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ALLEN-BRADLEY
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User's Manual

Bulletin 2760

Flexible Interface Module

(Catalog No. 2760-RB)

ALLEN-BRADLEY
A ROCKWELL INTERNATIONAL COMPANY

Industrial Control Group
Milwaukee, Wisconsin 53204

Catalog No. 2760-ND001 Series A
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Chapter 1 Using This Manual

Manual Objectives

The purpose of this manual is to aid you in the operation of the Catalog No. 2760-RB Flexible Interface Module.

What This Package Contains

This manual is organized by two sets of tabs. The larger, white tab separates the Flexible Interface Module User's Manual from the other related User's Manuals. The blue tabs separate the manual into three sections:

- Quick Start
- Configuration Software
- Module Command Set

The *Quick Start* section is just that. It is designed to quickly get your module connected to your controller, powered up, and tested for communication with itself and the I/O rack.

The *Configuration Software* section deals with the setup, configuration and operation of your module via the built-in configuration software.

The *Module Command Set* section consists of the user commands that can be implemented directly from an Allen-Bradley PLC processor or a host computer. These commands perform the same functions as the configuration software.

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Organization of This Manual

The following table lists the title and contents of each chapter. It also shows the placement of the blue tabs.

	Chapter	Title	Contents
	1	Using this Manual	Defines the structure of this manual. It also lists warnings, cautions, and conventions used.
	2	Overview	Contains a basic overview of the entire module, its capabilities, and a typical configuration.
	3	Hardware Set Up	Illustrates pinouts, cabling, and dip switch settings.
Tab 1 Quick Start	4	Quick Start	Shows how to test and verify communications with the 1771-I/O back-plane and the module.
Tab 2 Configuration Software	5	Using Your Programming Terminal	Shows you how to connect, setup, and enter configuration mode using various programming terminals.
	6	Using the Configuration Software	Gives an overview of the main menu, configuration keys, software conventions, and guidelines for selecting menu options.
	7	1X - Configuration Parameters	Explains how to change the configuration parameters for each module port.
	8	2X - Identification Numbers	Explains how to select protocol identification numbers for each port.
	9	3 - Device Port Protocol Names	Explains how to select a protocol to be used on ports 1 to 3.
	10	4DM - Match Code Entries	Explains how to set up match code operations.

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Organization of This Manual (continued)

Tab 3 Module Command Set

Chapter	Title	Contents
11	5I - Discrete Byte Input Entries	Explains how to set up a total of 6 discrete bytes.
12	6 - Data Matrix Entries	Explains how to matrix (or send copies of data) to other ports.
13	7 - Pass Through and 8 - Scratch Pad Area	Defines the pass through and scratch pad functions.
14	9XF - Module Functions	Explains the use of the reset, set defaults, flush, initialize, and clear diagnostics commands.
15	Hardware Diagnostics	Defines the hardware diagnostics that display for each port.
16	Software Diagnostics	Defines the software diagnostics that display for each port.
17	System Considerations	Use this chapter to better understand the operation and relationship of the module to your PLC processor.
18	PLC Controller User Commands	Defines commands you can implement at the PLC level to configure the module. These commands are identical to the functions of the configuration software.
19	Stand-alone Operation	Shows how to configure Series B modules with a host computer (not a PLC). The host sends commands via the configuration port to configure the module and monitor operations.
A	Specifications	Contains module specifications.
B	Troubleshooting	Shows how to troubleshoot the module using the 5 LEDs

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Defining Some Terms

You will see a number of terms that have special meanings.

DF1 A data link protocol that DF1 devices use to transmit data over RS-232/RS-422 serial communication lines. DF1 protocol on the 2760-SFC1 cartridge supports full duplex, peer-to-peer communications. The cartridge defines communication parameters (baud rate, parity, data bits) and transmission parameters (acknowledgements, no acknowledgements, inquiries, and block check characters) for different DF1 devices.

For details on DF1 communication protocol, refer to publication ANSI X3.28-1976.

DT (Dumb Terminal)

A data link protocol that ASCII dumb terminal devices use to transmit data over RS-232/RS-422 serial communication lines. Dumb terminal protocol as supplied on the 2760-SFC1 cartridge supports communication parameters (baud rate, parity, data bits) and message definition parameters.

IDP (Identification Protocol)

An extended application layer protocol used by Allen-Bradley intelligent sensing devices to communicate with other devices and host processors. IDP commands and responses are inserted as data within the PCCC layer.

Module

Catalog No. 2760-RB Flexible Interface Module.

PCCC (Programmable Controller Communication Commands)

A protocol or set of commands and responses that Allen-Bradley Programmable Controllers use to communicate with interface devices and intelligent sensing devices. PCCC or network commands and responses are inserted as data within the DF1 layer.

Protocol Cartridge

Refers to the cartridge that contains the software of the given protocol.

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Conventions Used

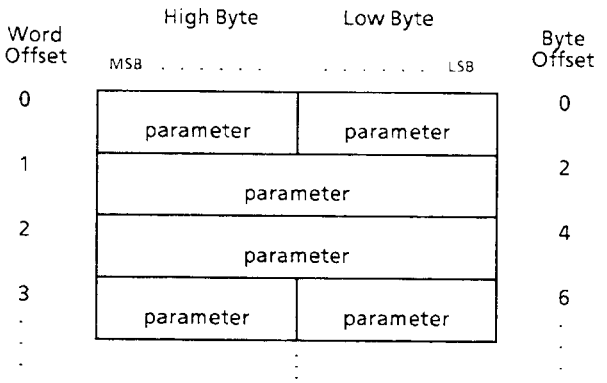
The following conventions are used throughout this manual:

- Characters in brackets [↵] indicate keys you press on a terminal keyboard, for example: [RETURN] and [BREAK].
- Different type styles are used in examples. THIS TYPE identifies terminal messages and prompts. **THIS TYPE** identifies data or keys you enter on the keyboard. In this example:

  ENTER A MAIN MENU SELECTION: **3 [RETURN]**

  The terminal displays ENTER A MAIN MENU SELECTION: and you enter **3** and **[RETURN]** on the keyboard.

- All PLC 16-bit word data structures are shown as follows:



Each word has two 8-bit bytes; a high byte and a low byte. Each bit in a word is numbered octally or decimally, with the most significant bit (MSB) at the left and the least significant bit (LSB) at the right. The PLC processor determines how the bits are numbered.

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Conventions Used (continued)

- Shading is used to mask off unnecessary information, as shown in the three examples below:

Example 1

Disregard this menu option
Nothing Has changed
This is of no interest to you
Look in the white areas

Something has changed
Look Here!
This is what I'm talking about!

Disregard this menu option
Nothing Has changed
This is of no interest to you
Look in the white areas

Take notice
This is what I mean!

This is of no interest to you
Nothing Has changed

Example 2

17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00

Not available for this function

Example 3

Match Code Bits				Handshake			
17	16	15	14	13	12	11	10
15	14	13	12	11	10	09	08

Disregard shaded areas

This is important

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Conventions Used (continued)

You will see the following caution symbol in this manual.



CAUTION: Notes when equipment may be damaged or data lost if stated procedures are not followed.



WARNING: Notes when you may be injured, either directly or indirectly, if stated procedures are not followed.

What You Need to Know

This manual assumes that you understand the operation of each serial device you connect to the module. You should understand the communication protocols used by each device and how each device communicates with a host device. You should be familiar with programmable controllers and have previous PLC programming experience.

Related Publications

Other manuals you will want to refer to when working with the Flexible Interface Module, include:

- DF1-ASCII Protocol Cartridge User's Manual
- DH-485 Protocol Cartridge User's Manual

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Chapter 2 Overview

Chapter Objectives

This chapter gives an overview of the module and its features.

Functional Overview

The Flexible Interface Module is a 2 slot module designed for use in a local or remote 1771 I/O Series B chassis. The module allows communications between Allen-Bradley devices that use different communication protocols such as RF antennas, bar code systems, machine vision products, message displays, programmable limit switches, serial printers and other Flexible Interface Modules.

Communications and data transfer are supported by the 1771 I/O system using discrete I/O and/or block transfer. The following rack configurations are supported:

- Single or multiple modules in a local rack.
  The number of modules is limited by local rack size and power. The module draws approximately 1.25 Amps.
- Single or multiple modules in remote racks.
  The number of modules is limited only by remote rack constraints. You can distribute modules among more than one rack.

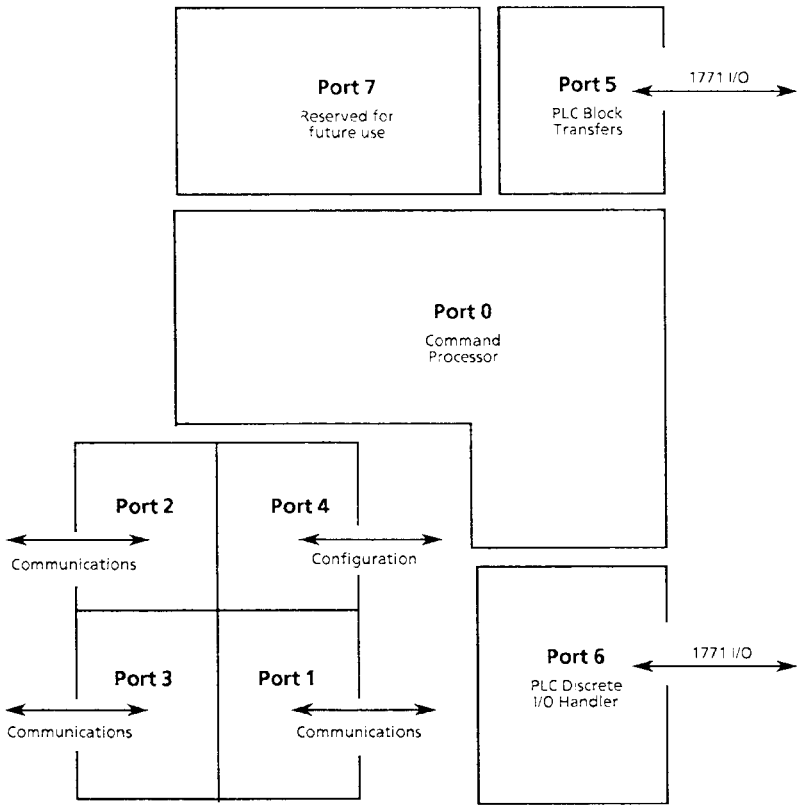
The module provides three, bidirectional, communication ports. These ports communicate with Allen-Bradley devices through the use of a *Protocol Cartridge*. A fourth port is used for configuration via a terminal and can also be used for bidirectional, serial communication using a fixed protocol. You can configure the module with a dumb terminal or 1771 I/O block transfer.

Figure 2.1 shows a block example of the module.

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Functional Overview (continued)

Figure 2.1
Flexible Interface Module Block Diagram



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Functional Overview (continued)

Port 0 - A logical port that handles the module's multiplexing functions such as resets, read/writes, and nonvolatile configurations. Port 0 is also referred to as the command processor.

Ports 1 to 3 - Physical device ports that are configured with protocol cartridge software.

Port 4 - The physical port used to configure the module (via a configuration terminal). This port has limited capability for handling device communications.

Ports 5 and 6 - Physical ports that communicate with the 1771 I/O system. Port 6 is not directly accessible, but provides match code and discrete byte input handling.

Port 7 - A logical port reserved for future use.

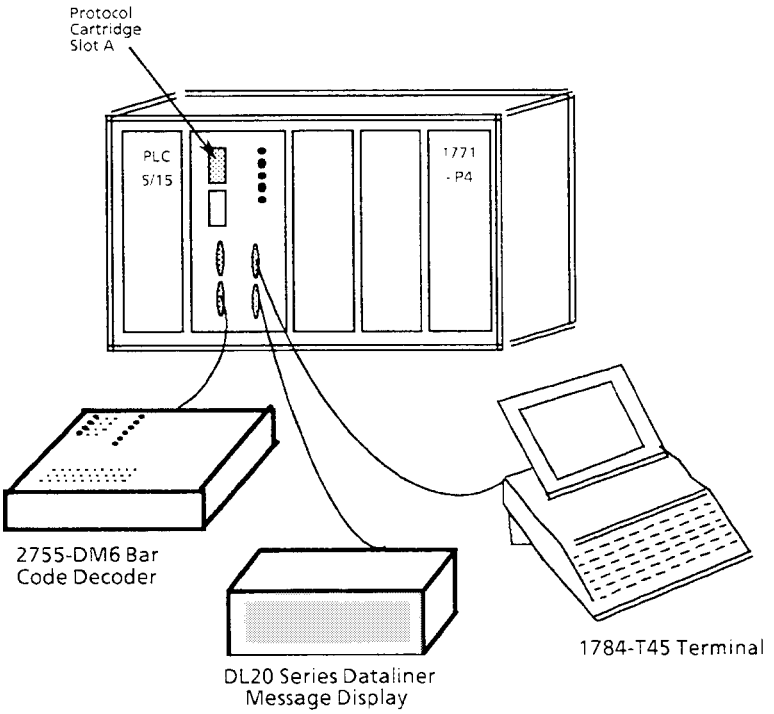
Typical Setup

Figure 2.2 illustrates a typical single rack system. The processor, power supply, and module reside in one rack.

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Typical Setup (continued)

Figure 2.2
Configuration Example



The system consists of:

- PLC-5 processor (PLC-5/12, PLC-5/15, or PLC-5/25).
- The Catalog No. 1771-P4 power supply
- A DL20 Series Dataliner Message Display, Catalog No. 2706-B21J31, is connected to Port 1.
- A Catalog No. 2755-DM6 Bar Code Decoder is connected to Port 3.
- The Catalog No. 2760-RB Flexible Interface Module
- The Catalog No. 2760-SFC1 Protocol Cartridge
- The Catalog No. 1784-T45 Programming Terminal

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Serial Device Support

The module supports the following electrical interfaces:

- RS-232-C
- RS-422-A
- RS-485

The pinouts *are not* EIA standard RS-232-C. In addition, you must *not* use any of the other wires, or pins, in the RS-232 cable. For more information, refer to *Chapter 3, Hardware Set Up.*

Configuration Parameters

The module configuration parameters are kept in nonvolatile storage. You can configure module parameters (excluding the configuration port and PLC options) through the:

- Configuration port using an Industrial Terminal or standard ASCII terminal.
- Host PLC processor via Block Transfer.

You can display, but not change, the dip switch settings through the configuration port.

The Industrial Terminal, used for configuration, may be either a Catalog No. 1770-T3, T4, 1784-T45, or -T50 (with optional Terminal Emulation Software).

Dip Switches

The module has four groups of dip switches: SW1, SW2, SW3, SW4.

Dip switch groups SW1 and SW2 set parameters for some of the configuration port and PLC options. You can display these settings with configuration commands, but the only way to change the settings is with the dip switches.

Dip switch groups SW3 and SW4 are termination switches and affect communications of ports 1,2, 3, and 4 (configuration port).

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Dip Switches (continued)

The charts below show the configuration port options you can set with dip switch groups SW1 and SW2. The tables show that the options vary somewhat for series A and series B modules. The default setting for each option appears in bold.

Series A Module

Configuration Port Options	Settings
Baud Rate	300 600 1200 2400 4800 **9600** 19.2K
Data Bits	**8** 7
Stop Bits	**1** 2
Parity	**None** Odd Even Mark Space
Modem Control	Enable **Disable**
Electrical Signal	*

Series B Module

Configuration Port Options	Settings
Baud Rate	300 600 1200 2400 4800 **9600** 19.2K
Data Bits	**8** 7
Stop Bits	**1** 2
Parity	**None** Odd Even Mark Space None (No Break) Even (No Break) Odd (No Break)
Modem Control	Enable **Disable**
Tool Kit Mode	Enable **Disable**
Port 5, Backplane	**Enable** Disable

* RS-422 and RS-232 electrical signals are simultaneously supported on the configuration port. The pins you connect to determine the electrical signal.

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Dip Switches (continued)

The chart below shows the PLC backplane options for both series A and series B modules. The default settings appear in bold.

PLC Backplane Options	Settings
Block Transfer Address	**B3**
Slot 0 Block Transfer	**Enable**
Slot 1 Block Transfer	**Disable**
PLC or I/O Adapter Slot Density	**Single Density** (2 slot addressing, 8 bits/slot) Dual Density (1 slot addressing, 16 bits/slot)

Chapter 3, Hardware Set Up, illustrates the dip switch settings.

Match Code Function

The module has a built-in *Match Code* feature which compares and matches data on any of the communication ports (ports 1, 2, or 3).

You can configure each port to search for 20 separate match codes, each up to 24 bytes in length. 1771 discrete I/O allows the monitoring of the compare status on each port.

The match code function provides entries which specify:

- *Data Address:* Locates the relative position of a byte in the data stream or packet.
- *Compare Data*: Defines up to 24 bytes of data for the compare and match operations.

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Match Code Function (continued)

- *Match Operation*: Defines a match or compare condition. The supported match operations are:
  - Equal to
  - Not equal to
  - Less than
  - Greater than
  - String found
  - String not found
- *Discrete I/O Bit Address*: Assigns the match or compare condition result (true/false = on/off) to a discrete I/O bit.

Discrete Input

The module allows the assignment of *Discrete Input* bits (on a per byte basis) for discrete input functions. A port can read up to 2 bytes from a specified address in the data stream or message (depending on the 1771 single I/O transfer width and other 1771 I/O assignments). The total number of discrete bytes per module is 6 or 2 per port.

Data Matrix

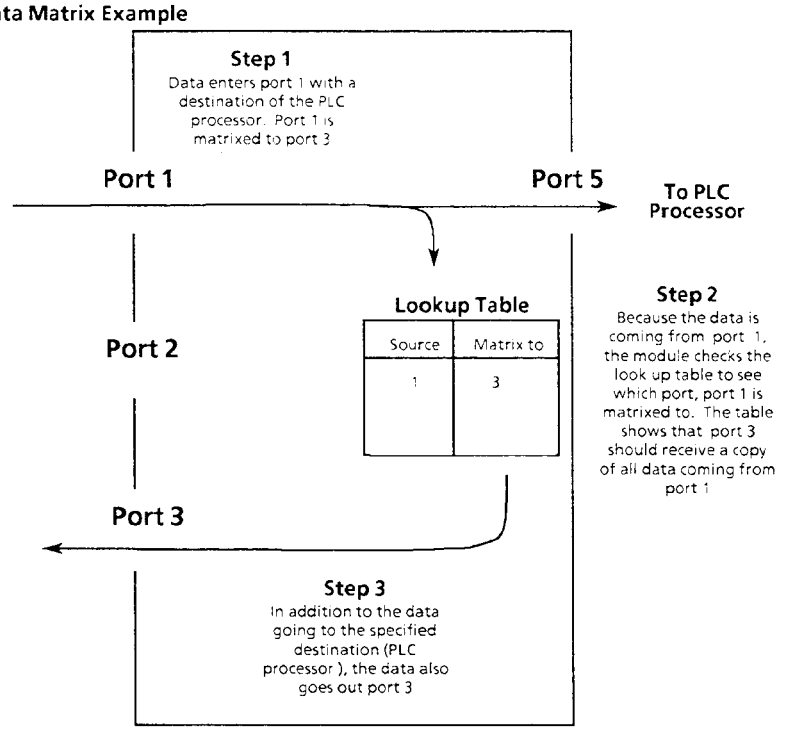
All data received by a port is sent to a specific destination. The configuration parameters of the port define this destination. Typically, the destination is the PLC (via port 5 of the module). The *Data Matrix* function allows you to send a copy of the same data to an additional destination such as a printer or message display.

The data matrix is basically a set of lookup tables. When you matrix one port to another, for instance matrix port 1 to port 3, the source (port 1) of the data is listed in the lookup table. The matrixed destination (port 3) is found and sent a copy of the data, as shown in Figure 2.3.

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Data Matrix (continued)

Figure 2.3
Data Matrix Example



Pass Through

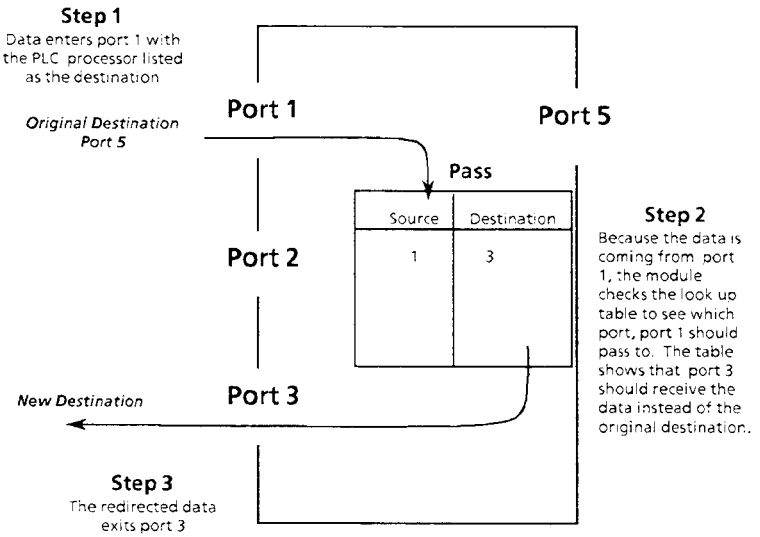
The *Pass Through* function redirects data from the original destination to any port you choose. It does not matter what the destination is listed as in the message header.

This function is useful if you need to configure a device connected to ports 1 through 3. For example, you could connect a configuration terminal to port 1 and pass it to port 3 where a device is connected. All data will pass, untouched, through port 1 and out port 3, as shown in Figure 2.4.

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Pass Through (continued)

Figure 2.4
Pass Through Example



Nonvolatile Scratch Pad

This area can store up to 128 bytes of hexadecimal data. The data is stored in the EEPROM and can be read or written to by the PLC processor.

Troubleshooting Indicators

The module has five LEDs which indicate operating conditions. These LEDs may be one of three colors; green, red, or orange. The three possible LED states are *steady on*, *off* and *flashing*. Refer to the appendix on troubleshooting for more details on the LEDs.

Hardware and software diagnostics are also available for each port.

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Chapter 3 Hardware Set Up

Chapter Objectives

This chapter explains:

- What hardware is compatible with the module.
- How to wire RS-232-C, RS-422-A and RS-485 devices.
- Dip switch settings and functions.

Bulletin 1771 Backplanes

The module uses two slots in the PLC controller's backplane. You must insert the module within one module group.

Only Series B backplanes are supported by the module:

- 1771-A1B
- 1771-A2B
- 1771-A3B
- 1771-A4B

Bulletin 1771 Backplane Adapters

The following backplane adapters function with the module:

- Catalog No. 1771-AS/ASC Remote Adapter for pre-series B, I/O racks
- Catalog No. 1771-ASB Series B Remote I/O Rack Adapter for series B I/O racks
- Catalog No. 1771-AL Local I/O rack Adapter for PLC-2 Family Processors
- Catalog No. 1785-LT PLC-5 Family Processors



CAUTION: Never power on the module in a chassis without a backplane adapter or PLC controller installed, unless the module is configured for stand-alone operation.

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Bulletin 1771 Backplane Adapters (continued)

The addressing mode required to support the advanced features of the module plays an important role in choosing the correct backplane adapter. The backplane adapters are called out below according to their addressing mode.

- Catalog No. 1771-AS/ASC Remote Adapter for pre-series B I/O racks
- Catalog No. 1771-AL Local I/O rack Adapter for PLC-2 Family Processors

Can only be used for 2 slot addressing (8 bit I/O)

- Catalog No. 1771-ASB Series B, Revision F, Remote I/O Rack Adapter for series B I/O racks
- Catalog No. 1785-LT PLC-5 Family Processors

Can be used for 2 or 1 slot addressing (8 or 16 bit I/O)

Refer to the appropriate adapter/processor manual for remote or local rack support, 1 and 2 slot addressing capability, block transfer capability, and series and revision level information.

1771 I/O Power Supplies

The size and type of power supply needed for proper operation of the module depends on the number and type of the other modules in the 1771 I/O system. The module uses 1.25 Amps. All 1771 embedded power supplies will work. However, you must make sure that the power supply is adequate for additional modules in the rack.

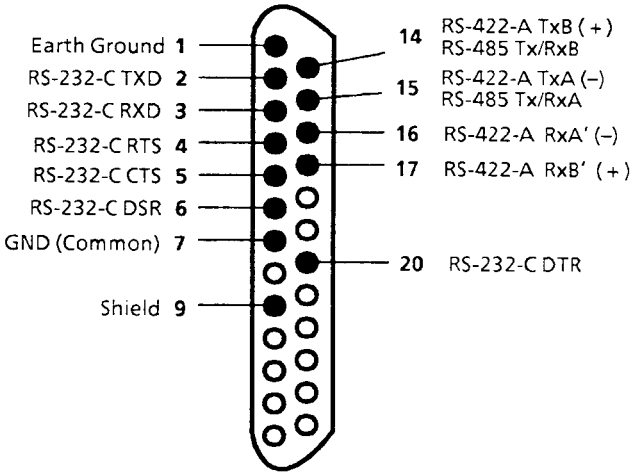
Port Connections

To connect a device to the module, you must first select an electrical interface. Electrical specification RS-232-C, RS-422-A and RS-485 are available on all 3 communication ports. The ports are shown in Figure 3.1.

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Port Connections (continued)

Figure 3.1
Port Connector Pin Out for Ports 1 to 3 and Configuration Port



Pin	Symbol	Description
1	⏚	Earth Ground
2	TXD (RS-232-C)	RS-232-C Transmitted Data
3	RXD (RS-232-C)	RS-232-C Received Data
4	RTS (RS-232-C)	Request To Send
5	CTS (RS-232-C)	Clear To Send
6	DSR (RS-232-C)	Data Set Ready
7	GND (Common)	Signal Ground (common)
9	Shield	Shield
14	TxB (RS-422-A) Tx/RxB (RS-485)	RS-422-A Transmit Data (+) -or- RS-485 Transmit / Receive Data
15	TxA (RS-422-A) Tx/RxA (RS-485)	RS-422-A Transmit Data (–) -or- RS-485 Transmit / Receive Data
16	RxA' (RS-422-A)	RS-422-A Receive Data (–)
17	RxB' (RS-422-A)	RS-422-A Receive Data (+)
20	DTR (RS-232-C)	Data Terminal Ready

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Connecting RS-232-C Devices

The communication ports act as Data Terminal Equipment (DTE) type devices. The RS-232-C signals follow the electrical specifications (found in EIA-232-C), but the physical pinout does *not* follow the standard. The maximum cable length for RS-232-C devices is 50 feet .

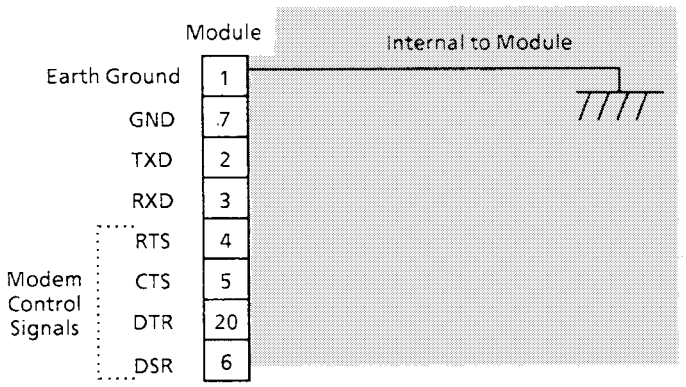
RS-232-C Signaling

To connect a device to the module using RS-232-C signaling, the following connections are necessary:

- Pin 1 (Earth Ground)
- Pin 2 (TXD)
- Pin 3 (RXD)
- Pin 7 (Gnd)
- Pin 4 RTS (Request To Send)
- Pin 5 CTS (Clear To Send)
- Pin 6 DSR (Data Set Ready)
- Pin 20 DTR (Data Terminal Ready)

Figure 3.2 shows the RS-232-C cabling diagram.

Figure 3.2
RS-232-C Cabling Diagram



Note: *Connect one end of the cable's shield to Earth Ground and leave the other end open.*

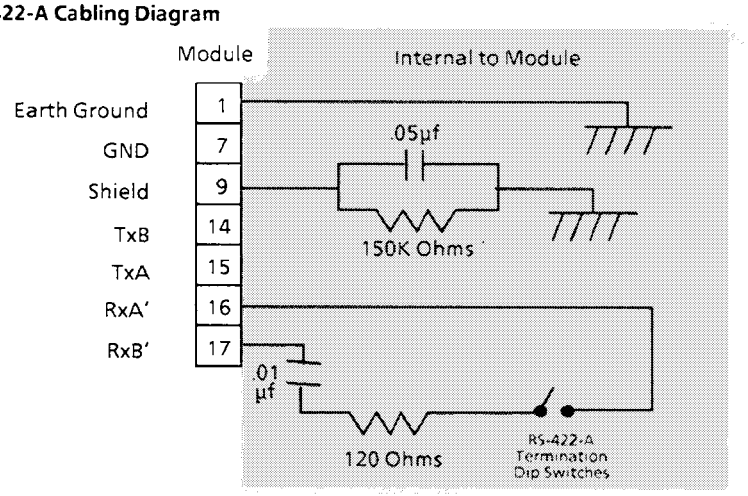
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Connecting RS-422-A Devices

The RS-422-A signals follow the electrical specifications (found in EIA-422-A), but the physical pinout does *not* follow the standard. To connect an RS-422-A device to the module, pins 1, 7, 9, 14-17 should be used. Pin 7 is optional. Pins 14 and 15 are the RS-422-A transmit pair. Pins 16 and 17 are the RS-422-A receive pair. The maximum cable distance is 4000 feet and must reside in one building.

Figure 3.3 illustrates the module's RS-422-A pinout of the Configuration Port. No other connections should be made between the two devices in the RS-422-A configuration.

Figure 3.3
RS-422-A Cabling Diagram



Note: *Connect one end of the cable's shield to Earth Ground and the other end to shield connection (9).*

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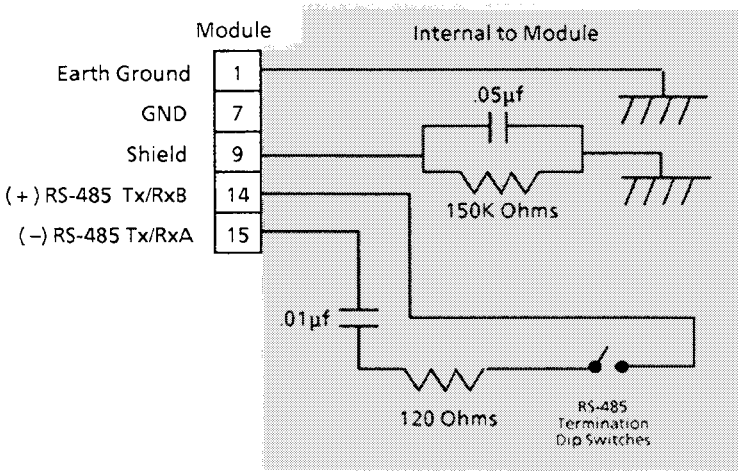
Connecting RS-485 Devices

The RS-485 signals follow the electrical specifications (found in EIA-485), but the physical pinout does *not* follow the standard. To connect an RS-485 device to the module, pins 1, 7, 9, 14 and 15 are used.

Pins 14 and 15 are the RS-485 transmit and receive pair. Do not use the modem control lines.

Maximum cable distance is 4000 feet, which must reside in one building. Figure 3.4 illustrates the cabling necessary to connect an RS-485 device to the module. No other connections should be made between the device and module in the RS-485 configuration.

Figure 3.4
RS-485 Cabling Diagram



Note: *Connect one end of the cable's shield to Earth Ground and the rest of the shields to Shield (9).*

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Dip Switches

The module has four groups of dip switches. The groups are labelled SW1, SW2, SW3, SW4. These switches are used to set:

- PLC Backplane options (SW1 and SW2)
- Configuration Port options (SW1 and SW2)
- Port Electrical Signal Termination (SW3 and SW4)

Tables 3.A, 3.B, 3.C, and 3.D define the parameters that are configured with each dip switch group. The tables show that the parameters vary somewhat for series A and series B modules.

Table 3.A
SW1 Functions for Series A Modules

Option	Related to	Refer to
Electrical Signal	Configuration Port	Figure 3.7
Number of Stop Bits	Configuration Port	Figure 3.10
Number of Data Bits	Configuration Port	Figure 3.11
Parity Mode	Configuration Port	Figure 3.12, 3.13
Block Transfer Address	PLC	Figure 3.14

Table 3.B
SW1 Functions for Series B Modules

Option	Related to	Refer to
Backplane	PLC	Figure 3.8
Tool Kit Mode	Protocol Development	Allen-Bradley sales representative
Number of Stop Bits	Configuration Port	Figure 3.10
Number of Data Bits	Configuration Port	Figure 3.11
Parity Mode	Configuration Port	Figure 3.12, 3.14
Block Transfer Address	PLC	Figure 3.15

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DIP Switches (continued)

Table 3.C
SW2 Functions for Series A and Series B Modules

Option	Related to	Refer to
Baud Rate	Configuration Port	Figure 3.16
Modem Control	Configuration Port	Figure 3.17
Slot 0 Block Transfer	PLC	Figure 3.18
Slot 1 Block Transfer	PLC	Figure 3.19
PLC or I/O Adapter Slot Density	PLC	Figure 3.20

Table 3.D
SW3 and SW4 Functions for Series A and Series B Modules

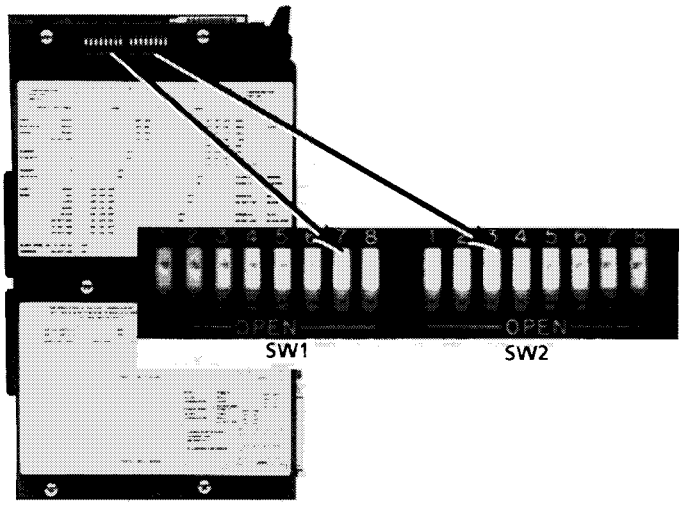
Option	Related to	Refer to
Port 2 Termination	Port 2	Figure 3.23
Port 3 Termination	Port 3	Figure 3.24
Port 1 Termination	Port 1	Figure 3.22
Configuration Port Termination	Configuration Port	Figure 3.25

Figure 3.5 shows the location of each dip switch group (SW1, SW2, SW3, SW4) on the module. Switch groups SW1 and SW2 are located on the side of the module. Switch groups SW3 and SW4 are located on the bottom of the module. The switches are only accessible when the module is removed from the I/O Rack.

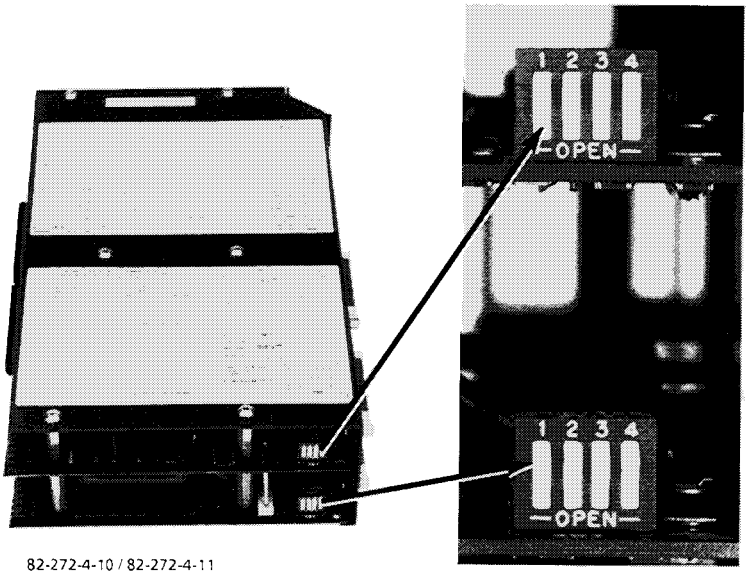
Figure 3.6 shows the default settings for each switch group. Figures 3.9 through 3.25 show the various dip switch settings.

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Figure 3.5
Dip Switch Locations



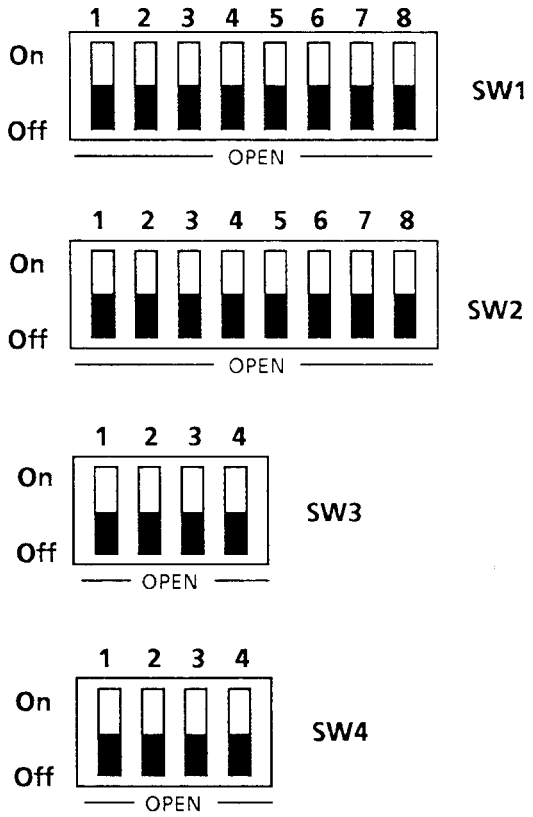
82-272-2-17 / 82-272-4-17



82-272-4-10 / 82-272-4-11

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Figure 3.6
Factory Default Dip Switch Settings

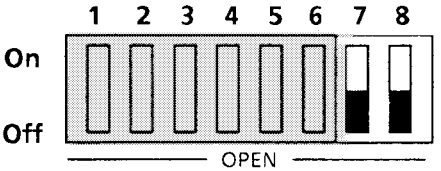


Note: *The black areas indicate the selected (depressed) switch position.*

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SW1 - Dip Switch Settings

Figure 3.7
Electrical Signal (SW1) - SERIES A MODULES Only



Note: *The Configuration Port simultaneously supports RS-232-C or RS-422-A. The pins you select on the Configuration Port determine the signal.*

Figure 3.8
Port 5, PLC Backplane (SW1) - SERIES B MODULES Only

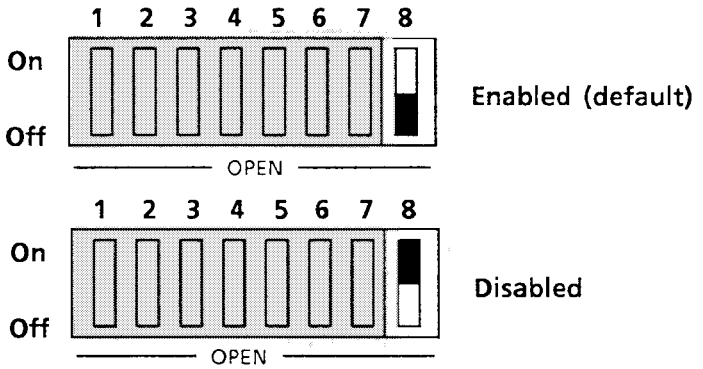
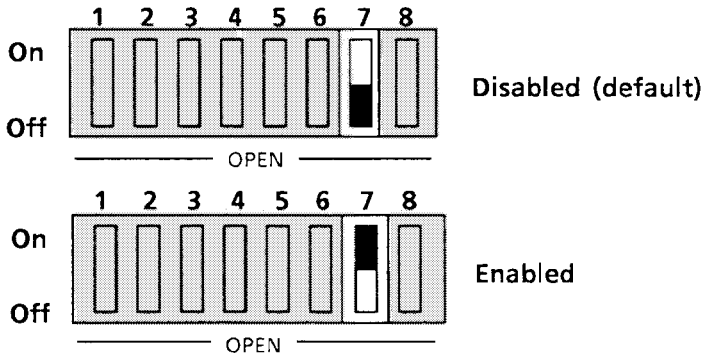


Figure 3.9
Tool Kit Mode (SW1) - SERIES B MODULES Only



Note: *The black areas indicate the selected (depressed) switch position.*

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SW1 - Dip Switch Settings (continued)

Figure 3.10
Number of Stop Bits (SW1) - Series A and B Modules

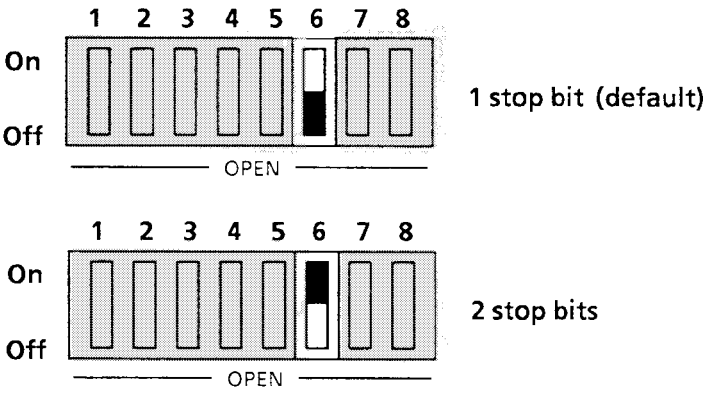
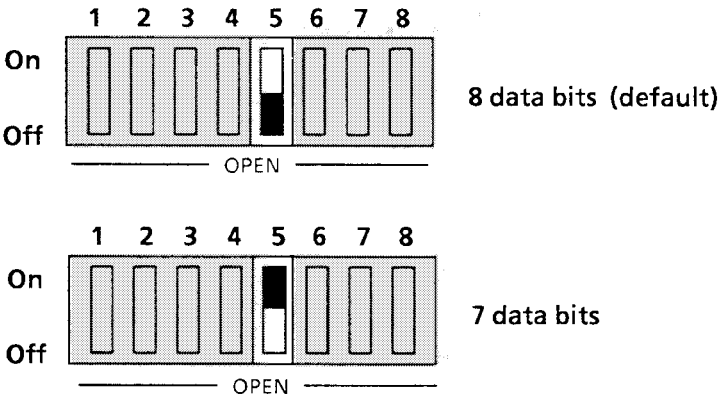


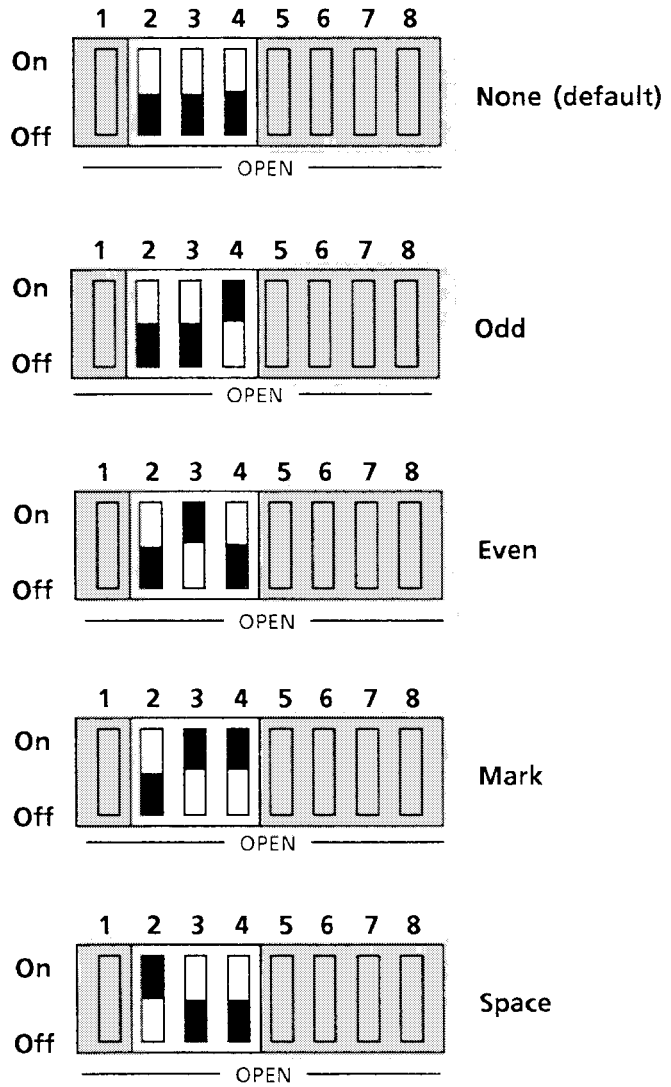
Figure 3.11
Number of Data Bits (SW1) - Series A and B Modules



Note: *The black areas indicate the selected (depressed) switch position.*

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Figure 3.12
Parity Mode (SW1) - Series A and Series B Modules

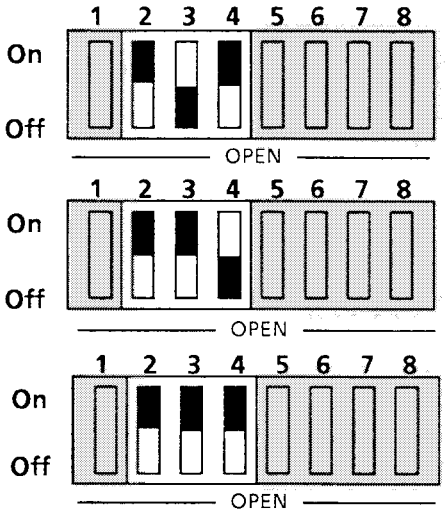


Note: *The black areas indicate the selected (depressed) switch position.*

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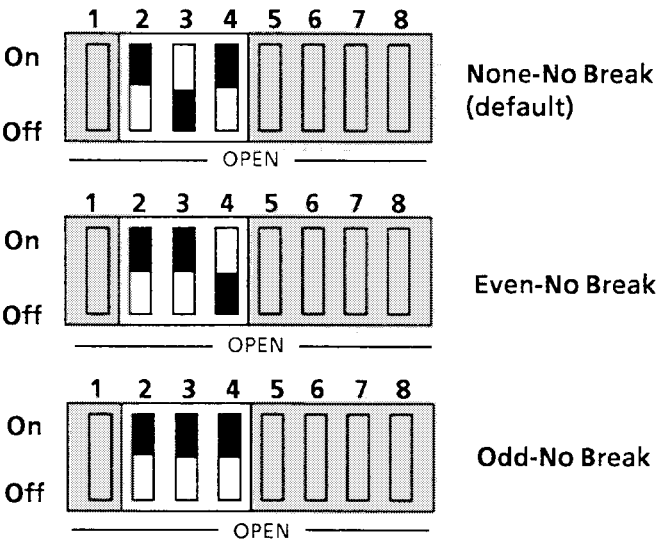
SW1 - Dip Switch Settings (continued)

Figure 3.13
Parity Mode (SW1) - SERIES A MODULES Only



Note: *The black areas indicate the selected (depressed) switch position.*

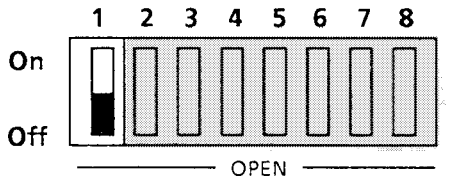
Figure 3.14
Parity Mode (SW1)- SERIES B MODULES Only



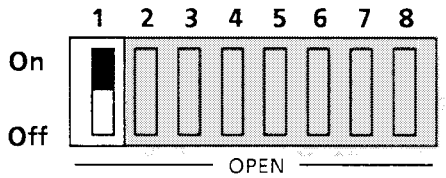
Note: *When a NO BREAK parity mode (None, Odd, Even) is set for the Configuration Port, a break condition will not enter configuration mode.*

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Figure 3.15
Block Transfer Address (SW1) - Series A and Series B Modules



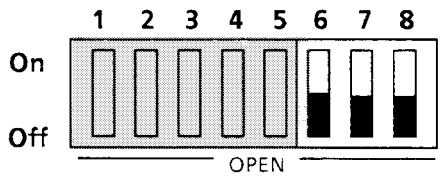
B3 (default)



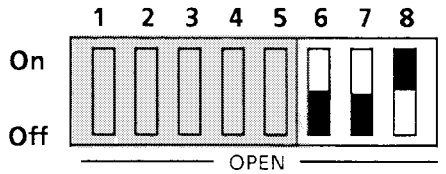
Do Not Use

SW2 - Dip Switch Settings

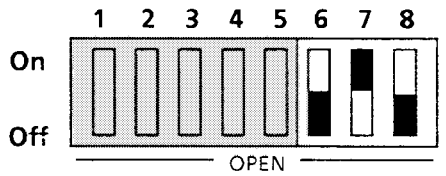
Figure 3.16
Baud Rate (SW2) - Series A and Series B Modules



9600 (default)



4800



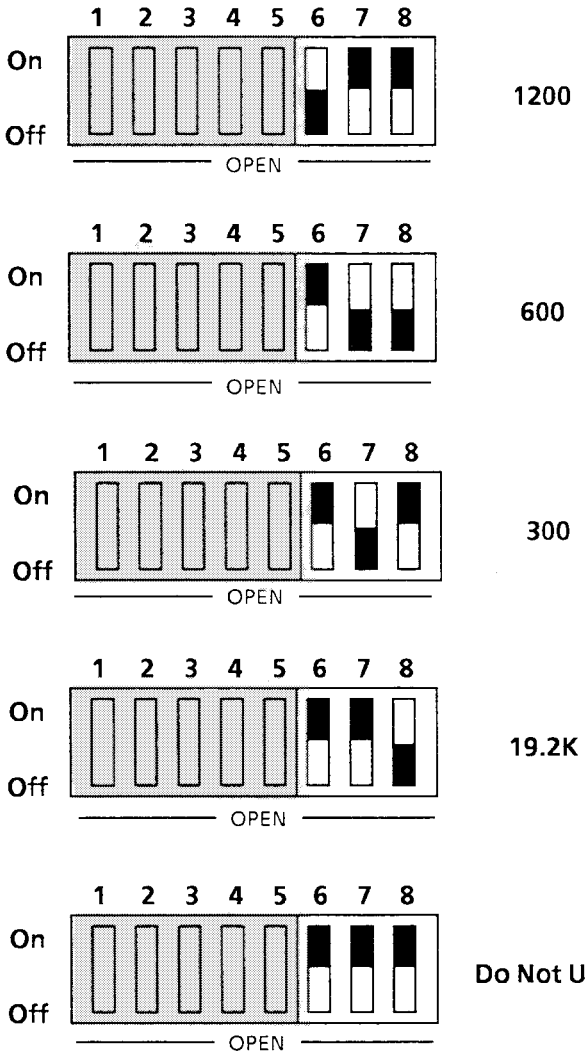
2400

Note: *The black areas indicate the selected (depressed) switch position.*

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SW2 - Dip Switch Settings (continued)

Figure 3.16 (continued)
Baud Rate (SW2) - Series A and Series B Modules



Note: The black areas indicate the selected (depressed) switch position.

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Figure 3.17
Modem Control Selection (SW2) - Series A and Series B Modules

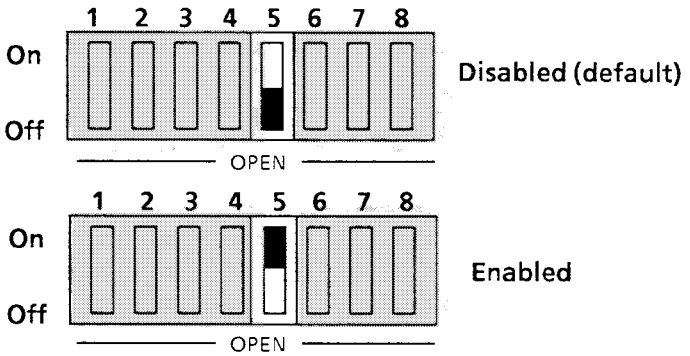


Figure 3.18
Slot 0 Block Transfer (SW2) - Series A and Series B Modules

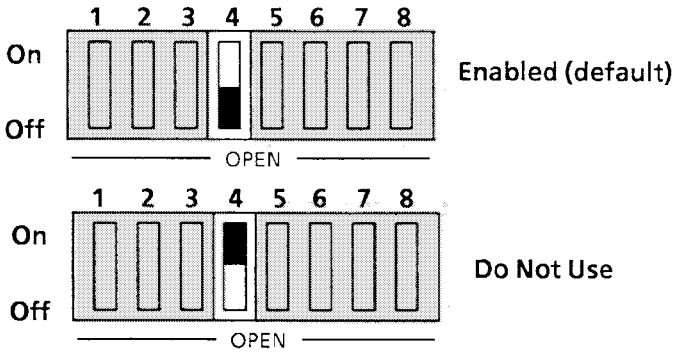
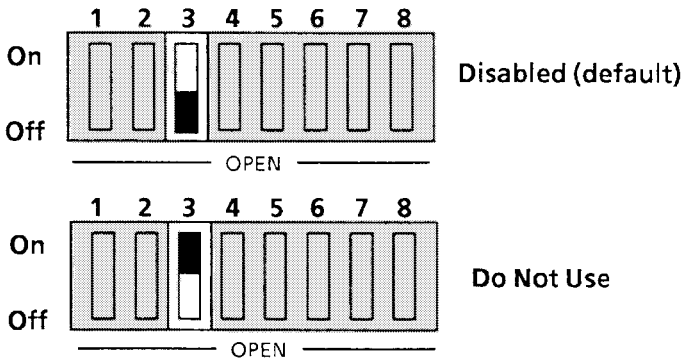


Figure 3.19
Slot 1 Block Transfer (SW2) - Series A and B Modules

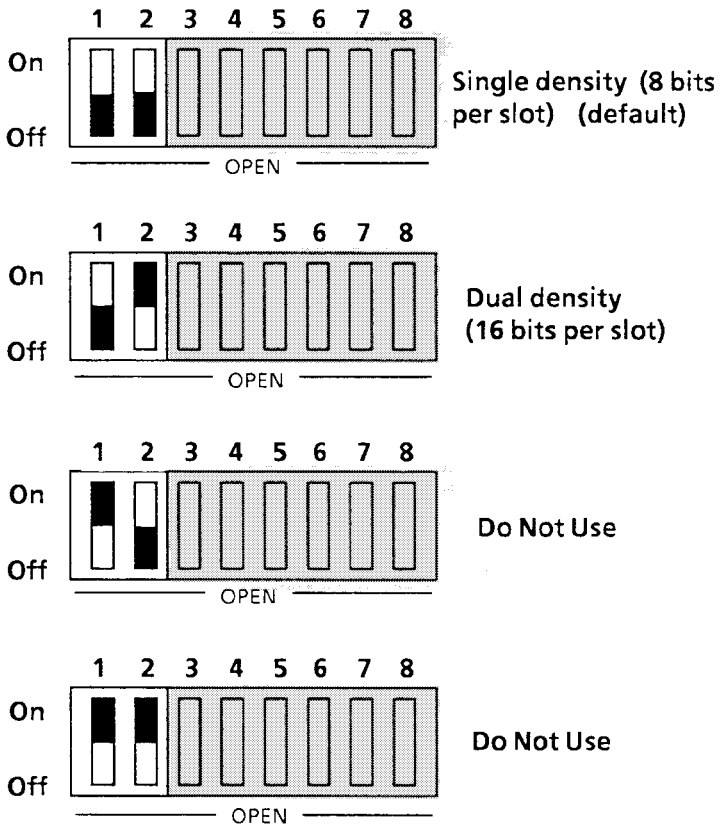


Note: *The black areas indicate the selected (depressed) switch position.*

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SW2 - Dip Switch Settings (continued)

Figure 3.20
PLC Controller Backplane Density (SW2) - Series A and Series B Modules

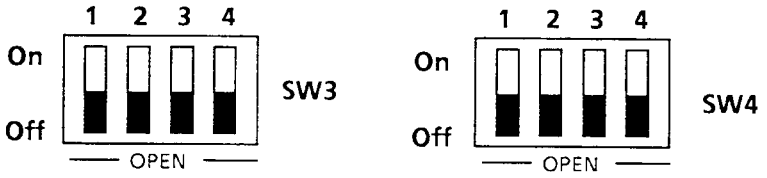


Note: *The black areas indicate the selected (depressed) switch position.*

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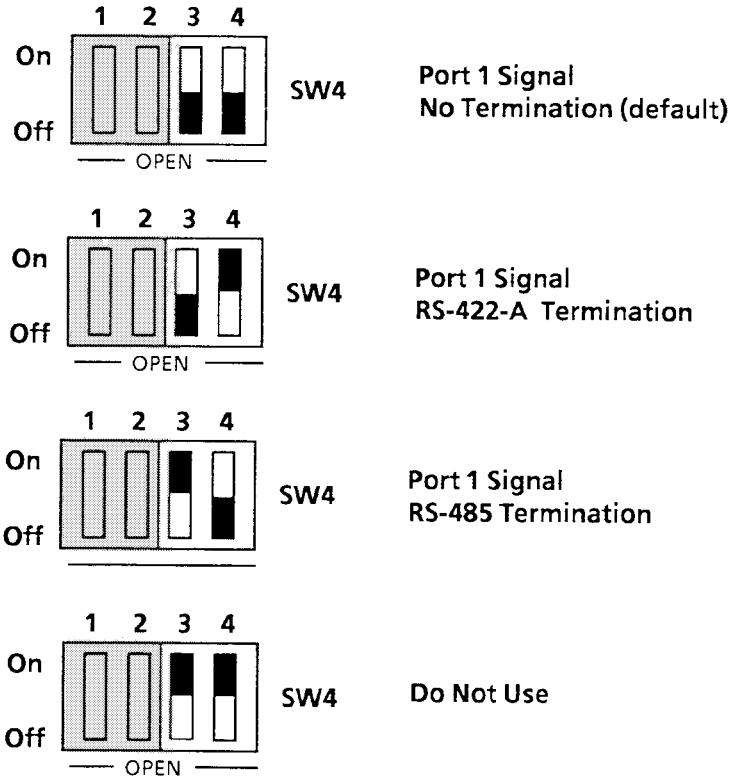
SW3, SW4 - Dip Switch Settings

Figure 3.21
Default Termination Dip Switch Settings (Series A and Series B Modules)



Note: *The black areas indicate the selected (depressed) switch position.*

Figure 3.22
Port 1 Termination

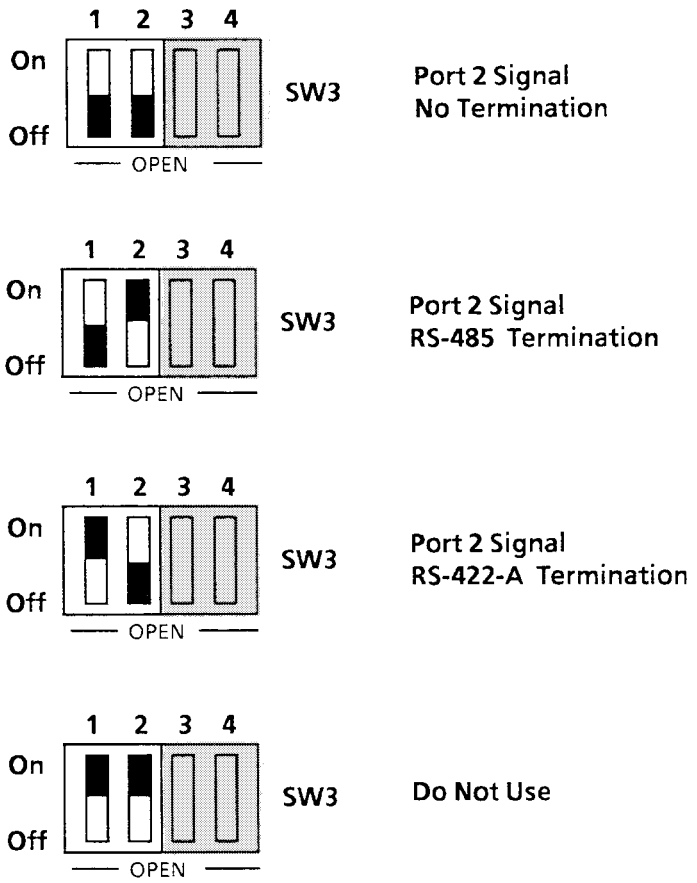


Note: *The black areas indicate the selected (depressed) switch position.*

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SW3, SW4 - Dip Switch Settings *(continued)*

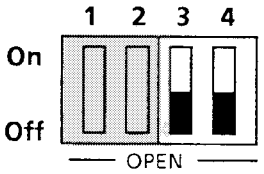
Figure 3.23
Port 2 Termination



Note: *The black areas indicate the selected (depressed) switch position.*

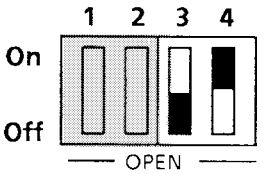
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Figure 3.24
Port 3 Termination



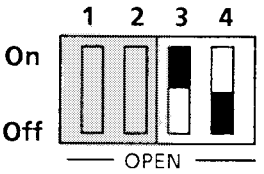
SW3

Port 3 Signal
No Termination (default)



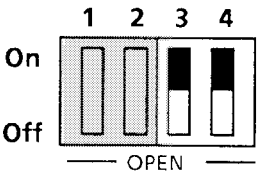
SW3

Port 3 Signal
RS-422-A Termination



SW3

Port 3 Signal
RS-485 Termination



SW3

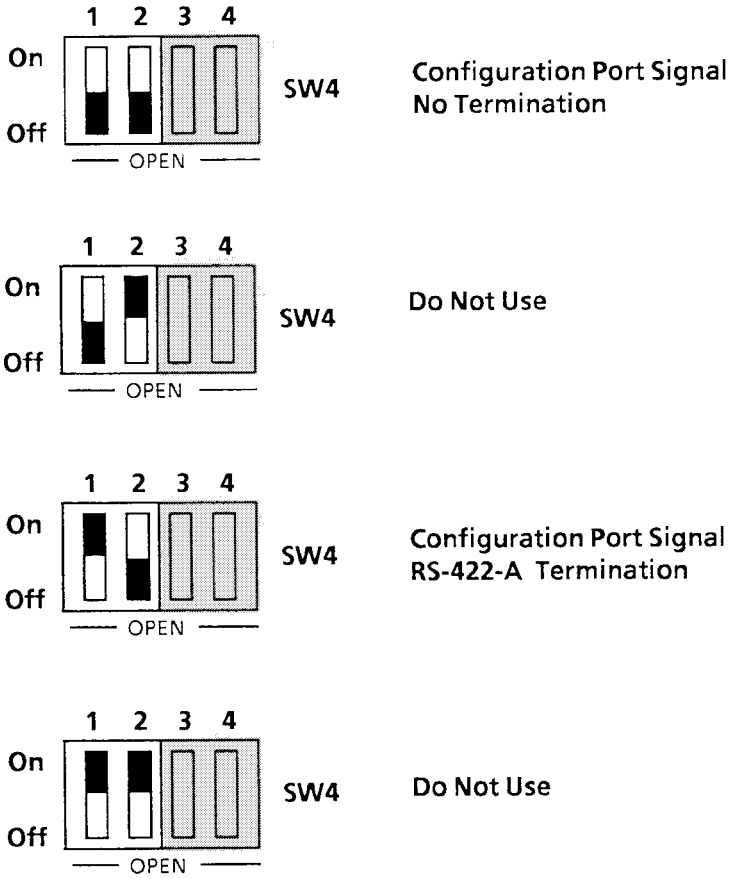
Do Not Use

Note: *The black areas indicate the selected (depressed) switch position.*

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SW3, SW4 - Dip Switch Settings (continued)

Figure 3.25
Configuration Port Termination



Note: *The black areas indicate the selected (depressed) switch position.*

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Quick Start

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Chapter 4 Quick Start

Chapter Objectives

This section guides you through an *out of the box* installation. Because it is a quick start, there will be little explanation of *why* you are performing each step.

