Connecting PLC-5 Processors and SLC Processors over a Serial Link

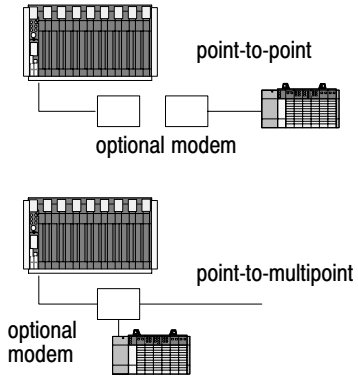
Using SLC 5/03™ Processors

Introduction

This document combines available PLC® and SLC™ documentation to show you how you can communicate between these two types of systems over a serial link.

Note: Channel 0 on the SLC 5/04™ processor also supports the connections described in this guide.

serial link

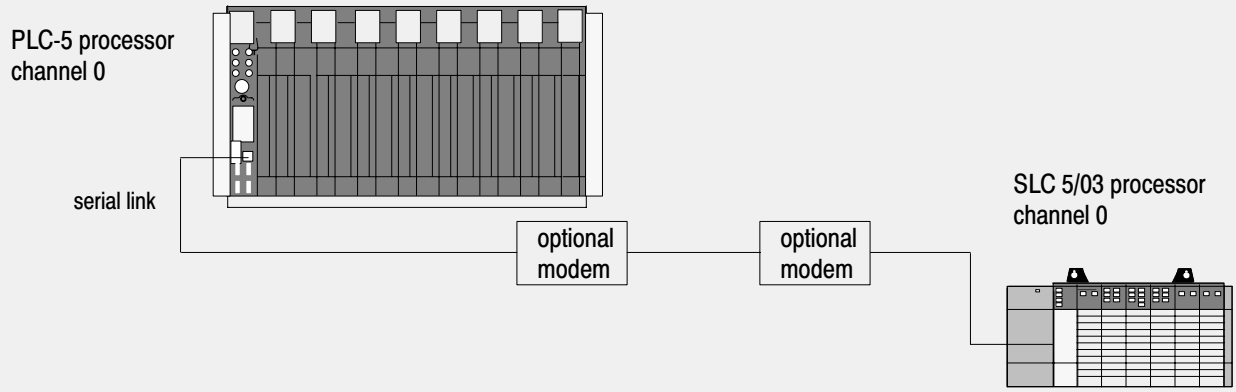


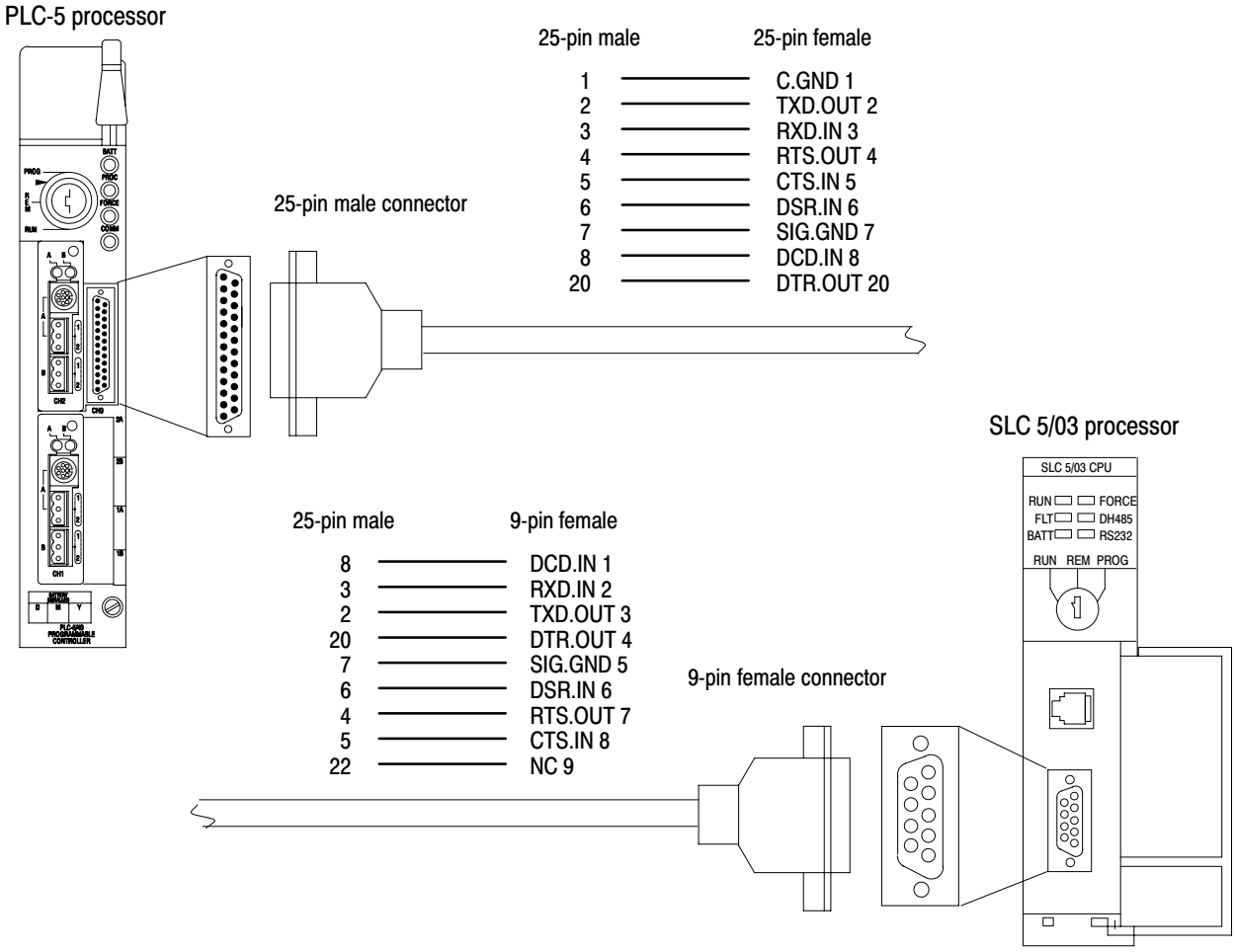
This information is in addition to the user documentation for the processors and communication modules discussed here. You should already have a solid understanding of how to use these processors. Each section in this document lists additional documentation you can refer to for detailed information.

This document is part of a larger set of reference materials to help you better use your PLC-5® processor. The 1785-6.8.*x* series of documents provides individual documents for different applications. This reference set is continually expanding, so see your Allen-Bradley sales representative or distributor for an up-to-date list of available reference documents.

