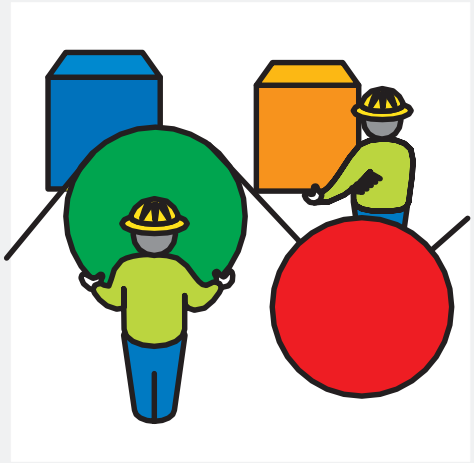
Allen-Bradley

DeviceNet Scanner

(Cat. Nos. 1784-PCIDS, –CPCIDS)

Configuration Manual



Important User Information

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

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

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

Throughout this manual we make notes to alert you to possible injury to people or damage to equipment under specific circumstances.

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

Attention helps you:

- Identify a hazard.
- Avoid the hazard.
- Recognize the consequences.

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

Important: We recommend that you frequently back up your application programs on an appropriate storage medium to avoid possible data loss.

About This Manual

What's in This Manual?

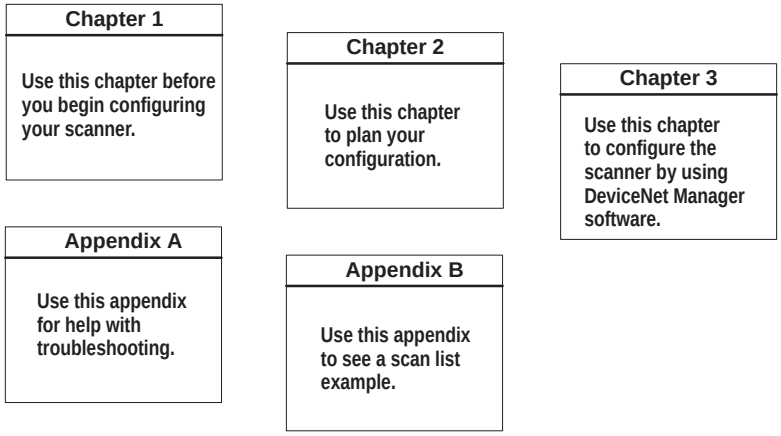
Use this manual with both the 1784–PCIDS and the–CPCIDS scanners.

Important: This manual describes both the 1784–PCIDS and –CPCIDS scanners since they are functionally equivalent. Throughout this manual, we use the generic term "1784–family scanner" to refer to both the 1784–PCIDS and the –CPCIDS scanners.

In the network diagrams, we show both the 1784–PCIDS and the –CPCIDS scanners. In the screen shots and examples, we refer to the 1784–PCIDS scanner node specifically, but understand that the 1784–CPCIDS scanner is interchangeable with the –PCIDS scanner.

This manual descibes how:

- the 1784–family scanners communicate with a PCI bus based host platform
- to map I/O data using DeviceNet Manager software
- to configure your 1784–family scanners



Audience

We assume that you:

- are developing a DeviceNet network using a PCI bus based host platform in conjunction with a 1784-family scanner
- know each of your device's I/O parameters and requirements
- are proficient with DeviceNet Manager software
- are familiar with the Microsoft® Windows™ environment

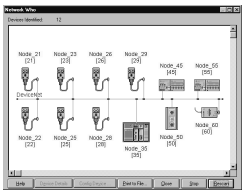
Conventions

The following conventions appear throughout this manual to guide you through the information and concepts.

Important: Your screens may appear slightly different than the ones depicted in this manual if you are running DeviceNet Manager software on a platform other than Windows NT, version 4.0.

This is a definition box. When a word is bold within the text of a paragraph, a definition box will appear in the left margin to further define the term.

A **definition box** defines terms that may be unfamiliar to you.



Screen captures are pictures of the software's actual screens. The names of screen buttons and fields are often bolded in the text of a procedure.

1

Step numbers appear on the screen captures by the corresponding buttons or fields discussed in the procedure text.

The "MORE" icon is placed beside any paragraph that references sources of additional information outside of this document.

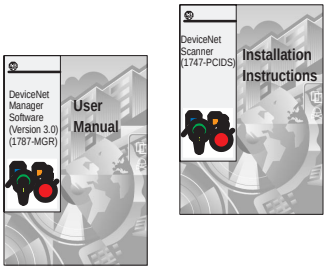
Screen Summary

The screen-summary arrow points to a table that summarizes each button and field of the corresponding screen capture.

Optional Step

The optional-step arrow points to a step that is not required for scanner configuration. It may be a stand-alone feature or may be dependent upon a set list of criteria.

Related Publications



Title	Publication Number
DeviceNet Manager Software User Manual	1787-6.5.3
DeviceNet PCI Communication Card Installation Instructions	1784-5.31
DeviceNet Cable Planning and Installation Manual	DN-6.7.2

Terminology

This term	Means
Change of State	The scanner module can send and receive data with slave devices that have the change of state feature. Data is sent whenever a data change occurs or at a user-configurable heartbeat rate.
Cyclic	The scanner module can send and receive data with slave devices that have the cyclic feature. Data is only sent at a user-configurable rate.
Dual Mode	The scanner is in dual mode when it serves as a master to one or more slaves and as a slave to another master simultaneously.
EDS	An electronic data sheet is a vendor-supplied template that dictates how information is displayed as well as what is an appropriate entry (value).
Explicit Messaging	This messaging protocol states the meaning of the message. The Explicit Message protocol commands the performance of a particular task and returns the results of the task performance to the requestor.
Heartbeat Rate	The heartbeat rate is associated with producing data once every EPR (Expected Packet Rate) duration. You may have four EPRs before you time out. This only applies to change of state and cyclic messaging.
Host Platform	the computer that hosts the 1784–family scanner module.
I/O	I/O is an abbreviation for “input and output data.”
Input Data	This data is produced by a DeviceNet device and collected by the scanner and made available for a host platform to read.
Output Data	This data is produced by a host platform that is written to the scanner’s memory. This data is sent by the scanner to DeviceNet devices.
MAC ID	A MAC ID is the address of a DeviceNet node.
Network	This is a DeviceNet network or DeviceNet Manager software representation of a network.
Node	A node is the hardware that has a single address on the network (also referred to as device).
Offline	This is when the communication adapter is not able to communicate on the network.
Online	This is when the communication adapter is configured and enabled to communicate on the network.
PC	This is an abbreviation for an IBM® compatible personal-computer.
Poll	This is a type of input/output-data communication. A poll message solicits a response from a single, specified device on the network (a point-to-point transfer of data).
Record	This is a node address and channel-specific memory assigned in the scanner’s non-volatile storage for a node in the scan list.
Rx	This is an abbreviation for “receive”.
1784–family Scanner	This refers to both the 1784-PCIDS and –CPCIDS scanners.
Slave Mode	The scanner is in slave mode when it serves as a slave to another master.
Strobe	This is a type of input/output-data communication. A strobe message solicits a response from each strobed device (a multicast transfer). It is a 64-bit message that contains one bit for each device on the network.
Scanner	This refers to both the 1784-PCIDS and –CPCIDS scanners.
Tx	This is an abbreviation for “transmit”.

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- training needs analysis

  DeviceNet courses *Designing a DeviceNet Network* (course no. CCP160) and *Configuring a DeviceNet Network* (course no. CCP161) are currently offered. Contact your local authorized Rockwell Automation distributor or sales/support office for more information.

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Table of Contents

Planning Your Configuration

What's in This Chapter?

This chapter introduces questions you should ask before configuring your 1784–family scanner. In addition, it presents an example DeviceNet network and I/O data mapping scheme.

What You Need to Know

To map data via your scanner module, you must understand:

- your network requirements
- how to map input data
- how to map output data

Beginning the Process

Planning before configuring your scanner helps make sure that you can:

- use your memory and bandwidth efficiently
- cater to device-specific needs and requirements
- give priority to critical I/O transfers
- leave room for expansion

A very important question to answer is "what is on your network?" You should be familiar with each device's:

- communication requirements
- I/O importance and size
- frequency of message delivery

You should also ask "how might this network appear in the future?" At this point in your planning, it is advantageous for you to have some idea of how the network could be expanded. When mapping your I/O, you have the opportunity to allot room for future I/O. This can save time and effort in the future.

Planning Examples

The following examples illustrate a data-mapping plan for a DeviceNet network.

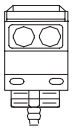
About This Example

This example has the following characteristics:

- a PCI bus based host platform
- a 1784–family scanner
- a Series 9000 photoelectric sensor (strobed)
- a RediSTATION operator interface (polled)

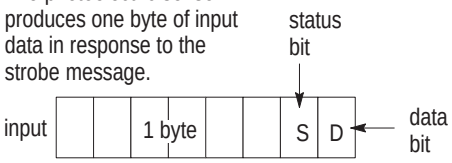
Important: In the following examples, output is data sent *to* a device. Input is data collected *from* a device.

Series 9000 photoelectric sensor

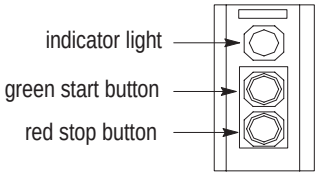


Two input bits from the photoelectric sensor will be mapped: one status bit and one data bit. The data bit is needed quickly; therefore, this input data will be mapped to the scanner's input data table.

The photoelectric sensor produces one byte of input data in response to the strobe message.

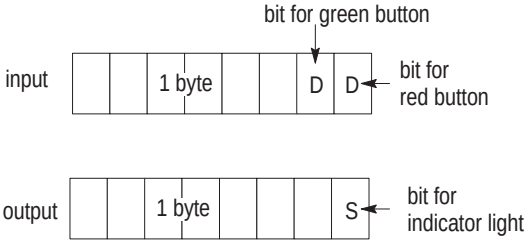


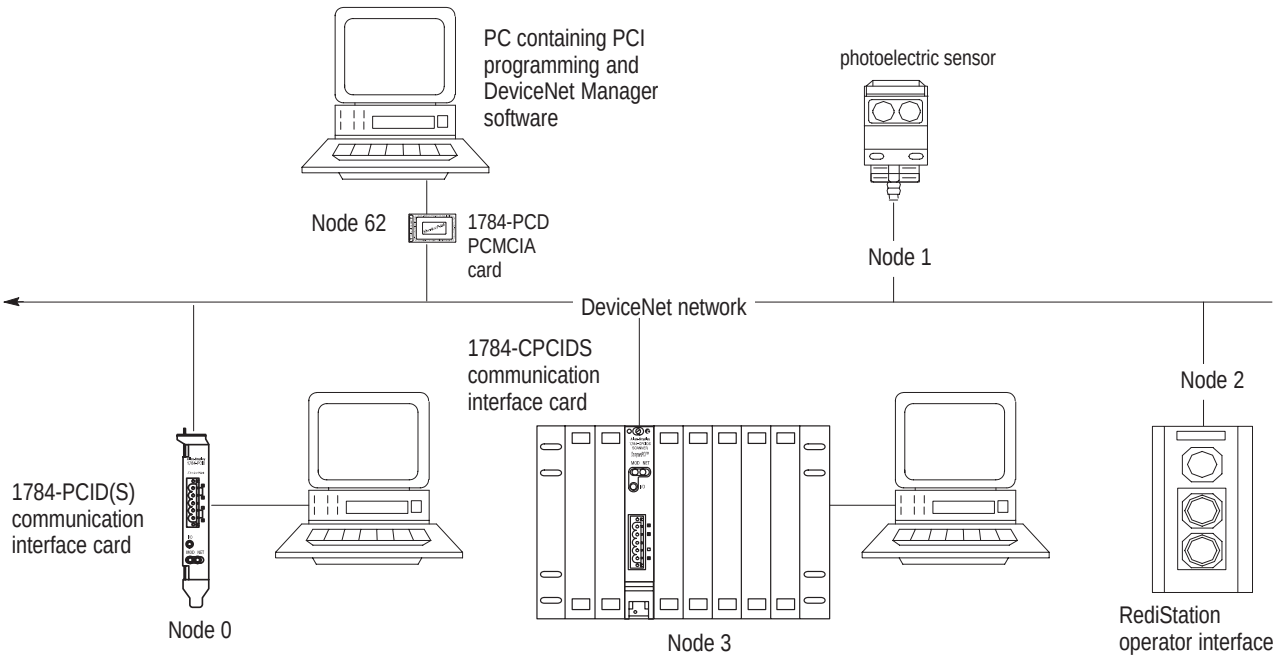
RediSTATION operator interface



Two input bits from the RediSTATION operator interface will be mapped: one bit for the green start button and one bit for the red stop button. One output bit for the operator interface will also be mapped: one bit for the operator interface's indicator light (on/off). Bit 4 of the input byte indicates if the bulb is missing.

The RediSTATION operator interface produces one byte of input data and consumes one byte of output data.





Part I – Photoelectric Sensor Mapping Input Data

The photoelectric sensor inputs are mapped to the scanner's input data table and then to the host platform's input data file.

Series 9000 Photoelectric Sensor Inputs

= unused bits

D = data bit
S = status bit
usage example: 1D = data bit for photoelectric sensor #1
1S = status bit for photoelectric sensor #1

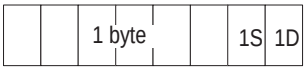
What's Happening?

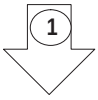
1. The status and data bits from the photoelectric sensor are mapped into the scanner's input data table.
2. The data table is then transferred to the host platform's input data file.

Important: The scanner only makes the data available for the host platform to read. The scanner does not move the data to the host platform.

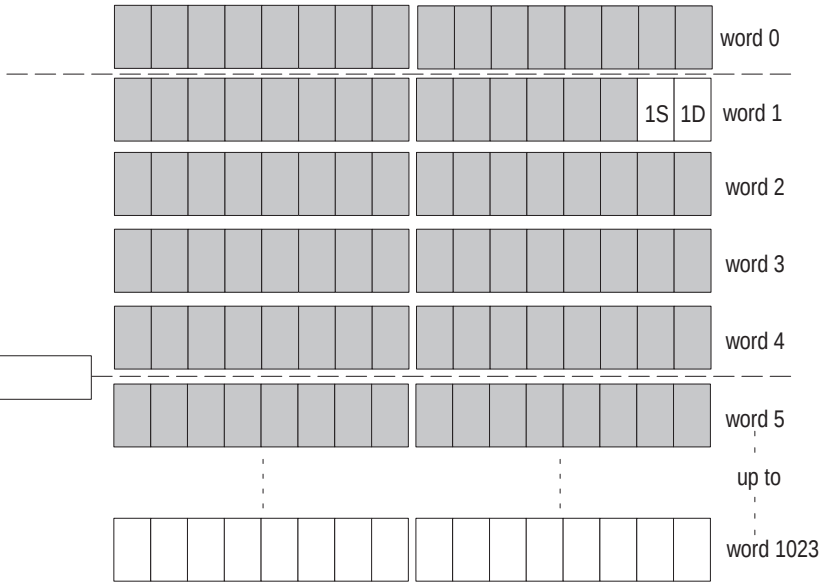
Photoelectric Sensor Input Bytes

photoelectric sensor node address 1



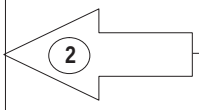


1784-PCIDS Scanner Input Image Table



Host Platform Input Image Table

Address	Data
Word 0	0000 0000 0000 0000
Word 1	0000 0000 0000 0000
Word 2	0000 0000 0000 0000
Word 3	0000 0000 0000 0000
Word 4	0000 0000 0000 0000
Word 5	0000 0000 0000 0000
Word 6	0000 0000 0000 0000
Word 7	0000 0000 0000 0000
Word 8	0000 0000 0000 0000



Example: The data bit for photoelectric sensor #1 (1D) appears at word 0, bit 1 in the input image table of your host platform.

