

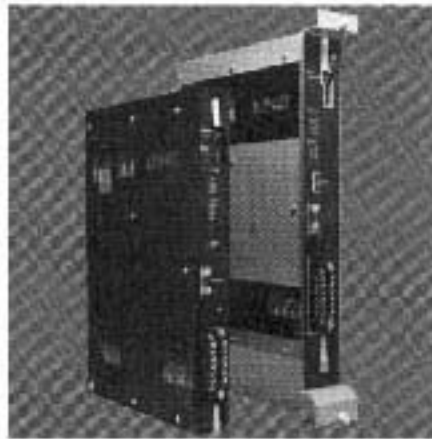


**ALLEN-BRADLEY**

## **I/O Scanner-Communication Adapter Module**

(Cat. No. 1775-S5, -SR5)

Product Data



## Fast and Convenient Communications

The I/O Scanner-Communication Adapter Module (Cat. No. 1775-S5, -SR5) provides high-speed communication for PLC-3 family programmable controllers.

With four available communication channels, you can connect each channel to communication devices up to 10,000 cable-feet from the PLC-3 or PLC-3/10 Processor Chassis (Cat. No. 1775-A1, -A2, -A3).

The features, benefits, and functions are outlined below:

**Table A**  
**Scanner Features and Functions**

Features	Benefits	Functions
Four I/O communication channels	High speed I/O communication with up to 4,096 I/O	Communicate with I/O Adapter Modules in I/O chassis. You can connect up to 16 I/O chassis to one I/O channel.
I/O scan priority	Ability to execute a faster scan for selected I/O chassis	Scan the I/O chassis according to a sequence that you select.
Data Highway/ PCL Communication Channel	Your system becomes a station on a Data Highway or a Peer-Communication-Link (PCL)	Communicate with other Allen-Bradley controllers and/or computers on a Data Highway or a PCL channel. Also provides direct connection for an Industrial Terminal (Cat. No. 1784-T50) for programming interface.
Status indicators	Easy troubleshooting	Keeps you informed on the scanner's status including: <ul style="list-style-type: none"> <li>• forces in the system</li> <li>• Data Highway/PCL channel</li> <li>• I/O communication channels</li> </ul>
Thumbwheel switch	Easy identification of system with multiple scanners	Distinguishes one scanner from another. You can insert up to: <ul style="list-style-type: none"> <li>• 15 scanners in a PLC-3 system</li> <li>• 2 scanners in a PLC-3/10 system</li> </ul>
Backup connector	Backup system capability	Transfers control over to a hot backup PLC-3 or PLC-3/10 system if a fault shuts down the primary system.
Terminal arm	<ul style="list-style-type: none"> <li>• I/O communication</li> <li>• Peer-to-peer communication</li> <li>• Backup communication</li> </ul>	<ul style="list-style-type: none"> <li>• Communicates with 1771 I/O chassis up to 10,000 cable feet away from the scanner via Twinaxial Cable (Cat. No. 1770-CD)</li> <li>• Communicates with scanners in up to six separate PLC-3 or PLC-3/10 systems for peer-to-peer communication via twinaxial cable</li> <li>• Communicates with a scanner in a backup PLC-3 or PLC-3/10 system for backup communication via twinaxial cable</li> </ul>
Message procedure commands	Easy command programming for Data Highway or PCL communication	<ul style="list-style-type: none"> <li>• Complex logic decisions, looping, and nesting</li> <li>• Symbolic representation of data and addresses</li> <li>• Embedded arithmetic expressions and logic operations</li> <li>• Error checking and reporting</li> <li>• Decimal, octal, or binary-coded decimal (BCD) data entry</li> <li>• Functions for converting data values to and from BCD</li> </ul>

## Using the Scanner

The scanner is a required module for PLC-3 family controllers. When you are setting up your system, you must have one scanner in the processor chassis with its thumbwheel set to one:

Insert this scanner catalog number	Into
1775-S5	PLC-3 processor chassis (Cat. No. 1775-A1, -A2)
1775-SR5	PLC-3/10 processor chassis (Cat. No. 1775-A3)

PLC-3 modules and PLC-3/10 modules are not interchangeable.



**WARNING:** Remove system power before removing or inserting the scanner into processor chassis. Failure to observe this warning could result in damage to processor components and/or undesired operation with injury to personnel.