Connecting the processors

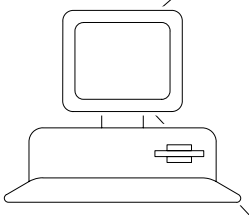
Point-to-point connection (full duplex)





Configuring the processors for point-to-point (full duplex)

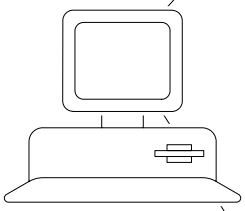
use your PLC-5 programming software to configure PLC-5 channel 0



```
                              Channel Overview

Channel 0:    SYSTEM (POINT-TO-POINT)
```

```
                    System Mode (Point-to-Point)
                         Channel 0 Configuration

  Diag. file:                  19
  Remote mode change:    DISABLED            System mode char.:         S
  Mode attention char.:     \0x1b            User mode char.:           U

  Baud rate:                1200             Parity:                 NONE
  Stop bits:                   1
  Control line: FULL DUPLEX MODEM

  Duplicate detect:           ON             Error detect:            CRC
  ACK timeout (20 ms):       100             NAK receive:               3
  Msg appl timeout (30sec):    0             DF1 ENQS:                  3



  Press a function key or enter a value.
  >
  Rem Prog   Forces:None                                  5/40 File BATCHTES
  Accept                                                        Chan 0  Select
   Edits                                                        Status  Option
    F1                                                            F9      F10
```

use your SLC programming software to configure SLC 5/03 channel 0



```
+ - - - - - - - - - - - - - - Channel Configuration - - - - - - - - - - - - - - - -+

CHANNEL 0 CONFIGURATION
        Current Communication Mode:  SYSTEM
                  User Mode Driver:  DF1 FULL-DUPLEX
                     Write Protect:  DISABLED
                       Mode Change:  RESERVED
          Mode Attention Character:  RESERVED
             System Mode Character:  RESERVED
               User Mode Character:  RESERVED
  Edit Resource/File Owner Timeout:  60    (seconds)

CHANNEL 1 CONFIGURATION
                System Mode Driver:  DH-485 MASTER
                     Write Protect:  DISABLED
  Edit Resource/File Owner Timeout:  10    (seconds)
```

```
+ - - - - - - - - - - - -  CHANNEL 0 SYSTEM MODE CONFIGURATION - - - - - - - - - - -+

Communication Driver:      DF1 FULL-DUPLEX

Diagnostic File:           RESERVED

Baud Rate:                 1200              Parity:                NONE


Duplicate Detect:          DISABLED          Error Detect:           CRC

                                             NAK Retries:              3
ACK Timeout [x20 ms]:      50                ENQ Retries:              3

Control Line:                FULL-DUPLEX MODEM  Embedded REsponse: ENABLED
+ - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - +


Press a function key

REM PROG


ACCEPT         UNDO                                    CHANNEL         SELECT
EDITS          EDITS                                   STATUS          OPTION
 F1             F2                                       F9              F10
```

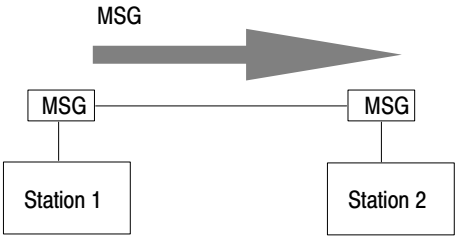
Application requirements

Full-duplex DF1 protocol is best for applications where you need high performance peer-to-peer communication.

The maximum cable length for an RS-232 serial link is 15 m (50 ft).

Communicating over a serial link

In a point-to-point configuration, the messaging is between the two connected devices.



Using full-duplex protocol

Full-duplex DF1 protocol (also referred to as DF1 point-to-point protocol) lets you use RS-232 point-to-point communication. This type of protocol supports simultaneous transmissions between two devices in both directions. You can use channel 0 as a programming port or as a peer-to-peer port using the MSG instruction.

By setting a parameter in Advanced Programming Software (APS), you can also make the processor verify that the host computer can receive embedded responses. To do this, the processor waits to receive an embedded response from the host computer before sending one of its own. A host computer that can send embedded responses should also be able to receive them.

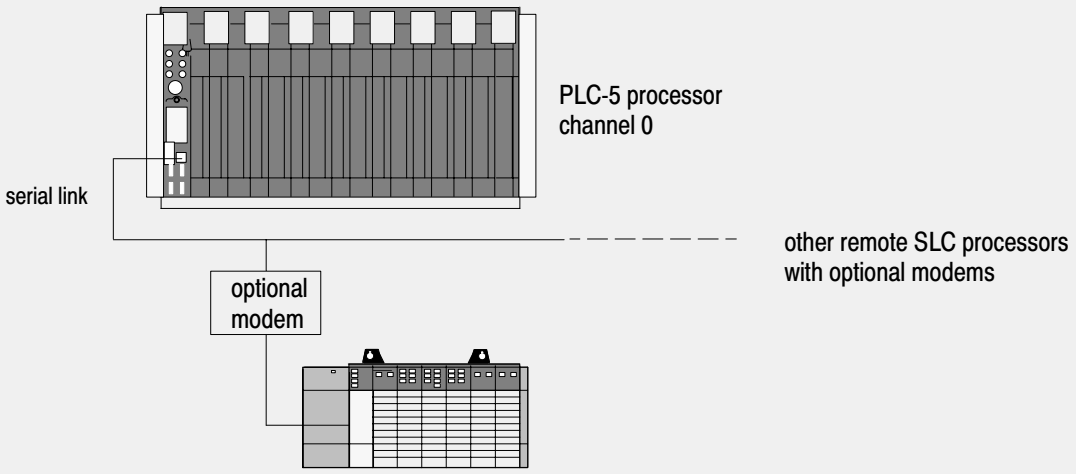
If you use modems with full-duplex DF1 protocol, make sure that they are capable of simultaneous bidirectional communication. Typically, dial-up modems designed to be connected to standard telephone lines can support full-duplex.

