Allen-Bradley

DS/DD Series B Enhanced Bar Code Decoders

(Bulletin 2755)

User 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 purposes of 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 that should be taken into consideration when applying products such as those described in this publication.

Throughout this manual we use notes to make you aware of safety considerations:

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

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

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

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Using this Manual

Chapter Objectives

This chapter gives an overview of the manual, including:

- what the package includes
- contents of manual
- what you need to know
- conventions and terminology
- warnings and cautions
- related publications

What the Package Includes

This manual and interchangeable LED indicator legends in six different languages are shipped with the following decoders:

Catalog Number	Description
2755-DS1A	Single-Head, NEMA Type 1
2755-DD1A	Dual-Head, NEMA Type 1
2755-DS1P	Single-Head, NEMA Type 1, with optional Pharma-Code capability
2755-DD1P	Dual-Head, NEMA Type 1, with optional Pharma-Code capability
2755-DS4A	Single-Head, NEMA Type 4
2755-DD4A	Dual-Head, NEMA Type 4
2755-DS4P	Single-Head, NEMA Type 4, with optional Pharma-Code capability
2755-DD4P	Dual-Head, NEMA Type 4, with optional Pharma-Code capability

The installation chapter shows how to replace the LED legend (if necessary).

The decoder is available in a variety of configurations for factory or customer installation. For example, the decoder is available with an optional LCD Display or I/O Module Board for use with single point I/O.

Contents of Manual

This manual describes how to install and use all versions of the decoder. The general contents of each chapter are:

Chapter	Title	Purpose
1	Using this Manual	Provides an overview of the manual.
2	Decoder Features	Describes the main features of the NEMA Type 1 and Type 4 decoders.
3	Overview of Decoder Operations	Gives an overview of decoder operations, including configuration options, host vs. stand–alone operation, and decoding capabilities.
4	Installing the Decoder and Quick Start	Describes how to install the decoder and supporting equipment.
5	Introduction to AUX Terminal Configuration	Provides an overview of the concepts which must be understood in order to use the decoder configuration software.
6	Configuration: Symbology	Explains how to use the configuration software to set symbology-related variables.
7	Configuration: Scanner Control, Primary Match Table, Discrete I/O	Explains how to use the configuration software to set up scanner(s), define match code strings, and control discrete I/O functions.
8	Configuration: Extended Match Table and Counters	Explains how to use the configuration software to set up and use the decoders advanced extended match code capabilities.
9	Configuration: Display Parameters	Explains how to use the configuration software to enable and format the display of various types of data on the AUX terminal or optional LCD screen.
10	Configuration: Host Message Replacement Rules	Explains how to use the configuration software to further control decoder operations and output with host message replacement rules.
11	Configuration: Host Message Format	Explains how to use the configuration software to format bar code data sent to the host.
12	Configuration: Host Communications	Explains how to use the configuration software to configure HOST port communications.
13	Configuration: AUX Terminal Data Entry	Explains how to use the AUX terminal for manual data entry and display functions.
14	Display & System Configuration	Explains how to use the configuration software to display data and counters, and perform a number of system-level activities.
15	ASCII Host Commands	Defines ASCII commands you can send from a host device to configure and control decoder operations.
16	PCCC Host Commands	Defines PCCC commands you can send from a host device to configure and control decoder operations.
17	Maintenance and Troubleshooting	Provides information on troubleshooting and maintaining the decoder.
18	Specifications	Lists specifications of the decoder.
Appendices, Glossary, Index		

What You Need to Know

No special knowledge is required to read this manual or use the decoder. However, if using the decoder to communicate with a programmable controller or host device, you should be familiar with communication devices, standards (RS-232, RS-422, RS-485) and terminology.

This manual defines commands a host device can send to the decoder and responses to those commands. However, the manual does not include programs which are required to generate the commands.

European Union Directive Compliance

If this product is installed within the European Union or EEA regions and has the CE mark, the following regulations apply.

EMC Directive

This apparatus is tested to meet Council Directive 89/336 Electromagnetic Compatibility (EMC) using a technical construction file and the following standards, in whole or in part:

- EN 50081-2 EMC – Generic Emission Standard, Part 2 – Industrial Environment
- EN 50082-2 EMC – Generic Immunity Standard, Part 2 – Industrial Environment

The product described in this manual is intended for use in an industrial environment.

Terminology

This manual contains many terms that are used within the bar code industry and terms that are unique to the decoder. Refer to the glossary at any time for definitions of these terms.

Conventions Used

The following conventions are used in this manual:

- All configuration menus and screens are approximate renderings of what you see on the terminal screen, although Allen-Bradley reserves the right to make minor modifications to any menu or screen to help improve performance.
- A symbol or word in brackets represents a single key you press on the computer keyboard. For example: [Esc], [Enter], [Backspace].

  On some computers, the [Enter] key is labelled [↵] or [Return].
- The built-in configuration screens of the decoder have many configuration parameters which are referred to throughout the manual. Parameter names are *italicized* within text.
- Information which you can select or enter into the menus or screens appear in the text in **bold** type.

- We have prepared this manual assuming you are using a complete implementation of the product: a dual-head scanner with Pharma-Code capabilities and LCD screen.

  You should apply its contents as appropriate to your own implementation. For instance, references to Scanner B will not apply to single–head decoders.
- We refer to all possible configurations of series 2755 decoders (NEMA Type 1 or Type 4, single or dual-head, with or without the optional LCD screen, or with or without Pharma–Code capabilities) as the decoder.

Related Publications

Other publications to which you may want to refer include:

- User's Manual for the 2755-L7 and -L9 Scan Heads
  Catalog No. 2755-ND002
- User's Manual for the 2755-L4F and -L4R
  Enhanced Medium Speed Scan Heads
  Publication 2755-829
- User's manual for the 2755-LD4 and -LD8 High Performance Visible Laser Diode Scanners
  Publication 2755-832
- Product Data for the 2755-NC16 Gun Adapter
  Catalog No. 2755-2.37
- User's Manual for the 2760-RB Flexible Interface Module
  Catalog No. 2760-ND001
- User's Manual for the 2760-SFC1 Protocol Cartridge
  Catalog No. 2760-ND003
- User's Manual for the 2760-SFC2 Protocol Cartridge
  Catalog No. 2760-ND002
- User's Manual for the 1771-DA ASCII I/O Module
  Publication No. 1771-6.5.13
- User's Manual for the 1771-DB BASIC Module
  Publication No. 1771-6.5.34

Decoder Features

Chapter Objectives

This chapter describes features of the Dual-Head Bar Code Decoders, including available options and accessories. It covers:

- NEMA type enclosures
- scanner ports
- power supply
- LED indicators
- serial communication ports (HOST port and AUX port)
- LCD display
- discrete input/output modules

NEMA Type Enclosures

The 2755-DS1_ and -DD1_ decoders have NEMA Type 1 enclosures. The 2755-DS4_ and 2755-DD4_ decoders have NEMA Type 4 enclosures. All connections and ports on the NEMA Type 4 enclosure comply with NEMA 4 standards.

Although the installation varies for the NEMA Type 1 and Type 4 decoders, they have the same features and operate identically.

Scanner Ports

Single-head decoders have one port for connecting a scanner. That port is designated Scanner Port A. Dual-head decoders have two ports for connecting scanners. They are designated Scanner Port A and B.

Both ports support scanners from the 2755-L4/L5, -L7/L9, –LD4 and –LD8[1] families with the appropriate cables. The scanners do not require a separate power supply. They receive power from the decoder through the cable. The NEMA Type 1 decoder also supports the 2755-G3 and –G6 Hand-Held Scanners and 2755–LD1 and –LD2 Scanners.[2]

[1] Catalog Numbers are incomplete. The 2755-L4/L5, –L7/L9, –LD4 and LD8 scanners are available in different configurations.

[2] The 2755-G3 and –G6 Hand-Held Scanners and 2755–LD1 and –LD2 Scanners require the 2755-NC16 Gun Adapter.

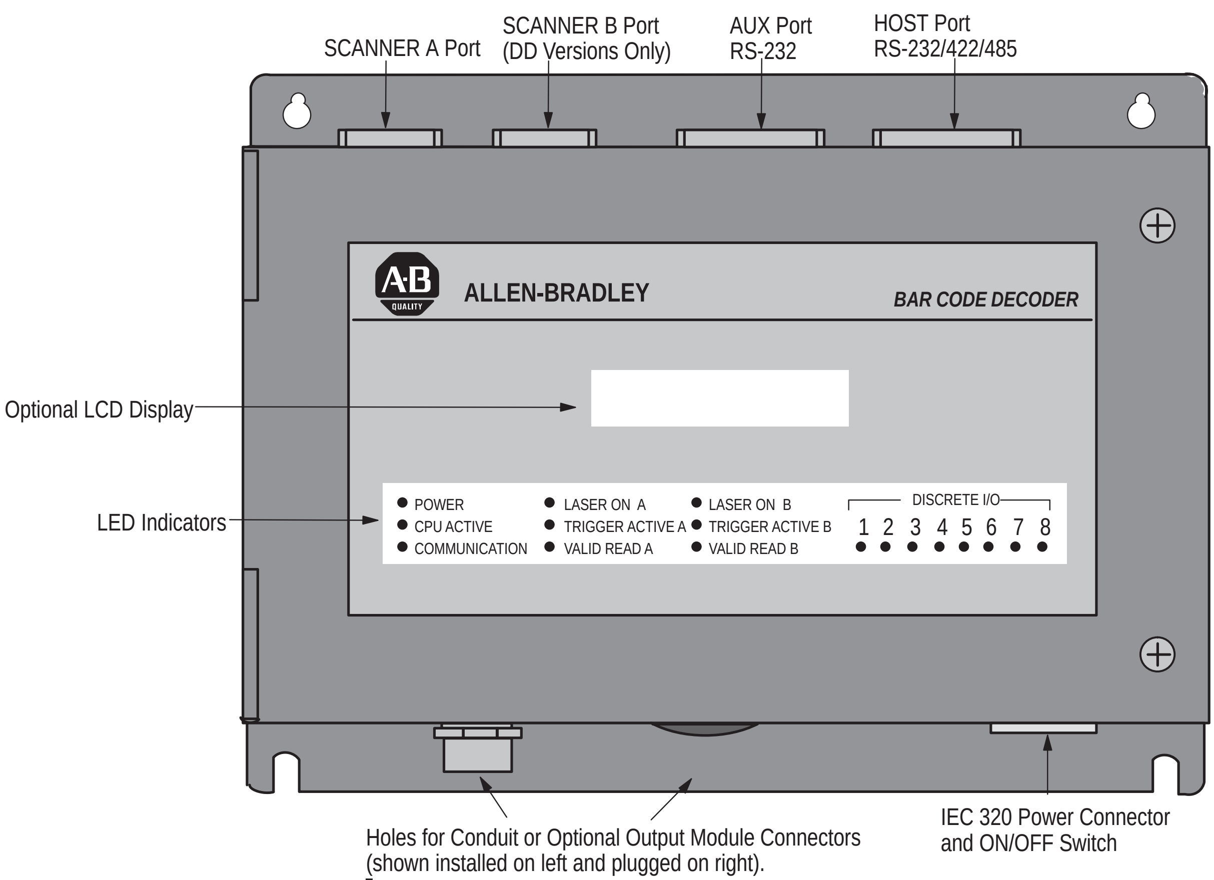
Dual-head scanners can operate in two modes:

- **Independent Mode**
  Both scanners operate independently of one another, each using a separate trigger source (Scanner A and Scanner B).
- **Coordinated Mode**
  Both scanners operate in a coordinated mode, each using the same trigger source (Scanner A).

Power Supply

An internal power supply provides power to both the laser scanner(s) and the decoder. The source voltage may range from 100 to 240 volts AC nominal (50 to 60 Hz). The power supply automatically adjusts to the input voltage.

Figure 2.1
NEMA Type 1 Decoder (Catalog No. 2755-DD1A)



LED Indicators

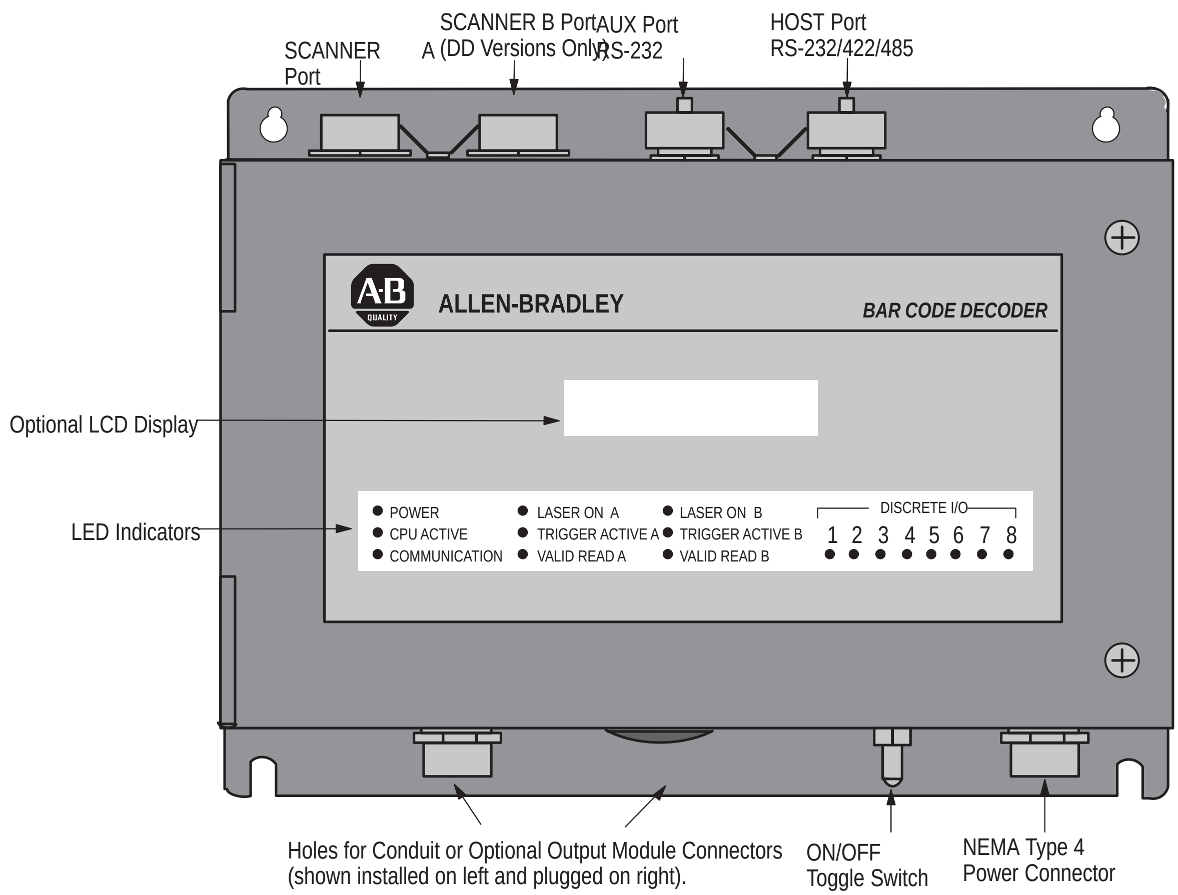
Seventeen front panel indicators provide a visual indication of the operating status of the dual-head decoders. There are fourteen front panel indicators on single-head decoders. Table 2.A defines the color and function of each LED.

Table 2.A
LED Indicators (NEMA Type 1 and Type 4 Decoders)

LED Label	Color	Lights when
Power	Green	The decoder is receiving power.
CPU Active	Green	The CPU is active and running. The LED turns off if a fault condition is detected.
Communications	Yellow	Data is transmitting to or from the AUX port or HOST port.
Laser On A	Red	Scanner A is activated to turn on its laser light source. ①
Trigger Active A	Yellow	The decoder is in triggered mode and scanning has been triggered for Scanner A or Scanner B.
Valid Read A	Green	A valid read occurs from Scanner A.
Laser On B	Red	Scanner B is activated to turn on its laser light source. ①. (Dual-head versions only)
Trigger Active B	Yellow	The decoder is in triggered mode and scanning has been triggered for Scanner A or B. (Dual-head versions only)
Valid Read B	Green	A valid read occurs from Scanner B. (Dual-head versions only)
Discrete I/O (1-8)	Red	Input/output module in position 1,2, 3, 4, 5, 6, 7, or 8 is active.

① The LED will light even if the scanner is disconnected or the Laser On switch for the scanner is in the OFF position.

Figure 2.2
NEMA Type 4 Decoder (Catalog No. 2755-DD4A)



LCD Display

The decoders support an optional 2 line x 20 character per line alphanumeric LCD Display for viewing:

- bar code data
- output counter values
- decoder performance values

The format of the display data is under user control via the configuration screens or host commands.

The LCD Display can be factory installed or ordered as a separate component for customer installation.

AUX Port

The AUX port communicates with a standard ASCII terminal using the RS-232 interface. We refer to this terminal as the AUX terminal. The AUX port can switch between two modes of operations.

Decoder Configuration

The AUX terminal is used to configure and monitor decoder operations.

Manual Data Entry

The AUX terminal is used to:

- enter data at the keyboard when the unattended scanners cannot read a label

  This feature is useful when labels are damaged or missing.
- display messages from the host
- display bar code data, output counters, and decoder status

The decoder features an AUX Terminal jumper on the main logic board to switch between configuration and manual data entry operations. Another way to switch between these two modes is to connect specific pins in the AUX port connector. The port and logic board jumpers are initially set for decoder configuration operations.

Important: The two operational modes described above are mutually exclusive. You can use the port for **either** decoder configuration **or** for manual data entry functions, but not both. Refer to Chapter 13 for additional information.

Host Port

The HOST port supports RS-232, RS-422, and RS-485 (using Allen-Bradley DH485 protocol) interfaces. The HOST port allows the exchange of data between the decoder and a host computer or Allen-Bradley PLC controller.

Power Connector and On/Off Switch

The NEMA Type 1 decoder uses an IEC 320 power entry connector.

The NEMA Type 4 decoder uses a standard 3-pin connector with a separate ON/OFF toggle switch (that is sealed to comply with NEMA Type 4 standards).

Power cord options are available for each decoder and are listed in the Decoder Options section.

Memory Backup

The decoders are designed to retain configuration during short term power interruptions. Controlled discharge of an on-board capacitor supports configuration retention for 6 hours at an ambient temperature of 50°C (122°F), or 50 hours at 30°C (86°F). The capacitor accumulates a charge when power is restored.

An optional battery (catalog number 1747-BA) may be used to retain the configuration without outside power for up to five years. When the optional battery is used, power interruptions (whether intentional or resulting from power supply “glitches”) will have no affect on operating memory.

If the battery is not used, long term power loss (see above) will result in the loss of the Extended Match Code Table configuration, the Primary and Extended Match Code Counters, and the text examples contained in the Host Replacement Rules. Note that the Replacement Rules themselves will *not* be lost, but the test examples you have entered at the bottom of each rule page *will* be lost.

Storage memory configuration is transferred into operating memory on restart if power is lost for a period longer than the on-board capacitor (and, if installed, optional battery) can support. Refer to Chapter 3 for an explanation of decoder memory architecture.

Discrete I/O Modules

The decoders support an optional I/O Module Board with eight positions for output modules. These I/O modules are used to control external AC or DC devices. Conditions that activate the outputs are under user control via the configuration screens or host commands.

All positions accept an output module. Position eight also accepts an input module. You can configure the input module (in position 8) to automatically load scanned bar code data into the match code table. This function is referred to as Autoload Input. Match code functions are described in detail in Chapters 7 and 8.

Each decoder has two conduit holes or optional connectors for wiring the I/O modules.

The I/O Module Board is available in several variations for factory or customer installation. You can order the decoder with the I/O Module Board only for customer installation of specific modules, or with 2 DC outputs and 1 DC input for ”out of the box” applications.

The options available for the NEMA Type 1 and Type 4 decoders are:

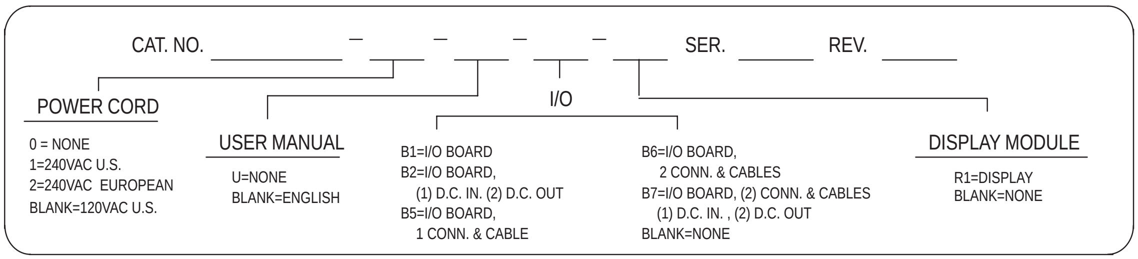
- I/O board without modules
- I/O board with 2 DC output modules and 1 DC input module
- I/O board with 1 NEMA Type 4 connector and cable for installing up to 4 modules in positions 1-8.
- I/O board with 2 NEMA Type 4 connectors and cables for installing up to 8 modules in positions 1-8.
- I/O board with 2 DC output modules, 1 DC input module and 2 NEMA Type 4 connectors/cables for installing up to 8 modules in positions 1-8.

Each option is listed under Decoder Options in this chapter.

Decoder Options (NEMA Type 1 Decoders)

Options available when ordering the NEMA Type 1 decoder are listed inside the decoder’s cover as shown below. Note that on actual production labels:

- the base catalog number will appear in the first field following the words “Cat No.”
- the series letter will appear in the field following “Ser.”
- the revision letter will appear in the field following “Rev.”.



Power Cords

Power cords available when ordering the NEMA Type 1 decoder are:

Option	Power Cord Description
Blank	120 VAC, IEC 320, terminated three prong, U.S. style power cord, 6 ft. (1.83 m)①
-0	No power cord (User must supply appropriate power cord)
-1	240 VAC, IEC 320, three wire (U.S. Color Code) unterminated power cord, 6 ft. (1.83 m)
-2	240 VAC, IEC 320, three wire (European Harmonized) unterminated power cord, 2.5 m (8 ft. 2 in)②

① Supplied with decoder if alternate power cord is not specified in catalog number.

② The decoder is not UL listed/CSA approved when used with European Harmonized power cords.

To order a replacement power cord for the NEMA Type 1 decoder, use the following replacement part numbers.

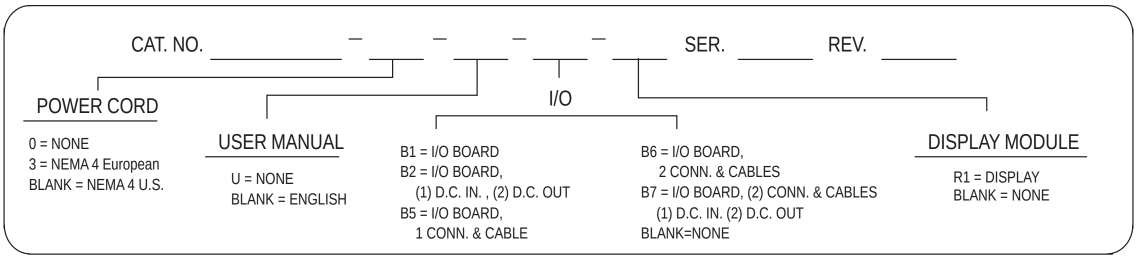
Replacement Part No.	Power Cord Description
77121-801-01	120 VAC, IEC 320, terminated, 6 ft. three prong, U.S. style power cord, 6 ft. (1.83 m)
77121-801-02	240 VAC, IEC 320, three wire (U.S. Color Code) unterminated power cord, 6 ft. (1.83 m)
77121-801-03	240 VAC, IEC 320, three wire (European Harmonized) unterminated power cord, 2.5 m (8 ft. 2 in)①

① The decoder is not UL listed/CSA approved when used with European Harmonized power cords.

Decoder Options (NEMA Type 4 Decoders)

Options available when ordering the NEMA Type 4 decoder are listed inside the decoder's cover. Note that on actual production labels:

- the base catalog number will appear in the first field following the words "Cat No."
- the series letter will appear in the field following "Ser."
- the revision letter will appear in the field following "Rev.".



Power Cords

Power cords available when ordering the NEMA Type 4 decoder include:

Option	Power Cord Description
Blank	120/240 VAC, three wire (US Color Code) unterminated power cord, 6 ft. (1.83 m)①
-0	No power cord (User must supply appropriate power cord)
-3	240 VAC, three wire (European Harmonized) unterminated power cord, 6 ft. (1.83 m)②

① Supplied with decoder if alternate power cord is not specified in catalog number.

② The decoder is not UL listed/CSA approved when used with European Harmonized power cords.

To order a replacement power cord for the NEMA Type 4 decoder, use the following replacement part numbers.

Replacement Number	Power Cord Description
77121-801-04	120/240 VAC, three wire (US Color Code) unterminated power cord
71721-801-05	240 VAC, three wire (European Harmonized) unterminated power cord①

① The decoder is not UL listed/CSA approved when used with European Harmonized power cords.

Input/Output Modules

The optional I/O Module Board supports the following I/O modules:

Output Modules (function as a switch not a power source)			
Catalog Number	**2755-OB5S**	**2755-OA5S**	**2755-OM5S**
Nominal Line Voltage	—	120 VAC	240 VAC
Maximum Line Voltage	60 VDC	140 VAC	280 VAC
Minimum Line Voltage	3.0 VDC	12 VAC	24 VAC
Maximum Peak Off State Voltage	60 VDC	400 V peak	600 V peak
Maximum Peak Off State Leakage	1.0 mA	2.5 mA RMS	4.5 mA RMS
Static off-state dv/dt	—	200 V/usec	200 V/usec
Maximum On-State Current	0.5 A DC	0.5 A RMS	0.5 A RMS
Minimum On-State Current	10 mA DC	50mA RMS	50mA RMS
Maximum 1 Cycle Surge	—	4.0 A peak	4.0 A peak
Maximum 1 Second Surge	1.5 A DC	—	—
Peak On-State Voltage	1.5 V DC	1.6 V peak	1.6 V peak

Input Modules (require voltage source for activation)			
Catalog Number	**2755-IB5S**	**2755-IA5S**①	**2755-IM5S**①
Maximum Input Voltage	32 VDC	140V RMS/VDC	280V RMS/VDC
Minimum Input Voltage	3.3 VDC	90V RMS/VDC	180V RMS/VDC
Input Resistance	1 k ohm	–	–
Maximum Input Current	32mA DC @32VDC	10mA RMS @140V RMS	8mA RMS @280V RMS
Drop Out Current	1.0 mA DC	2.5 mA RMS	1.5 mA RMS
Allowable Off-State Input Current	1.0 mA DC	3.0 mA RMS	2.0 mA RMS
Allowable Off-State Input Voltage	2.0 VDC	50 VRMS/VDC	120 VRMS/VDC

① AC or DC Input Module

Replacement Fuses (for decoders with I/O Module Board options)

Replacement Number	Description
77104-899-01	1.6 A plug-in fuse for output modules provide overload protection for decoder.

I/O Module Board Options (available when ordering either the NEMA Type 1 or Type 4 decoder)

Option	Module I/O Board	Output Modules			Input Module			I/O Connector/ Cables①
		Qty	Positions	Type	Qty	Position	Type	
-B1	Yes	0	—	—	0	—	—	None
-B2	Yes	2	1, 2	3 - 60 VDC at 0.5 amps	1	8	3.3 - 32 VDC	None
-B5	Yes	0	—	—	0	—	—	1 set
-B6	Yes	0	—	—	0	—	—	2 sets
-B7	Yes	2	1, 2	3 - 60 VDC at 0.5 amps	1	8	3.3 - 32 VDC	2 sets

① The I/O connector(s) wire to modules in positions 1-8 of the I/O board and comply with NEMA Type 4 standards. Six foot (1.83 meter) cables are supplied with each connector for wiring to the modules.

There are three I/O Module Board options available for **customer installation** in any 2755 decoder.

Catalog number 2755-NB0 includes a NEMA Type 4 connector and a 6 foot (1.83 meter) unterminated cable. Each connector and cable combination can connect to as many as four modules.

Catalog number 2755-NB1 includes an I/O Board (without modules).

Catalog number 2755-NB2 is a kit including two DC output modules (3 to 60 VDC at 0.5 amps), one input module (3.3 to 32 VDC), and the I/O board.

Catalog Number	Module I/O Board	Output Modules			Input Module			I/O Connector/ Cables①
		Qty	Positions	Type	Qty	Position	Type	
2755-NB0	No	0	—	—	0	—	—	1 set
2755-NB1	Yes	0	—	—	0	—	—	None
2755-NB2	Yes	2	1, 2	3 - 60 VDC at 0.5 amps	1	8	3.3 - 32 VDC	None

① The I/O connector(s) wire to modules in positions 1-8 of the I/O board and comply with NEMA Type 4 standards. Six foot (1.83 meter) cables are supplied with each connector for wiring to the modules.

LCD Display

The optional 2 line by 20 character LCD backlit display is available when ordering the NEMA Type 1 or Type 4 decoder by specifying display option R1 in the catalog number.

The display is also available for customer installation as Catalog No. 2755-NR1.

Scanners

The following table provides a quick reference guide to the Allen-Bradley scanners that are available for use with the decoders.

Catalog No.	Description
2755-LD8①	**High Performance Visible Laser Diode Bar Code Scanner.** 500 scan per second fixed mount scanners with read distances up to 50 inches (1.27 meters) depending on the symbol size and quality.
2755-LD4①	**High Performance Visible Laser Diode Bar Code Scanner.** 200 scan per second fixed mount scanners with read distances up to 84 inches (2.13 meters) depending on the symbol size, quality, and scanner range selected.
2755-L9①	**Industrial NEMA Type 4 High Speed Bar Code Scanner.** 800 scan per second raster and side scanning device with read distances up to 30 inches (76 cm) depending upon symbol size and quality.
2755-L7①	**Industrial NEMA Type 4 Bar Code Scanner.** 350 scan per second raster and side scanning device with read distances up to 50 inches (1.27 meters) depending upon symbol size and quality.
2755-L4F① -L4R①	**Enhanced NEMA Type 12 Bar Code Scanner.** 200 scan per second front or side scanning device with read distances up to 50 inches (1.27 meters) depending upon symbol size and quality.
2755-L5R①	**Enhanced NEMA Type 12 Raster Scanner.** 200 scan per second raster scanner with read distances up to 45 inches (1.14 meters) depending on symbol size and quality.
2755-G3①②	**Hand-Held Laser Scanner.** Non-contact scanners that can read bar code symbols at distances of 1 inch to 30 inches (2.5 to 76.2 cm).
2755-G6①②	**Hand-Held Laser Scanner.** Non-contact scanners that can read bar code symbols at distances of 8 to 66 inches (20.3 to 167.6 cm).
2755-LD1①②	**Standard Range Fixed Mount Laser Scanner.** 36 scan per second “stop and scan” scanners that can read bar code symbols at distances from 1 inch to 30 inches (2.5 to 76.2 cm) depending upon symbol size and quality.
2755-LD2①②	**Long Range Fixed Mount Laser Scanner.** 36 scan per second “stop and scan” scanners that can read bar code symbols at distances from 8 to 66 inches (20.3 to 167.7 cm) depending upon symbol size and quality.

① Catalog Number is not complete. The scanners are available in a variety of configurations. Check compatibility of new scanners with your Allen-Bradley representative.

② These scanners require the 2755-NC16 Gun Adapter to function with these decoders.

Decoder Accessories

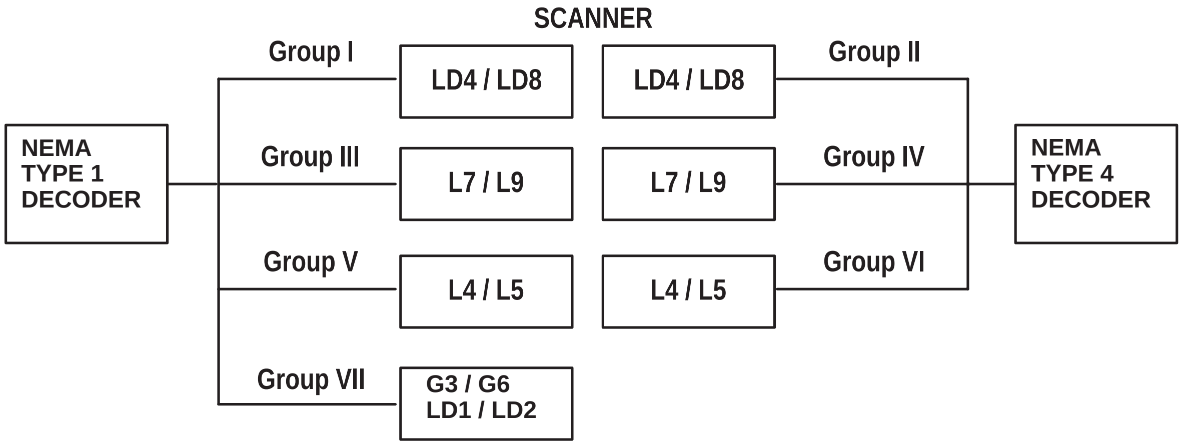
This section lists the accessories that are available for the NEMA Type 1 and Type 4 decoders.

Configuration and Cable Group Selector

Use the chart below and the Cable Selection Guide table that follows it to determine which cables are appropriate to your own application.

To use the chart, simply identify the scanner you are using in the center column, then look to the left if you are using a NEMA Type 1 decoder, or to the right if you are using a NEMA Type 4 decoder. A cable group identification number appears over the line connecting your scanner with your decoder type. For example, if you are using an -LD4 scanner with a NEMA Type 4 decoder, you would select a Group II cable.

Cable Selection Guide



Group	Decoder / Scanner Combination	Description	Length	Catalog No.
I	NEMA 1 to LD4 / LD8	Optional extension cable (there is a 10 ft. (3.05 m) cable hard-wired to the scanner)	15 ft. (4.75 m)	2755-C15D1
			40 ft. (12.19 m)	2755-C40D1
II	NEMA 4 to LD4 / LD84	Optional extension cable (there is a 10 ft. (3.05 m) cable hard-wired to the scanner)	15 ft. (4.75 m)	2755-C15D4
			40 ft. (12.19 m)	2755-C40D4
III	NEMA 1 to L7 / L9	Scanner Cable	10 ft. (3.05 m)	2755-CL10
			25 ft. (7.62 m)	2755-CL25
			40 ft. (12.19 m)	2755-CL40
			50 ft. (15.24 m)	2755-CL50
IV	NEMA 4 to L7 / L9	Scanner Cable	10 ft. (3.05 m)	2755-CN10
			25 ft. (7.62 m)	2755-CN25
			40 ft. (12.19 m)	2755-CN40
			50 ft. (15.24 m)	2755-CN50
V	NEMA 1 to L4 / L5	Scanner Cable	10 ft. (3.05 m)	2755-CK10
			25 ft. (7.62 m)	2755-CK25
VI	NEMA 4 to L4 / L5	Scanner Cable	10 ft. (3.05 m)	2755-CM10
			25 ft. (7.62 m)	2755-CM25
VII	NEMA 1 to G3 / G6①	Hand-Held Scanner Cable – Coiled	8 ft. (2.4 m)	2755-CG08
			15 ft. (4.6 m)	2755-CG15
		Hand-Held Scanner Cable – Straight	20 ft. (6.1 m)	2755-CG20
	NEMA 1 to LD1 / LD2①	Scanner Cable – Straight with 9-pin connectors on each end.	6 ft. (1.83 m)	2755-CD06
	NEMA 1 to G3 / G6① or LD1 / LD2	Adapter that plugs directly into the scanner port of a NEMA 1 decoder and provides the circuitry necessary to connect the decoder to a handheld scanner cable.	N/A	2755-NC16

① These scanners require the 2755-NC16 Gun Adapter to function with these decoders.