The scanner provides four separate communication channels that you can use to communicate with one of the following:

- I/O adapters (Cat. No. 1775-AS, -ASB) for I/O communication
- a scanner in a backup PLC-3 or PLC-3/10 processor for backup communication
- up to six PLC-3 or PLC-3/10 processors for peer-to-peer communication

For channel 4, you can communicate with one of these or one of the following:

- up to 64 stations on a Data Highway or PCL
- the industrial terminal (Cat. No. 1784-T50) for programming interface if you configure the channel for PCL communication

You can operate a 1775-S5 scanner with a 1775-S4A, -S4B scanner in a PLC-3 system and a 1775-SR5 with a 1775-SR scanner in a PLC-3/10 system. However, note the following cautions.



**CAUTION:** When using scanners:

- Use of backup or peer-to-peer communications requires that a 1775-S5, -SR5 scanner not be connected to a 1775-S4A, -S4B, or -SR scanner.
- You can replace a 1775-S4A, -SR scanner with a 1775-S5, -SR5 scanner. However, do **not** replace a 1775-S5, -SR5 scanner with a 1775-S4A, -S4B, or -SR scanner.

Failure to observe these cautions could result in equipment damage and/or undesired operation.

## I/O Scanning Interface

The scanner provides terminal connections for four separate I/O communication channels. These channels communicate with I/O adapter modules in I/O chassis. In scanning these I/O channels, the scanner:

- reads the status of output image table words from the processor data table and updates the status of the corresponding output I/O groups.
- reads the status of the input I/O groups and writes this data into the processor input image table word.

You can connect up to 16 I/O adapters on a single I/O channel. Through the LIST function, you can select the sequence that the scanner scans the I/O chassis. If an I/O chassis requires a faster update time, you can list the chassis more than once in the sequence.

**Important:** If you are using a Data Highway or PCL channel, then you cannot use channel four for I/O communication.

## Backup Communication

Through LIST selections for the scanner, you can configure an I/O channel for backup communication. In this configuration, an I/O channel on a scanner in the primary processor is connected to an I/O channel on a scanner in the backup processor. An input file receives data from the backup processor. An output file sends data to the backup processor.

The scanner also features a backup connector for installing a hot backup system. By cabling between the connectors labeled BACK UP on a number one scanner in the primary processor chassis and a number one scanner in the backup processor chassis, you can set up a hot backup system. In this system, if a fault disables the primary processor, the backup processor can take control of the outputs.

## **Peer-to-peer Communication**

Peer-to-peer communication allows PLC-3 and PLC-3/10 processors to exchange data such as part counts and production status information without connecting to a Data Highway or PCL.

Through LIST selections for the scanner, you can configure an I/O channel for peer-to-peer communication. In this configuration, you connect the I/O channel of a scanner in one processor to an I/O channel on a scanner in each of up to six PLC-3 or PLC-3/10 processors. You must designate one processor as the master of the communication channel. The other processors on the channel act as slaves.