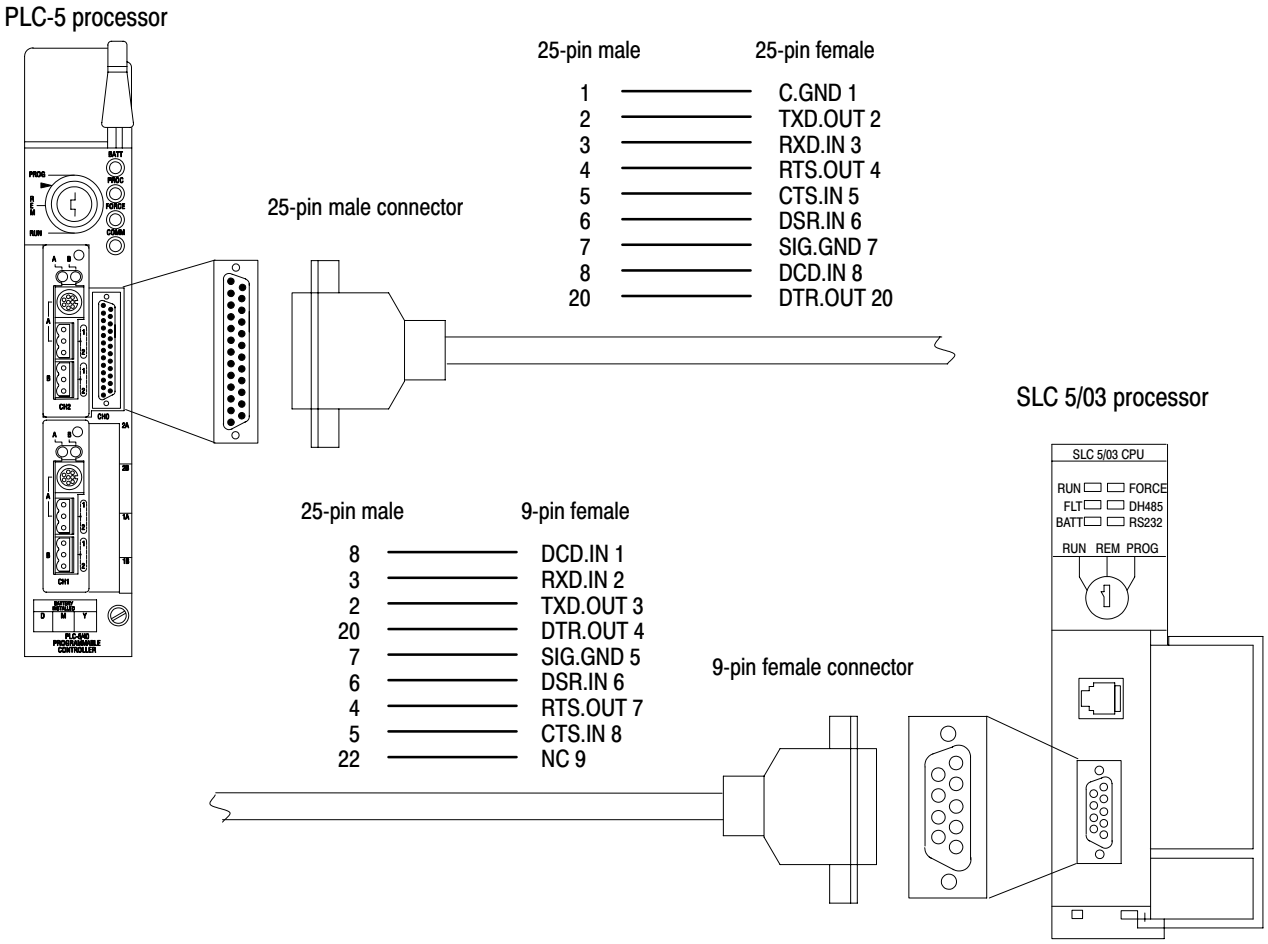
Additional documentation

- 1747-6.2 SLC 500 Modular Hardware Style Installation and Operation Manual
- 1785-6.1 PLC-5 Programming Software Instruction Set Reference Manual
- 1770-6.5.16 Data Highway/Data Highway Plus/DH-485 Protocol and Command Set Reference Manual
- AG-6.5.8 SCADA System Application Guide

Connecting the processors

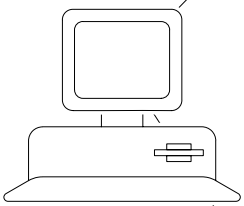
Point-to-multipoint connection (half duplex)





Configuring the processors for point-to-multipoint (half duplex) Using PLC-5 standard-based communication mode

use your PLC-5 programming software to configure PLC-5 channel 0



```
                              Channel Overview


Channel 0:    SYSTEM (MASTER)
```

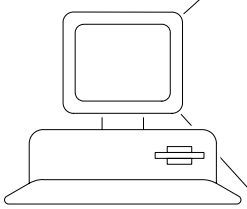
```
                        System Mode (Master)
                        Channel 0 Configuration

Diag. file:                19
Remote mode change:  DISABLED             System mode char.:         S
Mode attention char.:   \0x1b             User mode char.:           U

Baud rate:               9600             Parity:                 NONE
Stop bits:                  1             Station address:           1
Control line:   HALF DUPLEX WITHOUT CONTINUOUS CARRIER

Reply msg wait (20 ms):    25              Error detect:           CRC

ACK Timeout (20 ms):       50             RTS send delay (20 ms):    0
DF1 retries:                3             RTS off delay (20 ms):     0
Msg appl timeout (30sec):   1

Polling Mode: STANDARD (MULTIPLE MESSAGE TRANSFER PER NODE FILE SCAN)
```

Create station lists.

```
Master message transmit: BETWEEN STATION POLLS

Normal Poll File:      0                          Priority Poll File:       0

Active Station File:   0                          Normal Poll Group Size:   0


Press a function key or enter a value.
>
Rem Prog   Forces:None                                  5/30 File BATCH30
Accept                                                        Chan 0  Select
 Edits                                                        Status  Option
  F1                                                            F9      F10
```

Using PLC-5 message-based communication mode

use your PLC-5 programming software to configure PLC-5 channel 0



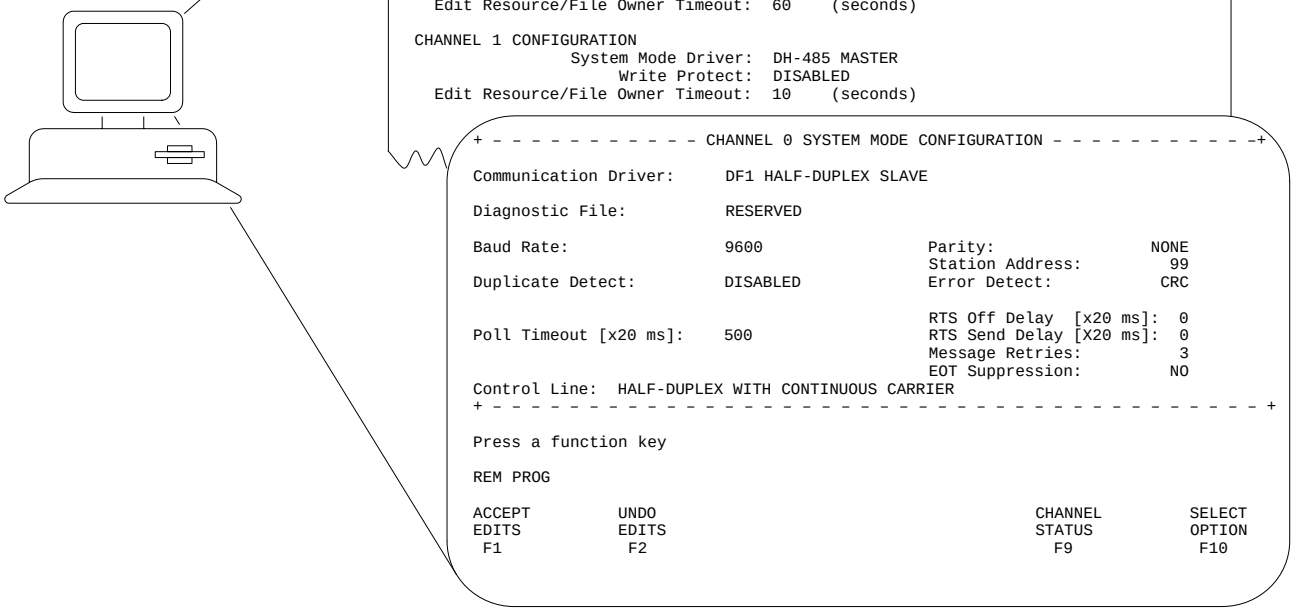
```
                              Channel Overview


Channel 0:    SYSTEM (MASTER)
```

```
                        System Mode (Master)
                        Channel 0 Configuration

Diag. file:                19
Remote mode change: DISABLED              System mode char.:         S
Mode attention char.:  \0x1b              User mode char.:           U

Baud rate:               9600             Parity:                 NONE
Stop bits:                  1             Station address:           1
Control line:   HALF DUPLEX WITHOUT CONTINUOUS CARRIER

Reply msg wait (20 ms):    25             Error detect:           CRC

ACK Timeout (20 ms):       50            RTS send delay (20 ms):    0
DF1 retries:                3            RTS off delay (20 ms):     0
Msg appl timeout (30sec):  1

Polling Mode: MESSAGE BASED (ALLOW SLAVE TO INITIATE MESSAGES)

Master message transmit: BETWEEN STATION POLLS
Press a function key or enter a value.
>
Rem Prog   Forces:None                                  5/30 File BATCH30
Accept                                                        Chan 0  Select
 Edits                                                        Status  Option
  F1                                                            F9      F10
```