The intent of this section is to establish proper communications between the PLC-5/15 and the Flexible Interface Module. Both a loopback and diagnostic test are provided for that reason.

No protocol cartridge or sensing device is required.

Getting started

The rest of this chapter is split into three parts:

- Hardware Setup
- Loopback Test
- Diagnostic Test

Read through each section, follow the steps, and enter the rungs. When finished, your PLC-5/15 data tables should look like the ones supplied at the end of each section.

Revisions of the equipment used in the tests are:

- 1771-I/O chassis with power supply
- 2760-RB Flexible Interface Module, Series A Rev. B
- 1771-SIM module
- 1785-LT PLC-5/15 Firmware revision E, Series B

Important: The block transfer schemes used in this manual are the only type supported.

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Hardware Setup

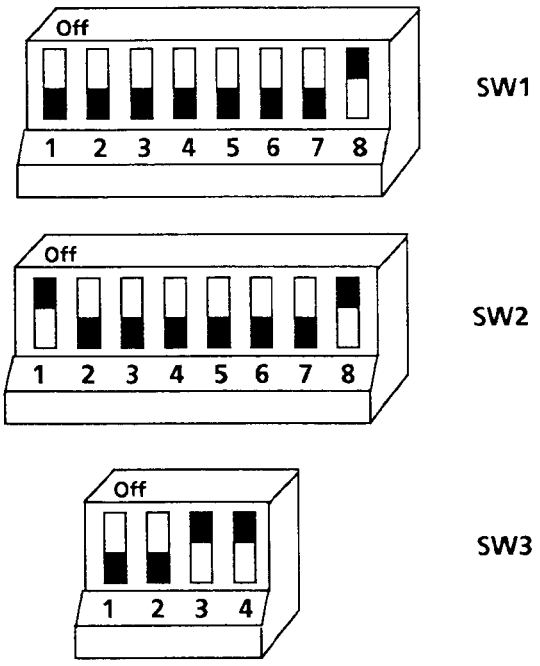
Follow the instructions in this section to:

- Set the dip switches on the PLC-5/15 processor, the 1771 I/O backplane, and the module.
- Insert the module in the 1771 I/O chassis.
- Apply power to the system.

1. PLC-5/15 Processor Dip Switches

Set the PLC-5/15 Processor dip switches as shown in Figure 4.1.

Figure 4.1
PLC-5/15 Processor Dip Switches



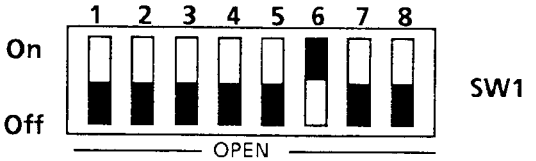
Note: *The black areas indicate the selected switch position*

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2. I/O Chassis Backplane Dip Switches

Set the I/O Chassis Backplane dip switches as shown in Figure 4.2.

Figure 4.2
I/O Chassis Backplane Dip Switches

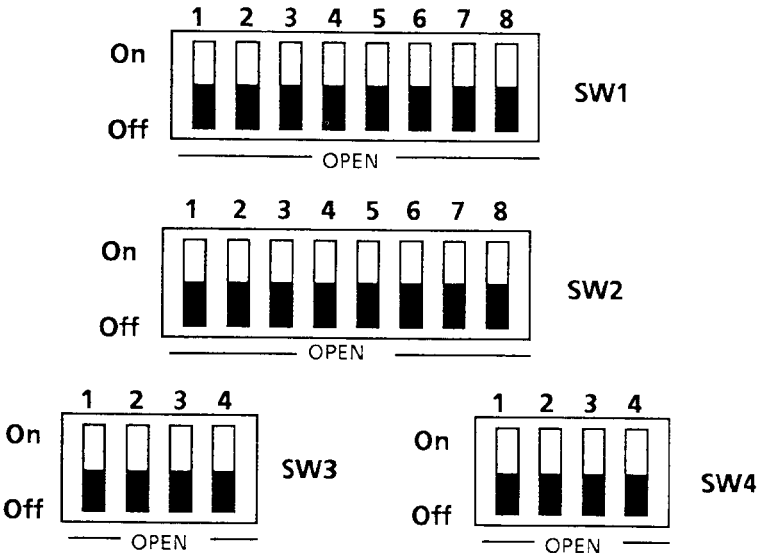


Note: The black areas indicate the selected switch position

3. Flexible Interface Module Dip Switches

Set the Flexible Interface Module dip switches as shown in Figure 4.3. Switch groups SW1 and SW2 are located on the top of the module. Switch groups SW3 and SW4 are located on the bottom of the module. The dip switches are set to factory defaults when shipped from the factory.

Figure 4.3
Module Dip Switch Settings (Factory Defaults)



Note: The black areas indicate the selected switch position

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4. Insert Modules

Insert the Flexible Interface Module into Rack 0, Module Group 0.

Insert the Catalog No. 1771-SIM module into Rack 0, Module Group 1, left slot. Use SIM Switch 00 to send the command.

The module uses two slots in the PLC controller's backplane. The module must be inserted within one module group (even if using 1 slot addressing).

5. Apply Power to System

Because there is no protocol cartridge installed, the LEDs associated with ports 1 through 3 will be red, the Configuration Port LED will be a steady green, and the Active/Fault LED will be flashing green.

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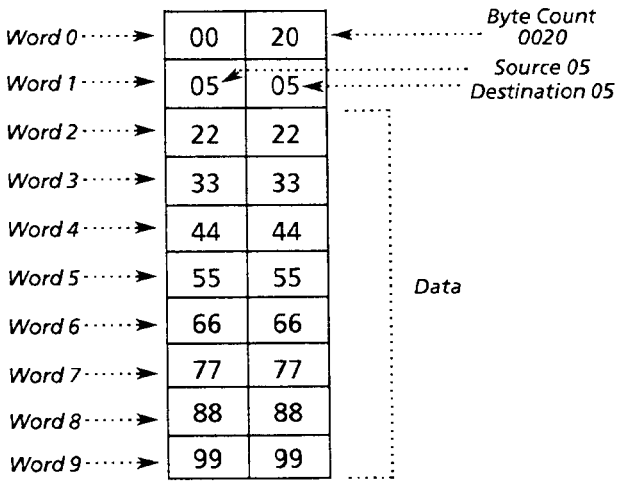
Loopback Test

The loopback test block transfer writes a 10 word file to the module. The first word contains the *Byte Count*, the second word contains the *Source* and *Destination*, the remaining eight words are data. The module echoes the data back through the use of a block transfer read (BTR) instruction. The module sends an echoed reply because the message destination (port 5) is equal to the source (port 5) .

1. Enter Command Block

Enter the command below into the PLC-5 data table starting at address N7:300. Refer to the documented program for further details. Enter all values in the BCD/HEX screen.

Figure 4.4
Loopback Test Command Block



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2. PLC-5/15 Program

Enter the following program:

```
Rung 2:0
   ENABLE THE BTW INSTRUCTION WHEN A COMMAND HAS BEEN MOVED
   TO THE BTW DATA FILE.
|   B3    N7:5  N7:0             +BTW---------------+       |
+--] [---]/[---]/[--------------+BLOCK TRNSFR WRITE+-(EN)-+
|     1     15    15            |Rack              0|      |
|                               |Group             0+-(DN) |
|                               |Module            0|      |
|                               |Control Block N7:5+-(ER) |
|                               |Data file   N7:100|       |
|                               |Length            0|       |
|                               |Continuous        N|       |
|                               +------------------+       |


Rung 2:1
   UNLATCH BIT B3/1 WHEN THE BTW INSTRUCTION HAS BEEN
   ENABLED
|  N7:5                                                  B3  |
+--] [-------------------------------------------------(U)--+
|    15                                                   1  |


Rung 2:2
   THE MODULE SETS BIT I:000/13 HIGH WHEN IT HAS DATA FOR
   THE PLC.
|  I:000     B3                                          B3  |
+--] [------[ONS]-----------------------------------------(L)-+
|    13         2                                         3  |


Rung 2:3
   ENABLE THE BTR INSTRUCTION WHEN BIT B3/3 IS LATCHED.

|   B3    N7:0  N7:5             +BTR---------------+       |
+--] [---]/[---]/[--------------+BLOCK TRNSFR READ +-(EN)-+
|     3     15    15            |Rack              0|      |
|                               |Group             0+-(DN) |
|                               |Module            0|      |
|                               |Control Block N7:0+-(ER) |
|                               |Data file   N7:200|       |
|                               |Length            0|       |
|                               |Continuous        N|       |
|                               +------------------+       |


Rung 2:4
   UNLATCH BIT B3/3 WHEN THE BTR INSTRUCTION HAS BEEN ENABLED.
|  N7:0                                                  B3  |
+--] [-------------------------------------------------(U)--+
|    15                                                   3  |
```

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2. PLC-5/15 Program *(continued)*

```
Rung 2:5
      USE THE BTR DONE BIT N7:0/13 TO BUFFER COMMAND
      RESPONSES.
|  N7:0                                +COP---------------+ |
+--] [-------------------------------+COPY FILE          +-+
|    13                              |Source     #N7:200| |
|                                    |Dest       #N7:350| |
|                                    |Length          10| |
|                                    +------------------+ |


Rung 2:6

   MOVE THE COMMAND STORED AT FILE LOCATION #N7:300 TO THE BTW
   DATA FILE BY CLOSING THE SWITCH AT INPUT ADDRESS I:001/00.
| I:001   B3                         +COP---------------+   |
+--] [--[ONS]--------------------+--+COPY FILE          +-+-+
|    00     0                    |  |Source     #N7:300| | |
|                                |  |Dest       #N7:100| | |
|                                |  |Length          10| | |
|                                |  +------------------+ | |
|                                |    B3                 | |
|                                +--(L)------------------+ |
|                                     1                   |


Rung 2:7
|                                                         |
+-----------------------[END OF FILE]---------------------|
```

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3. Data Table

The following PLC-5 data table is used in the loopback test. The data located at:

- Address N7:100 is the BTW file.
- Address N7:200 is the BTR file.
- Address N7:300 is where you entered the command.
- Address N7:350 is the buffer file for the command response.

Address	0	1	2	3	4	5	6	7	8	9
N7:100	0020	0505	2222	3333	4444	5555	6666	7777	8888	9999
N7:110	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:120	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:130	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:140	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:150	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:160	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:170	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:180	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:190	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:200	0020	0505	2222	3333	4444	5555	6666	7777	8888	9999
N7:210	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:220	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:230	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:240	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:250	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Address	0	1	2	3	4	5	6	7	8	9
N7:300	0020	0505	2222	3333	4444	5555	6666	7777	8888	9999
N7:310	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:320	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:330	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:340	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:350	0020	0505	2222	3333	4444	5555	6666	7777	8888	9999
N7:360	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:370	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:380	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:390	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:400	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:410	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:420	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:430	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:440	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:450	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

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Diagnostic Test

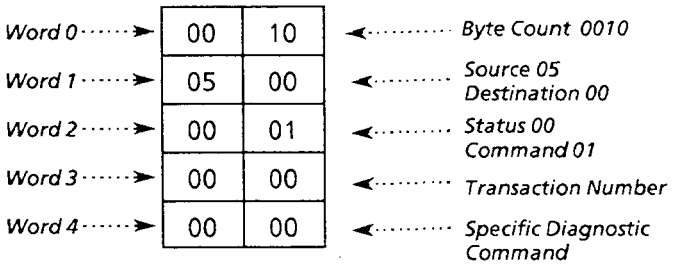
The diagnostic test allows you to obtain software and hardware diagnostic information from the module. The software and hardware diagnostic commands each come in two parts. The program supplied allows you to select *Software Diagnostics (menu function B0)* with SIM switch 01, and *Hardware Diagnostics (menu function A0)* with SIM switch 02. SIM switch 00 sends the command.

Both halves of the response, to the diagnostic commands, are buffered starting at address N7:400 and N7:440. That way, both halves of the the data can display on the same screen.

1. Enter Command Block

Enter the command block below into the PLC-5 data table starting at address N7:300 and N7:310. The PLC data table is shown on the last page of this chapter. Enter all values in the BCD/HEX screen. Refer to the documented program for further details.

Figure 4.5
Diagnostics Command Block



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2. Enter Diagnostic Commands

Starting at address N7:320, enter the following diagnostic commands into the PLC-5 data table (make sure you use the BCD/HEX screen).

2015 - *This is the first half of the Software Diagnostic command.*

2025 - *This is the second half of the Software Diagnostic command.*

2016 - *This is the first half of the Hardware Diagnostic command.*

2025 - *This is the second half of the Hardware Diagnostic command.*

Switch 00

The 1771-SIM module's switch input I:001/00 sends the first half of the diagnostic command, which you select via switch 1 or 2, to the BTW data file. The second half of the diagnostic command is sent, one second later, to the BTW data file.

Switch 01

The 1771-SIM module's switch input I:001/01 moves the software diagnostic command values *2015* and *2025* to word 4 of the diagnostic command block in Figure 4.5.

Switch 02

The 1771-SIM module's switch input I:001/02 moves the hardware diagnostic command values *2016* and *2026* to word 4 of the diagnostic command block in Figure 4.5.

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3. PLC-5 Program

Enter the following program:

```
Rung 2:0
   COUNTER C5:0 IS THE TRANSACTION NUMBER COUNTER.EACH TIME A
   COMMAND IS MOVED TO THE BTW DATA FILE VIA FAL INSTRUCTIONS
   R6:0 THROUGH R6:3,THE COUNTER IS INCREMENTED AND ITS
   ACCUMULATED VALUE IS MOVED TO THE FOURTH WORD OF THE COMMAND
   IN THE BTW DATA FILE.BIT B3/0 IS THEN USED TO ENABLE THE BTW
   INSTRUCTION.
|                                                                |
|    R6:0          B3            +CTU---------------+          |
+-+--] [--+------[ONS]---------+--+COUNT UP          +-(CU)-+--+
| |    DN |            5       |  |Counter       C5:0|       | |
| |       |                    |  |Preset        9999+-(DN)  | |
| |       |                    |  |Accum          188|       | |
| |       |                    |  +------------------+       | |
| |  R6:1 |                    |  +TOD---------------+       | |
| +--] [--+                    +--+TO BCD            +------+ |
| |     DN                       |  |Source   C5:0.ACC|      | |
| |                              |  |                 188|    | |
| |                              |  |Dest       N7:103|      | |
| |                              |  |                 392|    | |
| |                              |  +------------------+       | |
| |                              |    B3                       | |
| |                              +--(L)------------------------+ |
| |                                   0                         |
|                                                                |

Rung 2:1
   RESET COUNTER C5:0 WHEN ITS ACCUMULATED VALUE REACHES 9999.
|                                                                |
|  C5:0                                                  C5:0    |
+--] [-------------------------------------------------(RES)-+  |
|    DN                                                        |

Rung 2:2
   ENABLE THE BTW INSTRUCTION WHEN A COMMAND AND NEW
   TRANSACTION NUMBER HAVE BEEN MOVED TO THE BTW DATA FILE.
|                                                                |
|   B3    N7:5  N7:0              +BTW---------------+           |
+--] [---]/[---]/[---------------+BLOCK TRNSFR WRITE+-(EN)-+    |
|     0     15    15              |Rack              0|       |
|                                 |Group             0+-(DN)  |
|                                 |Module            0|       |
|                                 |Control Block N7:5+-(ER)   |
|                                 |Data file   N7:100|       |
|                                 |Length            0|       |
|                                 |Continuous        N|       |
|                                 +------------------+       |
```

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3. PLC-5 Program (continued)

```
Rung 2:3
   UNLATCH BIT B3/0 WHEN THE BTW INSTRUCTION HAS BEEN ENABLED
|                                                                  |
|  N7:5                                                      B3    |
+--] [-----------------------------------------------------(U)--+
|    15                                                      0   |
|                                                                  |

Rung 2:4
   THE MODULE SETS BIT I:000/13 HIGH WHEN IT HAS DATA FOR
   THE PLC.

|  I:000     B3                                              B3    |
+--] [------[ONS]-------------------------------------------(L)--+
|    13         6                                            7   |

Rung 2:5
   ENABLE THE BTR INSTRUCTION WHEN BIT B3/7 IS LATCHED.
|                                                                  |
|  B3   N7:0  N7:5              +BTR---------------+               |
+--] [---]/[---]/[--------------+BLOCK TRNSFR READ +-(EN)--+
|    7     15    15             |Rack             0|          |
|                               |Group            0+-(DN)    |
|                               |Module           0|          |
|                               |Control Block N7:0+-(ER)    |
|                               |Data file   N7:200|          |
|                               |Length           0|          |
|                               |Continuous       N|          |
|                               +------------------+          |

Rung 2:6
   UNLATCH BIT B3/7 WHEN THE BTR INSTRUCTION IS ENABLED.

|  N7:0                                                      B3    |
+--] [-----------------------------------------------------(U)--+
|    15                                                      7   |
```

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3. PLC-5 Program (continued)

```
Rung 2:7
  MOVE THE PROPER DIAGNOSTICS COMMAND VALUES TO THE DIAGNOSTIC
  COMMAND FILES
|                                                                  |
|  SELECT                                                          |
|  SOFTWARE                                                        |
|  DIAG-                                                           |
|  NOSTICS                                                         |
|   I:001       B3                    +MOV---------------+       |
+----] [------[ONS]-----------------+-+MOVE                +-+-+  |
|      01          7                | |Source      N7:320| | |  |
|                                   | |                8213| | |  |
|                                   | |Dest        N7:304| | |  |
|                                   | |                8213| | |  |
|                                   | +------------------+ | |  |
|                                   | +MOV---------------+ | |  |
|                                   +-+MOVE                +-+  |
|                                     |Source      N7:321|      |
|                                     |                8229|     |
|                                     |Dest        N7:314|      |
|                                     |                8229|     |
|                                     +------------------+       |
|                                                                  |

Rung 2:8
  MOVE THE PROPER DIAGNOSTICS COMMAND VALUES TO THE DIAGNOSTIC
  COMMAND FILES
|                                                                  |
|  SELECT                                                          |
|  HARDWARE                                                        |
|  DIAG-                                                           |
|  NOSTICS                                                         |
|   I:001       B3                    +MOV---------------+       |
+----] [-----[ONS]-----------------+-+MOVE                +-+-+  |
|      02          8                | |Source      N7:322| | |  |
|                                   | |                8214| | |  |
|                                   | |Dest        N7:304| | |  |
|                                   | |                8213| | |  |
|                                   | +------------------+ | |  |
|                                   | +MOV---------------+ | |  |
|                                   +-+MOVE                +-+  |
|                                     |Source      N7:323|      |
|                                     |                8230|     |
|                                     |Dest        N7:314|      |
|                                     |                8229|     |
|                                     +------------------+       |
|                                                                  |
```

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3. PLC-5 Program *(continued)*

```
Rung 2:9
   BUFFER THE RESPONSE OF THE FIRST HALF OF EACH DIAGNOSTICS
   COMMAND PAIR.
|                                                                  |
|  ENABLES                                                         |
|  RESPONSE                                                        |
|  BUFFER                                                          |
|  RUNG #9.                                                        |
|     B3    +EQU---------------+     +FAL---------------+          |
+--] [-----+EQUAL              +-----+FILE ARITH/LOGICAL+-(EN)--+
|      2    |Source A    N7:324|     |Control       R6:5|         |
|           |                392|     |Length          36+-(DN)  |
|           |Source B    N7:203|     |Position         0|         |
|           |                392|     |Mode           ALL+-(ER)  |
|           +------------------+     |Dest       #N7:400|         |
|                                    |                114|         |
|                                    |Expression         |         |
|                                    |#N7:200            |         |
|                                    +-------------------+         |
|                                                                  |

Rung 2:10
 UNLATCH BIT B3:0/02 WHEN FAL INSTRUCTION R6:5 HAS BUFFERED THE
 FIRST RESPONSE.
|                                                                  |
|                                                 ENABLES          |
|                                                 RESPONSE         |
|                                                 BUFFER           |
|                                                 RUNG #10.        |
|  R6:5                                              B3            |
+--] [-------------------------------------------------(U)--------+
|     DN                                               2           |

Rung 2:11
 BUFFER THE RESPONSE OF THE SECOND HALF OF EACH DIAGNOSTICS
 COMMAND PAIR.
|                                                                  |
|ENABLES                                                           |
|RESPONSE                                                          |
|BUFFER                                                            |
|RUNG #11.                                                         |
|    B3     +EQU---------------+    +FAL---------------+          |
+--] [-----+EQUAL              +----+FILE ARITH/LOGICAL+-(EN)--+
|      3    |Source A    N7:324|    |Control       R6:6|         |
|           |                392|    |Length          36+-(DN)  |
|           |Source B    N7:203|    |Position         0|         |
|           |                392|    |Mode           ALL+-(ER)  |
|           +------------------+    |Dest       #N7:440|         |
|                                   |                114|         |
|                                   |Expression         |         |
|                                   |#N7:200            |         |
|                                   +-------------------+         |
|                                                                  |
```

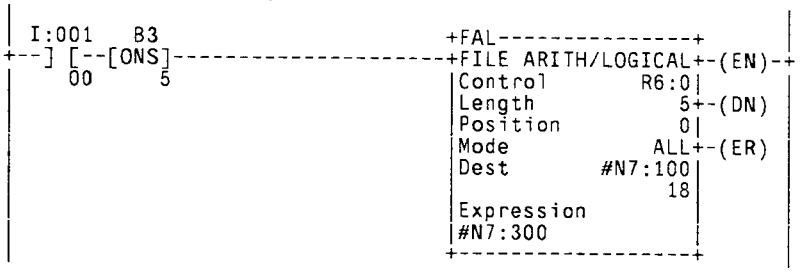
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3. PLC-5 Program *(continued)*

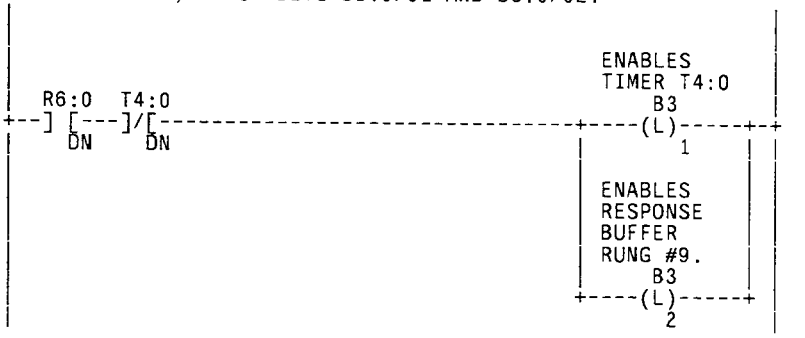
Rung 2:12
UNLATCH BIT B3:0/03 WHEN THE RESPONSE HAS BEEN BUFFERED



Rung 2:13
MOVE THE FIRST HALF OF THE SELECTED DIAGNOSTICS COMMAND TO THE BTW DATA FILE.



Rung 2:14
WHEN THE FIRST HALF OF THE SELECTED DIAGNOSTICS COMMAND HAS BEEN MOVED, LATCH BITS B3:0/01 AND B3:0/02.



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3. PLC-5 Program *(continued)*

```
Rung 2:15
   TIMER T4:0 ALLOWS 1 SECOND BETWEEN SENDING THE TWO HALVES OF
   THE SELECTED DIAGNOSTICS COMMAND.
|                                                                  |
|                                     ENABLES                      |
|                                     TIMER T4:0                   |
|     B3                          +TON--------------+              |
+----] [-------------------------+TIMER ON DELAY    +-(EN)--+     |
|       1                         |Timer         T4:0|            |
|                                 |Time base     0.01+-(DN)      |
|                                 |Preset         100|            |
|                                 |Accum            0|            |
|                                 +------------------+            |
|                                                                  |

Rung 2:16
   WHEN TIMER T4:0 TIMES OUT,THE SECOND HALF OF THE SELECTED
   DIAGNOSTICS COMMAND IS SENT.
|                                                 ENABLES          |
|                                                 THE SECOND       |
|                                                 HALF OF          |
|                                                 DIAG.CMD.        |
|  T4:0                                              B3            |
+--] [---------------------------------------+----(L)-----+--+     |
|    DN                                       |          4  |  |     |
|                                             |             |  |     |
|                                             | ENABLES     |  |     |
|                                             | TIMER T4:0  |  |     |
|                                             |     B3      |  |     |
|                                             +----(U)-----+  |     |
|                                                   1         |     |

Rung 2:17
   MOVE THE SECOND HALF OF THE SELECTED DIAGNOSTICS COMMAND TO
   THE BTW DATA FILE.
|                                       ENABLES                    |
|                                       THE SECOND                 |
|                                       HALF OF                    |
|                                       DIAG.CMD.                  |
|     B3       B3                   +FAL--------------+            |
+----] [-----[ONS]-----------------+FILE ARITH/LOGICAL+-(EN)--+     |
|       4       14                  |Control       R6:1|          |
|                                   |Length           5+-(DN)     |
|                                   |Position         0|           |
|                                   |Mode           ALL+-(ER)     |
|                                   |Dest       #N7:100|          |
|                                   |                 18|          |
|                                   |Expression         |          |
|                                   |#N7:310            |          |
|                                   +------------------+           |
|                                                                  |
```

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3. PLC-5 Program *(continued)*

```
Rung 2:18
   WHEN THE SECOND HALF OF THE SELECTED DIAGNOSTICS COMMAND HAS
   BEEN MOVED, UNLATCH BIT B3:0/04 AND LATCH BIT B3:0/03.
|                                                                  |
|                                                ENABLES           |
|                                                THE SECOND        |
|                                                HALF OF           |
|                                                DIAG.CMD.         |
|  R6:1                                             B3             |
+--] [-------------------------------------+----(U)-----+--+      |
|    DN                                    |      4     |  |      |
|                                          | ENABLES    |  |      |
|                                          | RESPONSE   |  |      |
|                                          | BUFFER     |  |      |
|                                          | RUNG #12.  |  |      |
|                                          |    B3      |  |      |
|                                          +----(L)-----+  |      |
|                                               3          |      |

Rung 2:19
|                                                                  |
|                                                                  |
+-----------------------[END OF FILE]-----------------------------|
```

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4. Data Table

Below is the data table used in the diagnostic test. The data located at:

- address N7:100 is the BTW file.
- address N7:200 is the BTR file.
- address N7:300 to N7:323 are the diagnostic commands.
- address N7:400 contains the first half of the diagnostic response.
- address N7:440 contains the second half of the diagnostic response.

Address	0	1	2	3	4	5	6	7	8	9
N7:100	0010	0500	0001	0188	2025	0000	0000	0000	0000	0000
N7:110	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:120	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:130	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:140	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:150	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:160	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:170	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:180	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:190	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:200	0072	0005	0041	0188	0000	0000	0000	0000	0000	0000
N7:210	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:220	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:230	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:240	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:250	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Address	0	1	2	3	4	5	6	7	8	9
N7:300	0010	0500	0001	0000	2015	0000	0000	0000	0000	0000
N7:310	0010	0500	0001	0000	2025	0000	0000	0000	0000	0000
N7:320	2015	2025	2016	2026	0000	0000	0000	0000	0000	0000
N7:330	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:340	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:350	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:360	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:370	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:380	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:390	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:400	0072	0005	0041	0187	0000	0000	0000	0000	0000	0000
N7:410	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:420	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:430	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N7:440	0072	0005	0041	0188	0000	0000	0000	0000	0000	0000
N7:450	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

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Chapter 5 Using Your Programming Terminal

Chapter Objectives

This chapter provides details on how to connect, setup, and enter configuration mode using the following programming terminals:

- 1784-T45 programming terminal with built-in terminal emulation software.
- 1784-T50 with optional terminal emulation software.
- 1770-T3 programming terminal.
- 1770-T4 programming terminal.
- ANSI standard terminal.
- Personal computer with terminal emulation software.

It also describes the cabling requirements for each terminal.

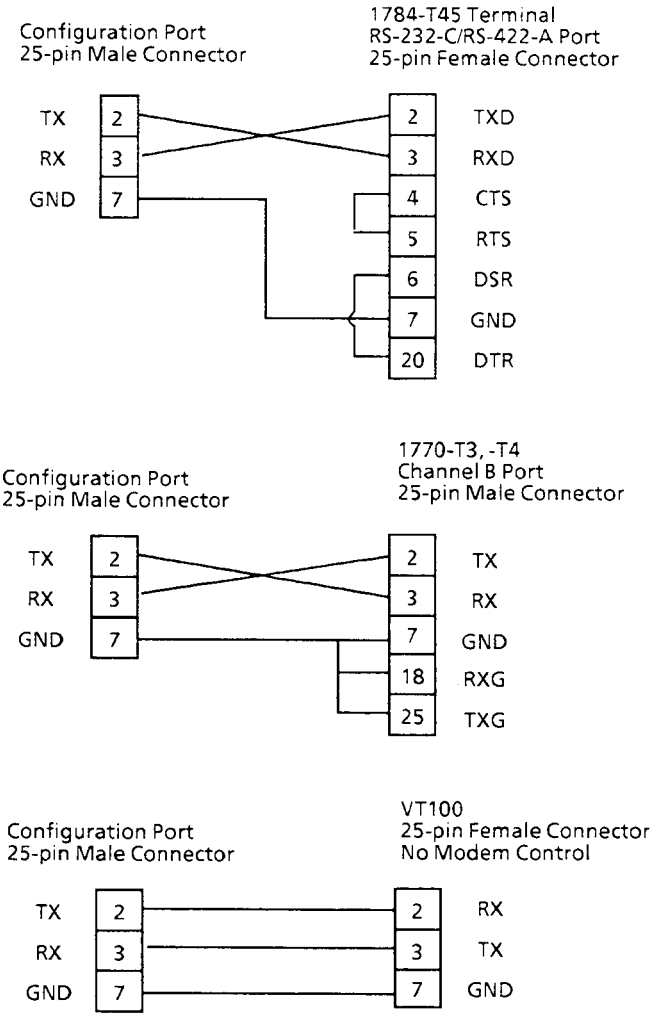
Cabling Requirements

The cabling requirements vary depending on which terminal you connect to the module. Figures 5.1 illustrates the connector pinouts for the configuration port and each terminal type.

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Cabling Requirements (continued)

Figure 5.1
Cabling Requirements for Programming Terminals

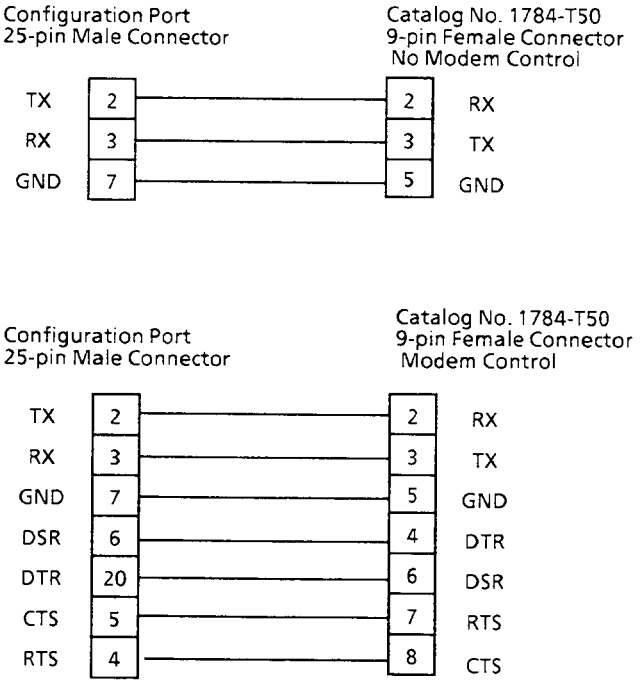


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Cabling Requirements (continued)

Figure 5.1 (continued)
Cabling Requirements for Programming Terminals



Connecting Programming Terminals

Before you can access the configuration software, you must connect the programming terminal to the module.

Using the appropriate communication cable for your terminal, follow these steps:

- Connect the 25 pin male connector to the module's configuration port.
- Connect the other end to the terminal's serial port.

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Setting Up Programming Terminals

You now need to set up the terminal to enable communications with the module. The data transmission parameters on the terminal must be set to match those of the configuration port.

The default transmission parameters of the configuration port are:

- 9600 baud rate
- 8 data bits
- 1 stop bits
- No parity

These parameters are set via dip switches on the module. Verify that these parameters are set for the configuration port and then set the same parameters on your terminal. For details on how to set the transmission parameters, refer to your Terminal's User Manual.

Use the dip switches on the 1770-T3 or -T4 terminal to set the transmission parameters.

Important:

1. When setting parity on the T4, *never* select the NOT USED setting.
2. When configuring the module with any programming terminal, do not use the parity mode dip switch settings below for the configuration port of Series B modules:
   - None-No Break
   - Even-No Break
   - Odd-No Break

   These settings will not allow you to enter configuration mode.

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Configuring with a 1784-T45

After connecting the 1784-T45 to the module, you are ready to set up the terminal and enter configuration mode.

For specific details on the use and operation of the 1784-T45, refer to the User's Manual.

1. **Apply system power to module.**

   The first two LED indicators will turn green when the module is ready.

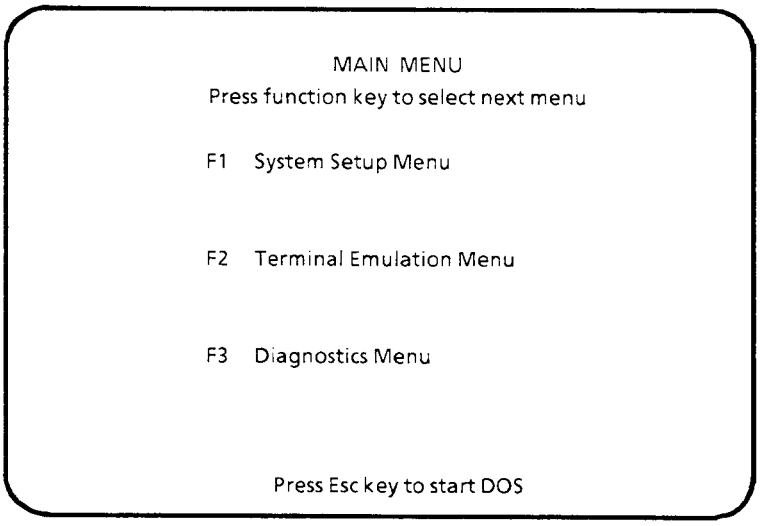
2. **Power on the 1784-T45 terminal.**

   The power switch is located on the left side of the unit.

   The terminal beeps once and then tests itself. When the test is complete, a message appears. The last line should indicate that all tests have passed.

3. **Press the [Ctrl] [Alt] [Cmd] key sequence to display the system Main Menu.**

   (Press the [Cmd] key while holding down both the [Alt] key and the [Ctrl] keys.)



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Configuring with a 1784-T45 (continued)

4. **Press [F1] to access the System Setup Menu.**

   Edit settings to match those on this screen.

```
                    SYSTEM SETUP
        Press function key to select next menu or change setting

F1  Disk Drive Configuration Menu      F6  Printer Connection = PARALLEL
                                           (BUILT-IN PRINTER PORT)
F2  Backlight Screen Auto-Blank = ON   F7  COM1 Parameters Menu

F3  Screen Display Mode = BW80         F8  COM2 Parameters Menu

F4  CPU Speed = FAST

F5  Country Keyboard = UNITED STATES
    See DG/One Owner's Manual for
    keyboards currently supported

                Press Esc key to return to Main Menu
```

5. **Press [F7] to access the COM1 Parameters Menu.**

```
                    COM1 PARAMETERS
              Press function key to change setting

        F1   Baud Rate = 9600
        F2   Parity = NONE
        F3   Data Bits = 8
        F4   Stop Bits = 1

        F5   Type = STANDARD PC COMPATIBLE COMMUNICATIONS

        F6   Power = ON

            Press Esc key to return to System Setup Menu
```

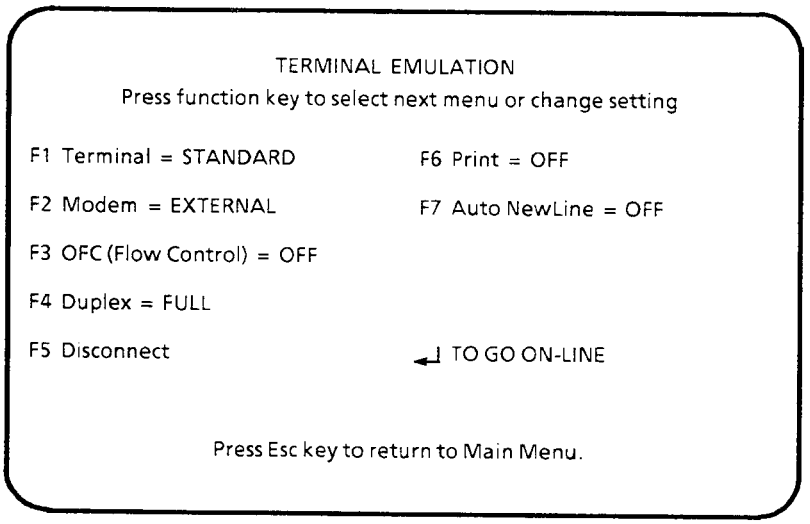
The communication settings in the box match the default settings of the configuration port. Don't change the other settings. If the configuration port settings are different, make the necessary changes before going on to the next step.

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Configuring with a 1784-T45 (continued)

6. **Press [Esc] to return to the System Setup Menu.**
7. **Press [Esc] to return to the Main Menu.**
8. **Press [F2] to access the Terminal Emulation Menu.**

   Edit settings to match those on this screen.



9. **Press [↵] to go on-line.** The screen clears.

   Note: With the terminal in emulation mode, the last line on every screen will show:

   Ctrl-Esc to Go Off-Line Std Terminal

   You are now ready to enter configuration mode.

10. **Hold down the [Alt] key and press [B].**

    This message appears:

    PRESS ANY KEY IN 60 SECONDS TO BEGIN 2760-RB MODULE CONFIGURATION

    You have 60 seconds to enter configuration mode. The screen updates the seconds as time elapses.

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Configuring with a 1784-T45 (continued)

11. **Press any key (before 60 seconds elapse) to access the configuration menu.**

    If you don't press a key within 60 seconds, you will not enter configuration mode. Repeat step 10.

```
                              2760-RB      SERIES X REVISION X
        COPYRIGHT 1989                     ALLEN-BRADLEY COMPANY, INC.
        ----------------------------------------------------------------


1X  - CONFIGURATION PARAMETERS          2X  - IDENTIFICATION NUMBERS
3   - DEVICE PORT PROTOCOL NAMES        4DM - MATCH CODE ENTRIES
5I  - DISCRETE BYTE INPUT ENTRIES       6   - THE DATA MATRIX ENTRIES
7   - THE PASS THROUGH ENTRIES          8   - NONVOLATILE SCRATCH PAD AREA
9XF - RB MODULE FUNCTIONS               AX  - HARDWARE DIAGNOSTICS
BX  - SOFTWARE DIAGNOSTICS              C   - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT   6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                              ENTER A MAIN MENU SELECTION: _
```

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Configuring with a 1770-T3

To enter configuration mode with the 1770-T3 terminal:

1. **Insert the alphanumeric keytop overlay on the terminal keyboard.**
2. **Apply system power to the module.**

   The first two LED indicators will turn green when the module is ready.
3. **Power on the terminal.**

   The Mode Selection screen appears. You are prompted to select a mode.

```
DIAGNOSTICS PASSED

                    MODE SELECTION

        KEYBOARD MODULE 1771-XX Software Revision

MODE:                   INSERT              FOR USE WITH THE
                        KEYTOP OVERLAY:     FOLLOWING PROCESSORS:

10 = PLC                1771-KBA            PLC

11 = PLC-2              1771-KfA            MINI PLC-2, PLC-2
                                            PLC-2/05, PLC-2/15
                                            PLC-2/16, PLC-2/17
                                            PLC-2/20 (LP1)
                                            PLC-2/20 (LP2)
                                            PLC-2/30

12 = ALPHANUMERIC       1771-KAA

                    SELECT DESIRED MODE? 12
```

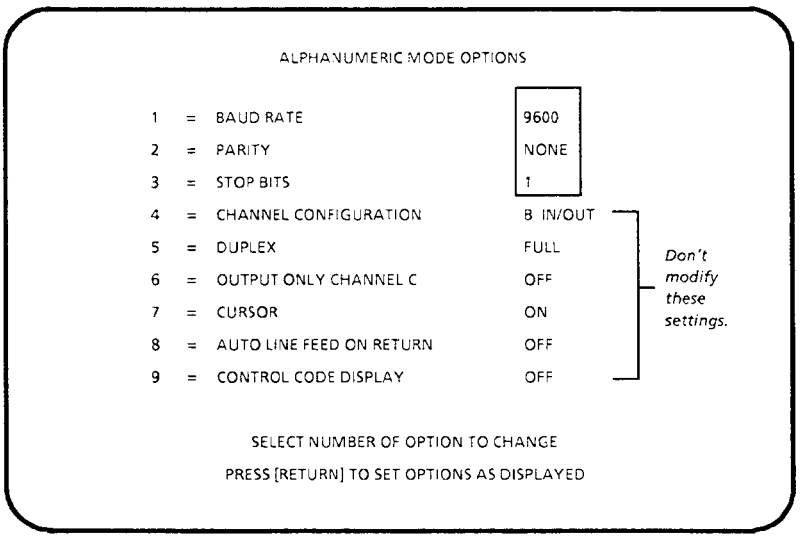
The information you see on the screen may vary from what you see here.

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Configuring with a 1770-T3 (continued)

4. **Enter 12 to select alphanumeric mode.**

   The Alphanumeric Mode Options screen appears .



   The communication settings in the box on the screen are accurate for the default settings of the configuration port. If the configuration port settings are different, make the necessary adjustments before going on to the next step. Refer to the User's Manual for your terminal.

5. **Press [RETURN] to exit the Mode Options screen.**

   The screen displays:

PRESS ANY KEY IN 60 SECONDS TO BEGIN 2760-RB MODULE CONFIGURATION

   You have 60 seconds to enter configuration mode. The screen updates the seconds as time elapses.

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Configuring with a 1770-T3 (continued)

6. **Press any key (before the 60 seconds elapse) to enter configuration mode and access the main menu.**

   If you don't press a key within 60 seconds, you will not enter configuration mode. Repeat step 5.

```
                                2760-RB     SERIES X REVISION X
COPYRIGHT 1989                              ALLEN-BRADLEY COMPANY, INC.
-------------------------------------------------------------------

1X  - CONFIGURATION PARAMETERS          2X  - IDENTIFICATION NUMBERS
3   - DEVICE PORT PROTOCOL NAMES        4DM - MATCH CODE ENTRIES
5I  - DISCRETE BYTE INPUT ENTRIES       6   - THE DATA MATRIX ENTRIES
7   - THE PASS THROUGH ENTRIES          8   - NONVOLATILE SCRATCH PAD AREA
9XF - RB MODULE FUNCTIONS               AX  - HARDWARE DIAGNOSTICS
8X  - SOFTWARE DIAGNOSTICS              C   - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT   6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                        ENTER A MAIN MENU SELECTION: _
```

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Configuring with a 1770-T4

To enter configuration mode with the 1770-T4 terminal:

1. **Insert the alphanumeric keytop overlay on the terminal keyboard.**
2. **Apply system power to the module.**

   The first two LED indicators will turn green when the module is ready.
3. **Power on the terminal.**

   The screen displays:

   ENTERING ALPHANUMERIC TERMINAL MODE

   and then:

PRESS ANY KEY IN 60 SECONDS TO BEGIN 2760-RB MODULE CONFIGURATION

   You have 60 seconds to enter configuration mode. The screen updates the seconds as time elapses.
4. **Press any key (before the 60 seconds elapse) to enter configuration mode and access the main menu.**

   If you don't press a key within 60 seconds, you will not enter configuration mode. Repeat step 3.

```
                              2760-RB     SERIES X  REVISION X
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-------------------------------------------------------------------

1X  - CONFIGURATION PARAMETERS          2X   - IDENTIFICATION NUMBERS
3   - DEVICE PORT PROTOCOL NAMES        4DM  - MATCH CODE ENTRIES
5I  - DISCRETE BYTE INPUT ENTRIES       6    - THE DATA MATRIX ENTRIES
7   - THE PASS THROUGH ENTRIES          8    - NONVOLATILE SCRATCH PAD AREA
9XF - RB MODULE FUNCTIONS               AX   - HARDWARE DIAGNOSTICS
BX  - SOFTWARE DIAGNOSTICS              C    - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT    6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                          ENTER A MAIN MENU SELECTION: _
```

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Configuring with an ANSI Standard Terminal

To enter configuration mode with an ANSI standard terminal, follow these steps:

1. **Apply system power to module.**

   The first two LED indicators will turn green when the module is ready.

2. **Power on the terminal and press the [BREAK] key.**

   The screen displays:

```
PRESS ANY KEY IN 60 SECONDS TO BEGIN 2760-RB MODULE CONFIGURATION
```

   You have 60 seconds to enter configuration mode. The screen updates the seconds as time elapses.

3. **Press any key** (but the [BREAK] key) **to enter configuration mode and access the main menu.**

   If you don't press a key within 60 seconds, you will not enter configuration mode. Repeat step 2.

```
                                2760-RB     SERIES X  REVISION X
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        ---------------------------------------------------------------

1X   - CONFIGURATION PARAMETERS          2X   - IDENTIFICATION NUMBERS
3    - DEVICE PORT PROTOCOL NAMES        4DM  - MATCH CODE ENTRIES
5I   - DISCRETE BYTE INPUT ENTRIES       6    - THE DATA MATRIX ENTRIES
7    - THE PASS THROUGH ENTRIES          8    - NONVOLATILE SCRATCH PAD AREA
9XF  - RB MODULE FUNCTIONS               AX   - HARDWARE DIAGNOSTICS
BX   - SOFTWARE DIAGNOSTICS              C    - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT    6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                          ENTER A MAIN MENU SELECTION: _
```

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Chapter 6 Using the Configuration Software

Chapter Objectives

The previous chapter showed you how to set up and connect various programming terminals to the module for configuration purposes. This chapter focuses on the main menu of the configuration software and conventions of using the software.

Looking at the Main Menu

After connecting a programming terminal to the configuration port of the module and entering configuration mode, the main menu appears. It looks like this:

Figure 6.1
Main Menu

```
                              2760-RB     SERIES X  REVISION X
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              ----------------------------------------------------------------


1X   - CONFIGURATION PARAMETERS          2X   - IDENTIFICATION NUMBERS
3    - DEVICE PORT PROTOCOL NAMES        4DM  - MATCH CODE ENTRIES
5I   - DISCRETE BYTE INPUT ENTRIES       6    - THE DATA MATRIX ENTRIES
7    - THE PASS THROUGH ENTRIES          8    - NONVOLATILE SCRATCH PAD AREA
9XF  - RB MODULE FUNCTIONS               AX   - HARDWARE DIAGNOSTICS
BX   - SOFTWARE DIAGNOSTICS              C    - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT    6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                              ENTER A MAIN MENU SELECTION: _
```

The menu lists all of the functions you can perform. All menu selections are entered at the bottom of the screen in response to this prompt:

```
ENTER A MAIN MENU SELECTION: _
```

The next section shows you how to enter a menu selection.

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Main Menu Selections

Each *Menu Selection*, referred to as a *Function*, begins with an alphanumeric character used as a descriptor. The descriptors are 1 - 9, A, B, and C.

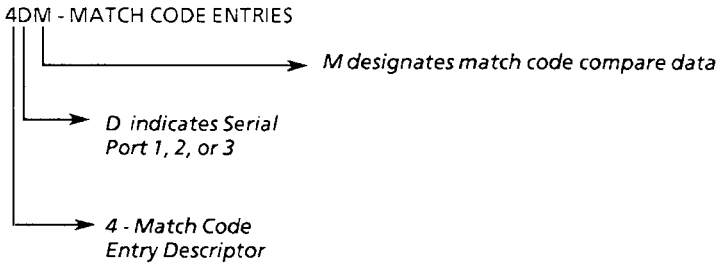
Some descriptors are followed by an alphabetic variable. Alphabetic variables indicate whether a port number, alphabetic function code, or alphabetic entry number should be entered. The alphabetic variables are X, D, F, M, and I.

- X represents ports 0 through 7
  - 0- where you direct configuration commands
  - 1- device port
  - 2- device port
  - 3- device port
  - 4- configuration port
  - 5- communicates with I/O rack slot 0
  - 6- communicates with I/O rack slot 1
  - 7- is reserved
- D represents ports 1 through 3
  - 1- device port
  - 2- device port
  - 3- device port
- F represents functions A through E
  - A- Reset
  - B- Set Defaults
  - C- Flush
  - D- Initialize
  - E- Clear Diagnostics
- M represents one of twenty match code entries labeled A to T (A = 1, B = 2, C = 3,... R = 18, S = 19, T = 20).
- I represents one of eight discrete byte input entries labeled A to H (A = 1, B = 2, C = 3,... G = 7, H = 8).

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Main Menu Selections (continued)

For example, let's examine menu selection 4DM:



Displaying/Editing Configuration Settings

When selecting a menu function, parameters display one screen at a time. At the end of each screen, you are asked if you want to continue the display:

CONTINUE THIS SELECTION (YES/NO) ?

To view the entire list, enter *Y* each time this prompt appears. To discontinue the display, enter *N*. After the viewing the entire or partial list you return to the menu or are asked if you want to edit the settings:

EDIT THIS SELECTION (YES/NO) ?

Answer *N* and you will return to the main menu. Answer *Y* and a series of questions appear. Some questions require a *value*, some *Yes* or *No*, and others require you to *Enable* or *Disable* a function. If you do not wish to change a certain parameter, press [RETURN] and the next question displays.

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Displaying/Editing Configuration Settings (cont.)

Each question shows the current setting and a range of possible values within parentheses. The examples below show the basic format for each type of question.

1. Yes or No.

   ```
   9600 BITS PER SECOND (YES/NO) = YES = ?
   ```

   The current response appears between the "=" signs. To accept the response and move on to the next question, press [RETURN]. To change the response, enter Y or N as appropriate.

2. Enable or Disable.

   ```
   MODEM CONTROL (ENABLE/DISABLE) = DISABLE = ?
   ```

   The current setting appears between the "=" signs. To accept the setting and move on to the next question, enter [RETURN]. To change the setting, enter E or D as appropriate.

3. Number or Letter value.

   ```
   DF1 RETRIES (DEC 0...255) = 10 = ?
   ```

   The current value appears between the "=" signs. This question requires you to enter a number value between 0 and 255. To accept the value and move on to the next question, enter [RETURN]. To change the value, enter a value between 0 and 255.

   ```
   SETUP DATA [0] (HEX 0...ff) = d = ?
   ```

   This question requires you to enter a HEX value between 0 and ff. Hex values consist of numbers and/or letters.

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Saving Configuration Settings

You can end an edit session in one of three ways:

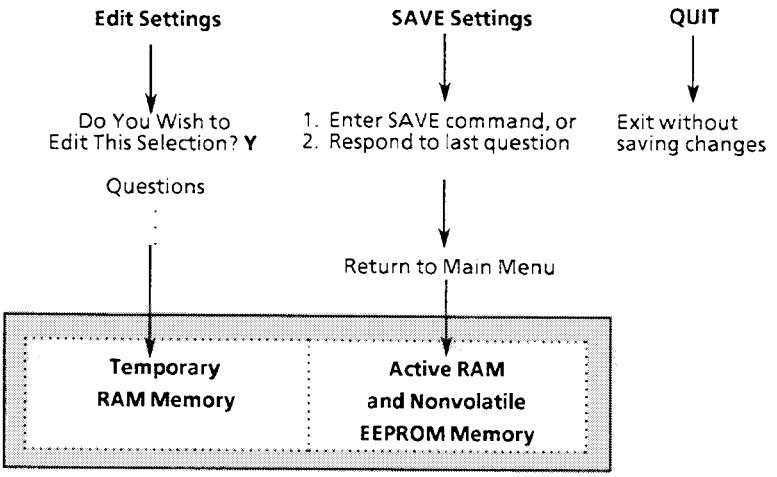
1. Go through the entire list of questions.
2. Enter the SAVE command at any prompt to end the session early and save all changes up to that point.

   Do not enter the SAVE command on the same line that you change a parameter setting. Enter SAVE on the next line.
3. Enter the QUIT command at any prompt to cancel the session without saving any changes.

When ending the session in one of the three ways listed above, this prompt appears:

```
PRESS THE RETURN KEY TO CONTINUE. _
```

Until you actually return to the main menu, all changes are stored in temporary RAM memory. Press [RETURN] to display the main menu. Once the main menu shows, the settings are automatically stored in active RAM and nonvolatile EEPROM memory.



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Configuration Keys

Some keyboard keys and commands serve a specific function during configuration operations.

[BREAK] Accesses configuration mode using an ANSI standard terminal. The [BREAK] key may be labeled differently on your terminal.

The list below defines the equivalent of the [BREAK] key on other programming terminals:

[MODE SELECT]	1770-T3 terminal
Power Off/On	1770-T4 terminal
[Alt] [B]	1784-T45 terminal

Note: If parity is set to No-Break for the configuration port of series B modules, the [BREAK] key or a break condition is ignored and you will not enter configuration mode.

[RETURN] Enters or accepts values during configuration. This key is sometimes labeled [ENTER] or [↵].

All examples in the rest of this manual use **[RETURN].**

[BACKSPACE] Backs up one character and erases the character at that cursor position. Use this key to correct typing errors. The [BACKSPACE] key is sometimes labeled [←], [DELETE], or [RUBOUT].

[A] - [Z]
[a] - [z] Some configuration questions require you to enter a letter. Enter letters in uppercase or lowercase.

[0] - [9] Some configuration questions require you to enter a number value from 0 to 9.

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Exiting Configuration Mode

To exit the main menu and leave configuration mode, select function *C - Exit Configuration Mode* from the main menu.

ENTER MAIN MENU SELECTION: **C [RETURN]**

Guidelines for Selecting Menu Options

Each chapter from 7 through 16 covers a separate menu option. The options are covered in the order that they appear on the menu. When configuring the ports of the module, **we recommend that you select menu options in this order:**

Configure the Device Ports

1. Select option 3 to reassign a communication protocol to each of the device ports (Chapter 9).
2. Select option 2X ($X = 1,2$, or 3) to identify the device connected to each port (Chapter 8).
3. Select option 1X ($X = 1,2$, or 3) to reconfigure the communication and protocol parameters for each device port (Chapter 7).

Display Diagnostic Information

1. Select option AX ($X = 1,2$, or 3) to display hardware diagnostic information for each module port (Chapter 15).
2. Select option BX ($X = 1,2$, or 3) to display software diagnostic information for each module port (Chapter 16).

Use Module Utilities

Use the reset, initialize, flush, set defaults, and clear diagnostic functions as necessary for each port. (See Chapter 14).

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Perform Special Operations

Use the match code, discrete byte input, and data matrix functions as required by your application. (See Chapters 10, 11, and 12).

After initial configuration and setup, you can select options as necessary and in the order most appropriate for your setup.



CAUTION: Do not configure the module during on-line operations. All configuration changes take effect immediately. All operations that change the configuration of the device ports should be done off-line.

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Chapter 7 1X - Configuration Parameters

Chapter Objectives

Menu function *1X - Configuration Parameters* allows you to display and change the configuration settings of the following module ports:

- Serial device ports (ports 1, 2, and 3)
- Configuration port (port 4)

This chapter focuses on the configuration port (port 4). Device port configuration is covered in the appropriate Protocol Cartridge User's Manual.

Selecting Configuration Parameters

A box surrounds function *1X* below to shows its location on the menu. To select this function, enter 1 followed by a port number (0 to 7) at the Menu Selection prompt.

```
                              2760-RB     SERIES X REVISION B
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-------------------------------------------------------------------

1X  - CONFIGURATION PARAMETERS          2X  - IDENTIFICATION NUMBERS
3   - DEVICE PORT PROTOCOL NAMES        4DM - MATCH CODE ENTRIES
5I  - DISCRETE BYTE INPUT ENTRIES       6   - THE DATA MATRIX ENTRIES
7   - THE PASS THROUGH ENTRIES          8   - NONVOLATILE SCRATCH PAD AREA
9XF - RB MODULE FUNCTIONS               AX  - HARDWARE DIAGNOSTICS
BX  - SOFTWARE DIAGNOSTICS              C   - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT   6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                          ENTER A MAIN MENU SELECTION: _
```

Valid configuration selections are 10 through 17. Each selection and its basic function is described briefly on the next page.

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1X

10 - Configuration Parameters of RB Command Processor
The following prompt appears, but you cannot change it.

RESERVED FOR FUTURE USE (DEC 0...0) = 0.

11 - Configuration Parameters of Serial Port 1
This information is protocol specific. See your Protocol Cartridge User's manual for details on this menu selection.

12 - Configuration Parameters of Serial Port 2
This information is protocol specific. See your Protocol Cartridge User's manual for details on this menu selection.

13 - Configuration Parameters of Serial Port 3
This information is protocol specific. See your Protocol Cartridge User's manual for details on this menu selection.

14 - Configuration Parameters of Configuration Port
This option enables you to modify parameters of the configuration port. The parameters vary depending on how the configuration port is used. The rest of this chapter covers this menu function.