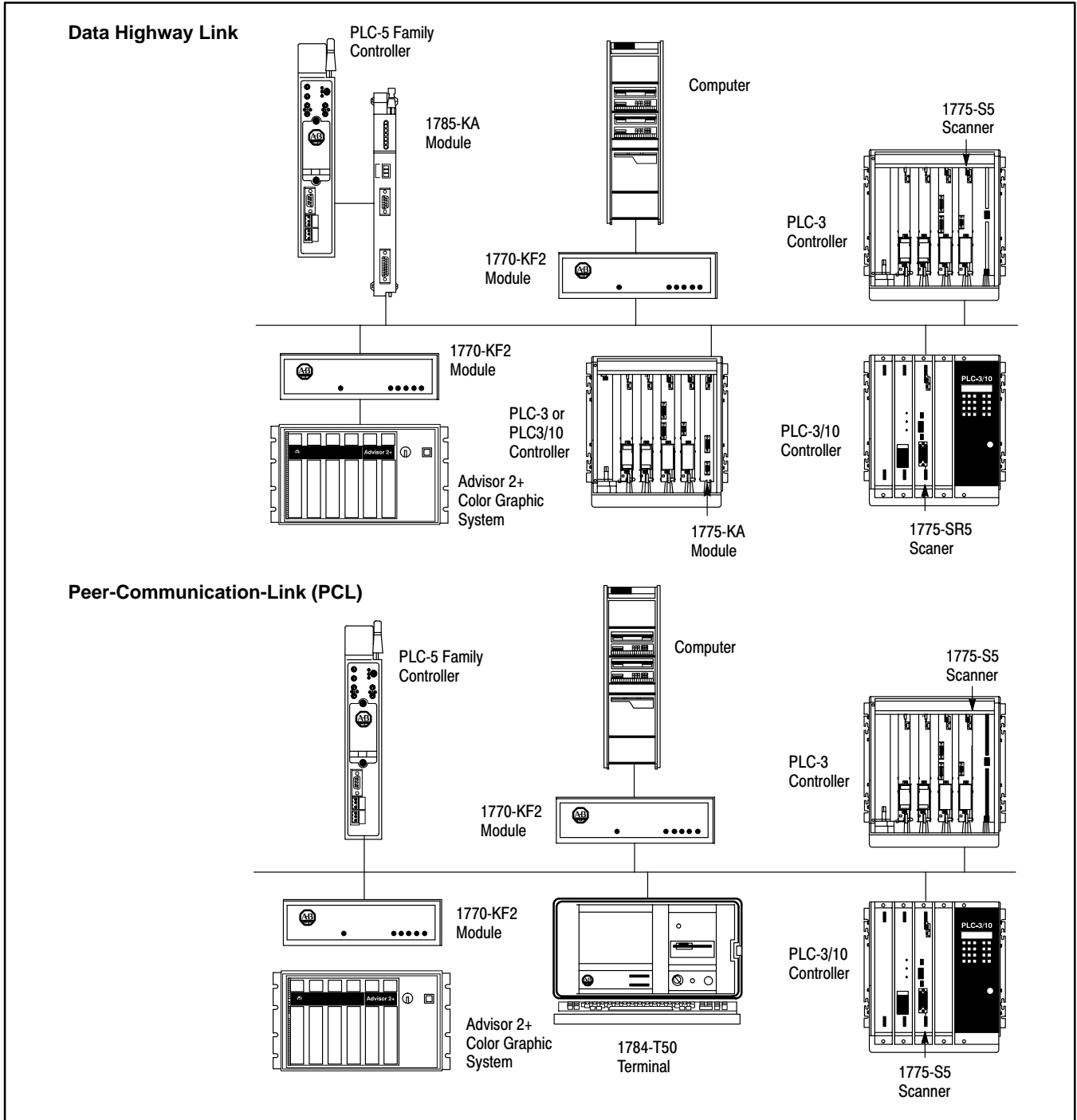
In peer-to-peer communication, the master communicates with each slave. You select a separate file in the master processor for each slave. This file is the source for data that transfers to the slave processor(s). You also select a file in each slave processor that receives the data.

Conversely, you select a file in the master processor for each slave that is the destination for data that transfers from the slave processor(s). You also select a file in each slave processor that contains the source data.

## **Data Highway/ PCL Communication**

The Allen-Bradley Data Highway and Peer-Communication-Link are industrial communication networks that link together as many as 64 distinct stations. Each station can be a programmable controller (PLC-3, PLC-3/10, PLC-5, etc.), a computer, or an intelligent device (Advisor2+ system, 1784-T50 industrial terminal, etc.). The central trunkline of a Data Highway or PCL can be up to 10,000 feet long, and each station can be as far as 100 feet away from the trunkline ([Figure 1](#)).

**Figure 1**  
**Typical Data Highway or PCL Configuration**



The difference between the communication links is the means of communication. The Data Highway uses a floating master function to handle communication between stations. This function allows a station to access the Data Highway based on three factors:

- station's readiness to transmit a message
- message priority
- station number

In this way, the floating master function prevents any single station from "hogging" the Data Highway, and it enables the Data Highway to continue functioning even if some of the stations become disabled.

The PCL uses a token passing function to handle communication between stations. The token is constantly passed from station to station even if no messages are sent. Each station obtains time to send a message. A station becomes master when it obtains the token and sends a message to another station. When a station is through communicating, the token automatically passes to the next higher station number on the link.

PCL is faster than Data Highway when the PCL has 16 stations or less. The delay time for link access increases as you increase the number of stations on a PCL.