continued on next page

Configuring the processors for point-to-multipoint (half duplex)
continued from previous pages

use your SLC programming software to configure SLC 5/03 channel 0



The SLC 5/03 OS302 and the SLC 5/04 OS401 support the SLC processor as a DF1 half-duplex master. All earlier SLC 5/03 and SLC 5/04 processors only support the SLC processor as DF1 half-duplex slave.

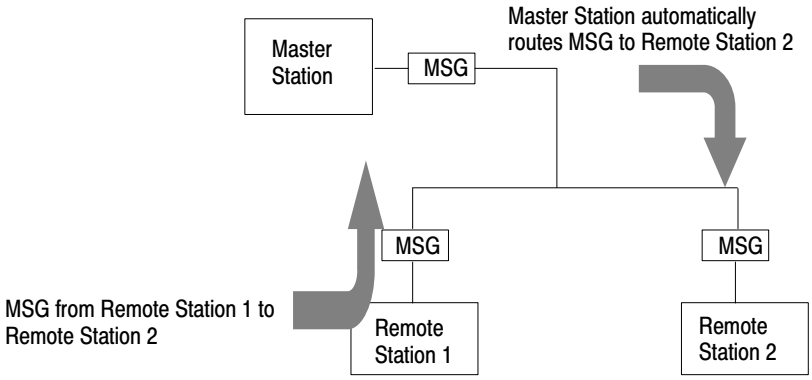
Application requirements

Use half-duplex protocol for a network of multiple slaves and one master that are connected by radio-frequency or leased-line modems in typical SCADA applications.

The maximum cable length for an RS-232 serial link is 15 m (50 ft).

Communicating over a serial link

In a point-to-multipoint configuration, the messaging is between remote stations. The master station polls each slave for data and routes data to the slaves.



Using half-duplex protocol

Half-duplex DF1 protocol provides a multi-drop single master/multiple slave network. In contrast to full-duplex DF1 protocol, communication takes place in one direction at a time and is controlled by the master. You can use channel 0 as a programming port or as a peer-to-peer port using the MSG instruction.

In half-duplex mode as a slave, the SLC 5/03 processor can send data packets only when it is first polled by the master device, which initiates all communication with slaves. The master polls each remote station on the network on a regular and sequential basis. A master device usually supports routing of data packets from one remote station to another, or slave-to-slave communication.

If the master device has no data to send, it can still receive data from the slave. To do this, the master sends out a poll packet addressed to the slave. If the slave has data to send, it does so in response to the poll packet. Otherwise the slave sends a simple two-byte response, so that the master knows that it is active.

Half-duplex DF1 supports up to 254 slaves (address 0 to 254) with address 255 reserved for master broadcasts. The SLC 5/03 supports broadcast reception.

You can use either half-duplex or full-duplex modems for the master, but you must use half-duplex modems for the remote stations, assuming there is more than one on a point-to-multipoint network.

Selecting a communication mode

A PLC-5 master station can communicate with remote stations in one of two communication modes:

If the PLC-5 master station initiates:	Select this communication mode:	To achieve these results:
polling packets to remote stations according to their position on a polling list Polling packets are formed independently of any user-programming.	standard communication mode see the configuration information on page 7	This is the communication mode used most often in point-to-multipoint configurations. Provides for these capabilities: • remote stations can send messages to the master station (polled report-by-exception) • remote stations can send messages to each other • lets the master station maintain an active node table
communication to remote stations using only user-programmed message (MSG) instructions Each request for data from a remote station must be programmed via a message instruction.	message-based communication mode see the configuration information on page 7	If your application uses satellite transmission or public switched telephone network transmission, consider choosing message-based. Communication to a remote station can be initiated on an as-needed basis.

Creating station lists

If you select standard communication mode for the PLC-5 processor, you have to create station lists for the PLC-5 processor. You create a station list by entering the station address of each remote station into either a normal poll file or priority poll file by using the data monitor of your programming software. Place each station address in an individual word in a poll file (normal and priority) starting at word 2.

The normal poll file should contain the station addresses of the slaves on the link. The priority poll file contains the station addresses of any slaves that you need to collect data from more frequently. The master polls the stations in the priority file before polling the stations in the normal file.

The normal and priority poll file can each contain as many as 64 addresses (1 word per slave address). The poll file layout is as follows:

This word in a poll file:	Contains this information:
word 0	total number of stations to be polled (for a list)
word 1	the address location (poll offset) of the station currently being polled For example: a value of 1 means the station address stored in word 2 is being polled, 2 means the address stored in word 3 is being polled, etc. This word is automatically updated by the master station as a new remote station is polled.
word 2 through word *xx*	the remote station address in the order that the stations should be polled Store one station address in each word.

To place a station address in a poll file, do the following:

1. Access the data monitor in your programming software.
2. Specify the address of the integer file that is either the normal poll file or the priority poll file (i.e., if the normal poll file is N11, specify N11:0).
3. Enter the station addresses of the remote stations you want in the poll list starting at word 2. Put them in the order you want them to be polled.