Package Detectors for Scanners

Scanner	Description	Catalog No.
L7 / L9	Optional, for Catalog No. 2755-L7, -L9 Scan Head. DC retroflective detector with an operating range up to 18 feet (5.49 meters). Mounts from front or rear, plus head rotation allows additional flexibility in selecting sending direction.	2755-NP3
	Optional, for Catalog No. 2755-L7, -L9 Scan Head. Polarized beam retroflective detector has a maximum operating distance of 10 feet (3.03 meters) or 8 feet (2.43 meters) with a 2 to 1 operating margin. Includes mounting brackets for single-hole or flat surface mounting.	2755-NP5
L4 / L5	Optional, for Catalog No. 2755-L4, -L5 Scan Head. DC retroflective detector with an operating range up to 18 feet (5.49 meters). Mounts from front or rear, plus head rotation allows additional flexibility in selecting sending direction.	2755-NP1
	Optional, for Catalog No. 2755-L4, -L5 Scan Head. Polarized beam retroflective detector has a maximum operating distance of 10 feet (3.03 meters) or 8 feet (2.43 meters) with a 2 to 1 operating margin. Includes mounting brackets for single-hole or flat surface mounting.	2755-NP4

We recommend using Allen-Bradley Photoswitch® package detectors (PhotoSeries 6000 or 9000) with 2755-LD4 and -LD8 scanners. You must order a **current sinking** type sensor with the QD (Quick Disconnect) suffix that is capable of operating with a +12V DC source (pin 1) and drawing not more than 100 mA and a **sink** capability of 5 mA at +12V DC.

For example: Catalog Number 42SRU-6203-**QD** or
Catalog Number 42GRU-9200-**QD**

Communication Cable and Connector Kit

A cable and connector kit is available for the AUX and HOST ports of the NEMA Type 4 decoder. We recommend using Catalog Number 2755-NC17 to make your own cable for RS-422 or RS-485. Pinouts can be found in Appendices D and E. Use Catalog Number 2755-CT1 *only* for RS-232. Order as separate components using the following catalog numbers.

Catalog Number	NEMA Type	Product	Description
2755–NC17	4	Connector Kit	19-pin NEMA 4 Host or AUX port connectors. Used to make custom NEMA 4 communication cables.
2755–CT1	4	Interface Cable	10 foot cable with NEMA Type 4 connector on one end for connecting to HOST or AUX port of NEMA Type 4 Decoder and 25-pin DB connector on other end for connecting to a host device or programming terminal (for RS-232 only).
2755–CY1	4	Host Port Interface Cable	Multidrop interface cable for DH485 applications using NEMA Type 4 decoders.

Overview of Decoder Operations

Chapter Objectives

This chapter defines the function of the decoder and gives an overview of decoder operations, including:

- function of decoder
- supported bar code symbologies
- configuration options
- stand-alone vs. host operations
- types of memory
- decoder operating modes

Function of Decoder

The decoder acquires and decodes video information from one or two scanners. The decoder can then:

- send the decoded data to a host device (host computer, programmable logic controller), ASCII terminal, or LCD display
- compare the decoded data to previously stored data and use the results to operate up to eight discrete outputs (match code operation)

The decoder also maintains counters for package count, no-reads, and discrete output operations.

Bar Code Symbologies

The decoder supports the following bar code symbologies:

- Code 39 (standard character set)
- Pharma–Code (available on DS*z*P and DD*z*P catalog numbers only)
- UPC-A and UPC-E including optional 2 or 5 digit supplements
- EAN-8 and EAN-13 including optional 2 or 5 digit supplements
- Code 128
- Codabar
- Interleaved 2-of-5

Configuration Options

You can configure or monitor decoder operations using the built-in configuration screens or by sending commands from a host device, such as a PLC controller or computer. Both configuration options allow you to:

- select a bar code symbology for decoding operations
- define operating parameters for the scanner(s)
- set host message format for decoded bar code data

- set host communication parameters
- define up to 8 primary and 128 extended match codes
- specify up to eight discrete outputs and the conditions that will activate each output
- set display format for data on LCD display and/or AUX port terminal
- define operating parameters for AUX port ASCII terminal when used for manual data entry

Configuration Screens

The decoder has built-in menus and screens for configuration and monitoring operations. You access these menus by connecting one of several standard ASCII terminals (or a computer emulating one of those terminals) to the AUX port of the decoder. The process of configuring the decoder at the AUX port is called AUX terminal configuration.

The configuration menus support five different languages: English, French, German, Italian, and Spanish.

Host Commands

The decoder also supports a set of host commands for configuring the decoder and monitoring operations. Host commands are sent to the decoder from a PLC controller or computer and perform the same functions as the configuration software.

The HOST port accepts commands using the RS-232 and RS-422 interfaces and a variety of communication protocols, as well as the RS-485 interface using Allen-Bradley DH485 protocol. Appendix F lists the protocol options for each interface.

Stand-alone Operation

The decoder can operate as a stand-alone device or connected to a host device. As a stand-alone device, the decoder uses output modules to control external devices. The decoder sends discrete output signals to external control equipment based on the results of decoded data.

The discrete outputs can be controlled remotely by host commands or manually via the configuration screens.

Chapter 7 provides information on how to control the discrete I/O. Appendixes G and H show various examples of input and output module connections.

Host Operation

The decoder can also communicate directly with a host computer or PLC in a control or data collection application. The decoder communicates with and transmits bar code data to a host computer or PLC controller via the HOST port of the decoder.

Programmable Logic Controllers (PLC)

The decoder connects to an Allen-Bradley PLC Controller in the following ways (see Figure 3.1):

1. Flexible Interface Module (Catalog No. 2760-RB) which supports a:

- point-to-Point link using the RS-232, RS-422, or DH485 interface to the HOST port
- multi-drop link using the DH485 interface of the HOST port and the Flexible Interface Module.

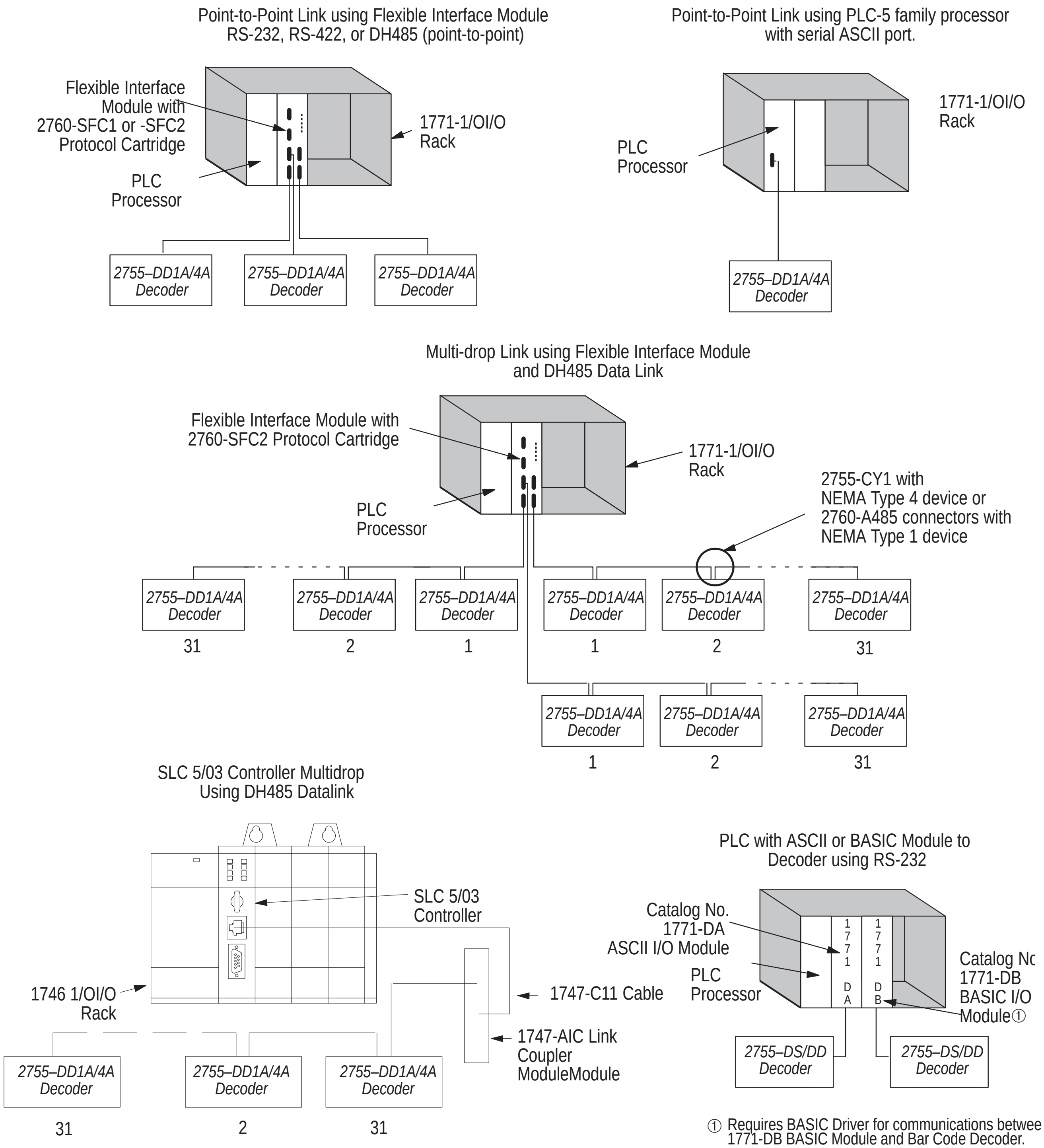
  Each port of the Module operates as a separate network, supporting up to 31 decoders

  Use the Catalog No. 2760-SFC2 protocol cartridge with the Flexible Interface Module and configure the decoder for DH485 mode.

2. Catalog No. 1771-DB BASIC Module or 1771-DA ASCII I/O Module connects decoder directly to a PLC.

3. Programmable logic controllers from the Allen-Bradley PLC-5™ family of products that support an RS-232 ASCII port.

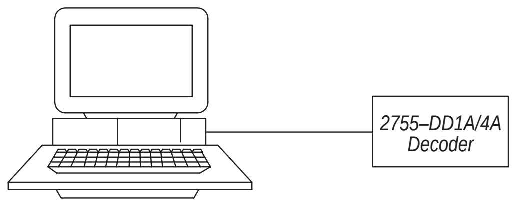
Figure 3.1 PLC Controller Configurations



① Requires BASIC Driver for communications betwee 1771-DB BASIC Module and Bar Code Decoder.

Host Computers

The decoder connects directly to other host computers using the RS-232 or RS-422 interface of the host device, or can be multi-dropped (with DH485) through a 1784-KR module.



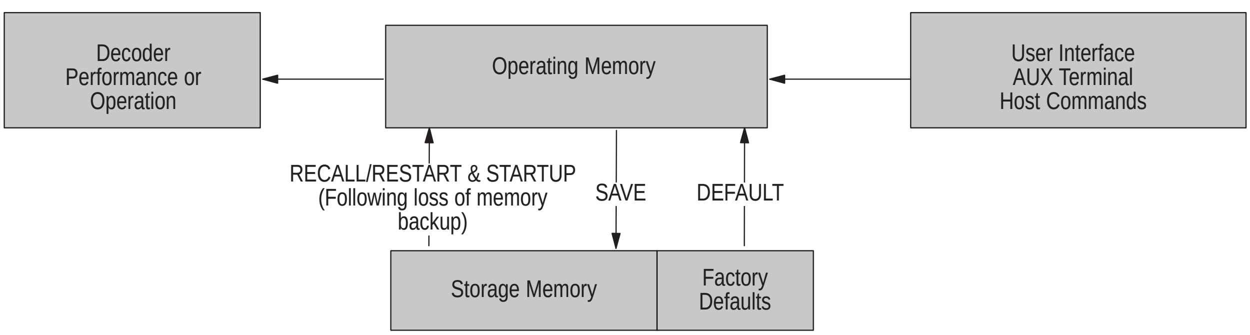
Types of Memory

The Series B decoder has two types of memory:

- operating memory
- storage memory.

Figure 3.2 shows the relationship of the types of memory, and the text that follows summarizes their contents.

Figure 3.2 Memory Areas of Decoder



Operating Memory

The decoder uses configuration parameters as they exist in operating memory to perform all functions. Initially set to factory defaults, these parameters can be changed using the AUX terminal configuration and ASCII or PCCC host commands. With the exception of specific host communication parameters (See Chapter 12), all parameters take effect immediately when changed[1]

You can use the *Default* command to reset the operating memory to factory defaults. The *Save* command will copy the contents of operating memory into storage memory. When you issue a *Recall*, the decoder copies the *Saved* parameters from storage memory into operating memory.

The decoders are designed to retain configuration in operating memory even during short term power interruptions. Refer to Chapter 2 for information about memory backup.

Storage Memory

Within the decoder there is permanently stored a copy of the factory default configuration parameters. You cannot modify this copy, but can copy them into the operating memory at any time using the *Default* command.

In addition, the decoder can retain in storage memory a copy of the configuration parameters you have set. You can use the *Save* command to copy the operating memory into storage memory. The *Recall* command copies the contents of storage memory back into the operating memory. You will find this capability useful for troubleshooting custom configurations, for making temporary changes on-line, and for use with Autoload and Lot.

The *Autoload* parameter (in either the Primary or Extended Match Code Table) and the *Lot* parameter (in the Extended Match Code Table) allow the decoder to take scanned symbol data and load it into the match code table. The *Restart* command will reset these parameters to the originally *Saved* parameter so that new values can be loaded.

[1] The parameters that do not change until they are saved and the decoder is restarted, involve host commu
would be disruptive to change host communications parameters while data transmission was in process.
communications parameters are loaded into operating memory from storage memory during restart.

Storage memory can be thought of as programmable read only memory (PROM). The default parameters are stored as read only (EPROM), while the user changeable portion as retentive EEPROM. for the sake of simplicity and consistency with earlier versions of the DS/DD decoders, we will maintain the conventions that the *Save* and *Recall* commands will ask for confirmation to “SAVE CONFIGURATION CHANGES TO EEPROM . . . Y/N?” and “RESTORE CONFIGURATION FROM EEPROM . . . Y/N?”

Memory Contents at Startup

Until you have modified and saved your own configuration parameters, the decoder storage memory will contain only the permanent factory default configuration. The first time you start the decoder it will create a copy of those factory defaults in operating memory.

Even on decoders without the optional battery, once you have saved them to storage memory you will retain most of your configuration parameters even with an extended loss of power. When you restart the decoder it will read the saved configuration parameters rather than the factory defaults. Parameters and values *not* retained after extended power loss without a battery include:

- Extended Match Code Table Configuration, which will be lost and reset to factory defaults
- Primary Match Code Table counts, which will be lost and reset to zero
- Host Replacement Rule Examples (which are the test examples you have entered on the bottom half of the **Host Message Replacement Rules** screen). These examples will be lost and the example section of the screen will be cleared. *Note that the rules themselves will be retained.*

The long life of the optional battery makes it unlikely that any loss of configuration or data will occur during any conceivable power outage in battery-backed decoders.

Decoder Operating Modes

This section gives a brief overview of the different operating modes of the decoder. You select these operating modes and parameters when configuring the decoder.

Scanning Modes

The decoder supports two scanning modes:

- **Coordinated Mode**
  Scanner A and Scanner B are coordinated, using the same trigger source and set of configuration parameters.
- **Independent Mode**
  Scanner A and Scanner B operate independently, each using a separate trigger source and set of configuration parameters.

Decode Modes

The decoder has three decode modes:

- **Continuous Mode**

  In continuous mode, the decoder attempts to decode every scan. Additional scans are accumulated until the capture count is satisfied. When the symbols per package is satisfied, a valid read occurs. In Continuous Mode there is no concept of a No-Read. Damaged or missing symbols are ignored.

  This mode is useful during initial setup to determine the optimum location of the scanner relative to the bar code labels.
- **Continuous/Unique Mode**

  This mode is similar to continuous mode except the decoder compares a valid read to the previous valid read. If the valid reads are identical, the new data is discarded. In continuous/unique mode, the decoder defines a package as a valid read if it is different (unique) from the previous
  valid read. The Symbols Read counter and the Package counter increment with every valid read. In Continuous/Unique Mode there is no concept of a No-Read. Damaged or missing symbolssignals are ignored.
- **Triggered Mode**

  In triggered mode, the decoder only attempts to decode data after receiving a trigger. The three trigger sources are:
  – Host. The trigger source is a command generated by a host computer or programmable controller
  – Package Detect. The trigger source is a package detector connected to the scanner

– Internal Timer. The trigger source is an internal timer that cycles the trigger on and off at a set time interval

Once triggered, the decoder continuously attempts to decode bar codes until one of the following conditions occurs:

– Number of symbols (bar codes) per package count is satisfied
– -Trigger off command (stop scan character) received from host device (Host Decode mode)
– -Package detect signal is no longer present (Package Detect mode)
– -No-read timer expires (Internal Timer mode)

Sending Data to Host – Speed vs. Timing

In the triggered mode, you can configure the decoder to send information to a host device and/or operate the discrete outputs:

- Immediately After Valid Package (for highest speed)

  This is a package with valid bar code symbols that meets the symbols (bar codes) per package count.

  The Immediately After Valid Package response mode sends decoded data to the discrete outputs and host immediately after the decode operation. This response mode is useful in high speed applications where maximum throughput is required.

  or

- At End of Trigger (for predictable timing)

  The At End of Trigger response mode sends decoded data to the discrete outputs and host when the:

  – -Host sends the stop scan character (Host Decode mode)
  – -Package detect signal expires (Package Detect mode)
  – -No-read timer expires (Internal Timer mode)

  This response mode is useful when timing of the discrete outputs or timing of host communications is critical.

No-read messages are always sent at the end of the trigger.

Installing the Decoder

Chapter Objectives

This chapter presents recommendations and instructions on how to install and connect equipment to the NEMA Type 1 and Type 4 Single and Dual-Head Bar Code Decoders. The information is organized by task, and can serve as a useful quick start tutorial to guide you through system installation and setup. Topics covered include:

- meeting electrical and grounding requirements
- installing alternate language LED indicator labels
- mounting dimensions
- connecting power cord
- setting communication parameters
- selecting language
- selecting CRT type
- selecting operations to perform
- connecting and configuring scanners
- setting symbology parameters
- customizing setup
- connecting AUX terminal
- connecting host device
- installing and wiring optional I/O modules

Power Requirements

Before Installation:

- verify that incoming power source is 100 to 240 volts AC nominal, 50 to 60 Hz
- protect power source with an external fuse or circuit breaker, rated at no more than 15 amps
- connect decoder to its own branch circuit (when possible) to reduce electrical noise

Electrical Recommendations

Install equipment using guidelines in publication NFPA 70E, Electrical Safety Requirements for Employee Workplaces. In addition:

- **do not use signal wiring and power wiring in the same conduit**
- **route incoming power to the decoder using a separate path from the communication cables (if paths must cross, their intersection should be perpendicular)**

When installing the decoder in a noise-polluted industrial environment, consider the effects of electromagnetic interference (EMI). Factors that minimize EMI include:

- proper grounding
- shielded cables
- correct routing of wires

Grounding

Grounding is an important safety measure in electrical installations. With solid-state systems, grounding also minimizes the effects of noise caused by electromagnetic interference (EMI).

An authoritative source on grounding requirements is the National Electrical Code published by the National Fire Protection Association of Boston, Massachusetts. Article 250 discusses the types and sizes of wire conductors and safe methods of grounding electrical equipment and components.

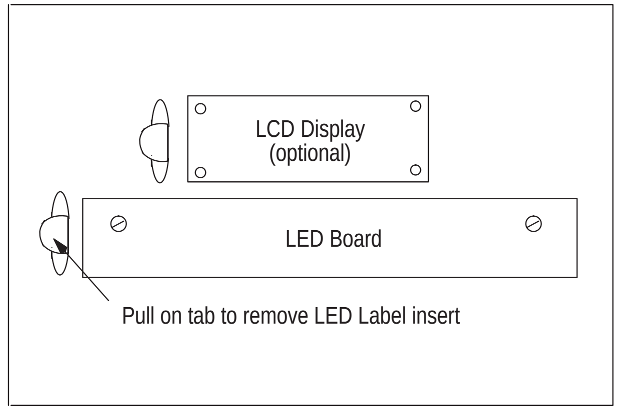
Replacing LED Label

The NEMA Type 1 and Type 4 decoders are shipped with LED indicator labels in six different languages: English, French, German, Italian, Japanese, and Spanish.

The decoders are shipped with the English label installed and a sheet of five alternate labels loosely packaged. If desired, replace the English label with another language label.

To replace the LED indicator label, loosen the two screws on the decoder cover and open. The LED label insert is on the inside the cover, between the LED board and cover. Remove the insert by pulling on the gray tab. Slide the desired label into position.

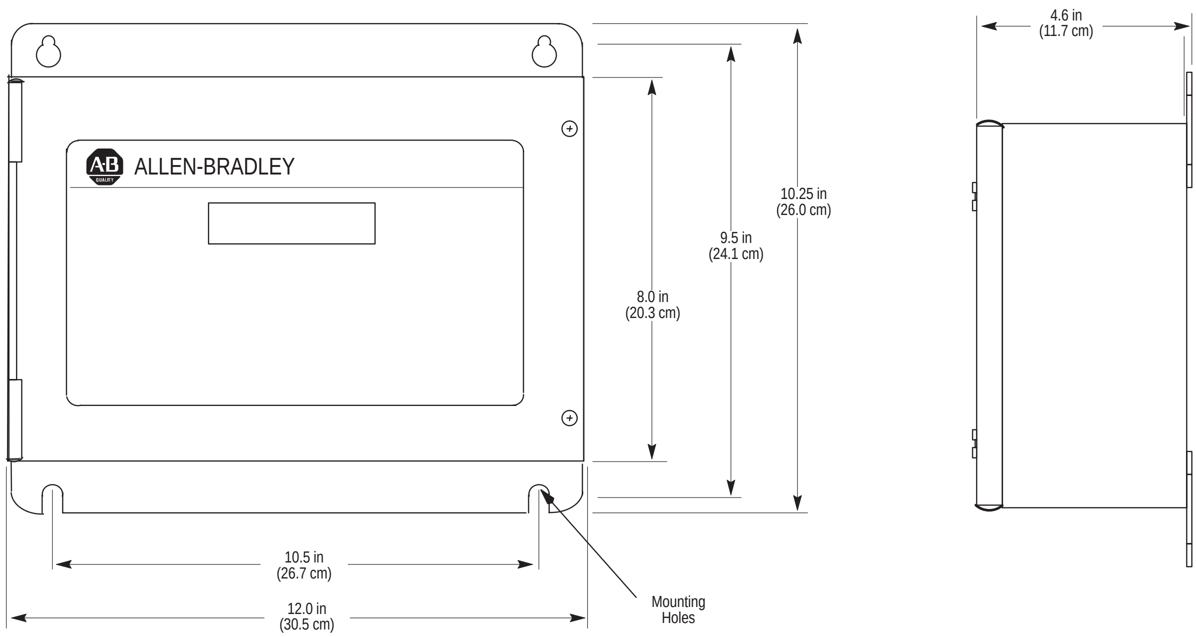
Figure 4.1 View of the front cover from inside



Mounting the Decoder

Figure 4.2 shows nominal mounting dimensions in inches (and cm) for the NEMA Type 1 and Type 4 decoders. The horizontal mounting orientation is shown here.

Figure 4.2 Mounting dimensions (for reference only)



Allow clearance of 6 inches above and below decoder for cables

You can mount the decoder horizontally or vertically. When mounting allow clearance:

- at hinged side of cover for cover to swing open
- of 6 inches (152 mm) above the decoder to connect cables to the scanner ports and communication ports

- of 6 inches (152 mm) below the decoder to wire I/O modules and to access the power entry/power switch

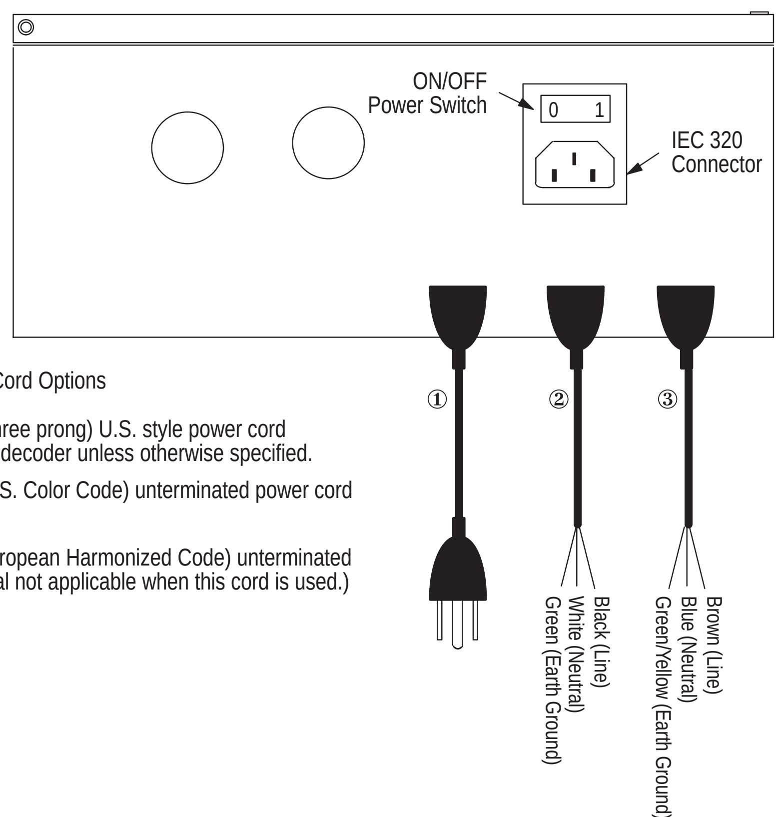
To mount the decoder, we recommend that you use four $^1/_4$ inch (M6) hex-head capscrews or bolts with flat and split lockwashers and nuts. Select a bolt that equals the thickness of the mounting surface, plus the thickness of the washers, plus at least $^1/_2$ inch (12.7 mm) to accommodate the mounting brackets of the decoder and the nut.

Installing Power Cord

The NEMA Type 1 decoder has a standard IEC 320 power entry connector.

Figure 4.3 shows the available power cord options for the NEMA Type 1 decoder. Unless an alternate power cord is ordered, the decoder is shipped with a 120 VAC terminated (3 prong) U.S. power cord.

Figure 4.3 Power cord options for NEMA Type 1 decoder



Power Cord Options

① 120 VAC, IEC 320 terminated (three prong) U.S. style power cord (6 ft./1.83m). Default. Shipped with decoder unless otherwise specified.

② 240 VAC, IEC 320 three wire (U.S. Color Code) unterminated power cord (6ft./1.83 m).

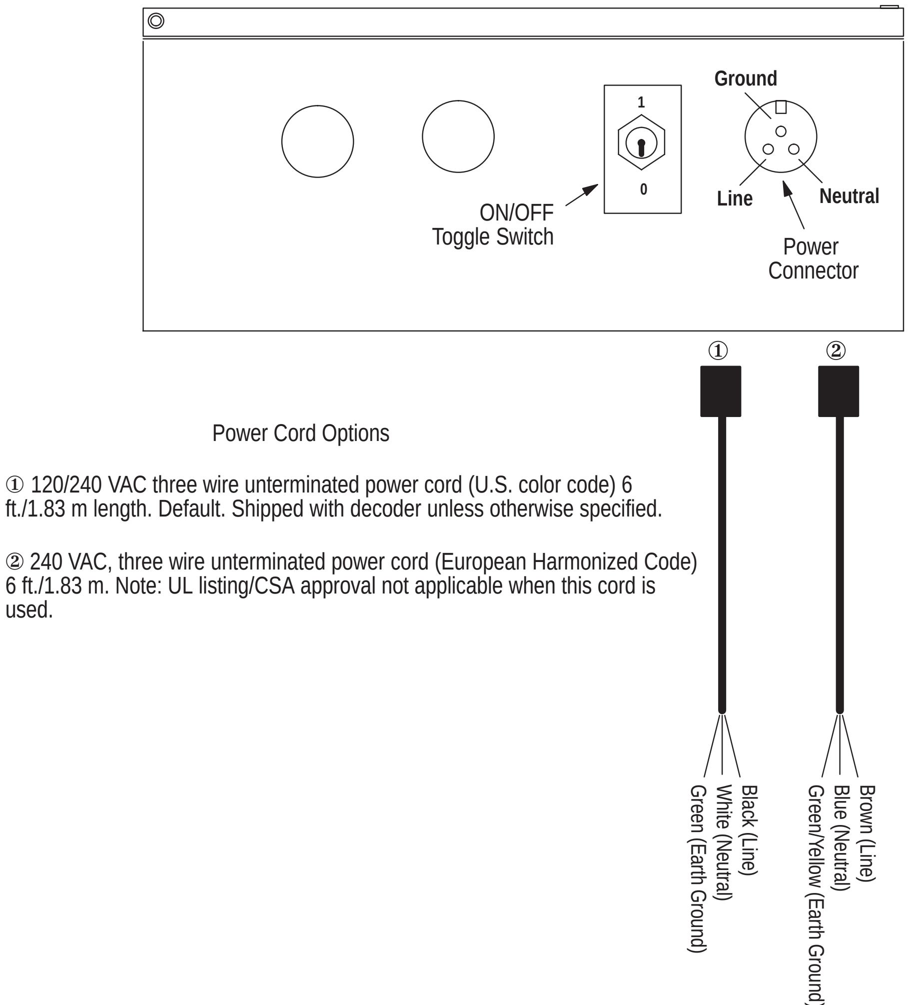
③ 240 VAC, IEC 320 three wire (European Harmonized Code) unterminated power cord. (UL listing/CSA approval not applicable when this cord is used.) (8 ft. 2 in./2.5 m)

ATTENTION: Disconnect incoming power and make sure the power switch on the decoder is in the off position before connecting power cord to power source.

The NEMA Type 4 decoder has a standard 3-pin power connector with a separate ON/OFF toggle switch.

Figure 4.4 shows the available power cord options for the NEMA Type 4 decoder. Unless an alternate power cord is ordered, the decoder is shipped with a 120/240 VAC, three wire (U.S. Color Code) unterminated power cord.

Figure 4.4 Power cord options for NEMA Type 4 Decoder



ATTENTION: Disconnect incoming power and make sure the power switch on the decoder is in the off position before connecting power cord to power source.

Quick Start for DS/DD Decoder Configuration and Scanner Setup

You will need a computer terminal or a personal computer with terminal emulation software (such as PROCOMM®) and an RS-232 cable. Lists of compatible terminals appear in Figures 4.7 and 4.8. Wiring information appears in Appendix D. See Chapters 5 through 14 for more detail on using a terminal to configure the decoder and monitor operations.

Connect AUX Terminal

Connect your terminal's RS-232 serial port to the AUX port of the 2755-DS or -DD decoder① To make easy connection to the NEMA Type 4 decoders, a 3.03 meter (10 foot) cable is available (Cat. No. 2755-CT1).

Set Communication Parameters

Set the terminal's serial port parameters to 9600 Baud, 8 Data Bits, 1 Stop Bit, No Parity (Parity = None).

Apply Power and Select Language

Turn the decoder on. The decoder will send the **Select Language** screen to the terminal. If the screen does *not* appear, then press the ESC key on your terminal. The Communications LED on the decoder should light momentarily, and the decoder will resend the **Select Language** screen. If the LED does not light when you press ESC, verify the terminal's communications settings and all connections.

① The AUX port supports a terminal for **either** configuring the decoder **or** for man entry. For information on use of the AUX port for manual data entry, consult Cha

```
SELECT LANGUAGE       CHOIX DU LANGUAGE      WAEHLE SPRACHE
 1) English           1) Anglais             1) Englisch
 2) French            2) Francais            2) Franzoesisch
 3) German            3) Allemand            3) Deutsch
 4) Italian           4) Italien             4) Italienisch
 5) Spanish           5) Espagnol            5) Spanisch

Press 1,2,3,4 or 5    Appuyer 1,2,3,4 ou 5   Druecken Sie 1,2,3,4 oder 5


SELEZIONARE LINGUA    SELECCIONAR LENGUA
 1) Ingeles            1) Ingles
 2) Francese           2) Frances
 3) Tedesco            3) Aleman
 4) Italiano           4) Italiano
 5) Spagnolo           5) Castellano

Prenere 1,2,3,4 o 5   Pulsar 1,2,3,4 o 5
```

Note: When using the 2755-CT1 cable to interface with a NEMA Type 4 decoder, it may be necessary to use a null modem adapter on some computers or terminals. You can identify such equipment by comparing the pinout supplied with your computer or terminal with the schematic supplied with your cable. You will need a null modem if pins 2 and 3 are reversed.

Choose a language from the **Select Language** screen by pressing the appropriate number on your keyboard. All of the screens that follow will now be displayed in the language you select.

Select CRT Type

After you have selected a language, the **Select CRT Type** screen will appear on your terminal. Select a terminal type from among those listed.

```
2755-DD1P/DD4P              Bar Code Decoder
       Copyright 1992 Allen-Bradley Company, Inc.

      SELECT CRT TYPE

      1) Allen-Bradley 1770 Industrial Terminal
      2) Allen-Bradley T45 Portable Terminal
      3) Lear Siegler ADM 3E
      4) Digital VT100


       Press 1,2,3,4 or ESC
```

Note: If the next screen that appears is not properly formatted, or if strange characters appear, press the ESC key to return to the **Select CRT Type** screen. Review your CRT Type selection. If you are using terminal emulation, verify that your settings are correct.

Select Operations

After you have selected a CRT type, you will see the **Select Operations** menu.

```
2755-DD1P/DD4P                             Bar Code Decoder
                  Copyright 1992 Allen-Bradley Company, Inc.

CONFIGURATION
  1) Symbology
  2) Scanner Control, Primary Match Table, Discrete I/O
  3) Extended Match Table and Counters
  4) Aux and LCD Display Format
  5) Host Message Replacement Rules
  6) Host Message Format
  7) Host Communications
  8) Aux Terminal Data Entry

Display                             System
  A) Bar Code Strings                 C) Reset Status and Primary Counters
  B) Status and Primary Counters      D) Reset Extended Match Counters
                                      E) Restart System
                                      F) Select Language
                                      G) Save Configuration

                           Press 1...8, A...G or ESC
```

Press “1” to proceed to the **Symbology** configuration screen. A **Caution** screen will appear. This screen allows you to disable the decoder’s optional output modules during configuration. It will appear each time you select a configuration screen from the **Select Operations** menu while the outputs are enabled. More information on this subject appears in Chapter 5. For now, press any key except ESC to continue configuration.