15 - Configuration Parameters of I/O Rack Slot 0
This option controls the interrupts for I/O rack slot 0. The following prompt appears, but you cannot change it.

RESERVED FOR FUTURE USE (HEX 0..0) = 0.

16 - Configuration Parameters of I/O Rack Slot 1
This option controls the interrupts for I/O rack slot 1. The following prompt appears, but you cannot change it.

RESERVED FOR FUTURE USE (HEX 0...0) = 0.

17 - Reserved
This function is reserved for future use. The following prompt appears, but you cannot change it.

RESERVED FOR FUTURE USE (DEC 0...0) = 0.

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14 - Configuration Port Parameters

The configuration port (Port 4) has three sets of configuration parameters. Each set performs a specific function.

1. Configure the module (limited set).
2. Enable communications with a Dumb Terminal device.
3. Enable communications with a DF1 device (without PCCC or IDP support).

The configuration port is assigned an identification number. This number determines the function of the port and what group of configuration parameters is used.

Menu option *2X* (24) - *Identification Numbers* defines the function of the configuration port. For more details on identification numbers, see Chapter 8.

The table below defines the parameters used for each configuration port identification number.

Configuration Port Identification Numbers (Menu selection 24)	Configuration Parameters Used
2760-RB Module Configuration Only, 150h *	Configuration Parameters
Dumb Term. Unspecified RB Network Device,130h Dumb Term. Unspecified Protocol Device, 13fh	Dumb Terminal Parameters
DF1 Unspecified RB Network Device, 8030h DF1 Unspecified Protocol Device, 803fh	DF1 Parameters

* Module Configuration is the default function of Port 4.

The sections that follow define each group of configuration parameters.

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Parameters for Module Configuration

If the configuration port is used only to configure the module, the parameters in Figure 7.1 display when you select menu option 14.

1X

The shaded parameters are not active during configuration mode; just the unshaded. Any changes you make to the shaded parameters are ignored.

Figure 7.1
Module Configuration Parameters

```
ENTER A MAIN MENU SELECTION: 14
XON/XOFF PROTOCOL (ENABLE/DISABLE) = DISABLE
BYTE SWAPPING ON OUTPUT ONLY(ENABLE/DISABLE) = DISABLE
BINARY DATA NO CONVERSIONS (YES/NO) = YES

HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE
HEADER BYTE LENGTH (DEC 0..4) = 0
HEADER DATA[0] (HEX 0...ff) = 0.
HEADER DATA[1] (HEX 0...ff) = 0.
HEADER DATA[2] (HEX 0...ff) = 0.
HEADER DATA[3] (HEX 0...ff) = 0.

TRAILER BYTE LENGTH (DEC 0..4) = 2.
TRAILER DATA[0] (HEX 0...ff) = d.
TRAILER DATA[1] (HEX 0...ff) = a.
TRAILER DATA[2] (HEX 0...ff) = 0
TRAILER DATA[3] (HEX 0...ff) = 0.
MAX DATA LENGTH IN (DEC 0...124) = 124.
MIN DATA LENGTH OUT (DEC 0...255) = 0.
PAD CHARACTER (HEX0...ff) = 0.

DEFAULT RB DESTINATION (HEX 0...ff) = 5.
DEFAULT RB SOURCE (HEX 0...ff) = 4.
DEFAULT RB ADDRESS (HEX 0...ffff) = 0.

SETUP TIMEOUT/SECS (DEC 0...255) = 0.
SETUP BYTE LENGTH (DEC 0...78) = 26.
SETUP DATA[0] (HEX 0...ff) = d.
SETUP DATA[1] (HEX 0...ff) = a.
SETUP DATA[2] (HEX 0...ff) = a.
                .
                .
                .
SETUP DATA[76] (HEX 0...ff) = 0.
SETUP DATA[77] (HEX 0...ff) = 0.
```

Setup Parameters

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Parameters for Module Configuration *(continued)*

When configuring the module or monitoring operations, a programming terminal is connected to port 4. The purpose of the setup parameters is to clear the screen of the programming terminal at power-up or reset.


```
SETUP TIMEOUT/SECS (DEC 0...255) = 0.
SETUP BYTE LENGTH (DEC 0...78) = 26.
SETUP DATA[0] (HEX 0...ff) = d          (carriage return)
SETUP DATA[1] (HEX 0...ff) = a          (linefeed)
SETUP DATA[2] (HEX 0...ff) = a.         (linefeed)
SETUP DATA[2] (HEX 0...ff) = a          (linefeed)
                    .
                    .
                    .
SETUP DATA[24] (HEX 0...ff) = a.        (linefeed)
SETUP DATA[25] (HEX 0...ff) = a.        (linefeed)
SETUP DATA[26] (HEX 0...ff) = 0.
SETUP DATA[27] (HEX 0...ff) = 0.
                    .
                    .
                    .
SETUP DATA[76] (HEX 0...ff) = 0.
SETUP DATA[77] (HEX 0...ff) = 0.
```

Twenty six characters are sent to the programming terminal to clear the screen. The first character sent out is a carriage return followed by twenty-six line feeds. Each of the above parameters is defined later on page 7-33.

You should not modify these parameters.

Important: All communication parameters (baud rate, parity, stop bits data bits, modem control) for the configuration port are set with dip switches.

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Parameters for a DF1 Device

1X

This section shows the parameters that display if the configuration port (port 4) is set to communicate with a DF1 device (not including PCCC or IDP protocols).

To communicate with a DF1 device, one of the following identification numbers must be assigned to port 4:

- DF1 Unspecified RB Network Device, 8030h
- DF1 Unspecified Protocol, 803fh

If the configuration port is identified as a DF1 Unspecified RB Network Device, the parameters in Figure 7.2 display when you selection menu option 14:

Figure 7.2
Configuration Parameters for DF1 Unspecified RB Network Device

```
ENTER A MAIN MENU SELECTION: 14

DF1 RESPONSE TIMEOUT/SECS (DEC 0...255) = 3.
DF1 RETRIES (DEC 0...255) = 10.
BCC CHECKING (ENABLE/DISABLE) = ENABLE.

DEFAULT RB DESTINATION (HEX 0...ff) = 5.
DEFAULT RB SOURCE (HEX 0...ff) = 4.
```

If the configuration port is identified as a DF1 Unspecified Protocol Device, the parameters in Figure 7.3 display when you select menu option 14:

Figure 7.3
Configuration Parameters for DF1 Unspecified Protocol Device

```
ENTER A MAIN MENU SELECTION: 14

DF1 RESPONSE TIMEOUT/SECS (DEC 0...255) = 3.
DF1 RETRIES (DEC 0...255) = 10.
BCC CHECKING (ENABLE/DISABLE) = ENABLE.
```

The parameters in Figures 7.2 or 7.3 are defined in the sections that follow.

Important: When using the configuration port to communicate with a DF1 device, select a No-Break parity setting with the dip switches.

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DF1 Response Timeout

Specifies the number of seconds the port will wait for a DF1 response (ACK/NAK) to a message transmission before timing out.

You can enter a value from 0 to 255 seconds, where 0 indicates no timeout (or infinite wait). The default value is 3 seconds, which means a positive (ACK) or negative (NAK) acknowledgement must be received within 3 seconds after the actual transmission.

```
DF1 RESPONSE TIMEOUT/SECS (DEC 0...255) = 3 = ?
```

If an ACK is received within three seconds, the message has been transmitted successfully and the next message is sent.

If a NAK is received within three seconds, the message is resent. The number of times the message is resent depends on the DF1 Retry value.

If neither an ACK or NAK is received within three seconds, a timeout occurs. The port requests another transmission of the response. The number of timeouts allowed depends on the DF1 Retry value.

To accept the default or current timeout value and move on to the next question, enter [RETURN].

```
DF1 RESPONSE TIMEOUT/SECS (DEC 0...255) = 3 = ? [RETURN]
```

To change the value, enter a new timeout value and press [RETURN]. For example, to specify a timeout value of 10 seconds after each message transmission, enter:

```
DF1 RESPONSE TIMEOUT/SECS (DEC 0...255) = 3 = ? 10 [RETURN]
```

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DF1 Retries

1X

Specifies the number of DF1 retries the port will allow for each message transmission. This parameter has two functions:

1. Specifies the number of times to resend a message when a NAK has been received.
2. Specifies the number of times to request a response to a message when a timeout has occurred.

You can enter a value from 0 to 255. The default value is 10, which means the port will allow ten NAKs and/or 10 timeouts for each message transmission.

```
DF1 RETRIES (DEC 0...255) = 10.
```

To accept the default or current retry value and move on to the next question, enter [RETURN].

```
DF1 RETRIES (DEC 0...255) = 10 = ? [RETURN]
```

To modify the setting, enter another retry value and press [RETURN]. For example, to specify a retry value of 15 for each message transmission, enter:

```
DF1 RETRIES (DEC 0...255) = 10 = ? 15 [RETURN]
```

BCC Checking

Specifies whether the Block Check Character (BCC) is enabled for each message transmission. BCC is a technique used to check the accuracy of each data message. The Options are E for Enabled or D for Disabled. The default is E or BCC checking enabled. When BCC checking is disabled, messages are not checked for accuracy.

```
BCC CHECKING (ENABLE/DISABLE) = ENABLE = ?
```

To accept the default or current setting and move on to the next question, enter [RETURN].

```
BCC CHECKING (ENABLE/DISABLE) = ENABLE = ? [RETURN]
```

To change the current setting, enter E or D as appropriate. For example, to disable BCC checking, enter D and [RETURN].

```
BCC CHECKING (ENABLE/DISABLE) = DISABLE = ? D [RETURN]
```

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Destination

Tells the module where to send or direct a message. Valid destination values are 0 to 5. Numbers 0 to 5 correspond to a module port or location.

0	RB command processor
1	Device port 1
2	Device port 2
3	Device port 3
4	Configuration port
5	1771-I/O backplane, slot 0 (for block transfers)
FF	Discards messages

The value FF Hex (or 255) discards messages but does not generate an error message. **Messages directed to locations other than 0 to 5 or FF (255) are discarded and may generate an error message.**

The default value is 5, which means all messages are directed to the PLC or slot 0 of the 1771-I/O backplane.

```
DEFAULT RB DESTINATION (HEX 0...ff) = 5 = ?
```

To accept the default value of 5 and move on to the next question, enter [RETURN] .

```
DEFAULT RB DESTINATION (HEX 0...ff) = 5 = ? [RETURN]
```

To change the default value of 5, enter another valid location value and press [RETURN].

Important: The identification number assigned to the port determines if the destination parameter is used.

- DF1 Unspecified Protocol.

  Messages are received from the device without a source and destination. The module uses the source supplied by the configuration parameters to route the message.

- DF1 Unspecified RB Network Device.

  Messages are received from the device with a source and destination. The module does not use the source from the configuration parameters.

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Source

1X

Tells the module where a message is coming from. All replies to messages are sent back to the source. Valid source entries are 0 to 5. Each number corresponds to a module port or location.

0	RB command processor
1	Device port 1
2	Device port 2
3	Device port 3
4	Configuration port
5	1771-I/O backplane, slot 0 (for block transfers)

The default value that appears after first power-up is 4, which means the source of all message is the configuration port.

```
DEFAULT RB SOURCE (HEX 0...ff) = 4
```

To accept the default value of 4, press [RETURN].

```
DEFAULT RB SOURCE (HEX 0...ff) = 4 = [RETURN]
```

After pressing [RETURN], the screen displays the next question.

To specify another module port or location, enter the appropriate value and press [RETURN].

Important: The identification number assigned to the port determines if this parameter is used or not.

- DF1 Unspecified Protocol.

  Messages are received from the device without a source and destination. The module uses the source supplied by the configuration parameters to route the message.

- DF1 Unspecified RB Network Device.

  Messages are received from the device with a source and destination. The module does not use the source from the configuration parameters.

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Parameters for a Dumb Terminal Device

If the configuration port is set to communicate with a dumb terminal device, the parameters in Figure 7.4 will display when you select menu option 14.

Figure 7.4
Configuration Parameters for a Dumb Terminal Device



These parameters are only active if the configuration port is assigned one of the following identification numbers:

- Dumb Term. Unspecified RB Network Device, 130h
- Dumb Term. Unspecified Protocol, 13fh

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Transmission Parameters

1X

The first group of parameters in Figure 7.4 affect the transmission of data to and from the configuration port.

```
XON/XOFF PROTOCOL (ENABLE/DISABLE) = DISABLE = ?
BYTE SWAPPING ON OUTPUT ONLY (ENABLE/DISABLE) = DISABLE = ?
BINARY DATA NO CONVERSIONS = Yes = ?
```

The following sections define these parameters and show you how to edit them.

XON / XOFF

Specifies whether the XON/XOFF flow control characters are enabled during data transmission. Valid responses are E for Enabled or D for Disabled. The default setting is D or XON/XOFF disabled.

```
XON/XOFF PROTOCOL (ENABLE/DISABLE) = DISABLE = ?
```

If disabled, the XON/XOFF characters are considered data.

If enabled, the XON character is sent when you reset or initialize the port. The XOFF character is sent when the buffer is approximately 70% full. When the buffer is less than 30% full, an XON is sent again.

To accept the default or current setting and move on the next question, press [RETURN].

```
XON/XOFF PROTOCOL (ENABLE/DISABLE) = DISABLE = ? [RETURN]
```

To modify the current setting, enter E or D as appropriate. For example, to enable XON/XOFF during data transmission, enter E and [RETURN].

```
XON/XOFF PROTOCOL (ENABLE/DISABLE) = DISABLE = ? E [RETURN]
```

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Byte Swapping On Output Only

Specifies whether the high and low bytes of a sixteen bit data word (word = 2 bytes) are swapped during the serial transmission of data to and from the module. Byte swapping effects only message data. Valid responses are E for Enabled or D for Disabled. The default setting is D or byte swapping disabled.


```
BYTE SWAPPING ON OUTPUT ONLY (ENABLE/DISABLE) = DISABLE = ?
```

To accept the default or current setting and move on to the next question, press [RETURN].

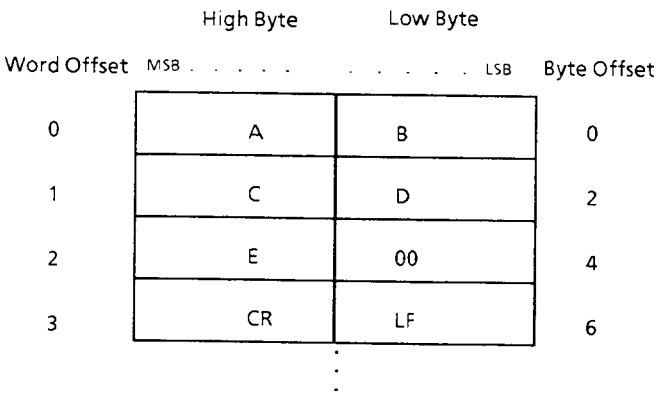
```
BYTE SWAPPING ON OUTPUT ONLY (ENABLE/DISABLE) = DISABLE = ? [RETURN]
```

To modify the current setting, enter E or D as appropriate. For example, to enable byte swapping, enter E and press [RETURN].

```
BYTE SWAPPING ON OUTPUT ONLY (ENABLE/DISABLE) = DISABLE = E [RETURN]
```

If the host is a PLC controller, data is transmitted with the low byte of each data word first and then the high byte.

Let's look at an example. The following data structure contains the ASCII string "ABCDE".



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Byte Swapping on Output Only (continued)

The ordering of the bytes during serial transmission would be:

B - A - D - C - 00 - E - LF - CR

If byte swapping is enabled, the ordering of bytes during serial transmission would be:

A - B - C - D - E - 00 - CR - LF



CAUTION: If byte swapping is enabled, all data should end on a word boundary and not in the middle of a word. To ensure that all data ends on a word boundary, the module adds a NULL character to each byte that does not contain data. If you use odd data lengths, you may see NULL characters in your data.

Data Type Conversions

Specifies whether binary data is converted to another data type as it enters and/or exits the configuration port. The default is BINARY DATA NO CONVERSIONS, which means the binary data is not converted to another data type as it enters or exits the port. The other options are described in Table 7.A.

```
BINARY DATA NO CONVERSIONS = Yes = ?
```

To accept the default or current setting and move on to the next question, press [RETURN].

```
BINARY DATA NO CONVERSIONS = Yes = ? [RETURN]
```

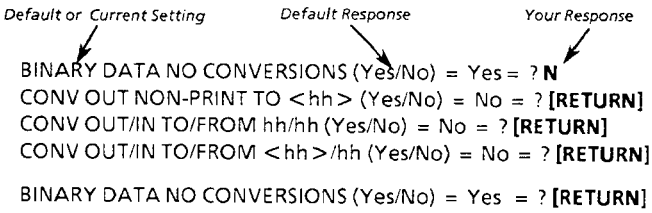
To override the current setting and display the next option, enter N and press [RETURN].

```
BINARY DATA NO CONVERSIONS = Yes = ? N [RETURN]
CONV OUT NON-PRINT TO <hh> (Yes/No) = No = ?
```

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Data Type Conversions (continued)

To display the rest of the options, press [RETURN] at the end of each line. The questions repeat until you enter Y to select an option, or press [RETURN] to retain the default setting.



To convert each non-printable output character to two hexadecimal characters in < > brackets, select the second option.

```
BINARY DATA NO CONVERSIONS = Yes = ? N [RETURN]
CONV OUT NON-PRINT TO <hh> (Yes/No) = No = ? Y [RETURN]
```

This setting becomes the default and will appear at the top of the list the next time you edit the data type parameter.

Important: If you enter the SAVE or QUIT command before selecting an option, the current option remains in effect.

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Data Type Conversions *(continued)*

1X

Table 7.A
Data Type Conversions for Dumb Terminal Devices

BINARY DATA NO CONVERSIONS

All data (00-FF Hex Byte) on input and output is in binary form.

Input	→	Module
T (ASCII) or 54 (Hex byte)		01010100
^G (ASCII) or 07 (Hex byte)		00000111

Module	→	Output
01010100		T (ASCII) or 54 (Hex byte)
00000111		^G (ASCII) or 07 (Hex byte)

CONV OUT NON-PRINT TO <hh>

All data (00-FF Hex Byte) on input is in binary form.

Input	→	Module
T (ASCII) or 54 (Hex byte)		01010100
^G (ASCII) or 07 (Hex byte)		00000111

On output, all printable characters are in binary form. The ASCII printable character range is from Space (20 Hex) to z (7A Hex).

Module	→	Output
01010100		T (ASCII) or 54 (Hex byte)

Characters outside of the 20 Hex to 7A Hex range are nonprintable characters. On output, each nonprintable character is converted to two ASCII hexadecimal characters enclosed in angle brackets < >.

Module	→	Output
00000111		<07> (ASCII) or 3C 30 37 3E (Hex bytes)

Note: Conversions do not affect header and trailer data. Header or trailer characters found in data portion of message will be treated as a header or trailer.

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Data Type Conversions (continued)

Table 7.A (continued)
Data Type Conversions for Dumb Terminal Devices

CONV OUT/IN NON-PRINT TO/FROM hh/hh

On input, every two ASCII characters are converted to their binary/hex byte equivalent.

Input	→	Module
54 (ASCII) or 35 34 (Hex bytes)		01010100
07 (ASCII) or 30 37 (Hex bytes)		00000111

On output, each binary/hex byte value is converted to two consecutive ASCII hexadecimal characters.

Module	→	Output
01010100		54 (ASCII) or 35 34 (Hex bytes)
00000111		07 (ASCII) or 30 37 (Hex bytes)

CONV OUT/IN NON-PRINT TO/FROM <hh>/hh

On input, every two ASCII hexadecimal characters are converted to their binary/hex byte equivalent.

Input	→	Module
54 (ASCII) or 35 34 (Hex Byte)		01010100
07 (ASCII) or 30 37 (Hex Byte)		00000111

On output, each binary or hex byte value is converted to two consecutive ASCII characters enclosed in angle brackets <>.

Module	→	Output
01010100		<54> (ASCII) or 3C 35 34 3E (Hex bytes)
00000111		<07> (ASCII) or 3C 30 37 3E (Hex bytes)

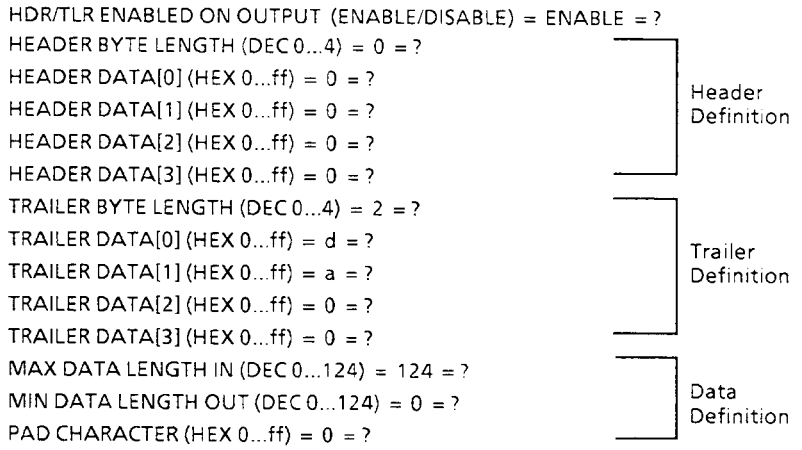
Note: Conversions do not affect header and trailer data. Header or trailer characters found in data portion of message will be treated as a header or trailer.

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Message Parameters

1X

The second group of questions in Figure 7.3 define the format of each message that enters and exits the configuration port using Dumb Terminal protocol.



The default message is sent with a trailer of carriage return/line feed, and a maximum of 124 characters or bytes.

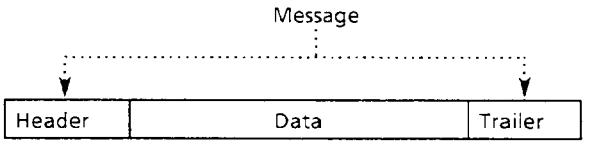
The following sections define the format of a message and show you how to edit the message parameters. To move through these questions without making changes, press [RETURN] at the end of each line.

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Basic Message Format

Messages formatted for Dumb Terminal protocol consist of three basic parts:

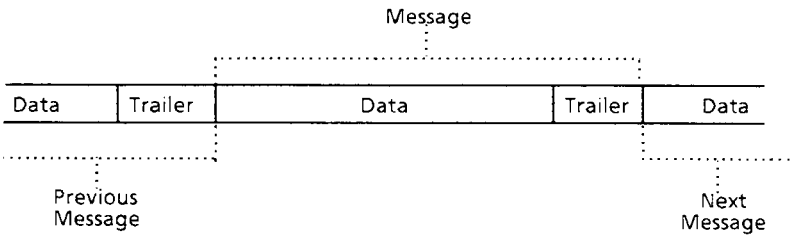
1. *Header*. A string of characters that mark the beginning of each message. The header is optional and only valid when used with a trailer.
2. *Trailer*. A string of characters that mark the end of each message. The trailer is optional.
3. *Data*. The actual data to transmit. The data cannot exceed 124 bytes or the maximum length set for messages.



Variations of Message Format

There are three variations of the basic message format:

1. Message is transmitted with a **trailer only**.

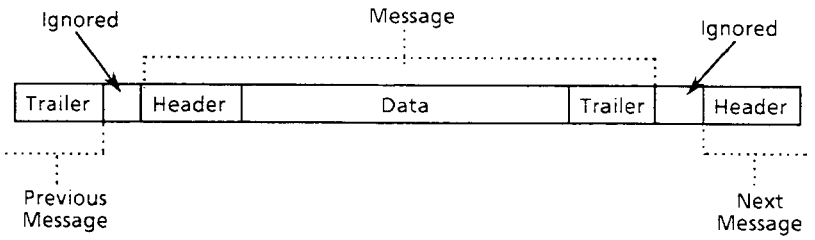


This is the **default** format of messages received from or sent to a dumb terminal device. The data portion of the message cannot exceed 124 characters and is followed by a trailer of carriage return and line feed.

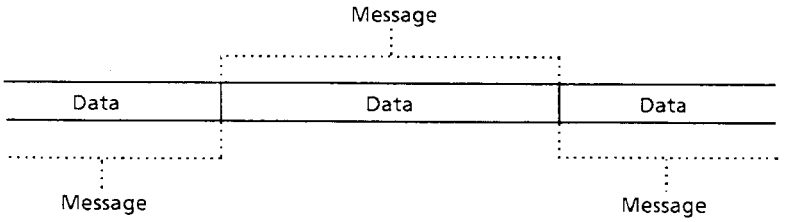
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Variations of Message Format (continued)

2. Message is transmitted with a **header and trailer**. Characters between the trailer and header are ignored.



3. Message is transmitted **without a header and trailer**. The maximum data length marks the start and end of a message.



The following sections show you how modify the parameters of each message segment.

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Header/Trailer on Output

Specifies whether the header and trailer are transmitted with the output message as it exits the configuration port. Valid responses are E for Enabled or D for Disabled. The default is E, which means all output messages are transmitted with the defined header and trailer.

```
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE = ?
```

To accept the default or current setting and move on to the next question, press [RETURN].

```
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE = ? [RETURN]
```

To modify the current setting, enter E or D as appropriate. For example, to disable the use of headers and trailers on messages, enter D and press [RETURN].

```
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE = ? D [RETURN]
```

Header Definition

The header is a group of characters that mark the beginning of each message. Parameters that define a header include header length and header data.

Header Length

Specifies the number of characters or bytes of data in the header. You can enter a value from 0 to 4. The default header length is 0, which indicates no header. Every two bytes of data equals one sixteen bit word.

```
HEADER BYTE LENGTH (DEC 0...4) = 0 = ?
```

To accept the default or current value and move on to the next question, press [RETURN].

```
HEADER BYTE LENGTH (DEC 0...4) = 0 = ? [RETURN]
```

To change the default, enter another value and press [RETURN]. For example, to specify a header length of two bytes, enter 2 and press [RETURN].

```
HEADER BYTE LENGTH (DEC 0...4) = 0 = ? 2 [RETURN]
```

The new value becomes the default and is displayed the next time you edit settings.

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Header Definition *(continued)*

Header Data

1X

Specifies the header data. You can enter one to four characters or bytes of data in the header. Each character or byte of data is entered on a single line and requires a HEX value from 0 to ff. The default value for each header byte is 0, which indicates NUL characters.

```
HEADER DATA[0] (HEX 0...ff) = 0 = ?
HEADER DATA[1] (HEX 0...ff) = 0 = ?
HEADER DATA[2] (HEX 0...ff) = 0 = ?
HEADER DATA[3] (HEX 0...ff) = 0 = ?
```

The number of characters in the header should match the header length. If the header length is 0, header data is ignored. If the header length is 2, the header data should contain two characters; one in header byte [0] and one in header byte [1]. Data stored in other bytes is ignored.

To accept the default or current value for each header byte, press [RETURN] at the end of each line.

```
HEADER DATA[0] (HEX 0...ff) = 0 = ? [RETURN]
HEADER DATA[1] (HEX 0...ff) = 0 = ? [RETURN]
HEADER DATA[2] (HEX 0...ff) = 0 = ? [RETURN]
HEADER DATA[3] (HEX 0...ff) = 0 = ? [RETURN]
```

To change the current value of a header byte, enter another HEX value and press [RETURN]. For example, the header byte length is 2. To include two asterisks "*" in the header, enter the HEX value 2A into header byte [0] and [1]. The value 2A is the HEX equivalent of the ASCII "*" character.

```
HEADER DATA[0] (HEX 0...ff) = 0 = ? 2A [RETURN]
HEADER DATA[1] (HEX 0...ff) = 0 = ? 2A [RETURN]
HEADER DATA[2] (HEX 0...ff) = 0 = ? [RETURN]
HEADER DATA[3] (HEX 0...ff) = 0 = ? [RETURN]
```

Always enter header data in sequential order, starting with HEADER DATA [0].

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Trailer Definition

The trailer is a group of characters that mark the end of each message. Parameters that define a trailer include trailer length and trailer data.

Trailer Length

Specifies the number of characters or bytes of data in the trailer. You can enter a value from 0 to 4 (0 indicates no trailer). The default trailer length is 2.

```
TRAILER BYTE LENGTH (DEC 0...4) = 2 = ?
```

To accept the default or current value and move on to the next question, press [RETURN].

```
TRAILER BYTE LENGTH (DEC 0...4) = 2 = ? [RETURN]
```

To change the default, enter another value between 0 and 4, and press [RETURN]. For example, to specify a trailer byte length of three, enter 3 and press [RETURN].

```
HEADER BYTE LENGTH (DEC 0...4) = 2 = ? 3 [RETURN]
```

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Trailer Definition (continued)

Trailer Data

1X

Specifies the trailer data. You can enter one to four characters or bytes of data in the trailer. Each character or byte of data is entered on a single line and requires a HEX value from 0 to ff. The default trailer is carriage return (CR) and line feed (LF). The HEX equivalent of carriage return is D; the HEX equivalent of linefeed is A. The last two bytes of data are not used and contain 0's.

```
TRAILER DATA[0] (HEX 0...ff) = d = ?
TRAILER DATA[1] (HEX 0...ff) = a = ?
TRAILER DATA[2] (HEX 0...ff) = 0 = ?
TRAILER DATA[3] (HEX 0...ff) = 0 = ?
```

The number of characters in the trailer should match the trailer length. If the trailer length is 0, trailer data is ignored. If the trailer length is 2, the trailer data should contain two characters: one in trailer byte [0] and one in trailer byte [1]. Data stored in other trailer bytes is ignored.

To accept the default or current value for each trailer byte, press [RETURN] at the end of each line.

```
TRAILER DATA[0] (HEX 0...ff) = d = ? [RETURN]
TRAILER DATA[1] (HEX 0...ff) = a = ? [RETURN]
TRAILER DATA[2] (HEX 0...ff) = 0 = ? [RETURN]
TRAILER DATA[3] (HEX 0...ff) = 0 = ? [RETURN]
```

To change the value of a trailer byte , enter another HEX value and press [RETURN]. Always enter data in sequential order, starting with TRAILER DATA [0].

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Data Definition

Defines the format of the data for each output message from the configuraton port. Parameters that define the format of the data include: maximum length, minimum length, and pad character.

Maximum Data Length In

Specifies the maximum number of characters or bytes in a message. Enter a value from 0 to 124, where 124 is the maximum number of characters in a message. The default value is 124.

```
MAX DATA LENGTH IN (DEC 0...124) = 124.
```

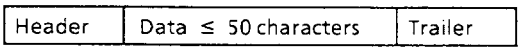
To accept the default or current value and move on to the next question, press [RETURN].

```
MAX DATA LENGTH IN (DEC 0...124) = 124. = ? [RETURN].
```

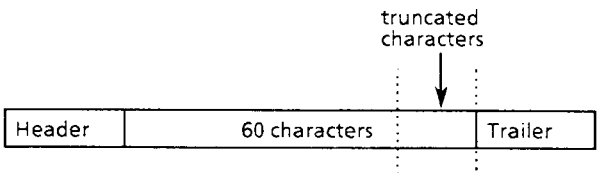
To change the default, enter another value and press [RETURN]. For example, to specify that the data portion of each message cannot contain more than 50 characters or bytes of data, enter:

```
MAX DATA LENGTH IN (DEC 0...124) = 124. = 50 [RETURN]
```

A message with a header/trailer is truncated if it exceeds 124 characters or the maximum value defined. For example, 50 is set as the maximum data length for messages.



If 60 characters are received, characters 51 to 60 are truncated and an overflow error occurs.



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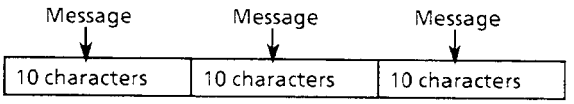
Data Definition *(continued)*

Maximum Data Length In

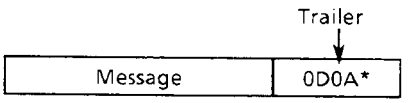
1X

The maximum data length affects the format of an input message in the following ways:

1. If you do not define a header and trailer for messages, the maximum length parameter defines the start and end of a message. For example, if the maximum length is set at 10, a message is received every ten characters.



2. If you do not define a header and trailer for messages and the maximum length value is 0, the message is received with a default trailer of CR (carriage return) and LF (line feed).



* 0D is the HEX equivalent of carriage return.
0A is the HEX equivalent of line feed.

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Data Definition *(continued)*

Minimum Data Length Out

Specifies the minimum number of characters or bytes of data a message must contain on output from the configuration port. If the message contains less than the minimum number of characters, pad characters are used to fill the message. Enter a value from 0 to 255. The default value is 0, which means a minimum data length is not set for the message.

```
MIN DATA LENGTH OUT (DEC 0...255) = 0 = ?
```

To accept the default or current value and move on to the next question, press [RETURN].

```
MIN DATA LENGTH OUT (DEC 0...255) = 0 = ? [RETURN]
```

To change the default, enter another value and press [RETURN]. For example, to specify that each message must contain at least 12 characters or bytes of data, enter:

```
MIN DATA LENGTH OUT (DEC 0...255) = 0 = 12 [RETURN]
```

The minimum length and pad character parameters are useful for devices that require fixed length messages. After padding, each message will contain the same number of characters.

Note: See Pad Character on next page.

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Data Definition (continued)

Pad Character

1X

The pad or fill character is used to satisfy the minimum length requirement of a message on output from the configuration port. For example, a minimum length of 12 is set for each output message. If 8 characters are transmitted, the pad character would fill the last four character or byte positions to meet the minimum length requirement.

Pad characters are inserted at the end of the data portion of a message. The pad character can be any HEX value from 0 to ff. The default is 0, which indicates the NUL character.

```
PAD CHARACTER (HEX 0...ff) = 0 = ?
```

To accept the default or current value and move on to the next question, enter [RETURN].

```
PAD CHARACTER (HEX 0...ff) = 0 = ? [RETURN]
```

To change the default, enter another HEX value and press [RETURN]. For example, to pad messages with spaces, enter the HEX value 20.

```
PAD CHARACTER (HEX 0...ff) = 0 = ? 20 [RETURN]
```

To pad messages with the "$" character, enter the HEX value 24.

```
PAD CHARACTER (HEX 0...ff) = 0 = ? 24 [RETURN]
```

The pad character is ignored unless a minimum data length is specified.

The minimum length and pad character parameters are useful for devices that require fixed length messages. After padding, each message will contain the same number of characters.

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Module Parameters

The third group of questions in Figure 7.3 define parameters the module uses for receiving messages.


```
DEFAULT RB DESTINATION (HEX 0...ff) = 5.
DEFAULT RB SOURCE (HEX 0...ff) = 4.
DEFAULT RB ADDRESS (HEX 0...ffff) = 0.
```

For dumb terminal devices that use an unspecified protocol, the module needs to know where each message is coming from (source) and where each command is directed (destination). All three parameters (destination, source, and address) are used for data matrix operations.

This section defines each module parameter and shows you how to edit the default or current settings. To move through these questions without making changes, just press [RETURN] at the end of each line.

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Destination

1X

Tells the module where to send or direct a message. Valid destination entries are 0 to 5. Numbers 0 to 5 correspond to a module port or location.

0	RB command processor
1	Device port 1
2	Device port 2
3	Device port 3
4	Configuration port
5	1771-I/O backplane, slot 0 (for block transfers)
FF	Discards messages

The value FF Hex (or 255) discards messages but does not generate an error message. **Messages directed to locations other than 0 to 5 or FF (255) are discarded and may generate an error message.**

The default value is 5, which means all messages are directed to the PLC or slot 0 of the 1771-I/O backplane.

```
DEFAULT RB DESTINATION (HEX 0...ff) = 5 = ?
```

To accept the default value of 5 and move on to the next question, enter [RETURN] .

```
DEFAULT RB DESTINATION (HEX 0...ff) = 5 = ? [RETURN]
```

To change the default value of 5, enter another valid location value and press [RETURN].

Important: The identification number assigned to the port determines if the destination parameter is used.

- DF1 Unspecified Protocol.

  Messages are received from the device without a source and destination. The module uses the source supplied by the configuration parameters to route the message.

- DF1 Unspecified RB Network Device.

  Messages are received from the device with a source and destination. The module does not use the source from the configuration parameters.

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Source

Tells the module where a message is coming from. All replies to messages are sent back to the source. Valid source entries are 0 to 5. Each number corresponds to a module port or location.

0	RB command processor
1	Device port 1
2	Device port 2
3	Device port 3
4	Configuration port
5	1771-I/O backplane, slot 0 (for block transfers)

The default value that appears after first power-up is 4, which means the source of all message is the configuration port.

```
DEFAULT RB SOURCE (HEX 0...ff) = 4
```

To accept the default value of 4, press [RETURN].

```
DEFAULT RB SOURCE (HEX 0...ff) = 4 = [RETURN]
```

After pressing [RETURN], the screen displays the next question.

To specify another module port or location, enter the appropriate value and press [RETURN].

Important: The identification number assigned to the port determines if this parameter is used or not.

- DF1 Unspecified Protocol.

  Messages are received from the device without a source and destination. The module uses the source supplied by the configuration parameters to route the message.

- DF1 Unspecified RB Network Device.

  Messages are received from the device with a source and destination. The module does not use the source from the configuration parameters.

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Address

1X

Specifies the starting data address the module uses to perform matrix operations on each incoming message.

DEFAULT RB ADDRESS (HEX 0...ffff) = 0 = ?

To accept the default value and move on to the next question, press [RETURN].

DEFAULT RB ADDRESS (HEX 0...ffff) = 0 = **[RETURN]**

Typically, the starting address for all matrix operations is 0. To tell the module to use address 200, enter:

DEFAULT RB ADDRESS (HEX 0...ffff) = 0 = **200 [RETURN]**.

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Setup Message Parameters

The last group of parameters in Figure 7.3 define the format of setup data for the configuration port. Setup data is used to send startup messages to connected devices at module power-up, reset, or DTR (Data Terminal Ready) transition from Off to On. Parameters that define setup data include: timeout value, setup byte length, and setup data.


```
SETUP TIMEOUT/SECS (DEC 0...255) = 0.
SETUP BYTE LENGTH (DEC 0...78) = 26.
SETUP DATA[0] (HEX 0...ff) = d.
SETUP DATA[1] (HEX 0...ff) = a.
SETUP DATA[2] (HEX 0...ff) = a.
                    :
                    :
SETUP DATA[76] (HEX 0...ff) = 0.
SETUP DATA[77] (HEX 0...ff) = 0.
```

This section defines each parameter of a setup message and shows you how to change the default or current setting.

If you connect a dumb terminal device to the configuration port, these twenty six characters of setup data will be sent to the device at power-up, reset, or initialization. To disable the setup message, set the byte length, timeout, and the first two SETUP DATA bytes to 0 (zero).

Setup Timeout

Specifies the number of seconds to wait after power-up or reset before sending the setup message or data to the connected device. Enter a value from 0 to 255. The default timeout value is 0, which means no delay.

```
SETUP TIMEOUT/SECS (DEC 0...255) = 0 = ?
```

To accept the default or current timeout value, press [RETURN].

```
SETUP TIMEOUT/SECS (DEC 0...255) = 0 = ? [RETURN]
```

To change the default, enter another value and press [RETURN]. For example, to set a time delay of two seconds, enter 2:

```
SETUP TIMEOUT/SECS (DEC 0...255) = 0 = 2 [RETURN]
```

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Setup Byte Length

1X

Specifies the number of characters or bytes of data in the setup message. Enter a value from 0 to 78. The default length is set at 26 characters.

```
SETUP BYTE LENGTH (DEC 0...78) = 26 = ?
```

To accept the default or current setup byte length and move on to the next question, press [RETURN].

```
SETUP BYTE LENGTH (DEC 0...78) = 26 = ? [RETURN]
```

To change the default, enter another value and press [RETURN]. For example, to set the length of the message to zero (0) characters:

```
SETUP BYTE LENGTH (DEC 0...78) = 26 = ? 0 [RETURN]
```

To disable the setup message, set the byte length, timeout, and the first two SETUP DATA bytes to 0 (zero).

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Setup Data

Specifies the actual setup message to send to a connected device at power-up, reset, or DTR transition from false to true (with modem control). Setup messages are device and application specific.

You can enter up to 78 characters or bytes of setup data. Each character or byte of data is entered on a separate line and requires a HEX value from 0 to ff.

```
SETUP DATA[0] (HEX 0...ff) = d = ?    (carriage return)
SETUP DATA[1] (HEX 0...ff) = a = ?    (linefeed)
SETUP DATA[2] (HEX 0...ff) = a = ?    (linefeed)
SETUP DATA[3] (HEX 0...ff) = a = ?    (linefeed)
              .                          .
              .                          .
              .                          .
SETUP DATA[24] (HEX 0...ff) = a = ?   (linefeed)
SETUP DATA[25] (HEX 0...ff) = a = ?   (linefeed)
SETUP DATA[26] (HEX 0...ff) = 0 = ?
SETUP DATA[27] (HEX 0...ff) = 0 = ?
SETUP DATA[28] (HEX 0...ff) = 0 = ?
              .
              .
              .
SETUP DATA[77] (HEX 0...ff) = 0 = ?
```

The first twenty six bytes, SETUP DATA [0] - SETUP DATA [25], contain data. These twenty six characters will be sent to the device at power-up, reset, or initialization. To disable the setup message, set the timeout, byte length, and the first two Setup Data bytes to 0 (zero)

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Setup Data (continued)

1X

The number of characters or bytes entered should match the Setup Byte Length. If the setup length is 0, setup data is ignored. If the setup length is 20, the setup data should contain twenty characters, starting with byte 0. The rest of the setup bytes should contain zeros.

When you define the setup length and setup data, the two bytes immediately following the setup data must be zeros (0). Do not include these bytes in the length value. If the zeros are included in the setup length, they will be treated as setup data.

Setup data is the last group of configuration parameters you can edit. To accept the current setup values and return to the main menu, enter the SAVE command and press [RETURN]. The SAVE command is a short cut; it eliminates the need to go through each line of setup data.

SETUP DATA[0] (HEX 0...ff) = d = ? **SAVE [RETURN]**

To change the default value for a setup byte , enter another HEX value and press [RETURN]. Always enter data in sequential order starting with setup byte 0. You are not allowed to skip bytes. When you have entered the last setup value, move to the next line and enter SAVE and [RETURN].

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Chapter 8 2X - Identification Numbers

Chapter Objectives

This chapter defines menu function *2X - Identification Numbers*. Identification numbers identify the:

- Type of devices connected to the serial ports (1,2,3) or the configuration port (4).
- Type of block transfer used by I/O rack slot 0 (port 5) for communications between the PLC controller and the module.

Selecting Identification Numbers

A box surrounds function *2X - Identification Numbers* to show its location on the main menu. To select this function, enter 2 followed by a port number (0 to 7) at the Menu Selection prompt.

```
                              2760-RB     SERIES A  REVISION B
        COPYRIGHT 1989                    ALLEN-BRADLEY COMPANY, INC.
        ---------------------------------------------------------------

1X   - CONFIGURATION PARAMETERS          2X   - IDENTIFICATION NUMBERS
3    - DEVICE PORT PROTOCOL NAMES        4DM  - MATCH CODE ENTRIES
5I   - DISCRETE BYTE INPUT ENTRIES       6    - THE DATA MATRIX ENTRIES
7    - THE PASS THROUGH ENTRIES          8    - NONVOLATILE SCRATCH PAD AREA
9XF  - RB MODULE FUNCTIONS               AX   - HARDWARE DIAGNOSTICS
BX   - SOFTWARE DIAGNOSTICS              C    - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT    6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                              ENTER A MAIN MENU SELECTION: _
```

Valid menu selections (20 through 27) and a description of their functions follow.

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20 - Identification Numbers of RB Command Processor

Function 20 has one protocol identification number, which you are not allowed to change.

RB CONFIGURATION, 0h (YES/NO) = YES.

21 - Identification Numbers of Serial Port 1

Use function 21 to identify the type of device connected to port 1. This information is protocol specific. For more details, refer to your *Protocol Cartridge User's Manual.*

22 - Identification Numbers of Serial Port 2

Use function 22 to identify the type of device connected to port 2. This information is protocol specific. For more details, refer to your *Protocol Cartridge User's Manual.*

23 - Identification Numbers of Serial Port 3

Use function 23 to identify the type of device connected to port 3. This information is protocol specific. For more details, refer to your *Protocol Cartridge User's Manual.*

24 - Identification Numbers of Configuration Port

Use function 24 to identify the use of the configuration port (port 4). You can use Port 4 to configure the module or to connect a device for communications.

25 - Identification Numbers of I/O Rack Slot 0

Function 25 identifies the type of block transfer to use for communication between the PLC processor and module.

26 - Identification Numbers of I/O Rack Slot 1

Function 26 has one option, which you cannot change.

INPUTS WITH RB_NETWORK HANDSHAKE, 30h (YES/NO) = YES.

For more information, refer to *Commands and Data Operation,* in *Chapter 17, System Considerations.*

27 - Reserved

Function 27 is reserved for future use. You cannot change it.

RESERVED FOR FUTURE USE, 0h (YES/NO) = YES.

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24 - Identifying Use of Configuration Port

Use menu function 24 to identify the use of the configuration port. You can use the configuration port (port 4) to configure the module and its ports or to communicate with a dumb terminal or DF1 device (without PCCC or IDP protocols).

When you select menu option 24, five identification options display. They toggle from the current selection of:

2760-RB MODULE CONFIGURATION ONLY, 150h (YES/NO) = YES
to
DUMB TERM. UNSPECIFIED RB NETWORK DEVICES, 130h (YES/NO) = NO
to
DUMB TERM. UNSPECIFIED PROTOCOL, 13fh (YES/NO) = NO
to
* DF1 UNSPECIFIED RB NETWORK DEVICES, 8030h (YES/NO) = NO
to
* DF1 UNSPECIFIED PROTOCOL, 803Fh (YES/NO) = NO

Note: The last two options marked by an asterisk (*) are available on Series B modules only.

2760-RB Module Configuration Only, 150h

This is the system default identification for the configuration port. It supports configuration of the module using a programming terminal as described in *Chapter 5, Using Your Programming Terminal.*

All messages with a destination of port 4 (configuration port) are discarded. Any message sending attempts through the configuration port will generate a configuration port error when the Maximum Length On Input is exceeded.

Dumb Term. Unspecified RB Network Device, 130h

Messages received from Dumb Terminal RB Network devices contain a source and destination. **The module does not add the source and destination**. The devices are responsible for supplying the source and destination.

Messages are formatted according to the Dumb Terminal protocol parameters defined in the port's configuration parameters.

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Dumb Term. Unspecified Protocol, 13fh

Messages received from Dumb Terminal Unspecified Protocol devices do not contain a source and destination. **The module adds the source and destination** as defined in the configuration port's configuration parameters. For more information, refer to *14 - Configuration Parameters of Configuration Port*).

2X

Messages are formatted according to the Dumb Terminal protocol parameters defined in the port's configuration parameters.

DF1 Unspecified RB Network Devices, 8030h

Messages received from DF1 Unspecified RB Network devices do contain a source and destination. **The module does not add the source and destination**. The devices are responsible for supplying the source and destination.

DF1 protocol parameters (Response/Timeouts, Retries, and BCC checking) are supplied by the port's configuration parameters.

DF1 Unspecified Protocol Devices, 803fh

Messages received from DF1 Unspecified Protocol devices do not contain a source and destination. **The module adds the source and destination** values defined in the configuration port's configuration parameters. For more information, refer to *14 - Configuration Parameters of Configuration Port*).

DF1 protocol parameters (Response/Timeouts, Retries, and BCC checking) are supplied by the port's configuration parameters.

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25 - Identifying Block Transfer Type (I/O Rack Slot 0)

Use menu function 25 to identify the type of block transfer to use for communications between the PLC processor and the module. Two options are available that toggle from the current selection of:

BT/INPUTS WITH RB_NETWORK HANDSHAKE, b0h (YES/NO) = YES.

To

BT WITH COUNT/INPUTS WITH RB_NETWORK HANDSHAKE, 8b0h (YES/NO) = NO

Block transfer I/O is used for commands to the module and message data transfers (bidirectional) to other ports. The PLC controller can send/receive messages and commands to/from the module using one of the two file protocols below.

BT With Count /Inputs With RB__Network Handshake

This type of block transfer adds the BCD Byte Count to the supplied source and destination on output. On input, the module expects the count to be supplied.

Figures 8.1 through 8.8 illustrate this type of block transfer for each configuration port device identification number.

BT/Inputs With RB__Network Handshake

This type of block transfer uses the source and destination supplied by the module or device.

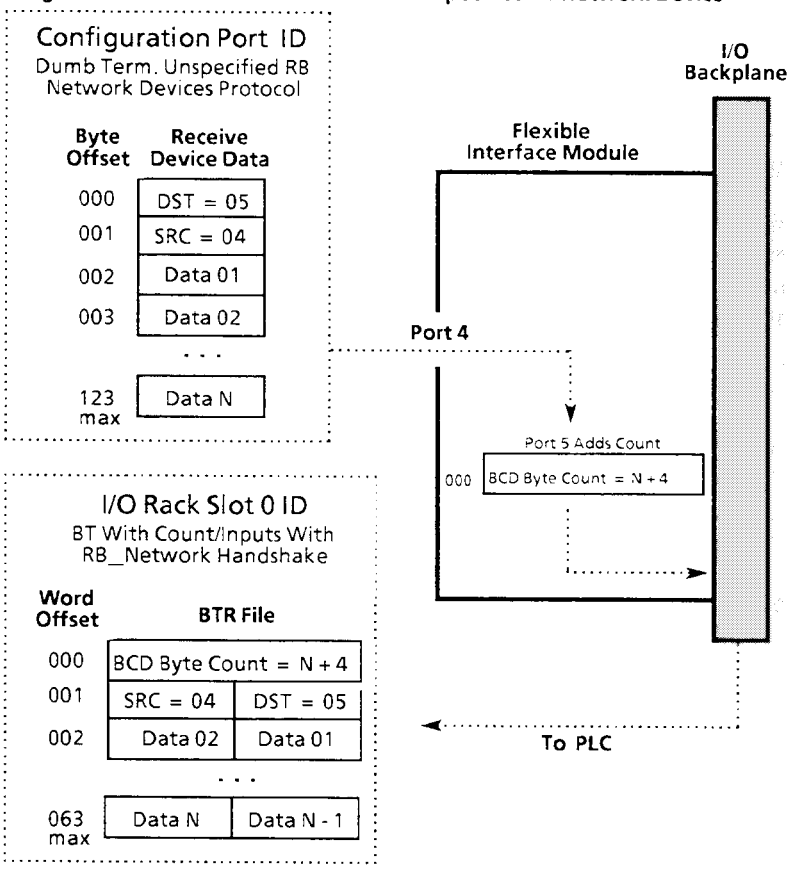
Figures 8.1 through 8.8 illustrate this type of block transfer for each configuration port device identification number.

Note: For both file protocols, Block Transfer Reads (BTRs) only return the amount of data (rounded up to the nearest word) available. If the BTR length is less than the amount of data, the BTR is ignored. If the Block Transfer Write (BTW) is less than the minimum or greater than the mazimum for the selected protocol, the IPF bit is set and error logged. For details, refer to *Commands and Data Operation* in *Chapter 17, System Considerations*.

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2X

Figure 8.1
BT With Count/Inputs With RB_Network Handshake
Configuration Port set for Dumb Terminal Unspecified RB Network Device



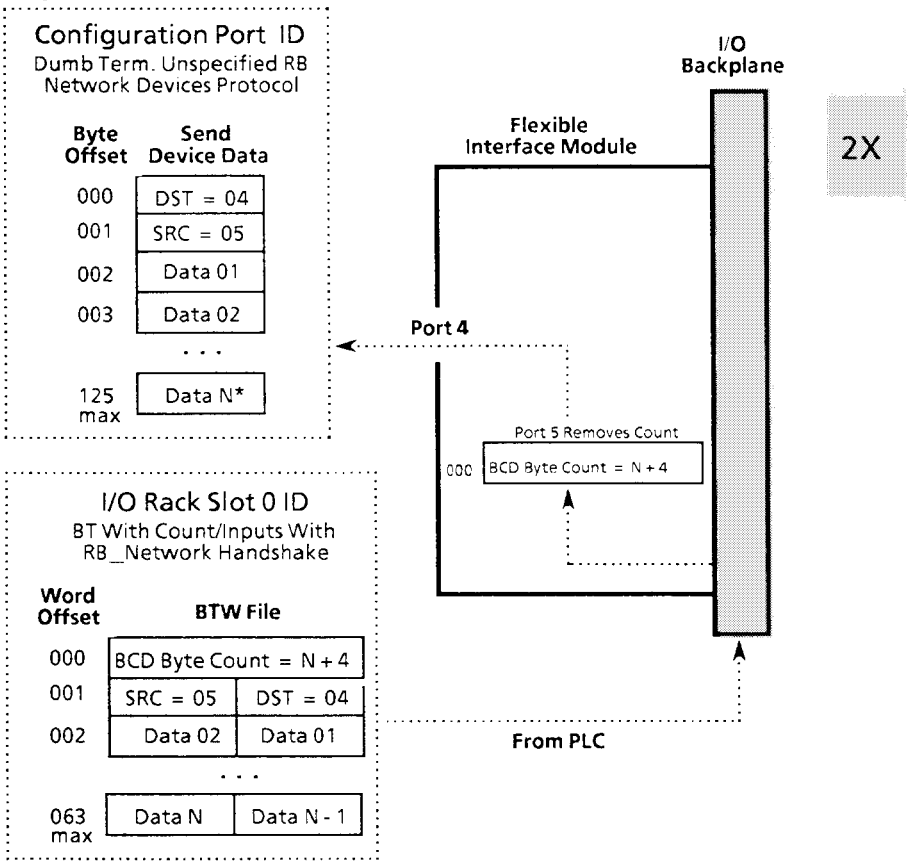
BCD Byte Count = N + 4, where:

BCD Byte Count consumes 2 bytes and the DST/SRC consume two more bytes. This gives four bytes of overhead (+ 4).

N equals the total number of data bytes, which cannot exceed 122 bytes.

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Figure 8.1 (continued)
BT With Count/Inputs With RB_Network Handshake
Configuration Port Set for Dumb Terminal Unspecified RB Network Device



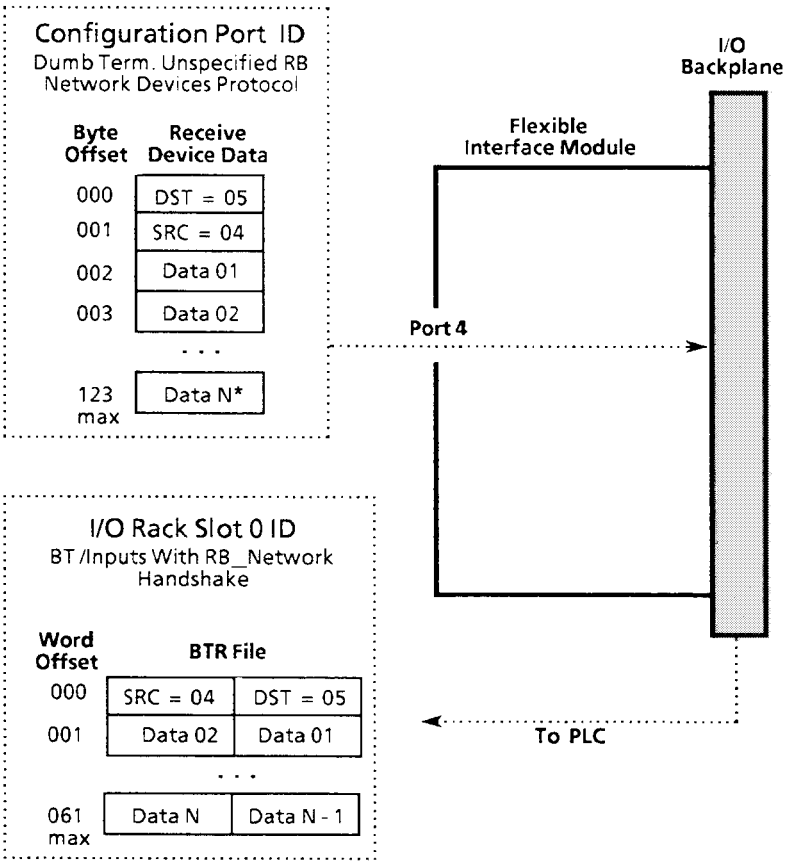
*N equals the total number of data bytes, which cannot exceed 124 bytes.

2X

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2X

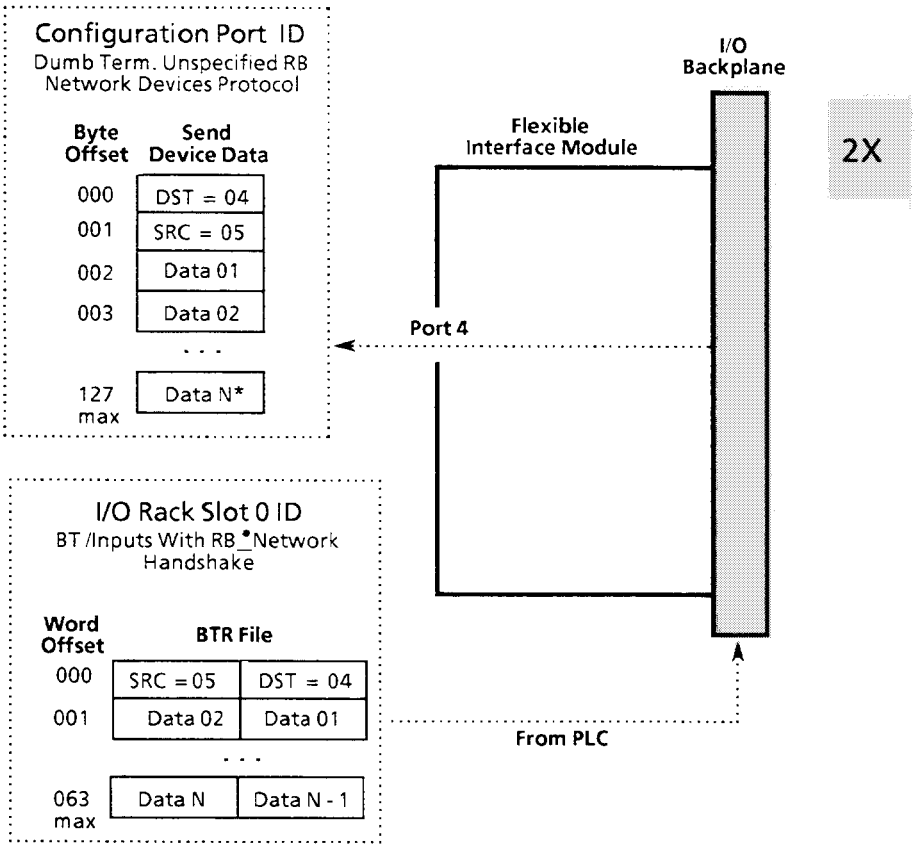
Figure 8.2
BT /Inputs With RB_Network Handshake
Configuration Port Set for Dumb Terminal Unspecified RB Network Device



*N equals the total number of data bytes, which cannot exceed 122 bytes.

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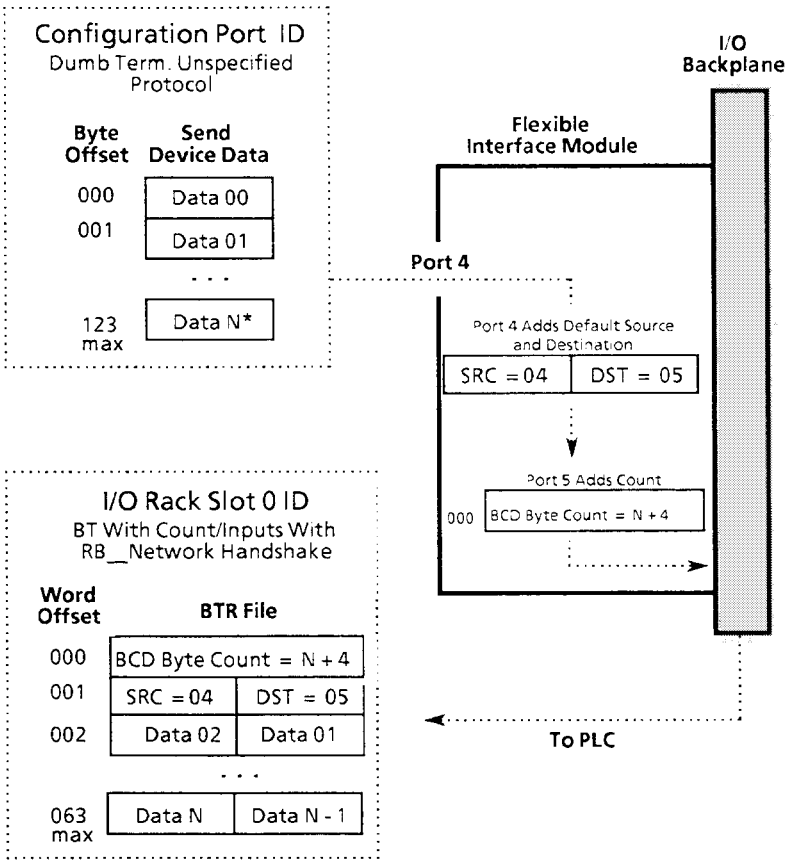
Figure 8.2 (continued)
BT /Inputs With RB_Network Handshake
Configuration Port Set for Dumb Terminal Unspecified RB Network Device



*N equals the total number of data bytes, which cannot exceed 126 bytes.