   Important: Station addresses are octal addresses. The poll files are integer files. To properly enter station addresses in a poll file, you must either:

   - change the radix of the file to octal
   - convert the octal station addresses to decimal

Figure 1 is an example of a station list containing three stations: octal addresses 10, 11, and 12. Station 12 (10 decimal) is being polled.

Figure 1
Example Station List (shown in decimal radix)

Poll File	Word 0	Word 1	Word 2	Word 3	Word 4
N:11	3	3	08	09	10
N:*xx*	total number of stations	pointer showing the station address being polled (Station 10 in word 4 being polled.)	address of first station in list	address of second station in list	address of third station in list

Monitoring active stations

To see what stations in a station list are active, use the data monitor to view the active station file. Each bit in the file represents a station on the link. The stations are numbered in order as a continuous bit-stream file starting with the first bit in the first word (Figure 2).

Figure 2
Example Active Station File

Address	15 Data 0	
B11:0	1111 1111 1111 1111 ←	Remote station 0
B11:1	1111 1111 1111 1111 ←	Remote station 16_{10}
B11:2	1111 1111 1111 1111	

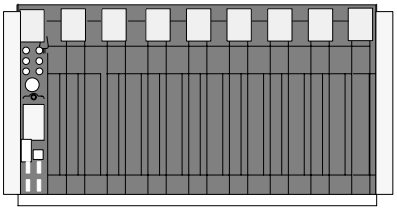
At power-up or after reconfiguration, the master station assumes that all remote stations are active. A station is shown inactive only after it fails to respond to a poll packet.

Additional documentation

- 1747-6.2 SLC 500 Modular Hardware Style Installation and Operation Manual
- 1785-6.1 PLC-5 Programming Software Instruction Set Reference Manual
- 1770-6.5.16 Data Highway/Data Highway Plus/DH-485 Protocol and Command Set Reference Manual
- AG-6.5.8 SCADA System Application Guide

Programming MSG instructions

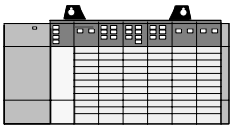
PLC-5 MSG instructions



The MSG instruction transfers data in packets. Each DH+ data packet can contain as many as 120 words. If your message transfer contains more words than fit in one packet, the transfer requires more than one packet of transfer data. The more packets to transfer, the longer the transfer takes.

The PLC-5 processor can queue as many as 16 message instructions at one time – for all channels. The processor channels queue message instructions on a first-come-first-served basis.

SLC 5/03 MSG instructions



Data associated with a message write instruction is buffered when you enable the instruction. The SLC 5/03 with OS300 processor services as many as four message instructions at one time. The SLC 5/03 with OS301 services up to four message instructions per channel, for a maximum of eight message instructions. There is also a 10-deep message queue for each channel.

When the SLC 5/03 processor responds to a PLC-5 type message, the SLC processor doesn't allow any reading or writing of its input and output image table. If the SLC 5/03 processor initiates the message, it allows reading and writing of its input and output image table.

SLC 5/03 with OS300
If a MSG instruction is in one of the four "channel independent" transmission buffers and is waiting to be transmitted, its control block has status bits EN and EW set. If more than four MSG instructions are enabled at one time, a "channel-dependent" overflow queue stores the MSG instruction header blocks (not the data for a MSG write) from the fifth instruction to the fourteenth.

SLC 5/03 with OS301
If a MSG instruction is in one of the four "channel dependent" transmission buffers and is waiting to be transmitted, its control block has status bits EN and EW set. If more than four MSG instructions for that channel are enabled at one time, a "channel dependent" overflow queue stores the MSG instruction header blocks (not the data for a MSG write) from the fifth instruction to the fourteenth.

This instruction, queued in a FIFO order, has control block status bit EN set. If more than 14 MSG instructions are enabled at one time for any one channel, control block status bit WQ is set, as there may be no room available in the overflow queue. This instruction must be re-scanned until space exists in this queue.

You configure MSG command parameters based on the series of the SLC 5/03 processor. SLC 5/03 processors with OS301 and later support PLC-5 command parameters (see page 14); earlier SLC 5/03 processors must use the PLC-2® compatibility file (see page 21).

Using peer-to-peer commands

Keep these considerations in mind when configuring messages to communicate over a DH+ link between PLC-5 and SLC 5/03 processors with OS301 and later.

- The SLC processor can only address words 0 to 255 in a PLC-5 data table.
- In an SLC MSG instruction, the maximum number of words you can read from or write to a PLC-5 processor is 100 words.

SLC 5/03 MSG commands

Choose from the following MSG commands when sending MSG instructions from SLC 5/03 series C or later processors and PLC-5 processors. These commands simplify sending messages by eliminating the PLC-2 compatibility file for both the PLC-5 processor and the SLC 5/03 processor.

If you want the instruction to:	On this type of network:	Select these MSG command parameters:	
read data from a PLC-5 processor	local DH+	**Type:**	Peer-to-Peer
		Read/Write:	Read
		Target Device:	PLC5
		Local/Remote:	Local
	remote DH+	**Type:**	Peer-to-Peer
		Read/Write:	Read
		Target Device:	PLC5
		Local/Remote:	Remote
write data to a PLC-5 processor	local DH+	**Type:**	Peer-to-Peer
		Read/Write:	Write
		Target Device:	PLC5
		Local/Remote:	Local
	remote DH+	**Type:**	Peer-to-Peer
		Read/Write:	Write
		Target Device:	PLC5
		Local/Remote:	Remote

Use 14 words of bit or integer data for the control block. This is the control block layout if you select a PLC-5 as the target device:

Control block for an SLC MSG instruction to a PLC-5 processor

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	Word
EN	ST	DN	ER	CO	EW	NR	TO	error code								0
node number																1
reserved for length in words																2
file number																3
file type (S, B, T, C, R, N, O, I, M0, M1)																4
element number																5
subelement number																6
reserved (internal messaging bits)															WQ	7
message timer preset																8
reserved (internal use only)																9
message timer accumulator																10
reserved (internal use only)																11
reserved (internal use only)																12
reserved (internal use only)																13

PLC-5 MSG commands

Choose from the following MSG commands when sending MSG instructions from a PLC-5 processor to an SLC 5/03 processor. These MSG command types are only available with enhanced PLC-5 processors.

If you want the instruction to:	On this type of network:	Select these MSG command parameters:	
read data from an SLC processor without specifying the actual word length of the message	local DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	PLC-5 Typed Read From SLC Local address of SLC processor address to read in SLC data table
	remote DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	PLC-5 Typed Read From SLC Remote address of SLC processor address to read in SLC data table
write data to an SLC processor without specifying the actual word length of the message	local DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	PLC-5 Typed Write To SLC Local address of SLC processor address to write to in SLC data table
	remote DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	PLC-5 Typed Write To SLC Remote address of SLC processor address to write to in SLC data table
read a specific number of words of data from an SLC processor	local DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	SLC Typed Logical Read Local address of SLC processor address to read in SLC data table
	remote DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	SLC Typed Logical Read Remote address of SLC processor address to read in SLC data table
write a specific number of words of data to an SLC processor	local DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	SLC Typed Logical Write Local address of SLC processor address to write to in SLC data table
	remote DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	SLC Typed Logical Write Remote address of SLC processor address to write to in SLC data table

When deciding how to send data through MSG instructions, keep these requirements in mind:

- The maximum message size for PLC-5 processors is 100 words (200 bytes).
- The maximum message size for SLC 5/03 processors is 112 words (224 bytes).