Note: Restarting the decoder by selecting “E” from the **Select Operations** menu after configuration will reactivate the output modules.

```
--SYMBOLOGY--  ---------LENGTHS---------   --CHECK CHARACTERS--
 CODE 39: No   . . . . . . . . .   No    INCLUDE: No
   I 2/5: No   . . . . . . . . .   No    INCLUDE: No      GUARD BARS: No
 CODABAR: No   . . . . . . . . .   No    INCLUDE: No
CODE 128: No   . . . . . . . . .       FNC1 CHAR: None    0

   UPC-A: No    SUPPLEMENTS: None
   UPC-E: No    SUPPLEMENTS: None      EXPAND:  No
   EAN-8: No    SUPPLEMENTS: None
  EAN-13: No    SUPPLEMENTS: None

        ENABLE PHARMA-CODE: Yes
          QUIET ZONE RATIO: Default     CODE VERIFICATION LIST
           SPACE TOLERANCE: 15          ----------------------
             BAR TOLERANCE: 15          1)      5)       9)       13)
  WIDE TO NARROW BAR RATIO: 2           2)      6)      10)       14)
    MINIMUM NUMBER OF BARS: 5           3)      7)      11)       15)
SCANNER A DECODE DIRECTION: Forward     4)      8)      12)       16)
SCANNER B DECODE DIRECTION: Forward
_______________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
_______________________________________________________________________________
```

At the **Symbology** configuration screen, we suggest resetting the decoder to assure that you are starting from a default configuration. To do so:

1. Press ESC to activate the command line at the bottom of the screen.
2. Use the arrow keys to move the highlight to the “DEFAULT’ option.
3. Press ENTER (or RETURN on some keyboards).
4. Confirm your intention to reset the decoder to its default configuration by answering yes to the confirmation prompt (press “Y” in English).

Set Symbology Parameters

Enable the symbology (or symbologies) you would like to read by using the arrow keys to move the highlight to the appropriate position. Toggle through the available selections by pressing the space bar. Press ENTER to accept each change.

Note: For best performance, enable only those symbologies you intend to read. You can find additional information on selecting symbologies in Chapter 6.

Configure Scanner(s)

Once all your symbology selections have been made, press ESC to activate the command line at the bottom of the screen. Press ENTER to select the highlighted “Next Page”.

```
________________________________________________________________________________
   COMMAND -- Exit:ESC  Select:RETURN  Next:SPACE
________________________________________________________________________________
       NEXT PAGE    THIS PAGE       RECALL     SAVE          DEFAULT
```

The **Scanner Control** screen will appear.

```
      --------SCANNER (A) CONTROL--------   ----------SCANNER (B) CONTROL----------
              LASER LIGHT: Triggered                 LASER LIGHT: Triggered
              DECODE MODE: Continuous                DECODE MODE: Coordinated 1
            NO-READ TIMER: None   (msec)         TRIGGER TIMEOUT: None    (msec)
         INTER-SCAN TIMER: None   (msec)
            CAPTURE COUNT: 2
             SYMBOLS/SCAN: 1           ----------PACKAGE DETECT INPUT----------
          SYMBOLS/PACKAGE: 1           (A) FILTER: No      SENSE: LO=Package
           MATCH COMPLETE: 1           (B) FILTER: No      SENSE: LO=Package
    -------------MATCH CODE TABLE-------------  -------DISCRETE I/O [   Enabled  ]-
 1) Any                                        0  A:B None                     0
 2) Any                                        0  A:B None                     0
 3) Any                                        0  A:B None                     0
 4) Any                                        0  A:B None                     0
 5) Any                                        0  A:B None                     0
 6) Any                                        0  A:B None                     0
 7) Any                                        0  A:B None                     0
 8) Any                                        0  A:B None                     0
_______________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
_______________________________________________________________________________
```

While your actual operation will vary depending on your application, you will want to follow the same basic steps during initial scanner setup. Those steps include:

1. Select the scanner based on the narrow element width (the narrowest bar or space) and desired reading distance

Refer to *Bar Code Site Survey* (Pub. No. 2755-939) to verify all important aspects of your own application. Consult the scanner’s Product Data Sheet or User Manual for read ranges.

2. Turn the decoder off and connect the scanner to the decoder

3. Even if your application will use a host computer, external display, discrete I/O (input or output devices), or package detect, *do not attach those devices at this time*.

   Figure 4.5 shows the scanners you can connect to Scanner Port A and B of the NEMA Type 1 decoder and the cables available for each scanner. Figure 4.6 shows the scanners you can connect to Scanner Port A and B of the NEMA Type 4 decoder and the cables available for each scanner. Each shows the optional package detectors connected to each scanner.

   Refer to the appropriate manuals for scanner mounting instructions.

Figure 4.5 Connecting scanners to NEMA Type 1 decoder

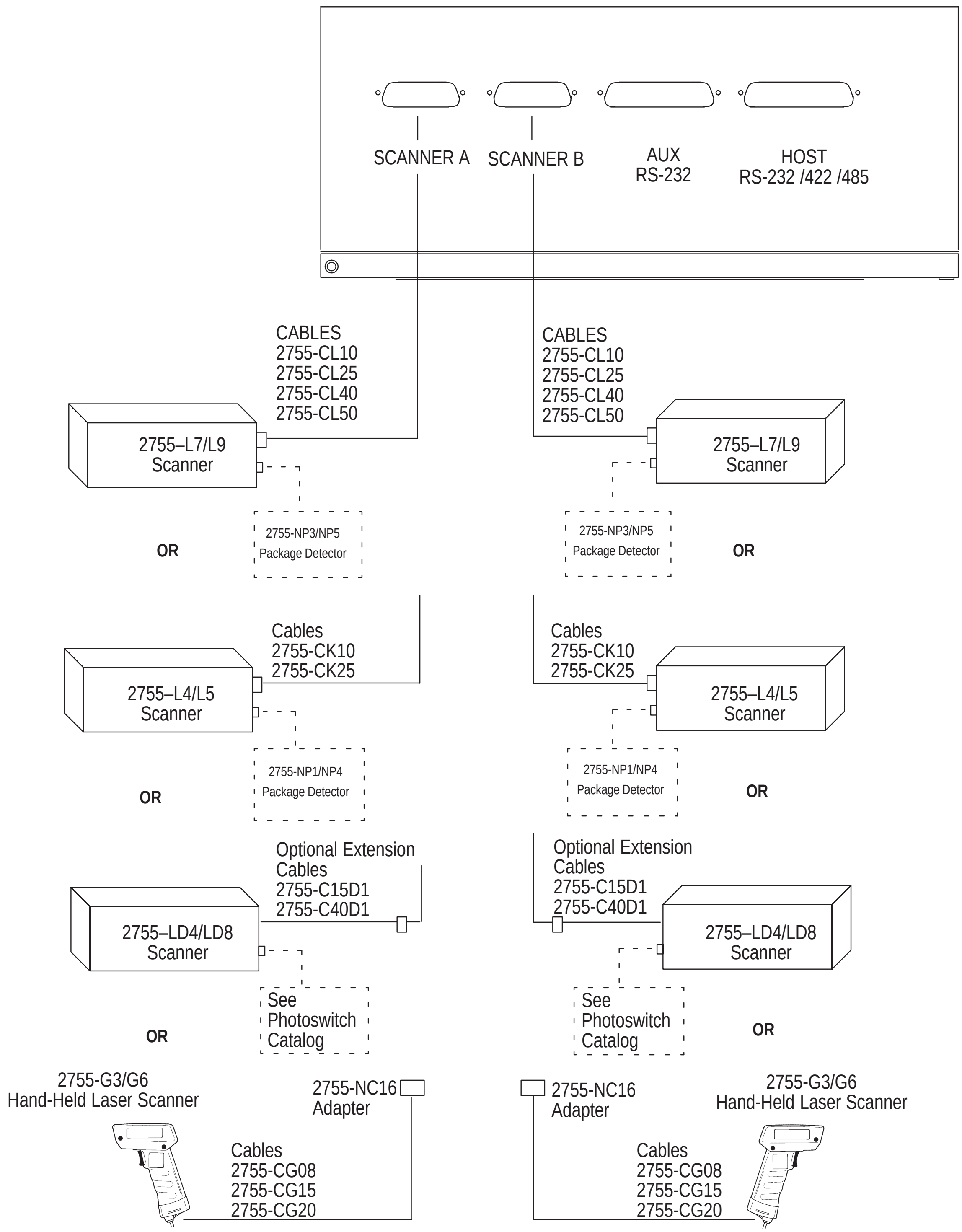
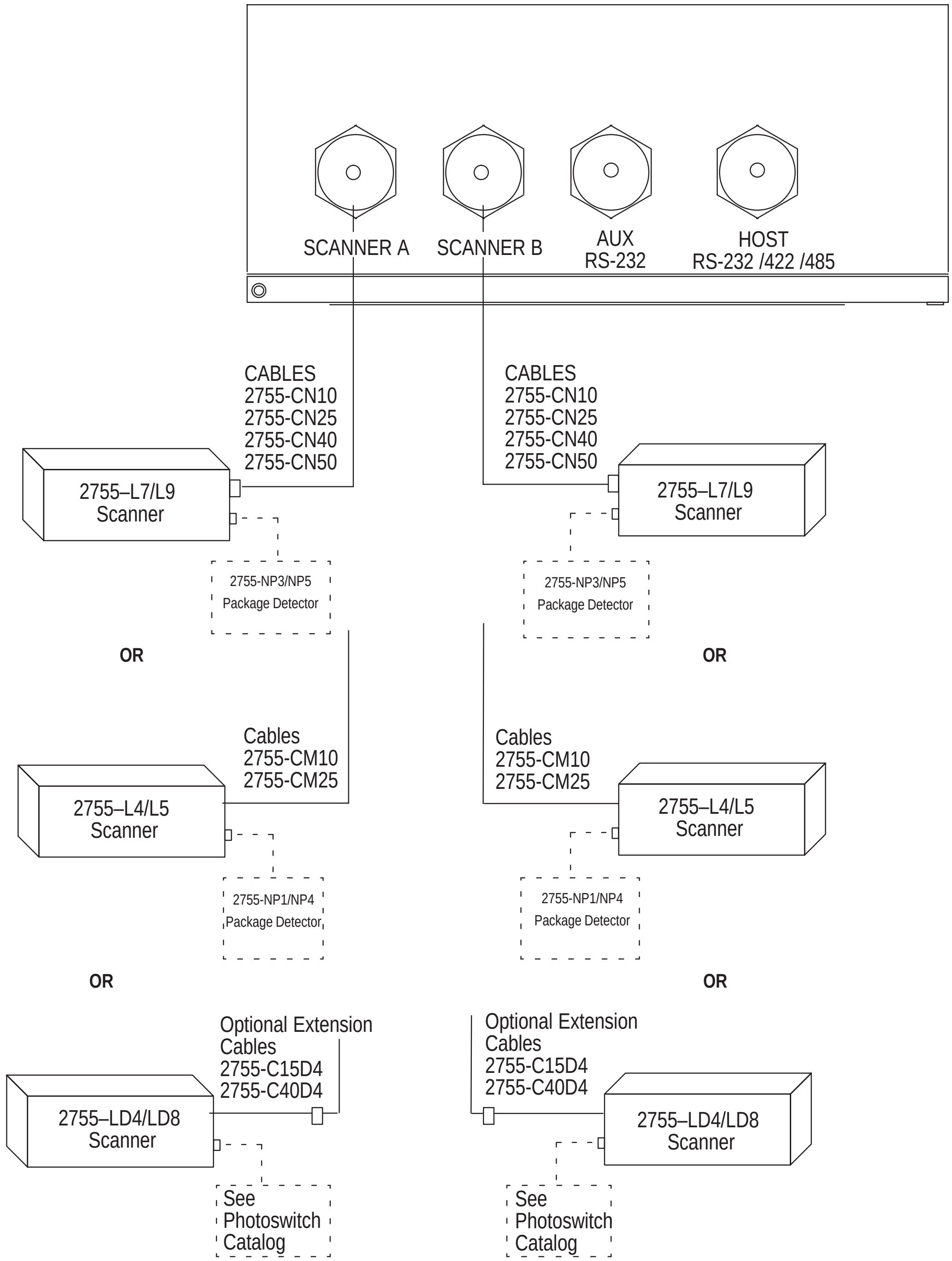


Figure 4.6 Connecting scanners to NEMA Type 4 decoder



4. Turn the decoder on and place a sample symbol at the desired read position. The symbol should **not** be moving at this time.

5. Monitor the decoder's performance while viewing the **Status and Primary Counters** screen. Decoder performance is a measure of the percentage of good reads compared to the total number of read attempts. The manual you received with your scanner will instruct you on the proper implementation of *pitch*, *tilt*, and *skew.* When properly scanning a good quality label, your decoder performance should be at or only slightly below 100 percent.

   To get to the **Status and Primary Counters** screen, press ESC twice. The first ESC brings up the Command Line:

```
COMMAND -- Exit:ESC  Select:RETURN  Next:SPACE

   NEXT PAGE   THIS PAGE      RECALL     SAVE        DEFAULT
```

   The second ESC brings up the Prompt Line asking if you want to save your changes to EEPROM:

```
SAVE CONFIGURATION TO EEPROM ... Confirm (Y/N) ?
```

   Note: EEPROM is a form of retentive memory that will retain your settings even if power to the decoder is lost.

   Press "Y" to approve the save. When your are finished you will be at the **Select Operation** menu. Press "B" to open the **Status and Primary Counters** screen.

```
2755-DD1P/DD4P                                 Bar Code Decoder
                  Copyright 1992 Allen-Bradley Company, Inc.

CONFIGURATION
  1) Symbology
  2) Scanner Control, Primary Match Table, Discrete I/O
  3) Extended Match Table and Counters
  4) Aux and LCD Display Format
  5) Host Message Replacement Rules
  6) Host Message Format
  7) Host Communications
  8) Aux Terminal Data Entry

Display                            System
  A) Bar Code Strings                C) Reset Status and Primary Counters
  B) Status and Primary Counters     D) Reset Extended Match Counters
                                     E) Restart System
                                     F) Select Language
                                     G) Save Configuration

                           Press 1...8, A...G or ESC
```

6. Adjust the position of the scanner to maximize decoder performance.
7. Fix the scanner in this optimized position.

Customize As Required

Your system is now ready to customize for best performance in your particular application. The software screens used to do that have been structured to “walk you through” the configuration process. We recommend stepping through the screens in the order they appear, using this manual as a reference.

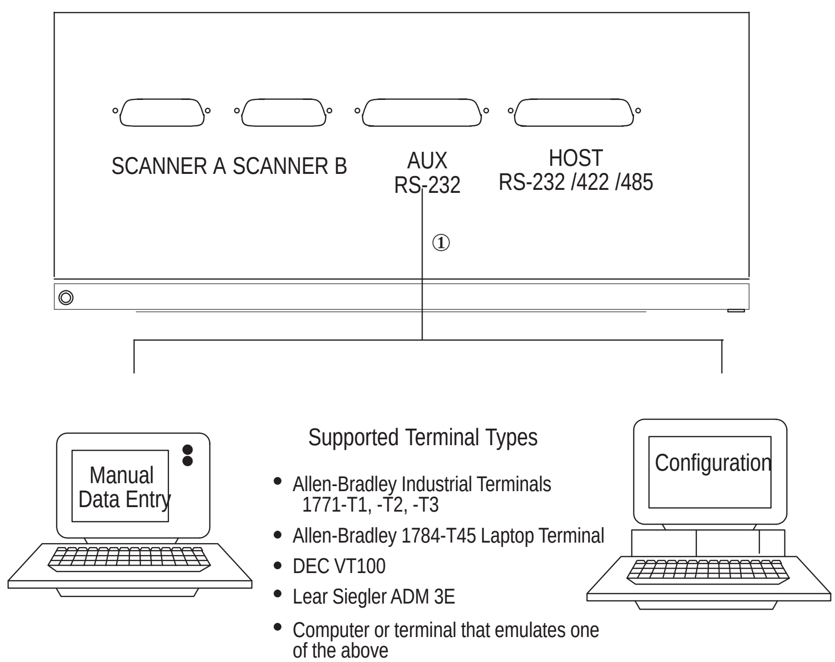
If your application requires a host device or I/O modules, the next two sections, “Connecting Host Device” and “Installing I/O Modules” will help guide you through the hardware configuration required to use them.

Connecting the AUX Terminal

The AUX port supports a terminal for **either** configuring the decoder **or** for manual data entry.

The AUX port on the NEMA Type 1 decoder is configured as shown below, and communicates over an RS-232 serial communication line. It has a 25-pin D shell (female) connector. Figure 4.7 shows terminals you can connect to the AUX port of the NEMA Type 1 decoder.

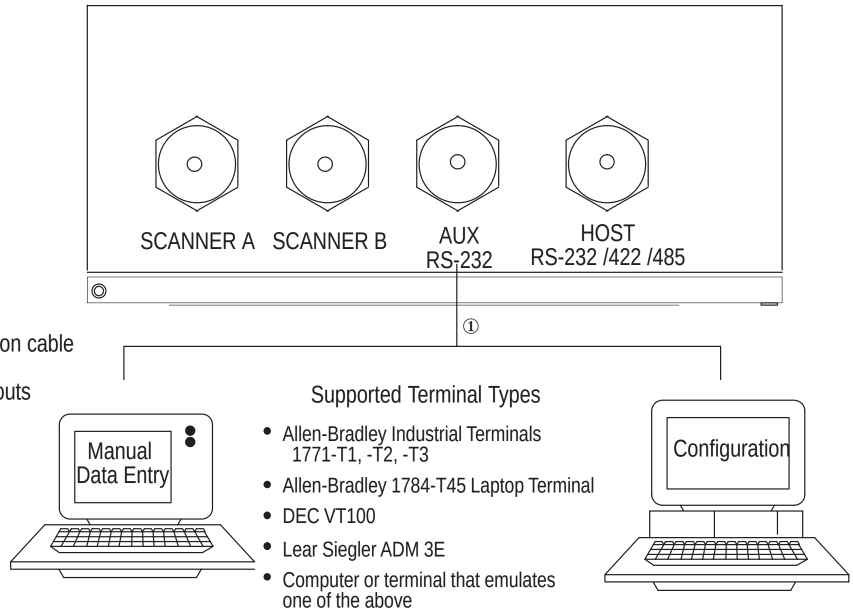
Figure 4.7 Connecting terminal to AUX port of NEMA Type 1 decoder



① Construct your own cable using the pinouts in Appendix D.

The AUX port on the NEMA Type 4 decoder has a 19-pin (male) connector and communicates over an RS-232 serial communication line. Figure 4.8 shows terminals you can connect to the AUX port of the NEMA Type 4 decoder.

Figure 4.8 Connecting terminal to AUX port of NEMA Type 4 decoder



① Use the Cat. No. 2755-CT1 communication cable or construct your own cable using the Cat. No. 2755-NC17 Connector Kit and pinouts shown in Appendix D.

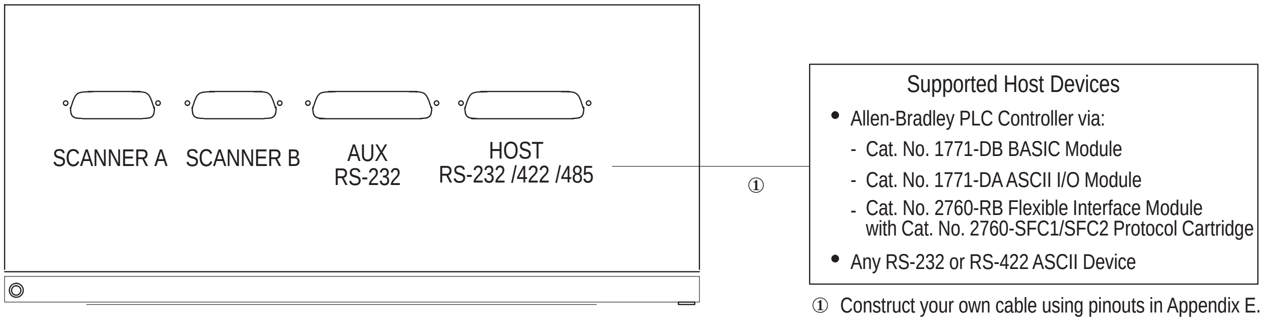
See Appendix D for details on connecting each terminal. See Chapters 5 through 14 for details on using a terminal to configure the decoder and to monitor operations.

Connecting the Host Device

The HOST port allows the exchange of data between a host computer and the decoder. A host computer can configure the decoder, remotely control the decoder, receive messages and data from the decoder, and exchange messages with the AUX terminal.

The HOST port on the NEMA Type 1 decoder is configured as shown below, and communicates over an RS-232, RS-422, or RS-485 communication line. It has a 25-pin (female) D shell connector. Figure 4.9 shows host devices you can connect to the HOST port of the NEMA Type 1 decoder.

Figure 4.9 Connecting device to HOST port of NEMA Type 1 decoder

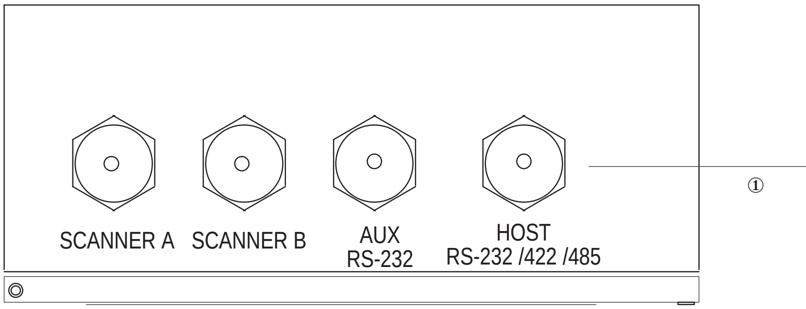


① Construct your own cable using pinouts in Appendix E.

Pin	Abbreviation	Function
1	GND	Chassis Ground
2	TD	RS-232 Transmit Data (from decoder to host).
3	RD	RS-232 Receive Data (from host).
4	RTS	RS-232 Request to Send
5	CTS	RS-232 Clear to Send
6	DSR	RS-232 Data Set Ready
7	SIG GND	RS-232 Signal Common
9	SHLD	RS-485 Shield Ground
12	485 TERM	RS-485 Line Termination. Jumpers to 13.
13	485 A/TERM	RS-485 Line Termination. Jumpers to 12.
14	TxB+	RS-422(B) or RS-485(B) Transmit Data (from decoder to host).
15	TxA-	RS-422(A) or RS-485(A) Transmit Data (from decoder to host).
16	RxA '-	RS-422 Receive Data (from host).
17	RxB '+	RS-422 Receive Data (from host).
18	422 A/TERM	RS-422 Line Termination. Jumpers to 19.
19	422 TERM	RS-422 Line Termination. Jumpers to 18.
20	DTR	RS-232 Data Terminal Ready

The HOST port on the NEMA Type 4 decoder has a 19-pin (male) connector and communicates over an RS-232, RS-422, or RS-485 communication line. Figure 4.10 shows host devices you can connect to the HOST port of the NEMA Type 4 decoder.

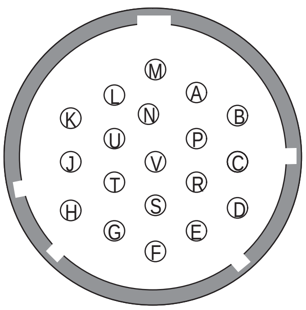
Figure 4.10 Connecting device to HOST port of NEMA Type 4 decoder



Supported Host Devices
- Allen-Bradley PLC Controller via:
  - Cat. No. 1771-DB BASIC Module
  - Cat. No. 1771-DA ASCII I/O Module
  - Cat. No. 2760-RB Flexible Interface Module with Cat. No. 2760-SFC1/SFC2 Protocol Cartridge
- Any RS-232 or RS-422 ASCII Device

① Use the Cat. No. 2755-CT1 communication cable or construct your own cable using the Cat. No. 2755-NC17 Connector Kit and the pinouts in Appendix E. Use 2755-CY1 for multidrop applications.

HOST Port (male) Connector



Pin	Abbreviation	Function
A	GND	Chassis Ground
B	RD	RS-232 Receive Data (from host).
C	TD	RS-232 Transmit Data (from decoder to host).
D	SIG GND	RS-232 Signal Common
E	DTR	RS-232 Data Terminal Ready
F	RTS	RS-232 Request to Send
H	DSR	RS-232 Data Set Ready
J	CTS	RS-232 Clear to Send
L	SHLD	RS-485 Shield Ground
M	485 TERM	RS-485 Line Termination. Jumpers to N.
N	485 A/TERM	RS-485 Line Termination. Jumpers to M.
P	TxB+	RS-422 Transmit Data (from decoder to host).
R	TxA-	RS-422 Transmit Data (from decoder to host).
S	RxA '-	RS-422 Receive Data (from host).
T	RxB '+	RS-422 Receive Data (from host).
U	422 A/TERM	RS-422 Line Termination. Jumpers to V.
V	422 TERM	RS-422 Line Termination. Jumpers to U.

See Appendix E for specific details on connecting to a host device using the different communication interfaces.

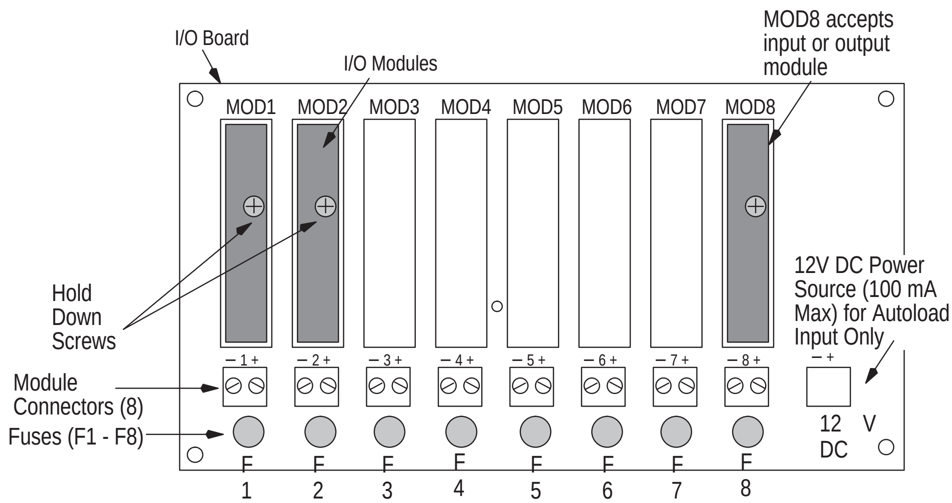
Installing I/O Modules

This section shows how to install input and output modules on the optional I/O Module Board. The board has eight positions (MOD1-MOD8) for I/O modules. All eight positions accept output modules. The MOD8 position alternately accepts an input module for the match code *AutoLoad* function.

The Accessories section in Chapter 2 provides a complete list of modules supported by the I/O board.

Figure 4.11 shows two output modules installed in the MOD1 and MOD2 positions and one input module in the MOD8 position. A screw holds each module into position on the I/O board.

Figure 4.11 I/O module board (with optional I/O modules installed



To install a module on the I/O board:

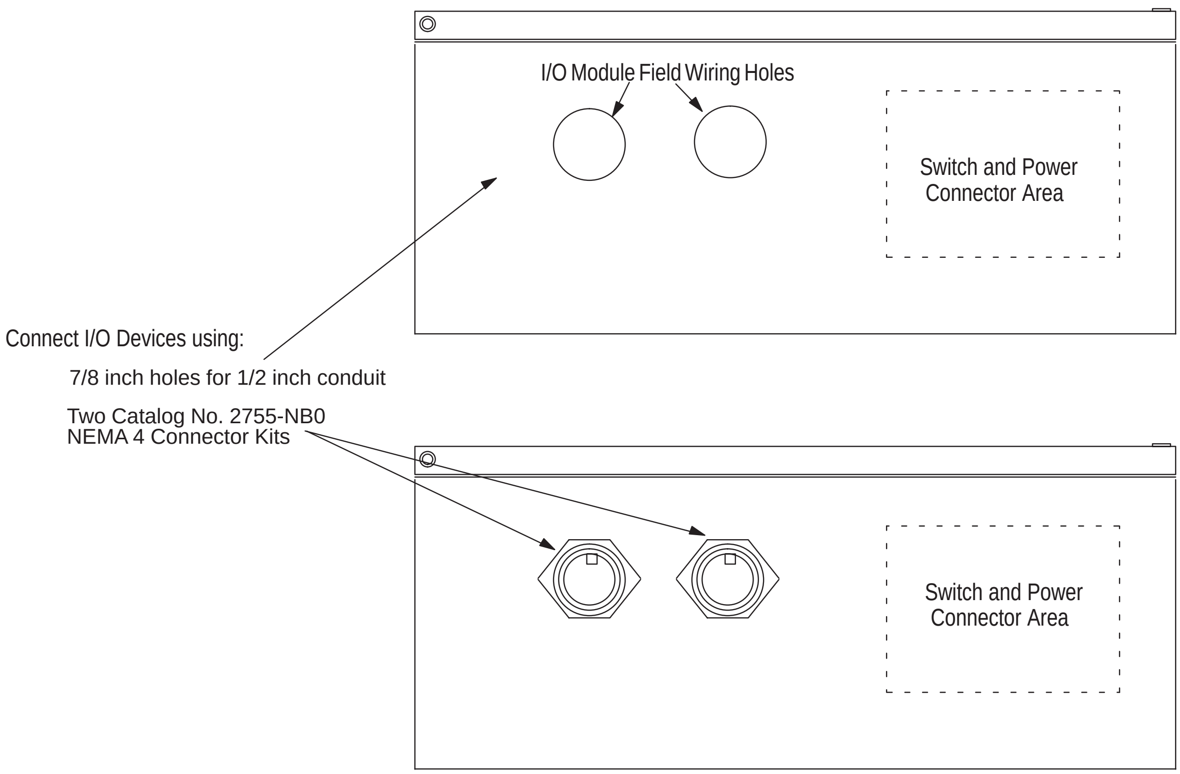
1. Verify that power is disconnected from decoder and module connectors.
2. Loosen the two screws which secure the cover of the decoder and open.
3. Carefully align module pins over sockets in board. Plug module into MOD position on I/O board.
4. **Note**: The module pins must puncture the silicon seal of the I/O board sockets.
5. Tighten the hold-down screw to secure module in position.

To remove a module, verify that the power is off, loosen the hold-down screw, and pull out module.

Connecting I/O Modules to External Devices

The bottom of the decoder has two holes for I/O module field wiring. The $^7/_8$ inch holes accept standard $^1/_2$ inch conduit fittings or NEMA 4 Conduit Hubs, or the 2755-NB0 NEMA 4 Connector Kit. The NEMA 4 connector can be used with either NEMA 1 or NEMA 4 decoders. Figure 4.12 shows the location of the holes in the bottom of the enclosure.

Figure 4.12 Connecting I/O to external devices



See the next section for details on how to install conduit hubs in the I/O module field wiring holes. Use the 2755-NB0 Connector Kit or the 1490-N1 conduit hubs in the NEMA Type 4 decoder to maintain the environmental rating.

Wiring I/O Modules

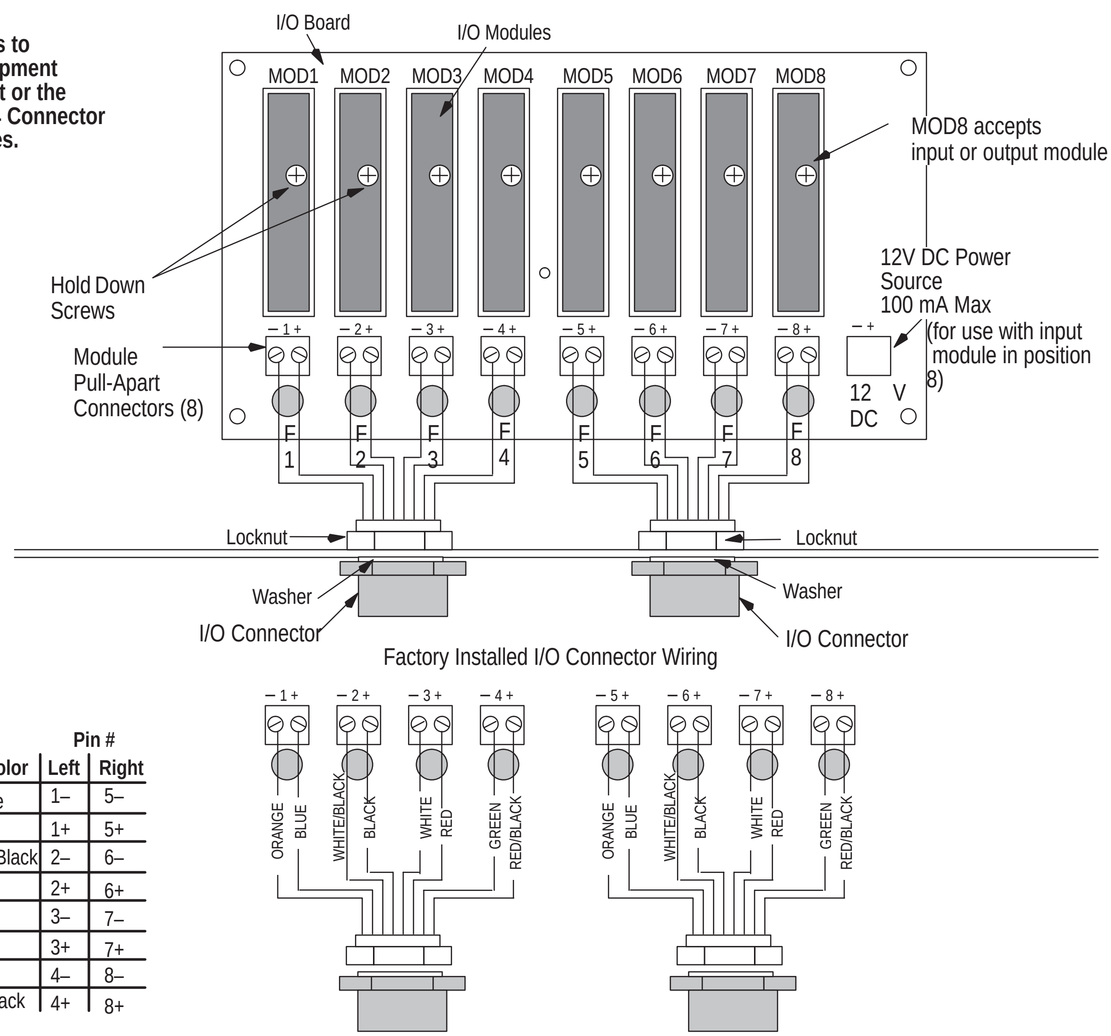
Figure 4.13 shows how the factory installed NEMA Type 4 Connectors are pre-wired to the I/O module locations. Below each output module is a terminal block connector which accepts up to 12 gauge wire.

To wire each output module:

1. Strip $^{1}/_{4}$ inch of the insulation from wires (removing wire particles).
2. Loosen terminal screws on pull-apart connector. For easier installation, remove connector from the I/O board by gently lifting the connector.
3. Insert wires into connector. Note polarity on module connectors when using DC modules.
4. Tighten terminal screws on connector to secure the wires.
5. Replace pull-apart connector if removed from I/O board.

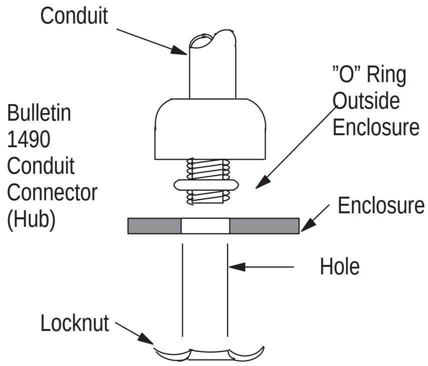
Figure 4.13 Wiring I/O modules

Wire modules to external equipment using conduit or the NEMA Type 4 Connector Kit and Cables.