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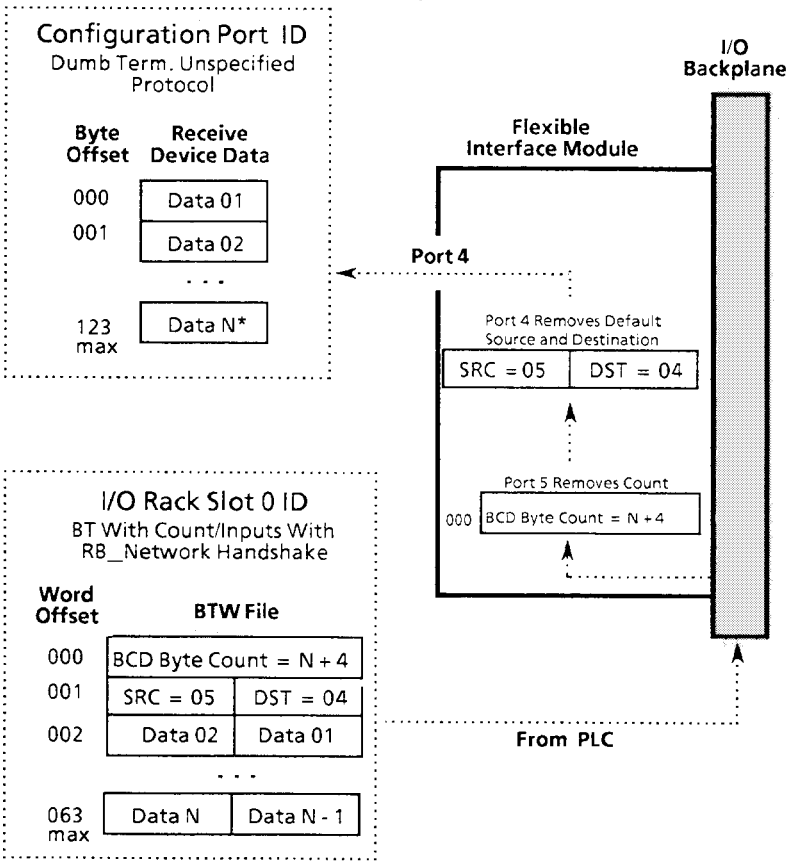
Figure 8.3
BT With Count/Inputs With RB_Network Handshake
Configuration Port Set for Dumb Terminal Unspecified Protocol



*N equals the total number of data bytes, which cannot exceed 124 bytes.

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Figure 8.3 (continued)
BT With Count/Inputs With RB_Network Handshake Configuration Port Set for Dumb Term. Unspecified Device

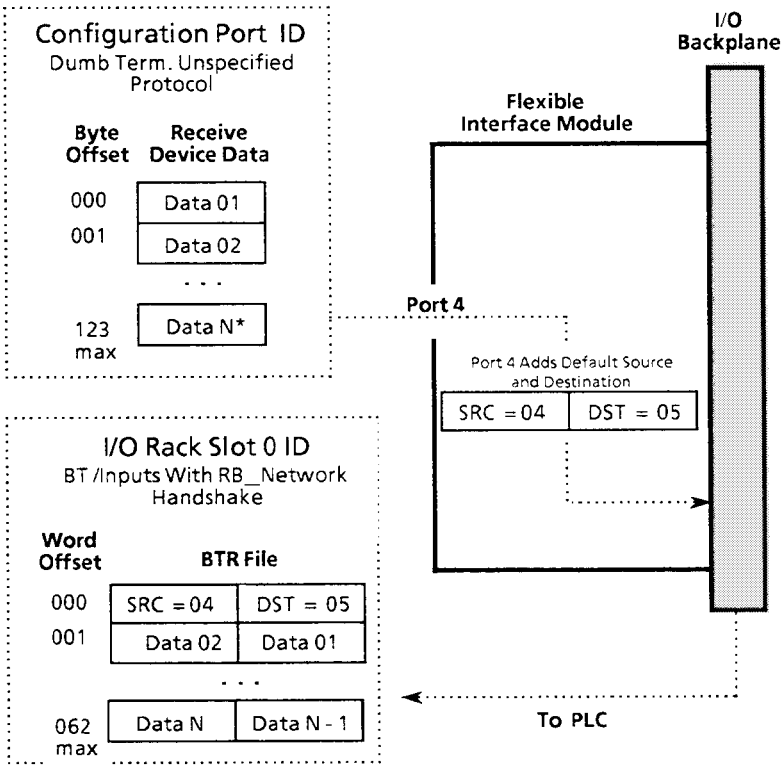


*N has a maximum of 128 data bytes. Because of PLC overhead 124 is the practical maximum.

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2X

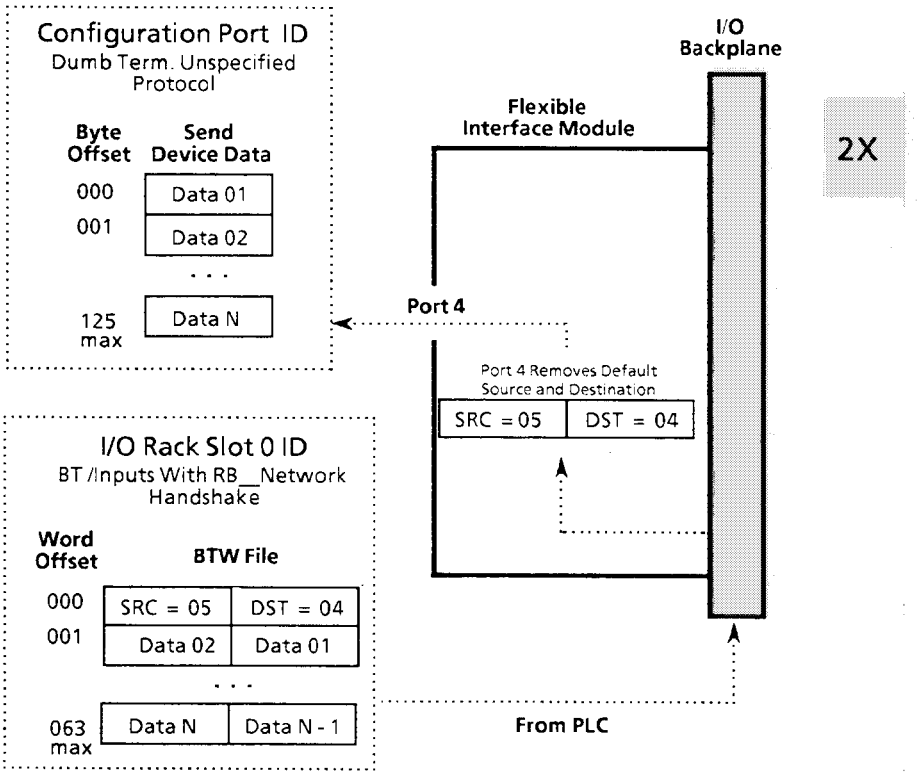
Figure 8.4
BT /Inputs With RB_Network Handshake
Configuration Port Set for Dumb Term. Unspecified Device



*N is the maximum number of data bytes, which cannot exceed 124.

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Figure 8.4 (continued)
BT /Inputs With RB__Network Handshake
Configuration Port Identified as Dumb Term. Unspecified Device



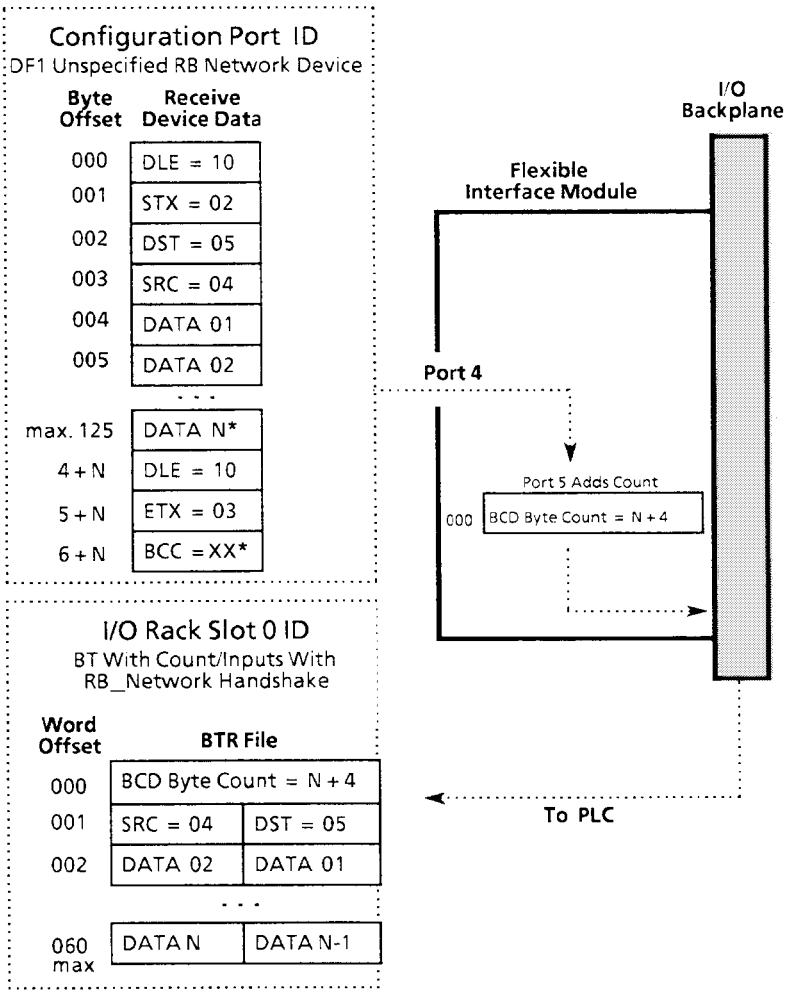
*N is the maximum number of data bytes, which cannot exceed 126

2X

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2X

Figure 8.5
BT With Count/Inputs With RB_Network Handshake
Configuration Port set for DF1 Unspecified RB Network Device



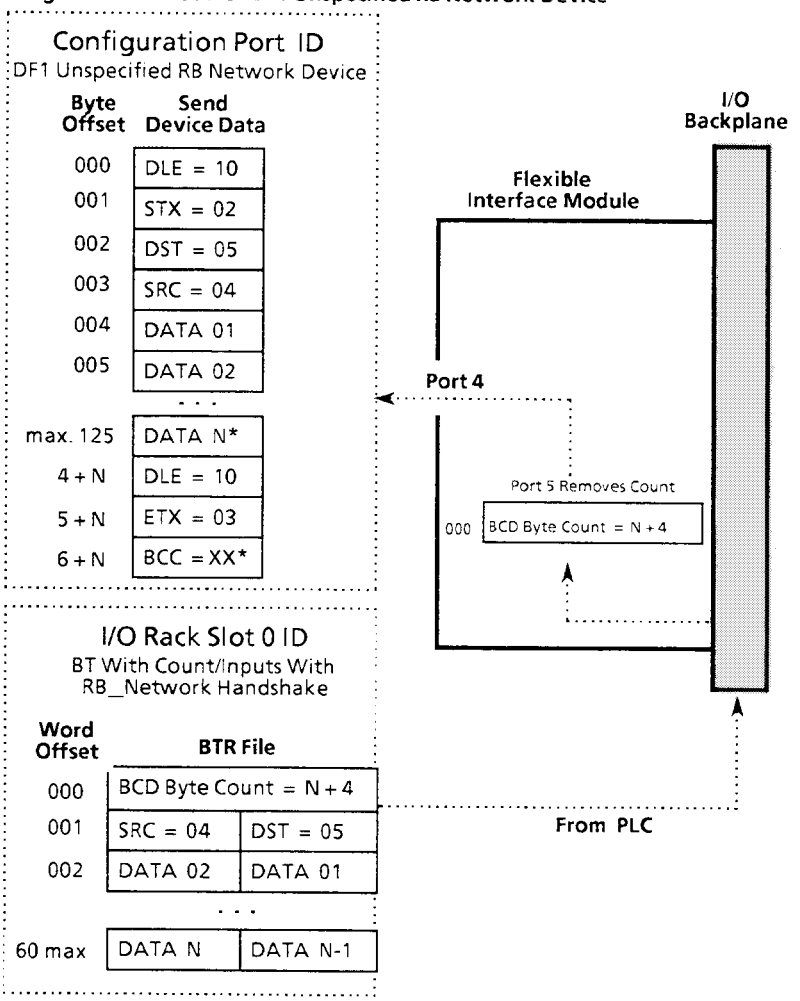
BCD Byte Count = N + 4, where:
BCD Byte Count consumes 2 bytes and the DST/SRC consume two more bytes. This gives four bytes of overhead (+ 4).

*N equals the total number of data bytes, which cannot exceed 122 bytes.

*BCC may or may not be present depending on the configuration parameters set for DF1 protocol.

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Figure 8.5 (continued)
BT With Count/Inputs With RB_Network Handshake
Configuration Port set for DF1 Unspecified RB Network Device

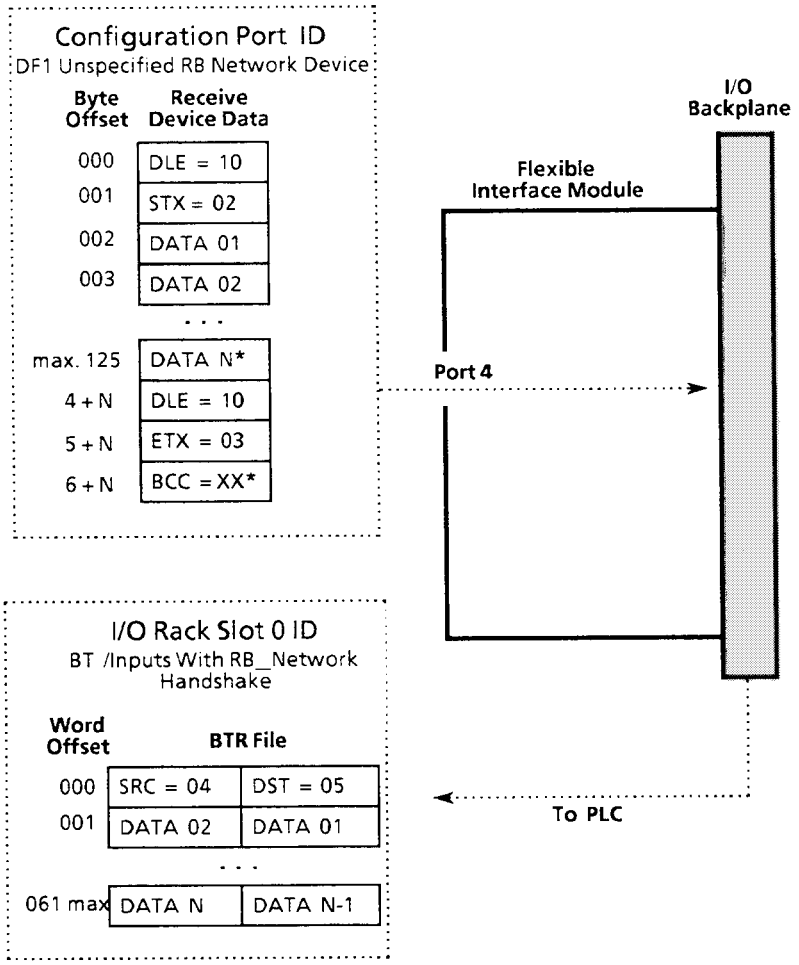


* N equals the total number of data bytes, which cannot exceed 124 bytes.

* BCC may or may not be present depending on the configuration parameters set for DF1 protocol.

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Figure 8.6
BT /Inputs With RB_Network Handshake
Configuration Port set for DF1 Unspecified RB Network Device

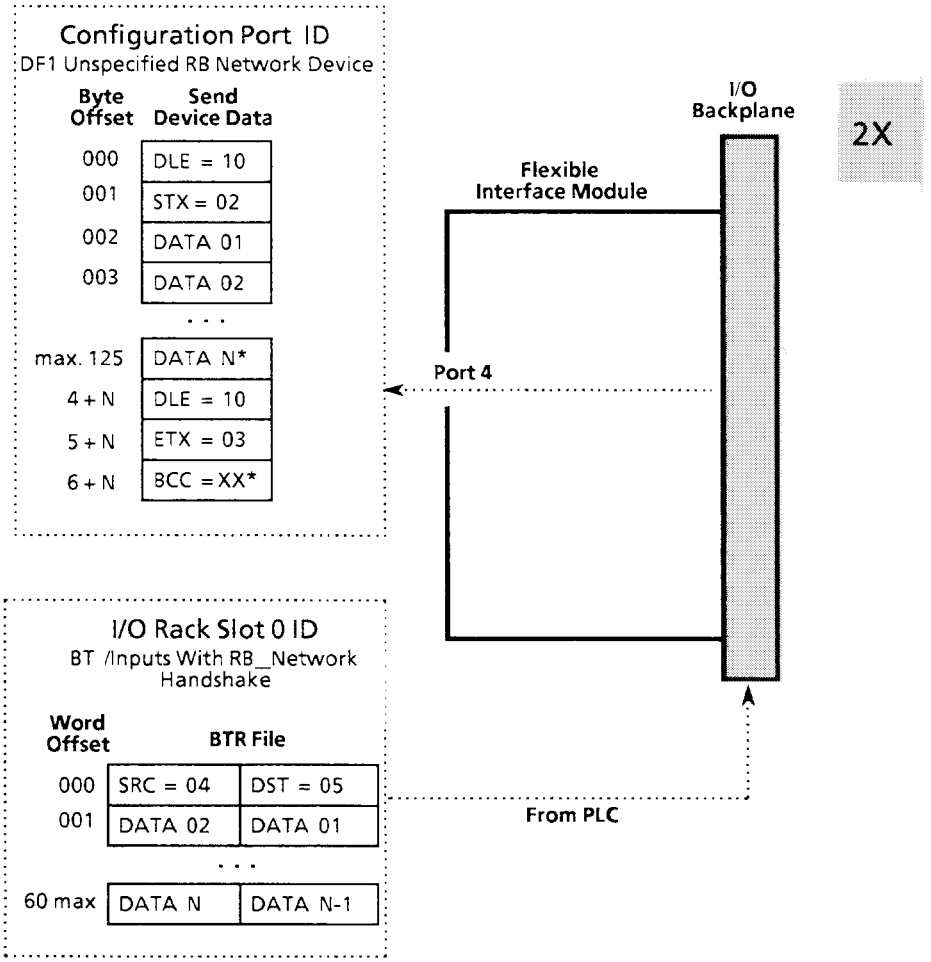


* N equals the total number of data bytes, which cannot exceed 122 bytes.

* BCC may or may not be present depending on the configuration parameters set for DF1 protocol.

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Figure 8.6 (continued)
BT /Inputs With RB_Network Handshake
Configuration Port set for DF1 Unspecified RB Network Device



2X

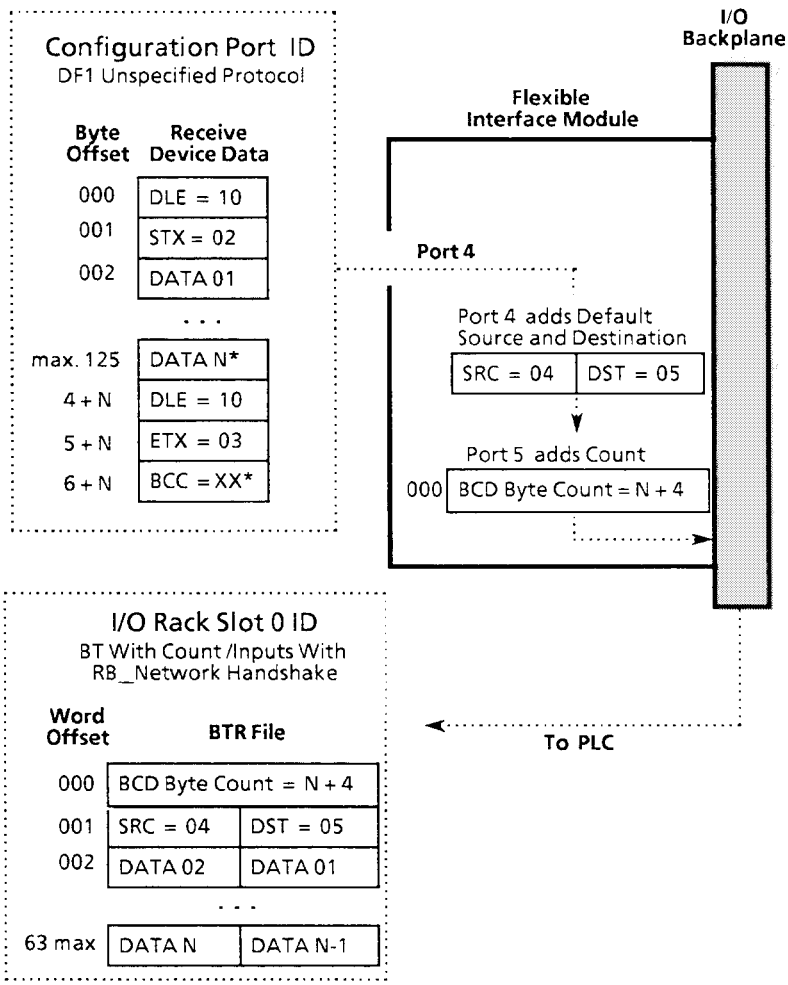
* N equals the total number of data bytes, which cannot exceed 124 bytes.

* BCC may or may not be present depending on the configuration parameters set for DF1 protocol.

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2X

Figure 8.7
BT With Count/Inputs With RB_Network Handshake Configuration Port set for DF1 Unspecified Protocol

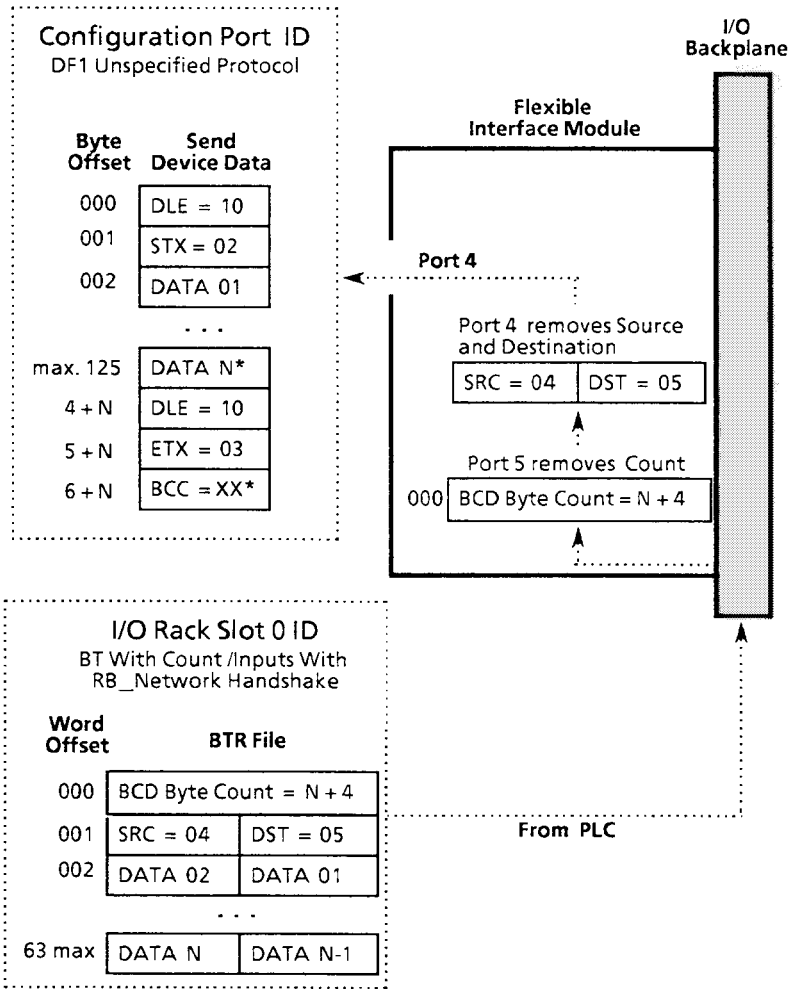


* N equals the total number of data bytes, which cannot exceed 124 bytes.

* BCC may or may not be present depending on the configuration parameters set for DF1 protocol.

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Figure 8.7 (continued)
BT With Count/Inputs With RB_Network Handshake Configuration Port set for DF1 Unspecified Protocol



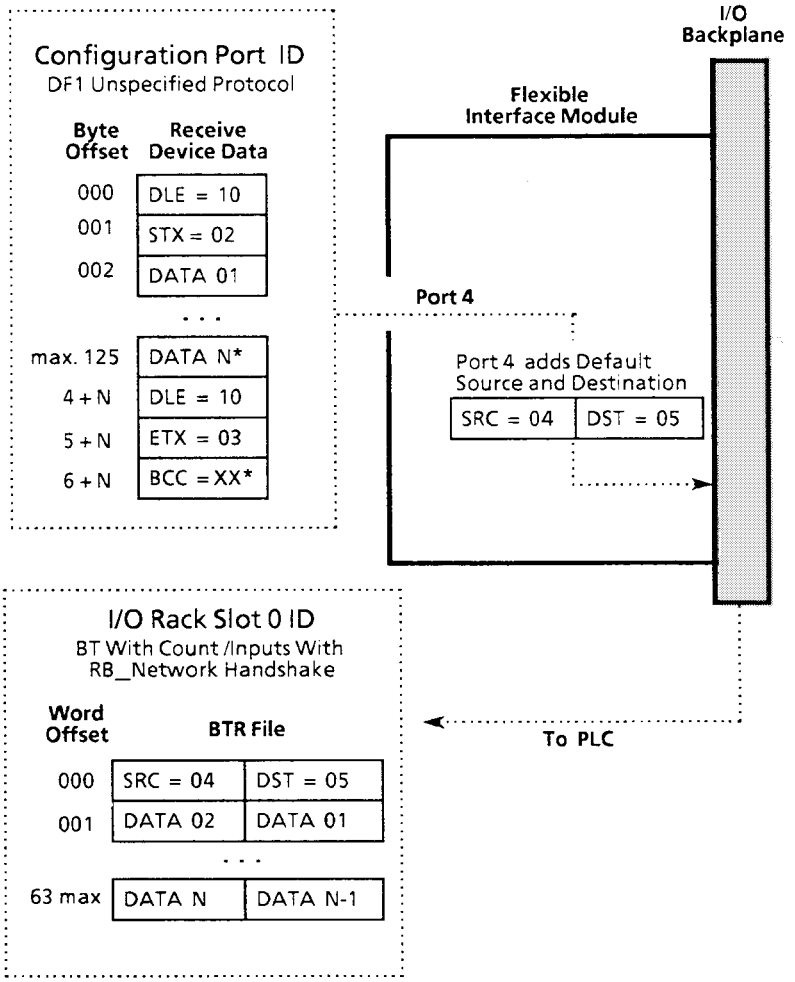
* N equals the total number of data bytes, which cannot exceed 128 bytes.

* BCC may or may not be present depending on the configuration parameters set for DF1 protocol.

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2X

Figure 8.8
BT /Inputs With RB_Network Handshake
Configuration Port set for DF1 Unspecified Protocol

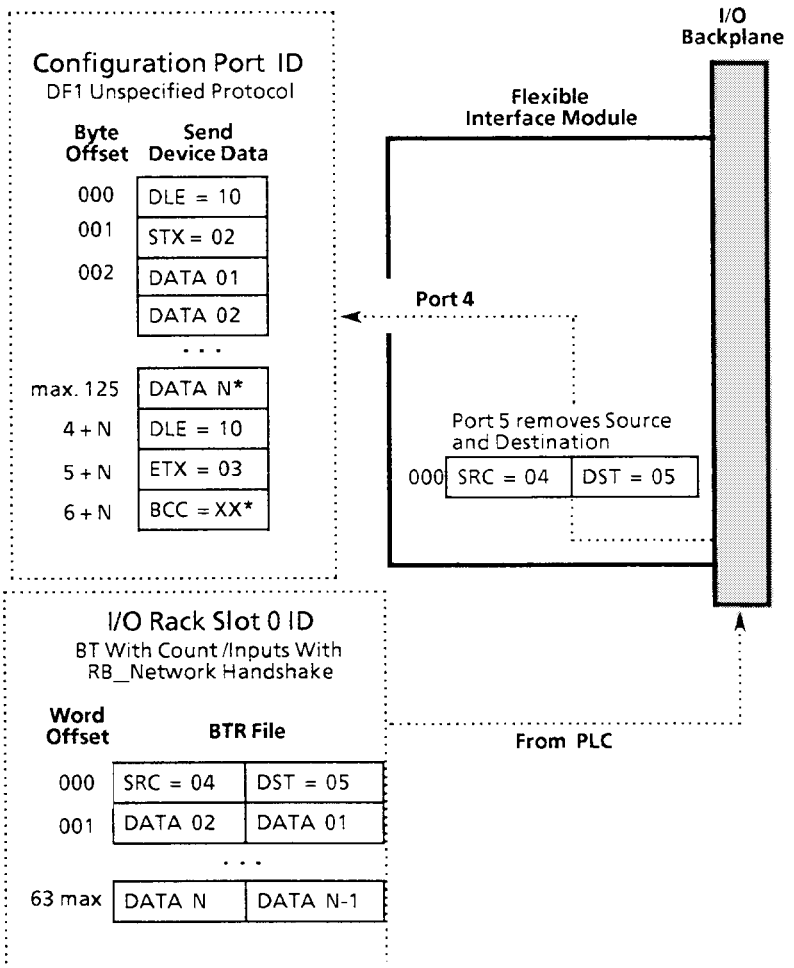


* N equals the total number of data bytes, which cannot exceed 124 bytes.

* BCC may or may not be present depending on the configuration parameters set for DF1 protocol.

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Figure 8.8 (continued)
BT /Inputs With RB_Network Handshake
Configuration Port set for DF1 Unspecified Protocol



* N equals the total number of data bytes, which cannot exceed 128 bytes.

* BCC may or may not be present depending on the configuration parameters set for DF1 protocol.

2X

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Chapter 9 3 - Device Port Protocol Names

Chapter Objectives

This chapter defines function *3 - Device Port Protocol Names*. This function allows you to display and change the protocol to run on each of the three serial ports.

3 - Device Port Protocol Names

Men function *3 - Device Port Protocol Names* allows you to select the protocol to run on each of the three serial ports. The example below shows the protocol information that displays when the Catalog No. 2760-SFC1 Protocol Cartridge is installed in the module. For more information on the assignment of device port protocol names, refer to your Protocol Cartridge User's Manual.

```
PORT 1 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DF1  , SERIES A , REVISION B  (YES/NO) = YES.

PORT 2 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DT   , SERIES A , REVISION B  (YES/NO) = YES.

PORT 3 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DF1  , SERIES A , REVISION B  (YES/NO) = YES.
```

The protocol names toggle from:

```
2760-SFC1 DF1  , SERIES A , REVISION B  (YES/NO) =
                    to
2760-SFC1 DT   , SERIES A , REVISION B  (YES/NO) =
```

When you answer *Yes* to a protocol (even if it is the one previously selected), the system resets.

The Quit and Save commands are not used with this function. Each time you toggle from one protocol name to another, the current selection is stored in EEPROM.

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No Copyright, Not Set Up - Series A Modules Only

The following *No Copyright* assignments

```
PORT 1 = NO COPYRIGHT,
NOT SET UP, SERIES , REVISION (YES/NO) = YES.

PORT 2 = NO COPYRIGHT,
NOT SET UP, SERIES , REVISION (YES/NO) = YES.

PORT 3 = NO COPYRIGHT,
NOT SET UP, SERIES , REVISION (YES/NO) = YES.
```


display for the following reasons:

- The module went through a power-up sequence without a protocol cartridge installed.
- The *90B Set Defaults - RB Command Processor* function was executed without a protocol cartridge installed.

No Copyright, Not Assigned - Series A Modules Only

The following *No Copyright* assignments

```
PORT 1 = NO COPYRIGHT,
NOT ASSIGNED, SERIES , REVISION (YES/NO) = YES.

PORT 2 = NO COPYRIGHT,
NOT ASSIGNED, SERIES , REVISION (YES/NO) = YES.

PORT 3 = NO COPYRIGHT,
NOT ASSIGNED, SERIES , REVISION (YES/NO) = YES.
```

display because:

- Protocols are assigned to the ports, but the correct protocol cartridge has either been removed or replaced with a cartridge containing different protocols.

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Cartridge Not Installed, Not Set Up - Series B Modules Only

The following *Cartridge Not Installed* assignments

PORT 1 = CARTRIDGE NOT INSTALLED,
NOT SET UP, SERIES , REVISION (YES/NO) = YES.

PORT 2 = CARTRIDGE NOT INSTALLED,
NOT SET UP, SERIES , REVISION (YES/NO) = YES.

PORT 3 = CARTRIDGE NOT INSTALLED,
NOT SET UP, SERIES , REVISION (YES/NO) = YES.

display for the following reasons:

- The module went through a power-up sequence without a protocol cartridge installed.
- The *90B Set Defaults - RB Command Prooessor* function was executed without a protocol cartridge installed.

Cartridge Not Installed, Not Assigned- Series B Modules Only

The following *Cartridge Not Installed* assignments

PORT 1 = CARTRIDGE NOT INSTALLED,
NOT ASSIGNED, SERIES , REVISION (YES/NO) = YES.

PORT 2 = CARTRIDGE NOT INSTALLED,
NOT ASSIGNED, SERIES , REVISION (YES/NO) = YES.

PORT 3 = CARTRIDGE NOT INSTALLED,
NOT ASSIGNED, SERIES , REVISION (YES/NO) = YES.

display because:

- Protocols are assigned to the ports, but the correct protocol cartridge has either been removed or replaced with a cartridge containing different protocols.

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Default Protocol Assignments

At power-up, ports 1, 2 and 3 of the module are initialized with a default protocol and configuration.

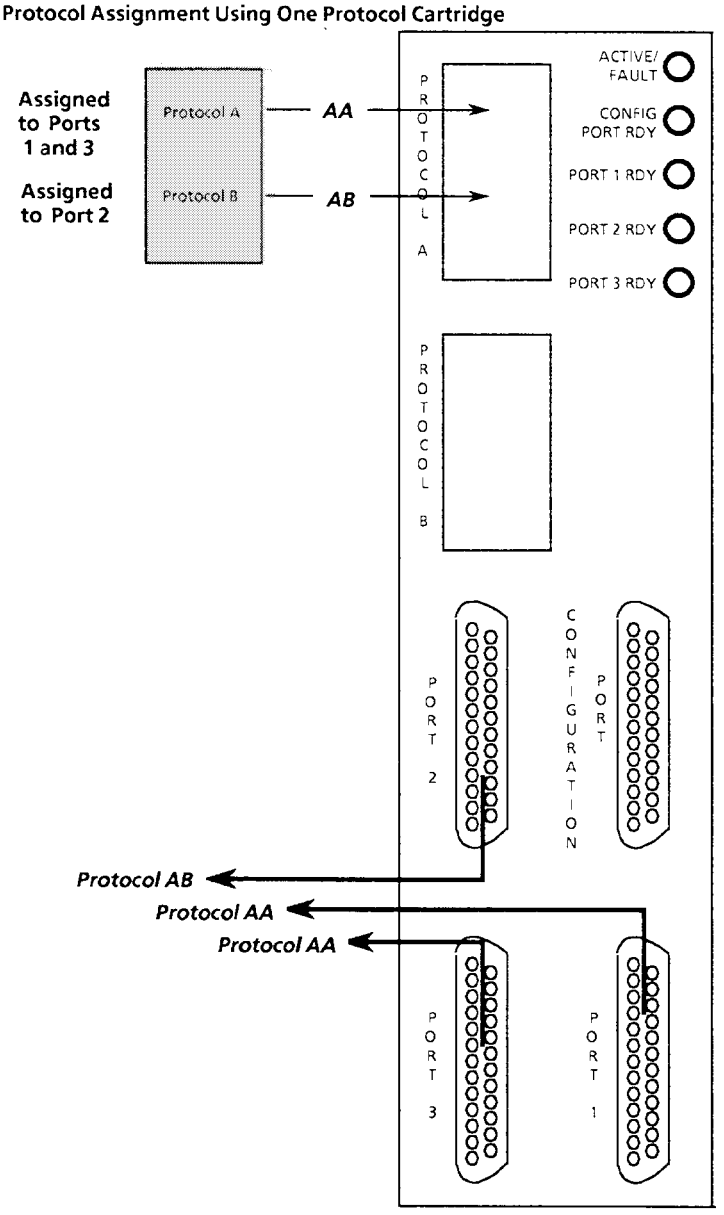
Figure 9.1 shows how protocols are assigned to the device ports at first power-up with one cartridge installed in protocol slot A (and the other slot empty).

Figure 9.2 shows how protocols are assigned to the device ports when two cartridges are installed in the module (one in protocol slot A and one in protocol slot B).

You can modify the default protocol assignments and configurations of the device ports by using the software stored in the cartridge. The *Configuration Software* section of your Protocol Cartridge User's Manual shows how to change the defaults. On subsequent power-ups, the module will use the configurations stored in the nonvolatile memory (EEPROM).

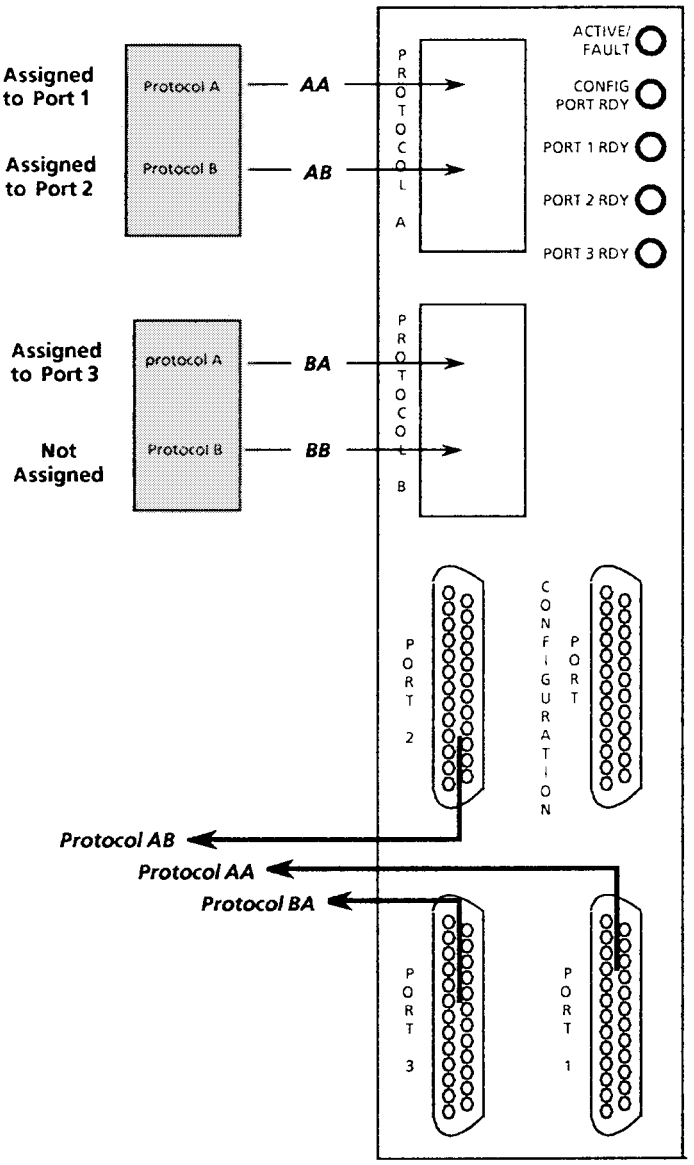
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Figure 9.1
Protocol Assignment Using One Protocol Cartridge



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Figure 9.2
Protocol Assignment Using Two Protocol Cartridges



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Chapter 10 4DM - Match Code Entries

Chapter Objectives

This chapter defines function *4DM - Match Code Entries*. Use this function to configure match codes for comparing or matching data on any of the three device ports (ports 1, 2, or 3).

Defining Match Code Entries

A box surrounds function *4DM - Match Code Entries* to show its location on the main menu.

4DM

```
                          2760-RB     SERIES X  REVISION X
COPYRIGHT 1989                        ALLEN-BRADLEY COMPANY, INC.
-------------------------------------------------------------------

1X  - CONFIGURATION PARAMETERS        2X  - IDENTIFICATION NUMBERS
3   - DEVICE PORT PROTOCOL NAMES      4DM - MATCH CODE ENTRIES
5I  - DISCRETE BYTE INPUT ENTRIES     6   - THE DATA MATRIX ENTRIES
7   - THE PASS THROUGH ENTRIES        8   - NONVOLATILE SCRATCH PAD AREA
9XF - RB MODULE FUNCTIONS             AX  - HARDWARE DIAGNOSTICS
BX  - SOFTWARE DIAGNOSTICS            C   - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT   6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                          ENTER A MAIN MENU SELECTION: _
```

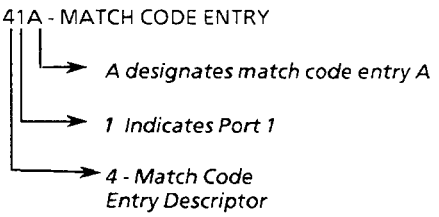
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Defining Match Code Entries (continued)

With function 4DM, you can enable or disable the match code function, select a match operation, enter match code setup information, and match code compare data. The supported match operations are:

- Equal to
- Not equal to
- Less than
- Greater than
- Find String
- String not found

Shown below is a breakdown of match code entry 41A. The *4* refers to the match code function. The *1* indicates port 1. The *A* is the first of 20 possible match code entries for that port.



To configure this match code for port 1, you would enter 41A at the menu selection prompt.

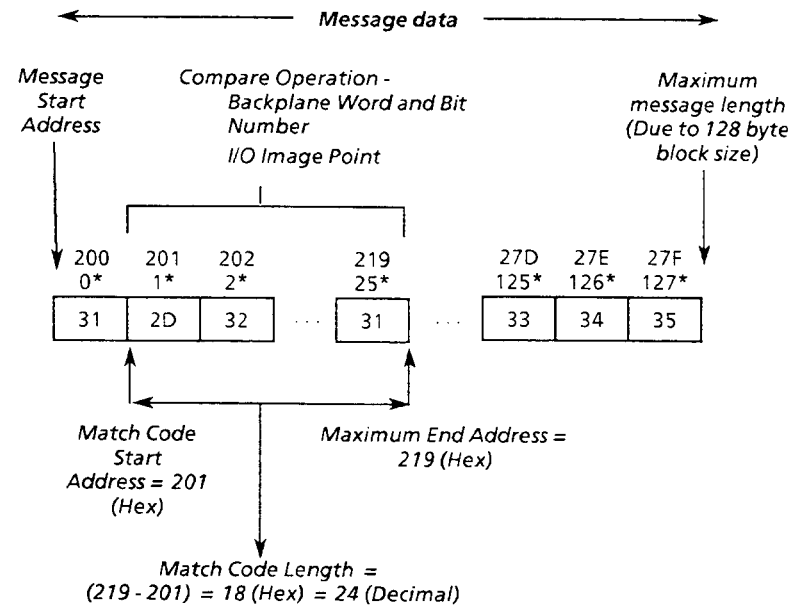
Enter a Main Menu Selection: **41A**

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Defining Match Code Entries (continued)

Each port can compare up to twenty match codes. Each match code can be 24 (or less) hex bytes in length, as shown below.

Figure 10.1
Compare Operation



Note: ** designates the byte offset in decimal.*

For example, menu function 41A can be used to configure port 1 to search up to 24 bytes. Using 41B, you can configure port 1 to search for an additional 24 bytes, now totaling 48 bytes for port 1.

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Defining Match Code Entries (continued)

Table 10.A shows how functions 41A through 41F can search an entire 128 byte block of data. The default starting address for the match code address is 200.

Table 10.A
Using the Match Code Function to Search a 128 Byte Block

Data Message Byte Offset (Decimal)	Match Code Entry Designator	Backplane Word - Bit Number (Decimal)	Match Code Length	Match Code Start Address (Hex)	Match Code Compare Data
0 ... 23	41A	2 - 0	24	200	Data [0] ... Data [23]
24 ... 47	41B	2 - 1	24	218	Data [0] ... Data [23]
48 ... 71	41C	2 - 2	24	230	Data [0] ... Data [23]
72 ... 95	41D	2 - 3	24	248	Data [0] ... Data [23]
96 ... 119	41E	2 - 4	24	260	Data [0] ... Data [23]
120 ... 127	41F	2 - 5	24	278	Data [0] ... Data [23]

The example in Table 10.A would consume 6 PLC Data Table I/O Image Points. The PLC program must appropriately combine (AND) all 6 true/false conditions into a composite true/false for the entire message match.

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Defining Match Code Entries (continued)

You can configure each of the three device ports to search for 20 separate pieces of information (totaling 60 match code entries).

You can disable the match code function without losing any match code configuration data. The only means of clearing match code data, by command, is to issue a *90B - RB Cmmnd Prcss - Set Defaults*. This will reset the entire module to system defaults.

The following parameters are common to each match code entry. The system default is shown for each parameter.

```
MATCH CODE ENTRY DISABLED (YES/NO) = YES = Y
BACKPLANE WORD NUMBER    (DEC 1...2) = 1.
BACKPLANE BIT NUMBER     (DEC 0...15) = 0.
MATCH CODE LENGTH        (DEC 1...24) = 1.
MATCH CODE START ADDRESS  (HEX 0...ffff) = 0.
MATCH CODE COMPARE DATA[0] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[1] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[2] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[3] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[4] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[5] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[6] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[7] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[8] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[9] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[10] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[11] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[12] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[13] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[14] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[15] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[16] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[17] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[18] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[19] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[20] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[21] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[22] (HEX 0...ff) = 0.
MATCH CODE COMPARE DATA[23] (HEX 0...ff) = 0.
```


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Equal To Operation

This is one of 6 available match code operations. The system default is the EQUAL TO OPERATION, which is the first option to appear. The options loop as follows:

```
MATCH CODE ENTRY DISABLED (YES/NO) = YES = ? N
EQUAL TO OPERATION      (YES/NO) = NO = ? N
NOT EQUAL TO OPERATION  (YES/NO) = NO = ? N
LESS THAN OPERATION     (YES/NO) = NO = ? N
GREATER THAN OPERATION  (YES/NO) = NO = ? N
FIND STRING OPERATION   (YES/NO) = NO = ? N
STRING NOT FOUND OPERATION (YES/NO) = NO = ? N
```


If you answer *No* to all of the operations, this question appears again:

```
MATCH CODE ENTRY DISABLED (YES/NO) = YES = ?
```

If you once again answer *No*, the loop will start over with:

```
EQUAL TO OPERATION      (YES/NO) = NO = ? Y
```

Backplane Word Number

The backplane word number determines where you will find the:

- discrete bytes
- match code bits set from a match

relative to the total number of words the module occupies in the Input Data Table.

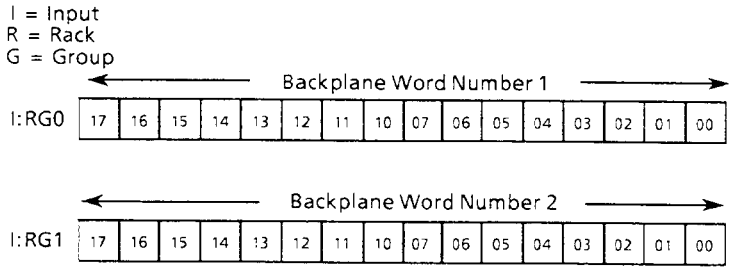
Where you should locate this word is dependent on other factors. Refer to the *I/O Point Image Map* section found in *Chapter 17, System Considerations* .

Figure 10.2 illustrates Input Image Table Words 1 and 2.

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Backplane Word Number *(continued)*

Figure 10.2
Input Image Table Words 1 and 2



Backplane Bit Number

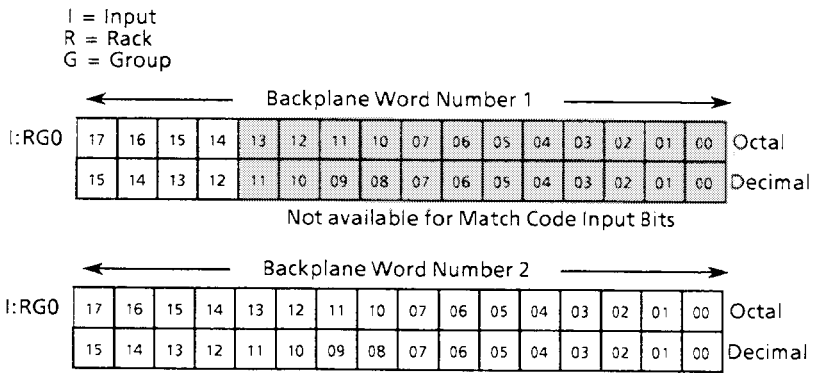
The backplane bit numbers set discrete bits on the PLC Backplane. The bit numbers available vary depending upon the backplane density (8 or 16 bit I/O).

- For 8 Bit I/O, bits 14_8 - 17_8 are available on Word 1
- For 16 Bit I/O, bits 14_8 - 17_8 are available on Word 1 and Bits 00_8 - 17_8 are available on Word 2

Where you locate this bit is dependent on other factors. Refer to the *I/O Point Image Map* section in *Chapter 17*.

Figure 10.3 illustrates Input Image Table Words 1 and 2.

Figure 10.3
Input Image Table Words 1 and 2



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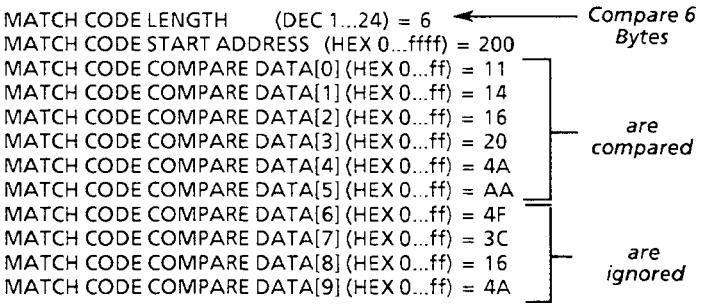
Match Code Start Address

This address defines where to start the compare operation. You must also know the start address of the incoming data message or you will not be comparing the correct data. The message's start address is protocol specific. Refer to your Protocol Cartridge User's Manual.

Match Code Length

This parameter specifies the length, in bytes, of the compare data for each match code entry (41A, 41B, ...). You can specify up to 24 bytes. If the compare data exceeds the match code length, the remaining compare data bytes are ignored.

For example, if you specify 6 bytes for the length, and enter 10 bytes of compare data, only the first 6 bytes are compared.



A match code operation will not occur if the match code length added to the match code start address exceeds the message length. Refer to *Match Code Bits* and *Data Input Bytes* in *Chapter 17, System Considerations*.

Match Code Compare Data

This is the hexadecimal match code compare data. You can enter up to 24 bytes of data.

Important: After setting up a match code for a port, use the A0 function to check the Port Lowest Raw Address and the Port Highest Raw Address. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

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Match Code Configuration Example

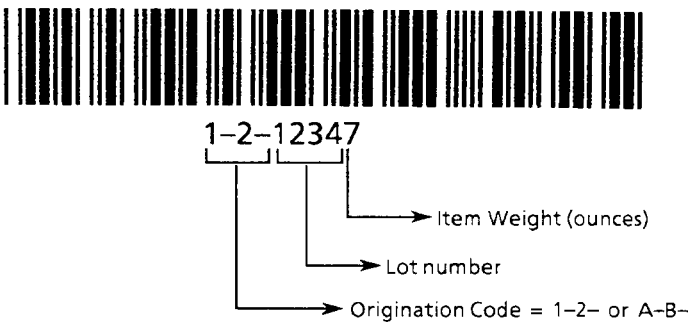
The example in this section demonstrates the match code function.

An Allen-Bradley Bar Code Decoder, Catalog No. 2755-DM6 is connected to port 3 of the module. It is used to differentiate and track visually identical items from two different sources. Each item has a bar code label containing an item identifier. Figure 10.4 shows this identifier. The first 4 characters of the bar code contain the *Origination Code*; the next 4 characters contain the lot number; and the remaining characters identify the item weight in ounces.

The PLC program will count the number of *A–B–* items, *1–2–* items, and items not conforming to either of the two sources.

No block transfer is necessary for this match code operation. The destination for the data is set at 255, which means the module will discard the data after performing the match code operation.

Figure 10.4
Bar Code Label for Match Code Operation

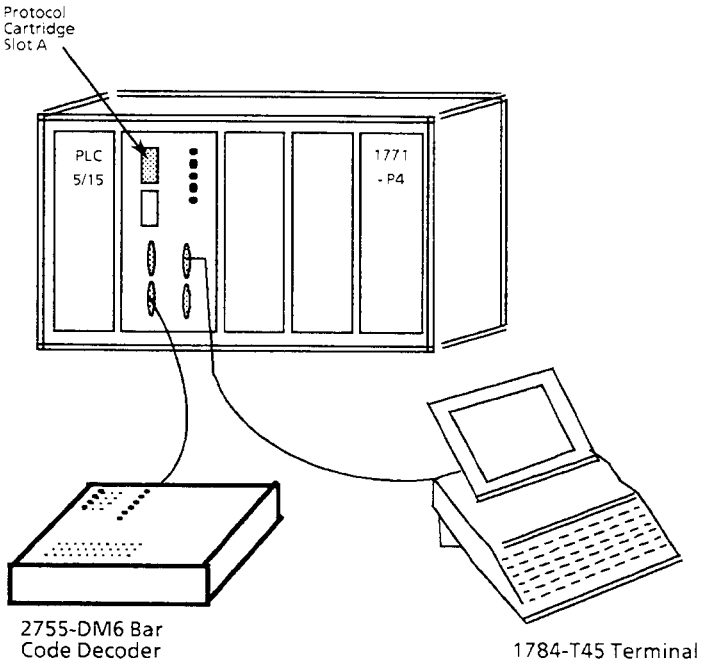


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Match Code Configuration Example (continued)

Figure 10.5 shows the configuration for the match code example.

Figure 10.5
Basic Configuration for Match Code Operation



The list of items required for this example are:

- 2760-RB Flexible Interface Module
- Catalog No. 2760-SFC1 Protocol Cartridge
- Bulletin 1771 Series B I/O Rack and power supply
- 1785-T45 Programming Terminal
- 2755-DM6 Bar Code Decoder
- PLC- 5/15 Processor

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Match Code Configuration Example (continued)

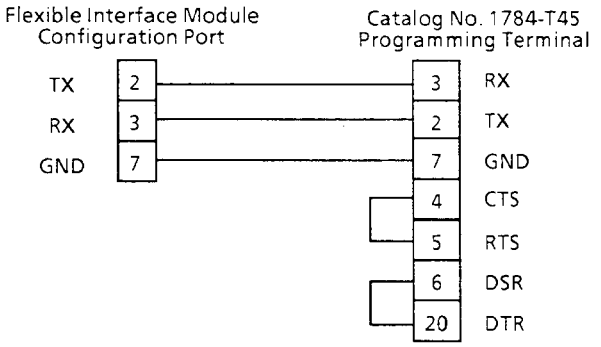
Follow steps 1 through 10 to connect the devices to the module; configure port 3; set up match code entries 43A and 43B; and enter the PLC program.

Important: While following this example, refer to *Chapter 17 - System Considerations* for the necessary details on the I/O point image table, handshake bits, and match code bits.

1. **Make sure the module's dip switches are set to factory defaults.**

2. **Fabricate the cable in Figure 10.6 to connect the 1784-T45 programming terminal to the configuration port.**

Figure 10.6
Cable for Connecting 1784-T45 Programming Terminal



3. **With the power off, insert a Catalog No. 2760-SFC1 Protocol Cartridge into the top slot of the module.**

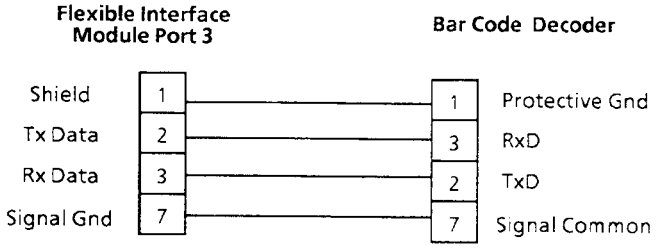
4. **Power on module and execute a *90B Set Defaults*.**
   Function 90B will clear the entire module and reset it to the factory defaults.

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Match Code Configuration Example (continued)

5. **Fabricate the cable shown in Figure 10.7 and connect the 2755-DM6 Bar Code Decoder to the module.**

Figure 10.7
Cable for Connecting 2755-DM6



6. **Using function *3 - Device Port Protocol Names*, change the protocol of port 3, as shown.**

```
PORT 1 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DF1  , SERIES A , REVISION B  (YES/NO) = YES

PORT 2 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DT  , SERIES A , REVISION B  (YES/NO) = YES
```

Answer No to DF1

```
PORT 3 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DF1  , SERIES A , REVISION B  (YES/NO) = YES = N
```

Answer Yes to DT

```
PORT 3 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DT  , SERIES A , REVISION B  (YES/NO) = NO = Y
```

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Match Code Configuration Example (continued)

7. **Using function *13 - Configuration Parameters for Serial Port 3*, examine the default message address. Change the destination to 255 to discard messages after the match code operation.**

```
MODEM CONTROL (ENABLE/DISABLE) = DISABLE = ?
9600 BITS PER SECOND (YES/NO) = YES = ?
8 BITS NO PARITY (YES/NO) = YES = ?
XON/XOFF (ENABLE/DISABLE) = DISABLE = ?
RS232 (YES/NO) = YES = ?
BYTE SWAPPING (ENABLE/DISABLE) = DISABLE = ?
BIG MESSAGES (ENABLE/DISABLE) = DISABLE = ?
BINARY DATA NO CONVERSIONS (YES/NO) = YES = ?
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE = ?
HEADER BYTE LENGTH (DEC 0..4) = 0 = ?
HEADER DATA[0] (HEX 0..ff) = 0 = ?
HEADER DATA[1] (HEX 0..ff) = 0 = ?
HEADER DATA[2] (HEX 0..ff) = 0 = ?
HEADER DATA[3] (HEX 0..ff) = 0 = ?
TRAILER BYTE LENGTH (DEC 0..4) = 2 = ?
TRAILER DATA[0] (HEX 0..ff) = d = ?
TRAILER DATA[1] (HEX 0..ff) = a = ?
TRAILER DATA[2] (HEX 0..ff) = 0 = ?
TRAILER DATA[3] (HEX 0..ff) = 0 = ?
MAX DATA BYTE LENGTH (DEC 0..124) = 0 = ?
MIN DATA BYTE LENGTH (DEC 0..124) = 0 = ?
PAD CHARACTER (HEX 0..ff) = 0 = ?
DEFAULT DESTINATION (DEC 0..255) = 5 = 255
DEFAULT SOURCE (DEC 0..255) = 255 = ?
DEFAULT ADDRESS (HEX 0..ffff) = 200 = ?
```

Change to 255

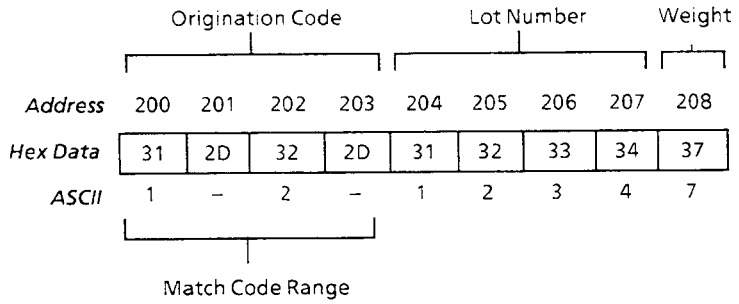
4DM

The default address specified may have a unique meaning, depending on the protocol in use. Protocols that have no inherent address, such as the one used in this example, automatically assign one for the module. The last screen excerpt displayed the default address as 200 (in hex). This information is needed later when a match code entry is configured.

