE: This example does not have multiple communications requests in each station. If you need multiple requests in your application, you should use the interlocking relays to ensure the DCM has adequate time to finish a communication task. See Chapter 4 for more detailed information.

Goal: Read 1 V memory location from peer station #1.



Peer Station #2 RLL Example

***Direct*SOFT**



DL405 HP Mnemonics

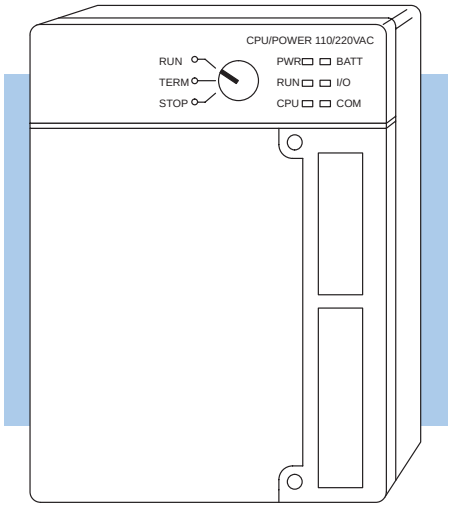
```
$0
STRN SP120
$1
LD K0001
$2
LD K0002
$3
LDA O2000
$4
RX V0
$5
END
```

NOTE: To create this program in RLL*PLUS*, just add an initial stage (ISG 0) to the beginning of the program.

Step 4: Start the Network

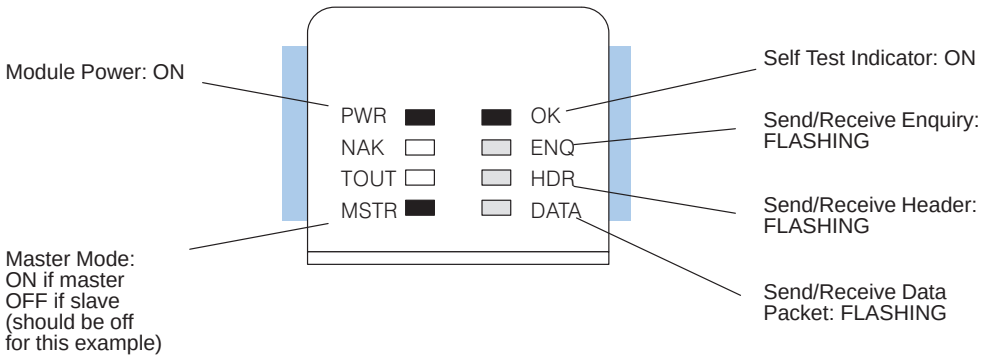
Switch the PLCs to Run Mode

For this example to work correctly both CPUs should be in Run mode. You can use the programming devices to place them in Run mode,or you can just turn the keyswitch to the RUN position.



Verify the Network

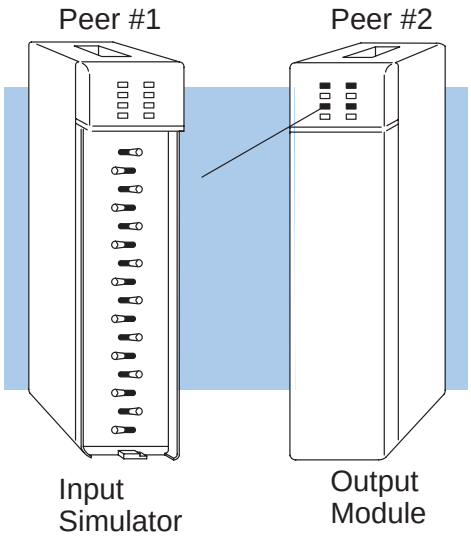
Check the DCM indicators to verify the network is operating correctly. shows the proper indicator conditions. The ENQ, HDR, and DATA indicators should be flashing.



Verify the Write Command

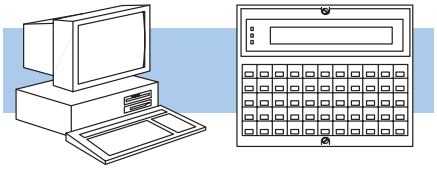
Now you can change the I/O simulator switch settings and verify the communications.

1. Set every other switch to the ON position
2. Look at the first slave station output module. The indicators should match the I/O simulator switch settings.
3. Change the I/O simulator switch settings at random and notice how the output module indicators change.



Verify the Read Command

You'll need to use the programming device to verify the read requests. Connect the programming device to peer station #2 and complete the following steps.



DirectSOFT

DL405 Handheld Programmer

	V 2001	V2000
V MON	0000	XXXX

Monitor a V Location

CLR CLR V 2 0 0 0 WD ST ENT

ENT

What should I do if it isn't working correctly?

Troubleshooting Steps

If the network does not seem to be working correctly, check the following items.

1. Cable and connections. Incorrectly wired cables and loose connectors cause the majority of problems. Verify you've selected the proper cable configuration and check that the cable is wired correctly.
2. Dipswitch settings. Make sure the switches are set the same for both stations.
3. Communications program. Verify the program has been entered as shown in the example.
4. If the network still doesn't work correctly go to Chapter 7, Network Operation and Troubleshooting, and use the troubleshooting charts.