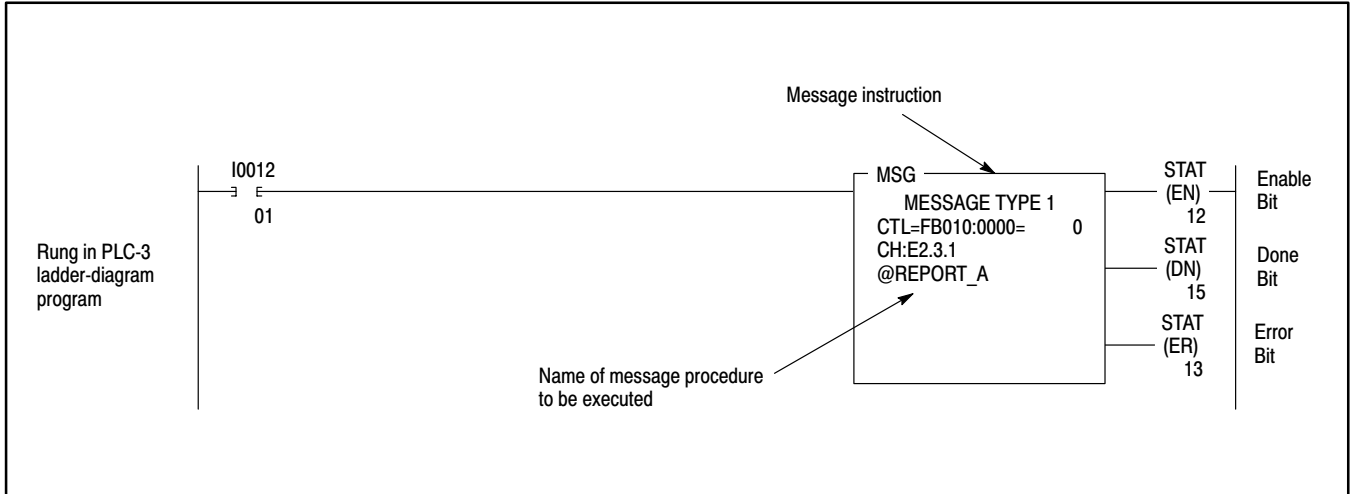
Through LIST selections or scanner dip switch settings, you can configure channel four for Data Highway or PCL communication. In this configuration, the scanner disables the terminals corresponding to channel four and enables the Data Highway/PCL connectors on its front edge.

### **Data Highway/PCL Programming**

The scanner communicated data by sending and receiving messages through its Data Highway/PCL connectors. To control and transmit these messages, you use the message (MSG) instruction in the ladder-diagram program (Figure 2).

The scanner executes the single command or the message procedure listed in the MSG instruction and returns the appropriate status information to the MSG block in the ladder-diagram program.

**Figure 2**  
**Example Message Instruction**



## Additional Scanners

You can have up to:

- 15 1775-S5 scanners in a PLC-3 system for a total of 8,192 I/O
- 2 1775-SR5 scanners in a PLC-3/10 system for a total of 4,096 I/O

Each additional scanner provides three I/O communication channels and a fourth channel that you can use for I/O, Data Highway, or PCL communication.

When inserting additional scanners, set each thumbwheel consecutively, starting with 2.

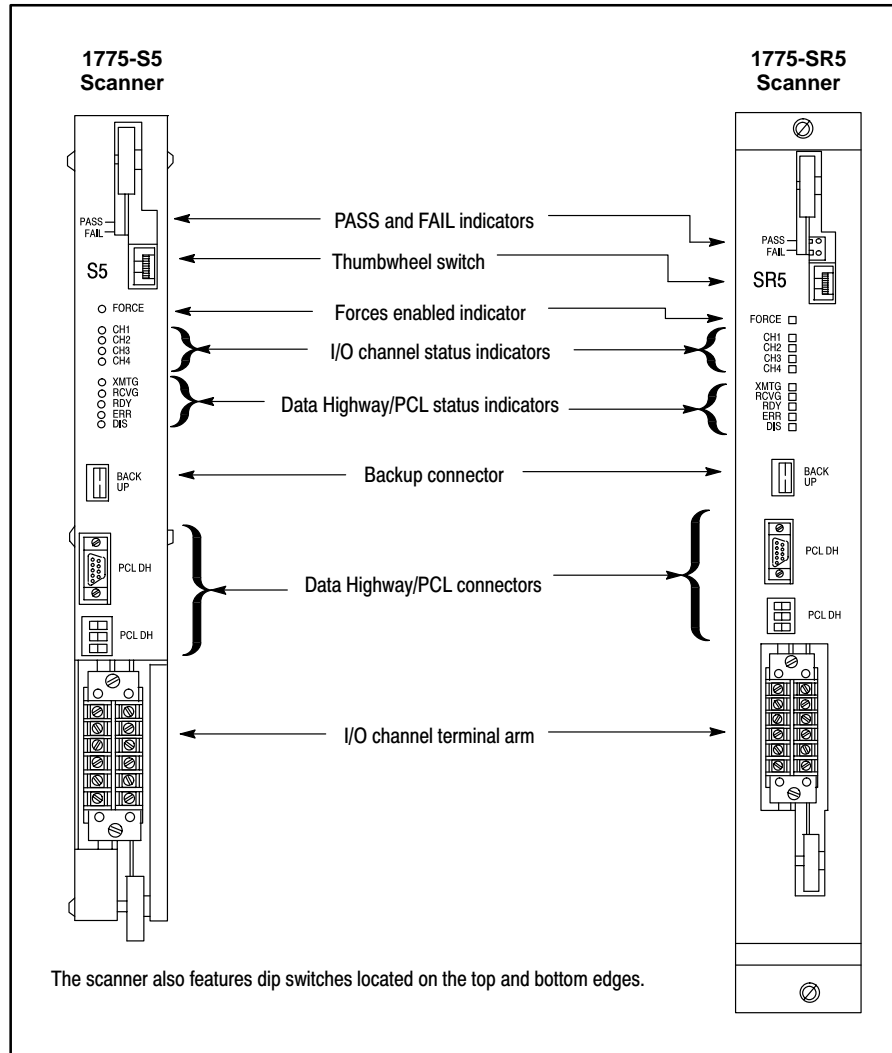
**Important:** For the PLC-3/10 controller, using an additional scanner does not increase I/O capacity. You can communicate at up to 4,096 I/O.