	Pin #	
Wire Color	Left	Right
Orange	1–	5–
Blue	1+	5+
White/Black	2–	6–
Black	2+	6+
White	3–	7–
Red	3+	7+
Green	4–	8–
Red/Black	4+	8+

Installing Conduit Hubs/NEMA Type 4 Decoder



Use the Bulletin 1490-N1 conduit hub with the NEMA Type 4 decoder to maintain environmentally sealed connections at conduit entrances. The NEMA Type 1 and Type 4 decoders accept Catalog Number 1490-N1 conduit hubs (for a $^{7}/_{8}$ inch hole size and $^{1}/_{2}$ inch conduit).

Conduit Holes

The conduit hubs install in the two output module field wiring holes in the bottom of the enclosure. Each hole size is $^{7}/_{8}$ inch and accepts $^{1}/_{2}$ inch conduit.

Conduit Connections

ATTENTION: To guard against enclosure damage, align the conduit so as to prevent unnecessary stress on the enclosure walls.

You can connect conduit to the conduit connector (hub) before or after the conduit connector is secured into the prepared hole using the connector locknut. Tighten connector locknut securely to provide bonding to equipment enclosure.

ATTENTION: To complete the bonding between grounding bushings and the enclosure, bonding must be provided in accordance with all applicable codes.

Chapter 5

Introduction to AUX Terminal Configuration

Chapter Objectives

This chapter describes the basic concepts you'll need to understand before attempting to use the built-in configuration menus and screens of the Dual-Head Bar Code Decoders to:

- select bar code symbology and supplements
- configure scanner operations
- reset decoder status and counters
- configure AUX port terminal and LCD display
- display bar code values
- configure host communications and host message format
- restart decoder

Connect and Set Up AUX Terminal

To use the built-in configuration menus and screens, you must first connect a terminal to the RS-232 AUX port of the decoder. Supported terminals include:

- Allen-Bradley Industrial Terminal (Catalog No. 1770-T1, -T2, -T3)
- Allen-Bradley 1784-T45 Laptop Terminal (Catalog No. 1784-T45)
- DEC VT100
- Lear Siegler ADM 3E
- computer or terminal that emulates one of the above

Appendix D provides details on how to connect and setup each terminal. The AUX port communication parameters are fixed at:

- 8 Data Bits
- 1 Stop Bit
- 9600 Baud Rate
- Parity None
- XON/XOFF Flow Control (Decoder responds to XON/XOFF, but does not generate XON/XOFF characters to the terminal.)

AUX Terminal Selector

The AUX terminal can be used to either configure the decoder or for manual data entry and display functions. The AUX port terminal is factory set for configuration functions.

Getting Started

After connecting the terminal to the decoder and setting the communication parameters, you can start using the configuration menus.

1. Power on the terminal or computer and load communications software (if required).
2. Power on the decoder. The POWER and CPU ACTIVE indicators light.
3. The **Select Language** screen displays:

```
SELECT LANGUAGE       CHOIX DU LANGUAGE      WAEHLE SPRACHE
 1) English           1) Anglais             1) Englisch
 2) French            2) Francais            2) Franzoesisch
 3) German            3) Allemand            3) Deutsch
 4) Italian           4) Italien             4) Italienisch
 5) Spanish           5) Espagnol            5) Spanisch

Press 1,2,3,4 or 5    Appuyer 1,2,3,4 ou 5   Druecken Sie 1,2,3,4 oder 5


SELEZIONARE LINGUA    SELECCIONAR LENGUA
 1) Ingeles            1) Ingles
 2) Francese           2) Frances
 3) Tedesco            3) Aleman
 4) Italiano           4) Italiano
 5) Spagnolo           5) Castellano

Prenere 1,2,3,4 o 5   Pulsar 1,2,3,4 o 5
```

If the **Select Language** screen does not appear, press [Esc]. If the **Select Language** screen still does not appear, check your communication parameters to be certain they match those listed earlier in this chapter. Also, be sure the COM port selected in your communications software matches the COM port to which the decoder is connected. See Appendix D for information on selecting a COM port.

Important: If you are unable to access the configuration screens, the AUX port may be set for manual data entry mode. See Chapter 13 for details on how to switch to configuration mode.

4. Press the number key that corresponds to the language you want to use. All subsequent screens will display in the selected language.
5. After selecting a language, the **Select CRT Type** screen displays.

```
2755-DD1P/DD4P              Bar Code Decoder
       Copyright 1992 Allen-Bradley Company, Inc.

      SELECT CRT TYPE

      1) Allen-Bradley 1770 Industrial Terminal
      2) Allen-Bradley T45 Portable Terminal
      3) Lear Siegler ADM 3E
      4) Digital VT100


       Press 1,2,3,4 or ESC
```

6. Press the number key that corresponds to the terminal you are using, or press [Esc] to return to the previous screen.
7. After selecting the terminal type, the **Select Operation** screen will appear.

```
2755-DD1P/DD4P                              Bar Code Decoder
                  Copyright 1992 Allen-Bradley Company, Inc.

CONFIGURATION
  1) Symbology
  2) Scanner Control, Primary Match Table, Discrete I/O
  3) Extended Match Table and Counters
  4) Aux and LCD Display Format
  5) Host Message Replacement Rules
  6) Host Message Format
  7) Host Communications
  8) Aux Terminal Data Entry

Display                            System
  A) Bar Code Strings                C) Reset Status and Primary Counters
  B) Status and Primary Counters     D) Reset Extended Match Counters
                                     E) Restart System
                                     F) Select Language
                                     G) Save Configuration

                           Press 1...8, A...G or ESC
```

This menu displays all of the operations you can perform including **Configuration** functions, **Display** functions, and **System** functions.

Select an operation by pressing a number key from [1] to [8] or [A] to [G]. Press [Esc] to return to the previous screen.

Each operation is described in the sections that follow.

Configuration Functions

The eight numbered options on the **Select Operation** menu access configuration functions:

1. Symbology

2. Scanner Control, Primary Match Table, Discrete I/O

3. Extended Match Table and Counters

4. Aux and LCD Display Format

5. Host Message Replacement Rules

6. Host Message Format

7. Host Communications

8. Aux Terminal Data Entry

9. If you select one of these options while the discrete outputs are enabled, the following caution message displays.

```
                              CAUTION
  Changing Configuration Parameters may cause the discrete outputs
 to switch unexpectedly.  To configure the decoder with the outputs
 DISABLED, press any key except the ESC key, make changes, SAVE and
    RESTART the decoder.  If outputs are to remain ENABLED during
  configuration, press the ESC key to view configuration screens.
```

The message informs you that configuration changes could change the state of the discrete outputs.

ATTENTION: If your application uses discrete outputs, we recommend that you disable the outputs during configuration to prevent unwanted state changes.

To proceed with configuration while the outputs are enabled, press the [Esc] key. To disable the outputs during configuration, press any other key.

Note: The outputs remain disabled until you restart the system with function **E) Restart System**.

After responding to the caution message, the selected configuration screen is displayed.

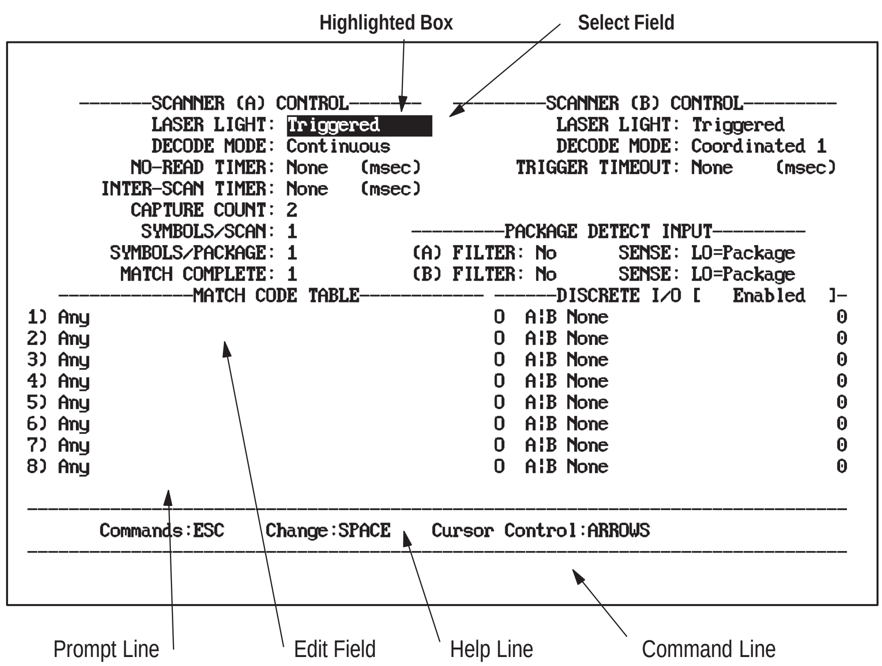
ATTENTION: When controlling outputs locally using configuration screens, suspend host communications to prevent outputs from unintentionally changing state.

Editing Conventions

This section provides some helpful hints on using and editing the configuration screens including:

- highlight
- moving around the screen
- data fields
- editing data fields
- audible beep
- prompt line and command line

For example purposes, let's look at one of the configuration screens while going over editing conventions.



Highlight

Highlight

Each screen displays a group of configuration parameters and settings. The cursor displays as a highlighted (reverse video) box indicating the current selection. The above screen shows the *Laser Light* setting of *Triggered* as the current selection.

↑ → ↓ ←

Moving Around the Screen

Use the arrow keys to move the highlight or selection cursor around the configuration screen.

↑ Moves the highlight or selection cursor up one field.

↓ Moves the highlight or selection cursor down one field. The [Return] key is equivalent to the [↓] key when moving around the screen.

→ Moves the highlight or selection cursor to the right one field.

← Moves the highlight or selection cursor to the left one field.

Note: The Allen-Bradley 1770 Industrial Terminals do not have arrow keys. Use Ctrl-U for up, Ctrl-D for down, Ctrl-L for left, Ctrl-R for right.

Field Types

Each configuration parameter has a field associated with it that shows the current setting. You can change the value or setting in any field. There are two main types of fields: **select fields** and **edit fields. A** third type, **select/edit numeric field**, is a hybrid of the other two.

Select Field

`LASER LIGHT: Triggered`

Select fields have a fixed group of settings from which you can choose. For example, the *Laser Light Mode* is a select field and the available settings are *On*, *Triggered*, or *Off.* An example is shown on the left.

Edit Field

`HEADER STRING:`

Edit fields are data entry fields which allow you to enter strings of characters. The length of the highlighted box determines the size of the field. An example is shown on the left. The three types of edit fields are:

- ASCII character (decimal value 0 to 255)

  ASCII fields display the decimal value followed by the ASCII character equivalent, for example: 013 = CR. You can enter:

  – a decimal value; the software displays the ASCII equivalent character
  – an ASCII (non-numeric) character such as T; the software displays the decimal equivalent
  – a [Return] when the field is empty; the software displays NONE which means an ASCII value is not defined. The decimal value of 255 is interpreted as NONE
- numeric values
- text strings (including non-printable characters, see Appendix I)

Select/Edit Numeric Field

A select/edit numeric field, as its name implies, behaves as both a select field and edit field. That is, you can *either* enter a numeric value from the keyboard, *or* use the space bar to move through a list of available values.

Changing Fields

To change the contents of a **select field, edit field**, or **select/edit field** use these keys:

[Space]	Advances through available settings in a select or select/edit field or opens an edit field for changes. Pressing [Space] in an edit field clears the contents of the field and places you in edit mode. In edit mode, the field is highlighted (displays in reverse video) while you enter text.
[Backspace]	Deletes the previous character in edit mode. Moves backwards through the available settings in a select or select/edit field. This key is labeled [Delete] or [Rubout] on some computers. This key is not valid in an edit field until the field is open.
[Tab]	Opens edit field and puts the cursor in the first position without affecting the field contents. If pressed when field is already open, moves the cursor one place to the right. This allows you to change the contents of edit fields without first clearing their contents with the space bar. Opens select and select/edit fields and selects next value.
[*]	In a select or select edit field, pressing the asterisk (*) will set the field to its default value. An asterisk in an unopened edit text field will open the field and enter an asterisk in the first position. When pressed in an edit text field that is already open, the asterisk will behave like any other printable character. **Note:** Most fields may be set to their default value by pressing the [Space] key and then [Enter]. Otherwise, press “ * ” (an asterisk) followed by [Enter].
[Return]	In open fields, accepts the field selection or entry and closes the field. You must press [Return] to close an open field before you can use the arrow keys to move to another field. Moves the cursor to the next field if applied to a closed field. This key is labeled [↵] or [Enter] on some computers.
[Esc]	Cancels the selection change or edits (before pressing [Return]) and restores the field to its initial contents.

Audible Beep

The terminal beeps when you enter invalid data into an edit field, for example, entering a letter into a numeric field. Some numeric fields have a range of minimum/maximum values. If you enter a value outside the range, the terminal beeps.

Help Line

The help line at the bottom of the screen displays keys that are active in the current mode of operation.

When first accessing a configuration screen, this help line displays:

```
--------------------------------------------------------------------------------
        Commands:ESC        Change:SPACE       Cursor Control:ARROWS
--------------------------------------------------------------------------------
```

The help line indicates that you can press:

- [Esc] to access the command line
- [Space] to change the contents of a select field or edit field
- arrow keys to move around the configuration screen

Select Mode

When pressing [Space] in a **select field**, the help line looks like this:

```
________________________________________________________________________________
     SELECT -- Cancel:ESC  Next:SPACE  Previous:BACKSPACE  Enter:RETURN
________________________________________________________________________________
```

In select mode, you can press:

- [Esc] to cancel the select operation and close the field.
  The field is restored to its initial contents.
- [Space] to toggle through the available selections
- [Backspace] to return to the previous screen
- [Return] to accept the selection and close the field

Edit Mode

When pressing [Space] in an **edit field**, the help line looks like this:

```
________________________________________________________________________________
       EDIT --  Cancel:ESC  Enter:RETURN  Erase Char:BACKSPACE
________________________________________________________________________________
```

In edit mode, you can press:

- [Esc] to cancel the edit operation and close the field. The field is restored to its initial contents.
- [Return] to accept the entered data and close the field
- [Backspace] while editing to erase the last character

Command Line

Press [Esc] while in any configuration screen to access the command line.

```
-----------------------------------------------------------------------------
    COMMAND -- Exit:ESC  Select:RETURN  Next:SPACE
-----------------------------------------------------------------------------
         NEXT PAGE  THIS PAGE        RECALL     SAVE          DEFAULT
```

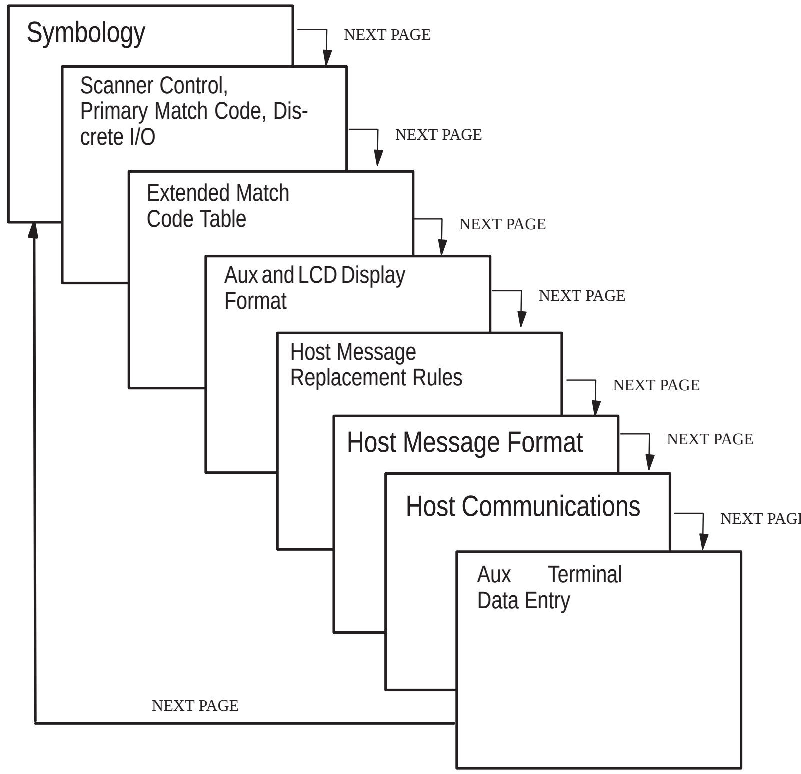
The command line displays with NEXT PAGE highlighted.

The following keys are active in the command line:

[Esc]	Exits configuration mode and returns to the **Select Operation** menu.
[Return]	Accepts the highlighted command and performs the operation.
[Space]	Toggles through options in the command line.
[→] [←]	Moves highlight one command to the right or left.

Command Summary

NEXT PAGE	Displays the next configuration screen. The screens display in the order below:



Note: You can also access these screens in any order from the **Select Operation** menu.

THIS PAGE — Returns to the top of the current configuration screen and refreshes that screen.

RECALL — Copies storage memory to operating memory. All parameter changes take immediate effect, with the following exceptions:

- Host communications parameters: baud rate, bits/character, parity, host protocol, device address, ACK character, and NAK character. These parameters will take effect only after a *Restart*.
- *Autoload* (Primary and Extended Match Code Table). Requires a *Restart* before scanned data will be autoloaded into the table.

The following message prompts you to confirm the recall:

```
RESTORE CONFIGURATION FROM EEPROM ... (Y/N)?
```

Press [N] or [Esc] to cancel the operation and return to the **Select Operation** menu. Press [Y] to recall the values from storage memory. The recalled configuration will then control decoder operations.

SAVE

Saves the configuration currently in operating memory to storage memory. The *Save* command does not alter the current operation of the decoder. The following message prompts you to confirm the save operation.

```
SAVE CONFIGURATION TO EEPROM ... Confirm (Y/N) ?
```

Press [N] or [Esc] to cancel the operation and return to the **Select Operation** menu. Press [Y] to save the configuration to storage memory.

DEFAULT

Copies the factory default configuration parameters into operating memory. All parameters take effect immediately, with the following exceptions:

- Host communications parameters: baud rate, bits/character, parity, host protocol, device address, ACK character, and NAK character. These parameters will take effect only after a *Restart*.

When you select *Default*, the following confirmation message will appear:

```
SET DEFAULT CONFIGURATION ... (Y/N)?
```

Press [N] or [Esc] to cancel the operation and return to the **Select Operation** menu. Press [Y] to restore the factory defaults in storage memory to operating memory. This operation has no effect on any configuration parameters previously saved to storage memory with the *Save* command. The factory defaults are listed in Appendix B.

ATTENTION: It is good practice to save your configuration once the required host communications parameters have been set. Doing so assures you will retain those parameter settings even after lengthy periods without power.

Configuration: Symbology

Configure Symbology

Option 1 on the **Select Operation** menu accesses the **Symbology** configuration screen. Use this function to select symbologies for decoding and to define the operating parameters to use during decoding. The screen is displayed with the first field highlighted.

```
--SYMBOLOGY--  --------LENGTHS--------   --CHECK CHARACTERS--
 CODE 39: No   .  .  .  .  .  .  .  .  .  No    INCLUDE: No
   I 2/5: No   .  .  .  .  .  .  .  .  .  No    INCLUDE: No      GUARD BARS: No
 CODABAR: No   .  .  .  .  .  .  .  .  .  No    INCLUDE: No
CODE 128: No   .  .  .  .  .  .  .  .  .      FNC1 CHAR: None    0

   UPC-A: No    SUPPLEMENTS: None
   UPC-E: No    SUPPLEMENTS: None       EXPAND:  No
   EAN-8: No    SUPPLEMENTS: None
  EAN-13: No    SUPPLEMENTS: None

        ENABLE PHARMA-CODE: Yes
          QUIET ZONE RATIO: Default     CODE VERIFICATION LIST
           SPACE TOLERANCE: 15          ----------------------
             BAR TOLERANCE: 15          1)       5)        9)       13)
  WIDE TO NARROW BAR RATIO: 2           2)       6)       10)       14)
    MINIMUM NUMBER OF BARS: 5           3)       7)       11)       15)
SCANNER A DECODE DIRECTION: Forward     4)       8)       12)       16)
SCANNER B DECODE DIRECTION: Forward

--------------------------------------------------------------------------------
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
--------------------------------------------------------------------------------
```

The default settings are displayed the first time you access this screen. Make changes appropriate for your application. If the factory defaults are satisfactory, you can return to the **Select Operation** menu by pressing [Esc] twice.

The parameters on this screen:

- Enable symbologies for decoding
- Enable specific length checking, which serves two purposes:
  – provides data integrity for variable length symbologies by protecting against short reads. The decoder will only decode bar code symbols that contain the exact number of characters specified in the length fields. Especially useful for Interleaved 2 of 5 when check characters are not being used.
  – optimizes operations by allowing the decoder to select scans for decoding from several labels with different lengths. For example, the decoder can select the 6 character code from a carton that has 14, 6, and 4 character codes
- Enable supplements for UPC/EAN symbologies
- Enable verification of guard bars with Interleaved 2-of-5 symbols
- Adjust and set the quiet zone ratio (if necessary)
- Configure parameters for Pharma–Code labels.

The decoder will auto discriminate between multiple symbologies. For optimum performance, enable only those symbologies and code lengths you intend to use.

The following pages define each symbology parameter along with the field type and possible values. The default value is shown in bold letters.

Code 39

Field Type	Options
Select	No **Yes**

Enables/disables decoding of Code 39 bar code labels. The default of *Yes* (except on Pharma-Code decoders) enables decoding of this symbology. Select *No* to disable decoding.

Code 39 Specific Lengths

Field Type	Options
Edit Numeric	0 through 64 (**0**)

Sets length checking for Code 39 bar code labels. The default is *0*, which means the decoder does not check lengths.

You can specify up to 8 code lengths (maximum of 64 characters). The code length **includes the check character, but not the start and stop characters**. If you specify a code length other than 0, the decoder will only decode labels with the number of characters specified.

Important: Enter specific lengths starting with the leftmost blank field. Specific lengths entered to the right of a blank field are ignored.

Correct

```
--SYMBOLOGY--  --------LENGTHS--------
 CODE 39: Yes  10 15 .  .  .  .  .  .
```

Incorrect

```
--SYMBOLOGY--  --------LENGTHS--------
 CODE 39: Yes  10 .  15 .  .  .  .  .
```

15 is to the right of a blank field and will be ignored.

Code 39 Check Character

Field Type	Options
Select	**No** Yes

Controls whether the decoder is required to compute and verify a code check character for Code 39 bar codes. The code check character ensures that the data is read correctly. The default is *No*, which means the decoder treats all decoded characters as data.

The Code 39 check character is computed as a Modulus 43 sum of all characters value as specified in the AIM specification USS-39.

Include Code 39 Check Character

Field Type	Options
Select	**No** Yes

Controls whether the code 39 check character computed by the decoder is included in the message sent to the host. The default is *No,* which means the Code 39 check character is not sent to the host.

Interleaved 2-of-5

Field Type	Options
Select	**No** Yes

Enables/disables decoding of Interleaved 2-of-5 bar code labels. The default of *No* disables decoding of this symbology. Select *Yes* to enable decoding.

Interleaved 2-of-5 Specific Lengths

Field Type	Options
Edit Numeric	Even numbers 2 through 64 (**0**)

Sets length checking for Interleaved 2-of-5 bar code labels. The default is *0,* which means the decoder does not check lengths.

You can specify up to 8 code lengths (maximum of 64 characters). **Only even numbers (2-64) are allowed.** The code length **includes the check character, but not the start and stop characters**. If you specify a code length other than 0, the decoder will only decode labels with the number of characters specified.

We recommend that you enter specific lengths for Interleaved 2-of-5 labels. Otherwise, a partial scan of symbols could result in a valid shorter read.

The decoder will ignore 2 character Interleaved 2-of-5 labels unless you enter a specific length of 2.

Interleaved 2-of-5 Check Character

Field Type	Options
Select	**No** Yes

Controls whether the decoder is required to compute and verify a code check character for Interleaved 2 of 5 bar codes. The code check character ensures that the data is read correctly. The default is *No*, which means the decoder treats all decoded characters as data.

The Interleaved 2 of 5 character is computed as a Modulus 10 sum of all characters value as specified in the AIM specification USS-I 2/5.

Include Interleaved 2-of-5 Check Character

Field Type	Options
Select	**No** Yes

Controls whether the Interleaved 2 of 5 check character computed by the decoder is included in the message sent to the host. The default is *No*, which means the Interleaved 2 of 5 check character is not sent.

Interleaved 2-of-5 Guard Bars

Field Type	Options
Select	**No** Yes

Controls verification of the presence of guard bars on Interleaved 2-of-5 symbols. The default of *No* results in no verification. Select *Yes* to activate guard bar verification.

Codabar

Field Type	Options
Select	**No** Yes

Enables/disables decoding of Codabar labels. The default of *No* disables decoding of this symbology. Select *Yes* to enable decoding.

Codabar Specific Lengths

Field Type	Options
Edit Numeric	0 through 64 (**0**)

Sets length checking for Codabar labels. The default is *0*, which means the decoder does not check lengths.

You can specify up to 8 code lengths (maximum of 64 characters). The code length **includes the check character *and* the start and stop characters**. If you specify a code length other than 0, the decoder will only decode labels with the number of characters specified.

Codabar Check Character

Field Type	Options
Select	**No** Yes

Controls whether the decoder is required to compute and verify a code check character for Codabar bar codes. The code check character ensures that the data is read correctly. The default is *No*, which means the decoder treats all decoded characters as data.

The Codabar character is computed as a Modulus 16 sum of all characters value as specified in the AIM specification USS-Codabar.

Include Codabar Check Character

Field Type	Options
Select	**No** Yes

Controls whether the Codabar check character computed by the decoder is included in the message sent to the host. The default is *No,* which means the Codabar check character is not sent.

Code 128

Field Type	Options
Select	**No** Yes

Enables/disables decoding of Code 128 labels. The default of *No* disables decoding of this symbology. Select *Yes* to enable decoding.

Code 128 Specific Lengths

Field Type	Options
Edit Numeric	0 through 64 (**0**)

Sets length checking for Code 128 labels. The default is *0*, which means the decoder does not check lengths.

You can specify up to 8 code lengths (maximum of 64 characters). The code length ***does not*** **include the check character or the start and stop characters**.① If you specify a code length other than 0, the decoder will only decode labels with the number of characters specified.

The decoder uses the specific length parameter in three ways:

- The decoder discards decoded symbols with lengths that do not match the specific length parameter

  This allows you to filter out all decoded symbols except those that have a specific length that appears in the specific length table.
- The decoder uses it to determine if the number of bar to space transitions that occur during a scan is appropriate for the symbologies and specific length values

  Scans that occur in the absence of a symbol or part of a symbol are not valid, and therefore result in extra processing overhead for the decoder. The decoder discards these scans before the microprocessor sees them.
- Once the microprocessor sees a scan, it uses the specific length parameter to search within the symbol for a valid number of bar to space transitions

① The decoder will ignore Code 128 FNC2, FNC3, and FNC4 characters regardless of the Code 128 FN Character setting. FNC2, FNC3, and FNC4 are also ignored by the specific length parameter.

This check differs from the one above, because instead of looking at the number of transitions in the entire *scan*, this search only considers the number of transitions contained within the *symbol*. The decoder rejects the scan if the number of transitions does not correspond to a selected specific length. It attempts to decode all scans if no specific length is specified.

Code 128 FNC1 Character

Field Type	Options
Edit	Valid ASCII **0** = None

Instructs the decoder to substitute any valid ASCII character for the Code 128 FNC1 (Function 1) character. The default is *0* (None), which means no substitution will take place.

The substitution will take place at the time of decoding, and before any rules or match operations are applied. Users frequently substitute the ASCII 29 character (CTRL]) for the FNC1 character.

UPC-A

Field Type	Options
Select	**No** Yes

Enables/disables decoding of UPC-A labels. The default of *No* disables decoding of this symbology. Select *Yes* to enable decoding.

UPC-A Supplements

Field Type	Options
Select	**None** 2 5 2 or 5 Auto

Enables/disables decoding of UPC-A supplementary codes. The default of *None* disables decoding of supplements for this symbology. Options are:

None	Disables decoding of supplementary codes.
2	Enables decoding of 2 character supplementary codes.
5	Enables decoding of 5 character supplementary codes.
2 or 5	Enables decoding of 2 or 5 character supplementary codes.
Auto	Enables decoder to auto discriminate supplementary codes (None, 2 or 5) on label①

① The Auto Selection allows you to mix labels without supplements with labels containing 2 or 5 digit supplements. The supplements are often a different size than the primary symbol. Therefore, **it is critical that both the primary symbol and the supplement be present when the decoder is triggered**. If the decoder does not detect the supplement, the primary symbol is sufficient to produce a valid scan. The Auto selection is not recommended when the *Decode Mode* is set to *Continuous*.

If you select 2, 5, or 2 or 5, the decoder must decode both the primary label and the supplement to produce a valid scan.

UPC-E

Field Type	Options
Select	**No** Yes

Enables/disables decoding of UPC-E labels. The default of *No* disables decoding of this symbology. Select *Yes* to enable decoding.

UPC-E Supplements

Field Type	Options
Select	**None** 2 5 2 or 5 Auto

Enables/disables decoding of UPC-E supplementary codes. The default of *None* disables decoding of supplements for this symbology. Options are:

None	Disables decoding of supplementary codes.
2	Enables decoding of 2 character supplementary codes.
5	Enables decoding of 5 character supplementary codes.
2 or 5	Enables decoding of 2 or 5 character supplementary codes.
Auto	Enables decoder to auto discriminate supplementary codes (None, 2 or 5) on label①

① The Auto Selection allows you to mix labels without supplements with labels containing 2 or 5 digit supplements. The supplements are often a different size than the primary symbol. Therefore, **it is critical that both the primary symbol and the supplement be present when the decoder is triggered**. If the decoder does not detect the supplement, the primary symbol is sufficient to produce a valid scan. The Auto selection is not recommended when the *Decode Mode* is set to *Continuous*.

If you select 2, 5, or 2 or 5, the decoder must decode both the primary label and the supplement to produce a valid scan.

Expand UPC-E

Field Type	Options
Select	**No** Yes

Controls whether the UPC-E bar code is transmitted in a 12 digit (expanded) format. The default is *No*, which means do not send the expanded form but the 6 digit (compressed) form.

EAN-8

Field Type	Options
Select	**No** Yes

Enables/disables decoding of EAN-8 labels. The default of *No* disables decoding of this symbology. Select *Yes* to enable decoding.

EAN-8 Supplements

Field Type	Options
Select	**None** 2 5 2 or 5 Auto

Enables/disables decoding of EAN-8 supplementary codes. The default of *None* disables decoding of supplements for this symbology. Options are:

None	Disables decoding of supplementary codes.
2	Enables decoding of 2 character supplementary codes.
5	Enables decoding of 5 character supplementary codes.
2 or 5	Enables decoding of 2 or 5 character supplementary codes.
Auto	Enables decoder to auto discriminate supplementary codes (None, 2 or 5) on label①

① The Auto Selection allows you to mix labels without supplements with labels containing 2 or 5 digit supplements. The supplements are often a different size than the primary symbol. Therefore, **it is critical that both the primary symbol and the supplement be present when the decoder is triggered**. If the decoder does not detect the supplement, the primary symbol is sufficient to produce a valid scan. The Auto selection is not recommended when the *Decode Mode* is set to *Continuous*.

If you select 2, 5, or 2 or 5, the decoder must decode both the primary label and the supplement to produce a valid scan.

EAN-13

Field Type	Options
Select	**No** Yes

Enables/disables decoding of EAN-8 labels. The default of *No* disables decoding of this symbology. Select *Yes* to enable decoding.

EAN-13 Supplements

Field Type	Options
Select	**None** 2 5 2 or 5 Auto

Enables/disables decoding of EAN-13 supplementary codes. The default of *None* disables decoding of supplements for this symbology. Options are:

None	Disables decoding of supplementary codes.
2	Enables decoding of 2 character supplementary codes.
5	Enables decoding of 5 character supplementary codes.
2 or 5	Enables decoding of 2 or 5 character supplementary codes.
Auto	Enables decoder to auto discriminate supplementary codes (None, 2 or 5) on label①

① The Auto Selection allows you to mix labels without supplements with labels containing 2 or 5 digit supplements. The supplements are often a different size than the primary symbol. Therefore, **it is critical that both the primary symbol and the supplement be present when the decoder is triggered**. If the decoder does not detect the supplement, the primary symbol is sufficient to produce a valid scan. The Auto selection is not recommended when the *Decode Mode* is set to *Continuous.*

If you select 2, 5, or 2 or 5, the decoder must decode both the primary label and the supplement to produce a valid scan.

Enable Pharma-Code Symbology (Pharma-Code Decoders Only)

Field Type	Options
Select	No **Yes**

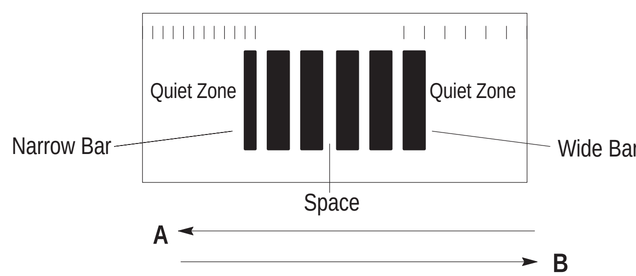
Enables decoding of Pharma-Code symbols. The default of *Yes* enables decoding for this symbology. Select *No* to disable decoding

Note: We recommend starting with the default settings for all Pharma-Code parameters except Minimum Number of Bars and Decode Direction, which must be determined by your application. The complex interrelationships among other Pharma-Code options make them best suited for use only by experienced Pharma-Code users in unusual instances when the default values do not provide acceptable results.

Quiet Zone Ratio (All Decoders)

Field Type	Options
Edit Numeric	4 through 10 (**5**)

Specifies the ratio of the width of the clear space before the first bar to the width of the first bar, or the width of the clear space after the last bar to the width of the last bar; whichever is smaller. Valid quiet zone ratio values are 4 to 10. The default is *5*. **The default value for this parameter has been optimized for most applications, and it is unlikely you will ever have a reason to change it.**



For this example:

If scan direction is **A** $\dfrac{\text{Clear Space Width}}{\text{1st Bar Width (Wide Bar)}} = 5$

If scan direction is **B** $\dfrac{\text{Clear Space Width}}{\text{1st Bar Width (Narrow Bar)}} = 10$

The decoder uses the quiet zone to determine the necessary clear space on both sides of the symbol. A symbol not preceded by an adequate quiet zone is ignored.① The quiet zone after the bars and spaces of a symbol indicates the end of data. If you specify a quiet zone ratio that is too small, the decoder may interpret a space within the symbol as the end of the symbol, resulting in no-reads or misreads. A general rule to use is:

$$\frac{\text{Maximum Space Width in Symbol}}{\text{Minimum Narrow Bar Width}} \leq \text{Quiet Zone Ratio} \leq \frac{\text{Width of the Smallest Quiet Zone}}{\text{Maximum Wide Bar Width}}$$

① If the Quiet Zone is found to be inadequate, the decoder will examine the symbol further to attempt a We recommend, however, that all labels be printed within specified limits.