Part II – RediSTATION Operator Interface Mapping Input Data

The RediSTATION operator interface's input byte is mapped to the scanner's data table. In the RediSTATION's byte is a bit for the:

- red button (on/off)
- green button (on/off)

RediSTATION Inputs

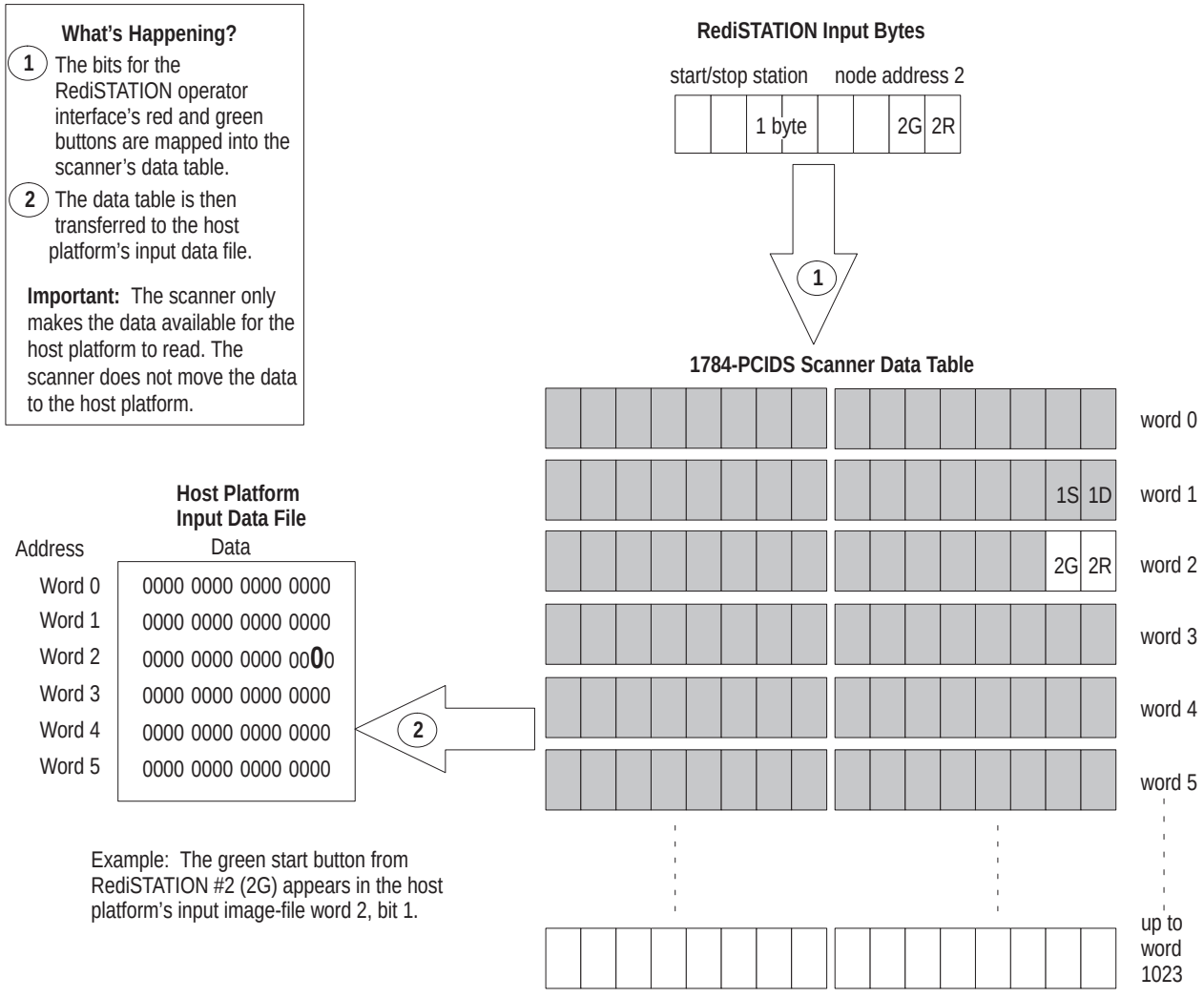
= unused bits

R = bit for red button
G = bit for green button
usage example: 2R = red-button bit for station #2
2G = green-button bit for station #2

What's Happening?

1. The bits for the RediSTATION operator interface's red and green buttons are mapped into the scanner's data table.
2. The data table is then transferred to the host platform's input data file.

Important: The scanner only makes the data available for the host platform to read. The scanner does not move the data to the host platform.



Example: The green start button from RediSTATION #2 (2G) appears in the host platform's input image-file word 2, bit 1.

Part III – RediSTATION Operator Interface Mapping Output Data

The RediSTATION operator interface's output is mapped to the scanner's discrete output data table. Within each of these output bytes is a bit for the indicator light. The output image table is then transferred from the host application. This example highlights the poll messages from which the RediSTATION operator interface receives its output bit.

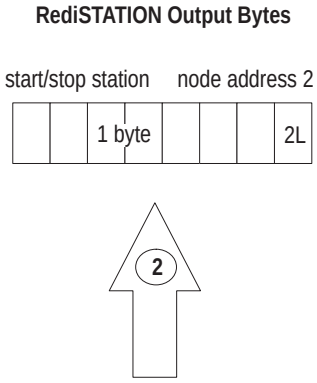
Mapping Example Part III
RediSTATION Output

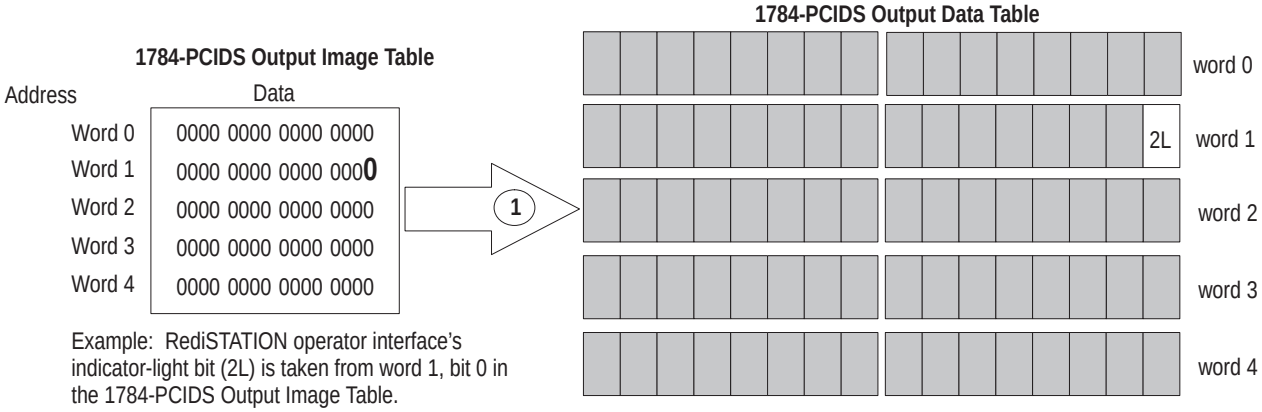
L = bit for the station indicator light
usage example: 2L = station indicator-light bit for RediSTATION #2

= unused bits

What's Happening?

1. The indicator-light bit for each RediSTATION operator interface is mapped to the scanner's output image table.
2. The output image-table is then sent out to the operator interfaces via poll messages from which each operator interface receives its indicator-light bit.





Example: RediSTATION operator interface's indicator-light bit (2L) is taken from word 1, bit 0 in the 1784-PCIDS Output Image Table.

What's Next?

The next step is to understand how to configure the scanner and perform I/O data mapping through DeviceNet Manager software. The next chapter details:

- Module Configuration
- Scan List Editor
- Edit Display Properties
- Edit Device I/O Parameters
- Auto Map
- Data Table Map
- Scan List Editor upload and download

Before You Begin

What's in This Chapter?

Read this chapter to understand communication between a host platform and DeviceNet devices through a 1784-family scanner, the data tables, and the DeviceNet Manager screens used to configure data tables.

What You Need to Know

Before configuring your scanner, you must understand:

- the data exchange between a host platform and DeviceNet devices through the 1784-family scanner
- user-configurable scanner data tables
- the role of DeviceNet Manager software

What Your Scanner Does

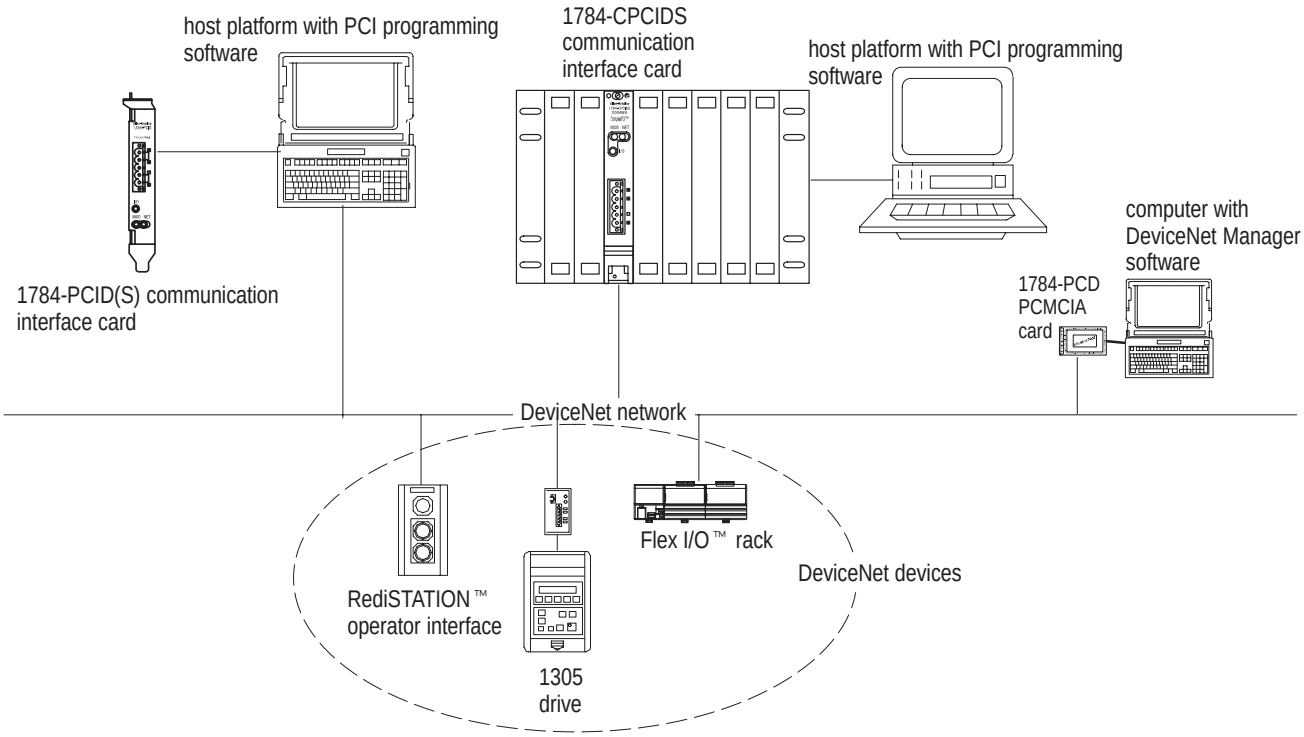
In a typical configuration, the scanner acts as an interface between DeviceNet devices and a host platform. The scanner communicates with DeviceNet devices over the network to:

- read inputs from a device
- write outputs to a device
- download configuration data
- monitor a device's operational status

The scanner communicates with the processor in the form of Input, Output, and Diagnostic Tables. Information exchanged includes:

- device I/O data
- status information
- configuration data

The following is an example configuration.



Communicating with Your Devices

A strobe message is a multicast transfer of data (which is 64 bits in length) sent by the scanner that solicits a response from each strobed slave device. There is one bit for each of the possible 64 node addresses. The devices respond with their data, which can be as much as 8 bytes.

A poll message is a point-to-point transfer of data (0 to 255 bytes)) sent by the scanner that solicits a response from a single device. The device responds with its input data (0 to 255 bytes).

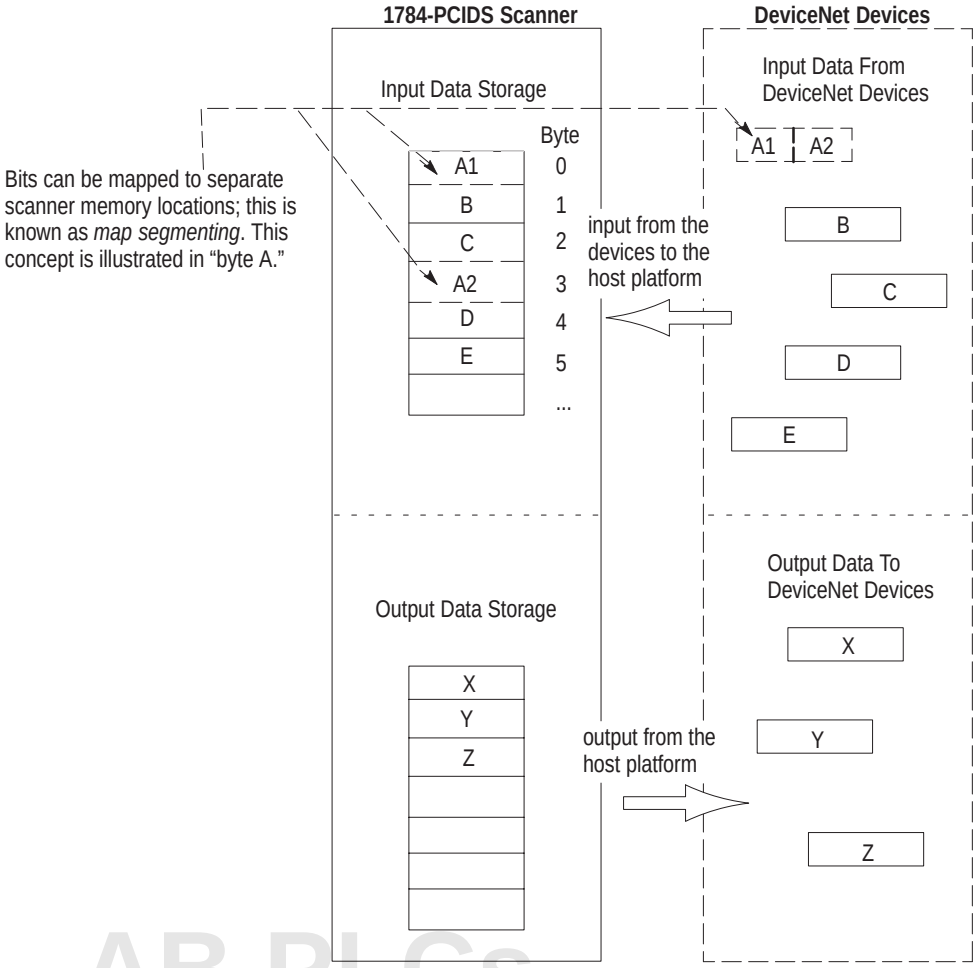
A change of state message is a point-to-point transfer of data sent whenever a data change occurs or at a user-configurable heartbeat rate. This does not solicit response data, but may receive an acknowledge message.

A cyclic message is sent only at a user-configurable rate.

Your scanner communicates with scanned device via **strobe, poll, change of state, and cyclic** messages. It uses these messages to solicit data from or deliver data to each device. Data received from the devices, or input data, is organized by the scanner and made available to your host platform. Data received from your host platform, or output data, is organized in the scanner and sent on to your devices.

Important: Throughout this document, *input* and *output* are defined from the host platform's point-of-view. Output is data sent from the host platform *to* a device. Input is data collected by the host platform *from* a device.