## Hardware Features

Your scanner fits into the PLC-3 or PLC-3/10 processor chassis and consists of the following hardware components (Figure 3):

**Figure 3**  
**Hardware Features on the Scanner**



## Electrostatic Discharge

Under some conditions, electrostatic discharge can degrade performance or damage the module. If you observe the following precautions, you can guard against electrostatic damage.

- Touch a grounded object to rid yourself of charge before handling the module.
- Do not touch the backplane connector or connector pins.
- When not in use, keep the module in its static-shielded bag.

## Related Publications

For detailed information on using the scanner, refer to the:

Publication	Title
1775-6.5.5	PLC-3 Family Controller I/O Scanner-Communication Adapter Module User's Manual
1770-6.2.1	Data Highway Cable Assembly and Installation Manual
1770-6.5.15	Industrial Terminal (Cat. No. 1770-T4) User's Manual
1770-6.5.16	Data Highway/PCL Protocol Command Set User's Manual
1771-6.5.37	Remote I/O Adapter (Cat. No. 1771-ASB) User's Manual
1775-6.3.1	PLC-3 Family Controller Backup Concepts Manual
1775-6.4.1	PLC-3 Family Controller Programming Reference Manual
1775-6.7.1	PLC-3 Family Controller Installation and Operation Manual
1784-6.5.1	Industrial Terminal (Cat. No. 1784-T50) User's Manual
6200-6.5.3	PLC-3 Programming Terminal Software User's Manual

## Specifications

### Functions

- I/O communication
- Data Highway communication
- Peer-Communication-Link (PCL) communication
- backup communication
- peer-to-peer communication
- front-panel support

### Location

- 1775-S5 – single slot in a PLC-3 chassis
- 1775-SR5 – single slot in a PLC-3/10 chassis

### I/O Capacity per Scanner

- 2,048 I/O (any mix)
- 4,096 I/O (complementary)

### Communication Rates (in kbaud)

- 57.6 at 10,000 cable feet (DH, PCL, I/O)
- 115.2 at 5,000 cable feet (I/O only)

### Cabling

- Twinaxial Cable (Cat. No. 1770-Cd) for I/O, DH, or PCL communication channels
- Industrial Terminal T50 Cable (Cat. No. 1784-CP5) for PCL communication to 1784-T50 industrial terminal

**Nominal Scan I/O Times per I/O Adapter at 115.2 kbaud**

- 4.5ms for 1 channel
- 5ms for 2 channels
- 5ms for 3 channels
- 6.5ms for 4 channels
- 8ms for 3 channels + Data Highway
- 9ms for 3 channels + PCL

**Backplane Current**

- 6.0A maximum from  $\pm 5V$  DC
- 20mA maximum from  $\pm 15V$  DC

**Environmental Conditions**

- Operating Temperature: 0 to 60°C (32 to 140°F)
- Storage Temperature: -40 to 85°C (-40 to 185°F)
- Relative Humidity: 5 to 95% (without condensation)



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