A typical quiet zone value for the Pharma-Code symbology is 5.

Space Tolerance (Pharma-Code Decoders Only)

Field Type	Options
Edit	5 through 40 (**15**) Ignore

Defines the percent difference (in width) between the narrowest and widest space elements of the Pharma-Code symbol. Space tolerance is expressed mathematically as:

$$\frac{(\text{Widest Space} - \text{Narrowest Space})}{\left[\frac{(\text{Widest Space} + \text{Narrowest Space})}{2}\right]} \times 100\% = \%\ \text{Space Tolerance}$$

Select a value that is greater than the worst case tolerance to prevent no-reads.

Valid percent values are 5 to 40, or Ignore. If set to Ignore any amount of space tolerance is allowed within the symbol. The default value is *15 (15%)*. **The default value for this parameter has been optimized for most applications, and it is unlikely you will ever have a reason to change it.**

The decoder will reject a symbol if two spaces within the symbol differ in width by more than the space tolerance value. Select *Ignore* to prevent the decoder from rejecting a symbol based on width differences between spaces.

Bar Tolerance (Pharma-Code Decoders Only)

Field Type	Options
Edit	5 through 40 (**15**) Ignore

Defines the percent difference (in width) between two bars of a symbol that have the same nominal width but the largest width difference. There are two bar tolerances since Pharma-Code symbols have wide and narrow bars. Bar tolerance is expressed mathematically as:

$$\frac{(\text{Widest }\textbf{Wide}\text{ Bar} - \text{Narrowest }\textbf{Wide}\text{ Bar})}{\left[\dfrac{(\text{Widest }\textbf{Wide}\text{ Bar} + \text{Narrowest }\textbf{Wide}\text{ Bar})}{2}\right]} \times 100\% = \%\text{ Bar Tolerance}$$

OR

$$\frac{(\text{Widest }\textbf{Narrow}\text{ Bar} - \text{Narrowest }\textbf{Narrow}\text{ Bar})}{\left[\dfrac{(\text{Widest }\textbf{Narrow}\text{ Bar} + \text{Narrowest }\textbf{Narrow}\text{ Bar})}{2}\right]} \times 100\% = \%\text{ Bar Tolerance}$$

Select a value that is greater than the worst case tolerance to prevent no-reads.

Valid bar tolerance values are 5 to 40, or Ignore. The Ignore value allows any amount of tolerance between bars of the same nominal width. The default value is *15 (15%)*. **The default value for this parameter has been optimized for most applications, and it is unlikely you will ever have a reason to change it.**

The decoder will reject a symbol if the width of two bars of the same nominal width differs by more than the bar tolerance value. Select *Ignore* to prevent the decoder from rejecting a symbol based on width differences between bars of the same nominal width.

Minimum Number of Bars (Pharma-Code Decoders Only)

Field Type	Options
Edit	3 through 12 (**5**)

Specifies the least number of bars that must be present within a Pharma-Code symbol for the decoder to perform a decode. Possible values are 3 to 12. The default is *5*.

If the Code Verification List contains values, the decoder will ignore the minimum bar setting and decode only those symbols that have values in the list.

If the Code Verification List has no values, the decoder will reject all symbols that contain fewer bars than the minimum bar setting.

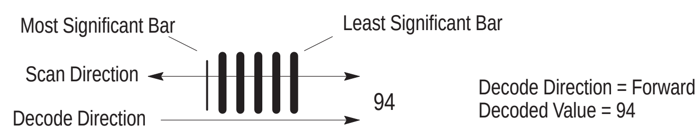
Decode Direction (Scanner A or B) (Pharma-Code Decoders Only)

Field Type	Options
Select	**Forward** Reverse

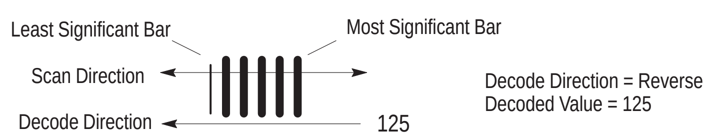
Sets the direction the decoder uses to decode a scanned label. Direction values are either Forward or Reverse. The default is *Forward*.

The decoder uses the decode direction to determine the least significant bar of a symbol. The examples below show how a Pharma-Code label is decoded depending on the direction.

Example 1: The decode direction is set to forward. The decode direction fixes the position of the least significant bar (regardless of scan direction). The decoded value is 94.



Example 2: The decode direction is set to reverse. The decode direction fixes the position of the least significant bar. The decoded value is 125.



Wide to Narrow Bar Ratio (Pharma-Code Decoders Only)

Field Type	Options
Edit	2 through 4 (**2**) Midrange

Specifies the minimum ratio of the widest bar to the narrowest bar within a symbol.

Valid settings are 2 to 4, or midrange. The default is *2*. **The default value for this parameter has been optimized for most applications, and it is unlikely you will ever have a reason to change it.**

If the setting is 2 to 4, the decoder will reject symbols whose wide to narrow bar ratio is less than the parameter setting.

The midrange value is half the sum of the widths of the narrowest and widest bar in the symbol. If the setting is midrange, the decoder will not reject symbols based on the wide to narrow bar ratio setting. Instead, all bars greater than or equal to the midrange are wide bars and all bars less than the midrange are narrow bars. Select midrange to prevent the decoder from rejecting a symbol based on the wide to narrow bar ratio.

Note: When set to midrange, the decoder will reject any symbol that contains bars that exactly equal the midrange width.

Code Verification List (Pharma-Code Decoders Only)

Field Type	**Options**
Edit	7 through 8190 **Blank**

Defines a list of numeric values the decoder uses to validate decoded Pharma-Code Symbols.

Because the orientation of a Pharma-Code label determines its value, you can use the Code Verification List to **enhance data security** when the value of the symbol is known. The decoder compares the value of the decoded symbol to all entries in the Code Verification List. If the value is in the list, a valid read occurs. If the value is not in the list, the decode is discarded. If all fields are left blank, the list is ignored and the decoder processes reads normally. This prevents inaccurate reads resulting from incorrect label orientation, decode configuration errors, or misreads due to poor label quality.

Note: If any value appears in the table, then only symbols that match an entry in the table will match.

The Code Verification List holds up to 16 values. Each field is numbered from 1 to 16. You can enter a value from 7 to 8190 in each field or leave the field blank. The default value for each field is *blank.*

Note: The Code Verification List is independent of the Match Code Table (described in the User Manual).

Configuration: Scanner Control, Primary Match Table, Discrete I/O

Scanner Control, Primary Match Code Table, Discrete I/O

Option 2 on the **Select Operation** configuration screens. Use this function to configure scanner control, match codes, and discrete I/O operations. The screen displays with the first field highlighted.

```
   -------SCANNER (A) CONTROL-------   ---------SCANNER (B) CONTROL---------
          LASER LIGHT: Triggered               LASER LIGHT: Triggered
          DECODE MODE: Continuous              DECODE MODE: Coordinated 1
        NO-READ TIMER: None   (msec)       TRIGGER TIMEOUT: None    (msec)
     INTER-SCAN TIMER: None   (msec)
        CAPTURE COUNT: 2
         SYMBOLS/SCAN: 1           ---------PACKAGE DETECT INPUT---------
      SYMBOLS/PACKAGE: 1           (A) FILTER: No     SENSE: LO=Package
       MATCH COMPLETE: 1           (B) FILTER: No     SENSE: LO=Package
 -------------MATCH CODE TABLE------------- ------DISCRETE I/O [   Enabled  ]-
1) Any                                      0  A|B None                      0
2) Any                                      0  A|B None                      0
3) Any                                      0  A|B None                      0
4) Any                                      0  A|B None                      0
5) Any                                      0  A|B None                      0
6) Any                                      0  A|B None                      0
7) Any                                      0  A|B None                      0
8) Any                                      0  A|B None                      0

-------------------------------------------------------------------------------
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
-------------------------------------------------------------------------------
```

The factory defaults are displayed the first time you access this screen. Make changes appropriate for your application. If the factory defaults are satisfactory, you can return to the **Select Operation** menu by pressing [Esc] twice.

The parameters are grouped by function on the screen. The following pages describe each group of parameters.

Scanner A Control Parameters

These parameters control the operation of Scanner A. Each parameter is defined below. The options for each parameter are summarized in a table, and explained more fully in the text. The default setting for each parameter is displayed in bold letters in the table.

Laser Light (Scanners A and B)

Field Type	Options
Select	On **Triggered** Off

Determines whether the Scanner A laser is on continuously, turns on and off with the trigger, or is off regardless of the trigger. Use triggered mode with slower package rates to extend the life of your laser.

This parameter also affects Scanner B when it is set to operate in coordinated mode with Scanner A. See *Scanning Mode* under Scanner B Control.

On The scanner scans continuously.

Triggered The scanner scans only when receiving a trigger from a package detector, host, or internal timer. The scanner continues scanning until an end trigger condition occurs.

Off Turns the scanner laser off. Use this setting as a safety precaution during decoder maintenance or troubleshooting.

Important: It is important that you understand the following terms before proceeding.

- valid scan
- valid symbol
- valid read
- valid package
- no-read

See Glossary for definitions.

Decode Mode

Field Type	Options
Select	Continuous Continuous/Unique **Package Detect** Host Internal Timer

Determines how the decoder starts and stops decoding. This parameter affects Scanner A, or Scanner A and B when both are operating in coordinated mode. (See *Scanning Mode* under Scanner B Control.)

Continuous The decoder continuously attempts to decode every scan from the scanner. There is no start and stop control.

The continuous mode of operation is useful during initial setup to determine the optimum location of the scanner relative to the bar code labels. (Use a *Symbols Per Package* value of 1 for setup.)

The no-read condition does not exist in this mode.

Continuous/Unique The decoder continuously attempts to decode every scan from the scanner. The decoder discards valid reads that are identical to the previous valid read. The decoder does not process data (send to host or activate appropriate match codes) until a new valid read is decoded.

A valid package in continuous/unique mode is a valid read that is different from the previous valid package.

The no-read condition does not exist in this mode.

Host A start scan command from a host device triggers the decoder to start decoding.

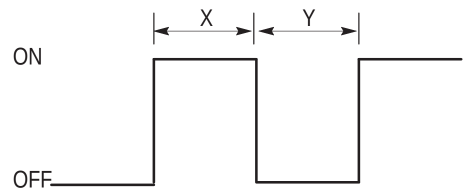
Note: Refer to the section on host communications for additional information on the start and stop scan commands.

Package Detect A package detect signal triggers decoding on and off. The package detect is typically an external presence sensor or the trigger of a hand-held laser scanner.

The package detect signals the arrival and departure of a package.

Internal Timer This mode uses the *No-Read Timer* as a trigger source. A set time interval triggers decoding on and off. The *No-Read Timer* determines the time interval.

Figure 7.1 Internal timer trigger



X = Y = No-Read Timer value (in milliseconds)

Minimum value = 10 msec
Maximum value = 9999 msec①
Resolution = 5 msec

A no-read occurs if the timer expires before a valid package occurs.

The *Internal Timer* decode mode is useful during initial setup to simulate the package detect signal.

Note: When Scanner B is operating independently from Scanner A, its decode mode is always either Package Detect or Host.

No-Read Timer

Field Type	Options
Edit	10 through 9999 or **0**

Specifies the length of time the decoder will try to decode a label when triggered by a host command or package detector. The timer starts when the decoder is triggered. If a valid package does not occur within the specified time (*Symbols/Package* setting is not satisfied), a no-read occurs.

The default of *0* disables the timer. To set the timer, enter a number between 10 and 9999.① Select a value that allows the decoder enough time to read an entire package or a no-read will occur.

Note: When the decode mode is set to internal timer, the no-read timer functions as a trigger source. The trigger remains on until the no-read timer expires. See *Internal Timer* under *Decode Mode*.

① **ATTENTION:** Set output durations in multiples of 5 milliseconds. Actual output will have a worst-case precision of +0 to –5 milliseconds, varying with the timing of the output. Durations that are not set in multiples of 5 milliseconds will be rounded up to the nearest multiple of 5 and function within the same +0 to –5 millisecond precision.

For example, a setting of 25 milliseconds will result in a duration of from 20 to 25 milliseconds. A setting of 23 milliseconds will result in the same duration range.

Inter-Scan Timer

Field Type	Options
Edit	10 through 9999 or **0**

Disables decoding for a set time interval after a valid read. The default is *0*, which disables the timer. The *Inter-Scan Timer* is valid in both continuous and triggered modes of operations.

You can use the *Inter-Scan Timer* to:

- provide a delay between decodes to enable multiple labels, that are not necessarily unique, to be read within the same package
- enable multiple decodes of the same label for verification purposes

The *Inter-Scan Timer* accepts a value between 10 and 9999.①

Important: To ensure that package labels are read before the *No-Read Timer* expires, set the *Inter-Scan Timer* to a value that is less than the *No-Read Timer* setting.

A valid read starts the timer. See Figure 5.2. The decoder decodes a scan within Field #1, which starts the *Inter-Scan Timer* and immediately stops decoding. The decoder waits for the timer to expire (or timeout) to resume decoding.

Use the following equations to create a delay between decodes:

Equation 1: **Minimum Inter-Scan Timer Value**

$$\frac{\text{W (cm or inches) x 1000 (msec/sec)}}{\text{Line Speed (cm/sec or inches/sec)}} = \text{Approximate Inter-Scan Timer Value (msec)}$$

Equation 2: **Maximum Inter-Scan Timer Value**

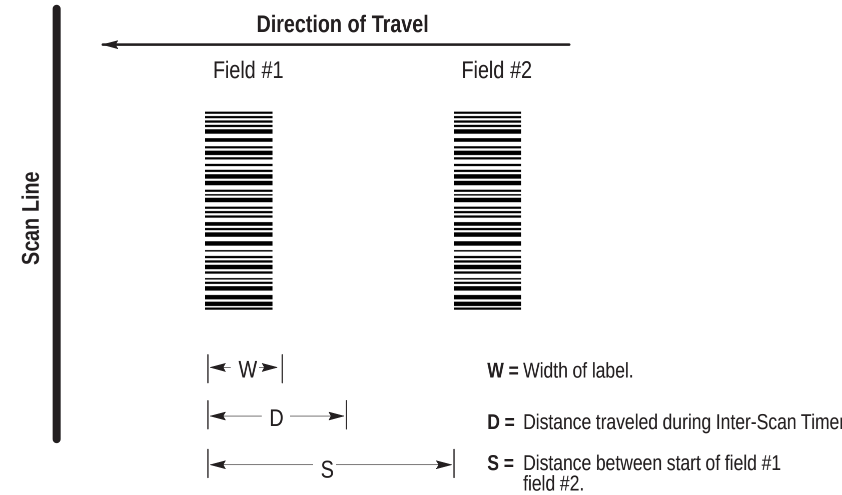
$$\frac{\text{S (cm or inches) x 1000 (msec/sec)}}{\text{Line Speed (cm/sec or inches/sec)}} = \text{Approximate Inter-Scan Timer Value (msec)}$$

You may have to experiment with several settings since factors such as label quality determine when the first read occurs.

① **ATTENTION:** Set output durations in multiples of 5 milliseconds. Actual output will have a worst-case precision of +0 to –5 milliseconds, varying with the timing of the output. Durations that are not set in multiples of 5 milliseconds will be rounded up to the nearest multiple of 5 and function within the same +0 to –5 millisecond precision.

For example, a setting of 25 milliseconds will result in a duration of from 20 to 25 milliseconds. A setting of 23 milliseconds will result in the same duration range.

Figure 7.2 Inter-scan timer



The label orientation must be such that distance D is ≤ S for the scanner to scan all of Field #2. The line speed must be constant.

Set the *Inter-Scan Timer* to a value between the minimum and maximum values to prevent additional decodes of Field #1, while allowing all of Field #2 to be scanned.

To allow multiple reads of a single symbol for verification purposes, set the *Inter-Scan Timer* to a value that is less than equation 1.

Capture Count

Field Type	Options
Select/Edit	1 through 8, or V **2**

Specifies the number of identical valid scans that must be decoded before a read is considered valid. The default is *2*, which means the capture count is not satisfied until two sequential, identical, valid scans are decoded. A capture count of 2 is appropriate for most applications.

To specify a different capture count, select a value between 1 and 8, or V. V (for *Verify*) requires that each symbol in a bar code must match an entry in the primary match code table to produce a valid read.

The “V” capture count is useful in high speed verification applications, where the value of the symbol is known. By loading the expected value into a match code table, the decoder only needs to acquire one valid scan matching the expected values to produce a valid read.

The decoder interprets a scanned label in one of three ways.

- **Valid Scan**

  Sufficient valid symbols have been decoded to satisfy the *Symbols/Scan* parameter.
- **Undecodable Scan**

  The scanned data does not correspond to a valid pattern within the selected symbologies.
- **Misread or Substitution Error**

  Smudges, stray marks, voids, or print errors (resulting in wider or narrower bars and spaces) may result in a pattern that is valid within an enabled symbology that is not representative of the intended data.

The capture count reduces misreads by requiring the decoder to read labels multiple times before producing a valid read.

Symbologies that are not self-checking (do not use start and stop characters or check characters) are more susceptible to misreads. For example, Interleaved 2-of-5 without check characters is not self-checking.

Setting the capture count too high may result in excessive no-reads, particularly when the number of scans crossing the label in a trigger period is low (5 - 10). Set the capture count to a value no greater than half the number of expected scans crossing the label in a trigger period.

Symbols / Scan

Field Type	Options
Select/Edit	1–6, Any **1**

Specifies the number of bar code symbols that must be present in a scan for a valid read. The default is *1*.

On a single scan (movement of laser beam from one side to another), the decoder can decode up to 6 successive bar code symbols. Valid settings for this parameter include 1, 2, 3, 4, 5, 6 or Any.

If you select Any, the decoder looks for up to 6 symbols. The decoder will ignore any damaged symbols it encounters.

Select Any for those applications where the number of symbols varies or cannot be controlled. For all other applications specify a number.

Important: If you select Any and the decoder is operating in a triggered mode, the symbols within each label must be unique. The decoder interprets identical symbols as duplicates and ignores the second symbol.

Symbols/Package

Field Type	Options
Select/Edit	1–16 **1**

Specifies the number of valid symbols that must be decoded to produce a valid package. The default is *1*. You can enter a numeric value between 1 and 16.

If the *Symbols/Package* setting is satisfied, a valid read occurs. If the *Symbols/Package* setting is not satisfied, a no-read occurs for that *package* as well as for each *symbol* not read.

Match Complete

Field Type	Options
Select/Edit	1–16 **1**

Specifies the number of times that symbols on a package must match entries in the match code table before a *Match Complete* condition occurs. You can enter a value from 1 to 16. The default is *1*, which means at least one symbol on a package must match an entry in the match code table.

Match Complete is one of ten output conditions that can activate an output. See the *Output Condition* parameter.

Note: The match complete count does not have to equal the *Symbols/Package* setting. However, the match complete count must be less than or equal to the *Symbols/Package* setting for a match complete condition to occur.

Scanner B Control Parameters

These parameters control the operation of Scanner B. Each parameter is defined below. The options for each parameter are summarized in a table, and explained more fully in the text. The default setting for each parameter is displayed in bold letters in the table.

Laser Light

Refer to Laser Light under Scanner A Parameters earlier in this section for information on Scanner B laser light control.

Decode Mode

Field Type	Options
Select	**Coordinated** 1 Coordinated 2 Package Detect Host

Sets the decode mode for Scanner B. The options are Coordinated 1, Coordinated 2, Package Detect, and Host. The default is *Coordinated 1*.

If you set the scanning mode to either Coordinated mode, Scanner B operates in concert with Scanner A, and both scanners use the trigger specified for Scanner A. **The *Trigger Timeout* parameters is not used when Scanner B operates in coordinated mode.**

If you use one of the independent decode modes (either Host or Package Detect), Scanner B will operate independently of Scanner A and use its own trigger source. If the *Decode Mode* is *package detect*; decoding is triggered by the Scanner B package detect signal. If the *Decode Mode* is *host*, decoding is initiated by the *Scanner B Start Character* and concluded by the *Scanner B Stop Character.*

In the Coordinated modes, the *Symbols/Package* setting can be satisfied by either or both scanner(s). For example, the *Symbols/Package* setting is 2. Scanner A can decode one valid symbol and Scanner B can decode one valid symbol to produce a valid read, or both symbols can be read from either scanner. The difference between the two coordinated modes is in how each defines what constitutes a unique decoding event within a package.

- In **Coordinated 1 mode (source dependent)**, the decoder *always* considers the source of the data as well as its content. Data will be treated as unique if it originates from different scanners, or if the value or symbology is different.
- In **Coordinated 2 mode (source independent)**, the decoder will consider data to be unique *only* when its value or its symbology is different. Identical data originating from different scanners will be treated as a single decode (and the second decode is ignored).

In Independent Package Detect mode, the *Symbols/Package* setting must be satisfied by each scanner individually. For example, the *Symbols/Package* setting is 2. Scanner A must decode two symbols to produce a valid read, *or* scanner B must decode two symbols to produce a valid read. If both scanners are triggered from their respective package detects, and Scanner A decodes only one symbol and Scanner B decodes only one symbol, two packages will be sent to the host with a no-read indicated in each.

In Independent Host Command mode, the decoder starts and stops decoding symbols as instructed by a host computer. For example, the *Symbols/Package* setting is 2. Scanner A must decode two symbols to produce a valid read, *or* scanner B must decode two symbols to produce a valid read. If both scanners are triggered using their respective Start Scan and Stop Scan characters, and Scanner A decodes only one symbol and Scanner B decodes only one symbol, two packages will be sent to the host with a no-read indicated in each.

The following example illustrates the difference between Coordinated 1 and Coordinated 2 modes, and how the *Symbols/Package* setting affects scanner operation in both the Coordinated and the Independent modes.

Symbols/Package = 2

	Coordinated 1 Mode		Coordinated 2 Mode	Independent Modes
Example #1	Scanner A reads 1234	Scanner B reads ABCD		
	ScnA /1234/ABCD//		ScnA/1234/ABCD//	ScnA/1234/No–Read// ScnB/ABDC/No–Read//
Example #2	Scanner A reads 1234	Scanner B reads 1234		
	ScnA /1234/1234//		ScnA/1234/No-Read//	ScnA /1234/No–Read// ScnB /1234/No–Read//
Example #3	Scanner A reads 1234	Scanner A reads ABCD		
	ScnA/1234/ABCD//		ScnA/1234/ABCD//	ScnA /1234/ABCD// ScnB/No-Read/No-Read//

In this example the *field delimiter* is the " /", *source identifiers* are ScnA and ScnB for scanner A and B respectively, and the default no-read message is "No-Read".

Trigger Timeout

Field Type	Options
Edit	10 through 9999 or **0**

Determines the length of time (in milliseconds) the Scanner B laser remains on after receiving a start trigger. The trigger timeout determines a no-read condition for Scanner B. The default is *0*, which disables the timer.

To set the trigger timeout, enter a number between 10 and 9999.① The timer has an accuracy of ± 5 milliseconds. Select a value that allows enough time for the decoder to read an entire package or a no-read will occur.

When Scanner B is triggered, the timer starts. If a package is not processed successfully within the elapsed time *Symbols/Package* setting is not satisfied), a no-read occurs.

Note: The *Trigger Timeout* acts like the *No-Read Timer* if the *Scanning Mode* is independent; it is not used if the *Scanning Mode* is set to coordinated.

Package Detect Input Parameters

These parameters control the package detect input for Scanner A and B. Each parameter is defined below. The options for each parameter are summarized in a table, and explained more fully in the text. The default setting for each parameter is displayed in bold letters in the table.

Package Detect Input A Filter

Field Type	Options
Select	Yes **No**

Enables or disables the debounce filter for the package detect signal on Scanner A. The default is *No* which disables the filter. When disabled, the decoder recognizes any signal greater than 1 millisecond as a start trigger.

① **ATTENTION:** Set output durations in multiples of 5 milliseconds. Actual output will have a worst-case precision of +0 to –5 milliseconds, varying with the timing of the output. Durations that are not set in multiples of 5 milliseconds will be rounded up to the nearest multiple of 5 and function within the same +0 to –5 millisecond precision.

For example, a setting of 25 milliseconds will result in a duration of from 20 to 25 milliseconds. A setting of 23 milliseconds will result in the same duration range.

If the filter is enabled, the decoder starts a timer whenever it senses a package detect signal longer than 1 millisecond. This timer delays the decoder's reaction to the package detect for between 10 and 15 milliseconds to allow any "bounce" in the signal level to settle. If the package detect signal is still present when the timer expires, the decoder will begin to process the package. Package detect signals shorter than 10 milliseconds **will be ignored** by the decoder when the filter is used. Because of timer resolution, package detects between 10 and 15 milliseconds **may be ignored**.

The filter likewise reacts to the loss of the package detect signal. When the signal is lost for a minimum of 1 millisecond, the filter will maintain the trigger for 10 to 15 milliseconds. The resultant trigger period length will be equal to the package detect period ± 5 milliseconds.

Note: This parameter also applies to Scanner B when operating in coordinated mode. In coordinated mode, Scanner A and B are triggered by the same package detect signal (Package Detect Input A Filter and Package Input A Sense).

Package Detect Input A Sense

Field Type	Options
Select	**Lo = Package** Hi = Package

Determines whether a package on Scanner Port A is detected when the voltage at the package detect input is high or low. The default is *LO=Package*.

Note: This parameter applies to Scanner B when operating in coordinated mode. In coordinated mode, Scanner A and B are triggered by the same package detect signal (Package Detect Input A Filter and Package Input A Sense).

Package Detect Input B Filter

Field Type	Options
Select	Yes **No**

Enables or disables the debounce filter for the package detect signal on Scanner B. The default is *No* which disables the filter. When disabled, the decoder recognizes any signal greater than 1 millisecond as a start trigger.

If the filter is enabled, the decoder starts a timer whenever it senses a package detect signal longer than 1 millisecond. This timer delays the decoder's reaction to the package detect for between 10 and 15 milliseconds to allow any "bounce" in the signal level to settle. If the package detect signal is still present when the timer expires, the decoder will begin to process the package. Package detect signals shorter than 10 milliseconds **will be ignored** by the decoder when the filter is used. Because of timer resolution, package detects between 10 and 15 milliseconds **may be ignored**.

The filter likewise reacts to the loss of the package detect signal. When the signal is lost for a minimum of 1 millisecond, the filter will maintain the trigger for 10 to 15 milliseconds. The resultant trigger period length will be equal to the package detect period ± 5 milliseconds.

Note: This parameter applies only when Scanner B is operating in independent mode. (See *Scanning Mode* under Scanner B Control.)

Package Detect Input B Sense

Field Type	Options
Select	**Lo = Package** Hi = Package

Determines whether a package on Scanner B is detected when the voltage at the package detect input is high or low. The default is *LO=Package*.

Note: This parameter applies only to Scanner B and only when Scanner B is operating in an independent mode. (See *Scanning Mode* under Scanner B Control.)

Primary Match Table Parameters

These parameters define match code entries in the primary match code table. You can define up to eight entries here (and another 128 entries in the extended match code table described later). Each table entry has two parameters:

- symbology of match code string
- match code string

Each parameter is defined below. The options for each parameter are summarized in a table, and explained more fully in the text. The default setting for each parameter is displayed in bold letters in the table.

Symbology (1 - 8)

Field Type	Options
Select	Code 39 Interleaved 2-of-5 Codabar UPC-A UPC-E EAN-8 EAN-13 Code 128 Pharma–Code① **Any**

① Applies **only** to decoders equipped with the optional Pharma–Code capabilities.

Selects the symbology of the match code string (1–8). You can select any one of the symbologies for each primary match code string.

Note: *Any* is the default symbology for all entries in the match code tables.

Match Code String (1 - 8)

Field Type	Options
Edit Text	0 to 32 characters **Blank**

Defines the characters for a specified match code string (1 - 8). The default is nothing (*blank*), which means a match code string is not defined.

You can enter up to 32 characters for each match code string (including non-printable control characters). Enter the characters as they will be transmitted to the host. **Do not include check digits if you disabled the *Include Check Character* parameter for the selected symbology.**

The string accepts the question mark (“**?**”) as a single character wild card. A position containing a **?** will match any single ASCII character in the same position of the decoded data.

Note: The Primary and Extended Match Code tables interpret a question mark differently than do the Host Replacement rules. The question mark functions as a generic wildcard when used in the primary match code table, and as a metacharacter in the Host Message Replacement Rules. (See Chapter 10.)

Discrete I/O Parameters

These parameters define conditions that control the discrete outputs. Each output is defined by four parameters:

- normal state of an output (O=opened or C=closed)
- source of the event (Scanner A or B)
- condition that activates an output
- duration of pulsed output
- send Host Message parameter

The discrete outputs can be controlled locally via the configuration screens or remotely using host commands. The discrete I/O system can:

- indicate the success or failure of the decoder to read bar code data from a package
- indicate the results of a compare operation between decoded bar code data and match code data
- provide external control of the outputs using host commands
- indicate a buffer full condition (no data lost)
- indicate a buffer overflow condition
- load bar code data into the match code table using an external switch along with an input module

ATTENTION: When controlling outputs locally using configuration screens, suspend host communications to prevent outputs from unintentionally changing state.

Each discrete I/O parameter is defined below. The options for each parameter are shown, with the default setting in bold letters.

Output State

Field Type	Options
Select	**O = Normally Open** C = Normally Closed

Defines the normal state of each discrete output (or input). The default is *O=Normally Opened.* To change the state of the output to C=Normally Closed, select *C.*

ATTENTION: Outputs are initially open (off) when power is first applied to the decoder, and again when the decoder is powered off.

If a fault condition is detected, the outputs open and the CPU ACTIVE indicator light turns off.

Source

Field Type	Options
Select	**A** (Default for DS) B **A|B = A or B** (Default for DD) A–B = Precedent determined

Specifies from which scanner(s) an event can originate and meet the primary match pattern requirements. For single head decoders, Scanner *A* is the default value. For dual head decoders, the default value is *A|B*, which means that the decoder will accept input from either A or B to create a match. Other options include Scanner *B*, or precedent determined (*A–B*).

When set to A–B, the decoder will use the *first* input from *either* Scanner A *or* Scanner B to establish a precedent for all following inputs. If, for example, the first input comes via Scanner B, then only data from Scanner B will be matched from that point on.

Output Condition

Field Type	Options
Select	**None** Read Package No–Read Package Match-Complete Match-Entry Read and No-Match No-Read or No-Match Auto Load at Startup Buffer Full Buffer Overflow Auto Load (INPUT)①

① Applies **only** to module position 8.

Defines the condition that will activate a specified output. The default is *None*, which means a condition is not defined for the output.

The available output conditions appear below. Select the output condition appropriate for your application.

None The factory default setting for each output is *None*, which means an output condition is not defined.

You can hold an output open or closed by setting the condition to None and then changing the *Output State* to normally open or normally closed.

Match-Entry Activates the specified output when bar code data matches the string to the left of the output. Used for verification of specific label information.

The corresponding output counter increments each time a match entry occurs.

In the following example, Output 1 (normally open contact) will activate (close) for 100 milliseconds if decoded data matches 123456.

```
   -------------MATCH CODE TABLE------------ ------DISCRETE I/O [  Disabled  ]-
1) Code 39 123456                            O  A:B Match-Entry            100
```

Match-Complete Activates the specified output when bar code data from a valid package matches the number of entries in the primary match code table as set by the *Match Complete* parameter.

The match-complete condition is used to verify that multiple symbols with different information appear on the same package.

Read (Package) Activates the specified output when bar code data results in a valid package.

The read (package) condition is used to verify the presence of a good label.

The corresponding output counter increments once for each package read.

No-Read (Package) Activates the specified output when a no-read occurs for the last processed package.

The no-read condition is used to detect missing or damaged labels.

A no-read occurs when end of trigger occurs without a valid package

The corresponding output counter increments once for each package not read.

NOTE: The no-read condition does not exist in continuous mode.

Read and No-Match Activates the specified output when a valid read occurs but the bar code data does not match **any** entry in the primary match code table.

The read and no-match condition is used to detect when incorrect labels have been used.

The corresponding output counter increments each time a read and no-match condition occurs.

No-Read or No-Match Activates the specified output when either a no-read or a no-match condition occurs. (The bar code data does not match **any** entry in the primary match code table.)

Like the read and no-match condition, this condition is used to detect incorrect or missing labels.

The corresponding output counter increments each time a no-read or no-match condition occurs.

Buffer Full The specified output signals that the bar code data buffer is full and cannot process additional bar code data. The output turns off when the buffer full condition is cleared. This is not a pulsed output. The output will actuate whenever the Buffer Full condition exists, and turn off when Host Communications resume.

Often, the decoder can decode data faster than the host can receive it. Use this condition as an indicator to control the package rate to keep pace with host transmissions.

The corresponding output counter increments each time the buffer full condition occurs.

Buffer Overflow The specified output signals that bar code data has been lost because of a buffer overflow condition. The output turns off when the buffer overflow condition is cleared.

The buffer overflow condition may occur:

- if host communications is suspended
- if an XOFF is sent to the decoder via either the Host or AUX Port

The performance indicator displays 999 until the buffer overflow condition is cleared.

The corresponding output counter increments each time the buffer overflow condition occurs.

AutoLoad

Configures the specified output to load bar code data from the **first** valid package(s) into the match code table.

After configuring one or more outputs for AutoLoad, you can activate AutoLoad in one of three ways:

1. Restart system (using Select Operation menu or host command). Refer to the examples for additional information.

2. Configure Output 8 for AutoLoad (INPUT) and apply the appropriate input voltage to the input module in I/O location 8. See AutoLoad (INPUT) and Appendix H.

3. Connect a normally opened (N.O.) contact to specific pins in the AUX connector as shown in Appendix H. The AutoLoad function activates when the contacts close.

Note: This method does not require an I/O Module Board with an installed input module.

Note: The first Autoload does not increment the counter.

After activating the AutoLoad function, and if the Symbology parameter is set to *Any*, then bar code fields (32 characters maximum) are sequentially loaded into the match code table until one of the following occurs:

- *Symbols/Package* setting is satisfied. If the number of outputs configured for AutoLoad is greater than the symbols/package setting, the Autoload function will fill entries until the symbols/package setting is satisfied. See AutoLoad (INPUT), below, for an explanation of how to load match code data into the table where the number of match codes is greater than the value of the Symbols/Package parameter.
- All entries (configured for AutoLoad) are filled.

NOTE: If the Symbology parameter is set to anything *other* than *Any*, then only symbols of the currently selected symbology will be AutoLoaded.

If an invalid operation occurs (decoder is unable to decode a symbol in a package), it will wait for the next package.

For each match code entry, the decoder:

- if Symbology is *Any*, the decoder changes the setting of the Symbology parameter to match the symbology of the first symbol read
- loads the match code string
- changes output condition to Match-Entry

If the bar code data contains the ”%” character, the decoder displays %% in the match code table, but records a single % in the data. Use the ”%” character to enter any non-printable character. For example, %M represents CTRL-M, or carriage return. See Appendix I.

ATTENTION: It is good practice to save your configuration once the required AutoLoad parameters have been set. Doing so assures you will retain key AutoLoad parameters even after lengthy periods without power.

AutoLoad (INPUT) Configures discrete input/output 8 for AutoLoad (INPUT). This function requires an input module in position 8 of the I/O Module Board, or connection of the appropriate pins on the AUX port. (Appendix H shows how to wire the input module in I/O location 8 to a normally open contact.)