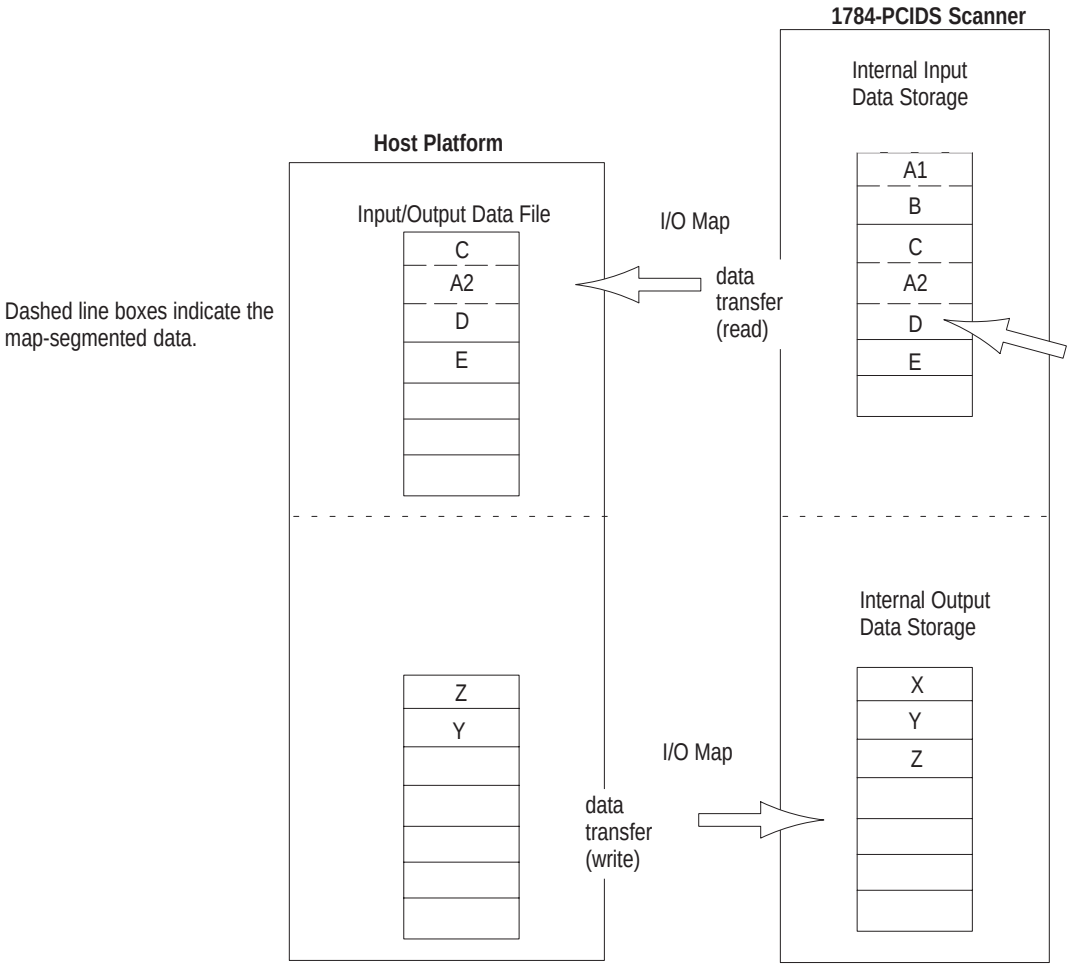
Important: All data sent and received on a DeviceNet network is in byte lengths. A device may, for example, produce only two bits of input information. Nevertheless, since the minimum data size on a DeviceNet network is one byte, two bits of information are included in the byte of data produced by the device. In this case (only two bits of input information), the upper six bits are insignificant.



Communicating with Your Host Platform

Your host platform communicates with the scanner via **input and output image tables**. Input data, gathered from the network's devices, is organized within the scanner and made available for the processor to "read" from the input image table.

The scanner does not send data to your host platform. Data transferred between your scanner and host platform must be initiated by the host platform. Output data is sent, or "written," to the scanner by your processor by placing the data in the output image table. This data is organized in the scanner, which in turn passes the data on to your scanned devices via strobe, poll, change of state, or cyclic messages.



What Scanner Data Tables Are and What They Do

To manage the flow of data between your processor and a network's devices, the scanner uses the following data tables.

- Scanner Configuration Table
- Scan List Table
- Device Input Data Table
- Device Output Data Table
- Device IdleTable
- Device Failure Table

You may configure two of these data tables through DeviceNet Manager software. These tables are stored in the scanner's non-volatile memory and used to construct all other data tables:

- Scanner Configuration Table (SCT)
- Scan List Table (SLT)

Scanner Configuration Table (SCT)

The SCT controls basic information your scanner needs to function on your DeviceNet network. It tells your scanner:

- if it can transmit and receive input and output data
- how long it waits after each scan before it scans the devices again
- when to send out its poll messages

Scan List Table (SLT)

The SLT supports I/O updating for each of your devices on the network. It also makes it possible for your scanner to make device data available to your SLC processor. The SLT tells your scanner:

- which devices to scan (node addresses)
- how to scan each device (strobe, poll, change of state, cyclic or any valid combination)
- how often to scan your devices
- exactly where in each device's total data to find the desired data
- the size of the input data/output data
- exactly where to map the input or output data for your host platform to read

DeviceNet Manager Software as a Configuration Tool

DeviceNet Manager software configures the scanner's data tables. This software tool connects to the scanner via the DeviceNet network and an RS-232 interface module (1770-KFD) or PC Card (1784-PCD, 1784-PCID, 1784–CPCID).

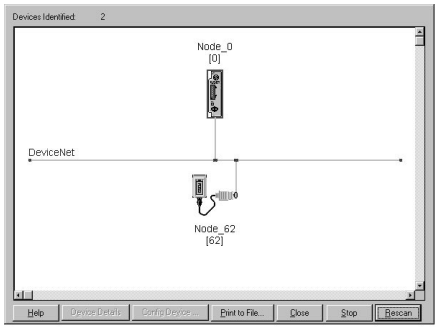
I/O communication is the exchange and transfer of input and output data.

The interscan delay is the time between scans. It is the time the scanner will wait between the last poll message and the start of the next scan cycle.

The background poll ratio sets the frequency of poll messages to a device in relation to the number of I/O scans. For example: if the ratio is set at 10, that device will be polled every 10 scans.

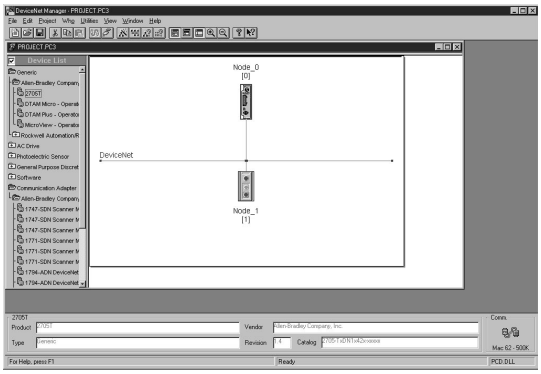
User configured tables	Data in this table	DeviceNet Manager configuration screen	See page
SCT	▪ basic operation parameters ▪ inter-scan delay ▪ background poll ratio	1784-PCIDS Module Configuration	3–3
SLT	▪ device-specific identification data	Scan List Editor (SLE)	3–8
	▪ data transfer method ▪ transmit/receive data size	Edit Device I/O Parameters	3–13
	▪ input and output data source and destination locations	These values can be configured automatically through the Auto Map function on the SLE or manually through the Data Table Map.	3–8 for SLE information or 3–16 for data table map information

1784-Family Scanner Configuration Screen-Map

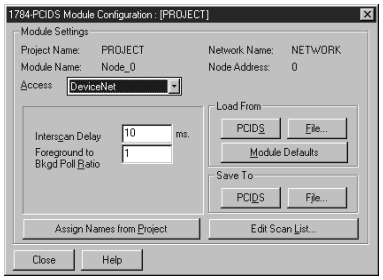


To access the Module Configuration screen from a Network Who, double click on the scanner icon.

The main dialog screen can be accessed through either the **Network Who** or **Project View.**

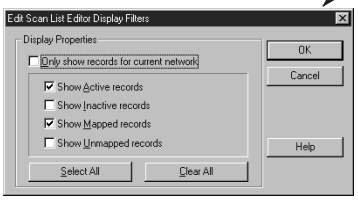


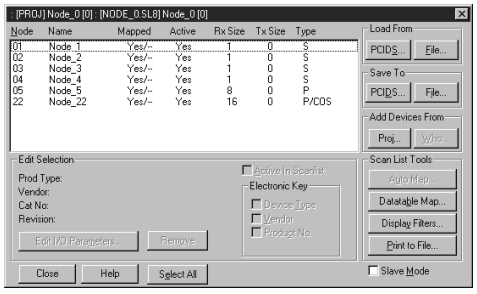
To access the Module Configuration screen from a Project View, double click on the scanner icon.



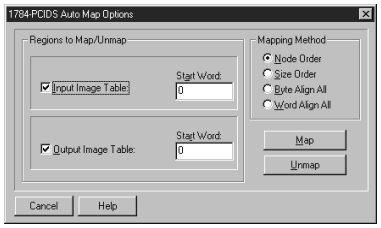
To access the Scan List Editor, choose **Edit Scan List**.

To edit the Scan List Editor display properties choose **Display Filters**.

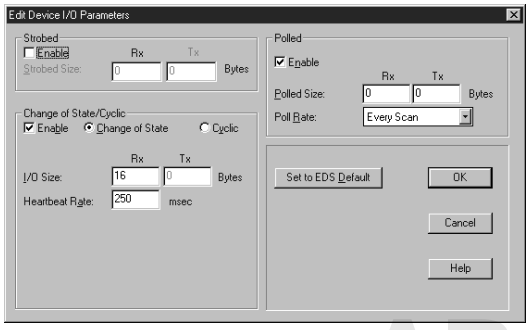




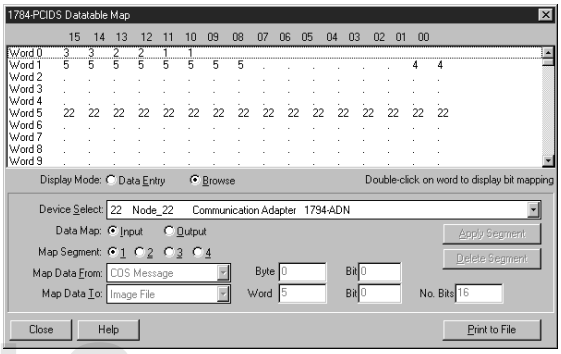
To have DeviceNet Manager software automatically map your device data, choose **Auto Map**.



To edit devices' I/O parameters, choose **Edit I/O Parameters**.



To view/edit your scan list's data table map, choose **Data Table Map**.



What's Next?

Chapter 2 covers the configuration-process planning stage through a data-mapping example. Chapter 3 details the configuration screens and how to use them. Appendix A lists the possible error messages you may see when mapping your I/O.

We recommend that you:

- use chapter 2 to become familiar with data mapping.
- use chapter 3 before configuring your scanner to become familiar with the configuration procedure using the software.
- use appendix A to correct scan list problems prompted by error messages.

Configuring Through DeviceNet Manager Software

What's in This Chapter

This chapter presents a summary and entry procedure for each DeviceNet Manager software scanner-configuration screen.

What You Need to Know

To configure your scanner, you should understand how to use these DeviceNet Manager software screens:

- Module Configuration
- Scan List Editor
- Edit Scan List Editor Display Filters
- Edit Device I/O Parameters
- Auto Map
- Data Table Map
- Upload
- Download

Beginning the Configuration Process

The scanner configuration process begins on the Module Configuration screen. The configuration process will follow these steps:

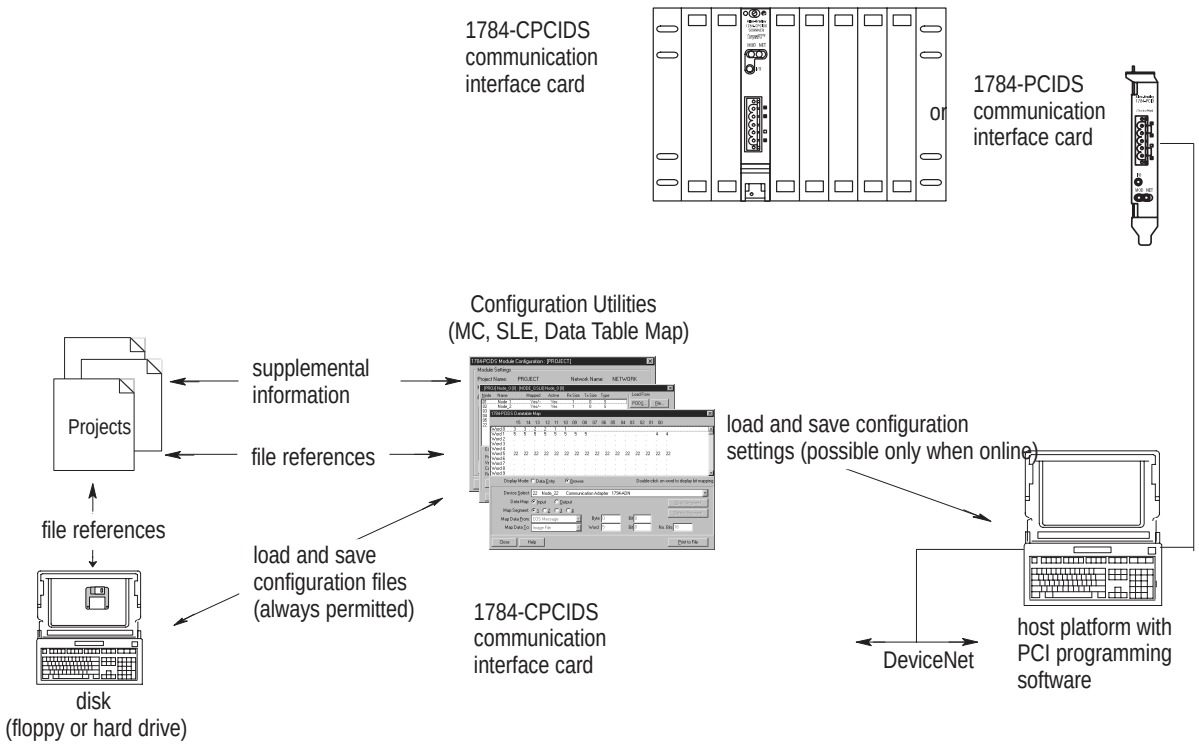
- set your scanner's basic I/O transfer parameters
- setup and/or edit your scan list
- view your finished scan list

Important: We recommend that you are familiar with data mapping and have a mapping scheme planned for your DeviceNet network before continuing. We further recommend that you thoroughly read the following procedures before attempting to configure your scanner.

Online and Offline Configuration

You can configure your scanner module in an online or offline mode. The following illustrates a typical process for each mode.

- Online configuration
  1. Load settings into the configuration utility (editor)
     - from a previously stored file.
     - from a previously stored file referenced in a project.
     - from the PCIDS or CPCIDS (scanner module's non-volatile memory).
  2. Save settings to the PCIDS/CPCIDS.
  3. (optional) Save settings to a file.
     This file can be "stand alone" or associated with a project.
- Offline configuration
  1. Enter all device data and configuration settings.
  2. Store settings in the project.
     Settings are saved using file references. Depending on the configuration screen you are saving, extensions can be *.sm8, *.sl8, *.lr8, *.mr8, or *.clc.