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Match Code Configuration Example *(continued)*

The figure below shows how the default address corresponds to the beginning of the message. Origination code 1–2– is used.



8. **Using function *43A - Match Code Entries for Port 3,* enable the match code function by entering N as shown below.**

MATCH CODE ENTRY DISABLED (YES/NO) = YES = **N**

Although not shown on the first menu, *Equal To Operation* and the following parameters will appear, one at a time. Modify the parameters as shown below:

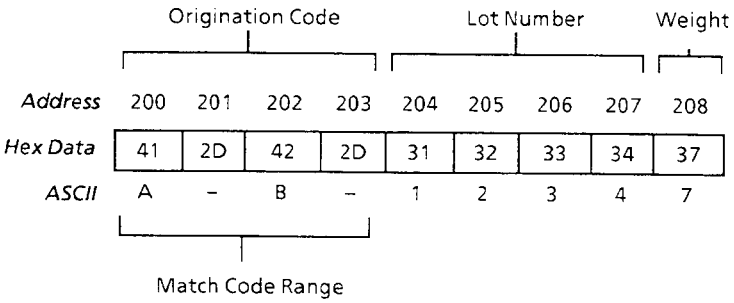
EQUAL TO OPERATION (YES/NO) = NO = **Y**
BACKPLANE WORD NUMBER (DEC 1...2) = 1 = **1**
BACKPLANE BIT NUMBER (DEC 0...15) = 0 = **12** **(See *Note)**
MATCH CODE LENGTH (DEC 1...24) = 1 = **4**
MATCH CODE START ADDRESS (HEX 0...ffff) = 0 = **200**
MATCH CODE COMPARE DATA[0] (HEX 0...ff) = 0 = **31**
MATCH CODE COMPARE DATA[1] (HEX 0...ff) = 0 = **2D**
MATCH CODE COMPARE DATA[2] (HEX 0...ff) = 0 = **32**
MATCH CODE COMPARE DATA[3] (HEX 0...ff) = 0 = **2D**

***Important:** The Backplane Bit Number, specified as decimal 12, is the first bit available. Decimal 12 corresponds to octal 14, as shown on a PLC Processor Display Data command for PLC I/O addresses.

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Match Code Configuration Example (continued)

The figure below shows the second origination code (A–B–).



9. **Using function *43B - Match Code Entries for Port 3*, enable the match code function, select *Equal To Operation* and modify the parameters as shown below:**

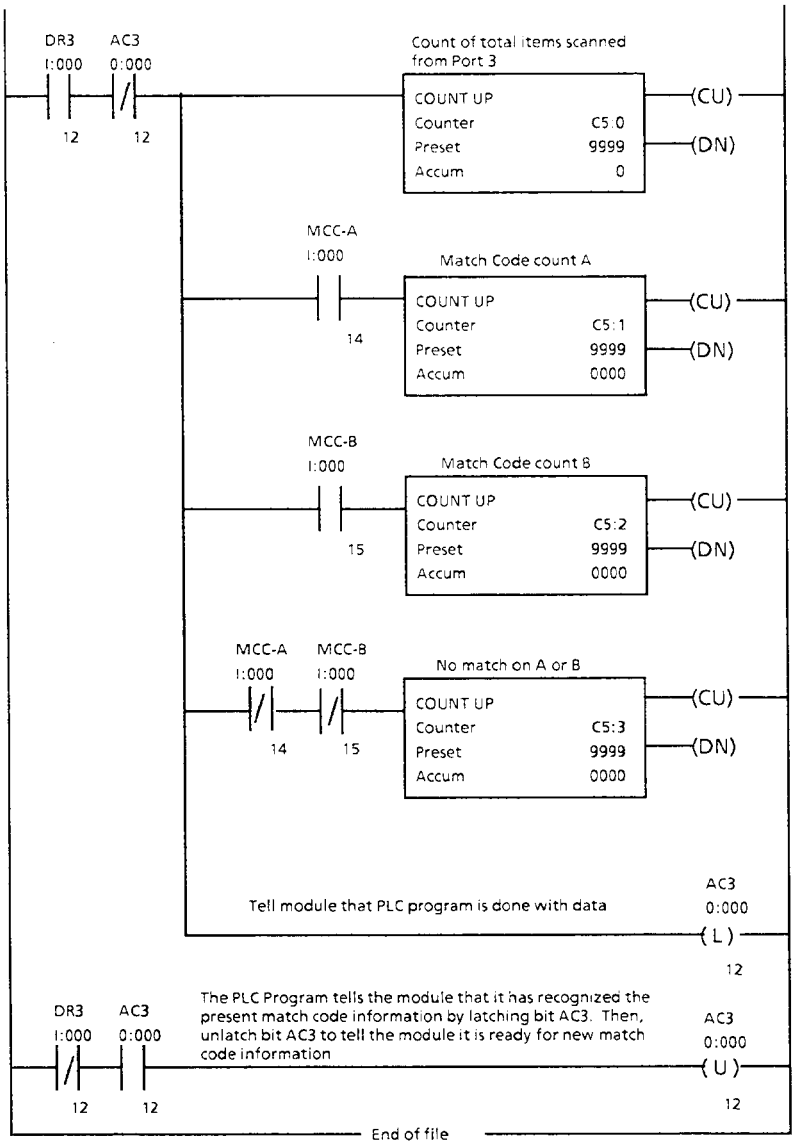
MATCH CODE ENTRY DISABLED (YES/NO) = YES = **N**
EQUAL TO OPERATION (YES/NO) = NO = **Y**
BACKPLANE WORD NUMBER (DEC 1...2) = 1 = **1**
BACKPLANE BIT NUMBER (DEC 0...15) = 0 = **13 (see *Note)**
MATCH CODE LENGTH (DEC 1...24) = 1 = **4**
MATCH CODE START ADDRESS (HEX 0...ffff) = 0 = **200**
MATCH CODE COMPARE DATA[0] (HEX 0...ff) = 0 = **41**
MATCH CODE COMPARE DATA[1] (HEX 0...ff) = 0 = **2D**
MATCH CODE COMPARE DATA[2] (HEX 0...ff) = 0 = **42**
MATCH CODE COMPARE DATA[3] (HEX 0...ff) = 0 = **2D**

***Important:** The Backplane Bit Number, specified as decimal 13, is the second bit available. Decimal 13 corresponds to octal 15, as shown on a PLC Processor Display Data command for PLC I/O addresses.

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Match Code Configuration Example (continued)

10. Enter the following PLC program. The program will provide the necessary handshake required by the module for accepting and counting the match code conditions:



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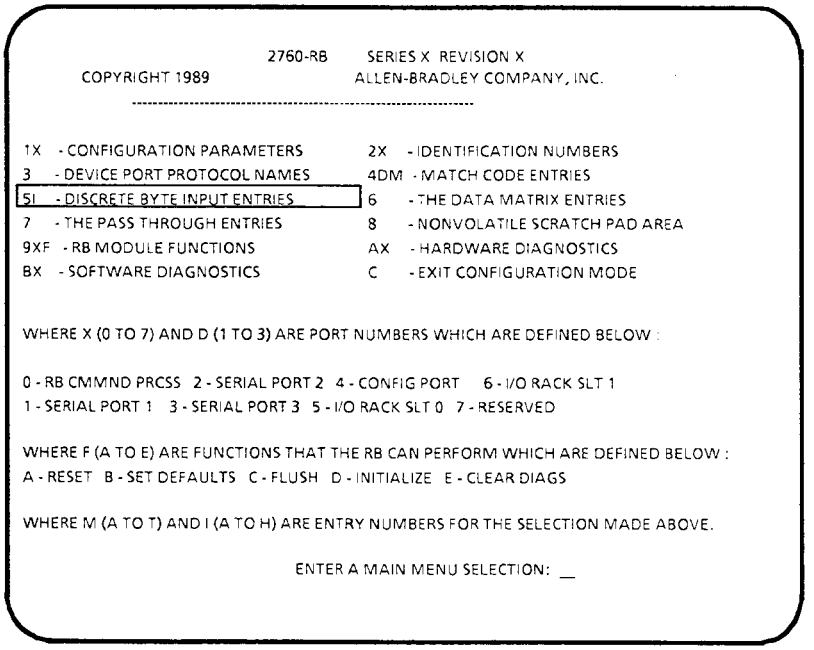
Chapter 11 5I - Discrete Byte Input Entries

Chapter Objectives

This chapter defines function *5I - Discrete Byte Input Entries*. Use this function to set up a total of 6 discrete bytes.

Defining Discrete Byte Input Entries

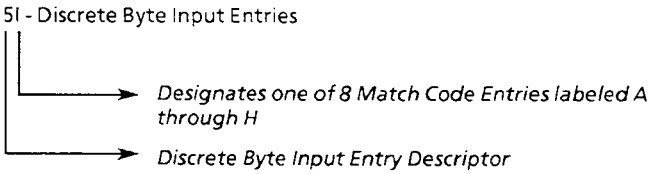
A box surrounds function *5I - Discrete Byte Input Entries* to show its location on the main menu.



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Defining Discrete Byte Input Entries (continued)

Menu function *5I* is used to designate up to 6 discrete bytes.



The following questions are identical for options 5A through 5H.

```
DEVICE PORT NUMBER    (DEC 0...3) = 0 = ?
BACKPLANE WORD NUMBER (DEC 1...2) = 2 = ?
BACKPLANE BYTE NUMBER (DEC 0...1) = 0 = ?
DATA ADDRESS          (HEX 0...ffff) = 0 = ?
```

5I

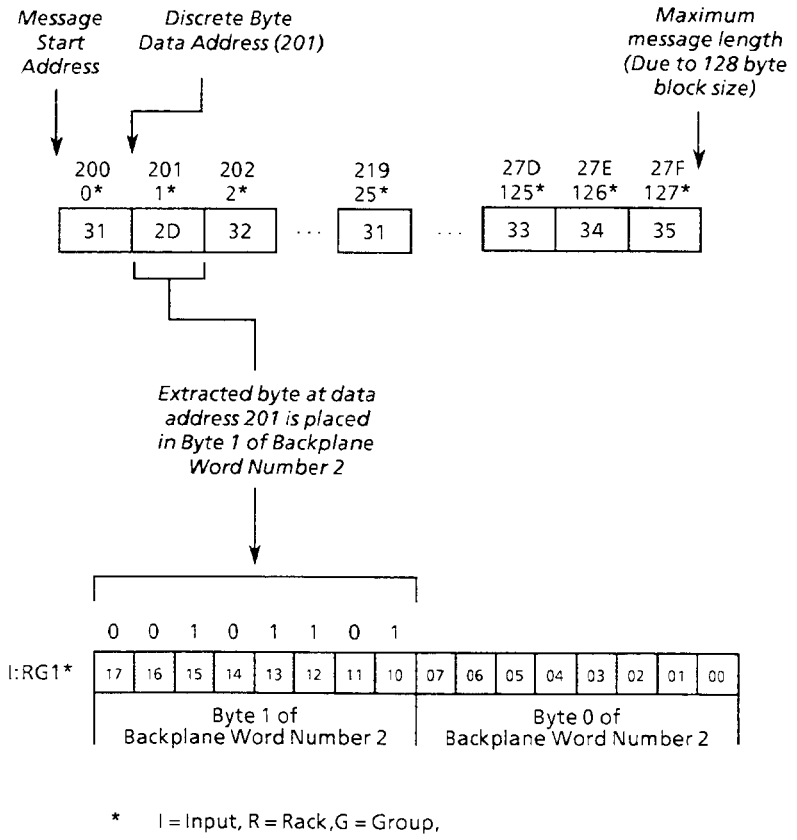
Each entry extracts a single byte from the designated device port (1, 2, or 3) without using a BTR data transfer operation. If the device port number is 0, the entry is disabled.

Figure 11.1 shows that the module supports a maximum of two simultaneous (one word) discrete byte inputs per port. This sets a practical limit of two entries per port, or six total discrete byte input entries per module. For more information, refer to *Processing Considerations* in *Chapter 17, System Considerations*.

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Defining Discrete Byte Input Entries (continued)

Figure 11.1
Discrete Byte Input Operation



* I = Input, R = Rack, G = Group,

The data address is relative to the start address of the message and specifies which byte to extract from the message. Start addresses are protocol specific. For more information, refer to your Protocol Cartridge User's Manual.

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Device Port Number

You activate a discrete byte input entry by entering a port number (1, 2, or 3) at the Device Port Number question.

```
DEVICE PORT NUMBER   (DEC 0...3) = 0 = ?
```

To deactivate a discrete byte input entry, enter a 0 at the Device Port Number question. Disabling a discrete byte input entry does not result in the loss of any discrete byte input configuration data.

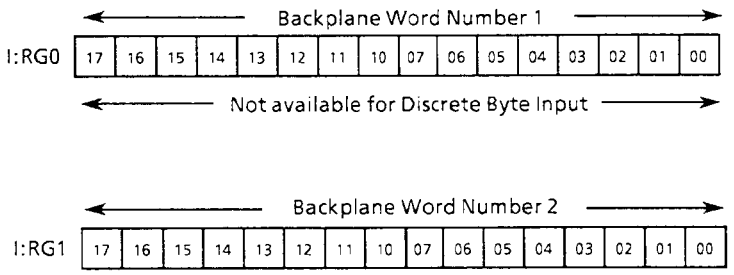
Backplane Word Number

The backplane word number identifies where to locate the byte of extracted data. This location is relative to the total number of words that the module occupies in the Input Data Table.


```
BACKPLANE WORD NUMBER (DEC 1...2) = 2 = ?
```

Input Image Table Words 1 and 2

I = Input
R = Rack
G = Group



You should locate this word at backplane word number 2. For more information, refer to *I/O Point Image Map* in *Chapter 17, System Considerations*.

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Backplane Byte Number

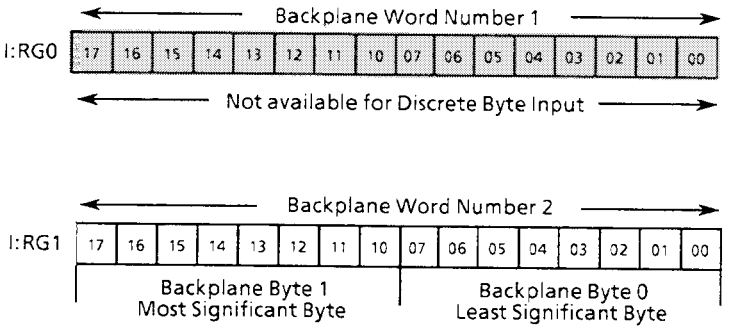
The backplane byte number specifies whether the extracted byte will be located in the upper (most significant byte) 8 bits or lower (least significant byte) 8 bits of the backplane word number, located in the Input Data Table word. Refer to the figure below.

BACKPLANE BYTE NUMBER (DEC 0...1) = 0 = ?

Where you locate this byte depends on other factors. For more information, refer to *I/O Point Image Map* in *Chapter 17, System Considerations*.

Input Image Table Words 1 and 2

I = Input
R = Rack
G = Group



Data Address

The data address is the address, relative to the start address of the message, where the extract operation is to occur. Start addresses are protocol specific. Refer to your Protocol Cartridge User's Manual.

DATA ADDRESS (HEX 0...ffff) = 0 = ?

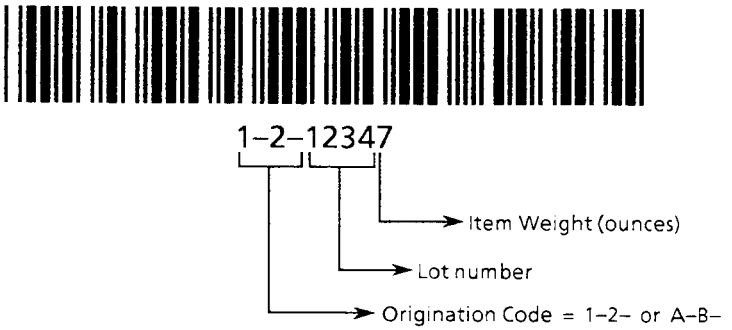
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Discrete Byte Input Configuration Example

The example in this section demonstrates the discrete byte input function.

An Allen-Bradley Bar Code Decoder, Catalog No. 2755-DM6, is connected to port 3. It is used to differentiate and track visually identical items from two different sources. Each item has a bar code label containing an item identifier. Figure 11.2 shows this identifier. The first 4 characters of the bar code contain the *Origination Code;* the next 4 characters contain the lot number; and the remaining 1 character identifies the item weight in ounces.

Figure 11.2
Bar Code Label for Discrete Byte Operation



The PLC program will count the number of items that weigh over 160 grams. A unit of measure conversion (from ounces to grams) must be done before a comparison is made.

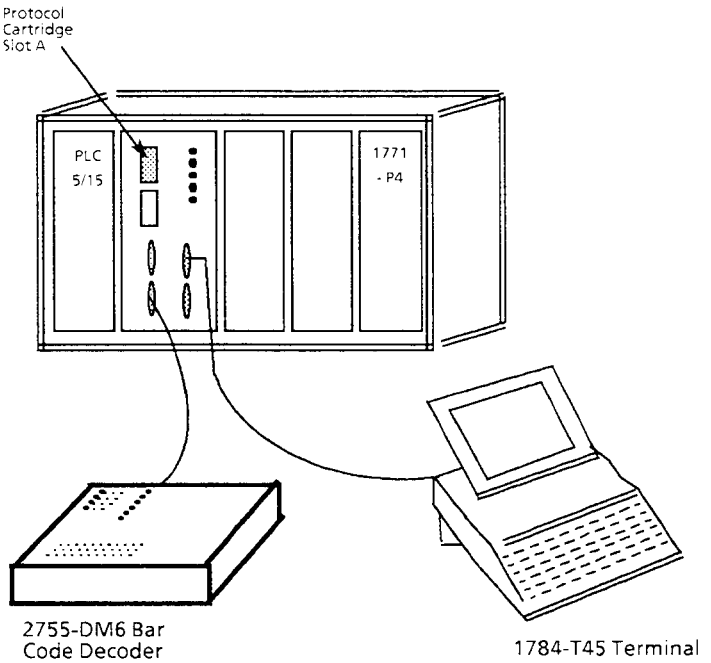
No block transfer is necessary for this compare operation. The destination for the data is set at 255, which means the module will discard the data after performing the match code operation.

Important: Steps 1 through 7 are the same steps listed under the *Match Code Configuration Example*, in Chapter 10.

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Discrete Byte Input Configuration Example (continued)

The figure below shows the configuration for the discrete byte input example.



The list of items required for this example are:

- 2760-RB Flexible Interface Module
- Bulletin 1771 Series B I/O rack and power supply (1 slot addressing must be used to access Discrete Byte entries)
- 1785-T45 Programming Terminal
- PLC- 5/15 Processor
- 2755-DM6 Bar Code Decoder

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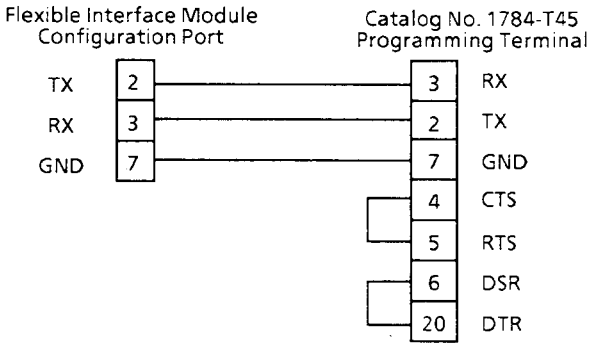
Discrete Byte Input Configuration Example (continued)

Follow steps 1 through 9 to connect devices to the module; configure port 3; set up discrete byte input entry 5A; and enter the PLC program.

Important: While following this example, refer to *Chapter 17 - System Considerations* for the necessary details on the I/O point image table, handshake bits, and discrete byte input bits.

1. **Make sure the module's dip switches are set to factory defaults.**

2. **Fabricate the cable shown below to connect the 1784-T45 programming terminal to the configuration port.**



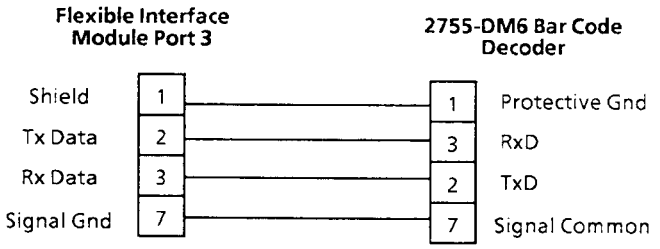
3. **With the power off, insert a Catalog No. 2760-SFC1 Protocol Cartridge into the top slot.**

4. **Power on module and execute a *90B Set Defaults*.**
   Function 90B will clear the entire module and reset it to the factory defaults.

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Discrete Byte Input Configuration Example (continued)

5. **Fabricate the cable shown below to connect the 2755-DM6 Bar Code Decoder to the module.**



6. **Using function *3 - Device Port Protocol Names*, change the protocol of port 3, as shown:**

```
PORT 1 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DF1  , SERIES A , REVISION B  (YES/NO) = YES

PORT 2 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DT  , SERIES A , REVISION B  (YES/NO) = YES
```

Answer No to DF1

```
PORT 3 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DF1  , SERIES A , REVISION B  (YES/NO) = YES = N
```

Answer Yes to DT

```
PORT 3 = COPYRIGHT 1989        ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DT  , SERIES A , REVISION B  (YES/NO) = NO = Y
```


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Discrete Byte Input Configuration Example (continued)

7. Using function *13 - Configuration Parameters for Serial Port 3*, examine the default message address. Change the destination to 255. Messages sent to this destination are discarded.

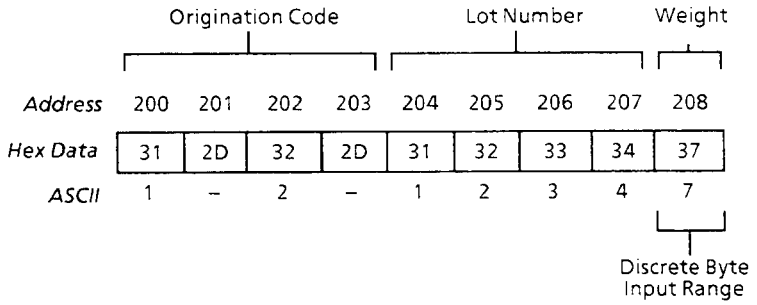

```
MODEM CONTROL (ENABLE/DISABLE) = DISABLE = ?
9600 BITS PER SECOND (YES/NO) = YES = ?
8 BITS NO PARITY (YES/NO) = YES = ?
XON/XOFF (ENABLE/DISABLE) = DISABLE = ?
RS232 (YES/NO) = YES = ?
BYTE SWAPPING (ENABLE/DISABLE) = DISABLE = ?
BIG MESSAGES (ENABLE/DISABLE) = DISABLE = ?
BINARY DATA NO CONVERSIONS (YES/NO) = YES = ?
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE = ?
HEADER BYTE LENGTH (DEC 0...4) = 0 = ?
HEADER DATA[0] (HEX 0...ff) = 0 = ?
HEADER DATA[1] (HEX 0...ff) = 0 = ?
HEADER DATA[2] (HEX 0...ff) = 0 = ?
HEADER DATA[3] (HEX 0...ff) = 0 = ?
TRAILER BYTE LENGTH (DEC 0 ..4) = 2 = ?
TRAILER DATA[0] (HEX 0...ff) = d = ?
TRAILER DATA[1] (HEX 0...ff) = a = ?
TRAILER DATA[2] (HEX 0...ff) = 0 = ?
TRAILER DATA[3] (HEX 0...ff) = 0 = ?
MAX DATA BYTE LENGTH (DEC 0...124) = 0 = ?
MIN DATA BYTE LENGTH (DEC 0...124) = 0 = ?
PAD CHARACTER (HEX 0...ff) = 0 = ?
DEFAULT DESTINATION (DEC 0...255) = 5 = 255
DEFAULT SOURCE (DEC 0...255) = 255 = ?
DEFAULT ADDRESS (HEX 0 ...ffff) = 200 = ?
```

Change to 255

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Discrete Byte Input Configuration Example (continued)

The figure below shows how the default address corresponds to the beginning of message:



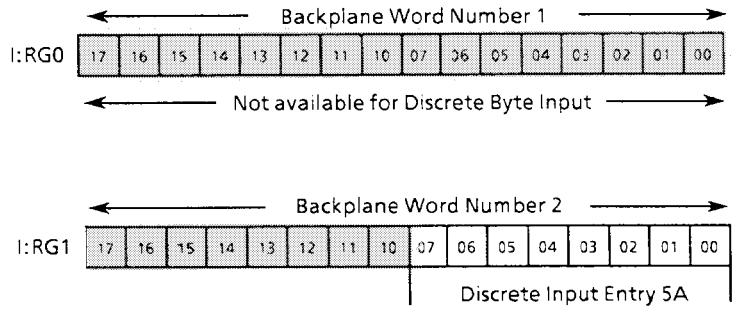
8. **Using function *5A - Discrete Byte Input Entry*, change the parameters to those shown below:**

5I

DEVICE PORT NUMBER (DEC 0...3) = 0 = **3**
BACKPLANE WORD NUMBER (DEC 1...2) = 2 = **2**
BACKPLANE BYTE NUMBER (DEC 0...1) = 0 = **0**
DATA ADDRESS (HEX 0...ffff) = 0 = **208**

The backplane bits for the byte data will consume I:001/00 through I:001/07. The figure below shows how the backplane bits relate to the weight (in ounces) extracted from address 208:

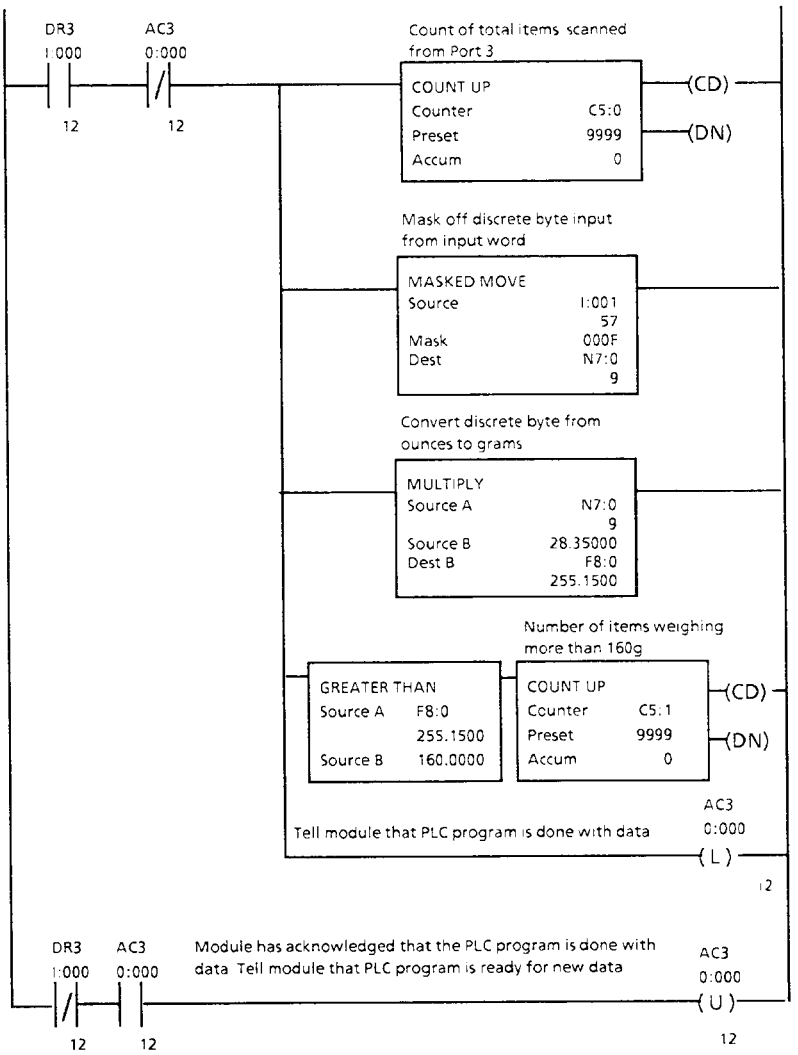
Input Image Table Words 1 and 2



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Discrete Byte Input Configuration Example (continued)

9. Enter the PLC program shown below. It will provide the necessary handshake required by the module for accepting and evaluating discrete byte input data:



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Chapter 12 6 - Data Matrix Entries

Chapter Objectives

This chapter defines function *6 - The Data Matrix Entries*. Use this function to send an additional copy of a data message to another port.

Defining Data Matrix Entries

A box surrounds function *6 - The Data Matrix Entries* below to show its location on the main menu.

```
                              2760-RB     SERIES X  REVISION X
        COPYRIGHT 1989                    ALLEN-BRADLEY COMPANY, INC.
        ---------------------------------------------------------

1X  - CONFIGURATION PARAMETERS          2X  - IDENTIFICATION NUMBERS
3   - DEVICE PORT PROTOCOL NAMES        4DM - MATCH CODE ENTRIES
5I  - DISCRETE BYTE INPUT ENTRIES       6   - THE DATA MATRIX ENTRIES
7   - THE PASS THROUGH ENTRIES          8   - NONVOLATILE SCRATCH PAD AREA
9XF - RB MODULE FUNCTIONS               AX  - HARDWARE DIAGNOSTICS
BX  - SOFTWARE DIAGNOSTICS              C   - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT    6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                          ENTER A MAIN MENU SELECTION: _
```

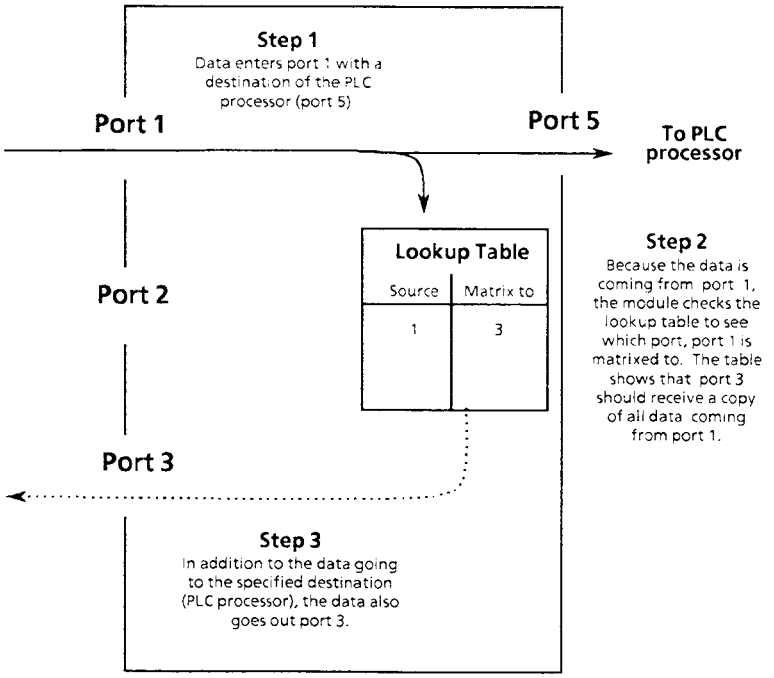

All data received by a port is sent to a specific destination, which is typically the PLC (via port 5). The *Data Matrix* function allows you to send copies of the same data to a second destination or port. When you matrix data from one port to another, for instance matrix port 1 to port 3, the source (port 1) of the data is compared to a lookup table. The matrixed destination (port 3) is found and sent a copy of the data.

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Defining Data Matrix Entries (continued)

Figure 12.1 illustrates the data matrix function.

Figure 12.1
Data Matrix Function



The following options allow you to choose which ports you want to matrix data to. You can matrix data to more than one port.

MATRIXING SERIAL 1 TO CONFIG (ENABLE/DISABLE) = DISABLE.
MATRIXING SERIAL 1 TO SERIAL 2 (ENABLE/DISABLE) = DISABLE.
MATRIXING SERIAL 1 TO SERIAL 3 (ENABLE/DISABLE) = DISABLE.
MATRIXING SERIAL 2 TO CONFIG (ENABLE/DISABLE) = DISABLE.
MATRIXING SERIAL 2 TO SERIAL 1 (ENABLE/DISABLE) = DISABLE.
MATRIXING SERIAL 2 TO SERIAL 3 (ENABLE/DISABLE) = DISABLE.
MATRIXING SERIAL 3 TO CONFIG (ENABLE/DISABLE) = DISABLE.
MATRIXING SERIAL 3 TO SERIAL 1 (ENABLE/DISABLE) = DISABLE.
MATRIXING SERIAL 3 TO SERIAL 2 (ENABLE/DISABLE) = DISABLE.
MATRIXING CONFIG TO SERIAL 1 (ENABLE/DISABLE) = DISABLE.
MATRIXING CONFIG TO SERIAL 2 (ENABLE/DISABLE) = DISABLE.
MATRIXING CONFIG TO SERIAL 3 (ENABLE/DISABLE) = DISABLE.

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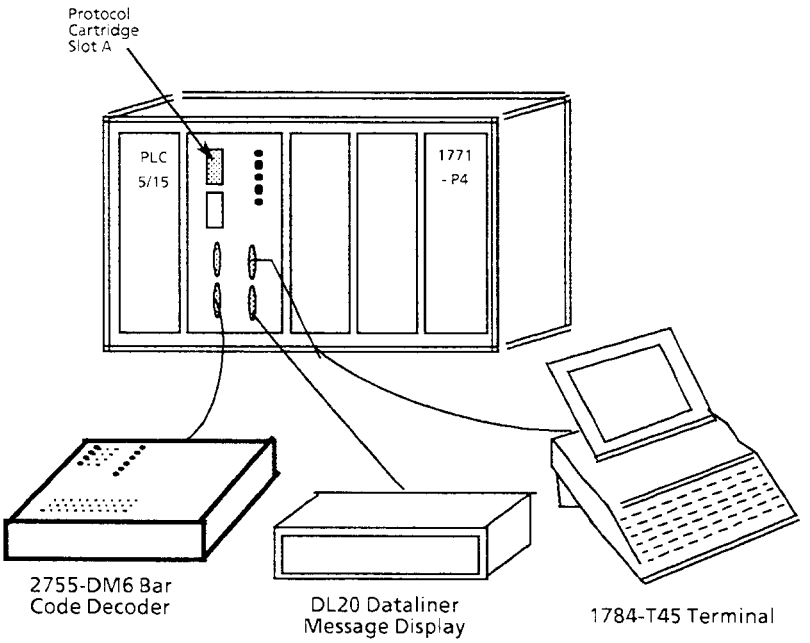
Data Matrix Configuration Example

The example in this section demonstrates the correct use of the data matrix function.

Important: This example expands on the discrete byte input example in Chapter 11. Please review that example before proceeding.

A message display is added to the configuration to display the bar code data as the bar codes are scanned. The Allen-Bradley DL20 Dataliner Message Display is connected to port 1. Figure 12.2 shows this configuration.

Figure 12.2
Data Matrix Configuration Example



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Data Matrix Configuration Example (continued)

The items required for the data matrix example are the same as for the discrete byte input example (in Chapter 11) with the addition of the DL20 Dataliner Message Display.

- 2760-RB Flexible Interface Module
- Bulletin 1771 Series B I/O rack and power supply (1 slot addressing must be used to access discrete byte entries)
- 1785-T45 Programming Terminal
- PLC- 5/15 Processor
- 2755-DM6 Bar Code Decoder
- 2706-B21J31, DL20 Series Dataliner Message Display

Two methods are available for matrixing data from the 2755-DM6 bar code decoder to the DL20 message display.

Method 1 Change the default destination to 5, for PLC block transfer operations. Add BTR support to the PLC program to acquire the information and empty the module buffers. All of the information from the scanner was not used in the previous example. It was discarded to eliminate BTRs. You must add BTW support to transfer the message back through the module to port 1 where the Dataliner Message Display is connected.

Method 2 Use function *6 - Data Matrix Entries* to matrix data from port 3 to port 1.

Method 2 is more efficient from a PLC program and operational standpoint and is the basis of this example.

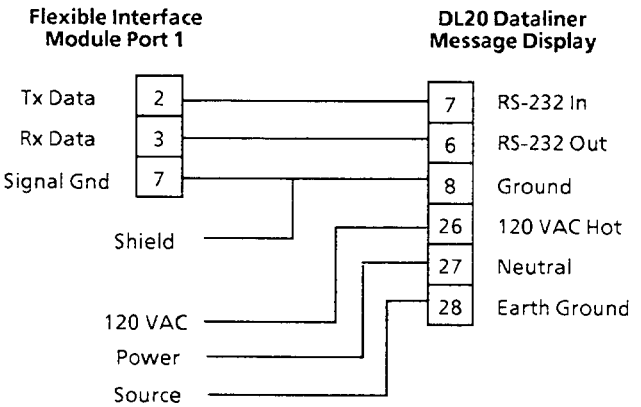
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Data Matrix Configuration Example (continued)

Follow steps 1 through 5 to connect the DL20 Message Display to port 1 of the module, configure port 1, and set up matrixing from port 3 to port 1. These steps are in addition to the steps followed for the discrete byte input example in Chapter 11.

1. **Set these parameters on the Dataliner Message Display:**
   - Baud Rate: **9600**
   - Parity: **None**
   - Data Length: **7** (parity is part of length)
   - Stop bits: **1**
2. **Fabricate the cable shown in Figure 12.3 and connect the Dataliner Display to port 1.**

Figure 12.3
Cable for Connecting DL20 Dataliner



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Data Matrix Configuration Example (continued)

3. **Using function *3 - Device Port Protocol Names*, change the port 1 protocol to DT, as shown:**

Answer No to DF1

```
PORT 1 = COPYRIGHT 1989          ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DF1  , SERIES A , REVISION B  (YES/NO) = YES = N
```

Answer Yes to DT

```
PORT 1 = COPYRIGHT 1989          ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DT   , SERIES A , REVISION B  (YES/NO) = NO = Y
```

The message display will operate in the slave mode. An initialization character sequence is required to place the message display into slave mode.

4. **Using function *11 - Configuration Parameters of Serial Port 1*, change the parameters to match those on the next page.**

6

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Data Matrix Configuration Example (continued)

```
MODEM CONTROL (ENABLE/DISABLE) = DISABLE = ?
9600 BITS PER SECOND (YES/NO) = YES = ?
8 BITS NO PARITY (YES/NO) = YES = N
8 BITS EVEN PARITY (YES/NO) = NO = ?
7 BITS MARK PARITY (YES/NO) = NO = Y
XON/XOFF (ENABLE/DISABLE) = DISABLE = ?
RS232 (YES/NO) = YES = ?
BYTE SWAPPING (ENABLE/DISABLE) = DISABLE = ?
BIG MESSAGES (ENABLE/DISABLE) = DISABLE = ?
BINARY DATA NO CONVERSIONS (YES/NO) = YES = ?
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE = ?
HEADER BYTE LENGTH (DEC 0...4) = 0 = 1
HEADER DATA[0] (HEX 0...ff) = 0 = 12
HEADER DATA[1] (HEX 0...ff) = 0 = ?
HEADER DATA[2] (HEX 0...ff) = 0 = ?
HEADER DATA[3] (HEX 0...ff) = 0 = ?
TRAILER BYTE LENGTH (DEC 0...4) = 2 = 3
TRAILER DATA[0] (HEX 0...ff) = d = 0
TRAILER DATA[1] (HEX 0...ff) = a = 1
TRAILER DATA[2] (HEX 0...ff) = 0 = D
TRAILER DATA[3] (HEX 0...ff) = 0 = ?
MAX DATA BYTE LENGTH (DEC 0...124) = 0 = ?
MIN DATA BYTE LENGTH (DEC 0...124) = 0 = 20
PAD CHARACTER (HEX 0...ff) = 0 = 20
DEFAULT DESTINATION (DEC 0...255) = 5 = ?
DEFAULT SOURCE (DEC 0...255) = 255 = ?
DEFAULT ADDRESS (HEX 0...ffff) = 200 = ?
SETUP TIMEOUT/SECS (DEC 0...255) = 0 = ?
SETUP BYTE LENGTH (DEC 0...78) = 0 = 15
SETUP DATA[0] (HEX 0...ff) = 0 = 1B
SETUP DATA[1] (HEX 0...ff) = 0 = 1B
SETUP DATA[2] (HEX 0...ff) = 0 = 1B
SETUP DATA[3] (HEX 0...ff) = 0 = 4E
SETUP DATA[4] (HEX 0...ff) = 0 = D
SETUP DATA[5] (HEX 0...ff) = 0 = 59
SETUP DATA[6] (HEX 0...ff) = 0 = D
SETUP DATA[7] (HEX 0...ff) = 0 = 4
SETUP DATA[8] (HEX 0...ff) = 0 = 0
SETUP DATA[9] (HEX 0...ff) = 0 = D
SETUP DATA[10] (HEX 0...ff) = 0 = 12
SETUP DATA[11] (HEX 0...ff) = 0 = 4
SETUP DATA[12] (HEX 0...ff) = 0 = 0
SETUP DATA[13] (HEX 0...ff) = 0 = D
SETUP DATA[14] (HEX 0...ff) = 0 = 12
SETUP DATA[15] (HEX 0...ff) = 0 = 00
SETUP DATA[16] (HEX 0...ff) = 0 = 00
```


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Data Matrix Configuration Example *(continued)*

Setup Data [0] through [14] is required to place the message display in slave mode. The purpose of the setup data is shown below:

Edit Prompt. Return message display to a known state.

Setup Data	0	1	2
Hex Data	1B	1B	1B
ASCII	ESC	ESC	ESC

Change message display from Edit Prompt to Run Prompt.

Setup Data	3	4
Hex Data	4E	0D
ASCII	N	CR

6

Change message display from Run Prompt to Run Mode.

Setup Data	5	6
Hex Data	59	0D
ASCII	Y	CR

Issue two control sequences to insure the switch from Run Mode to Slave Mode.

Setup Data	7	8	9	10	11	12	13	14
Hex Data	04	00	0D	12	04	00	0D	12
ASCII	EOT	NUL	CR	DC2	EOT	NUL	CR	DC2

CTRL-D
CTRL-O
CTRL-R

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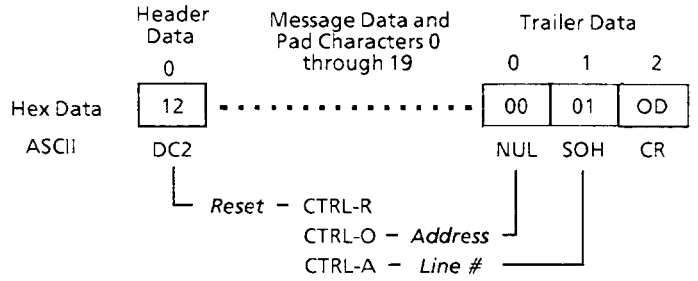
Data Matrix Configuration Example (continued)

Setup Data [15] and [16] must be set to zero and not included in the Setup Byte Length. For more information, refer to *Setup Data* in *Chapter 7, 1X - Configuration Parameters*.

The Header Data [0], Trailer Data [0] through [2], Min Data Byte Length, and Pad Character parameters are required to format data into fixed length packets for the Message Display.

The association between those parameters and the data packets is illustrated in Figure 12.4.

Figure 12.4
Data Packet Example



Refer to your Bulletin 2706 Dataliner Message Display User's Manual for further explanation of the operating characteristics of your DL20 Message Display.

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Data Matrix Configuration Example (continued)

5. **Use function *6 - Data Matrix Entries* to enable matrixing between ports 3 and 1, as shown below.**

```
MATRIXING SERIAL 1 TO CONFIG  (ENABLE/DISABLE) = DISABLE = ?
MATRIXING SERIAL 1 TO SERIAL 2 (ENABLE/DISABLE) = DISABLE = ?
MATRIXING SERIAL 1 TO SERIAL 3 (ENABLE/DISABLE) = DISABLE = ?
MATRIXING SERIAL 2 TO CONFIG  (ENABLE/DISABLE) = DISABLE = ?
MATRIXING SERIAL 2 TO SERIAL 1 (ENABLE/DISABLE) = DISABLE = ?
MATRIXING SERIAL 2 TO SERIAL 3 (ENABLE/DISABLE) = DISABLE = ?
MATRIXING SERIAL 3 TO CONFIG  (ENABLE/DISABLE) = DISABLE = ?
MATRIXING SERIAL 3 TO SERIAL 1 (ENABLE/DISABLE) = DISABLE = E
MATRIXING SERIAL 3 TO SERIAL 2 (ENABLE/DISABLE) = DISABLE = ?
```

All data coming from port 3 is displayed on the message display and also sent to its original destination.

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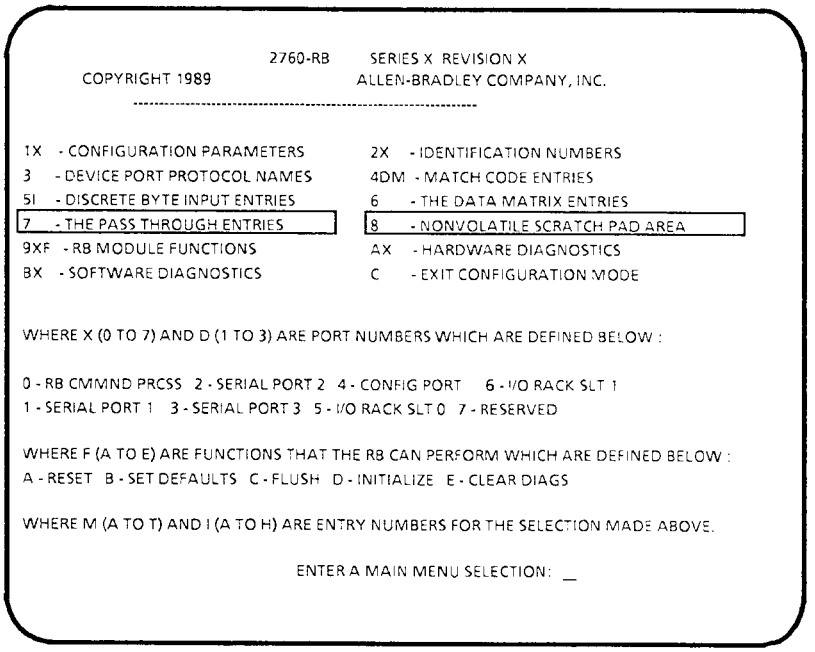
Chapter 13 Pass Through/Non-Volatile Scratch Pad

Chapter Objectives

This chapter defines functions *7 - The Pass Through Entries* and *8 - NonVolatile Scratch Pad Area.*

Use function *7- The Pass Through Entries* to redirect a message from the original destination to one that you specify. Use function *8 - NonVolatile Scratch Pad* to store information such as version numbers.

A box surrounds each function below to show their locations on the main menu.



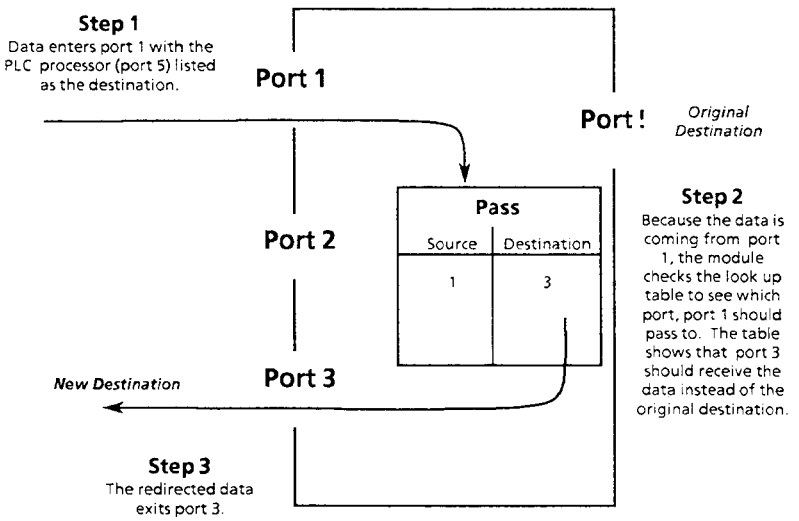
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7 - The Pass Through Entries

The pass through function redirects data to any port you choose, regardless of what destination is listed in the message header.

This function is useful if you need to configure a device connected to ports 1 through 3. For example, you could connect a configuration terminal to port 1 and pass it to port 3 where a device is connected. All data will pass, untouched, through port 1 and out port 3, as illustrated in Figure 13.1.

Figure 13.1
Pass Through Entries



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The following option allows you to select which ports to include in the pass through function. More than one port may be passed to. You cannot pass through the configuration port.

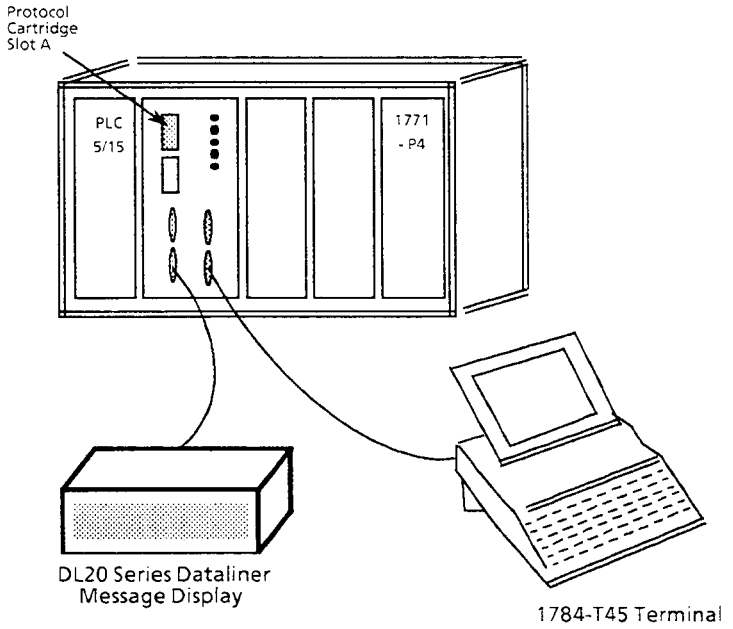
PASSING SERIAL 1 TO SERIAL 2 (ENABLE/DISABLE) = DISABLE.
PASSING SERIAL 1 TO SERIAL 3 (ENABLE/DISABLE) = DISABLE.
PASSING SERIAL 2 TO SERIAL 1 (ENABLE/DISABLE) = DISABLE.
PASSING SERIAL 2 TO SERIAL 3 (ENABLE/DISABLE) = DISABLE.
PASSING SERIAL 3 TO SERIAL 1 (ENABLE/DISABLE) = DISABLE.
PASSING SERIAL 3 TO SERIAL 2 (ENABLE/DISABLE) = DISABLE.

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Pass Through Example

The example in this section demonstrates the pass through function. An Allen-Bradley Dataliner Message Display is used with a 1784-T45 Terminal to display operator information. Figure 13.2 shows this configuration.

Figure 13.2
Pass Through Configuration Example



The following items are required:

- PLC-5/15 Processor
- 2760-RB Flexible Interface Module
- Catalog No. 2760-SFC1 Protocol Cartridge
- A Bulletin 1771 Series B I/O rack and power supply (1 slot addressing must be used)
- 1785-T45 Programming Terminal
- 2706-B21J31, DL20 Series Dataliner Message Display

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Pass Through Example (continued)

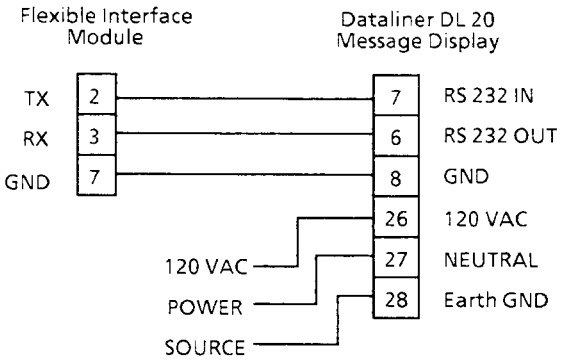
Follow steps 1 through 11 to connect the DL20 Message Display to port 3 and the 1784-T45 terminal to port 1; configure the ports appropriately; and set up the pass through function.

1. **Make sure the module's dip switches are set to factory defaults.**

2. **With the power off, insert a Catalog No. 2760-SFC1 Protocol Cartridge into the top slot of the module.**

3. **Execute a *90B - Set Defaults.*** *This will set the entire module to the factory defaults.*

4. **Fabricate the cable shown below and connect the DL20 Dataliner Message Display to port 3.**

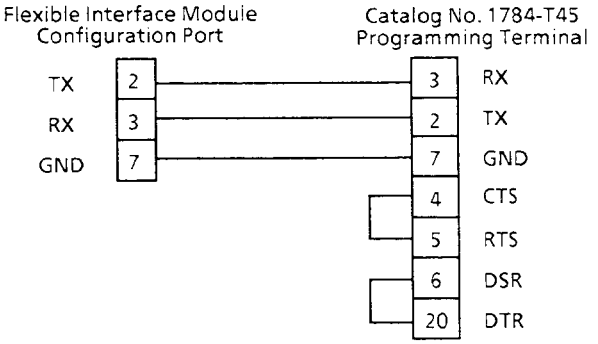


5. **Set these parameters on the DL20 Message Display:**
   - Baud Rate = **9600**
   - Parity = **None**
   - Data Length = **7** (parity is part of length)
   - Stop Bits = **1**

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Pass Through Example *(continued)*

6. **Fabricate the cable below and connect your T45 terminal to the configuration port of the module.**



7. **Use function *3 - Device Port Protocol Names* to change the protocol assignments for ports 1 and 3 to Dumb Terminal:**

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Answer No to DF1
PORT 1 = COPYRIGHT 1989 ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DF1 , SERIES A , REVISION B (YES/NO) = YES = **N**

Answer Yes to DT
PORT 1 = COPYRIGHT 1989 ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DT , SERIES A , REVISION B (YES/NO) = NO = **Y**

PORT 2 = COPYRIGHT 1989 ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DT , SERIES A , REVISION B (YES/NO) = YES =

Answer No to DF1
PORT 3 = COPYRIGHT 1989 ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DF1 , SERIES A , REVISION B (YES/NO) = YES = **N**

Answer Yes to DT
PORT 3 = COPYRIGHT 1989 ALLEN-BRADLEY COMPANY, INC.
2760-SFC1 DT , SERIES A , REVISION B (YES/NO) = NO = **Y**

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Pass Through Example (continued)

8. Change the following items using *Function 13 Configuration Parameters for Port 3* to those shown:

```
MODEM CONTROL (ENABLE/DISABLE) = DISABLE = ?
9600 BITS PER SECOND (YES/NO) = YES = ?
8 BITS NO PARITY (YES/NO) = YES = N
8 BITS EVEN PARITY (YES/NO) = NO = ?
7 BITS MARK PARITY (YES/NO) = NO = Y
XON/XOFF (ENABLE/DISABLE) = DISABLE = ?
RS232 (YES/NO) = YES = ?
BYTE SWAPPING (ENABLE/DISABLE) = DISABLE = ?
BIG MESSAGES (ENABLE/DISABLE) = DISABLE = ?
BINARY DATA NO CONVERSIONS (YES/NO) = YES = ?
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE = D
HEADER BYTE LENGTH (DEC 0..4) = 0 = ?
HEADER DATA[0] (HEX 0...ff) = 0 = ?
HEADER DATA[1] (HEX 0...ff) = 0 = ?
HEADER DATA[2] (HEX 0...ff) = 0 = ?
HEADER DATA[3] (HEX 0...ff) = 0 = ?
TRAILER BYTE LENGTH (DEC 0..4) = 2 = ?
TRAILER DATA[0] (HEX 0...ff) = d = ?
TRAILER DATA[1] (HEX 0...ff) = a = ?
TRAILER DATA[2] (HEX 0...ff) = 0 = ?
TRAILER DATA[3] (HEX 0...ff) = 0 = ?
MAX DATA BYTE LENGTH (DEC 0...124) = 0 = 1
MIN DATA BYTE LENGTH (DEC 0..124) = 0 = ?
```

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Pass Through Example (continued)

9. **Change the following items using Function *11-Configuration Parameters for Port 1* to those shown:**

```
MODEM CONTROL (ENABLE/DISABLE) = DISABLE = ?
9600 BITS PER SECOND (YES/NO) = YES = ?
8 BITS NO PARITY (YES/NO) = YES = ?
XON/XOFF (ENABLE/DISABLE) = DISABLE = ?
RS232 (YES/NO) = YES = ?
BYTE SWAPPING (ENABLE/DISABLE) = DISABLE = ?
BIG MESSAGES (ENABLE/DISABLE) = DISABLE = ?
BINARY DATA NO CONVERSIONS (YES/NO) = YES = ?
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE = ?
HEADER BYTE LENGTH (DEC 0...4) = 0 = ?
HEADER DATA[0] (HEX 0...ff) = 0 = ?
HEADER DATA[1] (HEX 0...ff) = 0 = ?
HEADER DATA[2] (HEX 0...ff) = 0 = ?
HEADER DATA[3] (HEX 0...ff) = 0 = ?
TRAILER BYTE LENGTH (DEC 0...4) = 2 = 0
TRAILER DATA[0] (HEX 0...ff) = d = ?
TRAILER DATA[1] (HEX 0...ff) = a = ?
TRAILER DATA[2] (HEX 0...ff) = 0 = ?
TRAILER DATA[3] (HEX 0...ff) = 0 = ?
MAX DATA BYTE LENGTH (DEC 0...124) = 0 = 1
MIN DATA BYTE LENGTH (DEC 0...124) = 0 = ?
```

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10. **Change the following items using function *7-Pass Through Entries* to resemble those shown below:**

```
PASSING SERIAL 1 TO SERIAL 2 (ENABLE/DISABLE) = DISABLE.
PASSING SERIAL 1 TO SERIAL 3 (ENABLE/DISABLE) = DISABLE. = E
PASSING SERIAL 2 TO SERIAL 1 (ENABLE/DISABLE) = DISABLE.
PASSING SERIAL 2 TO SERIAL 3 (ENABLE/DISABLE) = DISABLE.
PASSING SERIAL 3 TO SERIAL 1 (ENABLE/DISABLE) = DISABLE. = E①
PASSING SERIAL 3 TO SERIAL 2 (ENABLE/DISABLE) = DISABLE.
```

① *Required in case DL20 gives spurious response due to the DL20 setup.*

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Pass Through Example (continued)

11. **Set up your terminal for communications with the message display.** The data transmission parameters on the terminal must be set to match those of the DL20 message display. Step-by-step instructions are located in *Chapter 5, Using Your Programming Terminal* under the heading *Configuring with a 1784-T45*. Follow steps 1 through 9.

    Important: The COM1 parameters in step 5 should be set as shown:

    - F1 Baud Rate = **9600**
    - F2 Parity = **None**
    - F3 Data Bits = **8**
    - F4 Stop Bits = **1**

12. **Remove connector from configuration port and connect to port 1.**

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The DL20 message display will now operate as if the programming terminal was connected directly to it.

8 - Non-Volatile Scratch Pad Area

This area is used to store information, such as version numbers of PLC Software. You can write to the EEPROM approximately 10,000 times, entering any information. Information entered in hexadecimal form can be read out in ASCII form by the appropriate PLC Processors.

There are 128 entries available, as shown below:

```
NONVOLATILE SCRATCH PAD AREA[0] (HEX 0...ff) = 00.
NONVOLATILE SCRATCH PAD AREA[1] (HEX 0...ff) = 00.
NONVOLATILE SCRATCH PAD AREA[2] (HEX 0...ff) = 00.
NONVOLATILE SCRATCH PAD AREA[3] (HEX 0...ff) = 00.
                              .
                              .
                              .
NONVOLATILE SCRATCH PAD AREA[127] (HEX 0...ff) = 0.
```

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Chapter 14 9XF - Module Functions

Chapter Objectives

This chapter defines the *9XF - Module Functions*. These functions allow you to reset, set defaults, flush, initialize, and clear the diagnostic responses for ports 0 to 7.

Module Functions

A box surrounds option *9XF - Module Functions* below to show its location on the main menu.

```
                    2760-RB    SERIES X REVISION X
COPYRIGHT 1989                 ALLEN-BRADLEY COMPANY, INC.

1X  - CONFIGURATION PARAMETERS          2X  - IDENTIFICATION NUMBERS
3   - DEVICE PORT PROTOCOL NAMES        4DM - MATCH CODE ENTRIES
5I  - DISCRETE BYTE INPUT ENTRIES       6   - THE DATA MATRIX ENTRIES
7   - THE PASS THROUGH ENTRIES          8   - NONVOLATILE SCRATCH PAD AREA
9XF - RB MODULE FUNCTIONS               AX  - HARDWARE DIAGNOSTICS
BX  - SOFTWARE DIAGNOSTICS              C   - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT   6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                    ENTER A MAIN MENU SELECTION: _
```


With option 9XF you can perform the following functions:

- 9XA - Reset
- 9XB - Set Defaults
- 9XC - Flush
- 9XD - Initialize
- 9XE - Clear Diags

Questions do not display with these functions. Each action is carried out immediately. For example, to flush all unprocessed data from the configuration port, you would enter 94C. There are no responses confirming completed functions.