Important: AutoLoad (INPUT) requires that you configure one or more of the other outputs (1-7) for AutoLoad.

You can restore the AutoLoad condition to outputs configured (and **saved**) for Autoload by applying the appropriate input voltage to module 8. Refer to Chapter 4 for more information.

The AutoLoad (INPUT) condition serves two functions:

1. **Activates AutoLoad** Activates the AutoLoad function without restarting the system (via the Select Operation menu or host command). Refer to the examples for more information

2. **AutoLoads Multiple Packages** Loads multiple packages into the match code table as long as AutoLoad (INPUT) is held active. If the number of outputs configured for AutoLoad exceeds the *Symbols/Package* setting, multiple packages can be loaded until all table entries are filled. Do not use in Continuous Decode mode unless your intention is to load multiple versions of the same package.

When Output 8 is configured for AutoLoad (INPUT), the decoder will not load data into entry 8 of the match table.

AutoLoad (INPUT) is useful in product verification applications, where you need to load new match codes into the decoder regularly or when multiple packages must be used to fill the table. A switch or push button can be used to enter new product label data in the match code table.

Output Duration

Field Type	Options
Edit	10 to 9999 **0**

Specifies the length of time (in milliseconds) that an output is activated. Enter a value between 10 and 9999.① The default of *0* disables the timer.

Important: The pulsed outputs will not operate unless you specify an output duration.

The LED indicator for an output lights only when the output is in its **closed** state. Therefore, the LED for a normally open output lights when the output is closed. The LED for a normally closed output lights when the output is in its closed state and turns off when the output is opened.

① **ATTENTION:** Set output durations in multiples of 5 milliseconds. Actual output will have a worst-case precision of +0 to –5 milliseconds, varying with the timing of the output. Durations that are not set in multiples of 5 milliseconds will be rounded up to the nearest multiple of 5 and function within the same +0 to –5 millisecond precision.

For example, a setting of 25 milliseconds will result in a duration of from 20 to 25 milliseconds. A setting of 23 milliseconds will result in the same duration range.

Figure 7.3 AutoLoad using System Restart

AutoLoad Configuration at System Restart

(Saved configuration)

Output duration must be set for outputs and LEDs to operate.

First Valid Package Read

001688421378

411528258538

611679808644

```
   -------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
1) Any                                       0  A¦B Auto Load              100
2) Any                                       0  A¦B Auto Load              100
3) Any                                       0  A¦B Auto Load              100
4) Any                                       0  A¦B None                     0
5) Any                                       0  A¦B None                     0
6) Any                                       0  A¦B None                     0
7) Any                                       0  A¦B None                     0
8) Any                                       0  A¦B None                     0

-------------------------------------------------------------------------------
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
-------------------------------------------------------------------------------
```

Notes: AutoLoad is set for Outputs 1, 2, and 3 and applies to match code entries 1, 2, and 3.
Symbols/package parameter is set to 3.

After System Restart

```
   -------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
1) I2-of-5 001688421378                      0  A¦B Match-Entry            100
2) I2-of-5 411528258538                      0  A¦B Match-Entry            100
3) I2-of-5 611679808644                      0  A¦B Match-Entry            100
4) Any                                       0  A¦B None                     0
5) Any                                       0  A¦B None                     0
6) Any                                       0  A¦B None                     0
7) Any                                       0  A¦B None                     0
8) Any                                       0  A¦B None                     0

-------------------------------------------------------------------------------
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
-------------------------------------------------------------------------------
```

Notes: Bar code data loaded into match code table for entries 1,2 and 3.
Output condition changes from AutoLoad to Match Entry for Outputs 1, 2, and 3.
The AutoLoad condition for outputs 1, 2, and 3 is still saved.

System Restart

No new data scanned

```
   -------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
1) Any                                       0  A¦B Auto Load              100
2) Any                                       0  A¦B Auto Load              100
3) Any                                       0  A¦B Auto Load              100
4) Any                                       0  A¦B None                     0
5) Any                                       0  A¦B None                     0
6) Any                                       0  A¦B None                     0
7) Any                                       0  A¦B None                     0
8) Any                                       0  A¦B None                     0

-------------------------------------------------------------------------------
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
-------------------------------------------------------------------------------
```

Notes: Table is restored to saved configuration
Data cleared from primary match code table for entries 1, 2, and 3.
Output conditions change from Match Entry to AutoLoad for Outputs 1, 2, and 3.

Ready for Next AutoLoad (using System Restart)

Figure 7.4 AutoLoad using AutoLoad (INPUT)

AutoLoad Configuration at AutoLoad (Input)

(Saved Configuration)

Output duration must be set for outputs and LEDs to operate.

```
    -------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
 1) Any                                        0  A:B Auto Load             100
 2) Any                                        0  A:B Auto Load             100
 3) Any                                        0  A:B Auto Load             100
 4) Any                                        0  A:B None                    0
 5) Any                                        0  A:B None                    0
 6) Any                                        0  A:B None                    0
 7) Any                                        0  A:B None                    0
 8) Any                                        0  A:B Auto Load (INPUT)       0

 ______________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
 ______________________________________________________________________________
```

Notes: AutoLoad is set for outputs 1, 2, and 3 and applies to match code entries 1, 2, and 3.
Output 8 is set to AutoLoad (INPUT), which activates the AutoLoad function for entries 1, 2, and 3 when an input signal is momentarily applied.
Symbols per package parameter is set to 1.

First Valid Package Read

001688421378

After AutoLoad

```
    -------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
 1) I2-of-5 001688421378                       0  A:B Match-Entry           100
 2) Any                                        0  A:B Auto Load             100
 3) Any                                        0  A:B Auto Load             100
 4) Any                                        0  A:B None                    0
 5) Any                                        0  A:B None                    0
 6) Any                                        0  A:B None                    0
 7) Any                                        0  A:B None                    0
 8) Any                                        0  A:B Auto Load (INPUT)       0

 ______________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
 ______________________________________________________________________________
```

Notes: Bar code data loaded into match code table entry 1.
Output condition changes from AutoLoad to Match Entry for Output 1.
The output condition for outputs 2 and 3 does not change from AutoLoad since Symbols/Package setting has been satisfied.

AutoLoad Configuration after Next AutoLoad (INPUT)

No new data scanned

```
    -------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
 1) Any                                        0  A:B Auto Load             100
 2) Any                                        0  A:B Auto Load             100
 3) Any                                        0  A:B Auto Load             100
 4) Any                                        0  A:B None                    0
 5) Any                                        0  A:B None                    0
 6) Any                                        0  A:B None                    0
 7) Any                                        0  A:B None                    0
 8) Any                                        0  A:B Auto Load (INPUT)       0

 ______________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
 ______________________________________________________________________________
```

Notes: Table is restored to saved configuration.
Output condition changes from Match Entry to AutoLoad for Output 1.

Ready to Autoload next symbol read into match code table

Figure 7.5 Loading multiple packages using AutoLoad (INPUT)

AutoLoad Configuration at AutoLoad (Input)

(Saved Configuration)

Output duration must be set for outputs and LEDs to operate.

```
    -------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
 1) Any                                        0  A:B Auto Load             100
 2) Any                                        0  A:B Auto Load             100
 3) Any                                        0  A:B Auto Load             100
 4) Any                                        0  A:B None                    0
 5) Any                                        0  A:B None                    0
 6) Any                                        0  A:B None                    0
 7) Any                                        0  A:B None                    0
 8) Any                                        0  A:B Auto Load (INPUT)       0
 ____________________________________________________________________________
        Commands:ESC    Change:SPACE    Cursor Control:ARROWS
 ____________________________________________________________________________
```

Notes: AutoLoad is set for Outputs 1, 2, and 3 and applies to match code entries 1, 2, and 3. Output 8 is set to AutoLoad (INPUT) and activates the AutoLoad function for entries 1, 2, and 3 when an input signal is applied. In this example, the input signal is applied until all three symbols are read. **Symbols/package parameter is set to 1.**

AutoLoad (INPUT) Activated and Held

First Valid Package Read

001688421378

```
    -------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
 1) I2-of-5 001688421378                       0  A:B Match-Entry           100
 2) Any                                        0  A:B Auto Load             100
 3) Any                                        0  A:B Auto Load             100
 4) Any                                        0  A:B None                    0
 5) Any                                        0  A:B None                    0
 6) Any                                        0  A:B None                    0
 7) Any                                        0  A:B None                    0
 8) Any                                        0  A:B Auto Load (INPUT)       0
 ____________________________________________________________________________
        Commands:ESC    Change:SPACE    Cursor Control:ARROWS
 ____________________________________________________________________________
```

Notes: Bar code data loaded into match code table entry 1.
Output condition changes from AutoLoad to Match Entry for Output 1.
The condition for Outputs 2 and 3 does not change since Symbols/Package has been met.

AutoLoad (INPUT) Held Active

Second Valid Package Read

411528258538

```
    -------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
 1) I2-of-5 001688421378                       0  A:B Match-Entry           100
 2) I2-of-5 411528258538                       0  A:B Match-Entry           100
 3) Any                                        0  A:B Auto Load             100
 4) Any                                        0  A:B None                    0
 5) Any                                        0  A:B None                    0
 6) Any                                        0  A:B None                    0
 7) Any                                        0  A:B None                    0
 8) Any                                        0  A:B Auto Load (INPUT)       0
 ____________________________________________________________________________
        Commands:ESC    Change:SPACE    Cursor Control:ARROWS
 ____________________________________________________________________________
```

Notes: Bar code data from next package loaded into table entry 2.
Output condition changes from AutoLoad to Match Entry for output 2.
The condition for Output 3 does not change since the Symbols/Package setting has been met.

Figure 7.5 (continued)

Third Valid Package

611679808644

AutoLoad (INPUT) Held Active

```
    ------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
 1) I2-of-5 001688421378                     O  A|B Match-Entry           100
 2) I2-of-5 411528258538                     O  A|B Match-Entry           100
 3) I2-of-5 611679808644                     O  A|B Match-Entry           100
 4) Any                                      O  A|B None                    0
 5) Any                                      O  A|B None                    0
 6) Any                                      O  A|B None                    0
 7) Any                                      O  A|B None                    0
 8) Any                                      O  A|B Auto Load (INPUT)       0
____________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
____________________________________________________________________________
```

Notes: Bar code data from next package loaded into table entry 3.
Output condition changes from AutoLoad to Match Entry for Output 3.

After AutoLoad

AutoLoad (INPUT) No Longer Active

```
    ------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
 1) I2-of-5 001688421378                     O  A|B Match-Entry           100
 2) I2-of-5 411528258538                     O  A|B Match-Entry           100
 3) I2-of-5 611679808644                     O  A|B Match-Entry           100
 4) Any                                      O  A|B None                    0
 5) Any                                      O  A|B None                    0
 6) Any                                      O  A|B None                    0
 7) Any                                      O  A|B None                    0
 8) Any                                      O  A|B Auto Load (INPUT)       0
____________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
____________________________________________________________________________
```

Notes: Bar code data from three packages now loaded into table.
Conditions for Outputs 1, 2, and 3 show Match Entry.
After all the table entries are loaded, AutoLoad (INPUT) must be disabled and re-enabled to load additional packages.

AutoLoad Configuration after AutoLoad (INPUT) Activated Again

No new data scanned

```
    ------------MATCH CODE TABLE------------ ------DISCRETE I/O [   Enabled  ]-
 1) Any                                      O  A|B Auto Load             100
 2) Any                                      O  A|B Auto Load             100
 3) Any                                      O  A|B Auto Load             100
 4) Any                                      O  A|B None                    0
 5) Any                                      O  A|B None                    0
 6) Any                                      O  A|B None                    0
 7) Any                                      O  A|B None                    0
 8) Any                                      O  A|B Auto Load (INPUT)       0
____________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
____________________________________________________________________________
```

Notes: Table is restored to previously saved configuration.
Data cleared from match code table for entries 1, 2, and 3.
Output conditions change from Match Entry to AutoLoad for Outputs 1, 2, and 3

Ready to Autoload next symbol read into match code table

Configuration: Extended Match Table and Counters

Extended Match Table

You can use the screen illustrated below to set up match code entries in the Extended Match Code Table. You can define up to 128 entries here that provide added flexibility in response to incoming data over the Primary Match Codes described in the previous chapter.

Using Extended Match Codes you can compare all incoming data against table entries that you create to meet your own unique needs. The decoder can then count valid matches, and optionally fire one or more outputs.

Extended Match Codes provide a way to gather extremely detailed information based on decoder activity, and to exercise an additional level of control over decoder output activities.

The Extended Match Codes differ from the Primary Match Codes in a number of ways:

- Extended Match Code counters appear on the same screen from which they are controlled (the primary counters appear on a separate Status and Primary Counters screen)
- Extended Match Codes can activate multiple outputs, the duration of which are defined in the Primary Match Code Table (Primary Match Codes can each fire only a single output).

This screen displays the extended match code table in eight sets of sixteen entries. Set one includes entries 1 through 16, set 2 includes 17 through 32, and so on. The entry numbers (1 through 128) appear on the left side of the screen.

```
            SCREEN STATUS: AUTO REFRESH           SET 1 : Enabled
      MODE     SYMBOLOGY                                   COUNT     LOADING
NUMBER  SOURCE          EXTENDED MATCH CODE TABLE                  1 2 3 4 5 6 7 8
  1    D  A:B  Any                                             0 . . . . . . . .
  2    D  A:B  Any                                             0 . . . . . . . .
  3    D  A:B  Any                                             0 . . . . . . . .
  4    D  A:B  Any                                             0 . . . . . . . .
  5    D  A:B  Any                                             0 . . . . . . . .
  6    D  A:B  Any                                             0 . . . . . . . .
  7    D  A:B  Any                                             0 . . . . . . . .
  8    D  A:B  Any                                             0 . . . . . . . .
  9    D  A:B  Any                                             0 . . . . . . . .
  10   D  A:B  Any                                             0 . . . . . . . .
  11   D  A:B  Any                                             0 . . . . . . . .
  12   D  A:B  Any                                             0 . . . . . . . .
  13   D  A:B  Any                                             0 . . . . . . . .
  14   D  A:B  Any                                             0 . . . . . . . .
  15   D  A:B  Any                                             0 . . . . . . . .
  16   D  A:B  Any                                             0 . . . . . . . .
________________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
________________________________________________________________________________
```

Each parameter is defined below. The options for each parameter are summarized in a table, and explained more fully in the text. The default setting for each parameter is displayed in bold letters in the table.

Screen Status

Field Type	Options
Select	**Auto Refresh** Reset All Counts Reset Set Only Next Set Previous Set

This parameter can be used to control three different functions relating to the extended match codes:

- It determines whether the display is refreshed regularly

  Selecting the default *Auto Refresh* setting will result in all displayed counters being updated every second.

- It permits resetting the value of extended match code table counters to zero

  Selecting *Reset All Counts* zeroes all extended counters, whether they are among the currently displayed set or not. Selecting *Reset Set Only* zeroes only those counters in the currently displayed set. The system will ask you to confirm either reset command before it takes any action.

- It provides a means to move through all eight sets as necessary

  Selecting *Next Set* displays the next set of sixteen extended match code entries. Selecting *Previous Set* displays the previous set of sixteen extended match code entries.

  Both commands treat all eight sets as a closed loop. If you select *Next Set* while displaying set 8, the system will display set 1. If you select *Previous Set* while displaying set 1, the system will display set 8.

  Once you've selected either *Next Set* or *Previous Set*, you can continue to scroll through all sets by repeatedly pressing [Return]. Note, however, that there may be a slight delay while the system prepares and formats each new set for display. If you hold down the [Return] key in an effort to speed up paging, you are likely to pass your intended destination.

It is not necessary to assign extended match code values in sequence. One could, for example, assign match patterns to entries 1, 2, 5, 7, 12, and 16 in set 1, nothing in set 2, and 33 through 35 in set 3. The details of each application will determine the strategy used in assigning (or not assigning) extended match code patterns.

Status of Counter Set

Field Type	Options
Select	**Enabled** Disabled

This parameter activates or deactivates the counters within the particular set of extended match code values currently displayed. The default value is *Enabled*, which means that any extended match code table entry in the currently displayed set to which a match pattern has been assigned will be enabled. Selecting *Disabled* turns off all entries in the currently displayed set. **Keep in mind that this parameter affects only the currently displayed set.**

Use the Screen Status parameter described above to move among sets within the table. Note that when moving from one screen to another the “Set” identifier changes to reflect the number of the set currently displayed.

The ability to turn individual sets of extended match code table entries on and off at will provides a potentially useful additional level of process control and flexibility.

Mode

Field Type	Options
Select	A = Autoload M = Match Entry **D = Disabled** L = Lot

The Mode parameter controls the operational status of individual entries in the extended match code table. The default setting is *Disabled*. Other choices include:

- *Autoload*, which configures the specified extended match code table entry to match the bar code data from the **first** valid package(s) into the extended match code table

  Once a pattern is entered, the Mode parameter changes to *Match Entry.*

  If the bar code data contains the ”%” character, the decoder displays %% in the match code table, but records a single % in the data. Use the ”%” character to enter any non-printable character. For example, %M represents CTRL-M, or carriage return. See Appendix I.
- *Match Entry*, which activates the specified output when bar code data matches the string in that row[1]

[1] The duration of Extended Match Code Table outputs are established in the Primary Match Code Table below.

Used for verification of specific label information. The corresponding output counter increments each time a match entry occurs.

- *Lot*, which is an advanced capability available only in the extended match code table, and not in the primary match code table

  When *Lot* is selected, the decoder will change the Mode parameter to *Match Entry, M*, place into the extended match code table entry the value of the first Interleaved 2-of-5 label it reads, and increment the counter. If *Any* had been selected as the Symbology, it will change to *I 2-of-5*. Every time the system encounters a matching I 2-of-5 label it will then:

  – Increment the counter
  – Activate appropriate outputs.①

  This will continue until the decoder encounters a Code 39 label **with the same value**, at which point the system will:

  – Reset the Mode to *Disable*
  – Change the Symbology to *Code 39*
  – Increment the counter a final time
  – Activate appropriate outputs a final time.①

  You can use multiple *Lot* entries, and have them running independently of one another. The *Lot* parameter provides a level of process monitoring and control sophistication required in only a few applications, but highly valuable where needed to generate statistical information.

  For example, suppose extended match code table entry 1 is set up for lot mode, with activation of output 4. If the first Interleaved 2-of-5 symbol read by the decoder has a value of 123456, then the mode becomes *Match Entry,* and 123456 becomes the match string.

  Subsequent I 2 of 5 symbols with the same value will each increment the counter in row 1, and activate output 4. The first Code 39 symbol read that has the value 123456 will “close” the lot, and change the Symbology value from I 2 of 5 to Code 39, change *M* to *D* for the Mode, activate output 4 for the last time, and increment the counter a final time. This “closed” lot will not increment the counter or activate outputs for any I 2 of 5 or Code 39 symbols once the lot is closed. Instead, it will open a new lot if one is available.

Source

Field Type	Options
Select	**A** (Default for DS) B **A|B = A or B** (Default for DD) A–B = Precedent determined

Specifies from which scanner(s) an event can originate and meet the extended match pattern requirements. For single head decoders, Scanner *A* is the default value. For dual head decoders, the default value is *A|B*, which means that the decoder will accept input from either A or B to create a match. Other options include Scanner *B*, or precedent determined (*A–B*).

When set to *A–B*, the decoder will use the *first* input from *either* Scanner A *or* Scanner B to establish a precedent for all following inputs. If, for example, the first input comes via Scanner B, then only data from Scanner B will be matched from that point on.

Symbology

Field Type	Options
Select	Code 39 Interleaved 2-of-5 Codabar UPC-A UPC-E EAN-8 EAN-13 Code 128 Pharma–Code① **Any**

① Applies **only** to decoders equipped with the optional Pharma–Code capabilities.

Selects the symbology of the match code string. You can select any one of the symbologies for each extended match code string.

Note: *Any* is the default value in the Symbology field for all entries in the match code tables.

Match Pattern String

Field Type	Options
Edit Text	0 to 32 characters **Blank**

Defines the characters for a specified match code string (1 - 128). The default is no characters (*Blank)*, which means a match code string is not defined.

You can enter up to 32 characters for each match code string (including non-printable control characters). Enter the characters as they will be transmitted to the host. **Do not include check digits if you disabled the *Include Check Character* parameter for the selected symbology.**

The string accepts the question mark (**?**) as a single character wild card. A position containing a **?** will match any single ASCII character in the same position of the decoded data.

Note: The Extended Match Code tables interpret a question mark differently than do the Host Replacement rules. The question mark functions as a generic wildcard when used in the Extended Match Code Table, and as a metacharacter in the Host Message Replacement Rules.

The decoder compares all decoded data with the specified entries in the match code table. If the decoded data matches any of the 128 strings, a match condition occurs.

Count

Field Type	Options
Edit Numeric	0 through 999999 **0**

This field displays the current value of the extended match count for each table entry. The count automatically increments when the pattern, source, and symbology values all match a given extended match pattern. You can edit this field to set a specific start value when desired.

Loading

Field Type	Options
Edit Numeric	0 through 9, X **0**

In the most general sense, loading provides a means to distribute the response to incoming data among the eight discrete outputs. Loading instructs the decoder to respond to a match by activating the discrete corresponding to the next column number in which a nonzero value appears.

The default value of *0* disables loading for a given discrete. Values include *0* through *9*, and *X*.

Activation occurs from left to right in a “round-robin” fashion. During operation, a “greater than” symbol (>) will appear on the terminal screen to indicate the next discrete scheduled to fire. Any output set to “*X*” will fire every time a match is successful, in addition to the appropriate “round-robin” output.

Note: The duration of Extended Match Code Table outputs are established in the Primary Match Code Table. See below.

Given a situation where discretes 5, 6, and 8 are activated with loading values of 1, 3, and 1, the table below shows what would happen during three complete cycles (15 total matches). In the example below, a bold horizontal line marks the beginning of each new cycle.

Match #	Internal Status of Counters								On Terminal Display①							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
0	0	0	0	0	1	3	0	1	•	•	•	•	>1	3	•	1
1	0	0	0	0	0	3	0	1	•	•	•	•	1	>3	•	1
2	0	0	0	0	0	2	0	1	•	•	•	•	1	3	•	>1
3	0	0	0	0	0	2	0	0	•	•	•	•	1	>3	•	1
4	0	0	0	0	0	1	0	0	•	•	•	•	1	>3	•	1
5	0	0	0	0	1	3	0	1	•	•	•	•	>1	3	•	1
6	0	0	0	0	0	3	0	1	•	•	•	•	1	>3	•	1
7	0	0	0	0	0	2	0	1	•	•	•	•	1	3	•	>1
8	0	0	0	0	0	2	0	0	•	•	•	•	1	>3	•	1
9	0	0	0	0	0	1	0	0	•	•	•	•	1	>3	•	1
10	0	0	0	0	1	3	0	1	•	•	•	•	>1	3	•	1
11	0	0	0	0	0	3	0	1	•	•	•	•	1	>3	•	1
12	0	0	0	0	0	2	0	1	•	•	•	•	1	3	•	>1
13	0	0	0	0	0	2	0	0	•	•	•	•	1	>3	•	1
14	0	0	0	0	0	1	0	0	•	•	•	•	1	>3	•	1

① Tinted cells in this table show location of indicator arrow (“greater than” symbol). Cells are not highlighted on screen.

Note that the numbers displayed on the terminal during processing *do not change* as loading progresses. Only the “greater than” symbol changes, moving as necessary to indicate the *next* scheduled discrete activation.

Note also that the value in each vertical (output) column has meaning only in relation to the other values on the same horizontal (match entry) row. To find the percentage of cases in which a given loading value will fire, simply divide that value by the sum the values for that match, then multiply by 100.

0 + 0 + 0 + 0 + 1 + 3 + 0 + 1 = 5

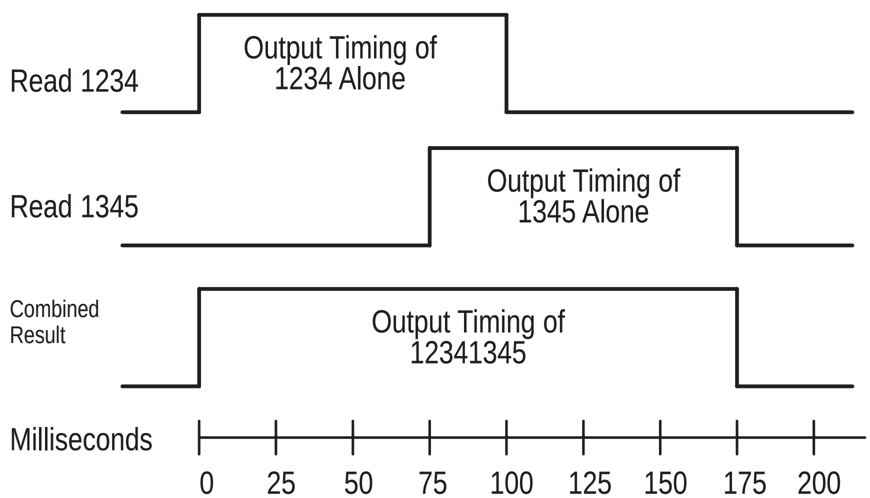
In the example above, discretes 5 and 8 will each fire 20% of the time (1/5*100), while discrete 6 will fire 60% of the time (3/5*100).

Output Duration

ATTENTION: Outputs that are addressed from multiple Extended Match Code Table entries (or from *both* Primary and Extended Match Code Table entries) and have overlapping durations will activate as shown below. Failure to consider this fact could lead to unexpected discrete output behavior.

The settings in the Primary Match Code Table determine the duration of all outputs initiated by the Extended Match Codes.

For example, assume output 1 is set to activate for 100 ms on a match to *1234* in the Primary Match Code Table, and to activate on a match to *1345* in the Extended Match Code Table. The duration of the Extended Match Code Table activation will be 100 ms (as established in the Primary Match Code Table). If the decoder reads *1234*, followed 75 ms later by *1345*, the resulting timing will be the 175 ms. The following illustration will help explain why.



Configuration: AUX and LCD Display Parameters

AUX and LCD Display Parameters

The decoder can display the following on an auxiliary terminal or an optional 2 line x 20 character per line alphanumeric LCD display to monitor:

- bar code data
- output counters
- decoder performance values
- host messages

The AUX terminal and LCD display can each display bar code data, output counter values and decoder performance indicators. The parameters on the screen shown below control how this data is formatted on both devices.

```
              ---------AUX and LCD DISPLAY FORMAT-----
                            DISPLAY DATA: None
                          MESSAGE FORMAT: Unformatted
                              SCROLL LCD: No
            POSITION
                0 BAR CODE STRINGS
                0 DECODER PERFORMANCE
                0 PACKAGE COUNTER
                0 SYMBOLS NOT READ COUNTER

               ---PRIMARY COUNTERS---
                0 1) None
                0 2) None
                0 3) None
                0 4) None
                0 5) None
                0 6) None
                0 7) None
                0 8) None
-------------------------------------------------------------------------------
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
-------------------------------------------------------------------------------
```

Each format parameter is defined below along with the field type and possible values. The default value is shown in bold letters

Display Data

Field Type	Options
Select	**None** Aux Only LCD Only Aux and LCD

Controls whether the formatted data is sent to the AUX terminal and/or the LCD display. The default is *None*, which disables the display of data on both devices.

Select *AUX Only* to display the data on the AUX terminal but not the LCD display. Select *LCD Only* to display the data on the LCD display but not the AUX terminal. Select *AUX and LCD* to enable the display of data on both devices.

The display parameters set for the AUX port apply to the AUX terminal when it is in manual data entry mode (See Chapter 13 for information on manual data entry).

Message Format

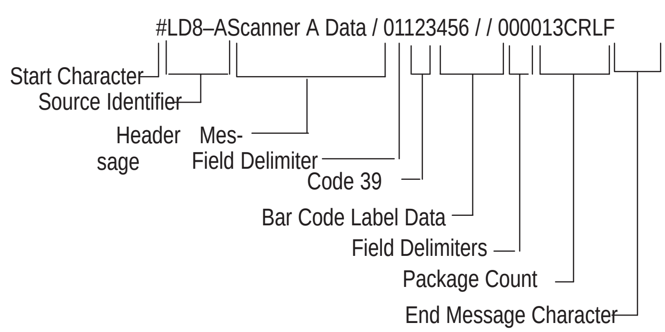
Field Type	Options
Select	**Unformatted** Host Format

Controls the format of the bar code data that is displayed. The default is *Unformatted*, which means the bar code data is displayed unformatted.

Select *Host Format* to display scanned data in the host message format set by the parameters on the **Host Message Format** configuration screen.

Note: Manually entered data cannot be sent to the LCD.

For example, assume the scanned bar code data is 123456. If the data is displayed unformatted, it is sent as 123456. If the data is displayed in the host format (using predefined configuration parameters), it is sent as:



See the **Host Message Format** screen configuration instructions in Chapter 11 for details on the configuration parameters that control the host message format.

Note: The Aux Terminal internal selector (described in Chapter 13) must be installed in the data entry position to send host formatted data to the Aux Port.

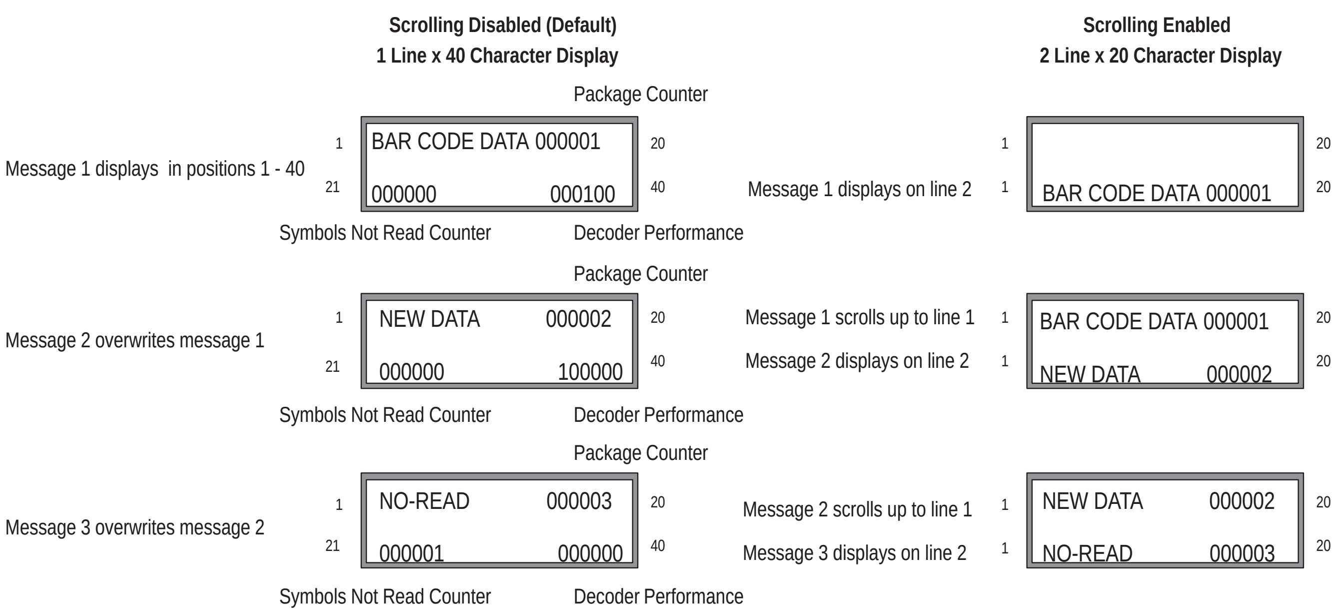
Scroll LCD

Field Type	Options
Select	**No** Yes

Enables or disables scrolling of the LCD display. The default of *No* disables scrolling and formats the LCD as a single line, 40 character display. Each new entry overwrites all positions.

Note: Newly displayed data will overwrite existing display data from the lowest position specified to the end of the display with blanks, so plan your LCD display parameters carefully. For example, messages written from the host to position 1 would not be overwritten by the decoder if the lowest position specified for LCD display was 21.

Select *Yes* to enable scrolling. With scrolling enabled, the LCD operates as a 2 line x 20 character display. New data always displays on line 2, moving the previous data up to line 1. The following figure illustrates how the LCD operates when scrolling is disabled (left) and enabled (right).



You must consider the operating mode of the LCD when displaying data. If scrolling is disabled, the LCD operates as a l line x 40 character display. Any data that exceeds 40 characters is truncated. If scrolling is enabled, the LCD operates as a 2 line x 20 character display. Any data that exceeds 20 characters is truncated.

Position: Bar Code Strings

Field Type	Options
Edit Numeric	0 through 40 **0**

Defines the character position at which to start displaying the bar code data. The default of *0* disables the display of bar code data.

To start the bar code data display at a specific position, enter a starting character position between 1 and 40. For example, to **start** the display at character position 1, enter 1.①

Position: Decoder Performance

Field Type	Options
Edit Numeric	0 through 40 **0**

Defines the character position at which to start displaying the decoder performance values for Scanner A and (for DD decoders) Scanner B. The performance indicator displays one value for each scanner. Each is left justified and can be a value up to 100. For DD decoders, the first value applies to Scanner A; the second value applies to Scanner B. The default of *0* disables the display of this data.

To determine the starting position for decoder performance display, enter a starting character position between 1 and 40. For example, to **start** the display at character position 21, select 21. Assuming scrolling is disabled, the display will appear beginning in the first position on the second line of the LCD display.①

Remember when selecting a starting position that you will need space for up to 3 characters for a single scanner and 6 characters for two scanners.

Position: Package Counter

Field Type	Options
Edit Numeric	0 through 40 **0**

Defines the character position at which to start displaying the 6 digit package counter. The default of *0* disables the display of the package counter.

① The *Default Prompt Message* and host messages always start in position 1. To prevent other data fro overwriting these messages on the LCD Display, select a position greater than the message length a LCD scrolling.

To start the package counter display at a specific position, enter a starting character position between 1 and 40. For example, to **start** the display at character position 30, select 30.①

Position: Symbols Not Read Counter

Field Type	Options
Edit Numeric	0 through 40 **0**

Defines the character position at which to start displaying the 6 digit no-read counter. The default of *0* disables the display of the no-read counter.

To start the no-read counter display at a specific position, enter a starting character position between 1 and 40. For example, to **start** the display at character position 30, select 30.①

Position: Primary Counters

Field Type	Options
Edit Numeric	0 through 40 **0**

Defines the character position at which to start displaying the 6 digit primary output counters (1–8). The default of *0* disables the display of the specified output counter.

To start the output counter display at a specific position, enter a starting character position between 1 and 40. For example, to **start** the display at character position 30, select 30.

Remember, each output counter occupies 6 character positions. If you display more than one counter, allow enough positions for each counter to prevent data from overwriting other data.①

Note: All of the output counters (1-8) are formatted the same way.

Displaying Host Messages

The LCD Display can display text messages that are sent from the host using the ASCII or PCCC form of the *Display Text Message* command (depending on the host protocol you are using). Refer to Chapters 15 and 16 for additional information on ASCII and PCCC commands.

① The *Default Prompt Message* and host messages always start in position 1. To prevent other data fro overwriting these messages on the LCD Display, select a position greater than the message length a LCD scrolling.

ASCII Command

The *Display Text Message* (TM) command allows you to send a message to the LCD Display. The following TM command sends the message ”START JOB!”.

TM010START JOB!