Important: The `PLC5 Typed Write to SLC` and `PLC5 Typed Read from SLC` commands are accessible only with release 5.0 and later 6200 programming software.

Using the MG control block, the control block size is fixed at 56 words. You must use the MG control block if you send messages to an SLC processor using the SLC read and write commands, or if you are send a message out any port other than channel 1A. This is the control block layout for a PLC-5 MSG instruction:

Control block for a PLC-5 MSG instruction

15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00	Word
EN ST DN ER CO EW NR TO |	0
error code (.ERR)	1
requested length (.RLEN)	2
done length (.DLEN)	3
modifiers (.DATA [0])	4
module class | push wheel	5
port ID | command type	6
command | function	7
station ID (6 words) .DATA [4] – .DATA [9]	8
local data table address (9 words) .DATA [10] – .DATA [18]	14
length remote address | parameters length	23
remote data table address (15 words) .DATA [20] – .DATA [34]	24
logical address of parameters file (9 words) .DATA [35] – .DATA [43]	39
reply class | reply pushwheel	48
reply mailbox | spare	49
port ID (6 words) .DATA [46] – .DATA [51]	50

ATTENTION: Use care when addressing PLC-5 MG.DATA structures. The information in these structures is vital to your control program. Changing MG.DATA values could severely affect the operation of your process.

Sending SLC Typed Logical Read and Typed Logical Write commands

Follow these guidelines when programming SLC Typed Logical Read and SLC Typed Logical Write commands:

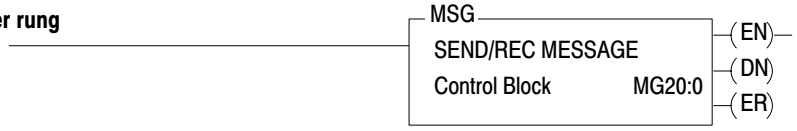
- You must use the MG data type for the MSG control block.
- The PLC-5 data table address and the destination address types should match when the data type is supported by the PLC-5 and SLC processors. If you want to send a data type that the SLC processor does not support, the SLC processor interprets that data as integer. This table maps the data types from the PLC-5 processor to the SLC processor.

This PLC-5 data type:	Is interpreted by the SLC 5/03 processor as:	This PLC-5 data type:	Is interpreted by the SLC 5/03 processor as:
Binary (B)	bit	String (ST)	string
Integer (N)	integer	BT control (BT)	integer
Output (O)	integer	Timer (T)	timer
Input (I)	integer	Counter (C)	counter
Status (S)	integer	Control (R)	control
ASCII (A)	ASCII	Float (F)	float
BCD (D)	integer	MSG control (MG)	integer
SFC status (SC)	integer	PID control (PD	integer

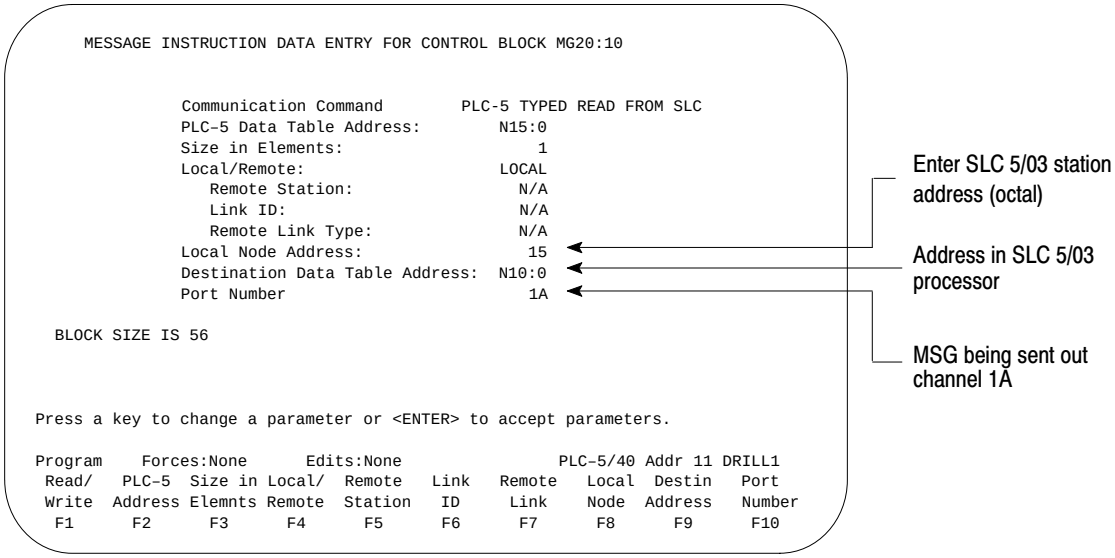
- To read/write from the SLC input, output (read only), or status file, specify an integer PLC-5 data table address and specify the address of the SLC input, output, or status file. For example, S:37 for word 37 of the SLC status file. Specify SLC input/output addresses by logical format, i.e., O:001 references slot 1.
- PLC-5 ASCII data is byte data (1/2 word) whereas, an SLC ASCII data element is one word. Therefore, if you request a PLC-5 Typed Read of 10 elements, the SLC 500 processor sends a packet containing 20 bytes (10 words).
- PLC-5 processors allow 1000 elements per file for most data types whereas SLC 500 processors allow 256 elements per file.

Figure 3
Sending a read MSG instruction from a PLC-5 processor to an SLC 5/03 processor

ladder rung



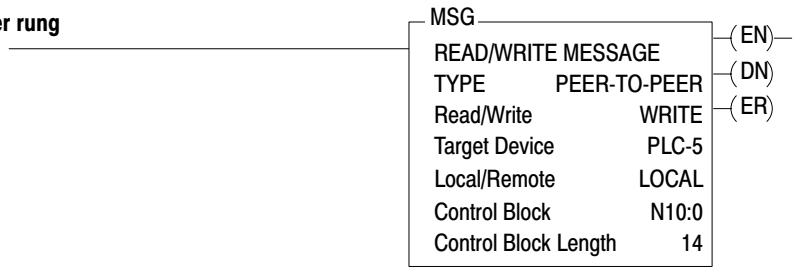
control block



This MSG example tells the PLC-5 processor (station 11_8) to read the information from N10:0 in an SLC 5/03 processor station 15_8 and place the information in N15:0 in the PLC-5 processor.