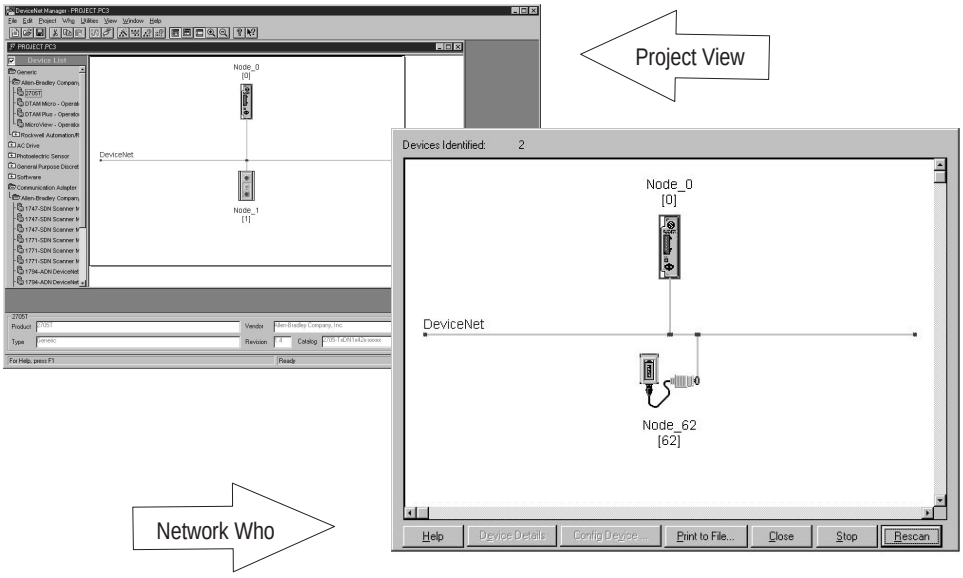


Configuring Your 1784-Family Scanner

Use the Module Configuration screen to configure parameters associated with the scanner itself and to gain access to other configuration screens.

Accessing the Module Configuration Screen

To access the Module Configuration screen, double-click on the scanner icon.



When there is more than one scanner in the Project or Network Who screen, you can tell what scanner a device belongs to by the color that surrounds the device. You can also place the cursor over the device until the yellow box is activated with the Product Type information.

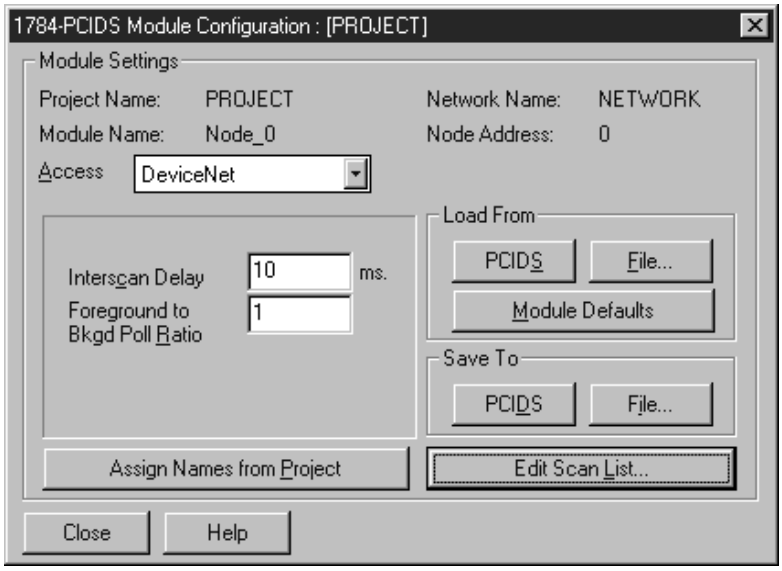
For example, a device highlighted in red belongs to the scan list in the scanner highlighted in red.

A number also appears in the upper right corner of a device indicating the scan list to which it belongs.

Important: The colors surrounding a device or scanner are arbitrary and indicate nothing more than the scanner/device relationship.

You see this screen.

The scan list editor title bar indicates (in parenthesis) where the data comes from (file, project, PCIDS, CPCIDS, or Who).



The Module Configuration screen allows you to set the scanner's module operational parameters.

Setting the Module's Operational Parameters

1. Enter the time the scanner waits between scans (between 2 and 9000 milliseconds) in the Interscan Delay edit box.

   The default Interscan Delay is 10 milliseconds.

2. Enter the ratio of foreground to background polls (between 1 and 65535) in the Foreground to Bkgd Poll Ratio edit box.

   The default poll ratio is 1.

   Devices can be polled at a background rate instead of every scan. Whether a device is polled every scan or at a background rate is determined in the Edit I/O Parameters screen discussed on page 3–13. For example, if the value of 5 is set, the scanner polls the selected device(s) once every five scans.

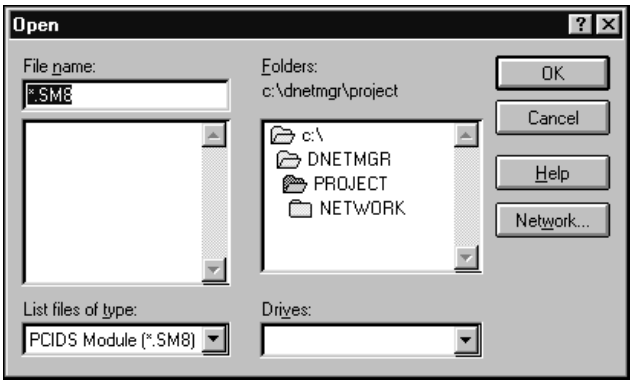
3. Set the loading options (files with an .sm8 extension):

   A. To load data from your scanner's non-volatile memory, in the Load From field, choose **PCIDS** or **CPCIDS**.

   The screen is automatically updated with what was received from the scanner.

   B. Load data from a file in your pc, in the Load From field, choose **File**.

You see a screen similar to this one.



You will only see the **Network** button if your pc is connected to a network.

Select the file you wish to load and choose **OK**.

C. To load module defaults from your scanner, in the Load From field, choose **Module Defaults**.

With step C, the Module Configuration screen is automatically updated. The title and status bars will reflect the change.

From title bar 

From status bar 

4. From the Access drop list, choose the means by which DeviceNet Manager software will access the network for configuring your scanner.

Currently the DeviceNet network is the only selection available.

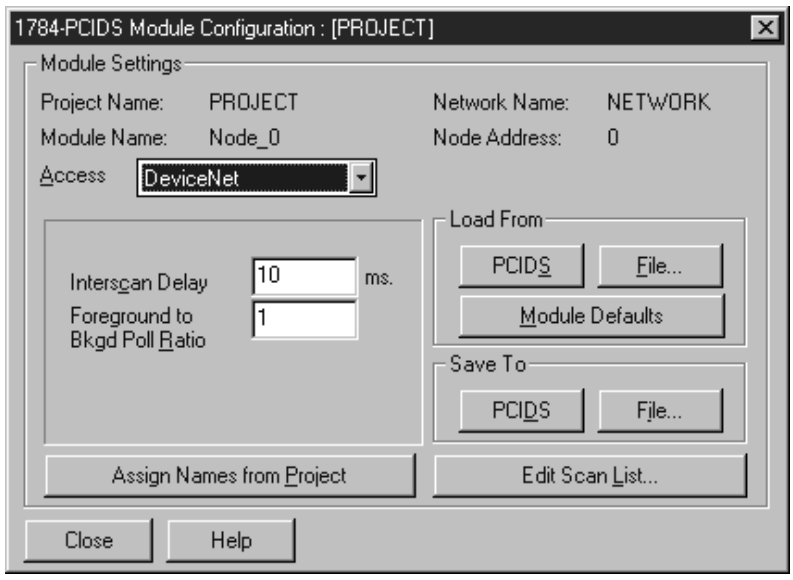
5. Save your data:

To	In this Field	Choose
Save data to your scanner's non-volatile memory[1]	Save to	**PCIDS** or **CPCIDS**
Save data to a file in your pc	Save to	**File**

[1] This induces a flash-memory update; the scanner must be in idle mode.

Assigning Names From the Project

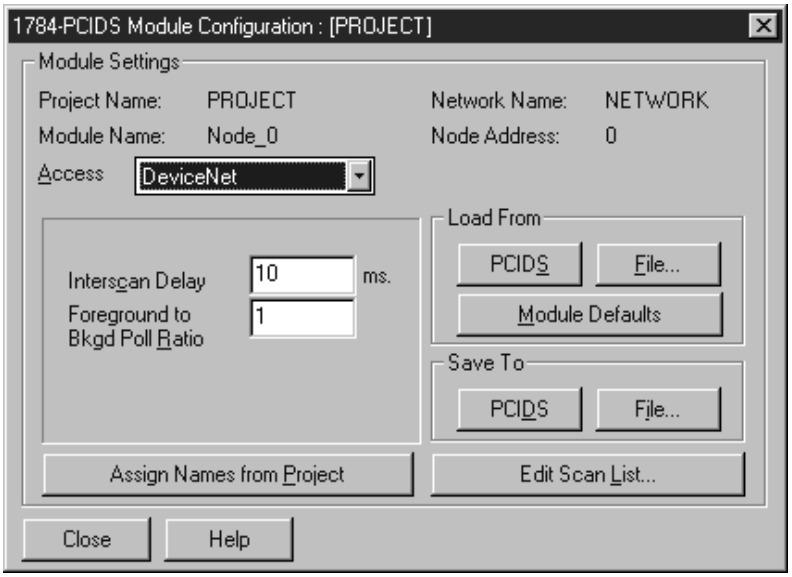
To assign the project names you specified in the Project View screen to the configuration file, choose **Assign Names from Project**. Names include project, module, and network.



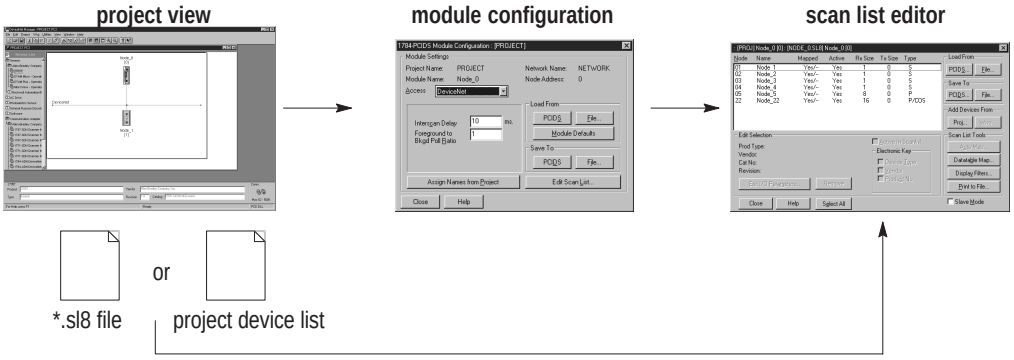
The Module Configuration screen automatically updates with the names from the project.

Important: You can only assign names from a project when you access the Module Configuration screen through the Project View screen, not the Network Who screen.

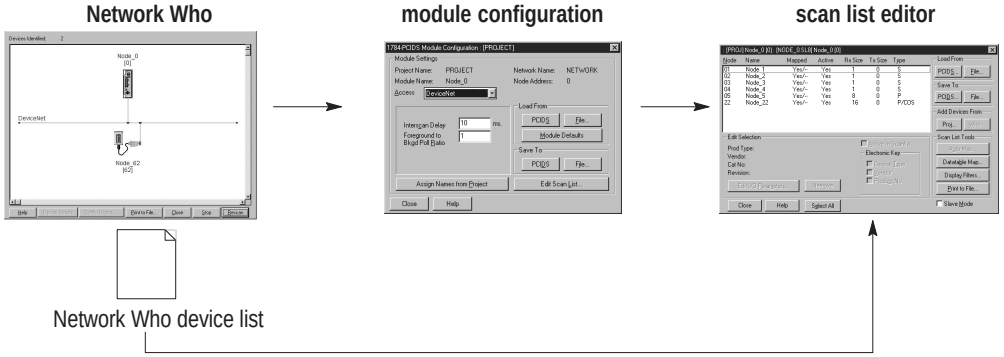
Accessing the Scan List Editor Screen



Entering the Scan List Editor Screen Through a Project



Entering the Scan List Editor Screen Through Network Who



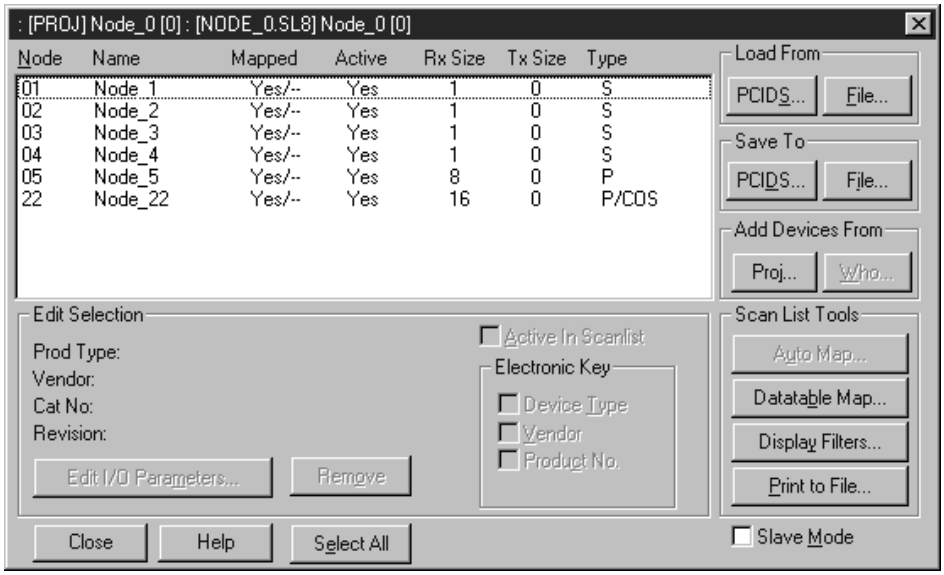
Using the Scan List Editor Screen

The Scan List Editor screen displays a summary of the network selected in the Module Configuration screen.

For information about	See page
Scan list editor functions	3–8
Removing devices from the scan list	3–9
Viewing device information in the scan list	3–9
Adding devices to the scan list from the Scan List Editor screen	3–11
Configuring a device in the scan list	3–13
Determining data-mapping preferences with auto map	3–15

Scan List Editor Functions

The Scan List Editor screen displays a summary of the network residing on the channel selected in the Module Configuration screen and allows you to determine I/O and data-mapping preferences.

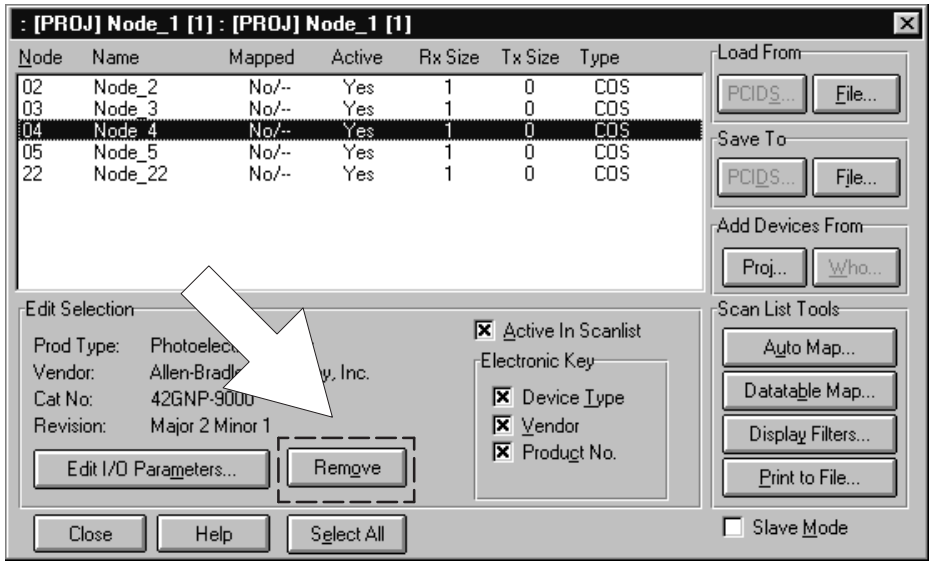


▶ The Scan List Editor screen supports a multiple-selection method. You can select multiple devices for edit at one time (these devices do not have to be consecutive). For example, you can choose nodes 1 and 2, then skip to nodes 5 and 10. You do not have to choose the nodes between 2 and 5 or 5 and 10. Highlight the specific nodes or range of nodes then choose the desired function.

When you choose **Slave Mode**, the scanner becomes enabled to be placed in another scanner's scan list as a slave device.

Removing Devices from the Scan List

To remove devices from the scan list in the Scan List Editor screen, highlight the device(s) you want to eliminate and choose **Remove**.