- Message Text String = START JOB!
- Length of Text String = 10
- AUX Keyboard Not Enabled = 0
- Command Code = TM

When the host sends this command to the decoder, the message displays on the LCD at the beginning of the line in position 01. The message remains on the display until it is overwritten by another message or data.

Remember, the LCD can only display 20 or 40 characters depending on whether scrolling is enabled. Messages that are longer than 20 or 40 characters will be truncated. See the examples on the next page.

If the TM command is sent with a string length of zero, the decoder displays the *Default Prompt Message* (if defined) instead. The following prompt defines this message:

DEFAULT PROMPT MESSAGE: ← **Defines 1 to 20 character prompt message. Initially, the default message is undefined.**

Refer to chapter 13 for additional information..

PCCC Command

You can also send a PCCC command to display a message on the LCD. The following command uses the command address of 900H to send the message ”START JOB!”. Bytes 6 – 15 define the characters of the message.

Display Message at AUX Terminal (900H)

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 08H	0
3	TNS		2
5	Command Address = 900H		4
7	”T”	”S”	6
9	”R”	”A”	8
11	” ”	”T”	10
13	”O”	”J”	12
15	”!”	”B”	14

When the host sends this command to the decoder, the message displays on the LCD at the beginning of the line in position 01. The message remains on the display until it is overwritten by another message or data.

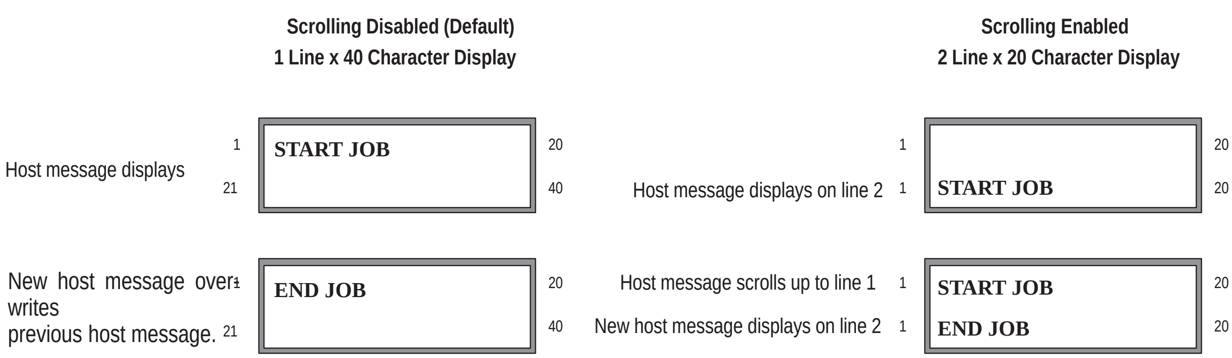
Remember, the LCD can only display 20 or 40 characters depending on whether scrolling is enabled. Messages that are longer than 20 or 40 characters will be truncated.

If the PCCC (900H) command is sent without a message defined, the decoder displays the *Default Prompt Message* instead.

How Scrolling Affects the Display of Host Messages

Scrolling affects the placement of host messages (and default prompt messages) on the LCD Display. When scrolling is disabled, each new message overwrites the last message. When scrolling is enabled, new messages display on line 2, scrolling the previous message up to line 1.

The following example shows how the LCD handles the host messages ”START JOB” and ”END JOB” when scrolling is disabled and enabled.



Select starting positions for other data that is greater than the length of the host messages. This will allow host messages and other data to display at the same time without overwriting each other.

LCD Display Examples

The section provides examples to illustrate how data is displayed on the LCD Display and how the configuration parameters control the format of the displayed data.

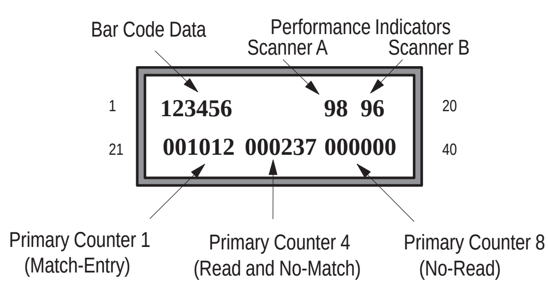
Example 1

In Example 1, the LCD Display is enabled to display bar code data, decoder performance values, primary counter 1, primary counter 4, and primary counter 8.

```
---------AUX and LCD DISPLAY FORMAT-----
              DISPLAY DATA: LCD Only        Enables LCD to display data.
            MESSAGE FORMAT: Unformatted     Displays unformatted bar code data
                SCROLL LCD: No              Disables scrolling
POSITION
    1 BAR CODE STRINGS                      Displays bar code data starting in position 1.
   15 DECODER PERFORMANCE                   Displays decoder performance values at position 15.
    0 PACKAGE COUNTER
    0 SYMBOLS NOT READ COUNTER

   ---PRIMARY COUNTERS---
   21 1) None                               Displays Primary Counter 1 at position 21.
    0 2) None
    0 3) None
   28 4) None                               Displays Primary Counter 4 at position 28.
    0 5) None
    0 6) None
    0 7) None
   35 8) None                               Displays Primary Counter 8 at position 35.
________________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
________________________________________________________________________________
```

When scrolling is not enabled, the display operates as a single line, 40 character display. Line 1 displays characters in positions 1 - 20. Line 2 displays characters in positions 21 - 40. Any data you configure to display beyond position 40 will be truncated.

The LCD display will look like this for the above configuration. Line 1 displays the bar code data and the decoder performance values. Line 2 displays output counters 1, 4, and 8.



Important: Host messages and *Default Prompt Messages* always display in position 01. If host messages are expected, select starting positions for other data that are greater than the length of these messages to avoid conflicts.

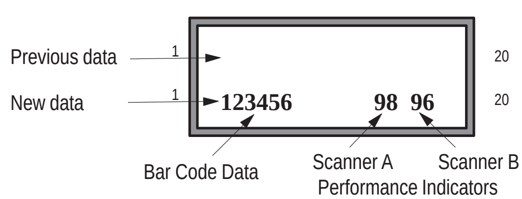
Example 2

In Example 2, the LCD Display is enabled to display bar code data in position 1 and decoder performance values in position 15.

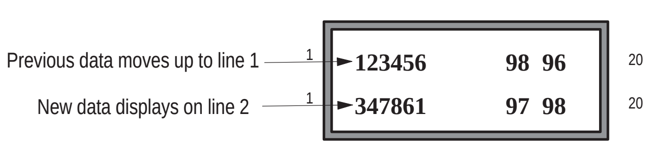
Scrolling is enabled for the LCD Display, which means the display operates as a 2 line display with 20 characters per line. Both lines display characters in positions 1 - 20. With scrolling enabled, you cannot display more than 20 characters per line at one time. Any data you configure to display beyond position 20 will be truncated.

```
---------AUX and LCD DISPLAY FORMAT-----
             DISPLAY DATA: LCD Only          <- Enables LCD to display data.
           MESSAGE FORMAT: Unformatted       <- Displays unformatted bar code data
               SCROLL LCD: Yes               <- Enables Scrolling
POSITION
    1 BAR CODE STRINGS                       <- Displays bar code data starting in position 1.
   15 DECODER PERFORMANCE                    <- Displays decoder performance values at position 15.
    0 PACKAGE COUNTER
    0 SYMBOLS NOT READ COUNTER

   ---PRIMARY COUNTERS---
    0 1) None
    0 2) None
    0 3) None
    0 4) None
    0 5) None
    0 6) None
    0 7) None
    0 8) None
______________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
______________________________________________________________________________
```

The LCD display will look like this for the above configuration. Line 2 displays the bar code data and the performance indicators.



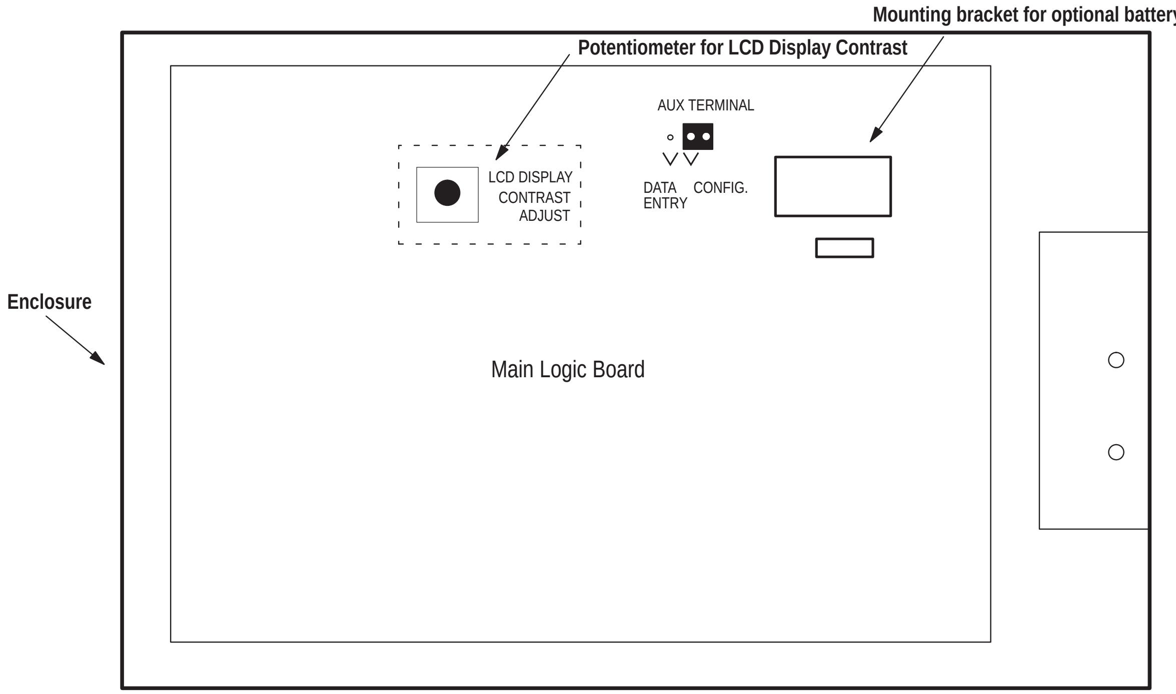
When scrolling is enabled, all new data displays on the second line. When the LCD receives new data, it will display on line 2, moving the previous data up one line.



Adjusting Contrast of LCD Display

The main logic board of the decoder has a potentiometer for adjusting the contrast of the LCD Display. Figure 9.1 shows the general location of the potentiometer on the main logic board.

Figure 9.1 Potentiometer for LCD display contrast



To adjust the contrast of the LCD Display:

1. Power on decoder, but if possible disconnect power from module connectors.
2. Loosen the two screws which secure the cover of the decoder and open.
3. Using your fingers, turn the LCD Display potentiometer to the left or right until the desired contrast or readability is achieved.
4. Close cover of decoder and tighten screws.

AUX Terminal Display Examples

The section provides examples to illustrate how data is displayed at the AUX terminal and how the configuration parameters control the format of the displayed data.

Example 1

In Example 1, the AUX terminal is configured to display unformatted bar code data in position 21.

```
---------AUX and LCD DISPLAY FORMAT-----
              DISPLAY DATA: Aux Only
            MESSAGE FORMAT: Unformatted
                SCROLL LCD: No
POSITION
   21 BAR CODE STRINGS
    0 DECODER PERFORMANCE
    0 PACKAGE COUNTER
    0 SYMBOLS NOT READ COUNTER

   ---PRIMARY COUNTERS---
    0 1) None
    0 2) None
    0 3) None
    0 4) None
    0 5) None
    0 6) None
    0 7) None
    0 8) None
```

Enables AUX Terminal to display data.
Displays unformatted bar code data.
Displays bar code data starting at position 21.

The AUX terminal display will look like this for the above configuration.

Bar Code Data

```
229176
229183
229192
229206
229240
229253
229263
229268
229285
229322
229327
229336
229345
229361
229371
229391
229427
229433
229438
229449
229456
229466
229476
229493
229517
```

Example 2

In Example 2, bar code data configured to display in position 21 **will not display** because the AUX terminal has not been enabled to display data.

```
---------AUX and LCD DISPLAY FORMAT-----
              DISPLAY DATA: None                 Disables the display of data on any device
            MESSAGE FORMAT: Unformatted
                SCROLL LCD: No
POSITION
   21 BAR CODE STRINGS                           Configures bar code data to display in position 21
    0 DECODER PERFORMANCE
    0 PACKAGE COUNTER
    0 SYMBOLS NOT READ COUNTER

   ---PRIMARY COUNTERS---
    0 1) None
    0 2) None
    0 3) None
    0 4) None
    0 5) None
    0 6) None
    0 7) None
    0 8) None
```

Example 3

In Example 3, the AUX terminal is enabled to display bar code data, decoder performance values, and the package counter.

```
---------AUX and LCD DISPLAY FORMAT-----
              DISPLAY DATA: Aux Only             Enables AUX terminal to display data.
            MESSAGE FORMAT: Unformatted          Displays unformatted bar code data.
                SCROLL LCD: No
POSITION
   21 BAR CODE STRINGS                Displays bar code data starting at position 21.
   50 DECODER PERFORMANCE             Displays Decoder Performance values at position 50.
   60 PACKAGE COUNTER                 Displays Package Counter at position 60.
    0 SYMBOLS NOT READ COUNTER

   ---PRIMARY COUNTERS---
    0 1) None
    0 2) None
    0 3) None
    0 4) None
    0 5) None
    0 6) None
    0 7) None
    0 8) None
```

The terminal display will look like this for the above configuration.

Decoder Performance Values
Scanner A Scanner B
Package Counter
Bar Code Data

Bar Code Data	Scanner A	Scanner B	Package Counter
229176	**0**	**98**	**1724**
229183	**0**	**96**	**1725**
229192	**98**	**0**	**1726**
229206	**0**	**95**	**1727**
229240	**96**	**0**	**1728**
229253	**99**	**0**	**1729**
229263	**0**	**97**	**1730**
229268	**0**	**99**	**1731**
229285	**97**	**0**	**1732**
229322	**0**	**96**	**1733**
229327	**99**	**0**	**1734**
229336	**99**	**0**	**1735**
229345	**0**	**95**	**1736**
229361	**0**	**98**	**1737**
229371	**97**	**0**	**1738**
229391	**0**	**99**	**1739**
229427	**98**	**0**	**1740**
229433	**97**	**0**	**1741**
229438	**98**	**0**	**1742**
229449	**0**	**95**	**1743**
229456	**96**	**0**	**1744**
229466	**99**	**0**	**1745**
229476	**0**	**97**	**1746**
229493	**0**	**99**	**1747**
229517	**97**	**0**	**1748**

Configuration: Host Message Replacement Rules

Introduction to Host Message Replacement Rules

Function 5 on the **Select Operation** menu accesses the **Host Message Replacement Rules** configuration screen. Use this function to modify the message sent to the host.

```
Rule:       1    Rules are not active
                                  SOURCE: A|B
 1                            SYMBOLOGY: Any
 2                        SYMBOL NUMBER: ALL
 3               FIND STRING CONTAINING:
 4           REPLACE ENTIRE STRING WITH:
 5                 MINIMUM FIELD LENGTH: 0
 6                            ALIGNMENT: Right
 7                       FILL CHARACTER: None    0
 8            HOST MESSAGE FIELD NUMBER: ALL
 9
10    BAR CODE STRING                    FIELD IN HOST MESSAGE
11    -------------------------------    -------------------------------
12                                       Rule does not match
13                                       Rule does not match
14                                       Rule does not match
15                                       Rule does not match
16                                       Rule does not match
                                         Rule does not match

-------------------------------------------------------------------------------
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
-------------------------------------------------------------------------------
```

Host message replacement rules may not be required in every application. They are unnecessary when your needs include simple object counting, or collection of raw bar code data. However, host message replacement rules will prove useful when you need to substitute a predetermined output message for specific bar code data during decoding. With them you can:

- send data in a particular, predefined order regardless of the order in which the labels were read
- mask bar code characters to simplify operations and speed processing
- truncate or pad the length of the data package
- substitute a predetermined text string for one or more expected values.
- convert abstract bar code contents into more easily understood text form
- categorize labels based upon selected portions of their contents.

Both the search and replacement strings that make up a Host Message Replacement Rule can consist of a combination of standard ASCII characters and special characters known as metacharacters. Metacharacters are explained later in this section.

Symbols vs. Host Message Fields

Understanding host message replacement rules and their use requires that you clearly understand the difference between two frequently confused terms.

A bar code **symbol** is the set of bars and spaces from which the scanner gathers data for interpretation by the decoder.

A **message field** is the decoded information sent from the decoder to a host after processing an incoming symbol.

In the most simple terms, a symbol can be thought of as a *stimulus* to the decoder, and a message field (or group of message fields assembled into a **host message**) can be considered the *response* to that stimulus.

Introduction to Host Message Replacement Rules

The decoder allows you to use up to 16 Host Message Replacement Rules. Each rule can be enabled and defined as necessary to meet your own application needs.

In addition to the prompt line at the bottom of the screen, the **Host Message Replacement Rules** configuration screen is made up of three sections:

```
Rule:     1
                          SOURCE: A¦B
 1*                    SYMBOLOGY: Any
 2                 SYMBOL NUMBER: ALL
 3        FIND STRING CONTAINING: .
 4     REPLACE ENTIRE STRING WITH: .
 5          MINIMUM FIELD LENGTH: 0
 6                     ALIGNMENT: Right
 7                FILL CHARACTER: None    0
 8      HOST MESSAGE FIELD NUMBER: ALL
 9
10  BAR CODE STRING                  FIELD IN HOST MESSAGE
11  -------------------------------  -------------------------------
12                                   Rule does not match
13                                   Rule does not match
14                                   Rule does not match
15                                   Rule does not match
16                                   Rule does not match
                                     Rule does not match
-----------------------------------------------------------------------------
      Commands:ESC    Change:SPACE    Cursor Control:ARROWS
-----------------------------------------------------------------------------
```

- **Rule status,** located on the far left side of the screen

  Each number represents an available host message replacement rule. **Currently enabled rules are marked with an asterisk (*).** Rules are enabled by assigning a value to the *Find String Containing* field.

- **Host message replacement rule definition,** located in the upper half of the screen

  This section displays the current search rule criteria (which include *Source*, *Symbology*, *Symbol Number*, and *Find String Containing*) and the replacement string to send to the host when matches are found. The rule definition also includes parameters to fix the length of the field, the character used to "fill" the field, and the alignment of the string within the field.

- **Example testing,** in the lower portion of the screen

  This section provides a "worksheet" where you can insert sample bar code strings to test the performance of your rules. This feature allows you to conveniently "debug" your replacement rule expressions for structural and logical errors before going on-line. You simply input the test bar code string on the left. The string that will appear in the host message after application of the displayed rule appears on the right. If your test string does not create a match, you will be notified of that fact on the right side of the screen.

Taken together, these three sections provide for full control over host message replacement rules, and enable you to format complete, comprehensible message fields as required.

Each format parameter is defined below along with the field type and possible values. The default value is shown in bold letters in the parameter tables. A careful study of the examples that follow the parameter descriptions will help explain their use.

Metacharacters

The decoder provides a complete set of special purpose characters you can use to perform logical functions on characters, expressions, or even entire strings. These characters are known as metacharacters. Simply put, they are string manipulation commands consisting of standard ASCII characters which you can embed within search or replacement strings. Each metacharacter conveys a specific instruction to the decoder software, and acts upon a clearly defined range within the string. Metacharacters can be used with standard alphanumeric characters to describe and manipulate even the most complex substitution scenarios with ease.

A listing of valid metacharacters appears in the table below. Each appears with a general explanation of its function and syntax. More detailed examples of their use appear at the end of this chapter.

Note: The host replacement rules interpret a question mark differently than does the match code table. As a metacharacter used with the host replacement rules, a question mark is *not* interpreted as a single character wild card. See Table 10.B and 10.C later in this chapter.

Note: There are two distinct sets of metacharacters used by the host message replacement rule software. One set applies only to search patterns, and the other only to replacement strings. If the decoder encounters a search pattern metacharacter in a replacement message, it will interpret it as a standard ASCII character. Conversely, if the decoder detects a replacement string metacharacter in a search pattern, it will interpret it as a standard ASCII character. For example, a "*****" in a replacement string will be treated as normal text, and "**&**" in a search pattern will be treated as normal text.

Use the characters described in the following tables to help establish the exact search patterns that meet your needs. Proceed carefully, however. While the individual metacharacters perform easily understood actions, combining and nesting them will quickly create extremely complex logical expressions. Be sure to test your expressions thoroughly in the lower half of the screen to make certain your search and replace strings perform as you expect them to under the conditions you are liable to experience.

Table 10.A Search pattern metacharacters – position dependent

Character	Description and Use
	Note: The following two metacharacters are position-dependent. They must appear in the location specified to be matched.
^	If the *circumflex* (^) is used as the **first** character in the search pattern, it indicates that the characters, other metacharacters, expressions, or strings must occur at the beginning of the string to be matched. Note that the circumflex has a special meaning if used within square brackets, as explained elsewhere in this chapter.
$	When the *dollar sign* is used as the **last** character in the search pattern, it indicates that the characters, other metacharacters, expressions or strings must occur at the end of the string to be matched.

Table 10.B Search pattern metacharacters – wildcard

Character	Description and Use
.	The *period* represents any single character, and is used as a single-character "wildcard".

Table 10.C Search pattern metacharacters – string manipulation

Character	Description and Use
	Note: These metacharacters refer to the character, metacharacter, string, or expression that immediately precedes them.
?	The *question mark* instructs the rule to match either **no occurrence** or **one occurrence** of what precedes it. This metacharacter is used in a search string where the character may not appear at all, or may appear once.
+	The *plus sign* instructs the rule to match **one or more occurrences** of what precedes it. This metacharacter is used in a search string where the character will be present, but you are unsure how many times it appears.
*	The *asterisk* instructs the rule to match **none or more occurrences** of what precedes it. This metacharacter is used in a search string in cases where the character *may not* appear, or *may appear one or more times.*

Table 10.D Search patter metacharacters – logical operators and other special functions

Character	Description and Use
[ ]	*Square brackets* ([ ]) instructs the rule to match an incoming string if any character enclosed within the brackets appears in the string. A range of values can be represented within the brackets by separating the first and last characters in the range by a hyphen. Square brackets must be used in pairs. **Note:** The *circumflex* (^) can be used as the first character within the square brackets to reverse the sense of the expression. **Examples** [ABC] Matches “A”, “B”, or “C” [L–P] Matches “L”, “M”, “N”, “O”, or “P” [0 – 9] Matches “0”, “1”, “2”, “3”, “4”, “5”, “6”, “7”, “8”, or “9” [^A – Z] Matches any character that is **not** upper case alphabetic
( )	*Parentheses* can be used in two different ways. They can be used in search patterns to group characters and metacharacters to form expressions. Parentheses must be used in pairs. **Examples** (AB)+ The plus sign applies to the expression (AB). Strings that would match this expression include: “AB”, “ABAB”, “123AB”, and “AB123”. Parentheses can also be used to identify strings for use in the Replace Entire String With field. If a character, string, or expression is surrounded by parentheses in a *search pattern*, then it can be later recalled in a *replace pattern* with the “\n” metacharacter described elsewhere in this chapter. **Note:** Parentheses may be nested to form complex expressions.

Character	Description and Use
|	A *vertical bar* (the shifted "\\" character on the keyboard) instructs the rule to match an incoming string if the character or expression on the left **or** right of the vertical bar appears in the string. **Examples** A | B Matches "A" or "B" abc|123 Matches "abc" or "123"
\\	The *backslash* indicates that the following character, which would normally be interpreted as a metacharacter, should instead be interpreted as a literal ASCII character. **Note:** The *backslash* is used differently in the Replace Patterns. See Table 10.E. **Example** \\. The period (.) will be interpreted as a period rather than a single character wildcard.

Table 10.E Replacement string metacharacters

Character	Description and Use
\n	The *backslash* plus a number *1* through *9* recalls a previously saved string. Any character, string or expression that is surrounded by parentheses in the search pattern (as described earlier) can be recalled by the replace pattern using the "\n" format. Since the parentheses may be nested, the number "n" represents the order of the groupings as defined by the order of the left parenthesis in the search pattern. **Examples** Search Pattern = 123(ABC) Replace Entire String With = \1 Incoming String = 123ABC456 Result for Host Message = ABC The search pattern above matches the incoming string. The Replace Entire String With value states that the string identified within the first parentheses should be sent to the host. Search Pattern = (123(ABC)) Replace Entire String With = \1\2 Incoming String = 123ABC456 Result for Host Message = 123ABCABC The search pattern above matches the incoming string. The Replace Entire String With value states that the string identified within the first parentheses (123ABC), *plus* the string identified by the second parentheses(ABC) should be sent to the host.
&	When the *ampersand* (&) is used in a replacement pattern, it indicates that the part of the string that matches the search pattern should be sent to the host. Therefore, if the string read contains more characters than the search pattern, then the additional characters are discarded. **Examples** Search Pattern = 123ABC Replace Entire String With = & Incoming String = 123ABC Result for Host Message = 123ABC The search pattern matches the incoming string. The Replace Entire String With value states that the string identified in the search pattern should be sent to the host. Search Pattern = 123ABC Replace Entire String With = & Incoming String = 123ABC456 Result for Host Message = 123ABC The search pattern matches the incoming string. The Replace Entire String With value states that the string identified in the search pattern should be sent to the host. This does not include the digits 456.

Processing Order

Matches are determined for each of the Host Message Fields (1 through 16) by applying the rule parameters as follows:

The lowest numbered rule with the Host Message Field Number value of 1 (or *All*) will be applied first. If that rule is successful, no other rule specifying field 1 (or *All*) will be applied. This will continue until a rule satisfies the field, or until all appropriate rules have been applied to field 1. The decoder will continue this process for all fields until each is satisfied, or until all appropriate rules have failed. No-read Replacement strings (if defined) will be substituted for the data if the rules fail. See Chapter 11.

Important: You will want to set up your host message replacement rule table with care. Here are a few general guidelines:

- Prioritize your replacement rules. Only one rule can fill a field, and once one rule has filled a field, then no other rules will apply to that field. Define the rule which will lead to the most preferable result first, the next preferable result next, and so on.
- If you need to fill specific fields, define the rules for those fields first.
- When using metacharacters, define first those expressions which are most restrictive (most specific), and then proceed to those which are less so.
- Define rules specifying *All* as the host message field number last. This is especially important, because if such a rule creates a match, then no other rules that occur after it and are directed to specific host fields can have any affect. (Remember: once one rule has filled a field, then no other rules will apply to that field.)

Configuration Parameters

Source

Field Type	Options
Select	**A** (Default for DS Only**)** B **A|B = A or B** (Default for DD only**)** Aux

Specifies where an event can originate and meet the host message replacement rule requirements. For DS decoders, Scanner *A* is the default value. For DD decoders, the default value is *A|B*, which means that the decoder will accept input from either A or B to create a match. You can also select AUX or, if you have a DD decoder, Scanner *B* as the source.

The decoder processes rules for the AUX and each of the scanners separately. For example, if all enabled rules specify Scanner A as the source, then data received from Scanner B or the auxiliary terminal does not pass through the rules and will not be affected by them.

Note: If *any* rule is enabled for a given source, then *all* data from that source will pass through the rules. For example, if *any* rule is enabled for AUX data, then *all* AUX data will pass through the rules.

Therefore, if you construct a rule with Scanner A as the source, and establish no rule for Scanner B, then all data from Scanner A will pass through the rules, while the data from Scanner B will not. In that case, a no-read from Scanner A would be represented by the appropriate no-read replacement string. A no-read from Scanner B (in *Independent Mode*) would be represented by the default no-read string. Use "**A|B**" as the source if you want the rule to apply to both scanners, or *whenever* Scanner B is set to coordinated mode.

When *AUX* is selected as the source, the rule processor ignores that rule's *Host Field Number, Symbol Number,* and *Symbology* parameters.

Symbology

Field Type	Options
Select	Code 39 Interleaved 2-of-5 Codabar UPC-A UPC-E EAN-8 EAN-13 Code 128 Pharma–Code① **Any**

① Applies **only** to decoders equipped with the optional Pharma–Code capabilities.

Selects the symbology to which the host message replacement rule should be applied. The default value is *Any.* Pharma–Code is available only on decoders equipped with the Pharma–Code option.

Symbol Number

Field Type	Options
Edit Numeric	1 to 16 **All**

Determines the bar code symbol to which the displayed rule should be applied. 1 would apply the rule only to the first symbol read, 2 to the second symbol, and so on up through 16. The default value of *All* applies the rule to all symbols read.

Use *All* in raster scanner applications, or whenever you are uncertain of the order in which the symbols will be read.

Note: Using a combination of *All* in the symbol number field and *All* in the host message field number field within a rule creates a special situation in which the decoder will attempt to match the rule using only those symbols that have not previously satisfied a rule.

A rule in which the host message field number is set to *All* will try to process every symbol to satisfy the search criteria until all of the host fields are satisfied.

Important: Do not set the host message field number to *All* unless:

- The *Number of Fields in Message* parameter is set to 1 on the **Host Message Format** screen.

  OR
- The *Number of Fields in Message* parameter is set to *All* on the **Host Message Forma**t screen *and* the *Symbols per Package* parameter is set to 1 on the **Scanner Contro**l screen

  OR
- The *Symbol Number* parameter is set to *All*.

Other configurations will result in multiple copies of the same data being set as different fields in the host message.

For example, if the *Number of Fields in Message* parameter is set to a number greater than 1, with the host message field number set to *All*, then the same symbol will be processed through a single rule multiple times. For the purposes of this example, assume the number of fields in message value is set to 3, and the user has enabled rule number 1 as shown below.

```
Rule:      1
                                  SOURCE: A|B
 1*                            SYMBOLOGY: Any
 2                         SYMBOL NUMBER: 1
 3              FIND STRING CONTAINING: .*
 4          REPLACE ENTIRE STRING WITH: &
 5                MINIMUM FIELD LENGTH: 0
 6                           ALIGNMENT: Right
 7                      FILL CHARACTER: None    0
 8           HOST MESSAGE FIELD NUMBER: ALL
 9
10    BAR CODE STRING                   FIELD IN HOST MESSAGE
11    ________________________________  ________________________________
12                                      Rule does not match
13                                      Rule does not match
14                                      Rule does not match
15                                      Rule does not match
16                                      Rule does not match
                                        Rule does not match
_______________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
_______________________________________________________________________________
```

If Scanner A reads the following symbols:

AB1 1AB BA1

Then the host message would be AB1AB1AB1. Since the first symbol read satisfies the search criteria, it will continue passing through the rule until all host fields are filled.

Changing the symbol number to 2 would lead to a host message of 1AB1AB1AB.

Instead, if the *Symbol Number* parameter is set to *All and* the host message field number is set to *All*, then each symbol that has satisfied a rule is "marked". That symbol's marked status prohibits other rules with both *Symbol Number* and *Host Message Field Number* parameters set to *All* from using it.

For example, resetting the symbol number to *All* in the configuration illustrated above results in a host message of AB11ABBA1.

This occurs because AB1 (the first symbol read) satisfies the rule and is used for host field one. Since AB1 has now been used, and both symbol number and host message field number are set to *All*, AB1 won't be considered for the second pass through the rule. Instead, 1AB will satisfy the rule on the second pass, and will be used for host field two and will be marked so it will not be considered for the third pass. BA1 satisfies the third pass, and will be used for host field three.

Find String Containing

Field Type	Options
Edit Text	Any valid string up to 24 characters in length **Blank**

If not blank, enables the selected rule number and specifies a string for which to search among incoming symbols. The string may consist of any valid combination of ASCII characters and metacharacters. All the *Find String Containing* fields are empty by default, which disables all host message replacement rules. Only enabled rules will affect decoder performance. All rules are empty – and therefore disabled – at default startup.

Replace Entire String With

Field Type	Options
Edit Text	Any valid string up to 24 characters in length **Blank**

Defines the string or expression that should be sent to the host to replace the string that was matched by the search pattern currently in effect. Whenever the search pattern is satisfied, the replacement pattern defined here will be substituted for the ***entire*** string.

Even if the search pattern is only a portion of the incoming string, the entire incoming string is replaced by the replacement pattern. For an example of how to replace only a portion of the incoming string, see Example 9 at the end of this chapter.

The resulting string appears in the field defined by the host message field number. The string or expression may consist of any valid combination of ASCII characters and metacharacters. The default value is *Blank*.

Minimum Field Length

Field Type	Options
Edit Numeric	0 through 64 **0**

Specifies the minimum number of characters in any field that satisfies the rule. Fields that are longer than the minimum field length remain unchanged, but fields that are shorter than the minimum length are padded to meet the minimum value. Fill characters appear either before or after the existing field, depending on the field's alignment.

The default value is *0*, which means minimum field length, alignment, and fill character functions are all disabled. Allowable values are any number from 0 to 64.

Alignment

Field Type	Options
Select	Left **Right**

Determines whether the data in the host message should align to the left or right edge of the field. The default is *Right*. As described above, fill characters will be applied before the text (pushing the text to the far right) in right justified fields, and after the text (pushing the text to the far left) in left justified fields.

Fill Character

Field Type	Options
Edit ASCII	Any ASCII Character 0–255 **0 = None**

Specifies a character to insert in the field when its length is less than the minimum field length selected above. For example, if the result of a successful replacement is the ***ABCD***, with a minimum field length of nine, left alignment, and a fill character of ASCII 35 (#), the resulting field would look like:

ABCD#####

Appendix I contains a complete chart of ASCII characters and their values.

Host Message Field Number

Field Type	Options
Edit Numeric	1 through 16 **All**

Specifies to which of the 16 available field numbers the currently displayed rule applies. The default value is *All*. Other allowable values include the numbers 1 through 16.

Since rule processing applies to the rules in numerical order (1 through 16), once a field is satisfied by a rule, no other rule with the same host message field number will be processed.

Note: Using a combination of *All* in the symbol number field and *All* in the host message field number field within a rule creates a special situation in which the decoder will attempt to match the rule using only those symbols that have not previously satisfied this rule or any other.

Assembling a Host Message

Some applications demand nothing more than a stream of raw bar code data to be of use. However, interpretation and manipulation of that raw data proves useful in many production situations. Host message replacement rules make that interpretation and manipulation possible.

When assembling a host message, the decoder software calls upon the rule processor to fill in each position of the host message beginning with the first host message field, and proceeding in order to the last.

Up to 16 fields can be specified for each message. The exact number is determined by the setting in the **Host Message Format** screen's number of fields in host message.

If the number of fields in host message value is *All*, then the number of fields in the host message will equal the value appearing in the *Symbols per Package* parameter on the **Scanner Control** screen. However, when its value is 1 to 16, then the decoder sends back exactly that number of fields.

In a case where the number of fields read does not equal the specified number of symbols per host message, the host replacement rules, if active, will determine which data is sent to the host. If the rules are inactive, symbol data will be sent in the order decoded, up to the value specified in the number of fields in the *Host Message* parameter. In cases where there are fewer symbols than there are fields specified, then the decoder will send no-read message strings as explained below.

If no rule finds a match for a given host message field, it inserts the no-read replacement string for that field number. In cases where the no-read replacement string has not been defined for that particular field number, then the decoder inserts the default no-read string. Finally, if the default no-read string is not defined, then the decoder leaves the field blank.