Figure 4
Sending a write MSG instruction from an SLC 5/03 processor to a PLC-5 processor

ladder rung



control block

```
   Type:               PEER-TO-PEER
   Read/Write                 WRITE
   Target Device              PLC-5                 ignore if timed out: 0  TO
   Local/Remote               LOCAL                       to be retried: 0  NR
   Control Block              N10:0                 awaiting execution: 0  EW
F10 Channel:                      1                     continuous run: 0  CO
F1  Target Node:                  2                              error: 0  ER
                                                          message done: 0  DN
                                                   message transmitting: 0  ST
                                                        message enabled: 0  EN
F5  Source File Address:                 N7:0          waiting for queue: 0  WQ
F6  Target Src/Dst File address:        N7:50
F7  Message Length in Elements:            10
F8  Message Timeout (seconds):              5

       ERROR CODE:     0                        control bit address: N10:0/8
        Error Code Desc:


 Target                      File    Target    Message  Message  Toggle
 Node                       Address  Offset   Length   Timeout   Bit    Channel
  F1                        F5       F6        F7       F8        F9       F10
```

The SLC 5/03 processor writes 10 elements to Target Node 2's N7 file, starting at word N7:50. The words are from the SLC integer file starting at word N7:0. If 5 seconds elapse without a reply, error bit N10:0/12 is set and error code 37h is displayed, indicating that the instruction timed out.

Using a PLC-2 compatibility file

When you send messages from a PLC-5 processor to an SLC 5/03 with OS300, you must use the PLC-2 compatibility file.

Keep these considerations in mind when you use a PLC-2 compatibility files to transfer messages between PLC-5 and SLC 5/03 processors.

both point-to-point and point-to-multipoint configurations

- In the SLC 5/03 MSG instruction, the Target Node is the decimal DF1 station address of the PLC-5 processor and Target Offset is the decimal "byte offset," which is the element into or from which you want to write or read data.
- The SLC processor uses word addressing while the PLC-5 processor uses byte addressing. In the Target Offset field of the SLC MSG control block, enter a word value that is equivalent to the byte (element) of the PLC-5 file number you want to write data into or read data from. One word equals two bytes; never enter an odd value for a Target Offset.
- The SLC processor can directly address only words 0_{10} to 127_{10} in a PLC-5 data table. By specifying a byte offset of 254 in the Target Offset field and a Message Length of 112, you can indirectly address words 128_{10} to 238_{10} (SLC 5/03 processor) in a PLC-5 data table.
- In a single instruction, the maximum amount of words you can read from or write to an SLC 5/03 processor is 112 words

point-to-point configurations

- In the PLC-5 processor, create integer files that correspond to the station addresses of the SLC processor that will be sending messages to the PLC-5 processor. When an SLC 5/03 processor sends a MSG instruction to a PLC-5 processor, the SLC 5/03 processor reads data from and writes data to a PLC-5 integer file that is equal to the SLC 5/03 processor's DF1 station address. For example, if the SLC 5/03 processor has a DF1 station address of 10, data is read from or written to N10 in the PLC-5 data table.

point-to-multipoint configurations

- In the SLC 5/03 processor, create and make available file N9 for PLC-2 type read and write messages, because the destination file of a PLC-2 type message to an SLC 5/03 processor defaults to N9 in a point-to-point configuration.

In full-duplex mode, specify the destination and source addresses as:

This address:	Is the node address of the:
destination	node for which the packet is intended
source	sender

SLC processors use word addressing while PLC-5 processors use byte addressing. Two bytes in the PLC-5 processor are equivalent to one word in the SLC processor. You can select whether the SLC processor uses word or byte addressing.

When you use this addressing:	The PLC-5 MSG instruction's destination address must be between:
SLC word	010_8 and 177_8 This range corresponds to word 16 through word 254 (even words only). Set SLC status bit S:2/8=0; this is the default setting.
SLC byte	010_8 and 377_8 This range corresponds to word 8 through word 254. Set SLC status bit S:2/8=1.

If you use the PLC-2 compatibility file, set S:2/8 in the SLC status file to 1. This bit is the CIF (Common Interface File) Addressing Mode selection bit and lets the SLC processor accept "byte offsets" from a PLC-5 processor. You must also create the CIF file, which is always integer file 9 in an SLC 5/03 or SLC 5/04 processor.

You cannot access words 0 - 7 or directly access 100_8 - 107_8 (64_{10}-71_{10}) in an SLC 5/02 Common Interface File from a PLC-5 processor.

SLC 5/03 command parameters using a PLC-2 compatibility file

Choose from the following MSG command parameters when sending MSG instructions from SLC 5/03 processors that are earlier than series C and PLC-5 processors.

If you want the instruction to:	On this type of network:	Select these MSG command parameters:	
read data from a PLC-5 processor	local DH+	**Type:**	Peer-to-Peer
		Read/Write:	Read
		Target Device:	485CIF
		Local/Remote:	Local
	remote DH+	**Type:**	Peer-to-Peer
		Read/Write:	Read
		Target Device:	485CIF
		Local/Remote:	Remote
write data to a PLC-5 processor	local DH+	**Type:**	Peer-to-Peer
		Read/Write:	Write
		Target Device:	485CIF
		Local/Remote:	Local
	remote DH+	**Type:**	Peer-to-Peer
		Read/Write:	Write
		Target Device:	485CIF
		Local/Remote:	Remote

Use 14 words of bit or integer data for the control block. This is the control block layout if you select a PLC-5 as the target device:

Control block for an SLC 5/03 MSG instruction using a PLC-2 compatibility file (485CIF)

15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00	Word
EN ST DN ER CO EW NR TO | error code	0
node number	1
reserved for length in words	2
offset in words	3
source address field	4
not used	5
not used	6
reserved (internal messaging bits) | WQ	7
message timer preset	8
reserved (internal use only)	9
message timer accumulator	10
reserved (internal use only)	11
reserved (internal use only)	12
reserved (internal use only)	13

PLC-5 command parameters using a PLC-2 compatibility file

Choose from the following MSG command parameters when sending MSG instructions from PLC-5 processors to SLC 5/03 processors earlier than series C.