Viewing Device Information in the Scan List

1. Set the loading options (files with an .sm8 extension):

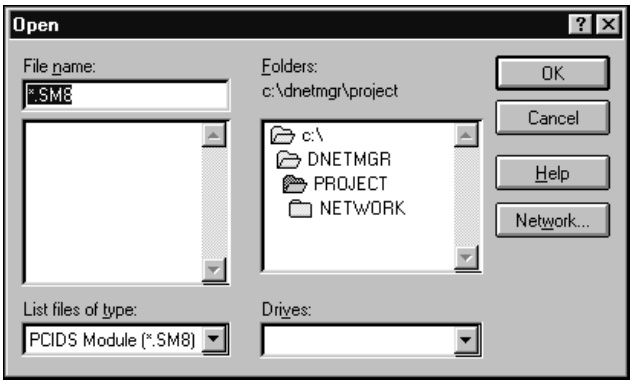
   Important: File operations are permitted online and offline. However, if you are offline, you must save or load your configuration settings to or from a file; you cannot save or load to PCIDS or CPCIDS.

   A. To load data from your scanner's non-volatile memory, in the Load From field, choose **PCIDS** or **CPCIDS**.

   The screen is automatically updated with what is received from the scanner.

   B. To load data from a file in your pc, in the Load From field, choose **File**.

You see a screen similar to this one.

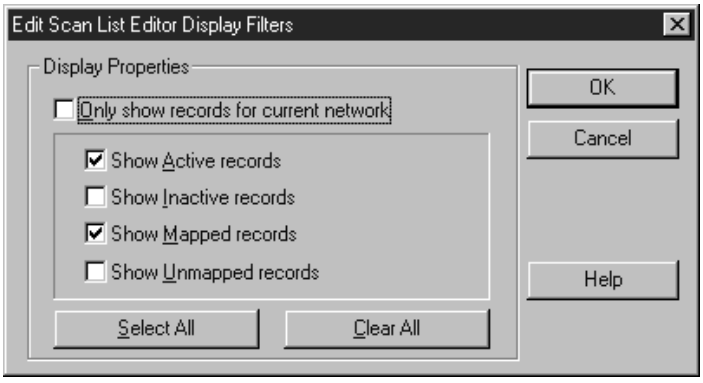


Select the file you wish to load and choose **OK**.

2. Click on the device you wish to view so it is highlighted.
3. Click on the Active in Scanlist check box to include the device in the scan cycle.
4. Click on the appropriate check boxes in the Electronic Key field to record information about the device that you want to store. (This may be useful in preventing someone from entering the wrong type of device into the network if a device has to be replaced or changed.)

   These items are a list of criteria that you can customize to fit your application's specific needs. An "X" in an item's box indicates that it is an active keying parameter. These selections are hierarchical in descending order. For example, you cannot choose Vendor without Device Type.
5. To edit the Scan List Editor display, choose **Display Filters**.

   You see this screen.



6. Customize the display by clicking on the box next to your choice(s).

Important: Certain display-property combinations can result in a blank Scan List Editor screen.

7. Choose **OK**.

   You return to the Scan List Editor screen.

8. Save your data:

To	In this Field	Choose
Save data to your scanner's non-volatile memory[1]	Save to	**PCIDS** or **CPCIDS**
Save data to a file in your pc	Save to	**File**

[1] This induces a flash-memory update; the scanner must be in idle mode.

Adding Devices to the Scan List from the Scan List Editor Screen

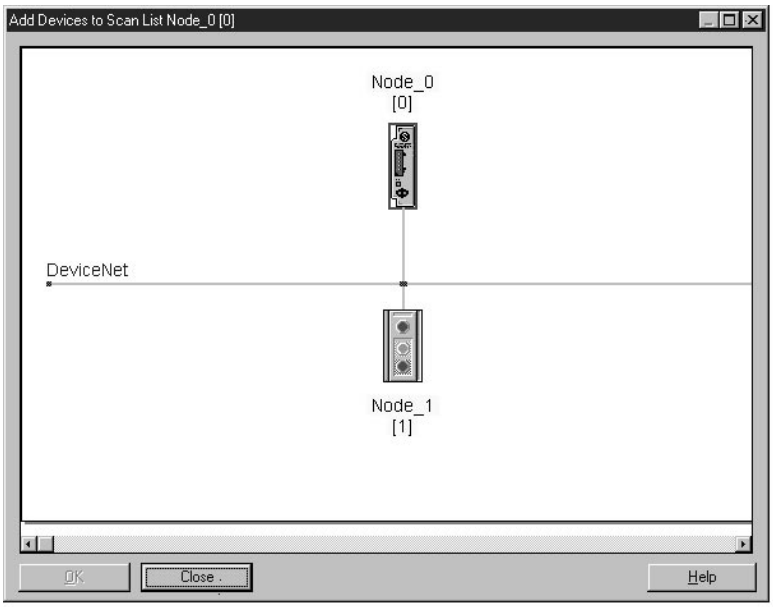
When adding devices to the scan list, the source from which devices are taken depends upon how you entered the scanner configuration screens – through project view or Network Who.

If you entered the configuration screens through	Then devices are added from
Project view	The project
Network Who	The who

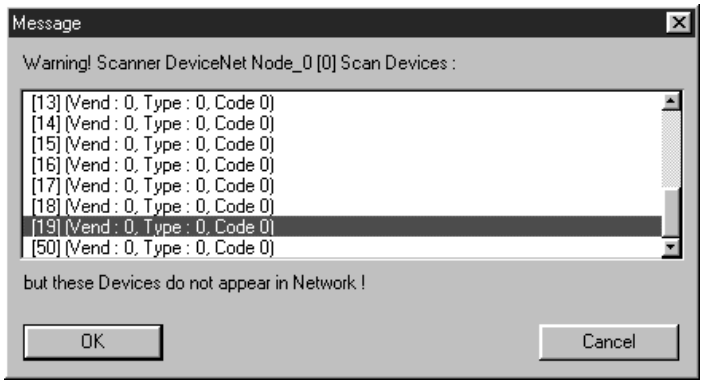
Follow these directions to add devices to your scan list from the scan list editor.

1. Choose the appropriate button in the Add Devices From group (**Proj** or **Who**).

   You see the Add Devices to Scan List screen.

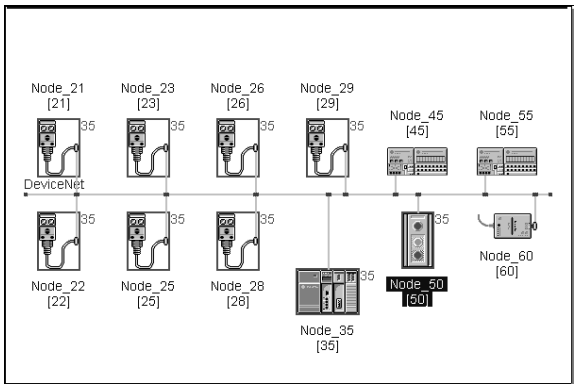


If you see this screen, the devices are currently in the scan list but are not in the network. Select and drag the device(s) you want to add to the scan list over the scanner icon and release them.



2. To add a device to a scanner's scan list, click on the device with the left mouse button and drag it onto the scanner.

Notice the red box and the node number next to the device indicating to which scan list it belongs.



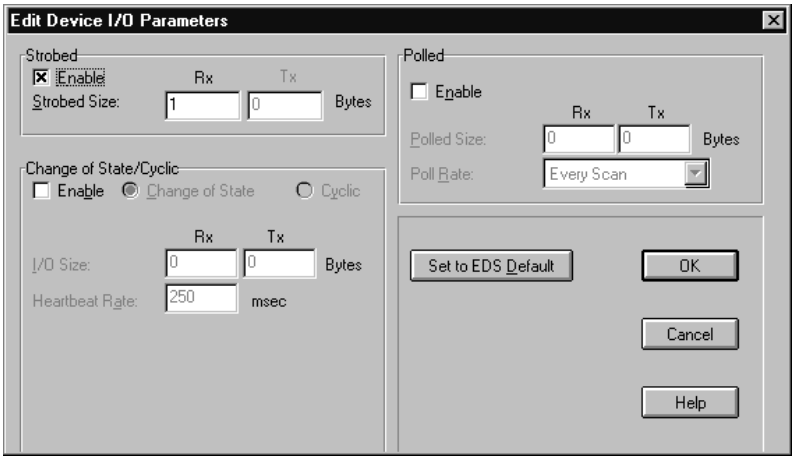
3. Once you've made your changes, choose **OK**.

Configuring a Device in the Scan List

1. To edit your device's I/O communication parameters, select the device and choose **Edit I/O Parameters**.

   When editing your devices, you can select one device or multiple devices at a time. Highlight the desired devices and choose **Edit I/O Parameters**. The entries made are then applied to all highlighted devices.

   You see this screen.



2. Click on the Enabled check box in the appropriate field, depending upon whether your device is strobed, polled, change-of-state, or cyclic.

   Important: Once you click on the check box next to Enabled in the change of state/cyclic field, you must click on the appropriate radio button next to change-of-state or cyclic, depending upon your device and/or application.

For this messaging type	Enter
Strobed	Strobed size
Polled	Polled sizes and poll rate
Change-of-state	I/O size and heartbeat
Cyclic	I/O size and send rate

▶ To have DeviceNet Manager software set the EDS file to the default setting, choose **Set to EDS Default**.

3. Choose **OK** or set an Rx/Tx size by typing it in.

   You return to the Scan List Editor screen.

4. Save your data:

To	In this Field	Choose
Save data to your scanner's non-volatile memory[1]	Save to	**PCIDS**
Save data to a file in your pc	Save to	**File**

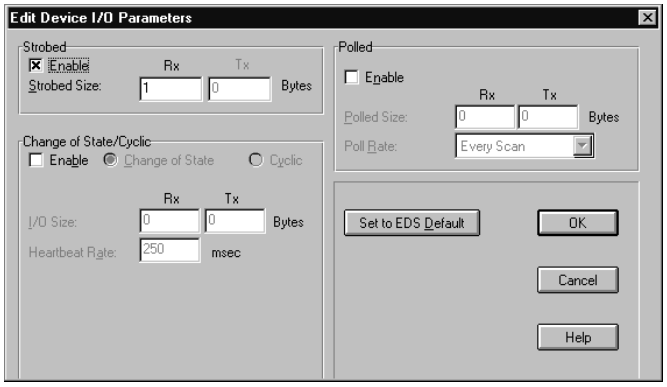
[1] This induces a flash-memory update; the scanmust be in idle mode.

Using the Slave Mode Function

1. Click on the 1784–family scanner you are configuring.
2. Choose **Slave Mode**.
3. Choose **Edit I/O Parameters**.

   You see this screen.

Notice you are editing a slave device.



4. Click on the box Enabled check box in the appropriate field, depending upon whether your scanner will be strobed, polled, change-of-state, or cyclic.

   Important: Once you click on the Enabled check box in the change-of-state/cyclic field, you must click on the appropriate radio button next to change-of-state or cyclic, depending upon your application.

For this messaging type	Enter
Strobed	Strobed sizes
Polled	Polled sizes and poll rate
Change-of-state	I/O size and heartbeat
Cyclic	I/O size and send rate

5. Enter the appropriate sizes and choose **OK**.

   You return to the Scan List Editor screen.

6. Save your data:

To	In this Field	Choose
Save data to your scanner's non-volatile memory[1]	Save to	**PCIDS**
Save data to a file in your pc	Save to	**File**

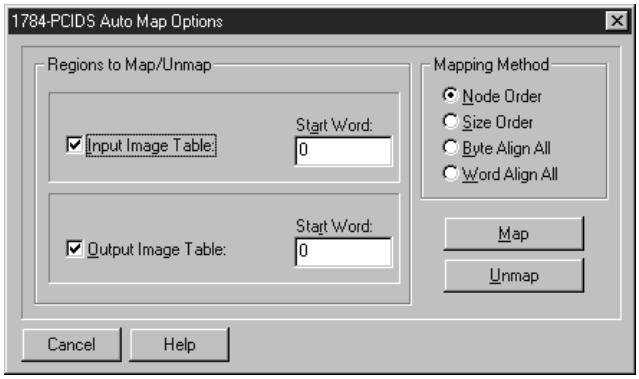
[1] This induces a flash-memory update; the scannermust be in idle mode.

Determining Data-Mapping Preferences with Auto Map

1. Select the device(s) you would like to auto map in the scan list so it is highlighted.
2. Choose **Auto Map**.

   You see this screen.

If you have a device that has already been mapped, you have the option to reverse the process. **Unmap** does not delete the selected device from the scan list, but only removes any data mapping for the selected device.



3. Click on the Input Image Table and/or Output Image Table check box, depending upon your device.

Data type	Designates
Input image	Locations within your image table to which the selected device's data is mapped
Output Image	Where data destined for the selected device resides in your image table's memory

4. From the appropriate drop list, depending upon what you selected in the above step, select the appropriate region to which you want to begin mapping the selected device's input and/or output data.
5. Enter the appropriate word within the region where the data begins in the Start Word edit box.
6. Click on the radio button next to the desired mapping method.

This mapping method	Maps
Node order	Your devices according to their node address (lowest to highest address)
Size order	Your devices according to the size of their I/O data (largest to smallest)
Byte Align All	All data on byte boundaries in incrementing node address order
Word Align All	All data on word boundaries in incrementing node address order

7. To map the selected device's data, choose **Map**.

   You return to the Scan List Editor screen.

About the Data Table Map

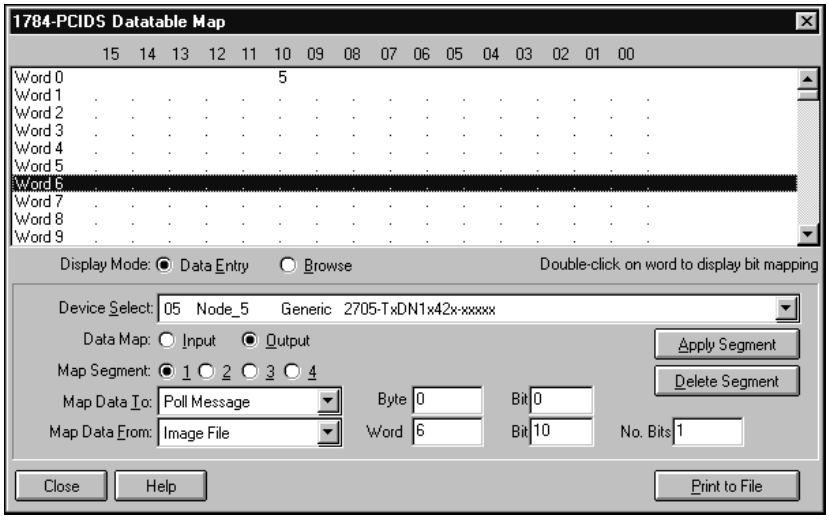
The Data Table Map screen facilitates customized data mapping. You can specify exact memory locations and data sizes (in bits) for your I/O data communication. In addition, it provides a useful browsing tool for scan list data table-map viewing.

For information about	See page
Using the data table map for custom editing	3–17
Mapping specific bits to specific device memory locations	3–19

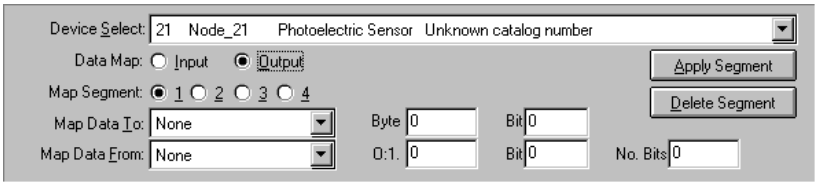
There are three symbols that may be displayed in the data table map:

This symbol	Means
X	Duplicate mapping condition. This will occur if you map more than one bit to the same bit location, mapping one on top of the other.
.	Unmapped bit
5 (or another numeral)	the node address of the device

Input Data Map



Output Data Map



- **Apply Segment** inserts the values from the Data Entry fields into your scan list's data table map.
- **Delete Segment** removes the selected map segment from the data table map.
- **Print to File** prints the data table map to a text file using the .mr8 file extension.