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Reset

Use this function to reset the entire module or just an individual port.

Reset clears the send and receive buffers of the specified port. Buffered messages that have exceeded the port's local storage capacity (if any) are not affected. The following menu selections define the reset operation of each module port.

90A **Reset Port 0** resets the entire module. This reset is the same as a power-up reset except for certain hardware checks and internal module hardware initializations. All serial ports (ports 1 to 3) are re-initialized. The module then exits configuration mode.

91A **Reset Port 1**. Refer to your Protocol Cartridge manual.

92A **Reset Port 2**. Refer to your Protocol Cartridge manual.

93A **Reset Port 3**. Refer to your Protocol Cartridge manual.

94A **Reset Port 4** does the following:

- Initializes the configuration port to internal defaults.
- Asserts DTR and RTS.
- Activates send and receive buffering.
- Clears both send and receive buffers.
- Updates switch values in the configuration port hardware diagnostics.
- Reconfigures the configuration port according to the dip switch states.
- If the configuration port is not setup for configuration only, the current configuration parameters are set and the module exits configuration mode.

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***Reset** (continued)*

95A **Reset Port 5** does the following:

- Inhibits BTRs and BTWs.
- Reprograms the PLC backplane interface (does not reset, only done at power-up reset).
- Checks PLC port dip switch states against power-up switch states.
- Sets the current configuration parameters.
- Clears the software diagnostics.
- Keeps hardware diagnostic counters current.
- Initializes other hardware diagnostic values.
- Clears the port's local buffers.
- Clears BTR, BTW, and I/O Point Image buffers on the module.
- Checks port 6 and if ready enables PLC backplane interface monitoring.

96A **Reset Port 6** is similar to Reset Port 5, except the last step checks port 5 (instead of 6) and if ready enables PLC backplane interface monitoring.

97A **Reset Port 7** is reserved and performs no function.

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Set Defaults

Use this function to set the entire module or just individual ports to the factory defaults.

90B **Set Defaults Port 0** is like a power down. It sets the entire module to the factory defaults including data matrix, discrete byte, and pass through setup information.

After selecting 90B, this question displays:

System Set Defaults, all configuration will be lost, Yes or No?

Enter N to return to the menu. Enter Y to proceed with the Set Default operation. All changes to the default configurations and setup data are erased.

All processing and control halts. Function 90B does the following:

- Invalidates the nonvolatile storage copy of the following for Ports 0 through 7:
  - Configuration Parameters
  - Identification Numbers
  - Device Port Protocol Names
  - Match Code Entries
  - Discrete Byte Input Entries
  - The Data Matrix Entries
  - The Pass Through Entries
  - Non-Volatile Scratch Pad Area

The module automatically performs a Reset Port 0 (refer to *90A - Reset Port 0*) with the default values maintained as described in the Set Defaults for ports 1 through 7.

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Set Defaults *(continued)*

90B *(cont.)* The default settings, parameters and values are the same as executing a set default function on each port. Additional module defaults that are set follow:

- Device Port Protocol Names (refer to *Chapter 9, 3 - Device Port Protocol Names).*
- Match Code Entries (refer to *Chapter 10, 4DM - Match Code Entries* for system defaults).
- Discrete Byte Input Entries (refer to *Chapter 11, 5I - Discrete Byte Input Entries* for system defaults).
- Data Matrix Entries (refer to *Chapter 12, 6 - Data Matrix Entries* for system defaults).
- Pass Through Entries (refer to *Chapter 13, 7 - The Pass Through Entries* for system defaults).
- Non-volatile Scratch Pad Area (refer to *Chapter 13, 8- Non-Volatile Scratch Pad* for system defaults).

91B **Set Defaults Port 1**. Refer to your Protocol Cartridge User's Manual.

92B **Set Defaults Port 2**. Refer to your Protocol Cartridge User's Manual.

93B **Set Defaults Port 3**. Refer to your Protocol Cartridge User's Manual.

94B **Set Defaults Port 4** assigns predefined values to:

- Configuration Parameters (system defaults are shown by function *14 - Configuration Parameters of Configuration Port* in *Chapter 7).*
- Identification Numbers (system defaults are shown by function *24 - Identification Numbers of Configuration Port* in *Chapter 8).*

The module then exits configuration mode.

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Set Defaults (continued)

95B **Set Defaults Port 5** assigns predefined values to the following:

- Configuration Parameters (system default values are shown under function *15 - Configuration Parameters of I/O Rack Slot 0* in *Chapter 7, 1X - Configuration Parameters*).
- Identification Numbers (system default values are shown under function *25 - Identification Numbers of I/O Rack Slot 0* in *Chapter 8, 2X - Identification Numbers).*

96B **Set Defaults Port 6** assigns predefined values to the following:

- Configuration Parameters (see function *16 - Configuration Parameters of I/O Rack Slot 1* in *Chapter 7, 1X - Configuration Parameters* for system defaults).
- Identification Numbers (see function *26 - Identification Numbers of I/O Rack Slot 1* in *Chapter 8, 2X - Identification Numbers* for system defaults).

97B **Set Defaults Port 7** is reserved and performs no function.

9XF

Flush

Use this function to clear the send and receive buffers of the port you are flushing. Buffered messages that exceed the port's local storage capacity (if any) will not be affected. The menu selections below define the flush operation for each port.

90C **Flush Port 0** is invalid, causes no errors, and performs no function.

91C **Flush Port 1**. Refer to your Protocol Cartridge Manual.

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***Flush** (continued)*

92C **Flush Port 2**. Refer to your Protocol Cartridge manual.

93C **Flush Port 3**. Refer to your Protocol Cartridge manual.

94C **Flush Port 4** flushes the screen. Press [RETURN] if your configuration terminal's screen becomes unreadable.

95C **Flush Port 5** is the same as the general flush description. Module operations with the PLC backplane can involve both ports 5 and 6 (depending on the addressing mode selected for the module, 2 slot or 1 slot). This may affect both block transfer data, match code input(s), and discrete byte input(s). Refer to *Chapter 17, System Considerations* for a description of the module I/O Point Image Map.

Flushing only this one port or flushing while performing BTRs and BTWs could leave extraneous handshake signals.

96C **Flush Port 6** is the same as the general flush description. Module operations with the PLC backplane can involve both ports 5 and 6 (depending on the addressing mode selected for the module, 2 slot or 1 slot). This may affect both block transfer data, match code input(s), and discrete byte input(s). Refer to *Chapter 17, System Considerations,* for a description of the module I/O Point Image Map.

Flushing only this one port or flushing while performing BTRs and BTWs could leave data (match code, discrete byte inputs, or BTR data) without handshake signals.

97C **Flush Port 7** is reserved and performs no function.

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Initialize

90D **Initialize Port 0** is invalid, causes no errors, and performs no function.

91D **Initialize Port 1**. Refer to your Protocol Cartridge Manual.

92D **Initialize Port 2**. Refer to your Protocol Cartridge Manual.

93D **Initialize Port 3**. Refer to your Protocol Cartridge Manual.

94D **Initialize Port 4**. If the configuration port is setup for configuration only, setup data is used. If the configuration port is setup to communicate with a DF1 or dumb terminal device, initialize deos the following:

- Updates the switch values in the configuration port's hardware diagnostics.
- Configures the configuration port according to the configuration port dip switch states (refer to *Chapter 3, Hardware Set Up*).
- Asserts DTR and RTS.
- Sets the current configuration parameters.
- Clears both send/receive buffers.

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Initialize (continued)

95D **Initialize Port 5** does the following:

- Inhibits BTRs and BTWs.
- Reprograms the PLC backplane interface (does not reset, only done at power-up reset).
- Checks PLC port dip switches states (ON or OFF) against power-up switch states.
- Sets the current configuration parameters.
- Keeps hardware diagnostic counters current.
- Initializes other hardware diagnostic values.
- Clears ports local buffers.
- Clears BTR, BTW, and I/O Point Image buffers on the module.
- Checks port 6 and if ready enables PLC backplane interface monitoring.

96D **Initialize Port 6** is similar to Initialize Port 5 except the last step checks port 5 and if ready enables PLC backplane interface monitoring.

97D **Initialize Port 7** is reserved and performs no function.

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Clear Diagnostics

This function sets or resets the software and hardware diagnostic parameters for a port. For details on the parameters, refer to Chapters *15 - Hardware Diagnostics* and *16 - Software Diagnostics*.

90E Clear Diags Port 0 does the following:

- Sets the software diagnostics for Port 0 to the values below. (For more information, refer to *B0 - Software Diagnostics for RB Command Processor* in *Chapter 16 Software Diagnostics*.)

```
POWER UP ERROR TYPE      (HEX 0...ff) = 0.
LOW LEVEL ERROR TYPE     (HEX 0...ff) = 0.
INTERNAL ERROR TYPE      (HEX 0...ff) = 0.
PORT 1 ERROR TYPE        (HEX 0...ff) = 0.
PORT 2 ERROR TYPE        (HEX 0...ff) = 0.
PORT 3 ERROR TYPE    (HEX 0...ff) = 0.
CONFIG PORT ERROR TYPE (HEX 0...ff) = 0.
PLC SLOT 0 ERROR TYPE    (HEX 0...ff) = 0.
PLC SLOT 1 ERROR TYPE    (HEX 0...ff) = 0.
RESERVED ERROR TYPE      (HEX 0...ff) = 0.
SYSTEM ERROR TYPE        (HEX 0...ff) = 0.
TOTAL ERROR COUNTER      (HEX 0...ff) = 0.
```

- Clears the IPF (I/O Point Fault bit).
- Clears the orange state from all module LEDs and sets the hardware diagnostics for port 0 to the values shown below. (For more information, refer to *A0-Hardware Diagnostics for RB Command Processor* in *Chapter 15*.)

```
INVALID WRITE COMMANDS..... = 0
INVALID READ COMMANDS..... = 0
COMMAND FIELD NOT READ OR WRITE. = 0
INVALID RB NETWORK SRC FIELD.... = 0
COMMAND FRAME ERRORS..... = 0
COMMAND PROCESSING ERRORS..... = 0
COMMAND PROCESSING TIME OUTS.... = 0
CMD NOT PROCESSED PORT BUSY..... = 0
CMD NOT PROCESSED PORT INACTIVE. = 0
DATA AREA NOT ALLOCATED..... = 0
INIT DATA AREA ACCESS ERRORS.... = 0
```


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Clear Diagnostics (continued)

```
EEPROM R/W ACCESS ERRORS..... = 0
LAST EEPROM ERROR CODE..... = 0
PORT 1 RAW ADDR RANGE ERROR..... = 0
PORT 2 RAW ADDR RANGE ERROR..... = 0
PORT 3 RAW ADDR RANGE ERROR..... = 0
RAW FRAME ERRORS..... = 0
MATCH CODE PROCESSING ERRORS.... = 0
DISCRETE BYTE PROCESSING ERRORS. = 0
PLC PORT REJECTED PACKETS..... = 0
PORT 1 LOWEST RAW ADDRESS..... = 0
PORT 1 HIGHEST RAW ADDRESS..... = 0
PORT 2 LOWEST RAW ADDRESS..... = 0
PORT 2 HIGHEST RAW ADDRESS..... = 0
PORT 3 LOWEST RAW ADDRESS..... = 0
PORT 3 HIGHEST RAW ADDRESS..... = 0
```

91E **Clear Diags Port 1** does the following:

- Clears software diagnostics for port 1. Refer to your Protocol Cartridge User's Manual.
- Clears hardware diagnostics for port 1. Refer to your Protocol Cartridge User's Manual.

Note: This function will not clear an orange LED or the IPF bit on this port.

92E **Clear Diags Port 2** does the following:

- Clears software diagnostics for port 2. Refer to your Protocol Cartridge User's Manual.
- Clears hardware diagnostics for port 2. Refer to in your Protocol Cartridge User's Manual.

Note: This function will not clear an orange LED or the IPF bit on this port.

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Clear Diagnostics (continued)

93E **Clear Diags Port 3** does the following:

- Clears software diagnostics for port 3. Refer to your Protocol Cartridge User's Manual.
- Clears hardware diagnostics for port 3. Refer to your Protocol Cartridge User's Manual.

Note: This function will not clear an orange LED or the IPF bit on this port.

94E **Clear Diags Port 4** does the following:

- Sets the software diagnostics for port 4 to the values shown below. (Refer to *B4 - Software Diagnostics for RB Command Processor* in the *Chapter 16, Software Diagnostics*).

```
TRANSMIT MESSAGES = 0
RECEIVE MESSAGES = 0
UNDER/OVERFLOW MESSAGES = 0
ILLOGICAL INDICATOR = 255
```

- Sets the hardware diagnostics for port 4 to the values shown below. (Refer to *A4 - Hardware Diagnostics - RB Command Processor* in *Chapter 15, Hardware Diagnostics).*


```
LAST ERROR - WORD = 0
NUMBER OF ERRORS - WORD = 0
DEVICE CTS ON = NO
DEVICE DSR ON = NO
TXMTR NOT BLOCKED BY XOFF (YES/NO) = NO
TXMTR NOT BLOCKED BY CTS (YES/NO) = NO
PORT DTR ON = YES
PORT RTS ON = YES
CONFIG PORT DIP SWITCH 1 = 0
CONFIG PORT DIP SWITCH 2 = 0
```

- If the configuration port is set to DF1 protocol and identification, these diagnostic entries are also set:

```
BAD BCCs (DEC 0 ...255) = 0.
DF1 NAKS RECEIVED (DEC ...255) = 0.
DF1 NAKS TRANSMITTED (DEC ...255) = 0.
DF1 ENQS RECEIVED (DEC ...255) = 0.
```

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Clear Diagnostics (continued)

95E Clear Diags Port 5 performs the following:

- Sets the software diagnostics for port 5 to the values shown below. (Refer to *B5 - Software Diagnostics - RB Command Processor* in the *Chapter 16, Software Diagnostics*).

```
READ_ERROR_COUNT = 0
LAST_READ_ERROR = 0
WRITE_ERROR_COUNT = 0
LAST_WRITE_ERROR = 0
INIT_ERROR_COUNT = 0
LAST_INIT_ERROR = 0
RESET_ERROR_COUNT = 0
LAST_RESET_ERROR = 0
FLUSH_ERROR_COUNT = 0
LAST_FLUSH_ERROR = 0
ID_ERROR_COUNT = 0
LAST_ID_ERROR = 0
OK_ERROR_COUNT = 0
LAST_OK_ERROR = 0
CLEAR_ERROR_COUNT = 0
LAST_CLEAR_ERROR = 0
QUIT_ERROR_COUNT = 0
LAST_QUIT_ERROR = 0
DIAGS_ERROR_COUNT = 0
LAST_DIAGS_ERROR = 0
TRANSMIT MESSAGES = 0
RECEIVE MESSAGES = 0
```


- Sets the hardware diagnostics for port 5 to the values shown below. (Refer to *A5 - Hardware Diagnostics - RB Command Processor* in *Chapter 15, Hardware Diagnostics*).

```
RBT RE-TRY COUNT = 0
WBT RE-TRY COUNT = 0
LAST TIC INTERRUPT SERVICE ERROR = 0
IGNORED RBT COUNT = 0
IGNORED WBT COUNT = 0
INTERRUPT COUNT = 0
INTERRUPT FLAG = 0
MISSED ISR COUNT = 0
MISSED INPUTS COUNT = 0
MISSED OUTPUTS COUNT = 0
LAST TIC SCANNER ERROR = 0
```

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Clear Diagnostics (continued)

96E **Clear Diags Port 6**. Sets the software diagnostics for port 6 to the values shown in the Clear Diags Port 5 software diagnostics list.

Sets the hardware diagnostics for port 6 to the values shown in the Clear Diags Port 5 hardware diagnostics list.

97E **Clear Diags Port 7** is reserved and performs no function.

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Chapter 15 AX - Hardware Diagnostics

Chapter Objectives

This chapter lists and defines the hardware diagnostics that display for each module port.

Displaying Hardware Diagnostics

Function *AX - Hardware Diagnostics* allows you to display hardware diagnostics for a module port. The letter X is a number from 0 to 7, which refers to a specific port of the module.

A box surrounds function *AX - Hardware Diagnostics* to show its location on the main menu.

```
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        ---------------------------------------------------------------

1X   - CONFIGURATION PARAMETERS          2X   - IDENTIFICATION NUMBERS
3    - DEVICE PORT PROTOCOL NAMES        4DM  - MATCH CODE ENTRIES
5I   - DISCRETE BYTE INPUT ENTRIES       6    - THE DATA MATRIX ENTRIES
7    - THE PASS THROUGH ENTRIES          8    - NONVOLATILE SCRATCH PAD AREA
9XF  - RB MODULE FUNCTIONS               AX   - HARDWARE DIAGNOSTICS
BX   - SOFTWARE DIAGNOSTICS              C    - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT    6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                          ENTER A MAIN MENU SELECTION: __
```

AX

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Displaying Hardware Diagnostics (continued)

To display hardware diagnostics for a specific port, enter the letter A and a number from 0 to 7. Valid selections are A0 to A7.

A0 Displays hardware diagnostics for RB command processor.

A1 Displays hardware diagnostics for port 1.

A2 Displays hardware diagnostics for port 2.

A3 Displays hardware diagnostics for port 3.

A4 Displays hardware diagnostics for configuration port.

A5 Displays hardware diagnostics for slot 0 of PLC backplane.

A6 Displays hardware diagnostics for slot 1 of PLC backplane.

A7 Reserved for future use.

For example, to display hardware diagnostics for the RB command processor, enter A0 at the menu prompt.

ENTER A MAIN MENU SELECTION: **A0 [RETURN]**

The sections in the rest of this chapter are labeled from A0 to A7. Each section defines the hardware diagnostics that display when selecting a particular menu option.

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A0 - Diagnostics for RB Command Processor

Enter function A0 to display hardware diagnostics for the RB command processor. The following parameters appear, but you will not be able to change them.

```
ENTER A MAIN MENU SELECTION: A0

INVALID WRITE COMMANDS        (DEC 0...255) = 0.
INVALID READ COMMANDS         (DEC 0...255) = 0.
COMMAND FIELD NOT READ OR WRITE (DEC 0...255) = 0.
INVALID RB NETWORK SRC FIELD  (DEC 0...255) = 0.
COMMAND FRAME ERRORS          (DEC 0...255) = 0.
COMMAND PROCESSING ERRORS     (DEC 0...255) = 0.
COMMAND PROCESSING TIME OUTS  (DEC 0...255) = 0.
CMD NOT PROCESSED PORT BUSY   (DEC 0...255) = 0.
CMD NOT PROCESSED PORT INACTIVE (DEC 0...255) = 0.
DATA AREA NOT ALLOCATED       (DEC 0...255) = 0.
INIT DATA AREA ACCESS ERRORS  (DEC 0...255) = 0.
EEPROM R/W ACCESS ERRORS      (DEC 0...255) = 0.
LAST EEPROM ERROR CODE        (DEC 0...255) = 0.
PORT 1 LOWEST RAW ADDRESS     (HEX 0...ffff) = 0.
PORT 1 HIGHEST RAW ADDRESS    (HEX 0...ffff) = 0.
PORT 2 LOWEST RAW ADDRESS     (HEX 0...ffff) = 0.
PORT 2 HIGHEST RAW ADDRESS    (HEX 0...ffff) = 0.
PORT 3 LOWEST RAW ADDRESS     (HEX 0...ffff) = 0.
PORT 3 HIGHEST RAW ADDRESS    (HEX 0...ffff) = 0.
PORT 1 RAW ADDR RANGE ERROR   (DEC 0...255) = 0.
PORT 2 RAW ADDR RANGE ERROR   (DEC 0...255) = 0.
PORT 3 RAW ADDR RANGE ERROR   (DEC 0...255) = 0.
RAW FRAME ERRORS              (DEC 0...255) = 0.
MATCH CODE PROCESSING ERRORS  (DEC 0...255) = 0.
DISCRETE BYTE PROCESSING ERRORS (DEC 0...255) = 0.
PLC PORT REJECTED PACKETS     (DEC 0...255) = 0.
```

In the display above, zero is an error type number. The values change depending on the state of the module. All error types are in hexadecimal format.

AX

Invalid Write Commands

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. The command word associated with the write command was invalid. This error could result from an invalid command type; invalid port; or invalid command subfunction. Check the format of the command set for proper assignment of protocol identifications. RSP = 48, STS = 10. Refer to *Chapter 18, PLC Controller User Commands* for an explanation of RSP and STS.

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Invalid Read Commands

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. The command word associated with the read command was invalid. The error could result from an invalid command type; invalid port; or invalid command subfunction. Check the format of the command set for proper assignment of protocol identifications. RSP = 41, STS = 10. Refer to *Chapter 18, PLC Controller User Commands* for an explanation of RSP and STS.

Command Field Not Read or Write

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command . The command field was not a read or write. The command word is not examined further. Check the format of the command set for proper assignment of protocol identifications. RSP = 40, STS = 10. Refer to *Chapter 18, PLC Controller User Commands* for an explanation of RSP and STS.

Invalid RB Network SRC Field

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. The SRC port (indicating which port sent the command and where the response will be sent) was port 0. Port 0 does not send itself commands. Another invalid SRC port number is inserted in the command packet, which will discard the packet. No response is generated because the port that sent the command packet is unknown. Check the format of the command set for proper assignment of protocol identifications.

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Command Frame Errors

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. Tracks the number of errors detected during the command packet validation process. This number may be higher than the number of packets rejected since a packet may have more than one invalid field. Check other diagnostics to determine how many fields are in error. RSP = 40, 41, or 48. STS = 10. See *Chapter 18, PLC Controller User Commands* for details on RSP and STS.

Command Processing Errors

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. Tracks how many commands failed during execution. The error is not EEPROM related. This error may occur when writing a match code entry with an out of range parameter. RSP = 41 or 48. STS = 11. Refer to *Chapter 18, PLC Controller User Commands* for an explanation of RSP and STS.

Command Processing Timeouts

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. Tracks how many commands timed out during execution. A time out occurs when a port is commanded to do something and does not indicate whether it completed successfully or failed. This is not an error if the command that timed out was a port initialize, a port reset or a write port device ID. An initialize command can take over three seconds. The initialize command is part of the port reset and write port device ID command. RSP = 41 or 48. STS = 13. Refer to *Chapter 18, PLC Controller User Commands* for an explanation of RSP and STS.

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Command Not Processed: Port Busy

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. Tracks the number of commands that did not start because the port was processing a previous command. The port may not have completed a reset or initialize command. Issue the command again. RSP = 41 or 48. STS = 15. Refer to *Chapter 18, PLC Controller User Commands* for details on RSP and STS.

Command Not Processed: Port Inactive

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. Tracks the number of commands that could not start because the port was not running. A protocol was not downloaded to the device port or the port would not run at power-up. Check the *Software Diagnostics for RB Command Processor* under the port error type. RSP = 41 or 48. STS = 14. See *Chapter 18, PLC Controller User Commands* for details on RSP and STS.

Data Area Not Allocated

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. Tracks how many commands tried to access an area of memory not allocated in a device port. These unallocated areas could be:

- Raw initialization frame(s)
- Initialization frame descriptions
- Device ID description frames
- Raw physical layer diagnostics frame
- physical layer diagnostics description frames
- Raw link layer diagnostics frame
- Link layer diagnostics description frames

Because there is no data area to read from or write to, the command would not process. RSP = 41 or 48. STS = 16. See *Chapter 18, PLC Controller User Commands* for details on RSP and STS.

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Initialization Data Area Access Errors

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. Tracks how many commands tried to access an initialization frame that was not allocated. These errors normally occur during configuration. The status code indicates that at least one initialization frame was allocated but the user tried to access other unallocated frames. RSP = 41 or 48. STS = 17. Refer to *Chapter 18, PLC Controller User Commands* for details on RSP and STS.

EEPROM R/W Access Errors

(Counter, range 0 - 255.) Clear with a *Reset* or *Clear Diagnostics* command. Tracks how many times an error occurred when reading or writing to the EEPROM. Check the last EEPROM Error Code when the count increases to determine if the error is a processing error or a fault. RSP = 41 or 48. STS = 12. See *Chapter 18, PLC Controller User Commands* for an explanation of RSP and STS.

Last EEPROM Error Code

Each time an EEPROM access error occurs, this diagnostic indicates the reason for the failure.

1 = **Internal EEPROM read parameter error.** Processing error due to incorrect read type command.

2 = **Read EEPROM page checksum error.** Your module requires repair.

3 = **Internal EEPROM write parameter error.** Processing error due to incorrect write type command.

4 = **Internal EEPROM write failure.** Your module requires repair.

5 = **Internal EEPROM parameter error (not read or write)** Contact your Allen-Bradley Representative.

6 = **EEPROM access error during system restart .** Your module requires repair.

AX

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Port 1 Lowest Raw Address

Tracks the lowest raw address required for port 1 raw data processing. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

Port 1 Highest Raw Address

Tracks the highest raw address required for port 1 raw data processing. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

Port 2 Lowest Raw Address

Tracks the lowest raw address required for port 2 raw data processing. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

Port 2 Highest Raw Address

Tracks the highest raw address required for port 2 raw data processing. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

Port 3 Lowest Raw Address

Tracks the lowest raw address required for port 3 raw data processing. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

Port 3 Highest Raw Address

Tracks the highest raw address required for port 3 raw data processing. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

Port 1 Raw Address Range Error

Counts the number of times raw data processing was not performed on a packet from port 1 because the data did not cover the required raw address range. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

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Port 2 Raw Address Range Error

Counts the number of times raw data processing was not performed on a packet from port 2 because the data did not cover the required raw address range. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

Port 3 Raw Address Range Error

Counts the number of times raw data processing was not performed on a packet from port 3 because the data did not cover the required raw address range. Refer to *Match Code Operation* and *Discrete Byte Operation* in *Chapter 17, System Considerations*.

Raw Frame Errors

(Counter, range 0 - 255.) Tracks the number of errors detected during the raw packet validation process. This number may be higher than the number of packets rejected since a packet may have more than one invalid field.

Match Code Processing Errors

(Counter, range 0 - 255.) Tracks the number of match code processing errors.

Discrete Byte Processing Errors

(Counter, range 0 - 255.) Tracks the number of discrete byte input processing errors. If there was a problem with the raw packet or an error occurred during the match code or discrete byte input process, the I/O backplane bits will not be updated.

PLC Port Rejected Packets

(Counter, range 0 - 255.) The PLC port rejected the information assigned to the I/O backplane bits. The PLC port returned the packet to the raw data processing function. Contact your Allen-Bradley Representative.

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A1 - Hardware Diagnostics for Serial Port 1

The information that displays for menu function A1 is protocol specific. Refer to your Protocol Cartridge User's Manual.

A2 - Hardware Diagnostics for Serial Port 2

The information that displays for menu function A2 is protocol specific. Refer to your Protocol Cartridge User's manual.

A3 - Hardware Diagnostics for Serial Port 3

The information that displays for menu function A3 is protocol specific. Refer to your Protocol Cartridge User's manual.

A4 - Hardware Diagnostics for Configuration Port

Select menu function A4 to display the configuration port hardware diagnostics.

```
ENTER MAIN MENU SELECTION: A4

        LAST ERROR - WORD (HEX 0...ffff) = 0.
        NUMBER OF ERRORS - WORD (HEX 0...ffff) = 0.
        DEVICE CTS ON (YES/NO) = YES.
        DEVICE DSR OFF (YES/NO) = YES.
        TXMTR NOT BLOCKED BY XOFF (YES/NO) = YES.
        TXMTR NOT BLOCKED BY CTS (YES/NO) = YES.
        PORT DTR ON (YES/NO) = YES.
        PORT RTS ON (YES/NO) = YES.
        CONFIG PORT DIP SWITCH 1 (HEX 0...ff) = 0.
        CONFIG PORT DIP SWITCH 2 (HEX 0...ff) = 0.
```

AX

The diagnostics are as follows:

Last Error - Word

Type FFFF to FFEC. Contact your Allen-Bradley Representative.

Type FFEB - Parity Error. This is a processing error. Check for incorrect communication configuration, noisy cabling, or inactive data throttling.

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***Last Error - Word** (continued)*

Type FFEA - Overflow Error - This is a processing error. Check for incorrect communication configuration, noisy cabling, or inactive data throttling.

Type FFE9 - Too many setup characters.

Type FFE8 - Break detected during setup data transmission.

Type FFE7 to FFE0 - Contact your Allen-Bradley Representative.

Number of Errors - Word

0000 TO FFFF. Count of port hardware related errors.

Device CTS Off/on

Shows the state of the port's CTS (Clear To Send) level.

Device DSR Off/On

Shows the state of the port's DSR (Data Set Ready) level.

TXMTR Blocked/Not Blocked Due to XOFF

Shows the state of XON/XOFF control of transmission of data from port.

TXMTR Blocked/Not Blocked Due to CTS

Shows state of CTS control of transmission of data from port.

Port DTR Off/On

Shows state of DTR (Data Terminal Ready) line.

Port RTS Off/On

Shows state of RTS (Ready To Send) line.

Configuration Port Dip Switch 1

00 TO FF. Shows Port's local bit image of dip switch 1.

Configuration Port Dip Switch 2

00 TO FF. Shows Port's local bit image of dip switch 2.

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A5, A6 - Diagnostics for I/O Rack Slot 0 and Slot 1

The information that displays for menu selections A5 and A6 are for Allen-Bradley field engineers to verify correct I/O Rack interface initialization and operation.

A7 - Reserved

Menu function A7 is reserved. The following line appears, but you cannot change it.

```
RESERVED FOR FUTURE USE (DEC 0...0) = 0.
```


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Chapter 16 BX - Software Diagnostics

Chapter Objectives

This chapter lists and defines the software diagnostic messages that display for each port.

Displaying Software Diagnostics

Function *BX - Software Diagnostics* allows you to display software diagnostics for a module port. The letter X is a number from 0 to 7, which refers to a specific port of the module.

A box surrounds function *BX - Hardware Diagnostics* to show its location on the main menu.

```
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        ----------------------------------------------------------------

1X   - CONFIGURATION PARAMETERS          2X   - IDENTIFICATION NUMBERS
3    - DEVICE PORT PROTOCOL NAMES        4DM  - MATCH CODE ENTRIES
5I   - DISCRETE BYTE INPUT ENTRIES       6    - THE DATA MATRIX ENTRIES
7    - THE PASS THROUGH ENTRIES          8    - NONVOLATILE SCRATCH PAD AREA
9XF  - RB MODULE FUNCTIONS               AX   - HARDWARE DIAGNOSTICS
BX   - SOFTWARE DIAGNOSTICS              C    - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT    6 - I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0  7 - RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT THE RB CAN PERFORM WHICH ARE DEFINED BELOW :
A - RESET  B - SET DEFAULTS  C - FLUSH  D - INITIALIZE  E - CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE SELECTION MADE ABOVE.

                          ENTER A MAIN MENU SELECTION: _
```


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Displaying Software Diagnostics (continued)

To display software diagnostics for a specific port, enter the letter B and a number from 0 to 7. Valid selections are B0 to B7.

- B0 Displays software diagnostics for RB command processor.
- B1 Displays software diagnostics for port 1.
- B2 Displays software diagnostics for port 2.
- B3 Displays software diagnostics for port 3.
- B4 Displays software diagnostics for configuration port.
- B5 Displays software diagnostics for slot 0 of PLC backplane.
- B6 Displays software diagnostics for slot 1 of PLC backplane.
- B7 Reserved for future use.

For example, to display software diagnostics for the RB command processor, enter B0 at the menu prompt.

```
ENTER A MAIN MENU SELECTION: B0 [RETURN]
```

The sections in the rest of this chapter are labeled from B0 to B7. Each section defines the software diagnostics that display when selecting a particular menu option.

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B0 - Software Diagnostics for RB Command Processor

Enter menu option B0 to display software diagnostics for the module's command processor.

```
ENTER A MAIN MENU SELECTION: B0

POWER UP ERROR TYPE     (HEX 0...ff) = 0.
LOW LEVEL ERROR TYPE    (HEX 0...ff) = 0.
INTERNAL ERROR TYPE     (HEX 0...ff) = 0.
PORT 1 ERROR TYPE       (HEX 0...ff) = 0.
PORT 2 ERROR TYPE       (HEX 0...ff) = 0.
PORT 3 ERROR TYPE       (HEX 0...ff) = 0.
CONFIG PORT ERROR TYPE  (HEX 0...ff) = 0.
PLC SLOT 0 ERROR TYPE   (HEX 0...ff) = 0.
PLC SLOT 1 ERROR TYPE   (HEX 0...ff) = 0.
RESERVED ERROR TYPE     (HEX 0...ff) = 0.
SYSTEM ERROR TYPE       (HEX 0...ff) = 0.
TOTAL ERROR COUNTER     (HEX 0...ff) = 0.
```

In the display above, zero is as an error type number. The values change depending on the state of the module. A value of ff is a critical fault and is cleared with function *90A-Reset*. Function *90B- Set Defaults* will not clear the fault. All error types are in hexadecimal format.

Power Up Error Type

Module start up code and system initialization functions:

Type 01 - DIP Power Up Error
Dip switch information write to nonvolatile memory returned an error. Your module requires repair.

Type 02 - Dual Port RAM Power Up Error
Indicates a hardware failure. Reset (power off, power on) the module.

Type 03 - Hardware Power Up Error
An error occurred during hardware initialization, after a power up sequence. Reset (power off, power on) the module.

Type 04 - Bogus Interrupt Power Up Error
Unexpected interrupts were generated during power up. Contact your Allen-Bradley representative.

Type 12 - TIC Power Up Error
Dip switch, programming, and MIDD byte information write to nonvolatile memory returned an error. Your module requires repair.

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Low Level Error Type

These errors are related to startup and system initialization functions and internal low level interrupt handlers.

Type 05 - Low Level Bogus Interrupt Error
Unexpected interrupts were generated during processing. Contact your Allen-Bradley representative.

Type C8 - System ROM 1 A CRC Error
Should cause a watch dog fail.

Type C9 - System ROM 1 B CRC Error
Should cause a watch dog fail.

Type CA - System ROM 2 A CRC Error
Should cause a watch dog fail.

Type CB - System ROM 2 B CRC Error
Should cause a watch dog fail.

Type CC - Protocol ROM AA CRC Error
Protocol cartridge in Protocol A slot has invalid code for the first protocol (AA) in the cartridge. Turn off power, reseat protocol cartridge, power up the module. If error continues, try another protocol cartridge.

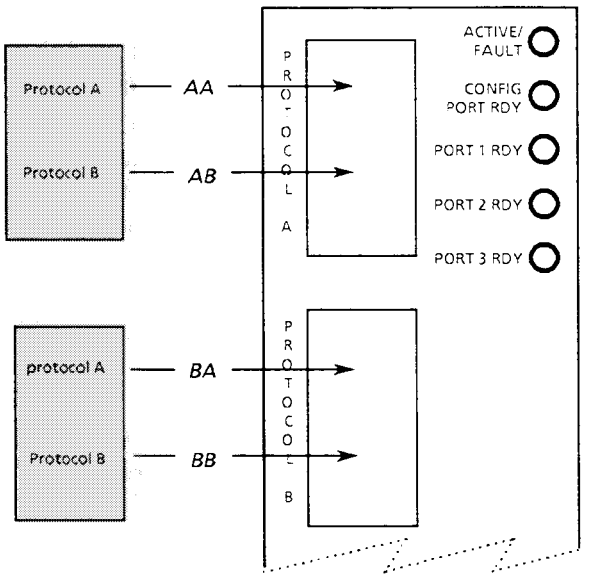
Type CD - Protocol ROM AB CRC Error
Protocol cartridge in Protocol A slot has invalid code for the second protocol (AB) in the cartridge. Turn off power, reseat protocol cartridge, power up the module. If error continues, try another protocol cartridge.

Type CE - Protocol ROM BA CRC Error
Protocol cartridge in Protocol B slot has invalid code for the first protocol (BA) in the cartridge. Turn off power, reseat protocol cartridge, power up the module. If error continues, try another protocol cartridge.

Type CF - Protocol ROM BB CRC Error
Protocol cartridge in Protocol B slot has invalid code for the second protocol (BB) in the cartridge. Turn off power, reseat protocol cartridge, power up the module. If error continues, try another protocol cartridge.

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Low Level Error Type (continued)



Type E6 - System ROM 1 A Checksum Error
Should cause a watch dog fail.

Type E7 - System ROM 1 B Checksum Error
Should cause a watch dog fail.

Type E8 - System ROM 2 A Checksum Error
Should cause a watch dog fail.

Type E9 - System ROM 2 B Checksum Error
Should cause a watch dog fail.

Type EA - Protocol ROM AA Checksum Error
Protocol cartridge in Protocol A slot has invalid code for the first protocol (AA) in the cartridge. Turn off power, reseat protocol cartridge, power up the module. If error continues, try another protocol cartridge.

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Low Level Error Type (continued)

Type EB - Protocol ROM AB Checksum Error
Protocol cartridge in Protocol A slot has invalid code for the second protocol (AB) in the cartridge. Turn off power, reseat protocol cartridge, power up the module. If error continues, try another protocol cartridge.

Type EC - Protocol ROM BA Checksum Error
Protocol cartridge in Protocol B slot has invalid code for the first protocol (BA) in the cartridge. Turn off power, reseat protocol cartridge, power up the module. If error continues, try another protocol cartridge.

Type ED - Protocol ROM BB Checksum Error
Protocol cartridge in Protocol B slot has invalid code for the second protocol (BB) in the cartridge. Turn off power, reseat protocol cartridge, power up the module. If error continues, try another protocol cartridge.

Type D2 - Interrupt 21 Function Not Provided Error
Reset (power off, power on) the module.

Type D3 - Interrupt 21 Function 3F (Read) Error
Reset (power off, power on) the module.

Type D4 - Interrupt 21 Function 40 (Write) Error
Reset (power off, power on) the module.

Type DC - MALLOC (Memory Allocation) Error
Reset (power off, power on) the module.

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Internal Error Type

Internal processor (Port 0)

Type 11 - Hardware (Physical) Error
An EEPROM error occurred during command processing. Reset the module with function *90A - Reset Port 0*. If that doesn't work, power the module off and on. If both attempts fail, set defaults with function *90B - Set Defaults Port 0*, and then power the module off and on.

Type 22 - Power Up Error
An EEPROM error occurred during command processing. Reset the module with function *90A - Reset Port 0*. If that doesn't work, power the module off and on. If both attempts fail, set defaults with function *90B - Set Defaults Port 0* function and then power the module off and on.

Type 77 - CRC/ Checksum System Error
An EEPROM error occurred during command processing. Reset the module with function *90A - Reset Port 0*. If that doesn't work, power the module off and on. If both attempts fail, set defaults with function *90B - Set Defaults Port 0* and then power the module off and on.

Port 1 Error Type

Type 0 to FE - Port Processing Error
This information is protocol specific. Refer to your Protocol Cartridge User's Manual.

Type FF - Port is Inactive
Check assigned protocol for protocol cartridge. Check low level error type for protocol cartridge.

Port 2 Error Type

Type 0 to FE - Port Processing Error
This information is protocol specific. Refer to your Protocol Cartridge User's Manual.

FF - Port is Inactive
Check assigned protocol for protocol cartridge. Check low level error type for protocol cartridge.

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Port 3 Error Type

Type 0 to FE - Port Processing Error
This information is protocol specific. Refer to your Protocol Cartridge User's Manual.

Type FF - Port is Inactive
Check assigned protocol for protocol cartridge. Check low level error type for protocol cartridge.

Configuration Port Error Type

Type DD - Software Error
Run software diagnostics on the Configuration Port.

Type EE - Hardware Error
Run hardware diagnostics on the Configuration Port.

Type FF - Port is Inactive

PLC Slot 0 Error Type (Port 5)

Type 01 - Received Truncated Message
The PLC controller received a message with a byte count greater than 128. The message was truncated. Check the BCD byte count in the BTW file. Make sure the correct device identification is selected.

Type 02 - Received and Discarded Message
The PLC controller received a message with a byte count less than 3. The message was discarded. Check the BCD byte count in the BTW file. Make sure the correct device identification is selected.

Type 03 - Sent Truncated Message
The PLC received a message greater than 126 bytes. The message was truncated. Check protocol and configuration parameters for port 1, 2, or 3. The maximum message length may be incompatible with the device identification selected for port 5. Refer to *Chapter 17, System Considerations* and your Protocol Cartridge User's Manual.

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PLC Slot 0 Error Type (Port 5)

Type 04 - Discarded Message
Message of 0 length was sent to the PLC controller. The message was discarded.

Type 05 - Write Error
A write to the PLC controller (not an actual block transfer) caused an error. Check software diagnostics for the port.

Type FF - Port is Inactive
Check power-up error type and internal error type. Contact your Allen-Bradley representative.

PLC Slot 1 Error Type (Port 6)

Type FF - Port is Inactive
Check power-up error type and internal error type. Contact your Allen-Bradley representative.

Reserved Error Type

None (all error types are reserved).

System Error Type

Type 06 - Bad Port Number Error
Invalid port number was associated with the destination. Check compatibility of device identification and device/data format. Refer to your Protocol Cartridge User's Manual.

Type 07 - Port 0 Not Ready Error
The port is not ready to accept messages or it is inactive. Check the hardware diagnostics for Port 0 (*A0- Hardware Diagnostic for RB Command Processor*).

Type 08 - Port 1 Not Ready Error
The port is not ready to accept messages or it is inactive. Check the port 1 error type and refer to your Protocol Cartridge User's Manual.

Type 09 - Port 2 Not Ready Error
The port is not ready to accept messages or it is inactive. Check the port 2 error type and refer to your Protocol Cartridge User's Manual.

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System Error Type (continued)

Type 0A - Port 3 Not Ready Error
The port is not ready to accept messages or it is inactive. Check the port 3 error type and refer to your Protocol Cartridge User's Manual.

Type 0B - Port 4 Not Ready Error
Port is not ready to accept messages or it is inactive. Check the configuration port error type and software diagnostics.

Type 0C - Port 5 Not Ready Error
The port is not ready to accept messages or it is inactive. Check the PLC slot 0 error type and software diagnostics.

Type 0D - Port 6 Not Ready Error
The port is not ready to accept messages or it is inactive. Check the PLC slot 1 error type and software diagnostics.

Type 0E - Port 7 Not Ready Error
Port is not ready to accept messages; it is a reserved port and indicates an internal error. Contact your Allen-Bradley representative.

Total Error Counter
0 to FF, count is latched at FF. Counts all errors logged. Use function *90E - Clear Diags Port 0* to clear the values.

B1 - Software Diagnostics for Serial Port 1

This information is protocol specific. For more information on this function, refer to your Protocol Cartridge User's Manual.

BX

B2 - Software Diagnostics for Serial Port 2

This information is protocol specific. For more information on this function, refer to your Protocol Cartridge User's Manual.

B3 - Software Diagnostics for Serial Port 3

This information is protocol specific. For more information on this function, refer to your Protocol Cartridge User's Manual.

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B4 - Software Diagnostics for Configuration Port

When selecting menu option B4, the software diagnostic display is specific to the configuration port identification. (Identification numbers are defined in Ch*apter 8, 2x - Identification Numbers*). This section shows the diagnostic displays for Dumb Terminal and DF1 Unspecified identifications.

Dumb Terminal Diagnostic Display

If the configuration port is setup for dumb terminal use, the following parameters display when you select menu option B4.

```
TRANSMIT MESSAGES (DEC 0...255) = 0.
RECEIVE MESSAGES (DEC 0...255) = 0.
UNDER/OVERFLOW MESSAGES (DEC 0...255) = 0.
ILLOGICAL INDICATOR (DEC 255...255) = 255.
```

The definition of each dumb terminal parameter follows.

Transmit Messages
Counter from 0 to 255. Tracks messages queued to local port buffer from internal buffer. Refer to configuration port error types listed under *B0 - Software Diagnostics for RB Command Processor* to check for hardware related problems.

Receive Messages
Counter from 0 to 255. Tracks messages queued from local port buffer to internal buffer. This count includes related errors. Refer to configuration port error types listed under *B0 - Software Diagnostics for RB Command Processor* to check for hardware related problems.

Under/Overflow Messages
Counter from 0 to 255. Tracks the number of messages with less than the number of characters (underflow) or more than the number of characters (overflow) required by the protocol. Check compatibility of device identification and device/data format. Refer to your Protocol Cartridge User's Manual.

Illogical Indicator - Always 255
If not 255, indicates a corrupted memory variable. This could be a software or hardware fault. Reset the module.

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DF1 Diagnostic Display - Series B Modules Only

If the configuration port is setup for DF1 Unspecified use, the following parameters display when you select menu option B4:

```
TRANSMIT MESSAGES (DEC 0...255) = 0.
RECEIVE MESSAGES (DEC 0...255) = 0.
BAD BCCs (DEC 0...255) = 0.
MESSAGE UNDER/OVERFLOWS (DEC 0...255) = 0.
DF1 NAKS RECEIVED (DEC 0...255) = 0.
DF1 NAKS TRANSMITTED (DEC 0...255) = 0.
DF1 ENQS RECEIVED (DEC 0...255) = 0.
ILLOGICAL INDICATOR (DEC 0...255) = ff.
```

The definition of each parameter follows.

Transmit Messages
Counter from 0 to 255. Tracks messages queued to local port buffer from internal buffer. Refer to configuration port error types listed under *B0 - Software Diagnostics for RB Command Processor* to check for hardware related problems.

Receive Messages
Counter from 0 to 255. Tracks messages queued from local port buffer to internal buffer. This count includes related errors. Refer to configuration port error types listed under *B0 - Software Diagnostics for RB Command Processor* to check for hardware related problems.

Bad BCCS
Counter from 0 to 255. The total number of messages received by the configuration port that were discarded because of BCC (Block Check Character) failures.

BX

Message Under/Overflows
Counter from 0 to 255. The total number of messages received by the Configuration Port that were truncated or discarded because of invalid lengths.

DF1 NAKS Received
Counter from 0 to 255. The total number of NAKS or negative acknowledgements received by the configuration port.

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DF1 Diagnostic Display - Series B Modules Only

DF1 NAKS Transmitted
Counter from 0 to 255. The total number of NAKS or negative acknowledgements transmitted by the configuration port.

DF1 ENQs Received
Counter from 0 to 255. The total number of DF1 ENQs received or transmitted by the configuration port.

Illogical Indicator - Always 255
If not 255, indicates a corrupted memory variable. This could be a software or hardware fault. Reset the module.

B5, B6 - Software Diagnostics for I/O Rack Slot 0 and 1

When selecting menu option B5 or B6, the following software diagnostics display for slot 0 or slot 1 of the I/O rack backplane:

```
READ_ERROR_COUNT (HEX 0...ff) = 0.
LAST_READ_ERROR (HEX 0...ff) = 0.
WRITE_ERROR_COUNT (HEX 0...ff) = 0.
LAST _WRITE_ERROR (HEX 0...ff) = 0.
INIT_ERROR_COUNT (HEX 0...ff) = 0.
LAST_INIT_ERROR (HEX 0...ff) = 0.
RESET_ERROR_COUNT (HEX 0...ff) = 0.
LAST_RESET_ERROR (HEX 0...ff) = 0.
FLUSH_ERROR_COUNT (HEX 0...ff) = 0.
LAST_FLUSH_ERROR (HEX 0...ff) = 0.
ID_ERROR_COUNT (HEX 0...ff) = 0.
LAST_ID_ERROR (HEX 0...ff) = 0.
OK_ERROR_COUNT (HEX 0...ff) = 0.
LAST_OK_ERROR (HEX 0...ff) = 0.
CLEAR_ERROR_COUNT (HEX 0...ff) = 0.
LAST_CLEAR_ERROR (HEX 0...ff) = 0.
QUIT_ERROR_COUNT (HEX 0...ff) = 0.
LAST_QUIT_ERROR (HEX 0...ff) = 0.
DIAGS_ERROR_COUNT (HEX 0...ff) = 0.
LAST_DIAGS_ERROR (HEX 0...ff) = 0.
TRANSMIT MESSAGES (HEX 0...ffff) = 0.
RECEIVE MESSAGES (HEX 0...ffff) = 0.
```


The definition of each parameter follows:

Read_Error_Count

(Counter Range 00 - ff). Accumulated count of read errors.

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Last_Read_Error

Type FE - Invalid Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type F9 - Invalid Parameter
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type 84 - No Block Transfer ID
Data was sent to port 5 or port 6 when the identification does not support block transfer. Normally the module supports data sent to port 5 only. Port 5 is the only port enabled for block transfers.

If error occurs on port 6, messages are incorrectly directed to port 6. Correct the configuration parameters. If error occurs on port 5, set the module defaults and reset module.

Type 83 - No Raw Receive ID
Internal processing error. Possible error in the current identification for the Port. Verify identification. Set the module defaults and reset module.

Type 81 - System_IO_Reset
A read of discrete type data was requested. The module does not support this mode of data transfer. The error indicates an internal processing error or corrupted memory. This could be a software or hardware fault. Reset module.

Write_Error_Count

BX

Counter from 00 to ff Hex. Accumulated count of write errors on ports handling data.

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Last_Write_Error

Type FE - Invalid Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type FC - Invalid Buffer Size
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type F9 -Invalid Parameter
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type F7 - Local Port Buffer Full
This is a processing error. If data throttling is inactive and not corrected by the PLC read data (BTR), the module internal buffers fill and data lost or corrupted.

Type 90 - No Handshake Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type 86 - Invalid Data Count
Byte count for message is less than 0 or greater than 128. Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type 85 - No Raw Write ID
Internal processing error. Possible error in the current device identification for the port. Verify the device identification. Set the module defaults and reset module.

Type 84 - No Block XFER ID
Data sent to port 5 or port 6 when the ID does not support block transfer. Normally the module supports data sent to port 5 only. Port 5 is the port with block transfers enabled.

If error occurs on port 6, messages are incorrectly directed to port 6. Correct the configuration parameters. If error occurs on port 5, set the module defaults and reset module.

Type 81 - System IO Reset
This is a local port buffer full error with I/O backplane disabled (PLC controller not in run mode). If data throttling is inactive and not corrected by the PLC read data (BTR), the module buffers fill and data lost or corrupted.

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Init_Error_Count

Counter from 00 - ff Hex. Count of initialization errors.

Last_Init_Error

Type FE - Invalid Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type 91 - EEPROM Read
Reading nonvolatile memory has generated an error. Your module requires repair.

Last_Init_Error

Type 89 - Invalid ID
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type 88 - DIP Switch Configuration Backplane Mismatch
Faulty hardware associated with dip switches. Your module requires repair.

Type 87 - Power Up Error
Nonvolatile memory fault. Your module requires repair.

Reset_Error_Count

Counter from 00 to ff Hex. Accumulated count of reset errors.

Last_Reset_Error

Type FE - Invalid Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type 8F - Clear Diagnostics Error
Indicates a corrupted memory. This could be a software or hardware fault. Reset module.

Type 8D - Clear Write Error
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

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Last_Reset_Error *(continued)*

Type 8C - Clear Read Error
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Type 8B - Initialization Error
Examine the Last_Init_Error for which initialization error occurred.

Flush_Error_Count

Counter from 00 to ff Hex. Accumulated count of flush errors.

Last_Flush_Error

Type FE - Invalid Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

ID_Error_Count

Counter from 00 to ff Hex. Accumulated count of ID errors.

Last_ID_Error

Type FE - Invalid Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module

Ok_Error_Count

Counter from 00 to ff Hex. Accumulated count of OK errors.

Last_Ok_Error

If not 0, contact Allen-Bradley representative.

Last_Clear_Error

Type FE - Invalid Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Quit_Error_Count

Counter from 00 to ff Hex. Accumulated count of quit errors.

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Clear_Error_Count

Counter from 00 to ff Hex. Accumulated count of clear errors.

Last_Quit_Error

Type FE - Invalid Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

Diags_Error_Count

Counter from 00 to ff Hex. Accumulated count of diagnostic errors.

Last_Diags_Error

Type FE - Invalid Port
Indicates a corrupted memory variable. This could be a software or hardware fault. Reset module.

TYPE 91 - EEPROM Read
Reading nonvolatile memory has generated an error. Your module requires repair.

Transmit Messages

Counter from 00 to ffff Hex. Accumulated count of messages queued for BTR service. The messages may not have reached the PLC based on the number of block transfer reads issued and successfully completed.

Receive Messages

Counter from 00 to ffff Hex. Accumulated count of messages queued for BTW service. This is a count of messages received from the PLC. Because of internal buffering, some messages may not have reached their destination.

B7 - Reserved

Menu function B7 is reserved. The following line appears, but you cannot change it.

```
RESERVED FOR FUTURE USE (DEC 0...0) = 0
```

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Chapter 17 System Considerations

Chapter Objectives

This chapter contains information on I/O, addressing, error status, handshaking, match code, discrete input, commands and data operation, and system error/fault handling.

Read this chapter to familiarize yourself with the internal functions of the module.

System Operation

The module is a point I/O module and a block transfer I/O module.

Point I/O is used for data, data handshake, and error status (and block transfer control/status in some PLC processors).

Block transfer I/O is used for commands and message data transfers. Specific module functions use a combination of the following types of I/O:

Error Status - Point input for collective module error status.

Handshake - Point inputs/outputs used with block transfer read, match codes, and discrete byte inputs.

Match Code Bits - Point inputs for true/false data.

Discrete Byte Input - Point inputs for byte data extracted from data messages.

Commands and Data - Block transfer I/O to perform module functions or to direct or acquire file data to or from a port.

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I/O Point Image Map

The module is a tandem 8 or 16 point I/O module. In 2 slot addressing mode, the module acts as 2 adjacent 8 point I/O (bidirectional) modules.

In 1 slot addressing mode, the module acts as 2 adjacent 16 point input/output (bidirectional) modules. Not all these I/O are assigned functionality. Some are reserved for future use or product compatibility.

2 Slot Addressing

The module does not support discrete byte input in 2 slot addressing (referred to on the module as single density).

When selecting 2 slot addressing, refer to the proper PLC processor manuals to configure the system and rack(s).

Important: Do not use the module in racks set up for complementary IIO.

Figure 17.1 shows the PLC Processor Image Table Words when operating the module in 2 slot addressing mode:

Figure 17.1
One 2-slot I/O Group

Output Image Table for the I/O Group

17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Octal
15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Decimal
Reserved					Handshake			Reserved								

Input Image Table for the I/O Group

17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Octal
15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Decimal
Match Code Bits				Handshake				Error Status								

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1 Slot Addressing

When selecting 1 slot addressing (referred to on the module as dual density, in other manuals referred to as double density) refer to the proper PLC processor manuals to configure the system and rack(s).

Important: Do not use the module in racks set up for complementary I/O.

Figure 17.2 shows the PLC Processor Image Table Words when operating the module in 1 slot addressing mode:

Figure 17.2
Two 1-Slot I/O Groups

O:RG0 **Output Image Table for the First I/O Group**

17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Octal
15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Decimal
Reserved					Handshake			Reserved								

O:RG1 **Output Image Table for the Second I/O Group**

17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Octal
15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Decimal
Reserved Output Bits																

I:RG0 **Input Image Table for the First I/O Group**

17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Octal
15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Decimal
Match Code Bits				Handshake				Error Status								

I:RG1 **Input Image Table for the Second I/O Group**

17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	Octal
15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Decimal
Match Code Bits or 1 Discrete Byte Input								Match Code Bits or 1 Discrete Byte Input								

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I/O Point Image Map (continued)

The Input Image Table Word for the First I/O Group (2 slot or 1 slot addressing) contains:

Match Code Bits - Point inputs for true/false data.

Handshake - Point inputs used with block transfer read, match codes, and discrete byte inputs.

Error Status - Point input for collective module error status.

The Output Image Table Word for the First I/O Group (2 slot or 1 slot addressing) contains:

Reserved Bits - Reserved for future use.

Handshake Bits - Point outputs used with match code and discrete input bytes.

Reserved Bits - Reserved for future use. Also used by some PLC Processors for block transfer control.

Error Status

The *Error Status Bits* include *Module Status Bits* and *Reserved Bits* for future use and product compatibility. The Input Image Table Word and Output Image Table Word containing the error status bits are illustrated in the following sections.

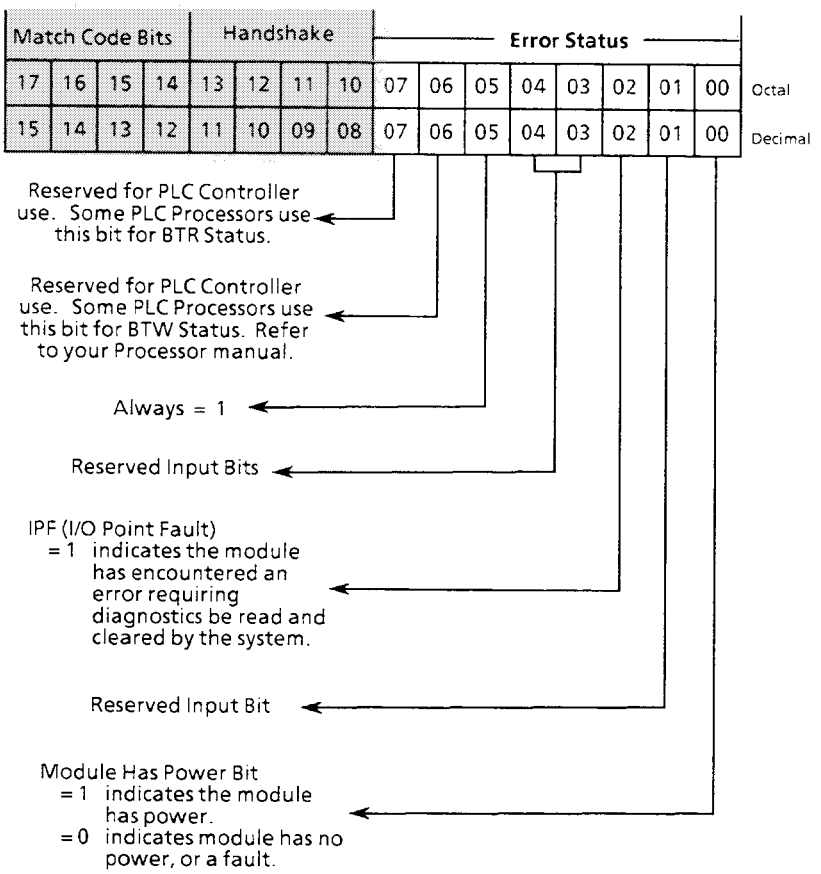
The format of these words are the same for 2 slot addressing (single density) and 1 slot addressing (dual or double density).