If you want the instruction to:	On this type of network:	Select these MSG command parameters:	
read 16-bit words from any area of the PLC-2 data table or PLC-2 compatibility file.	local DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	PLC-2 Unprotected Read Local address of SLC processor (octal) file offset in CIF SLC file (N9)
	remote DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	PLC-2 Unprotected Read Remote address of SLC processor (octal) file offset in CIF SLC file (N9)
write 16-bit words to any area of the PLC-2 data table or PLC-2 compatibility file.	local DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	PLC-2 Unprotected Write Local address of SLC processor (octal) file offset in CIF SLC file (N9)
	remote DH+	**Communication Command:** **Local/Remote:** **Local Node Address:** **Destination Data Table Address:**	PLC-2 Unprotected Write Remote address of SLC processor (octal) file offset in CIF SLC file (N9)

The MG control block is fixed at 56 words. You must use the MG control block if you send messages to an SLC processor using the SLC read and write commands, or if you are send a message out any port other than channel 1A. This is the control block layout for a PLC-5 MSG instruction:

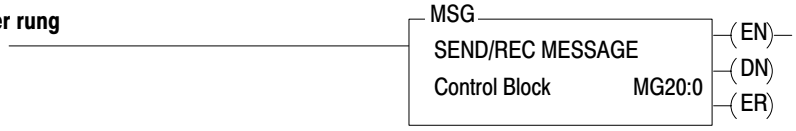
Control block for a PLC-5 MSG instruction

15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00	Word
EN ST DN ER CO EW NR TO |	0
error code (.ERR)	1
requested length (.RLEN)	2
done length (.DLEN)	3
modifiers (.DATA [0])	4
module class | push wheel	5
port ID | command type	6
command | function	7
station ID (6 words) .DATA [4] – .DATA [9]	8
local data table address (9 words) .DATA [10] – .DATA [18]	14
length remote address | parameters length	23
remote data table address (15 words) .DATA [20] – .DATA [34]	24
logical address of parameters file (9 words) .DATA [35] – .DATA [43]	39
reply class | reply pushwheel	48
reply mailbox | spare	49
port ID (6 words) .DATA [46] – .DATA [51]	50

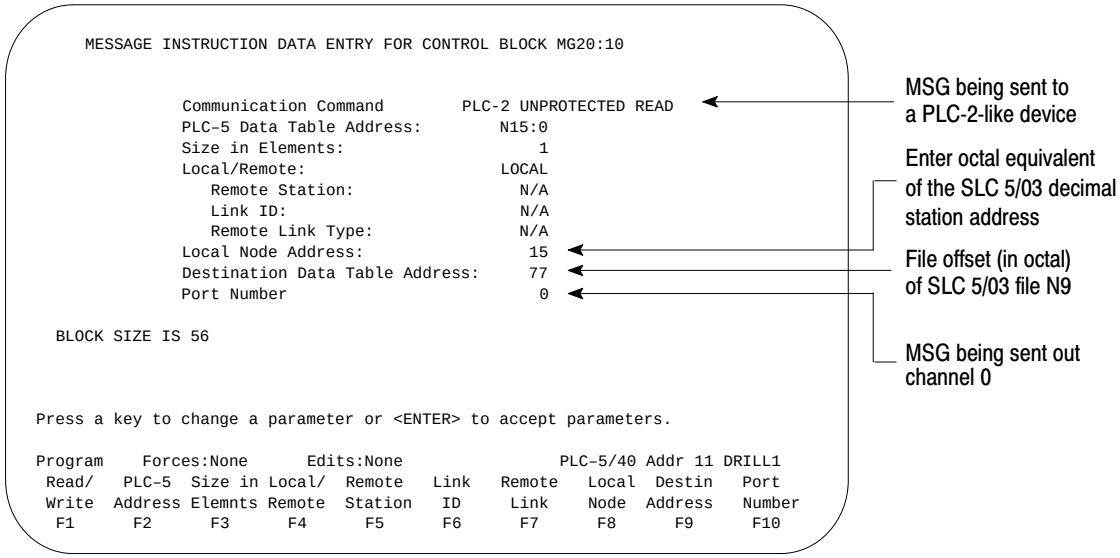
ATTENTION: Use care when addressing PLC-5 MG.DATA structures. The information in these structures is vital to your control program. Changing MG.DATA values could severely affect the operation of your process.

Figure 5
Sending a read MSG instruction from a PLC-5 processor to an SLC 5/03 processor

ladder rung



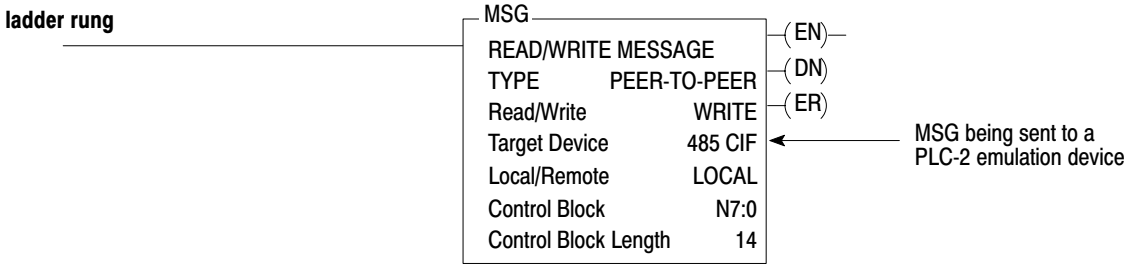
control block



This MSG example tells the PLC-5 processor (station 11_8) to read the information from SLC 5/03 remote station 13_{10}'s (15_8) common interface file N9, offset 77_8 (63_{10}) and place the information in station 11_8's file N15:0.

Set S:2/8 in the SLC 5/03 status file to 1. This bit is the CIF (Common Interface File) Addressing Mode selection bit and lets the SLC 5/03 processor accept "byte-offsets" from a PLC-5 processor.

Figure 6
Sending a write MSG instruction from an SLC 5/03 processor to a PLC-5 processor



control block

```
   Type:              PEER-TO-PEER
   Read/Write               WRITE
   Target Device          485 CIF                  ignore if timed out: 0  TO
   Local/Remote             LOCAL                        to be retried: 0  NR
   Control Block             N7:0                  awaiting execution: 0  EW
F10 Channel:                   0                      continuous run: 0  CO
F1  Target Node:               9                               error: 0  ER
                                                      message done: 0  DN
                                                 message transmitting: 0  ST
                                                     message enabled: 0  EN
F5  Source File Address:     S:37                   waiting for queue: 0  WQ
F6  Target Offset:             20
F7  Message Length in Elements:  6
F8  Message Timeout (seconds):  60

       ERROR CODE:  0000                        control bit address: N7:0/8
        Error Code Desc:


 Target                     File    Target    Message  Message  Toggle
 Node                      Address  Offset   Length   Timeout   Bit    Channel
  F1                       F5       F6        F7       F8       F9       F10
```

This MSG example is telling the SLC 5/03 remote station (station 99_{10}) to write the information from its S:37-S:42 through its serial port (channel 0) to the PLC-5 master station 9_{10}. The data's destination is N99:10 of the PLC-5 processor, based on a byte target offset of 20_{10}.

Important: The SLC 5/03 processor writes the information into an integer file in the PLC-5 processor's data table. The integer file number is equivalent to the SLC 5/03 processor's station address (which is PLC-2 emulation).

For example, if the SLC 5/03 processor in this example is station 99_{10}, then it writes the data from its S:37-S:42 into N99 of the PLC-5 master station. File N99 must exist in the PLC-5 for it to receive data from the SLC 5/03 remote station.

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