Using the Data Table Map for Custom Editing

You can select specific bits of input data and map them to specific scanner memory locations by following these directions.

1. To edit the data table map, click on the radio button next to Data Entry.

   You enter the Data Table Map screen under browse mode by default.

2. Select a device to edit from the Device Select drop list.

   Whatever device appears in the Device Select field is the device you are editing.

3. Click on the appropriate radio button in the Data Map field depending upon whether you are mapping input or output data.

4. Click on the appropriate radio button in the Map Segment field.

   You can map input data using up to four map segments.

5. Click on the desired input data's location in the Map Data To drop list.

   This indicates to the scanner which type of message will arrive – strobe, poll, change-of-state, or cyclic. This entry must match the type of communication you chose when defining the device's communication characteristics in the Edit I/O Parameters screen.

6. Enter the location of the input data by indicating where in the DeviceNet message to begin mapping input bits in the Byte and Bit edit boxes.

   You need to indicate the exact byte and bit location.

7. Click on the desired location in your scanner's memory where you want to store the input data in the Map Data From drop list.

8. Enter the input data's mapping location by indicating the word and bit at which the data begins in your scanner's memory in the Word and Bit edit boxes.

9. Enter the size of the input data you are mapping to the location in the Map Data To field in the No. Bits edit box.

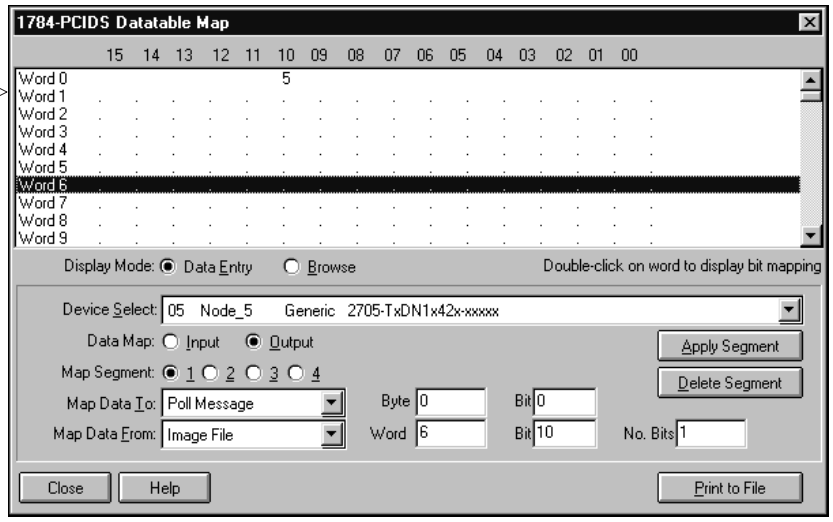
   Important: The input value must be equal to or less than the strobe, poll, change-of-state, or cyclic receive value entered when defining communication characteristics in the Edit I/O Parameters screen.

Mapping Specific Bits to Specific Device Memory Locations

1. To edit the data table map, click on the radio button next to Data Entry.

   You see a screen similar to this one.

Once you've completed the following procedure, the map segment's data is displayed in the appropriate position within this window.



2. Select a device to edit in the Device Select drop list.

   Whatever device appears in the Device Select field is the device you are editing.

3. Click on the radio button in the Data Map field next to output.

   Notice the output data map appears in the map tool's display window.

4. Click on the appropriate radio button in the Map Segment field.

5. Click on the desired type of message to put the output data in the Map Data To drop list.

   You must choose in what type of message the output data is sent to your device.

6. Enter the location of the output data by indicating where in the DeviceNet message to begin mapping output bits in the Byte and Bit edit boxes.

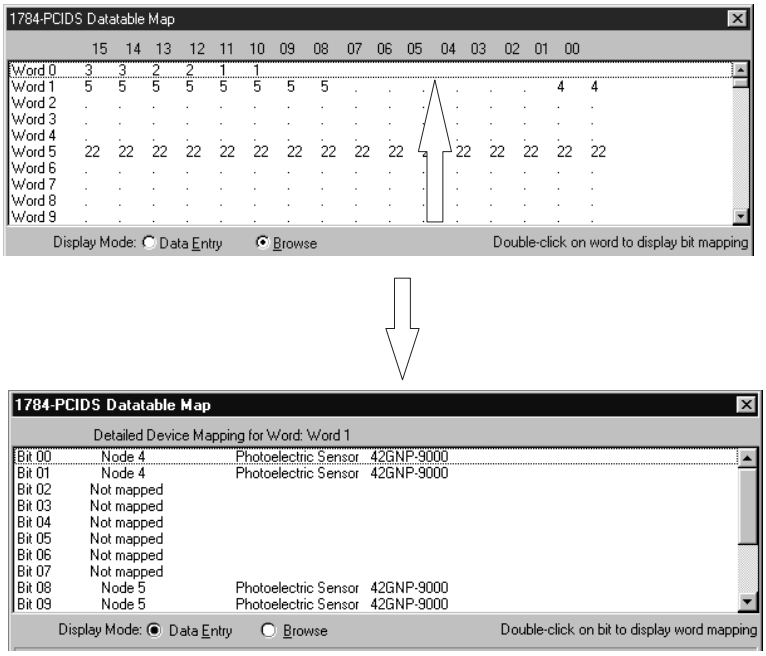
   You need to indicate the exact byte and bit location.

7. Click on the desired location in your scanner's memory to retrieve the output data in the Map Data From drop list.

8. Enter the output data's mapping location by indicating the word and bit at which the data begins in your scanner's memory in the Word and Bit edit boxes.

9. Enter the size of the output data you are mapping from the location in the Map Data To field in the No. Bits edit box.

▶ To view a specific data table word on the bit level, double-click on the desired word. The data table map display window changes to view just those bits within the selected word.



About Your Files

When you save Module Configuration or Scan List Editor information to a file, each is given a specific extension.

- MCC data is stored in **.sm8** files
- Scan list data is stored in **.sl8** files
- Scan list reports are stored in **.lr8** files
- Scan list map reports are stored in **.mr8** files
- Custom launch data is stored in **.clc** files

When you access the scanner configuration screens from Project View, scanner files are stored at the project level.

When you access the scanner configuration screens from Network Who, you choose where to store the scanner files. This is because there is no project data attached to Network Who.

What's Next?

If you feel ready to proceed with your configuration process, apply to your system the procedures discussed in chapters 2 and 3. If you need further information, continue on to the scan list file example in appendix B.

- Photoelectric sensor scan list example
- RediSTATION operator interface scan list example

If You Encounter Error Messages

If you encounter error messages while building your scan list file, refer to the troubleshooting table in appendix A.

- Input maps 1-4 errors
- Input message-type errors
- Output maps 1-4 errors
- Output message-type errors
- Mapping and/or auto map errors

Troubleshooting

What's in This Appendix?

This appendix lists possible DeviceNetManager software error messages specific to scan list configuration.

The first column, Message, is further divided into these categories:

Input Maps 1-4	Error messages resulting from input-data entries for one of your input map segments, 1, 2, 3, or 4
Input Message Type	Error messages resulting from a I/O type mismatch. Parameters set in the Edit Device I/O Parameters screen (strobe, poll, change of state, and/or cyclic) do not match the Map Data From entry in the Data Table Map screen
Output Maps 1-4	Error messages resulting from output-data entries for one of your output map-segments, 1, 2, 3, or 4
Output Message Type	Error messages resulting from a I/O type mismatch. Parameters set in the Edit Device I/O Parameters screen (strobe, poll, change of state, and/or cyclic) do not match the Map Data To entry in the Data Table Map screen
Data Mapping	Error messages resulting from manual or auto data maps that cannot be defined under one of the above troubleshooting categories

Important: The troubleshooting table includes only those errors detected by DeviceNetManager software while using the data-mapping screens. This table does not include general errors particular to DeviceNetManager software itself, nor does it list any errors that may be displayed in a number code on the scanner module itself.

Message	Description	Recommendation
Input Maps 1-4		
Number of strobe bits exceeds strobe Rx size	The no. bit value exceeds the strobe Rx size value.	The no. bits (number of bits) indicated in the input data-map must be equal to or less than the strobe Rx size. Please note that no. bits indicates bits while the strobe Rx size indicates bytes.
Number of poll bits exceeds poll Rx size	The no. bit value exceeds the poll Rx size value.	The no. bits (number of bits) indicated in the input data-map must be equal to or less than the poll Rx size. Please note that the no. bits indicates bits while the poll Rx size indicates bytes.
Data bits mapped beyond end of the input table	Input bits have been mapped outside the boundaries of the input table.	Reevaluate where you would like to map your input bits. Enter the correct values in for word and bit in the output map's Map Data To.
Input Message Type		
Scan type prohibits poll bit assignment Scan type prohibits strobe bit assignment Scan type prohibits strobe and poll bit assignment	The type of I/O communication indicated does not match the input data map's Map Data From.	Determine what mode of communication you wish to use: strobe, poll, change of state, and/or cyclic. Be sure that I/O values are entered for the appropriate communication mode.
Output Maps 1-4		
Number of strobe bits greater than 1	Each device has one bit of information in the output strobe message; therefore, it is not possible to map more than one bit of output data per device into the strobe message.	Reenter the correct value for no. bits (number of bits). This must be either one or zero.
Strobe bit assignment inconsistent with device node address	The bit mapping is incorrect for the designated device.	Match the device's node address to the proper position within the strobe message. For example: node address 1 would be mapped to bit 1 of byte 0.
Number of poll bits exceeds poll Tx size	The value entered for bit exceeds the value entered for poll Tx size.	The no. bits (number of bits) indicated in the output data-map must be equal to or less than the poll Tx size. Please note that the no. bits indicates bits while the poll Tx size indicates bytes.
Data bits mapped beyond end of the output image table	Output bits have been mapped from outside the boundaries of the output image table.	Reevaluate from where you would like to map your output bits. Enter the correct values for word and bit in the output map's Map Data From.

Message	Description	Recommendation
Output Message Type		
Scan type prohibits poll bit assignment Scan type prohibits strobe bit assignment Scan type prohibits strobe, poll, change of state, or cyclic bit assignment	The type of I/O communication indicated does not match the output data Map's Map Data To.	Determine what mode of communication you wish to use: strobe, poll change of state, and/or cyclic. Be sure that the correct I/O values are entered for the appropriate communication mode.
Data Mapping		
No output strobe, poll, change state, and cyclic data size specified for current scan type	The scanner has been instructed to strobe, poll, change of state, or cyclic a message but has not been allotted any bits to carry out the command.	Type in the appropriate value in the output data map's no. of bits.
Poll Tx size: current scan type prohibits poll bit assignment	A poll bit has been assigned without the communication type set as poll.	Set the mode of communication to poll in Edit Device I/O Parameters screen.
Input source byte: bit offset is greater than 7	The source bit value is greater than seven. Eight bits comprise one byte. When counting the number bits in a byte, the first bit begins with zero. Any value greater than seven indicates more than eight bits and therefore more than one byte.	Correctly identify the byte and bit offset for the data element desired. Reenter the corrected values for byte and bit in the input data-map's Map Data From.
Output dest byte: bit offset is greater than 7	The destination bit value is greater than seven. Eight bits comprise one byte. When counting the number bits in a byte, the first bit begins with zero. Any value greater than seven indicates more than eight bits and therefore more than one byte.	Correctly identify the byte and bit offset for the data element desired. Reenter the corrected values for byte and bit in the output data map's Map Data To.

Scan List Example

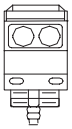
What's in This Appendix?

The following pages combine the data mapping examples from chapter 2 with DeviceNetManager software.

Understanding a Scan List Example

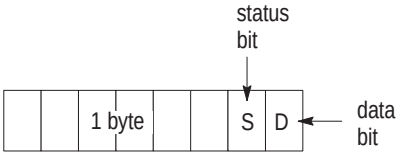
This example illustrates how each Scan List Configuration screen appears when the mapping example's network is configured.

Series 9000 photoelectric sensor

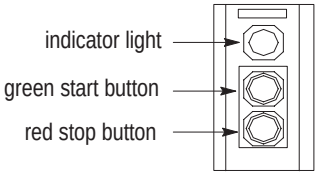


Two input bits from each photoelectric sensor will be mapped. One status bit and one data bit.

The photoelectric sensor produces one byte of input data and consumes one bit of output data.

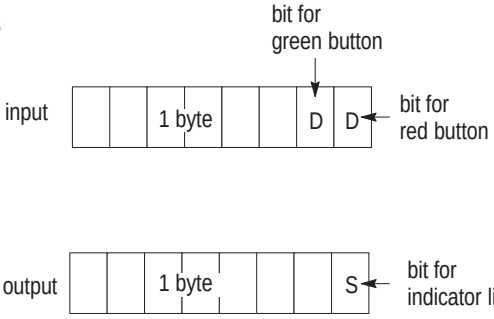


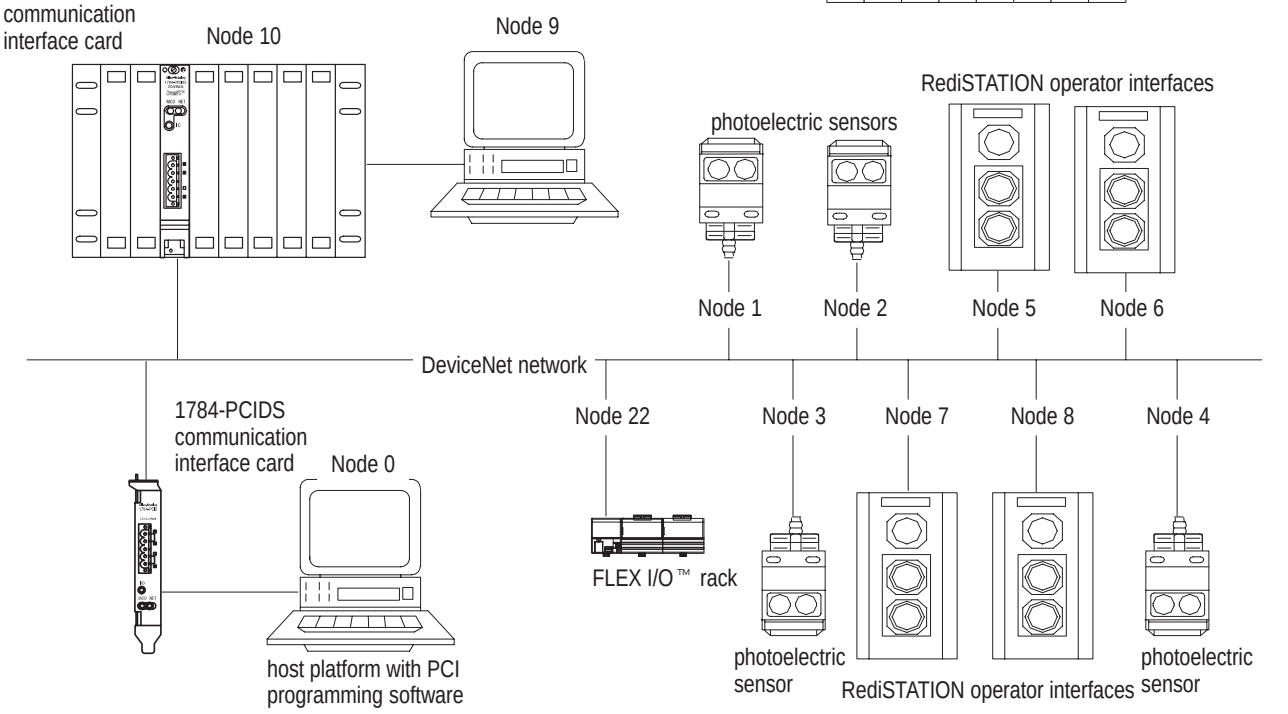
RediSTATION operator interface



Two input bits from each RediSTATION operator interface will be mapped. One bit for the green start button and one bit for the red stop button. One output bit for each operator interface will also be mapped: one bit for each operator interface's indicator light (on/off).