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Input Image Table Word for the First I/O Group

Figure 17.3 illustrates the *Error Status Bits* in the PLC processor Input Image Table Word for the First I/O Group associated with the module in 1 or 2 slot addressing (dual or single density) mode:

Figure 17.3
Error Status Bits: Input Image Table Word for First I/O Group

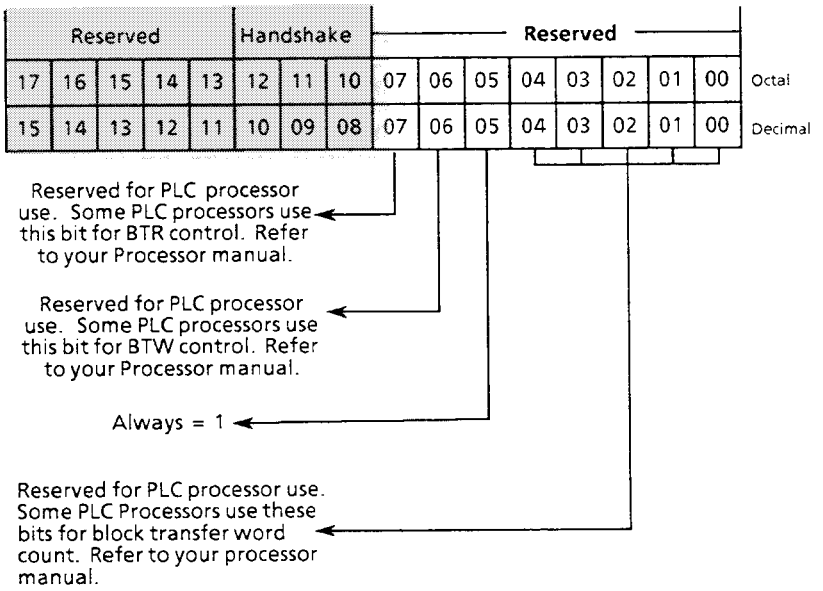


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Output Image Table Word for the First I/O Group

Figure 17.4 illustrates the *Reserved Bits* in the PLC processor Output Image Table Word for the First I/O Group associated with the module in 1 or 2 slot addressing (dual or single density) mode:

Figure 17.4
Reserved Bits: Output Image Table Word for the First I/O Group



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Handshake

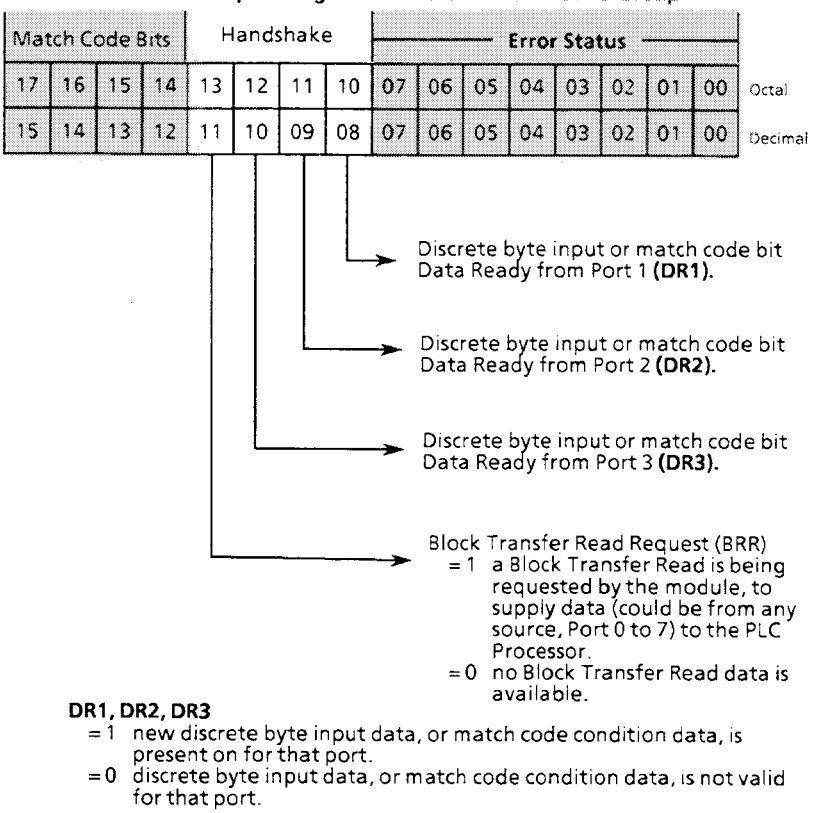
The *Handshake Bits* are used with block transfer reads, match codes, and discrete byte inputs. The following sections show the Input Image Table Word and Output Image Table Word with the handshake bits.

The format of these words are the same for 2 slot addressing (single density) and 1 slot addressing (dual or double density).

Input Image Table Word for the First I/O Group

Figure 17.5 shows the handshake bits in the PLC processor Input Image Table Word for the first I/O group associated with the module in 1 or 2 slot addressing mode:

Figure 17.5
Handshake Bits: Input Image Table Word for the First I/O Group

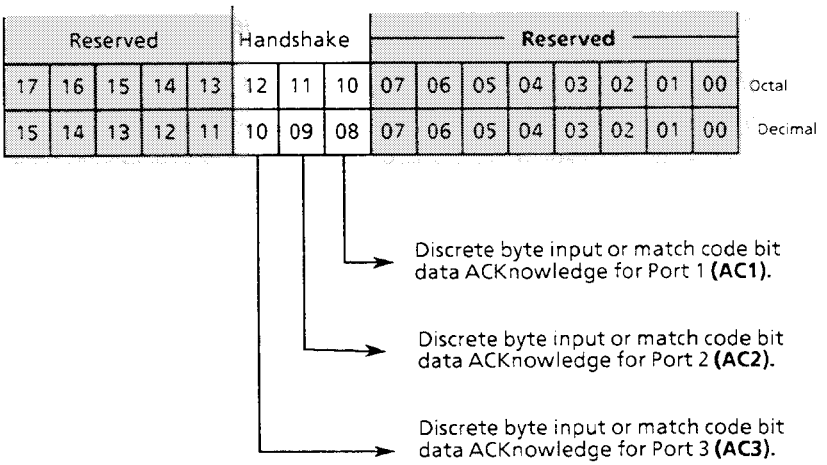


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Output Image Table Word for the First I/O Group

Figure 17.6shows the handshake bits in the PLC processor Output Image Table Word for the First I/O Group associated with the module in 1 or 2 slot addressing mode:

Figure 17.6
Handshake Bits: Output Image Table Word for the First I/O Group



AC1, AC2, AC3
= 1 The PLC Processor has read the discrete input/match code condition data for the associated port (1 to 3). Used in conjunction with discrete inputs Data Ready for associated port (1 to 3)
= 0 Discrete byte input/match code condition acknowledge is not active on specified port (1 to 3).

Match Code Bits and Discrete Byte Input

The *Match Code Bits* provide point inputs for true/false conditions that correspond to a configured match code entry. (Refer to *Chapter 10, 4DM - Match Code Entries*.) These bits are qualified to the PLC program with the handshake bits.

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Match Code Bits and Discrete Byte Input (continued)

The *Discrete Byte Input* is a fixed group of 8 bits providing a fixed group of point inputs for conveying byte data extracted from data messages into the PLC program. These bits are qualified to the PLC program with the handshake bits.

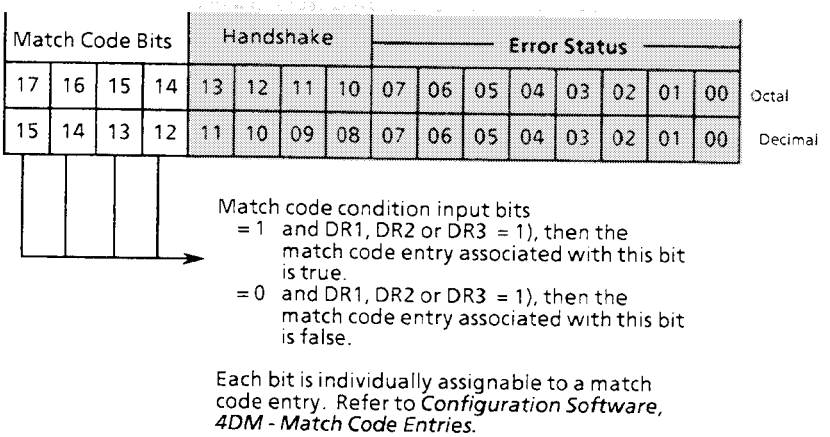
The following sections show the Input Image Table Word and Output Image Table Word with the match code and discrete byte input bits.

The format of these words is different for 2 slot addressing (single density) and 1 slot addressing (dual or double density).

2 Slot Addressing

Figure 17.7 shows the match code bits in the PLC processor Input Image Table Word for the First I/O Group associated with the module in single density mode:

Figure 17.7
Match Code Bits: Input Image Table Word for the First I/O Group



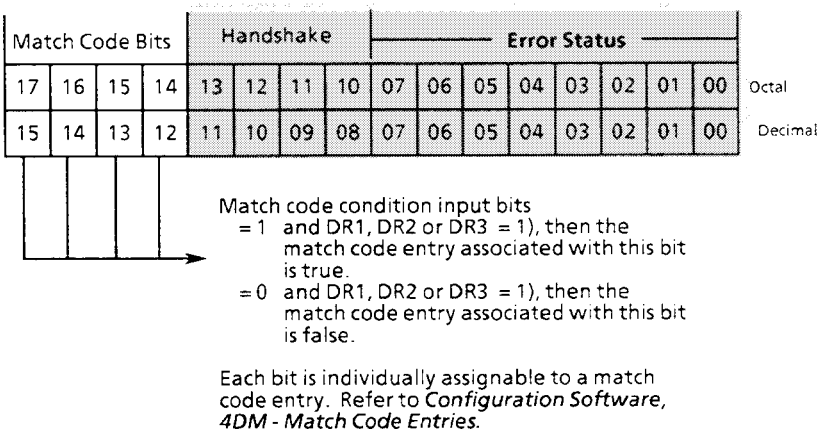
In 2 slot addressing (single density) mode, discrete byte input bits are not accessible.

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1 Slot Addressing

Figure 17.8 shows the match code bits and discrete byte inputs bits in the PLC processor Input Image Table Word for the First I/O Group and Second I/O Group associated with the module in dual density:

Figure 17.8
Match Code Bits: Input Image Table Word for the First I/O Group

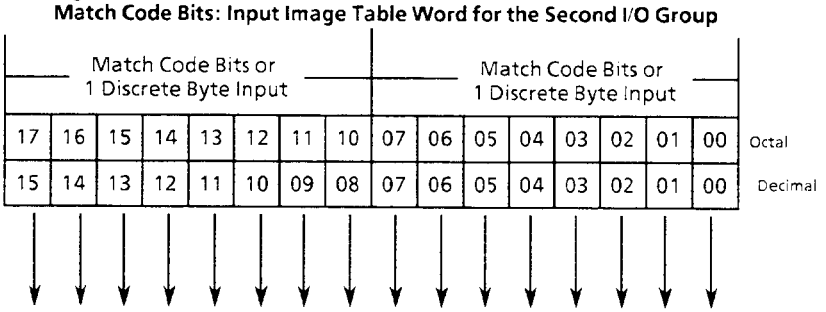


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1 Slot Addressing *(continued)*

Figure 17.9 showss the match code bits in the PLC processor Input Image Table Word for the Second I/O Group.

Figure 17.9
Match Code Bits: Input Image Table Word for the Second I/O Group



Discrete Byte Input
When DR1, DR2, or DR3 = 1, the extracted byte from the data message (described by the discrete byte input entry associated with this byte of input image word) is present and valid.

- OR -

Match code condition input bits
= 1 and DR1, DR2 or DR3 = 1), then the match code entry associated with this bit is true.
= 0 and DR1, DR2 or DR3 = 1), then the match code entry associated with this bit is false.

Each bit is individually assignable to a match code entry. Refer to *Configuration Software, 4DM - Match Code Entries.*

Important: Do not use the same byte for both match code and discrete byte input functions. The match code data will write over any discrete byte data.

It is acceptable for match codes and discrete bytes to share a word. For example, the lower byte (00_8 to 07_8) can contain match code data and the upper byte (10_8 to 17_8) can contain discrete byte data.

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Raw Address

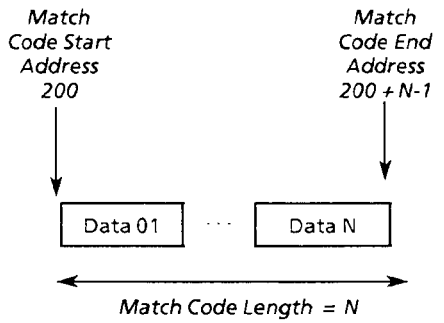
Raw addresses are associated with match code start addresses and discrete byte input data addresses. When configuring match code and discrete byte input entries, check the raw address range of the port to insure proper operation of *any* match code or discrete byte input.

The match code start address defines where the compare operation is to begin. This address is relative to the start address of the message. Message start addresses are protocol specific. Refer to your Protocol Cartridge User's Manual.

The match code length specifies the length, in bytes, of the match code compare data. The maximum length is 24 bytes. The length must include all the match code compare data.

Figure 17.10 shows how the start address and the match code length determine the address range for match codes.

Figure 17.10
Match Code Length



The discrete byte input data address defines where the extract operation is to occur. This address is relative to the start address of the message. Message start addresses are protocol specific. Refer to your Protocol Cartridge User's Manual.

The length of the discrete byte input extraction is 1 byte.

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Raw Address (continued)

The message address range for the port must include the lowest match code start address or lowest discrete byte input address (whichever is the lowest) and the highest match code end address. This is calculated as:

address range = match code start address + match code length

The address range is calculated and tracked for each serial device port (1,2, and 3).

To display the Port Lowest Raw Address and the Port Highest Raw Address, use function *A0- Hardware Diagnostics for RB Command Processor.*

Messages that vary in length can cause inoperative match codes/discrete byte inputs.

Figure 17.11 illustrates match code and discrete byte input operations for port 1. The figure shows the following information for port 1:

- Sample input data messages.
- Discrete byte input entry 5A.
- Match code entries 41A and 41B.
- Message start address for each messages. The start addresses vary from 200 to 206.
- Lowest and highest raw addresses displayed by function *A0-Hardware Diagnostics for RB Command Processor.*
- Match code inoperative states.

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Raw Address (continued)

Figure 17.11
Potential Match Code Inoperative States

Entry	Data Address	Length	Data Byte and Address Offsets 200	201	202	203	204	205	206	Operation
Match Code 41A	201	2		01	02					
Match Code 41B	203	2				01	02			
Discrete Byte Input 5A	205	1						01		
Sample Message 1	200	6	01	02	03	04	05	06		Valid
Sample Message 2	200	5	01	02	03	04	05			Invalid
Sample Message 3	205	1						01		Invalid
Sample Message 4	201	5		01	02	03	04	05		Valid
Sample Message 5	202	5			01	02	03	04	05	Invalid

A0 - Hardware Diagnostics for RB Command Processor

Port 1 Lowest Raw Address (Hex 0...ffff = 201)
Port 1 Highest Raw Address (Hex 0...ffff = 205)

The result of each sample message follows:

Message 1 Generates two match code conditions at addresses 201-202 and 203-204s and extracts one discrete byte at address 205. The Port 1 Lowest Raw Address is 201 and the Port 1 Highest Raw Address is 205. This means operations start at address 201 and end at address 205. The addresses of *all three* operations fall within this 201 - 205 range.

Message 2 Generates no match code conditions or discrete byte extraction. The operations are invalid. The five byte message starts at 200 and does not meet the Port 1 Highest Raw Address of 205. Message 2 only extends to address 204. All three operations are invalid.

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Raw Address (continued)

Message 3 Generates no match code conditions or discrete byte extraction. The operations are invalid because the 1 byte message, starting at 205, does not meet the Port 1 Lowest Raw Address range of 201. Message 3 starts at address 205. All three operations are invalid.

Message 4 Generates two match code conditions at addresses 201-202 and 203-204, and one discete byte extraction at address 205. The Port 1 Lowest Raw Address is 201 and the Highest Raw Address is 205. This means operations start at address 201 and end at address 205. The addresses of *all three* operations fall within the 201 - 205 range.

Message 4 Generates no match code conditions or discrete byte extraction. The operations are invalid. The message start address of 202 does not meet the Port 1 Lowest Raw Address of 201.

Match Code Operation

While referring to Figure 17.12, initial conditions are AC1, AC2, AC3 = 0 and DR1, DR2, DR3 = 0. A match code condition occurs for port x (x = 1, 2, or 3) and the following states occur:

1. The module presents the data as match code bits and sets DRx = 1.
2. The PLC program recognizes DRx, uses the condition, and then sets ACx = 1 when finished with the match code data. All match code bits remain static.
3. When ACx = 1, the module clears DRx = 0. All match code bits remain static.
4. When DRx = 0, the PLC program can clear ACx = 0. All match code bits may change.

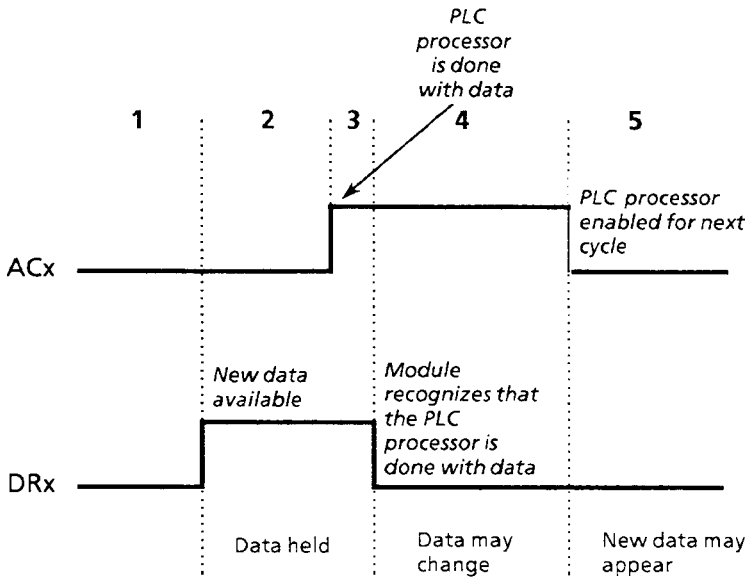
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Match Code Operation (continued)

5. When ACx = 0, the module maintains DRx = 0 if no new match code data exists for port x; or the module sets DRx = 1 if new match code data is available for port x.

Only one port goes through the above sequence at a time. (Only one of these input bits will be set at one time: DR3, DR2, or DR1.)

Figure 17.12
Match Code Handshake State Waveform

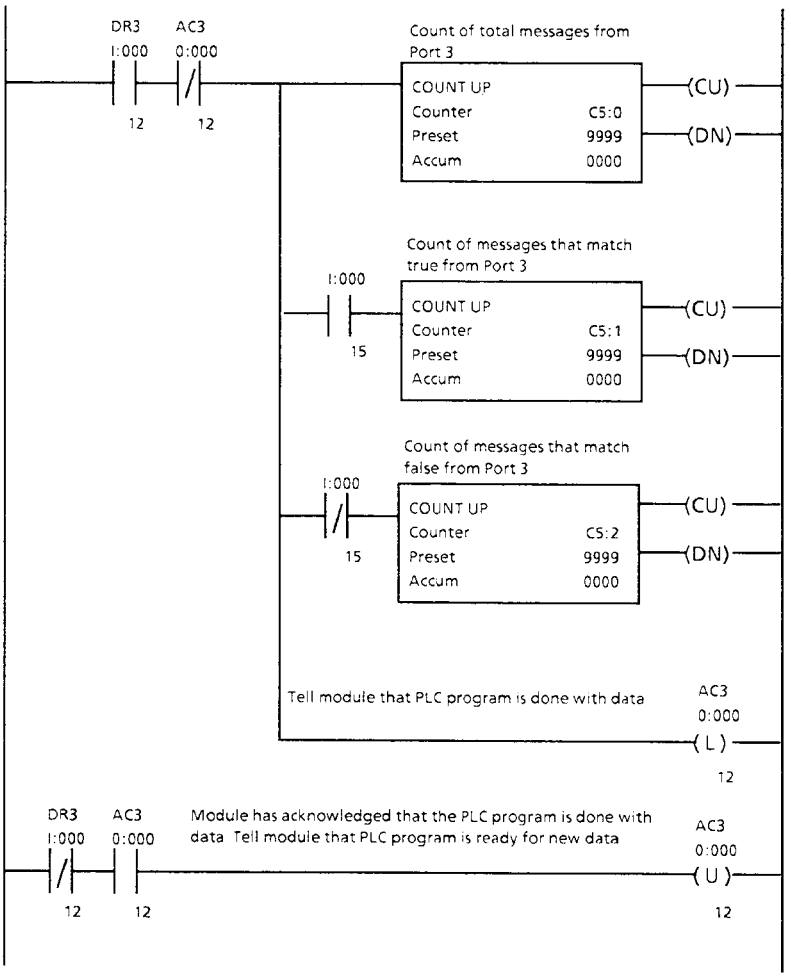


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Match Code Operation *(continued)*

Figure 17.13 provides an example ladder diagram excerpt of a match code input handshake for port 3:

Figure 17.13
Match Code Input Handshake for Port 3



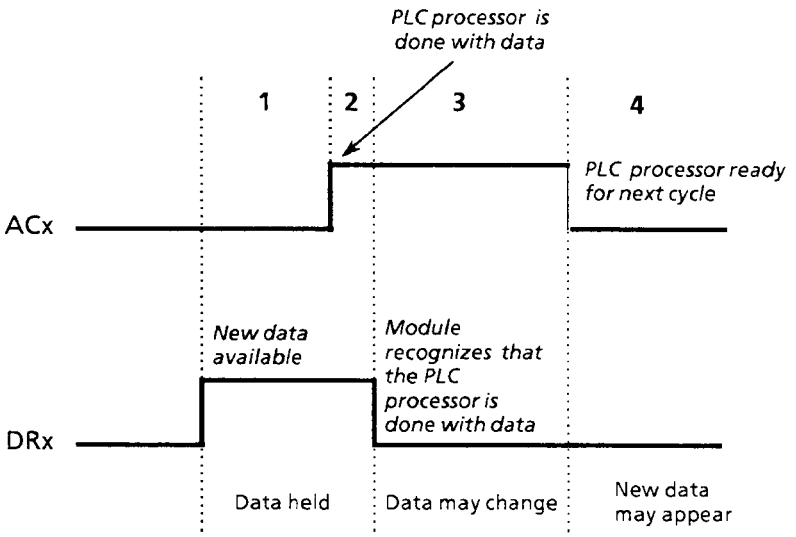
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Discrete Byte Input Operation

While referring to Figure 17.14, initial conditions are AC1, AC2, AC3 = 0 and DR1, DR2, DR3 = 0. A discrete byte input occurs for port x (x = 1, 2, or 3) and the following states occur:

1. The module presents the data as discrete byte inputs and sets DRx = 1.
2. The PLC program recognizes DRx, uses the condition, and then sets ACx = 1 when finished with the discrete byte input data. All discrete byte inputs remain static.
3. When ACx = 1, the module clears DRx = 0. All discrete byte inputs remain static.
4. When DRx = 0, the PLC processor can clear ACx = 0. All discrete byte inputs may change.
5. When ACx = 0, the module maintains DRx = 0 if no new discrete byte input data exists for port x; or the module sets DRx = 1 if new discrete byte input data is presented to port x.

Figure 17.14
Discrete Byte Input Handshake State Waveform



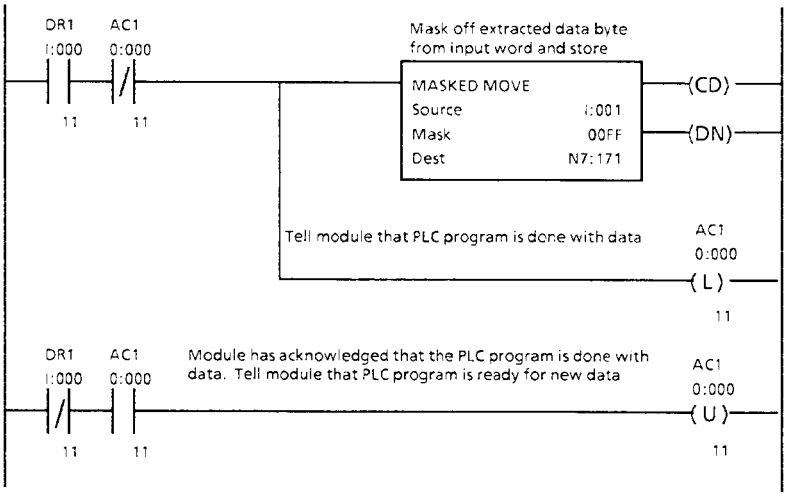
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Discrete Byte Input Operation (continued)

Only one port goes through the above sequence at a time. (Only one of these input bits will be set at one time: DR3, DR2, or DR1.)

Figure 17.15 shows an example ladder diagram excerpt of a discrete byte input handshake for port 2:

Figure 17.15
Discrete Byte Input Handshake for Port 2



Combining Match Code and Discrete Byte Input Operations

It is acceptable to use match code and discrete byte functions in the same word. However, **you must not overlap the match code and discrete byte data.** Do not assign the same byte to discrete byte and match code operations if you plan on using them simultaneously on the same port.

For example, port 1 is used for discrete byte *and* match code operations. Assign match code operations to the lower byte, leaving the upper byte free for discrete byte operations. Do not assign the lower byte to discrete byte operations. The match code data will overwrite the discrete byte data.

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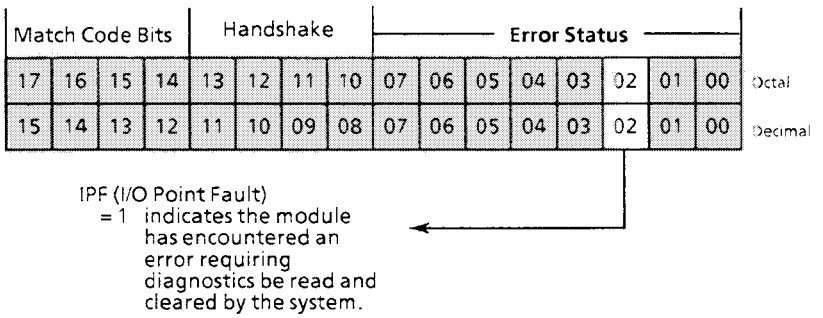
Commands and Data Operation

Block transfer I/O is used for commands to the module and message data transfers (bidirectional) to other ports. The PLC can send messages to the module or receive messages from the module using the selected protocol for block transfer files. The protocol can be either:

- BT With Count/Inputs with RB__Network Handshake, 8b0h (default)
- BT/Inputs With RB__Network Handshake, b0h

For both protocols, block transfer reads (BTR) only return the amount of data (rounded to the nearest word) available. If the BTR length is less than the amount of data, the BTR is ignored, the IPF bit (Figure 17.16) set, and the corresponding error logged. Each protocol is defined in the following sections.

Figure 17.16
IPF Bit



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BT With Count/Inputs With RB__Network Handshake

This protocol includes the count of the bytes (in 4 digit BCD format) to block transfer and the minimum header for the RB Network (destination and source, each in 2 digit hex format). The BCD byte count is included in the count.

The advantages of this protocol are:

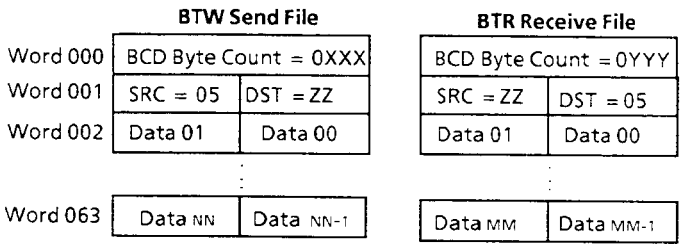
- Block transfer writes (BTWs) can be set to a maximum fixed size. The message or command passed to the destination is limited to the count specified.
- An extraneous byte, due to word count (BTW Length) roundup, is not transferred to the destination. Some devices (depending on the device protocol) cannot handle an incorrect byte length (extra bytes).

The disadvantages of this protocol are:

- An additional word of file area is consumed by the RB Network overhead. 124 bytes remain.
- Block transfer writes transfer the maximum fixed length for all transfers. This increases the block transfer overhead for both the PLC processor and the module.

Figure 17.17 shows the format of the block transfer files for the *BT With Count/Inputs With RB__Network Handshake.*

Figure 17.17
Block Transfer Files: BT with Count/Inputs with RB__Network Handshake



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BT With CountIInputs With RB__Network Handshake (continued)

The *BCD Byte Count* can be 0003 to 0128. *The Send File BCD Byte Count* may or may not equal the *Receive File BCD Byte*. This is command or message dependent.

BT/Inputs With RB Network Handshake

This protocol consists of the minimum header for the RB Network (destination and source, each in 2 digit hex format).

The advantages of this protocol are:

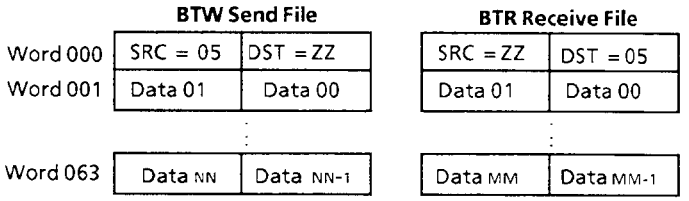
- 126 bytes out of the 128 byte file size maximum is available for command/responses or messages.

The disadvantages of this protocol are:

- Block transfer write length may vary depending on the device or protocol used. The length of the message or command is obtained from the BTW length. An extraneous byte, due to word count (BTW length) roundup, is transferred to the destination. Some devices (depending on the device protocol) cannot handle an incorrect byte length (extra bytes).

Figure 17.18 shows the format of the block transfer files for the *BT/Inputs With RB__Network Handshake* protocol.

Figure 17.18
Block Transfer Files: BT/Inputs with RB__Network Handshake



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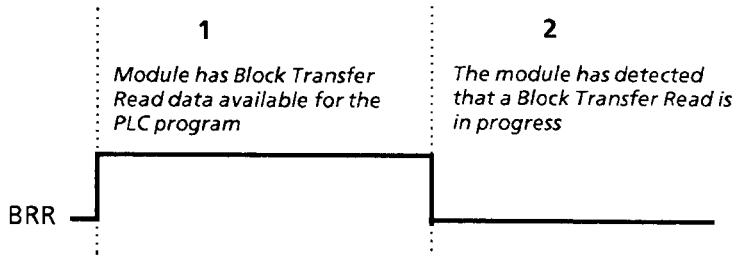
BTR Operation

The BRR (Block transfer Read Request) handshake bit qualifies BTR enables from the module. The BRR bit is *true* when the module has file oriented data (messages/command responses) ready for transfer. This eliminates the need for polling the module with BTRs and handling the conditions of ignored block transfer reads.

All data returned by the module in response to a BTR is considered valid by the module. BTRs are either responded to or ignored based on the availability of data or the length of the request sufficient enough to accept the data.

Refer to Figure 17.19 for the action of the BRR when the data has one or more files to transfer.

Figure 17.19
Block Transfer Read Handshake State Waveform

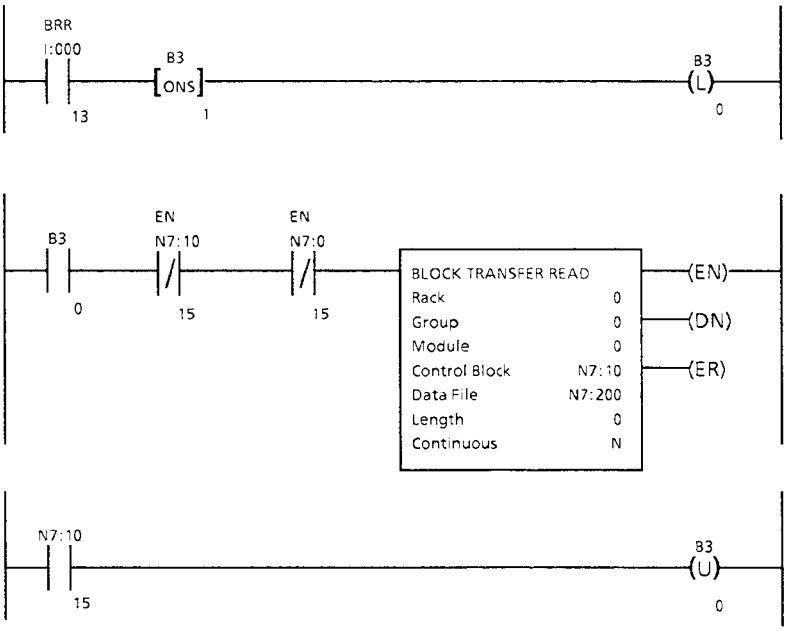


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BTR Operation *(continued)*

Figure 17.20 shows an example ladder diagram excerpt of a block transfer read handshake using the BRR bit.

Figure 17.20
Block Transfer Read Handshake



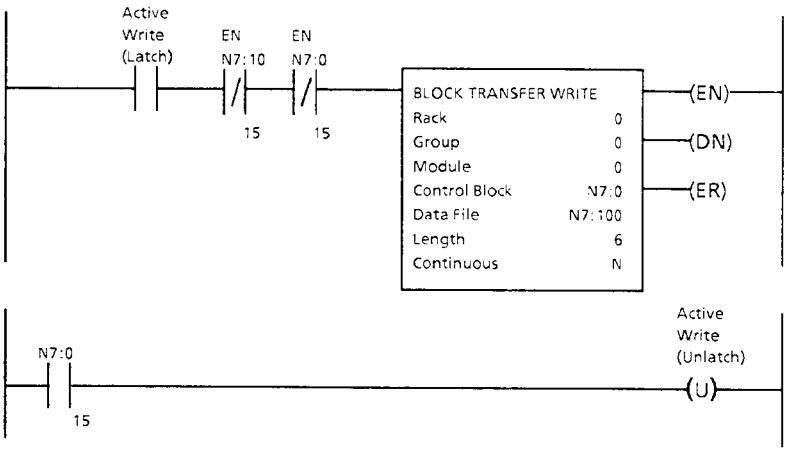
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BTW Operation

BTWs (Block Transfer Writes) require no handshake. The module accepts a BTW of any length when it is able. If the length is inappropriate for the protocol selected, or other errors are found in the format, the IPF bit is set.

Figure 17.21 shows an example Ladder Diagram excerpt for a block transfer write.

Figure 17.21
Block Transfer Write Handshake



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System Error/Fault Handling

Module errors fall into two categories; *Faults* and *Processing Errors*.

Faults are unexpected and may occur at any time during operation. In general, faults are not system recoverable and require investigation and intervention.

Processing Errors are caused by the user, programmer, or external device. Processing errors activate the IPF bit and set the appropriate port LED to orange.

The two specific types of errors are:

1. **Watch Dog Time Out Fault.**
   The module processor is inactive and no communication via the PLC or configuration port is possible. Refer to *Appendix B, Troubleshooting* for more information on the watch dog time out fault.

2. **Processing Error.**
   The module processor detected a fault, but is operational enough to provide some diagnostic information. The IPF (I/O Point Fault) bit is set and the Active/Fault LED is orange, or the serial port (1,2,3) or configuration port LEDs are red/orange. The IPF bit indicates that you should read the software diagnostics for the RB command processor.



CAUTION: The module should not be used for communications in this condition, unless the user has qualified the fault as noncritical.

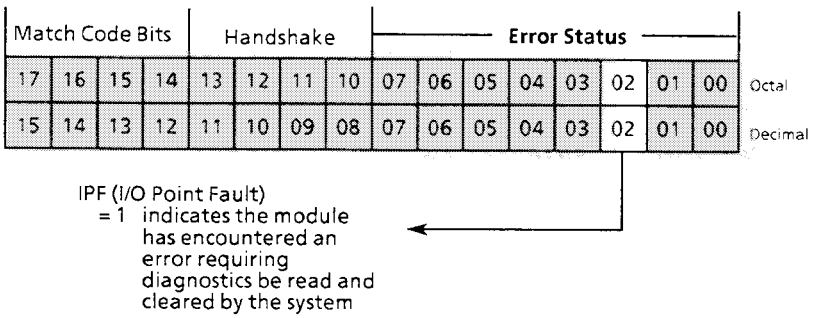
Refer to *B0 - Software Diagnostics for RB Command Processor* in *Chapter 16* for more details on faults. Refer to *Appendix B, Troubleshooting* for details on Active/Fault LED states.

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IPF (Diagnostic) Monitoring

Your PLC program should continually monitor the IPF (I/O Point Fault) bit. This bit alerts you of any errors or faults occurring with the module, except for watch dog timeouts or other *hang* conditions.

Figure 17.22
IPF Bit



The errors or faults that activate this bit for port 1, 2, or 3 are listed in *Appendix B, Troubleshooting*. More protocol specific errors and faults are listed in your Protocol Cartridge User's manual. Any error or fault that changes the LED color from green (no error state) will set the IPF bit.

When the IPF bit is set, your PLC program should inquire as to the cause of the error/fault and evaluate the severity. Once the cause has been evaluated and the PLC program continues (or ceases operation) the IPF condition must be cleared.

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IPF (Diagnostic) Monitoring (continued)

To clear the IPF bit, use function *90E* and clear the *Software Diagnostics* for the *RB Command Processor*. The IPF bit is reset unless one of the following conditions exist:

- Error condition reoccurs and corrective action not taken.
- New error condition occurs.
- Error could not be cleared.

Processing Considerations

Using a protocol without throttling capability or throttling enabled poses a danger in some protocols where source and destination information can be corrupted. When using these protocols, select an unspecified protocol type (one that does not obtain source and destination information from the message data itself).

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Module
Command Set

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Chapter 18 PLC Controller User Commands

Chapter Objectives

This chapter contains the PLC Controller Commands that allow you to issue commands from a PLC program to perform module functions.

Module Command Summary

All PLC Controller Commands are classified by Type:

Type 1 - Write only. No data is returned, except for the response header with the command status.

Type 2 - Read only. No data is sent except for the command header with specifiers. The response returns data.

PLC Controller Commands allow you to issue commands from a PLC program to perform module functions. These commands perform the same functions as the configuration software.

Commands are sent from the PLC to the module using the PLC block transfer mechanism (port 5). Port 5 has two identification numbers. These numbers determine the type of block transfer to use when sending commands and responses to and from the module. Refer to *Commands and Data Operation* in *Chapter 17, System Considerations* for a description of the block transfer identification numbers.

In this chapter, the identification number used for all command and response file formats is:

BT With Counts/Inputs With RB__Network Handshake

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Type 1 User Commands

Figure 18.1 lists the Type 1 write only commands. It also shows the Type 1 command and response files. The *SubFunction (SF) Number* in the *Command Write Address* specifies the module command to perform. For example, SF = 01, specifies the initialize command.

An example of each Type 1 command is shown following the command and response file descriptions below.

See *Commands and Data Operation* in *Chapter 17, System Considerations* for descriptions of BCD Byte Count, SRC, and DST.

CMD — 08 specifies an unprotected write command.

Transaction Number Word — A number that uniquely identifies commands and links them to command responses. The transaction number is user defined and returned in the response. When issuing many commands before responses are returned, sequential execution and return cannot be guaranteed.

Command Write Address — Specifies three items: the type of command to process (Type 1); the module port on which to execute the command; and the module subfunction. See Figure 18.1

STS = zz — Returns the status of a processed command in the response file. Possible status values (in Hex) are:

00 - The command processed without errors.

10 - The command file contained one or more invalid fields.

11 - A non-EEPROM related problem occurred during processing.

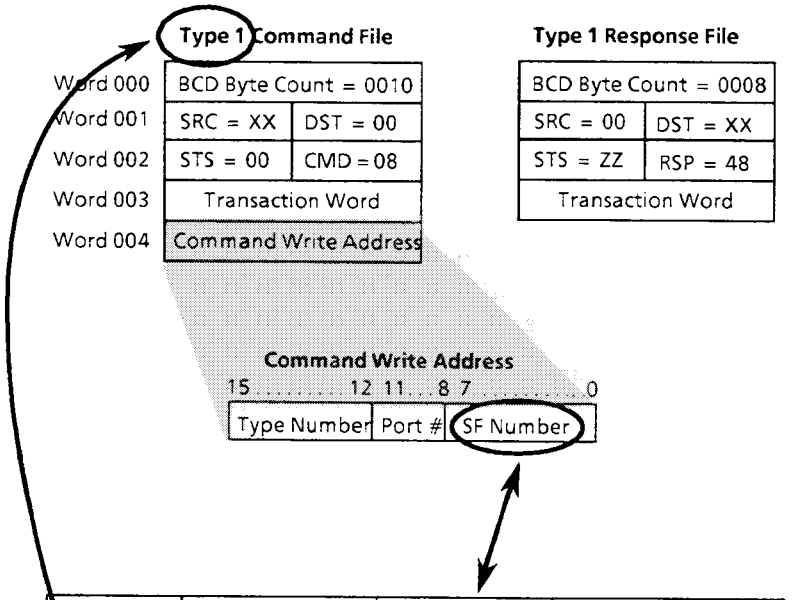
12 - An error occurred when trying to access the EEPROM.

13 - The port took over 3 seconds to process the command. This is valid for the reset and initialize commands.

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Type1 User Commands (continued)

Figure 18.1
Type 1 - Write Only Commands



Type Number	Command	SF Number (in hex)	Command is Available on Port #
1	Initialize	01	1 - 7
1	Reset	02	0 - 7
1	Set Defaults	03	0 - 7
1	Flush	04	1 - 7
1	Clear Software Diagnostics	05	0 - 7
1	Clear Hardware Diagnostics	06	0 - 7

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Type1 User Commands (continued)

STS = zz (cont.)

14 - The port is inactive. The command was not started.

15 - The port is processing another command. This could occur when trying to execute a command on a port that has not finished processing a reset command. The command was not started.

16 - **The command attempted to access a data area not allocated.** You have used an invalid command.

17 - The command tried to access an area of device port initilization data that is not allocated. You have used an invalid command.

RSP = xx

Returns a response (RSP = xx in the response file) to the command sent. Possible response values (in Hex) are:

40 - The packet does not contain a response to a read or write command. The command packet CMD field was invalid. The STS (status) field will contain 10.

41 - The packet contains a response to a read command. For Type 1 commands this would also be invalid. This could be a response to a different command or a data message not relating to the command sent. Use transaction numbers to match command responses.

48 - The packet contains a response to a write command. Check the STS field for 0. If it is not 0, refer to the individual commands in the following sections for an explanation of a non zero STS field.

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Initialize

Initialize is a Type 1 command with a subfunction (SF) of 01 Hex and is valid for ports 1 to 7. For more details on this command, refer to *9XD - Initialize* in *Chapter 14, 9XF - Module Functions*.

Initialize Command File

Word 000	BCD Byte Count = 0010	
Word 001	SRC = XX	DST = 00
Word 002	STS = 00	CMD = 08
Word 003	Transaction Word	
Word 004	Initialize Write Address	

Initialize Response File

BCD Byte Count = 0008	
SRC = 00	DST = XX
STS = ZZ	RSP = 48
Transaction Word	

Initialize Write Address (Word 4) has the following values:

1101 **Initialize Port 1**: Refer to your Protocol Cartridge User's Manual.

1201 **Initialize Port 2**: Refer to your Protocol Cartridge User's Manual.

1301 **Initialize Port 3**: Refer to your Protocol Cartridge User's Manual.

1401 **Initialize Port 4**: For details on this function, refer to *9XD - Initialize* in *Chapter 14*.

1501 **Initialize Port 5**: For details on this function, refer to *9XD - Initialize* in *Chapter 14*.

1601 **Initialize Port 6**: For details on this function, refer to *9XD - Initialize* in *Chapter 14*.

1701 **Initialize Port 7**: For details on this function, refer to *9XD - Initialize* in *Chapter 14*.

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Reset

Reset is a Type 1 command with a subfunction (SF) of 02 Hex and is valid for ports 0 to 7. For more information on this command, refer to *9XA - Reset* in *Chapter 14, 9XF - Module Functions*.

Reset Command File

Word 000	BCD Byte Count = 0010	
Word 001	SRC = XX	DST = 00
Word 002	STS = 00	CMD = 08
Word 003	Transaction Word	
Word 004	Reset Write Address	

Reset Response File

BCD Byte Count = 0008	
SRC = 00	DST = XX
STS = ZZ	RSP = 48
Transaction Word	

Reset Write Address (Word 4) has the following values:

1002 **Reset Port 0:** For details on this command, refer to *9XA - Reset* in *Chapter 14, 9XF - Module Functions*.

1102 **Reset Port 1:** Refer to your Protocol Cartridge User's Manual.

1202 **Reset Port 2:** Refer to your Protocol Cartridge User's Manual.

1302 **Reset Port 3:** Refer to your Protocol Cartridge User's Manual.

1402 **Reset Port 4:** For details on this function, refer to *9XA - Reset* in *Chapter 14*.

1502 **Reset Port 5:** For details on this function, refer to *9XA - Reset* in *Chapter 14*.

1602 **Reset Port 6:** For details on this function, refer to *9XA - Reset* in *Chapter 14*.

1702 **Reset Port 7:** For details on this function, refer to *9XA - Reset* in *Chapter 14*.

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Set Defaults

Set Defaults is a Type 1 command with a subfunction (SF) of 03 Hex and is valid for ports 0 to 7. For details on this command, refer to *9XB - Set Defaults* in *Chapter 14, 9XF - Module Functions*.

Set Defaults Command File

Word 000	BCD Byte Count = 0010	
Word 001	SRC = XX	DST = 00
Word 002	STS = 00	CMD = 08
Word 003	Transaction Word	
Word 004	Set Defaults Wrt Addr	

Set Defaults Response File

BCD Byte Count = 0008	
SRC = 00	DST = XX
STS = ZZ	RSP = 48
Transaction Word	

Set Defaults Write Address (Word 4) has the following values:

1003 **Set Defaults Port 0**: Refer to *90B - Set Defaults* in *Chapter 14, 9XF - Module Functions*.

1103 **Set Defaults Port 1**: Refer to your Protocol Cartridge User's Manual.

1203 **Set Defaults Port 2**: Refer to your Protocol Cartridge User's Manual.

1303 **Set Defaults Port 3**: Refer to your Protocol Cartridge User's Manual.

1403 **Set Defaults Port 4**: For details on this function, refer to *9XB - Set Defaults* in *Chapter 14*.

1503 **Set Defaults Port 5**: For details on this function, refer to *9XB - Set Defaults* in *Chapter 14*.

1603 **Set Defaults Port 6**: For details on this function, refer to *9XB - Set Defaults* in *Chapter 14*

1703 **Set Defaults Port 7**: For details on this function, refer to *9XB - Set Defaults* in *Chapter 14*.

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Flush

Flush is a Type 1 command with a subfunction (SF) of 04 Hex and is valid for ports 1 to 7. For more details on this command, refer to *9XC - Flush* in *Chapter 14, 9XF - Module Functions.*

Flush Command File

Word 000	BCD Byte Count = 0010	
Word 001	SRC = XX	DST = 00
Word 002	STS = 00	CMD = 08
Word 003	Transaction Word	
Word 004	Flush Write Address	

Flush Response File

BCD Byte Count = 0008	
SRC = 00	DST = XX
STS = ZZ	RSP = 48
Transaction Word	

Flush Write Address (Word 4) has the following values:

1104 **Flush Port 1**: Refer to your Protocol Cartridge User's Manual.

1204 **Flush Port 2**: Refer to your Protocol Cartridge User's Manual.

1304 **Flush Port 3**: Refer to your Protocol Cartridge User's Manual.

1404 **Flush Port 4**: For details on this function, refer to *9XC - Flush* in *Chapter 14.*

1504 **Flush Port 5**: For details on this function, refer to *9XC - Flush* in *Chapter 14.*

1604 **Flush Port 6**: For details on this function, refer to *9XC - Flush* in *Chapter 14.*

1704 **Flush Port 7**: For details on this function, refer to *9XC - Flush* in *Chapter 14.*

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Clear Software Diagnostics

Clear Software Diagnostics is a Type 1 command with a subfunction (SF) of 05 Hex and is valid for ports 0 to 7. For more information on this command, refer to *9XE - Clear Diags* in *Chapter 14, 9XF - Module Functions*.

The format of the command is as follows:

Clear Hardware Diagnostics

	Command File		Response File	
Word 000	BCD Byte Count = 0010		BCD Byte Count = 0008	
Word 001	SRC = XX	DST = 00	SRC = 00	DST = XX
Word 002	STS = XX	CMD = 08	STS = ZZ	RSP = 48
Word 003	Transaction Word		Transaction Word	
Word 004	Clr Soft Diags Wr Adr			

Clear Software Diagnostics Write Address (Word 4) has these values:

1005 **Clear Software Diagnostics Port 0**: Refer to *9XE - Clear Diags* in *Chapter 14, 9XF - Module Functions*.

1105 **Clear Software Diagnostics Port 1**: Refer to your Protocol Cartridge User's Manual.

1205 **Clear Software Diagnostics Port 2**: Refer to your Protocol Cartridge User's Manual.

1305 **Clear Software Diagnostics Port 3**: Refer to your Protocol Cartridge User's Manual.

1405 **Clear Software Diagnostics Port 4**: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14*.

1505 **Clear Software Diagnostics Port 5**: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14*.

1605 **Clear Software Diagnostics Port 6**: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14*.

1705 **Clear Software Diagnostics Port 7**: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14*.

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Clear Hardware Diagnostics

Clear Hardware Diagnostics is a Type 1 command with a subfunction (SF) of 06 Hex and is valid for ports 0 to 7. For more information on this command, refer to *9XE - Clear Diags* in *Chapter 14, 9XF - Module Functions*.

Clear Hardware Diagnostics

	Command File		Response File	
Word 000	BCD Byte Count = 0010		BCD Byte Count = 0008	
Word 001	SRC = XX	DST = 00	SRC = 00	DST = XX
Word 002	STS = XX	CMD = 08	STS = ZZ	RSP = 48
Word 003	Transaction Word		Transaction Word	
Word 004	Clr Hard Diags Wr Adr			

Clear Hardware Diagnostics Write Address (Word 4) has these values:

1006 **Clear Hardware Diagnostics Port 0**: For details on this function, see *9XE - Clear Diags* in *Chapter 14*.

1106 **Clear Hardware Diagnostics Port 1**: Refer to your Protocol Cartridge User's Manual.

1206 **Clear Hardware Diagnostics Port 2**: Refer to your Protocol Cartridge User's Manual.

1306 **Clear Hardware Diagnostics Port 3**: Refer to your Protocol Cartridge User's Manual.

1406 **Clear Hardware Diagnostics Port 4**: For details on this function, see *9XE - Clear Diags* in *Chapter 14*.

1506 **Clear Hardware Diagnostics Port 5**: For details on this function, see *9XE - Clear Diags* in *Chapter 14*.

1606 **Clear Hardware Diagnostics Port 6**: For details on this function, see *9XE - Clear Diags* in *Chapter 14*.

1706 **Clear Hardware Diagnostics Port 7**: For details on this function, see *9XE - Clear Diags* in *Chapter 14*.

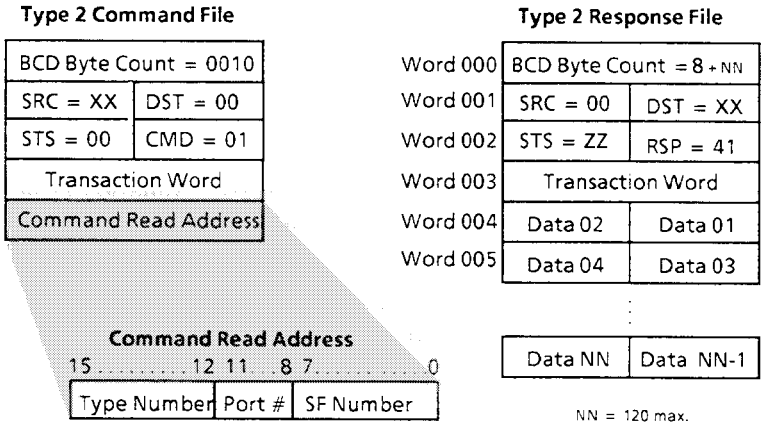
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Type 2 User Commands

Figure 18.2 lists the Type 2 read only commands. It also shows the Type 2 command and response Files. The *SubFunction (SF) Number* in the *Command Read Address* specifies the module command you want to perform.

Following a description of some of the bytes in the command and response files are examples of each Type 2 command.

Figure 18.2
Type 2 - Read Only Commands



Type Number	Command	SF Number (in hex)	Command is Available on Port #
2	Get Software diagnostics "A"	15	0 - 7
2	Get Software Diagnostics "B"	25	0 - 7
2	Get Hardware Diagnostics "A"	16	0 - 7
2	Get Hardware Diagnostics "B"	26	0 - 7

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Type 2 User Commands (continued)

See *Commands and Data Operation* in *Chapter 17, System Considerations* for a description of BCD Byte Count, SRC, and DST.

CMD	01 specifies an unprotected read command.
Transaction Number Word	A number that uniquely identifies commands and links them to command responses. The transaction number is user defined and returned in the response. When issuing many commands before responses are returned, sequential execution and return cannot be guaranteed.
Command Read Address	Specifies three items: the type of command to process (Type 2); the module port on which to execute the command; and the module subfunction. See Figure 18.2.
STS = zz	Returns status of a processed command in the response file. Status values are the same as the Type 1 commands.
RSP = xx	Returns a response (RSP = XX in the response file) to the command sent. Possible response values (in Hex) are: **40** - The packet does not contain a response to a read or write command. The command packet CMD field was invalid. The STS (status) field will contain 10 Hex. **41** - The packet contains a response to the read command. Check the STS field for zero. If it is not zero, refer to the individual commands in the following sections for an explanation of a nonzero STS field. **48** - The packet contains a response to a write command. For Type 2 commands, this would be invalid. This could be a response to a different command, or a data message not relating to the command sent. Use transaction numbers to match command responses.

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Get Software Diagnostics

Get Software Diagnostics is a Type 2 command with a subfunction (SF) of 15 Hex and 25 Hex. This function executes on ports 0 to 7.

Software diagnostics can contain up to 128 bytes of information. Two *Get* commands are required to retrieve the information. Each *Get* returns a 64 byte section. The *Get* section A command returns bytes 0 through 63. The *Get* section B command returns bytes 64 through 123.

Use Get Software Diagnostics SF = 15 to retrieve the first 64 bytes from section A and SF = 25 to retrieve the second 64 bytes from section B.

Get Software Diagnostics

Command File A

Word 000	BCD Byte Count = 0010	
Word 001	SRC = XX	DST = 00
Word 002	STS = 00	CMD = 01
Word 003	Transaction Word	
Word 004	Get Soft Diags Rd Adr	

Command File B

Word 000	BCD Byte Count = 0010	
Word 001	SRC = XX	DST = 00
Word 002	STS = 00	CMD = 01
Word 003	Transaction Word	
Word 004	Get Soft Diags Rd Adr	

Response File

Word 000	BCD Byte Count = 8 + NN	
Word 001	SRC = 00	DST = XX
Word 002	STS = ZZ	RSP = 41
Word 003	Transaction Word	
Word 004	Data 02	Data 01
Word 005	Data 04	Data 03
⋮		
Word 035	Data 64	Data 63

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Get Software Diagnostics (continued)

Get Software Diagnotics Read Address (Word 4) has these values:

2015 **Software Diagnostics Port 0**, section A: Refer to *B0 - Software Diagnostics for RB Command Processor* in *Chapter 16*.

Word #			
	005	Low Level Error Type	Power Up Error Type
	006	Port 1 Error Type	Internal Error Type
	007	Port 3 Error Type	Port 2 Error Type
	008	PLC Slot 0 Error Type	Config Port Error Type
	009	Reserved Error Type	PLC Slot 1 Error Type
	010	Total Error Counter	System Error Type
	⋮		
	035		

2025 **Software Diagnostics Port 0**: section B has no meaningful data.

2115 **Software Diagnostics Port 1**, section A: Refer to your Protocol Cartridge User's Manual.

2125 **Software Diagnostics Port 1**, section B: Refer to your Protocol Cartridge User's Manual.

2215 **Software Diagnostics Port 2**, section A: Refer to your Protocol Cartridge User's Manual.

2225 **Software Diagnostics Port 2**, section B: Refer to your Protocol Cartridge User's Manual.

2315 **Software Diagnostics Port 3**, section A: Refer to your Protocol Cartridge User's Manual.

2325 **Software Diagnostics Port 3**, section B: Refer to your Protocol Cartridge User's Manual.

2415 **Software Diagnostics Port 4**, section A: Refer to *B4 - Software Diagnostics for Configuration Port* in *Chapter 16, Software Diagnostics*.

The parameters that display are specific to how the configuration port is identified for use: Dumb Terminal or DF1 communication.

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Get Software Diagnostics *(continued)*

The section A file layout for Dumb Terminal diagnostic parameters looks like this:

Word #	Dumb Terminal Diagnostic Display - Port 4	
004		
005		
006	Receive Messages	Transmit Messages
007	Under/verflow messages	
008		
009		
010		
011		
012		Illogical indicator
	⋮	
035		

The section A file layout for DF1 diagnostic parameters looks like this:

Word #	DF1 Diagnostic Display - Port 4 Series B Modules only	
004		
005		
006	Receive Messages	Transmit Messages
007	Under/overflow messages	BAD BCCs
008	DF1 NAKs Received	
009	DF1 ENQs Received	DF1 NAKs Transmitted
010		
011		
012		Illogical indicator
	⋮	
035		

2425 **Software Diagnostics Port 4**: section B has no meaningful data.

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Get Software Diagnostics (continued)

2515 **Software Diagnostics Port 5**, section A: Refer to *B5 - Software Diagnostics for I/O Rack Slot 0* in *Chapter 16, Software Diagnostics.*

Word #		
004	LAST_READ_ERROR	READ_ERROR_COUNT
005	LAST_WRITE_ERROR	WRITE_ERROR_COUNT
006	LAST_INIT_ERROR	INIT_ERROR_COUNT
007	LAST_RESET_ERROR	RESET_ERROR_COUNT
008	LAST_FLUSH_ERROR	FLUSH_ERROR_COUNT
009	LAST_ID_ERROR	ID_ERROR_COUNT
010	LAST_OK_ERROR	OK_ERROR_COUNT
011	LAST_CLEAR_ERROR	CLEAR_ERROR_COUNT
012	LAST_QUIT_ERROR	QUIT_ERROR_COUNT
013	LAST_DIAGS_ERROR	DIAGS_ERROR_COUNT
014	TRANSMIT MESSAGES	
015	RECEIVE MESSAGES	
⋮		
035		

2525 **Software Diagnostics Port 5**: section B has no meaningful data.

2615 **Software Diagnostics Port 6**: section A is identical in format with Software diagnostics Port 5, section A.

2625 **Software Diagnostics Port 6**: section B has no meaningful data.

2715 **Software Diagnostics Port 7**: section A is reserved.

2725 **Software Diagnostics Port 7**: section B is reserved.

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Get Hardware Diagnostics

Get Hardware Diagnostics is a Type 2 command with a subfunction (SF) of 16 Hex and 26 Hex. This function executes on ports 0 to 7.

Hardware diagnostics can contain up to 128 bytes of information, Two *Get* commands are required to retrieve diagnostics. Each command returns a 64 byte section. The *Get* section *A* command returns bytes 0 through 63. The *Get* section *B* command returns bytes 64 through 123. Use Get Hardware Diagnostics SF = 16 to retrieve the first 64 bytes from section A. Use SF = 26 to retrieve the second 64 bytes from section B.

Get Hardware Diagnostics

Read Command File A

Word 000	BCD Byte Count = 0010	
Word 001	SRC = XX	DST = 00
Word 002	STS = 00	CMD = 01
Word 003	Transaction Word	
Word 004	Get Hard Diags Rd Adr	

Read Command File B

BCD Byte Count = 0010	
SRC = XX	DST = 00
STS = 00	CMD = 01
Transaction Word	
Get Hard Diags Rd Adr	

Read Response File

Word 000	BCD Byte Count = 8 + NN	
Word 001	SRC = 00	DST = XX
Word 002	STS = ZZ	RSP = 41
Word 003	Transaction Word	
Word 004	Data 02	Data 01
Word 005	Data 04	Data 03
	⋮	
Word 035	Data 64	Data 63-1

Hardware Diagnostics Read Address (Word 4) has these values:

2016 **Hardware Diagnostics Port 0**, section A: Refer to *A0 - Hardware Diagnostics for RB Command Processor* in *Chapter 15, Hardware Diagnostics.*

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Get Hardware Diagnostics (continued)

Word #	Hardware Diagnostics - Port 0	
004	Invalid Write Commands	
005	Command Field Not Read Or Write	Invalid Read Commands
006	Command Frame Errors	Invalid RB Network SRC Field
007		
008		
009	Command Processing Time Outs	Command Processing Errors
010	Command Not Processed, Port Inactive	Command Not Processed, Port Busy
011	Init Data Area Access Errors	Data Area Not Allocated
012	Last EEPROM Error Code	EEPROM R/W Access Errors
013		
014	Port 1 Lowest Raw Address	
015	Port 1 Highest Raw Address	
016	Port 2 Lowest Raw Address	
017	Port 2 Highest Raw Address	
018	Port 3 Lowest Raw Address	
019	Port 3 Highest Raw Address	
020	Port 2 Raw Address Range Error	Port 1 Raw Address Range Error
021	Raw Frame Errors	Port 3 Raw Address Range Error
022	Discrete Byte Processing Errors	Match Code Processing Errors
023		PLC Port Rejected Packets
⋮		
035		

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Get Hardware Diagnostics (continued)

2026 **Hardware Diagnostics Port 0**: section B has no meaningful data.

2116 **Hardware Diagnostics Port 1**, section A: Refer to your Protocol Cartridge User's Manual.

2126 **Hardware Diagnostics Port 1**, section B: Refer to your Protocol Cartridge User's Manual.

2216 **Hardware Diagnostics Port 2**, section A: Refer to your Protocol Cartridge User's Manual.

2226 **Hardware Diagnostics Port 2,** section B: Refer to your Protocol Cartridge User's Manual.

2316 **Hardware Diagnostics Port 3**, section A: Refer to your Protocol Cartridge User's Manual.