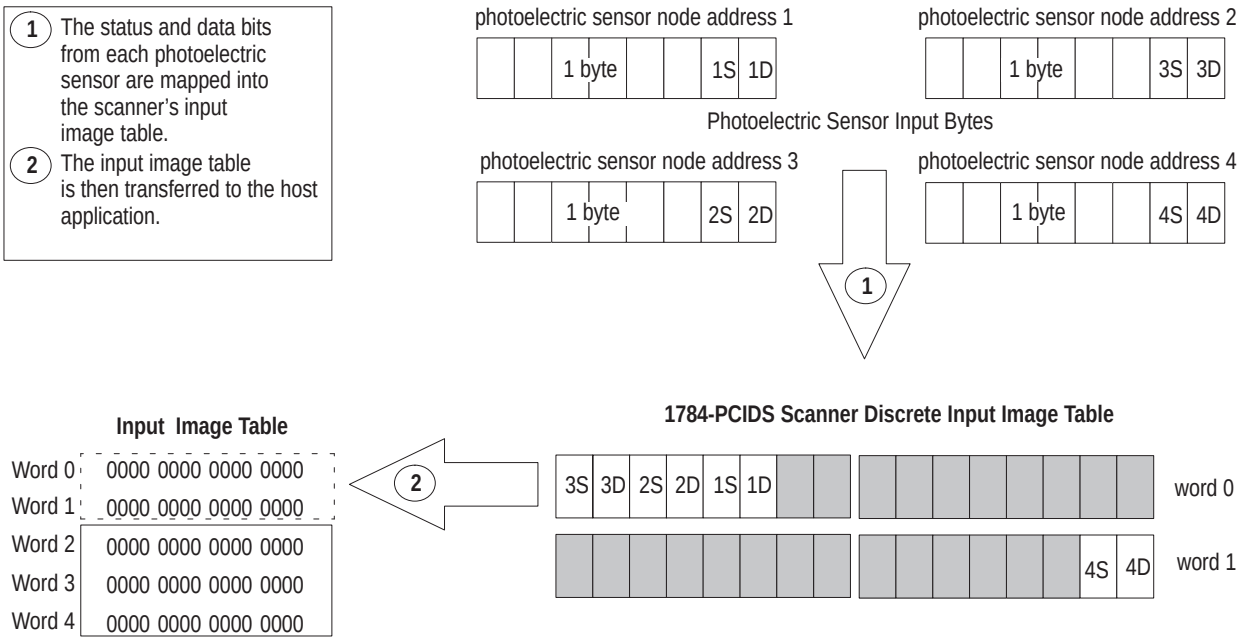
The RediSTATION operator interface produces one byte of input data and consumes one byte of output data.



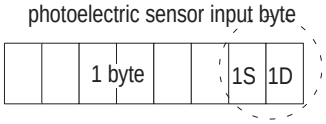


Photoelectric Sensor Input Mapping Scheme Example

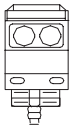
1. The status and data bits from each photoelectric sensor are mapped into the scanner's input image table.
2. The input image table is then transferred to the host application.

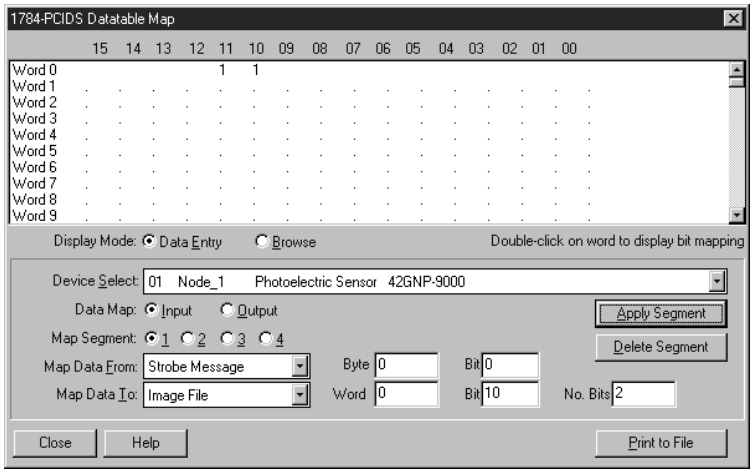


Node Address 1 Input Data



Series 9000 photoelectric sensor





The photoelectric sensor at node address 1 is a strobed device that produces 1 byte of input data.

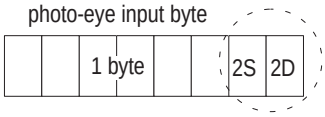
Remember that this node must be enabled in the scan list before it may participate in I/O communication with the scanner.

In map segment 1, input data is taken from the strobe response starting at byte 0, bit 0.

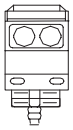
This input data is mapped to the scanner's input image table starting at word 0, bit 10.

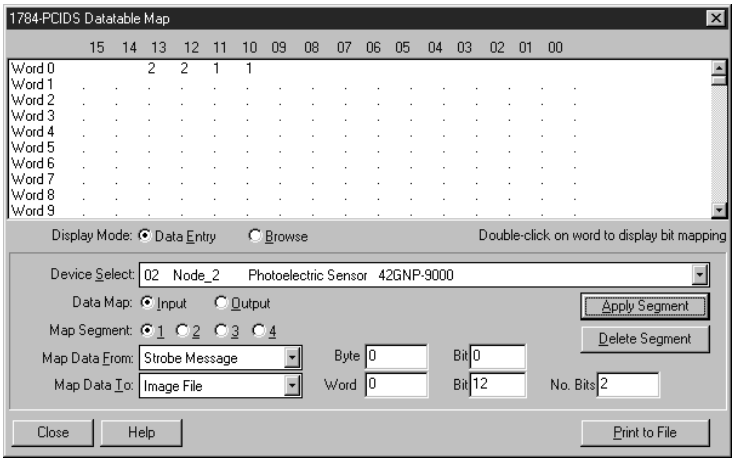
The number of bits mapped is 2 (1 data bit and 1 status bit).

Node Address 2 Input Data



Series 9000 photoelectric sensor





The photoelectric sensor at node address 2 is a strobed device that produces 1 byte of input data.

Remember that this node must be enabled in the scan list before it may participate in I/O communication with the scanner.

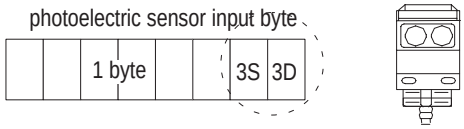
In map segment 1, input data is taken from the strobe response starting at byte 0, bit 0.

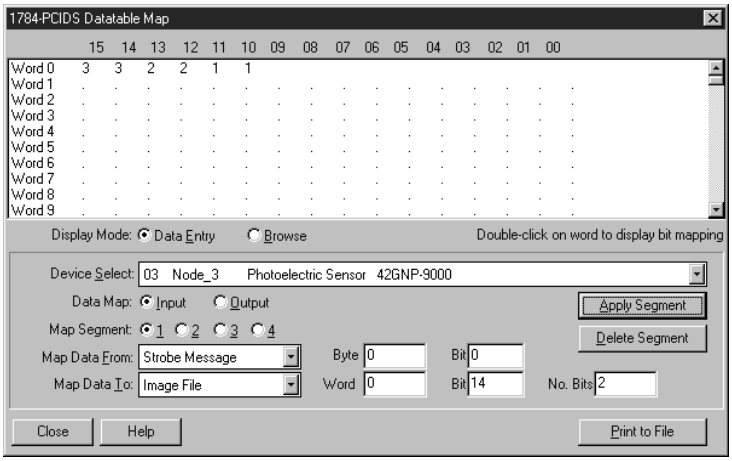
This input data is mapped to the scanner's input image table starting at word 0, bit 12.

The number of bits mapped is 2 (1 data bit and 1 status bit).

Node Address 3 Input Data

Series 9000 photoelectric sensor





The photoelectric sensor at node address 3 is a strobed device that produces 1 byte of input data.

Remember that this node must be enabled in the scan list before it may participate in I/O communication with the scanner.

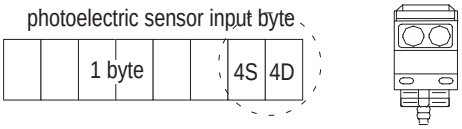
In map segment 1, input data is taken from the strobe response starting at byte 0, bit 0.

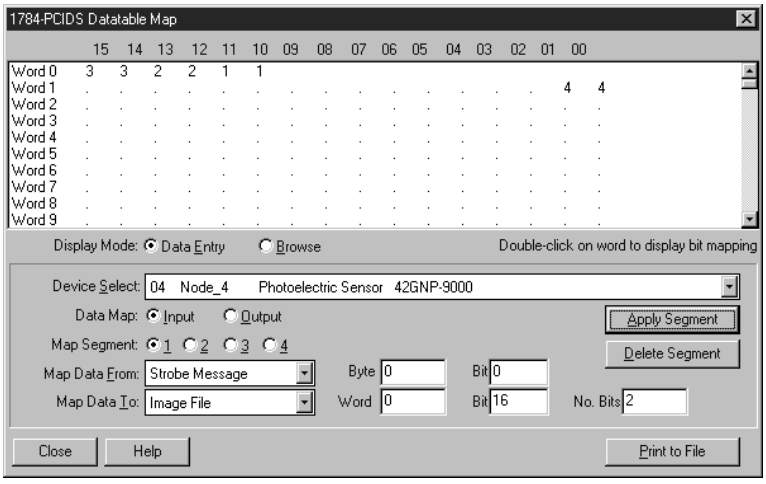
This input data is mapped to the scanner's input image table starting at word 0, bit 14.

The number of bits mapped is 2 (1 data bit and 1 status bit).

Node Address 4 Input Data

Series 9000 photoelectric sensor





The photoelectric sensor at node address 4 is a strobed device that produces 1 byte of input data.

Remember that this node must be enabled in the scan list before it may participate in I/O communication with the scanner.

In map segment 1, input data is taken from the strobe response starting at byte 0, bit 0.

This input data is mapped to the scanner's input iamge table starting at word 1, bit 0.

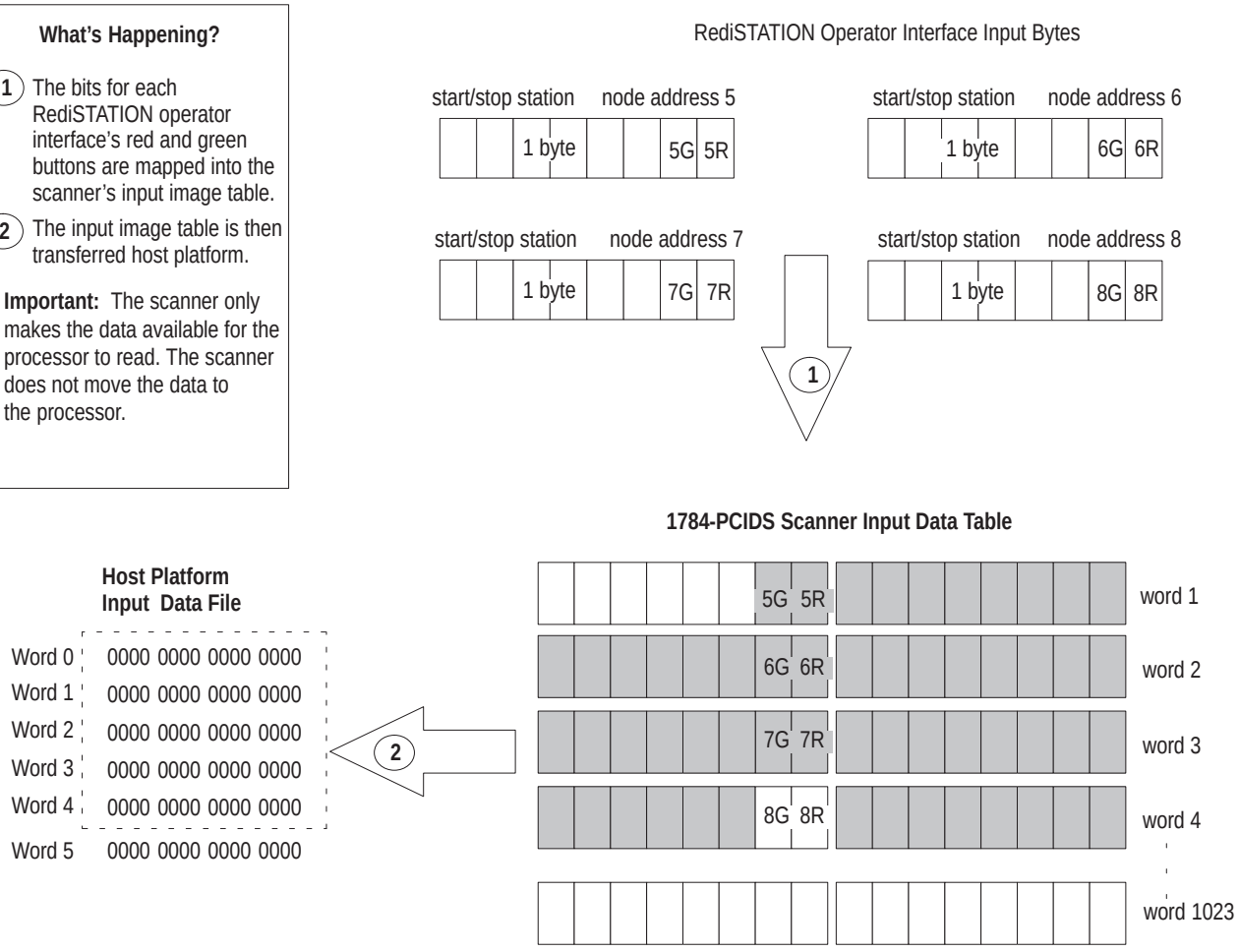
The number of bits mapped is 2 (1 data bit and 1 status bit).

RediSTATION Operator Interface Input Mapping Scheme Example

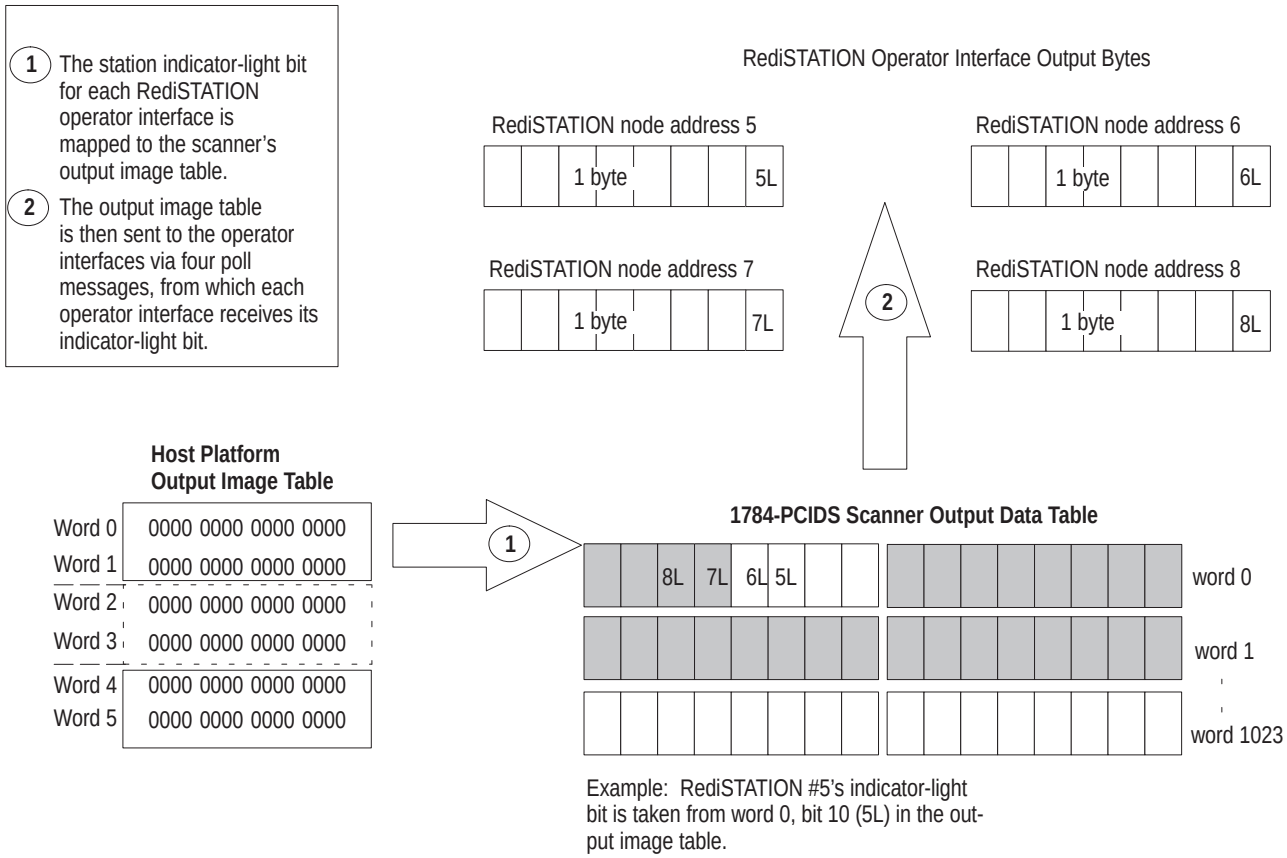
What's Happening?

1. The bits for each RediSTATION operator interface's red and green buttons are mapped into the scanner's input image table.
2. The input image table is then transferred host platform.

Important: The scanner only makes the data available for the processor to read. The scanner does not move the data to the processor.



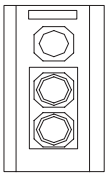
RediSTATION Operator Interface Output Mapping Scheme Example



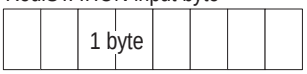
Example: RediSTATION #5's indicator-light bit is taken from word 0, bit 10 (5L) in the output image table.

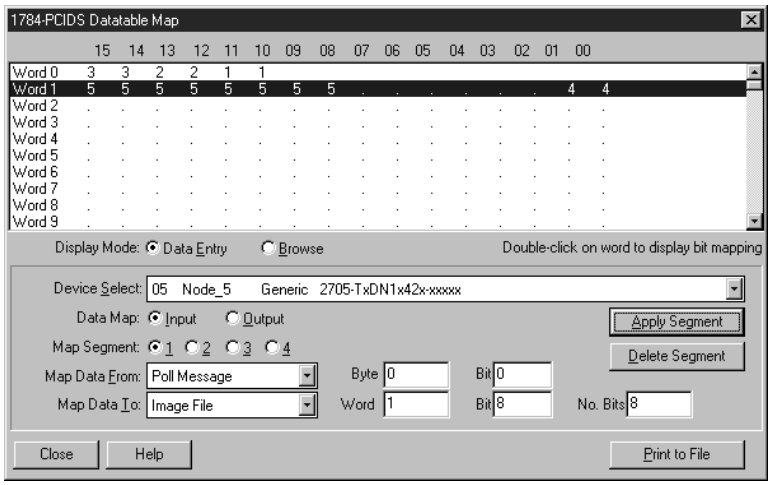
Node Address 5 Input and Output Data

RediSTATION operator interface



RediSTATION input byte





The RediSTATION operator interface at node address 5 is a polled device that produces 1 byte of input data.

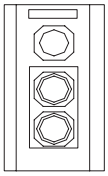
Remember that this node must be enabled in the scan list before it may participate in I/O communication with the scanner.

In map segment 1, input data is taken from the poll response starting at byte 0, bit 0.

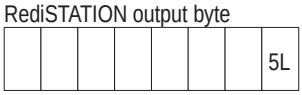
This input data is mapped to the scanner's input image table starting at word 1, bit 8.

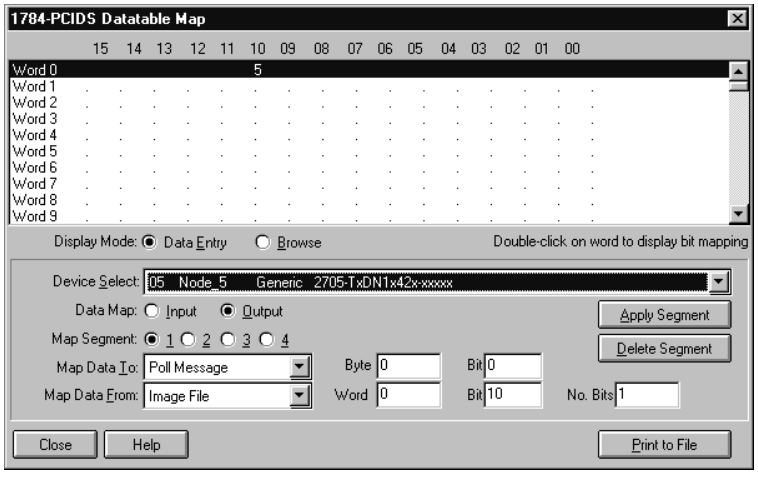
The number of bits mapped is 8.

RediSTATION operator interface



RediSTATION output byte





The RediSTATION operator interface at node address 5 is a polled device that receives a 1 byte poll message containing its output data.

Remember that this node must be enabled in the scan list before it may participate in I/O communication with the scanner.

In map segment 1, output data is mapped to a 1 byte poll message starting at byte 0, bit 0.

This output data is mapped from the scanner's output image table starting at word 0, bit 10.

The number of bits mapped is 1. Each RediSTATION operator interface receives a bit for its indicator light which is either on or off.

FLEX I/O Module Input Mapping Scheme Example

What's Happening?

1. The bits from each FLEX I/O module are mapped into the scanner's input image table.
2. The input image table is then transferred to the host application's input data file.

Important: The scanner only makes the data available for the processor to read. The scanner does not move the data to the processor.

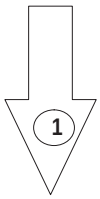
FLEX I/O Module Input Bytes

The FLEX I/O module produces 6 bytes of input data and consumes 4 bytes of output data.

1794-ADN adapter module	1794-IB16 input module	1794-OB16 output module

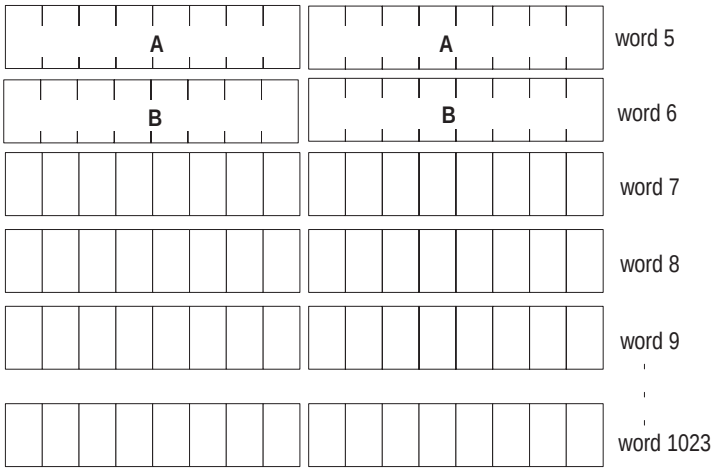
FLEX I/O module node address 22

1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
Module Status **A**		Input Bits from 1794-IB16 **B**		Ignore **C**	



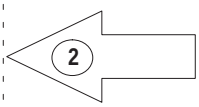
Input Map Segment

1784-PCIDS Scanner Input Data Table



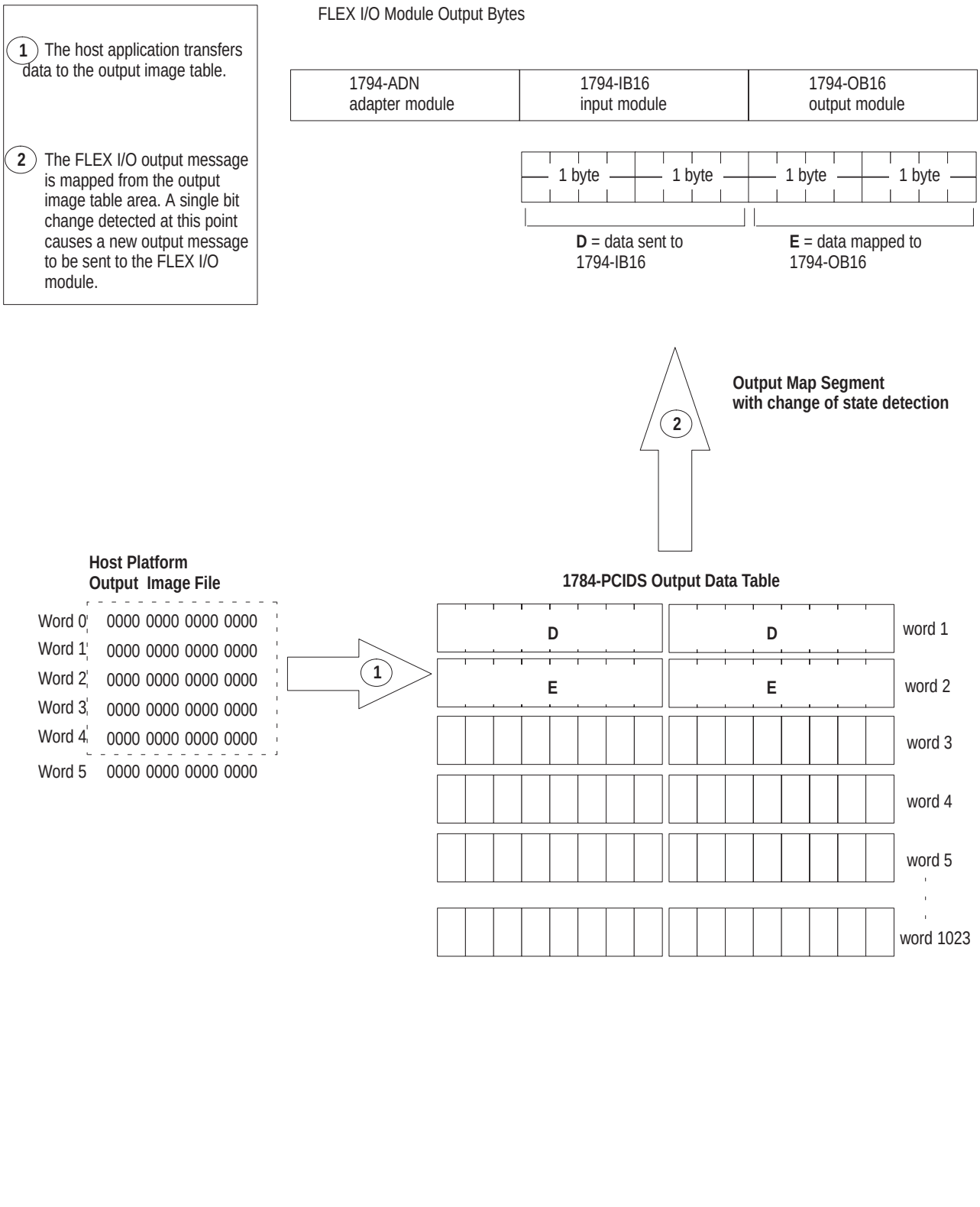
Host Platform Input Data File

Word 0	0000 0000 0000 0000
Word 1	0000 0000 0000 0000
Word 2	0000 0000 0000 0000
Word 3	0000 0000 0000 0000
Word 4	0000 0000 0000 0000
Word 5	0000 0000 0000 0000



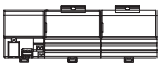
FLEX I/O Module Output Mapping Scheme Example

1. The host application transfers data to the output image table.
2. The FLEX I/O output message is mapped from the output image table area. A single bit change detected at this point causes a new output message to be sent to the FLEX I/O module.

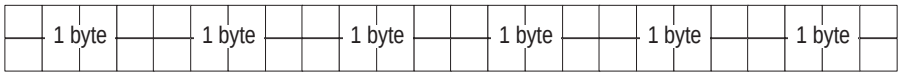


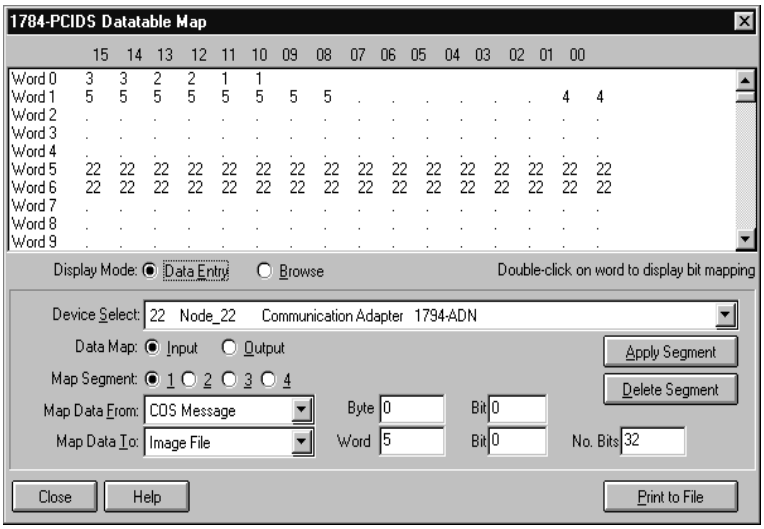
Node Address 22 Input and Output Data

FLEX I/O module



FLEX I/O input bytes





The FLEX I/O module at node address 22 is a change of state device that produces 6 bytes of input data. Only 4 bytes are mapped.

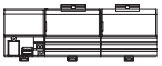
Remember that this node must be enabled in the scan list before it may participate in I/O communication with the scanner.

In map segment 1, input data is taken from the change of state message starting at byte 0, bit 0.

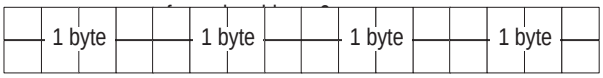
This input data is mapped to the scanner's input image table starting at word 5, bit 0.

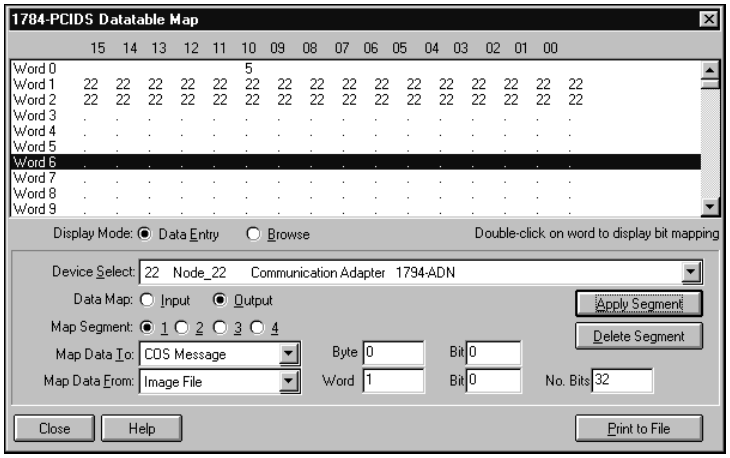
The number of bits mapped is 32.

FLEX I/O module



Change of state message





The FLEX I/O module at node address 22 is a change of state device that receives 4 bytes of a change of state message containing its output data.

Remember that this node must be enabled in the scan list before it may participate in I/O communication with the scanner.

In map segment 1, output data is mapped to a 4 byte chage of state message starting at byte 0, bit 0.

This output data is mapped from the scanner's output image table starting at word 1, bit 0.

The number of bits mapped is 32.

Symbols

Numbers

A

B

C

D

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Cat. No. 1784-PCIDS, –CPCIDS Pub. No. 1784-6.5.28 Pub. Date July 1998 Part No. 955132-82

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☐ Completeness What information is missing?	☐ procedure/step ☐ illustration ☐ definition ☐ example ☐ guideline ☐ feature ☐ explanation ☐ other	☐ info in manual (accessibility) ☐ info not in manual
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