2326 **Hardware Diagnostics Port 3**, section B: Refer to your Protocol Cartridge User's Manual.

2416 **Hardware Diagnostics Port 4**, section A: Refer to *A4 - Hardware Diagnostics for the Configuration Port* in *Chapter 15*.

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Get Hardware Diagnostics (continued)

Hardware Diagnostics - Port 4

Word #	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
004																
005																
006	Last Error - Word															
007	Number Of Errors - Word															
008											⑥	⑤	④	③	②	①
009																
010																
011																
012	Config Port Dip Switch 2								Config Port Dip Switch 1							
	⋮															
035																

①	0 = Device CTS Off 1 = Device CTS On
②	0 = Device DSR Off 1 = Device DSR On
③	0 = TXMTR Not Blocked by XOFF 1 = TXMTR Blocked Due to XOFF
④	0 = TXMTR Not Blocked by CTS 1 = TXMTR Blocked due to CTS
⑤	0 = Port DTR Off 1 = Port DTR On
⑥	0 = Port RTS Off 1 = Port RTS On

2426 **Hardware Diagnostics Port 4**: section B has no meaningful data.

2516 **Hardware Diagnostics Port 5,** section A: Refer to *A5 - Hardware Diagnostics for I/O rack Slot 0* in *Chapter 15, Hardware Diagnostics.*

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Get Hardware Diagnostics *(continued)*

Hardware Diagnostics Port 5

Word #		
004	TIC Base IO Address	
005	Override TIC Base IO Address	
006	Override Mask	Override Data
007	RBT Re-Try Count	Override STO Byte Offset
008	Handshake TIC Base IO Address	
009	Handshake Pointer Offset	
010	Handshake Pointer Segment	
011	Handshake STO/STI Byte Offset	WBT Re-Try Count
012	Activate Handshake Base IO	
013	Last OA/DR Data State	Activate Handshake Offset
014	AC Mask	Last OR/AC Data State
015	Dip Switch 1 Bit Image	BRR Mask
016	Last TIC Interrupt Service Error	Dip Switch 2 Bit Image
017	Current ID	
018	Ignored WBT Count	Ignored RBT Count

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Get Hardware Diagnostics *(continued)*

Hardware Diagnostics Port 5 (continued)

Word #		
019	Interrupt Count	Last Recorded IO Reset State
020	Last Interrupt Status Byte	Interrupt Flag
021	Module Type MIDD Byte 2	Last Module Control Byte
022	Firmware Revision - MIDD Byte 4	Module Series - MIDD Byte 3
023	Release Year - MIDD Byte 6	Hardware Revision MIDD Byte 5
024	Missed ISR Count	Checksum Offset MIDD Byte 7
025	Missed Outputs Count	Missed Inputs Count
026	RBT Allow Status	RBT Timeout Down Count
027	RBT Allow Status	RBT Count Mask
028	Last RBT Inhibit State	Last RBT Status
029	Reserved	OR Mask
030	Last Read Module Status Byte	OR Mask
031	ROF Start Pointer Offset	
032	ROF Start Pointer Segment	
033	ROF End Pointer Offset	
034	ROF End Pointer Segment	
035	ROF Data Pointer Offset	

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Get *Hardware Diagnostics* *(continued)*

2526 **Hardware Diagnostics Port 5**, section B: Refer to *A5 - Hardware Diagnostics for I/O rack Slot 0* in *Chapter 15, Hardware Diagnostics.*

Hardware Diagnostics Port 5 (continued)

Word #		
004	ROF Data Pointer Segment	
005	ROF Write Pointer Offset	
006	ROF Write Pointer Segment	
007	Last STI Status	STI Update Flag
008	STI Start Pointer Offset	
009	STI Start Pointer Segment	
010	STI End Pointer Offset	
011	STI End Pointer Segment	
012	STI Data Pointer Offset	
013	STI Data Pointer Segment	
014	STI Write Pointer Offset	
015	STI Write Pointer Segment	
016	STO Start Pointer Offset	
017	STO Start Pointer Segment	
018	STO End Pointer Offset	
019	STO End Pointer Segment	
020	STO Data Pointer Offset	

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Get Hardware Diagnostics (continued)

Hardware Diagnostics Port 5 (continued)

Word #		
021	STO Data Pointer Segment	
022	STO Read Pointer Offset	
023	STO Read Pointer Segment	
024	Last Re-Sync WOF Count	Last STO Status
025	Last WBT Inhibit State	Last WBT Allow Status
026	Last Write Module Status Byte	Last WBT Status
027	WOF Start Pointer Offset	
028	WOF Start Pointer Segment	
029	WOF End Pointer Offset	
030	WOF End Pointer Segment	
031	WOF Start Pointer Offset	
032	WOF Start Pointer Segment	
033	WOF End Pointer Offset	
034	WOF End Pointer Segment	
035	WBT Timeout Down Count	Reserved

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Get Hardware Diagnostics *(continued)*

2616 **Hardware Diagnostics Port 6**: section A is identical in format with Hardware Diagnostics Port 5, section A.

2626 **Hardware Diagnostics Port 6**: section B is identical in format with Hardware Diagnostics Port 5, section B.

2716 **Hardware Diagnostics Port 7**: section A is reserved.

2726 **Hardware Diagnostics Port 7**: section B is reserved.

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Chapter 19 Stand-alone Operation

Chapter Objectives

This chapter shows how to use series B modules for stand-alone operations. In this mode, commands are not sent to the module from a PLC, but from a host computer that is connected to the configuration port. This chapter defines:

- Stand-alone configuration
- Host computer commands to execute module functions

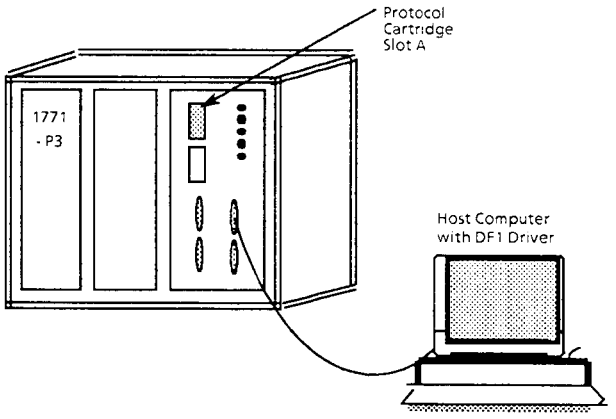
Stand-alone Setup

For stand-alone operation, a host computer is connected to the configuration port of the module. A program on the host computer is responsible for:

- Sending commands to the module
- Monitoring module operations

To insure secure communications between the host and the module, we recommend that the host computer use DF1 protocol or have a DF1 driver installed. Figure 19.1 shows a stand-alone setup.

Figure 19.1
Stand-alone Setup



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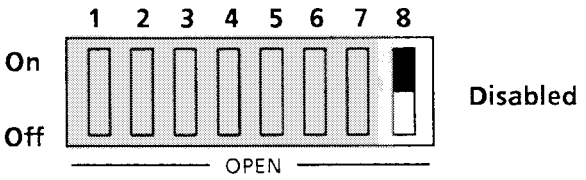
Stand-alone Setup *(continued)*

The stand-alone setup in Figure 19.1 consists of:

- 1771-PSC Power Supply Chassis
- 1771-P3 Power Supply in far left slot
- 2760-RB (Series B) Flexible Interface Module
- Host computer with DF1 Driver
- 2760-SFC1, -SFC2, or any other protocol cartridge depending on what devices are connected to ports 1, 2, or 3.

For stand-alone operation of the module, you must disable the Port 5, PLC Backplane Dip Switch option. This switch is located in switch group SW1. The correct setting looks like this:

Port 5, PLC Backpane SW1 Dip Switch Option



Note: *The black area indicates the selected (depressed) switch position.*

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Module Command Summary

All host computer commands are classified by Type:

Type 1 - Write only. No data is returned, except for the response header with the command status.

Type 2 - Read only. No data is sent except for the command header with specifiers . The response returns data.

Type 1 and 2 commands allow you to send commands from a host computer program to perform module functions. These commands perform the same functions as the configuration software.

Commands are sent from the host computer to the module via the configuration port (port 4). All commands are transferred from a host with a DF1 driver in serial stream format.

The identification number assigned to the configuration port (port 4) affects the serial format of commands and responses. In this chapter, all commands and responses are formatted according to this identification number:

DF1 Unspecified RB Network Device, 8030h

Refer to the section *24- Identifying Use of Configuration Port* in Chapter 8 for details on identification numbers.

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Type 1 User Commands

The Type 1 Write Commands perform these module functions:

- Initialize
- Reset
- Set Defaults
- Flush
- Clear Software Diagnostics
- Clear Hardware Diagnostics

Figure 19.2 lists the general format of all Type 1 Write commands in serial byte order. The *SubFunction (SF) Number* in the low byte (byte 008) of the *CMD Write Address* specifies the command to perform. For example, SF = 01 specifies the initialize command.

A description of each Type 1 Command is shown following the command and response byte descriptions below.

See *Commands and Data Operation* in *Chapter 17, System Considerations* for descriptions of SRC and DST.

CMD — 08 specifies an unprotected write command.

Transaction Number Word — A number that uniquely identifies commands and links them to command responses. The transaction number is user defined and returned in the response. When issuing many commands before responses are returned, sequential execution and return cannot be guaranteed.

CMD Write Address — The high byte (009) specifies the type of command to process (Type 1) and the port on which to execute the command. The low byte (008) specifies the module subfunction. See Figure 19.2.

STS = zz — Returns the status of a processed command in the response file. Possible status values (in Hex) are:

00 - The command processed without error.

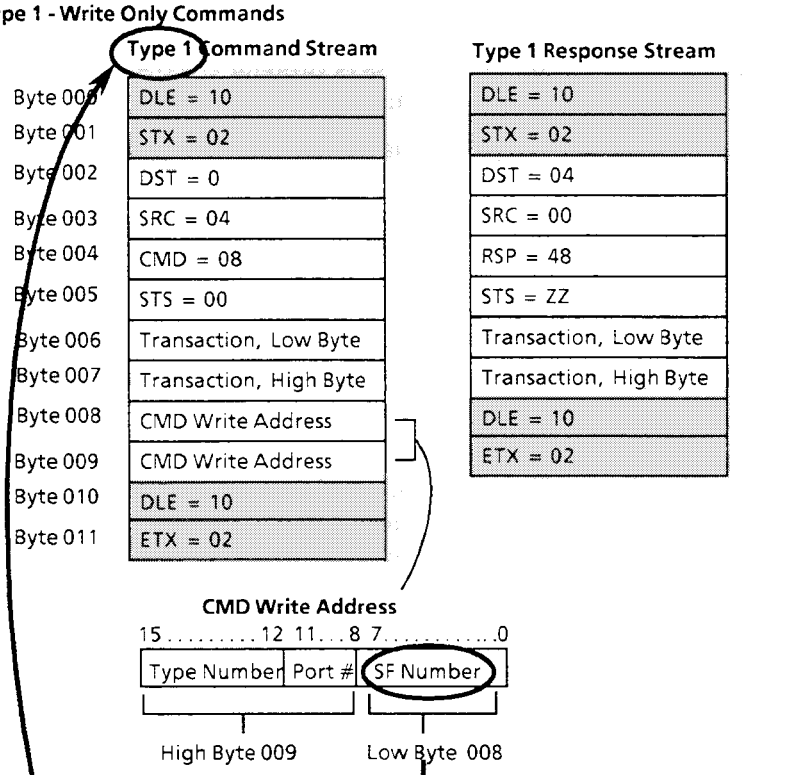
10 - The command file contained one or more invalid fields.

11 - A non-EEPROM related problem occurred during processing.

12 - An error occurred when trying to access the EEPROM.

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Figure 19.2
Type 1 - Write Only Commands



Type Number	Command	SF Number (in hex)	Command is Available on Port #
1	Initialize	01	1 - 7
1	Reset	02	0 - 7
1	Set Defaults	03	0 - 7
1	Flush	04	0 - 7
1	Clear Software Diagnostics	05	0 - 7
1	Clear Hardware Diagnostics	06	0 - 7

Note: Shaded bytes are DF1 protocol parameters. The actual data stream may include the DF1 characters (DLE, STX, ETX, BCC). For details on DF1, refer to the appropriate manual. BCC checking may or may not be present depending on the configuration parameters set for DF1 protocol.

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Type1 User Commands (continued)

STS = zz (cont.)

13 - The port took over 3 seconds to process the command. This is valid for the reset and Initialize commands.

14 - The port is inactive. The command was not started.

15 - The port is processing another command. This could occur when trying to execute a command on a port that has not finished processing a reset command. The command was not started.

16 - **The command tried to access a data area not allocated.** You have used an invalid command.

17 - The command tried to access an area of device port initialization data that is not allocated. You have used an invalid command.

RSP = xx

Returns a response (RSP = xx in the response file) to the command sent. Possible response values (in Hex) are:

40 - The packet does not contain a response to a read or write command. The command packet CMD field was invalid. The STS (status) field will contain 10.

41 - The packet contains a response to a read command. For Type 1 commands this would also be invalid. This could be a response to a different command or a data message not relating to the command sent. We recommend the use of transaction numbers to match command responses.

48 - The packet contains a response to a write command. Check the STS field for 0. If it is not 0, refer to the individual commands in the following sections for an explanation of a nonzero STS field.

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Initialize

Initialize is a Type 1 command with a subfunction (SF) of 01 Hex. It is valid for ports 1 to 7. For more details on this command, refer to section *9XD - Initialize* in *Chapter 14, 9XF - Module Functions*.

	Initialize Command Stream	Initialize Response Stream
Byte 000	DLE = 10	DLE = 10
Byte 001	STX = 02	STX = 02
Byte 002	DST = 00	DST = 04
Byte 003	SRC = 04	SRC = 00
Byte 004	CMD = 08	RSP = 48
Byte 005	STS = 00	STS = ZZ
Byte 006	Transaction Low Byte	Transaction, Low Byte
Byte 007	Transaction High Byte	Transaction, High Byte
Byte 008	01	DLE = 10
Byte 009	Initialize Write Address	ETX = 02
Byte 010	DLE = 10	
Byte 011	ETX = 02	

Initialize Write Address (Byte 009) has the following values:

11- Initialize Port 1: Refer to your Protocol Cartridge User's Manual.

12- Initialize Port 2: Refer to your Protocol Cartridge User's Manual.

13- Initialize Port 3: Refer to your Protocol Cartridge User's Manual.

14 - Initialize Port 4: For details on this function, refer to *9XD - Initialize* in *Chapter 14*.

15 - Initialize Port 5: For details on this function, refer to *9XD - Initialize* in *Chapter 14*.

16 - Initialize Port 6: For details on this function, refer to *9XD - Initialize* in *Chapter 14*.

17 - Initialize Port 7: For details on this function, refer to *9XD - Initialize* in *Chapter 14*.

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Reset

Reset is a Type 1 command with a subfunction (SF) of 02 Hex and is valid for ports 0 to 7. For more details on this command, refer to *9XA - Reset* in *Chapter 14, 9XF - Module Functions*.

	Reset Command Stream	Reset Response Stream
Byte 000	DLE = 10	DLE = 10
Byte 001	STX = 02	STX = 02
Byte 002	DST = 00	DST = 04
Byte 003	SRC = 04	SRC = 00
Byte 004	CMD = 08	RSP = 48
Byte 005	STS = 00	STS = ZZ
Byte 006	Transaction, Low Byte	Transaction, Low Byte
Byte 007	Transaction, High Byte	Transaction, High Byte
Byte 008	02	DLE = 10
Byte 009	Reset Write Address	ETX = 02
Byte 010	DLE = 10	
Byte 011	ETX = 02	

Reset Write Address (High Byte 009) has the following values:

10 - Reset Port 0: For more details on this command, refer to *9XA - Reset* in *Chapter 14*.

11 - Reset Port 1: Refer to your Protocol Cartridge User's Manual.

12 - Reset Port 2: Refer to your Protocol Cartridge User's Manual.

13 - Reset Port 3: Refer to your Protocol Cartridge User's Manual.

14 - Reset Port 4: For details on this function, refer to *9XA - Reset* in *Chapter 14*.

15 - Reset Port 5: For details on this function, refer to *9XA - Reset* in *Chapter 14*.

16 - Reset Port 6: For details on this function, refer to *9XA - Reset* in *Chapter 14*.

17 - Reset Port 7: For details on this function, refer to *9XA - Reset* in *Chapter 14*.

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Set Defaults

Set Defaults is a Type 1 command with a subfunction (SF) of 03 Hex and is valid for ports 0 to 7. For details on this command, refer to *9XB- Set Defaults* in *Chapter 14, 9XF- Module Functions*.

	Set Defaults Command Stream	Set Defaults Response Stream
Byte 000	DLE = 10	DLE = 10
Byte 001	STX = 02	STX = 02
Byte 002	DST = 00	DST = 04
Byte 003	SRC = 04	SRC = 00
Byte 004	CMD = 08	RSP = 48
Byte 005	STS = 00	STS = ZZ
Byte 006	Transaction, Low Byte	Transaction, Low Byte
Byte 007	Transaction, High Byte	Transaction, High Byte
Byte 008	03	DLE = 10
Byte 009	Set Defaults Write Adr	ETX = 02
Byte 010	DLE = 10	
Byte 011	ETX = 02	

Set Default Write Address (High Byte 9) has the following values:

10 - Set Defaults Port 0: Refer to section *90B - Set Defaults* in *Chapter 14, 9XF - Module Functions*.

11 - Set Defaults Port 1: Refer to your Protocol Cartridge User's Manual.

12 - Set Defaults Port 2: Refer to your Protocol Cartridge User's Manual.

13 - Set Defaults Port 3: Refer to your Protocol Cartridge User's Manual.

14 - Set Defaults Port 4: For details on this function, refer to section *9XB- Set Defaults* in *Chapter 14*.

15 - Set Defaults Port 5: For details on this function, see section *9XB- Set Defaults* in *Chapter 14*.

16 - Set Defaults Port 6: For details on this function, refer to section *9XB - Set Defaults* in *Chapter 14*.

17 - Set Defaults Port 7: For details on this function, refer to section *9XB - Set Defaults* in *Chapter 14*.

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Flush

Flush is a Type 1 command with a subfunction (SF) of 04 Hex and is valid for ports 1 to 7. For more information on this command, refer to *9XC - Flush* in *Chapter 14, 9XF - Module Functions*.

	Flush Command Stream	Flush Response Stream
Byte 000	DLE = 10	DLE = 10
Byte 001	STX = 02	STX = 02
Byte 002	DST = 00	DST = 04
Byte 003	SRC = 04	SRC = 00
Byte 004	CMD = 08	RSP = 48
Byte 005	STS = 00	STS = ZZ
Byte 006	Transaction, Low Byte	Transaction, Low Byte
Byte 007	Transaction, High Byte	Transaction, High Byte
Byte 008	04	DLE = 10
Byte 009	Flush Write Address	ETX = 02
Byte 010	DLE = 10	
Byte 011	ETX = 02	

Flush Write Address (high byte 009) has the following values:

- **11 - Flush Port 1:** Refer to your Protocol Cartridge User's Manual.
- **12 - Flush Port 2:** Refer to your Protocol Cartridge User's Manual.
- **13 - Flush Port 3:** Refer to your Protocol Cartridge User's Manual.
- **14 - Flush Port 4:** For details on this function, refer to *9XC - Flush* in *Chapter 14*.
- **15 - Flush Port 5:** For details on this function, refer to *9XC - Flush* in *Chapter 14*.
- **16 - Flush Port 6 :** For details on this function, refer to *9XC - Flush* in *Chapter 14*.
- **17 - Flush Port 7:** For details on this function, refer to *9XC - Flush* in *Chapter 14*.

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Clear Software Diagnostics

Clear Software Diagnostics is a Type 1 command with a sub-function (SF) of 05 Hex and is valid for ports 0 to 7. For more details on this command, refer to *9XE - Clear Diags* in *Chapter 14*.

	Clear Hardware Command Stream	Response Stream
Byte 000	DLE = 10	DLE = 10
Byte 001	STX = 02	STX = 02
Byte 002	DST = 00	DST = 04
Byte 003	SRC = 04	SRC = 00
Byte 004	CMD = 08	RSP = 48
Byte 005	STS = 00	STS = ZZ
Byte 006	Transaction, Low Byte	Transaction, Low Byte
Byte 007	Transaction, High Byte	Transaction, High Byte
Byte 008	05	DLE = 10
Byte 009	Clr Soft. Diag Wrt Adr	ETX = 02
Byte 010	DLE = 10	
Byte 011	ETX = 02	

Clear Software Diag. Write Address (byte 9) has these values:

10 - Clear Software Diagnostics Port 0: Refer to *9XE - Clear Diags* in *Chapter 14, 9XF - Module Functions*.

11 - Clear Software Diagnostics Port 1: Refer to your Protocol Cartridge User's Manual.

12 - Clear Software Diagnostics Port 2: Refer to your Protocol Cartridge User's Manual.

13 - Clear Software Diagnostics Port 3: Refer to your Protocol Cartridge User's Manual.

14 - Clear Software Diagnostics Port 4: For details on this function, refer to *9XE-Clear Diags* in *Chapter 14*.

15 - Clear Software Diagnostics Port 5: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14*.

16 - Clear Software Diagnostics Port 6: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14*.

17 - Clear Software Diagnostics Port 7: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14*.

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Clear Hardware Diagnostics

Clear Hardware Diagnostics is a Type 1 command with a subfunction (SF) of 06 Hex and is valid for ports 0 to 7. For more details on this command, refer to *9XE - Clear Diags* in *Chapter 14, 9XF - Module Functions.*

Clear Hardware Diag. Command Stream		Response Stream
Byte 000	DLE = 10	DLE = 10
Byte 001	STX = 02	STX = 02
Byte 002	DST = 00	DST = 04
Byte 003	SRC = 04	SRC = 00
Byte 004	CMD = 08	RSP = 48
Byte 005	STS = 00	STS = ZZ
Byte 006	Transaction, Low Byte	Transaction, Low Byte
Byte 007	Transaction, High Byte	Transaction, High Byte
Byte 008	06	DLE = 10
Byte 009	Clr Hard Diag Wrt Adr	ETX = 02
Byte 010	DLE = 10	
Byte 011	ETX = 02	

Clear Hardware Diags Write Address (Byte 9) has these values:

10 - Clear Hardware Diagnostics Port 0: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14.*

11 - Clear Hardware Diagnostics Port 1: Refer to your Protocol Cartridge User's Manual.

12 - Clear Hardware Diagnostics Port 2: Refer to your Protocol Cartridge User's Manual.

13 - Clear Hardware Diagnostics Port 3: Refer to your Protocol Cartridge User's Manual.

14 - Clear Hardware Diagnostics Port 4

15 - Clear Hardware Diagnostics Port 5: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14.*

16 - Clear Hardware Diagnostics Port 6: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14.*

17 - Clear Hardware Diagnostics Port 7: For details on this function, refer to *9XE - Clear Diags* in *Chapter 14.*

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Type 2 User Commands

The Type 2 Commands perform these module functions:

- Get or Read Software Diagnostics
- Get or Read Hardware Diagnostics

Figure 19.3 lists the format of all Type 2 Read commands and responses in serial byte order. The *SubFunction (SF) Number* in the low byte of the *CMD Read Address* specifies the command to perform. For example, SF = 16 reads the first segment of software diagnostics.

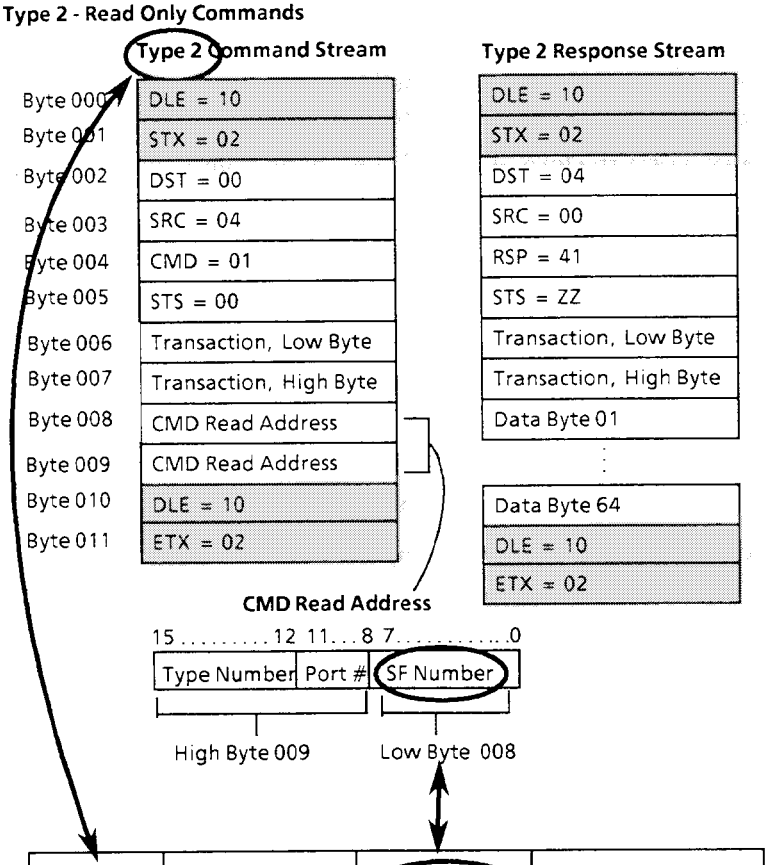
A description of each Type 2 command is shown following the command and response byte descriptions below.

See *Commands and Data Operation* in *Chapter 17, System Considerations* for a description of SRC and DST.

CMD	01 specifies an unprotected read command.
Transaction Number Word	A number that uniquely identifies commands and links them to command responses. The transaction number is user defined and returned in the response. When issuing many commands before responses are returned, sequential execution and return cannot be guaranteed.
Command Read Address	The high byte (009) specifies the type of command to process (Type 2) and the module port on which to execute the command. The low byte (008) specifies the module subfunction. See Figure 19.3.
STS = zz	Returns status of a processed command in the response file. Status values are the same as the Type 1 commands.

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Figure 19.3
Type 2 - Read Only Commands



Type Number	Command	SF Number (in hex)	Command is Available on Port #
2	Get Software Diagnostics "A"	15	0 - 7
2	Get Software Diagnostics "B"	25	0 - 7
2	Get Hardware Diagnostics "A"	16	0 - 7
2	Get Hardware Diagnostics "B"	26	0 - 7

Note: Shaded bytes are DF1 protocol parameters. The actual data stream may include the DF1 characters (DLE, STX, ETX, BCC). For details on DF1, refer to the appropriate manual. BCC checking may or may not be present depending on the configuration parameters set for DF1 protocol.

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Type 2 User Commands (continued)

RSP=xx Returns a response (RSP=xx in the response file) to the command sent. Possible response values (in Hex) are:

40 - The packet does not contain a response to a read or write command. The command packet CMD field was invalid. The STS (status) field will contain 0x10.

41 - The packet contains a response to a read command. Check the STS field for zero. If it is not zero, refer to the individual commands in the following sections for an explanation of a nonzero STS field.

48 - The packet contains a response to a Write command. For Type 2 commands, this would be invalid. This could be a response to a different command, or a data message not relating to the command sent. We recommend the use of transaction numbers to match command responses.

Get Software Diagnostics

Get Software Diagnostics is a Type 2 command with a subfunction (SF) of 15 and 25 Hex. This function executes on ports 0 to 7.

Software diagnostics contain up to 128 bytes of information. Two *Get* commands are required to retrieve the information. Each *Get* returns a 64 byte section. The *Get* section A command returns bytes 0 through 63. The *Get* section B command returns bytes 64 through 123.

Use Get Software Diagnostics SF=15 to retrieve the first 64 bytes from section A and SF=25 to retrieve the second 64 bytes from section B.

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Get Software Diagnostics (continued)

Get Software Diagnostics - Section A and B

	Command Stream A	Command Stream B
Byte 000	DLE = 10	DLE = 10
Byte 001	STX = 02	STX = 02
Byte 002	DST = 00	DST = 00
Byte 003	SRC = 04	SRC = 04
Byte 004	CMD = 01	CMD = 01
Byte 005	STS = 00	STS = 00
Byte 006	Transaction, Low Byte	Transaction, Low Byte
Byte 007	Transaction, High Byte	Transaction, High Byte
Byte 008	15	25
Byte 009	Get Soft Diag Read Adr	Get Soft Diag Read Adr
Byte 010	DLE = 10	DLE = 10
Byte 011	ETX = 02	ETX = 02

Response Stream A and B

Byte 000	DLE = 10
Byte 001	STX = 02
Byte 002	DST = 04
Byte 003	SRC = 00
Byte 004	RSP = 41
Byte 005	STS = ZZ
Byte 006	Transaction, Low Byte
Byte 007	Transaction, High Byte
Byte 008	Data Byte 01
⋮	⋮
Byte 071	Data Byte 64
Byte 072	DLE = 10
Byte 073	ETX = 02

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Get Software Diagnostics (continued)

Get Software Diagnotics Read Address (low byte 008, high byte 009) has these values:

Low Byte	High Byte	
15	20	**Software Diagnostics Port 0**, section A :Refer to *B0 - Software Diagnostics for RB Command Processor* in *Chapter 16, Software Diagnostics.*

Byte #	
008	Power Up Error Type
009	Low Level Error Type
010	Internal Error Type
011	Port 1 Error Type
012	Port 2 Error Type
013	Port 3 Error Type
014	Config Port Error Type
015	PLC Slot 0 Error Type
016	PLC Slot 1 Error Type
017	Reserved Error Type
018	System Error Type
019	Total Error Count
020	
⋮	
071	

25	20	**Software Diagnostics Port 0**: section B has no meaningful data.

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Get Software Diagnostics (continued)

Low Byte	High Byte	
15	21	**Software Diagnostics Port 1,** section A: Refer to your Protocol Cartridge User's Manual.
25	21	**Software Diagnostics Port 1,** section B: Refer to your Protocol Cartridge User's Manual.
15	22	**Software Diagnostics Port 2,** section A: Refer to your Protocol Cartridge User's Manual.
25	22	**Software Diagnostics Port 2,** section B: Refer to your Protocol Cartridge User's Manual.
15	23	**Software Diagnostics Port 3,** section A: Refer to your Protocol Cartridge User's Manual.
25	23	**Software Diagnostics Port 3,** section B: Refer to your Protocol Cartridge User's Manual.
15	24	**Software Diagnostics Port 4,** section A: Refer to *B4 - Software Diagnostics for Configuration Port* in *Chapter 16, Software Diagnostics*. The parameters that display are specific to how the configuration port is identified for use: Dumb Terminal or DF1 communication.

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Get Software Diagnostics *(continued)*

The section A file layout for Dumb Terminal diagnostic parameters looks like this:

Dumb Terminal Diagnostic Response Data

Byte #	
008	
009	
010	
011	
012	Transmit Messages
013	Receive Messages
014	
015	Under/Overflow Msgs.
016	
017	
018	
019	
020	
021	
022	
023	
024	Illogical Indicator
025	
⋮	⋮
071	

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Get Software Diagnostics (continued)

The section A file layout for DF1 diagnostic parameters looks like this:

DF1 Diagnostic Response Data - Series B Modules

Byte #	
008	
009	
010	
011	
012	Transmit Messages
013	Receive Messages
014	Bad BCCs
015	Under/Overflow Msgs.
016	Protocol Timeouts
017	DF1 NAKs Received
018	DF1 NAKs Transmitted
019	DF1 ENQs Received
020	
021	
022	
023	
024	Illogical Indicator
025	
⋮	
071	

25 **24** **Software Diagnostics Port 4**: section B has no meaningful data.

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Get Software Diagnostics (continued)

Low Byte	High Byte	
15	25	**Software Diagnostics Port 5**, section A: Refer to *B5 - Software Diagnostics for I/O Rack Slot 0* in *Chapter 16, Software Diagnostics.*

Byte #			
	008	Read Error Count	
	009	Last Read Error	
	010	Write Error Count	
	011	Last Write Error	
	012	Init Error Count	
	013	Last Init Error	
	014	Reset Error Count	
	015	Last Reset Error	
	016	Flush Error Count	
	017	Last Flush Error	
	018	ID Error Count	
	019	Last ID Error	
	020	OK Error Count	
	021	Last OK Error	
	022	Clear Error Count	
	023	Last Clear Error	
	024	Quit Error Count	
	025	Last Quit Error	
	026	Diags Error Count	
	027	Last Diags Error	
	028	Transmit Messages	Low Byte
	029	Transmit Messages	High Byte
	030	Receive Messages	Low Byte
	031	Receive Messages	High Byte
		⋮	
	071		

25	25	**Software Diagnostics Port 5**: section B has no meaningful data.

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Get Software Diagnostics (continued)

Low Byte	High Byte	
15	26	**Software Diagnostics Port 6**: section A format is identical to the software diagnostics Port 5, section A.
25	26	**Software Diagnostics Port 6**: section B has no meaningful data.
15	27	**Software Diagnostics Port 7**: section A is reserved.
25	27	**Software Diagnostics Port 7**: section B is reserved.

Get Hardware Diagnostics

Get Hardware Diagnostics is a Type 2 command with a subfunction (SF) of 16 and 26 Hex. This function executes onports 0 to 7.

Hardware diagnostics contain up to 128 bytes of information. Two *Get* commands are required to retrieve diagnostics. Each command returns a 64 byte section. The *Get* section *A* command returns bytes 0 through 63. The *Get* section *B* command returns bytes 64 through 123.

Use Get Hardware Diagnostics SF = 16 to retrieve the first 64 bytes from section A.

Use SF = 26 to retrieve the second 64 bytes from section B.

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Get Hardware Diagnostics *(continued)*

Get Hardware Diagnostics - Section A and B

	Command Stream A	Command Stream B
Byte 000	DLE = 10	DLE = 10
Byte 001	STX = 02	STX = 02
Byte 002	DST = 00	DST = 00
Byte 003	SRC = 04	SRC = 04
Byte 004	CMD = 01	CMD = 01
Byte 005	STS = 00	STS = 00
Byte 006	Transaction, Low Byte	Transaction, Low Byte
Byte 007	Transaction, High Byte	Transaction, High Byte
Byte 008	16	26
Byte 009	Get Hard Diag Rd Adr	Get Hard Diag Rd Adr
Byte 010	DLE = 10	DLE = 10
Byte 011	ETX = 02	ETX = 02

Response Stream B

Byte 000	DLE = 10
Byte 001	STX = 02
Byte 002	DST = 04
Byte 003	SRC = 00
Byte 004	RSP = 41
Byte 005	STS = ZZ
Byte 006	Transaction, Low Byte
Byte 007	Transaction, High Byte
Byte 008	Data Byte 01
⋮	⋮
Byte 071	Data Byte 64
Byte 072	DLE = 10
Byte 073	ETX = 02

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Get Hardware Diagnostics (continued)

Get Hardware Diagnotics Read Address (low byte, high byte) has these values:

Low Byte	High Byte	
16	20	**Hardware Diagnostics Port 0,** section A :Refer to *A0- Hardware Diagnostics for RB Command Processor* in *Chapter 16.*

Byte #	
008	
009	Invalid Write Commads
010	Invalid Read Commads
011	CMD not read or write
012	Invalid RB Network SRC
013	Command Frame Errors
014	
015	
016	
017	
018	CMD Processing Errors
019	CMD Processing Timeouts
020	CMD Not Processed-Port Busy
021	CMD Not Processed-Port Inactive
022	Data Area Not Allocated
023	Init Data Area Access Errors
024	EEPROM R/W Access Errors
025	Last EEPROM Error Code
026	
027	
028	Port 1 Lowest Raw Addr, LSB
029	Port 1 Lowest Raw Addr, MSB
030	Port 1 Highest Raw Addr, LSB
031	Port 1 Highest Raw Addr, MSB
032	Port 2 Lowest Raw Addr, LSB
033	Port 2 Lowest Raw Addr, MSB

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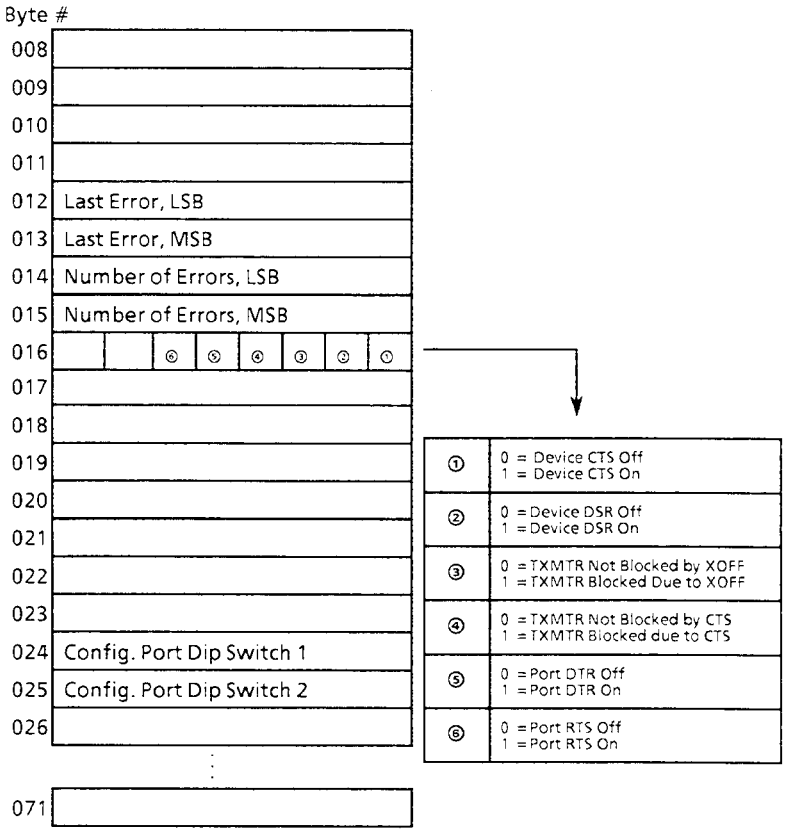
Get Hardware Diagnostics (continued)

Low Byte	High Byte			
16	20	**Hardware Diagnostics Port 0**, section A.		
		(cont.)	034	Port 2 Highest Raw Addrs, LSB
			035	Port 2 Highest Raw Addrs, MSB
			036	Port 3 Lowest Raw Addrs, LSB
			037	Port 3 Lowest Raw Addrs, MSB
			038	Port 3 Highest Raw Addrs, LSB
			039	Port 3 Highest Raw Addrs, MSB
			040	Port 1 Raw Addrs, Range Error
			041	Port 2 Raw Addrs, Range Error
			042	Port 3 Raw Addrs, Range Error
			043	Raw Frame Errors
			044	Match Code Processing Errors
			045	Discrete Byte Processing Errors
			046	PLC Port Rejected Errors
			047	
			⋮	
			071	
26	20	**Hardware Diagnostics Port 0**: section B has no meaningful data.		
16	21	**Hardware Diagnostics Port 1**, section A: Refer to your Protocol Cartridge User's Manual.		
26	21	**Hardware Diagnostics Port 1**, section B:Refer to your Protocol Cartridge User's Manual.		
16	22	**Hardware Diagnostics Port 2**, section A: Refer to your Protocol Cartridge User's Manual.		
26	22	**Hardware Diagnostics Port 2**, section B: Refer to your Protocol Cartridge User's Manual.		
16	23	**Hardware Diagnostics Port 3**, section A: Refer to your Protocol Cartridge User's Manual.		
26	23	**Hardware Diagnostics Port 3**, section B: Refer to your Protocol Cartridge User's Manual.		

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Get Hardware Diagnostics (continued)

Low Byte	High Byte	
16	24	**Hardware Diagnostics Port 4,** section A: Refer to *A4 - Hardware Diagnostics for the Configuration Port* in *Chapter 15, Hardware Diagnostics.*



26	24	**Hardware Diagnostics Port 4**, section B has no meaningful data.

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Get Hardware Diagnostics (continued)

Low Byte	High Byte	
16	25	**Hardware Diagnostics Port 5**, section A: Refer to *A5 - Hardware Diagnostics for I/O rack Slot 0* in *Chapter 15, Hardware Diagnostics.*

Byte #		
	008	TIC Base IO Address, LSB
	009	TIC Base IO Address, MSB
	010	Override TIC Base IO Adrs, LSB
	011	Override TIC Base IO Adrs, MSB
	012	Override Data
	013	Override Mask
	014	Override STO Byte Offset
	015	RBT Retry Count
	016	Handshake TIC Base IO Adr LSB
	017	Handshake TIC Base IO Adr MSB
	018	Handshake Pointer Offset, LSB
	019	Handshake Pointer Offset, MSB
	020	Handshake Pointer Segment, LSB
	021	Handshake Pointer Segment MSB
	022	WBT Retry Count
	023	Handshake STO/STI Byte Offset
	024	Activate Handshake Base IO, LSB
	025	Activate Handshak Base IO, MSB
	026	Activate Handshake Offset
	027	Last OA/DR Data State
	028	Last OR/AC Data State
	029	AC Mask
	030	BRR Mask
	031	DIP Switch 1 Bit Image
	032	DIP Switch 2 Bit Image
	033	Last TIC Interrupt Service Error

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Get Hardware Diagnostics (continued)

Low Byte	High Byte		
16	25	**Hardware Diagnostics Port 5,** section A.	
	(cont.)	034	Current ID, LSB
		035	Current ID, MSB
		036	Ignored RBT Count
		037	Ignored WBT Count
		038	Last Recorded IO Reset State
		039	Interrupt Count
		040	Interrupt Flag
		041	Last interrupt Status Byte
		042	Last Module Control Byte
		043	Module Type-MIDD Byte 2
		044	Module Series-MIDD Byte 3
		045	Firmware Revision- MIDD Byte 4
		046	Hardware Revision- MIDD Byte 5
		047	Release Year- MIDD Byte 6
		048	Checksum Offset- MIDD Byte 7
		049	Missed ISR Count
		050	Missed Inputs Count
		051	Missed Outputs Count
		052	Last TIC Scanner Error
		053	Program Byte Read Only
		054	RBT Timeout Down Count
		055	RBT Allow Status
		056	RBT Count Mask
		057	Last RBT Inhibit State
		058	Last RBT Status
		059	Reserved

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Get Hardware Diagnostics (continued)

Low Byte	High Byte			
16	25	**Hardware Diagnostics Port 5,** section A.		
		(cont.)	060	OR Mask
			061	Last Read Module Status Byte
			062	ROF Start Pointer Offset, LSB
			063	ROF Start Pointer Offset, MSB
			064	ROF Start Pointer Segment, LSB
			065	ROF Start Pointer Segment, MSB
			066	ROF End Pointer Offset, LSB
			067	ROF End Pointer Offset, MSB
			068	ROF End Pointer Segment, LSB
			069	ROF End Pointer Segment, MSB
			070	ROF Data Pointer Offset, LSB
			071	ROF Data Pointer, Offset MSB

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Get Hardware Diagnostics (continued)

Low Byte	High Byte	
26	25	**Hardware Diagnostics Port 5,** section B: Refer to *A5 - Hardware Diagnostics for I/O rack Slot 0* in *Chapter 15, Hardware Diagnostics.*

Byte #		
	008	ROF Data Pointer Segment, LSB
	009	ROF Data Pointer Segment, MSB
	010	ROF Wrt Pointer Offset, LSB
	011	ROF Wrt Pointer Offset, MSB
	012	ROF Wrt Pointer Segment, LSB
	013	ROF Wrt Pointer Segment, MSB
	014	STI Update Flag
	015	Last STI Status
	016	STI Start Pointer Offset, LSB
	017	STI Start Pointer Offset, MSB
	018	STI Start Pointer Segment, LSB
	019	STI Start Pointer Segment, MSB
	020	STI End Pointer Offset, LSB
	021	STI End Pointer Offset, MSB
	022	STI End Pointer Segment, LSB
	023	STI End Pointer Segment, MSB
	024	STI Data Pointer Offset, LSB
	025	STI Data Pointer Offset, MSB
	026	STI Data Pointer Segment, LSB
	027	STI Data Pointer Segment, MSB
	028	STI Write Pointer Offset, LSB
	029	STI Write Pointer Offset, MSB
	030	STI Write Pointer Segment, LSB
	031	STI Write Pointer Segment, MSB
	032	STO Start Pointer Offset, LSB
	033	STO Start Pointer Offset, MSB

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***Get Hardware Diagnostics** (continued)*

Low Byte | High Byte

26 **25** **Hardware Diagnostics Port 5:** section B.

(cont.)

034	STO Start Pointer Segment, LSB
035	STO Start Pointer Segment, MSB
036	STO End Pointer Offset, LSB
037	STO End Pointer Offset, MSB
038	STO End Pointer Segment, LSB
039	STO End Pointer Segment, MSB
040	STO Data Pointer Offset, LSB
041	STO Data Pointer Offset, MSB
042	STO Data Pointer Segment, LSB
043	STO Data Pointer Segment, MSB
044	STO Read Pointer Offset, LSB
045	STO Read Pointer Offset, MSB
046	STO Read Pointer Segment, LSB
047	STO Read Pointer Segment, MSB
048	Last STO Status
049	Last Resync WOF Count
050	Last WBT Allow Status
051	Last WBT Inhibit State
052	Last WBT Status
053	Last Write Module Status Byte
054	WOF Start Pointer Offset, LSB
055	WOF Start Pointer Offset, MSB
056	WOF Start Pointer Segment, LSB
057	WOF Start Pointer Segment, MSB
058	WOF End Pointer Offset, LSB
059	WOF End Pointer Offset, MSB

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Get Hardware Diagnostics (continued)

Low Byte	High Byte	
26	25	**Hardware Diagnostics Port 5**: section B.

(cont.)

060	WOF End Pointer Segment, LSB
061	WOF End Pointer Segment, MSB
062	WOF Data Pointer Offset, LSB
063	WOF Data Pointer Offset, MSB
064	WOF Data Pointer Segment, LSB
065	WOF Data Pointer Segment, MSB
066	WOF Read Pointer Offset, LSB
067	WOF Read Pointer Offset, MSB
068	WOF Read Pointer Segment, LSB
069	WOF Read Pointer Segment, MSB
070	Reserved
071	WBT Timeout Down Count

16	26	**Hardware Diagnostics Port 6**: section A is identical in format to section A of Hardware Diagnostics for port 5.
26	26	**Hardware Diagnostics Port 6**: section B is identical in format to section B of Hardware Diagnostics for port 5.
16	27	**Hardware Diagnostics Port 7**: section A is reserved.
26	27	**Hardware Diagnostics Port 7**: section B is reserved.

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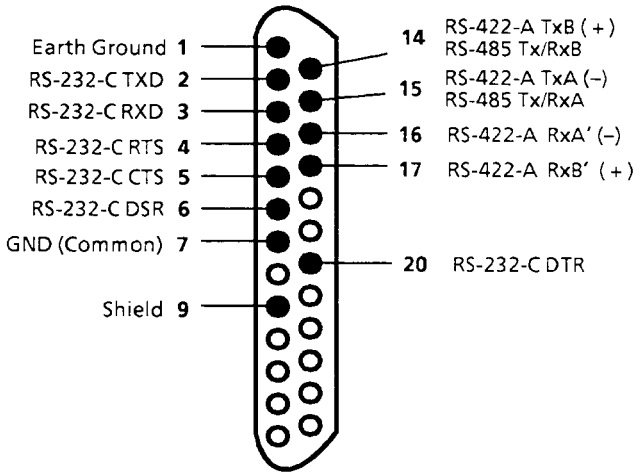
Appendix A Specifications

Electrical

Interfaces	RS-232-C (Optically Isolated to 1500 V) RS-422-A (Optically Isolated to 1500 V) RS-485 (Optically Isolated to 1500 V)
Power	1.25A drawn from Backplane

Mechanical

Location	Local or Remote 1771 I/O Backplane
Connections	4 (25 pin D-shell). 3 Device Ports, 1 Configuration Port



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Environmental

Humidity	5% to 95% (non-condensing)
Temperature	
Operating	0°C to 60°C (32°F to 140°F)
Storage	-40°C to 85°C (-40°F to 185°F)

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Appendix B Troubleshooting

This chapter describes the states of the module during start up, reset and set defaults, and after start up.

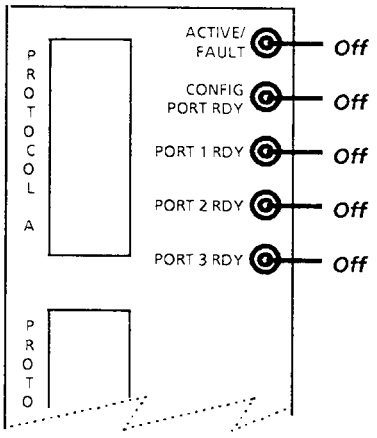
LED States During Module Start Up

Upon power up, the module's LED indicators provide sequential error status in one of 2 conditions; passing and steady.

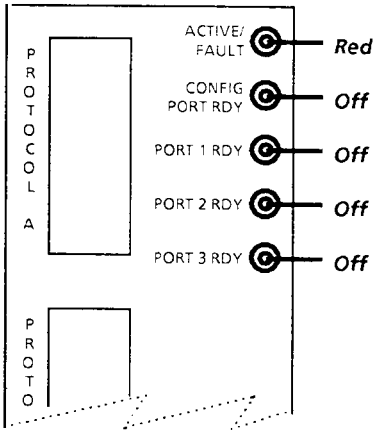
In the passing condition, the state of the LEDs are changing. In the steady condition, the module has faulted and processing has ceased.

LED states 1 through 6 are outlined below. The following pages illustrate and step through a normal 6-step start up by showing each LED's color, relative to the startup state.

LED State 1



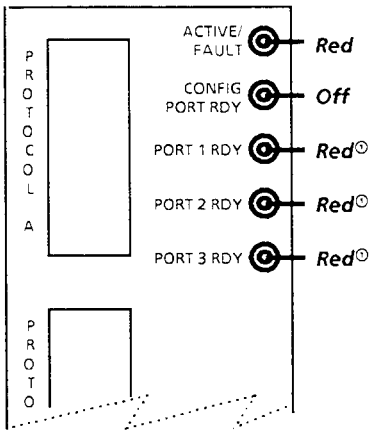
LED State 2



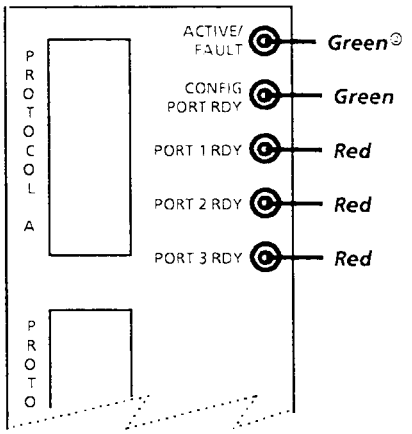
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LED States During Module Start Up (continued)

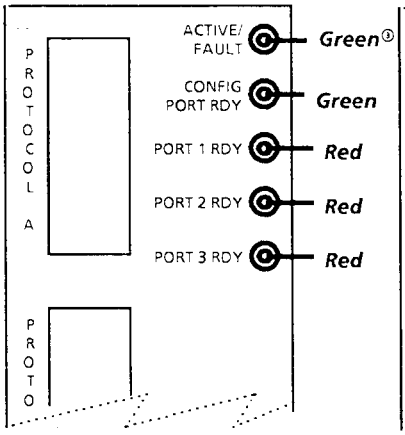
LED State 3



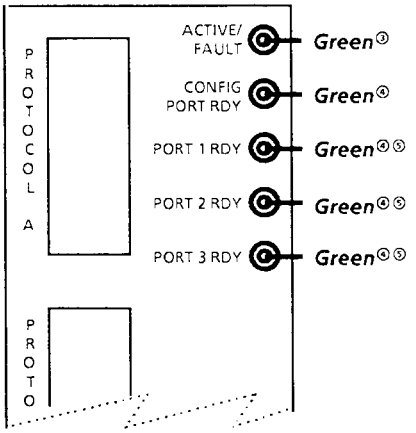
LED State 4



LED State 5



LED State 6



① *May be Red or Off on Series B modules*
② *May be off during fault.*
③ *Always flashing.*
④ *May be flashing, depending on the receive activity of the port.*
⑤ *Refer to Protocol Cartridge Manual for proper interpretation of LED after power-up.*

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LED States During Module Start Up (continued)

LED states 1 through 6 are described below:

1. **No power to module.** Possible faults are:
   - **Module startup error**. Serious hardware or software malfunction. Reset (power off, power on) the module. If the problem persists, contact your Allen-Bradley Representative.
2. **Power up.** Possible faults are:
   - **Processor enable fault**. Check power supply configuration jumper on rack backplane, also check that module is installed in rack properly.
3. **Power up complete**. Possible faults are:
   - **Ram test error**. Serious hardware fault. Reset (power off, power on) the module. If the problem persists, contact your Allen-Bradley Representative.
   - **ROM test error**. Serious hardware fault. Reset (power off, power on) the module. If the problem persists, contact your Allen-Bradley Representative.
   - **Watch dog time out**. Serious hardware or software malfunction. Reset (power off, power on) the module. If the problem persists, contact your Allen-Bradley Representative.
   - **System PROMs failed CRC or CHECKSUM check**. Reset (power off, power on) the module. If the problem persists, contact your Allen-Bradley Representative.
4. **Initialization**. Possible faults are:
   - **Serious hardware or software malfunction.** Reset (power off, power on) the module. If the problem persists, contact your Allen-Bradley Representative.

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LED States During Module Start Up (continued)

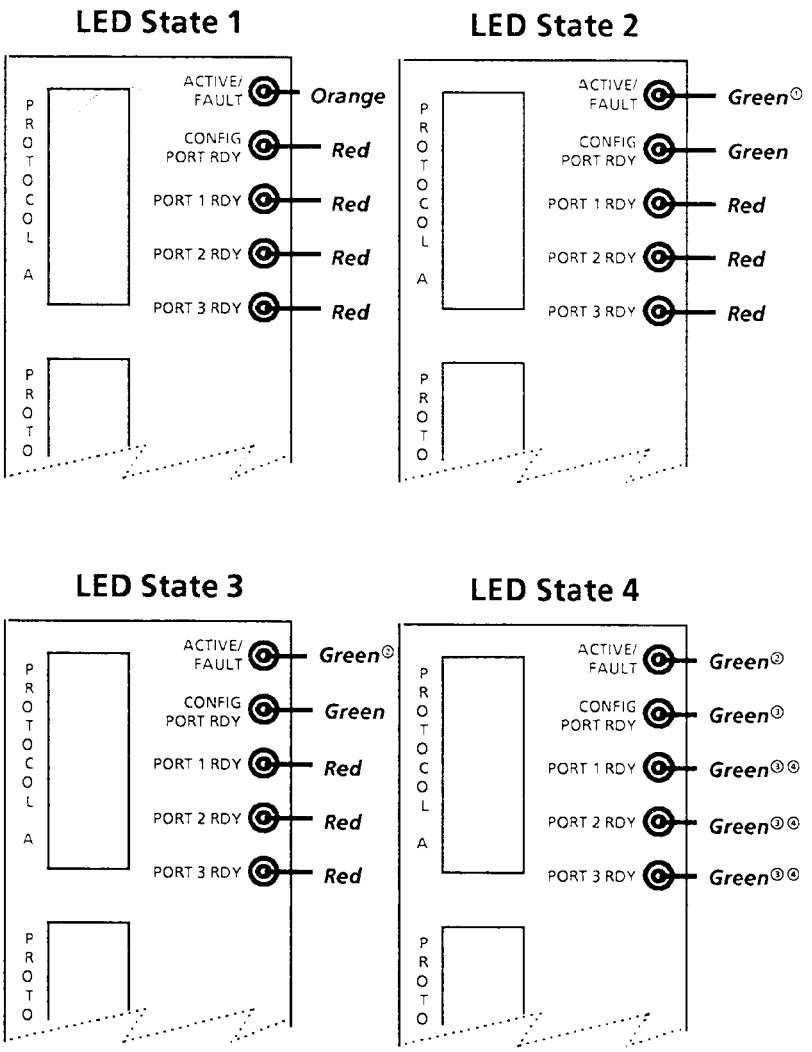
5. **Module active**. Any port LED that remains red could have the following faults:
   - **No protocol cartridge installed** in protocol cartridge slot. Power down the module and install the proper protocol cartridge. Do not insert the cartridge while the power is on.
   - **Protocol selected for the respective port is not available** in the protocol cartridge presently installed (in slots A and B). Check the device port protocol names (function 3) that are selected for each port. Select one of the protocols that correspond to one of the installed protocol cartridges.

     If the correct protocol is not available on any of the installed protocol cartridges, power down the module. Obtain the correct protocol cartridge, install the cartridge, power up the module, and assign the new protocol to that port.
   - **Protocol cartridge failed CRC or checksum checks**. Refer to Low Level Error Type, found under software diagnostics for RB Command Processor (function B0).
   - **Port processor hardware fault.**
6. **Ports active**. Module is ready to use.

Once the module has properly initialized, the LEDs report the current state of the module. Refer to LED States After Start Up.

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LED States During Reset and Set Defaults



① *May be off during fault.*
② *Always flashing*
③ *May be flashing, depending on the receive activity of the port*
④ *Refer to Protocol Cartridge Manual for proper interpretation of LED after power-up.*

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LED States During Reset and Set Defaults (continued)

1. **Reset or Set Defaults command.** Possible faults:
   - **Module startup error**. Serious hardware or software malfunction. Reset (power off, power on) the module. If the problem persists, contact your Allen-Bradley Representative.
   - **System PROMs failed CRC or CHECKSUM check**. Reset (power off, power on) the module. If the problem persists, contact your Allen-Bradley Representative.
2. **Initialization**. Possible faults are:
   - **Serious hardware or software malfunction.** Reset (power off, power on) the module. If the problem persists, contact your Allen-Bradley Representative.
3. **Module active**. Any port that remains red could have the following faults:
   - **No protocol cartridge installed** in protocol cartridge slot. Power down the module and install the proper protocol cartridge. Do not insert the cartridge while the power is on.
   - **Protocol selected for the respective port is not available** in the protocol cartridge presently installed (in slots A and B). Check the device port protocol names that are selected for each port. Select one of the protocols that correspond to one of the installed protocol cartridges.

     If the correct protocol is not available on any of the installed protocol cartridges, power down the module. Obtain the correct protocol cartridge, install the cartridge, power up the module, and assign the new protocol to that port.
   - **Protocol cartridge failed CRC or checksum checks**. Refer to Low Level Error Type, found under software diagnostics for RB Command Processor.
   - **Port processor hardware fault.**
4. **Ports active**. Module is ready to use.

Once the module has properly initialized, the LEDs report the current state of the module. Refer to *LED States After Start Up*.

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LED States after Start Up

During a reset of port 0 (function 90A), or a device port protocol name change (function 3) all LEDs turn red. The module will then execute states 4, 5 and 6 as shown in the section titled *LED States During Module Start Up*. If, after the execution of steps 4, 5 and 6 the LEDs are not green (steady or flashing), refer to tables B.1, B.2, or B.3.

Table B.1
ACTIVE/FAULT LED States

LED State	Condition	Action
Flashing Green	Module processor operating correctly	None. Proper Function.
Green	If more than 15 seconds, indicates an initialization problem or a processing overload.	Contact your Allen-Bradley Representative.
Orange	Critical hardware or software fault.	Obtain software diagnostics for RB Command Processor. Refer to chapter on Software Diagnostics.
Red	Watch dog time out fault	Power off, power on module. If problem persists, contact Allen-Bradley Representative.

Table B.2
CONFIG PORT RDY LED States

LED State	Condition	Action
Flashing Green	Receiving data.	None. Proper Function.
Green	Port is ready to receive and not receive data.	If data is expected from device (device must be currently transmitting), check cable connector or device on port.
Orange	Communication fault	Check Config Port error type under software diagnostics for RB command processor.
Red	Critical hardware or software fault	Check Config Port error type under software diagnostics for RB command processor.

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LED States After Start Up *(continued)*

Table B.3
PORT 1, 2, or 3 RDY LED States

LED State	Condition	Action
Red	Critical hardware or software fault	Check the following low level error types under software diagnostics for the RB command processor: - Protocol ROM AA CRC Error - Protocol ROM AB CRC Error - Protocol ROM BA CRC Error - Protocol ROM BB CRC Error Refer to chapter on Software Diagnostics.
All 3 ports Red	Missing or incorrect Protocol Cartridge upon power up.	Use function 3 to check protocol assignments. If *No Copyright* is displayed, refer to *Chapter 9, 3 - Device Port Protocol Names* for more information.
All others.		Refer to appropriate Protocol Cartridge Manual.

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User's Manual

Bulletin 2760

Flexible Interface Module

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