Examples

Example 1: Sorting by Data Source

Parameter	Rule #1 Value	Rule #2 Value
Source	A	B
Symbology	Any	Any
Symbol Number	All	All
Find String Containing	.*	.*
Replace Entire String With	&	&
Minimum Field Length	0	0
Alignment	Right	Right
Fill Character	None	None
Host Message Field Number	1	2

In the decode mode Coordinated 1 or 2, two symbols per package and each scanner reading a single symbol, the data from Scanner A will always appear first, and the data from Scanner B second. Appropriate No-Read messages may be selected for each scanner by using the No-Read Replacement Rules.

Example 2: Identifying the Source of Data

Parameter	Rule #1 Value	Rule #2 Value
Source	A|B	Aux
Symbology	Any	Any
Symbol Number	All	All
Find String Containing	.*	.*
Replace Entire String With	&	& Aux Data
Minimum Field Length	0	0
Alignment	Right	Right
Fill Character	None	None
Host Message Field Number	1	1

All scanner data will be sent to the host as received. Data entered into the AUX Port will be sent with the characters “Aux Data” appended to the data. In a real application, it may be critical to know the source of information. The Host Replacement Rules make this possible. (Also see Source Identifier.)

Example 3: Sorting by Symbology

By setting up specific rules to check for symbology, different code types may be sent to the host in a predetermined order.

Parameter	Rule #1 Value	Rule #2 Value
Source	A|B	A|B
Symbology	Code 128	I 2 of 5
Symbol Number	All	All
Find String Containing	.*	.*
Replace Entire String With	&	&
Minimum Field Length	0	0
Alignment	Right	Right
Fill Character	None	None
Host Message Field Number	1	2

In this case, 2 symbols per package will be read. The symbols are sent to the host with the Code 128 symbol first, or its No-read Replacement Message. This technique may be useful in applications where these two symbologies are used together.

Example 4: Sorting by Symbol Number

Parameter	Rule #1 Value	Rule #2 Value
Source	A|B	A|B
Symbology	Any	Any
Symbol Number	2	1
Find String Containing	.*	.*
Replace Entire String With	&	&
Minimum Field Length	0	0
Alignment	Right	Right
Fill Character	None	None
Host Message Field Number	1	2

The above rules allow the host to receive the symbol data in reverse order from the order it was decoded. The first symbol decoded (symbol number 1) will be sent as field number 2, while symbol number 2 will be sent first.

Example 5: Sorting Symbols by Data Identifiers

Parameter	Rule #1 Value	Rule #2 Value	Rule #3 Value	Rule #4 Value
Source	A|B	A|B	A|B	A|B
Symbology	Any	Any	Any	Any
Symbol Number	All	All	All	All
Find String Containing	^P(.......)$	^Q(.*)	^S(.*)	^V(.....)$
Replace Entire String With	\1	Qty = \1	\1	\1
Minimum Field Length	0	0	0	0
Alignment	Right	Right	Right	Right
Fill Character	None	None	None	None
Host Message Field Number	1	2	3	4

This example illustrates the effects of sorting host data using data identifiers. Specifications such as AIAG and ODETTE use these unique characters to identify specific data within a group of symbols. These characters are embedded into the encoded Bar Code symbol. Although not always printed in the human readable text, they appear as the first character (or group of characters) in the symbol. In this example data are sorted so that the part number, quantity, serial number, and supplier identification are sent to the host in that particular order. By using the parentheses in the search string and the “\1” in the replace string, we are able to strip off the data identifier, and send only the data desired.

In this example, if the part number does not have exactly 7 characters after the identifier, it will fail the rule and not be sent. In rule #2, we search for the quantity identifier. If the symbol Q100 was read, we would send “Qty = 100” with the replace string “Qty = \1”

Example 6: Sorting by Unique Characters and/or Strings

Parameter	Rule #1 Value
Source	**A|B**
Symbology	**Any**
Symbol Number	**All**
Find String Containing	**^6[2–9] | ^[7–9][0–9]$**
Replace Entire String With	**&**
Minimum Field Length	**0**
Alignment	**Right**
Fill Character	**None**
Host Message Field Number	**1**

This rule checks symbols as they are decoded for values between 62 and 99. All other symbols would be ignored by this rule. Values between 62 and 99 are sent to the host. Note the ^ and $ are required to avoid matching strings such as 562 or 758 that do contain the desired string data (62 and 75), but are not the desired matches.

Example 7: Stripping Unwanted Characters

Parameter	Rule #1 Value
Source	**A|B**
Symbology	**Any**
Symbol Number	**All**
Find String Containing	**^0*(. *)$** ($ is optional in this example)
Replace Entire String With	**\1**
Minimum Field Length	**0**
Alignment	**Right**
Fill Character	**None**
Host Message Field Number	**1**

This example strips *leading* zeroes off the decoded symbols. For example, the symbol 00012345678905 would be sent to the host as 12345678905.

Example 8: Stripping Unwanted Characters

Parameter	Rule #1 Value
Source	**A|B**
Symbology	**UPC-A**
Symbol Number	**All**
Find String Containing	**^(. . . . . .)(. *)**
Replace Entire String With	**\2**
Minimum Field Length	**0**
Alignment	**Right**
Fill Character	**None**
Host Message Field Number	**1**

This rule allows the number system character (first character) and the next 5 characters (the manufacturer's identification code) to be dropped when the data is sent to the host. This technique can be useful in obtaining maximum throughput, as it helps minimize communication and host program sorting time.

Example 9: Substituting Characters Within a String

Parameter	Rule #1 Value
Source	**A|B**
Symbology	**Any**
Symbol Number	**All**
Find String Containing	**(. *)(123)(. *)**
Replace Entire String With	**\1ABC\3**
Minimum Field Length	**0**
Alignment	**Right**
Fill Character	**None**
Host Message Field Number	**1**

This example will substitute "ABC" for "123" within the string. Note that if "123" appears more than once within the incoming data, "ABC" will be substituted only for the *last* occurrence. For example, "01234567" would become "0ABC4567", and "01231237" would become "0123ABC7".

Configuration: Host Message Format

Host Message Format

Function 6 on the **Select Operation** menu accesses the **Host Message Format** configuration screen. Use this function to configure the message format of bar code data sent to the host. The screen displays with the first field highlighted.

```
          START CHARACTER: None    255
      SOURCE IDENTIFIER for (AUX):       (A):       (B):
            HEADER STRING:
          FIELD DELIMITER: None    255   NUMBER OF FIELDS IN MESSAGE: ALL
           SEND SYMBOLOGY: No                      SEND PACKAGE COUNT: No
     SEND BAR CODE STRINGS: Yes              SEND DECODER PERFORMANCE: No
                                                         END MESSAGE: CrLf
         DEFAULT NO-READ STRING:
FIELD                                  FIELD
NUMBER  NO-READ REPLACEMENT STRING     NUMBER  NO-READ REPLACEMENT STRING
  1                                      9
  2                                     10
  3                                     11
  4                                     12
  5                                     13
  6                                     14
  7                                     15
  8                                     16

-----------------------------------------------------------------------------
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
-----------------------------------------------------------------------------
```

The default settings are displayed the first time you access this screen. Make changes appropriate for your application. If the factory defaults are satisfactory, you can exit the configuration software by pressing [Esc] twice, or move on to the **Host Communication**s configuration screen by pressing [Esc][Return]

The parameters are grouped by function on the screen. The following pages describe each group of parameters.

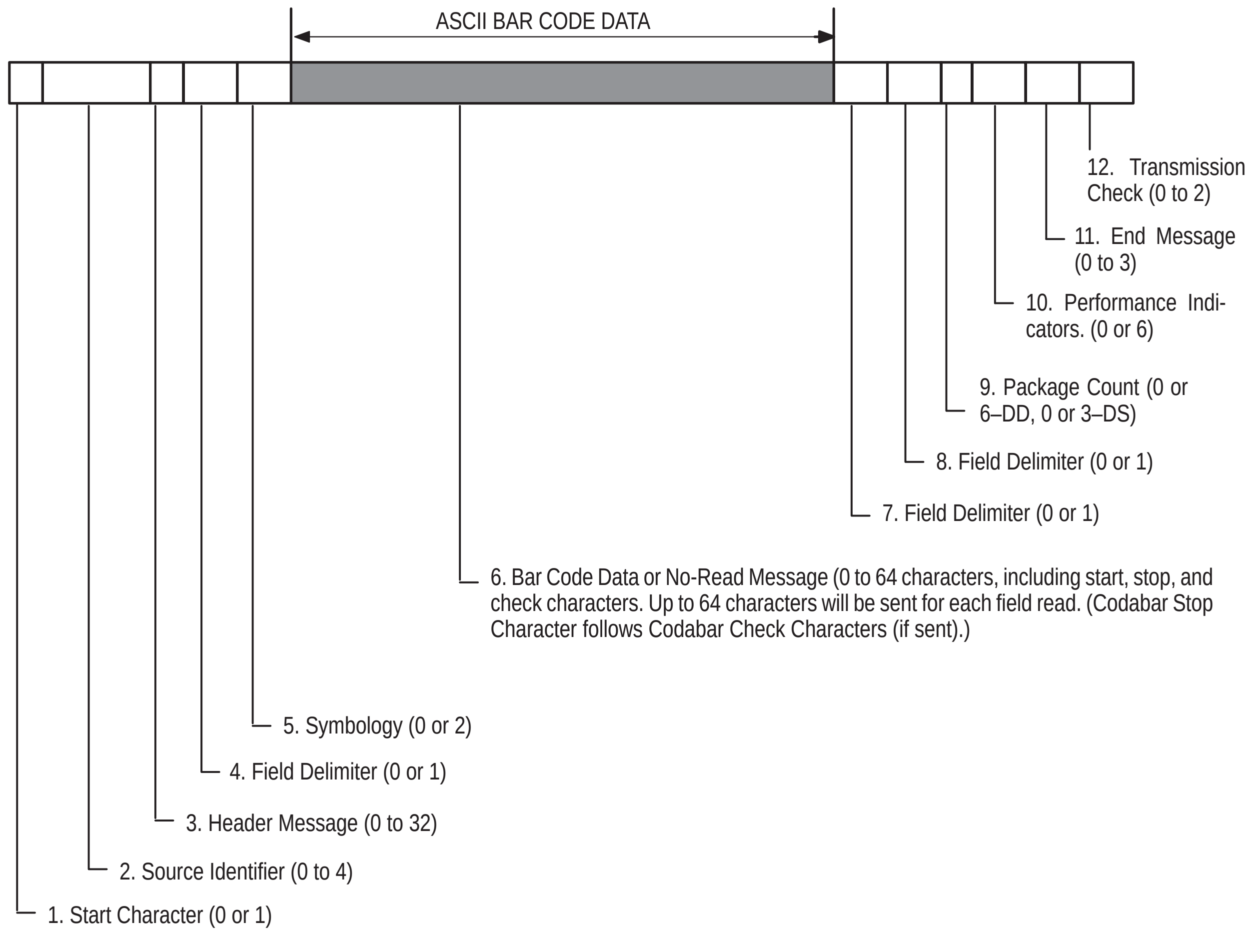
Introduction to Host Message Format

Bar code data is sent to the host at the end of a trigger or after a valid package (see *Send Message to Host*). The data is sent to the host as an ASCII string. The figure below shows the structure of the string. For each field in the string, the figure shows:

- the type of data in each field
- length of the field (in parentheses)

Some of the fields are controlled by the bar code itself. However, most of the fields are controlled by the host message configuration parameters. In addition, many of these same functions can be performed using the Host Replacement Rules described earlier in this manual.

Bar Code Host Message Format



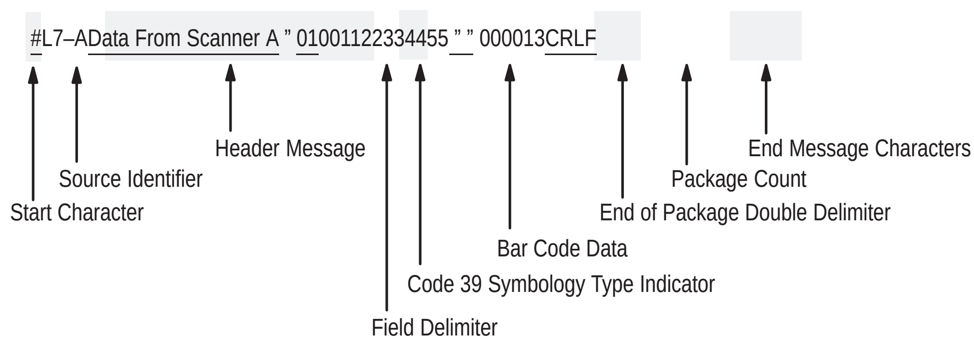
In messages containing multiple bar code data strings, each string will be separated by a single field delimiter. A double delimiter follows the final string.

Below are some sample host messages to help you configure your decoder. The examples show data transmitted by the decoder. The configuration parameters for the message were set up as follows:

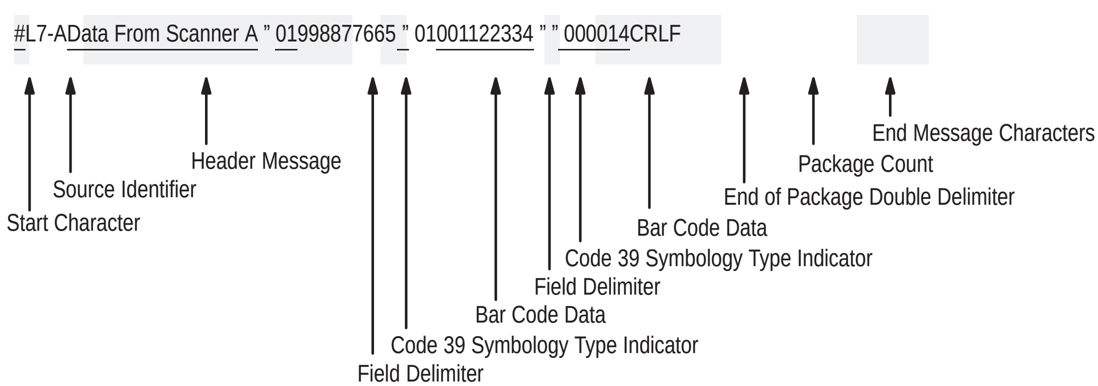
```
        START CHARACTER: 35      "#"
   SOURCE IDENTIFIER for (AUX):       (A):L7-A   (B):
          HEADER STRING: Data From Scanner A
        FIELD DELIMITER: 34      """   NUMBER OF FIELDS IN MESSAGE: ALL
         SEND SYMBOLOGY: Yes                 SEND PACKAGE COUNT: Yes
  SEND BAR CODE STRINGS: Yes            SEND DECODER PERFORMANCE: No
                                                    END MESSAGE: CrLf
       DEFAULT NO-READ STRING: No-Read
FIELD                                  FIELD
NUMBER  NO-READ REPLACEMENT STRING     NUMBER  NO-READ REPLACEMENT STRING
  1                                       9
  2                                      10
  3                                      11
  4                                      12
  5                                      13
  6                                      14
  7                                      15
  8                                      16

_________________________________________________________________________
        EDIT --  Cancel:ESC  Enter:RETURN  Erase Char:BACKSPACE
_________________________________________________________________________
```

Note: A double delimiter (two quotation marks in this example) indicate the end of bar code data.

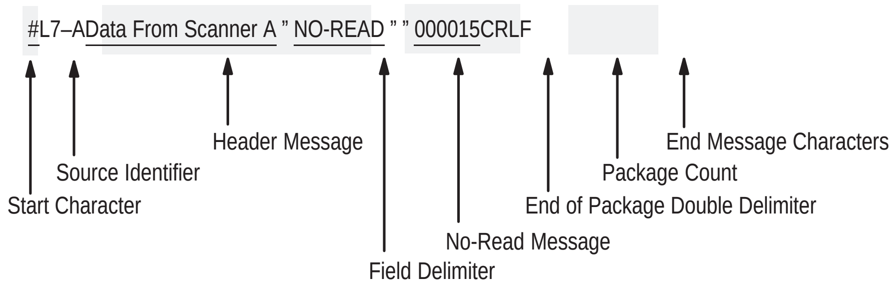
Example 1: If one Code 39 label is decoded, the decoder transmits:



Example 2: If two Code 39 labels are scanned on a single package, the decoder transmits:



Example 3: If a No-Read occurs, the decoder transmits:



Note: Message packages can consist of both bar code strings and no-read strings.

Host Message Parameters

The parameters listed below include those used to control the message format of bar code data that is sent to the host. Each parameter is defined below. The options for each parameter are summarized in a table, and explained more fully in the text. Where appropriate, the default setting for each parameter is displayed in bold letters in the table.

Start Character

Field Type	Options
Edit Numeric	ASCII Numeric (1 – 255) **255 = None**

Defines the three digit decimal ASCII starting character for every bar code message sent to the host. The default is *None or 255*, which indicates no start character.

Source Identifier for AUX, A, and B

Field Type	Options
Edit Text	Any ASCII Character String (4 chars max) **Blank**

Defines a 1 to 4 character identifier to include in each message sent to the host. The string identifies the source device for the data contained in the message. The default for each field is *Blank*, which means a source identifier is not defined. Example source identifiers are SCNA, SCNB, and AUX.

The source identifier may be unique for Scanner A, Scanner B and the AUX terminal to identify the data source.

Header Message

Field Type	Options
Edit Text	Any ASCII Character String (32 chars max) **Blank**

Defines a 1 to 32 character header message to include in each message sent to the host. The default is *Blank*, which means a header message is not defined. An example header message is BAR CODE DATA.

Field Delimiter

Field Type	Options
Edit Numeric	ASCII Numeric (1 – 255) **255 = None**

Defines the three digit decimal ASCII character that will indicate the beginning and end of bar code label data. If multiple symbols are being read, the delimiter also separates each field in the message. A double delimiter (two consecutive occurrences of a delimiter character) indicates the end of a package.

The default is *None or 255*, which means no delimiter is defined. When choosing a delimiter, be careful to select a character that will not appear in the bar code data.

Number of Fields in Message

Field Type	Options
Edit Numeric	1 through 16 **0 = All**

Determines the number of bar code symbols to include in each message. The default *All* sets the value to equal the number of symbols per package. The values 1 through 16 will set this value to a specific number of fields. (See Symbols Per Package, Chapter 7, and Host Replacement Rules: Host Message Field Number, Chapter 10, for more information.)

Send Symbology

Field Type	Options
Select	Yes **No**

Controls whether the symbology type of the bar code is included in the message sent to the host. The default is *No*, which means the symbology type is not sent to the host.

If you select *Yes*, the symbology type is transmitted as a two digit code:

00	**Keyboard Data from AUX Terminal**
01	**Code 39**
02	**Interleaved 2-of-5**
03	**Codabar**
04	**UPC-A**
05	**UPC-E**
06	**EAN-8**
07	**EAN-13**
08	**Code 128**
09	**Pharma-Code**

Send Package Count

Field Type	Options
Select	Yes **No**

Controls whether the package count is included in the message sent to the host. The default is *No*, the package count is not sent to the host.

The six digit package count is maintained by the package counter. Counter data can also be sent to the host when requested by a host command as described elsewhere in this manual.

Send Bar Code Strings

Field Type	Options
Select	**Yes** No

Controls whether bar code data is sent to the host. The default of *Yes* sends bar code data to the host.

Send Decoder Performance

Field Type	Options
Select	Yes **No**

Controls whether the performance indicators for Scanners A and B are included in the message sent to the host. The default is *No*, the performance indicators are not sent to the host.

The performance indicator is a three digit value for DS units, and a six digit value for DD units. The first three digits apply to Scanner A, and the last three digits apply to Scanner B.

End Message

Field Type	Options
Select	None **CRLF** CR LF ETX CRETX LFETX CRLFETX

Defines an ASCII control code to terminate or end each message sent to the host. The default is *CRLF,* which terminates each message with a carriage return and line feed.

Default No-Read Message

Field Type	Options
Edit Text	Any ASCII Character String (32 chars max) **Blank**

Defines a 1 to 32 character no-read message to include in each message sent to the host when a no-read occurs and a specific no-read message has not been defined for that field (see below). The default is *Blank,* which means a default no-read message string is not defined. An example no-read message is NO-READ.

No-Read Replacement Strings

Field Type	Options
Edit Text	Any ASCII Character String (32 chars max) **Blank**

If the rules are active (See Chapter 10), defines a 1 to 32 character string to include in the message sent to the host. These strings are sent when a no-read or a specific host replacement rule is not satisfied for a specific field (1 through 16). The default is *Blank*, which means a no-read replacement string is not defined for that field. If a no-read does occur, or a replacement rule fails, the default no-read message (if one is defined) will be sent.

Configuration: Host Communications

Host Communications

Function 7 on the **Select Operation** menu accesses the **Host Communications** menu screen from which you can control communications for the HOST port of the decoder. The screen displays with the first field highlighted.

The default settings are displayed the first time you access this screen. Make changes appropriate for your application. If the factory defaults are satisfactory, you can exit the configuration software by pressing [Esc] twice, or move on to the **AUX Terminal Data Entry** configuration screen by pressing [Esc][Return]

```
---------HOST COMMUNICATIONS--------
         BAUD RATE*: 9600
         BITS/CHAR*: 8 Data 1 Stop
            PARITY*: None
     HOST PROTOCOL*: RS232
    DEVICE ADDRESS*: 1
          ACK CHAR*: None    255
          NAK CHAR*: None    255

 *Save and Restart required for these parameters to take effect.

                     SCANNER A    SCANNER B
    START SCAN CHAR: None    255  None    255
     STOP SCAN CHAR: None    255  None    255

       LARGE BUFFER: No
  SEND HOST MESSAGE: At End of Trigger
 TRANSMISSION CHECK: None

------------------------------------------------------------------------------
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
------------------------------------------------------------------------------
```

Host communication parameters (Baud Rate, Bits/Char, Parity, Host Protocol, Device Address, ACK/NAK Char) do not take effect until you SAVE them and restart the decoder.

Each parameter is defined below along with its field type and possible values. The default value is shown in the table in bold letters.

Baud Rate

Field Type	Options
Select	**9600** 4800 2400 1200 300 19200 38400

Selects the baud rate (data transmission speed) for the HOST port. The default is *9600* the first time the decoder is started. From then on, operation is determined at restart by the contents of storage memory.

Bits/Char

Field Type	Options
Select	**8 Data 1 Stop** 8 Data 2 Stop 7 Data 1 Stop 7 Data 2 Stop

Selects the number of data and stop bits transmitted with each character via the HOST port. The default is *8 Data Bits, 1 Stop Bit* the first time the decoder is started. From then on, operation is determined at restart by the contents of storage memory.[①]

Parity

Field Type	Options
Select	**None** Even Odd

Selects the parity bit for each character transmitted or received at the HOST port. The default is *None* the first time the decoder is started. From then on, operation is determined at restart by the contents of storage memory.

① The contents of storage memory can be reviewed by performing a Recall. Parameters are saved to s memory with the Save command.

Host Protocol

Field Type	Options
Select	**RS232** RS232 XON/XOFF RS232 CTS/RTS – 1 RS232 CTS/RTS – 2 RS422 RS422 XON/XOFF DH485 PCCC – 1 DH485 PCCC – 2 DH485 ASCII – 1 DH485 ASCII – 2

Selects a communication interface and protocol for the HOST port. The default is *RS-232* (with no flow control*)* the first time the decoder is started. From then on, operation is determined at restart by the contents of storage memory.

Other options include:

- RS232 XON/XOFF uses XON/XOFF flow control
- RS232 CTS/RTS-1 uses half duplex RTS, CTS and DTR modem control lines to control the flow of data from the decoder to the host.
- RS232 CTS/RTS-2 uses RTS, CTS and DTR modem control lines for bidirectional (full duplex) flow control between the decoder and the 2760-RA/RB module (when the module has modem control enabled).
- RS422 (no flow control) uses no flow control.
- RS422 XON/XOFF uses XON/XOFF flow control.
- DH485 PCCC-1 uses PCCC commands with write replies.
- DH485 PCCC-2 uses PCCC commands without write replies.
- DH485 ASCII-1 uses ASCII commands with responses.
- DH485 ASCII-2 uses ASCII commands without responses.

Device Address

Field Type	Options
Edit Numeric	00 through 31 **01**

Specifies the node address of the decoder if operating as a node on an RS-485 network. Each node on the network **must** have a unique node address from 00 to 31. The default device address for the decoder is *01* the first time the decoder is started. From then on, operation is determined at restart by the contents of storage memory.

ACK Character

Field Type	Options
Edit ASCII	0 through 255 **255 = None**

Defines an Acknowledge (ACK) character for ACK/NAK protocol. The first time the decoder is started, the default is *None*, which means an ACK character is not defined. From then on, the default is determined at restart by the contents of storage memory.[1]

The ACK character is sent by the host to acknowledge receipt of a message. The decoder holds the last transmitted message until an ACK is returned to the decoder. Any command the decoder receives from the host is also interpreted as an ACK character.

You must define ACK **and** NAK characters to enable ACK/NAK protocol with the host. **ACK/NAK protocol only applies to bar code data sent *to* the host. It is typically used with the transmission check to provide error detection. You can also use ACK/NAK protocol to provide flow control.**

NAK Character

Field Type	Options
Edit ASCII	0 through 255 **255 = None**

Defines a Negative Acknowledge (NAK) character for ACK/NAK protocol. The first time the decoder is started, the default is *None*, which means a NAK character is not defined. From then on, the default is determined at restart by the contents of storage memory.[1]

The NAK character is sent by the host when a message is not received properly and prompts the decoder to retransmit the last message up to three times.

[1] If any of the characters below are used as single character commands (*ACK/NAK* or *Start/ Characters*), then the escape sequence (ESC=!) must be used with all two character comm start with that character.

A B C D H I M N O P R S T

If the single character commands do not use these uppercase characters, you do not have t start command sequence. For example, if N is used as the NAK command, then it would b impossible to send the NR command without preceding it with the ESC=! start command s If n is used instead, then no start command sequence would be necessary to send an NR cc **Therefore, we recommend using only lowercase letters for single character command**

Refer to Chapter 15 for additional information.

You must define ACK **and** NAK characters to enable ACK/NAK protocol with the host. **ACK/NAK protocol only applies to bar code data sent *to* the host. It is typically used with the transmission check to provide error detection. You can also use ACK/NAK protocol to provide flow control.**

Start Scan Character

Field Type	Options
Edit ASCII	0 through 255 **255 = None**

This parameter is used with the stop scan character and only applies when the *Decode Mode* is set to *Host*.

Defines the character that tells the scanner(s) to start scanning. There is a field for both Scanner A and, if present, Scanner B. The default is *None*, which means a start scan character is not defined.①

Stop Scan Character

Field Type	Options
Edit ASCII	0 through 255 **255 = None**

This parameter is used with the start scan character and only applies when the *Decode Mode* is set to *Host*.

Defines the character that tells the scanner(s) to stop scanning. There is a field for both Scanner A and, if present, Scanner B. The default is *None*, which means a stop scan character is not defined.①

① If any of the characters below are used as single character commands (*ACK/NAK* or *Start/ Characters*), then the escape sequence (ESC=!) must be used with all two character comm start with that character.

A B C DH IM NO PR ST

If the single character commands do not use these uppercase characters, you do not have t start command sequence. For example, if N is used as the NAK command, then it would b impossible to send the NR command without preceding it with the ESC=! start command s If n is used instead, then no start command sequence would be necessary to send an NR c **Therefore, we recommend using only lowercase letters for single character command**

Refer to Chapter 15 for additional information.

Large Buffer

Field Type	Options
Select	Yes **No**

Enables or disables use of the 8K byte buffer on the HOST port. The default is *No*, which disables use of this buffer.

The 8K byte buffer allows the decoder to decode and buffer messages to the host. This feature is useful for applications where the host is incapable of handling high burst rates of data from the decoder. If *No* is selected, the decoder will only buffer one message.

ATTENTION: Do not use the large buffer if the data sent to the host must be coordinated with the output modules, because the buffering may delay receipt of the data by the host.

Send Message to Host

Field Type	Options
Select	**At End of Trigger** Immediately After Valid Package

Specifies when the decoder sends data to the host or activates an output module. The default is *At End of Trigger.*

The end of trigger condition is determined by the decode mode. The end of trigger conditions for the triggered decode modes are:

Timing	Host	Package Detect	Internal Timer
End of Trigger (send message to host at end of trigger)	Stop scan character	Detect signal goes inactive	
	No-read timer expires	No-read timer expires	No-read timer expires
Immediately After Valid Package	Symbols/package count met	Symbols/package count met	Symbols/package count met

The response mode for the continuous and continuous/unique decode modes is always *Immediately After Valid Package*. The decoder sends data and activates the outputs immediately after a valid package (symbols/package count is met) or a no-read, whichever comes first. Use this mode for maximum speed.

Transmission Check

Field Type	Options
Select	**None** LRC Checksum – LSB Checksum – MSB

Specifies the type of transmission check that is generated at the end of a message sent to the host. The default is *None*, which means no transmission check is generated.

The decoder can generate three types of transmission checks:

1. **LRC (Longitudinal Redundancy Check). A** byte developed by an exclusive OR of all bytes in a message.
2. **Checksum–MSB.** Sixteen bit sum of all the bytes in a message with the most significant byte transmitted first.
3. **Checksum–LSB.** Sixteen bit sum of all the bytes in a message with the least significant byte transmitted first.

Appendix C provides an example of a transmission check.

Do not use XON/XOFF flow control with transmission check. The transmission check bytes could be interpreted as an XOFF character.

Configuration: AUX Terminal Data Entry

Chapter Objectives

The terminal connected to the AUX port can be used for either configuration or manual data entry and display operations. We refer to this terminal as the AUX terminal. This chapter describes how to configure and use the AUX terminal for manual data entry and display operations. Topics include:

- supported terminals for manual data entry
- configuration for AUX terminal data entry
- how to enable manual data entry mode
- how to display bar code data, decoder performance and counter values
- how to display host messages
- how to perform manual data entry at the keyboard

Supported Terminals

Any terminal that supports the following features can be used for manual data entry or display operations at the AUX port:

- Carriage Return and Line Feed
- 9600 Baud Rate
- 8 Data Bits
- 1 Stop Bit
- Parity None
- XON/XOFF Flow Control

Specific terminal types for data entry and display include:

- Allen-Bradley Industrial Terminal (Catalog No. 1771-T1, -T2, -T3)
- Allen-Bradley laptop computers (Catalog No. 1784-T45, –47, –48)
- Allen-Bradley 2708-DH5 Series of Attended Workstations
- DEC VT100
- Lear Siegler ADM 3E

Appendix D provides details on how to connect and setup the terminals listed above. To set the above communication parameters for other types of terminals, refer to your terminal's User Manual.

AUX Terminal Configuration

Function 8 on the **Select Operation** screen accesses the **AUX Terminal Data Entry** screen. Use this screen to configure the AUX terminal for manual data entry operations. These parameters are used by the terminal when the AUX port is set to manual data entry (not configuration) mode.

Note: Manual data entry and configuration modes are mutually exclusive.

Each manual data entry parameter is defined below along with the field type and possible values. The default value is shown in the tables in bold letters.

```
          -----AUX TERMINAL DATA ENTRY-----
          ENABLE KEYBOARD ENTRY: No
                  CONFIRM ENTRY: No
                AUX DATA FORMAT: Unformatted
                   RUBOUT CHAR: 8    BS
              ECHO TO TERMINAL: No
                SIZE OF DISPLAY: 80

         DEFAULT PROMPT MESSAGE:

 ______________________________________________________________
     Commands:ESC    Change:SPACE    Cursor Control:ARROWS
 ______________________________________________________________
```

Enable Keyboard Entry

Field Type	Options
Select	**No** Yes No-Read

Enables or disables use of the terminal keyboard when the AUX port is set to manual data entry mode. The default is *No*, which disables keyboard data entry.

No Disables the keyboard locally. However, the host can remotely enable the keyboard for one message using the *Display Text Message* command as explained later in this chapter.

Yes Enables the keyboard for data entry. Selecting *Yes* enables you to manually enter data at the keyboard. When entry is enabled, pressing [ESC] will cancel the current entry.

Data entered at the keyboard is sent to the host with the *AUX Port Source Identifier* (if defined) and formatted according to the *Aux Data Format* parameter. The data is either formatted like the host message or is unformatted.

No-Read Enables the keyboard for data entry when a no-read occurs for a package. Selecting *No-Read* allows you to manually enter a single string at the keyboard.

If a no-read occurs, the *Default Prompt Message* displays (if defined) prompting you to act. You can also use the *Display Text Message* host command at any time to manually prompt for data.

Data is sent to the host with the *AUX Port Source Identifier* (if defined) and formatted according to the *Aux Data Format* parameter.

Note: For safety considerations, data entered at the keyboard cannot be used to control the discrete I/O.

Confirm Entry

Field Type	Options
Select	**No** Yes

Specifies whether you are required to confirm a keyboard entry by typing the data a second time. The default is *No*, confirmation is not required.

Select *Yes* to require that data entered at the keyboard be entered a second time. Data must be entered twice consecutively in exactly the same way before it is sent to the host.

Entering the data twice helps ensure data integrity. Errors are more likely to occur with data that is manually entered than scanned, but it is unlikely that one will make identical typing errors in succession. Simply press [ENTER] twice in succession to send no message (with the end message character).

AUX Data Format

Field Type	Options
Select	**Unformatted** Host Format

Controls the format of data sent to the host from the keyboard. The default is *Unformatted*; the data, with the *AUX Source ID* prefix (if defined), is sent in the same form it was entered.

Select *Host Format* to send the data in the host message format set by the parameters on the **Host Message Format** configuration screen. The host format packages the manually entered data as if it were scanned. The source identifier for the AUX terminal (if defined) will distinguish manually entered data from scanned data. If *Send Symbology* is enabled, “00” will be sent for data entered at the AUX terminal. (Also see Host Message Replacement Rules, Chapter 10.)

Rubout Character

Field Type	Options
Edit ASCII	0 through 255 **008 BS**

Defines the terminal character that allows you to delete the previous character during keyboard data entry. The default is *backspace* (decimal ASCII 008). To define a different rubout character, enter a numeric value between 0 and 255.

Echo To Terminal

Field Type	Options
Select	**No** Yes

Controls whether data entered at the keyboard is displayed (echoed) on the terminal display. The default is *No*, keyboard data is not echoed.

If the terminal itself is set to echo data, select *No* to prevent the terminal from displaying duplicate characters; otherwise, select *Yes*.

Size of Display

Field Type	Options
Edit Numeric	10 through 80 **80**

Defines the maximum number of characters that can display on one line of the terminal display. The default is *80*, which means up to 80 characters can display on one line. The typical display size is 80. To specify another display size, enter a value between 10 and 80.

Default Prompt Message

Field Type	Options
Edit Text	ASCII Text to 20 Characters Max **Blank**

Defines a 1 to 20 character message that displays on the terminal prompting you to enter keyboard data or take some other action. The message always starts at position 1 on the display. The default is *Blank*, which means a prompt message is not defined.

This message is displayed when *Enable Keyboard Entry* is set to *No-Read* and a no-read occurs. It is also displayed when *Enable Keyboard Entry* is set to *No* and the host remotely enables the keyboard for one message using the *Display Text Message* command. If this command is sent with a zero length string (no message), the *Default Prompt Message* is displayed.

Switching to Manual Data Entry Mode

The AUX terminal port is set for configuration operations at the factory. To enable the AUX terminal for manual data entry (instead of configuration), use one of the AUX Terminal Selectors.

The AUX Terminal Selectors allow you to switch between configuration and manual data entry operations using one of two methods:

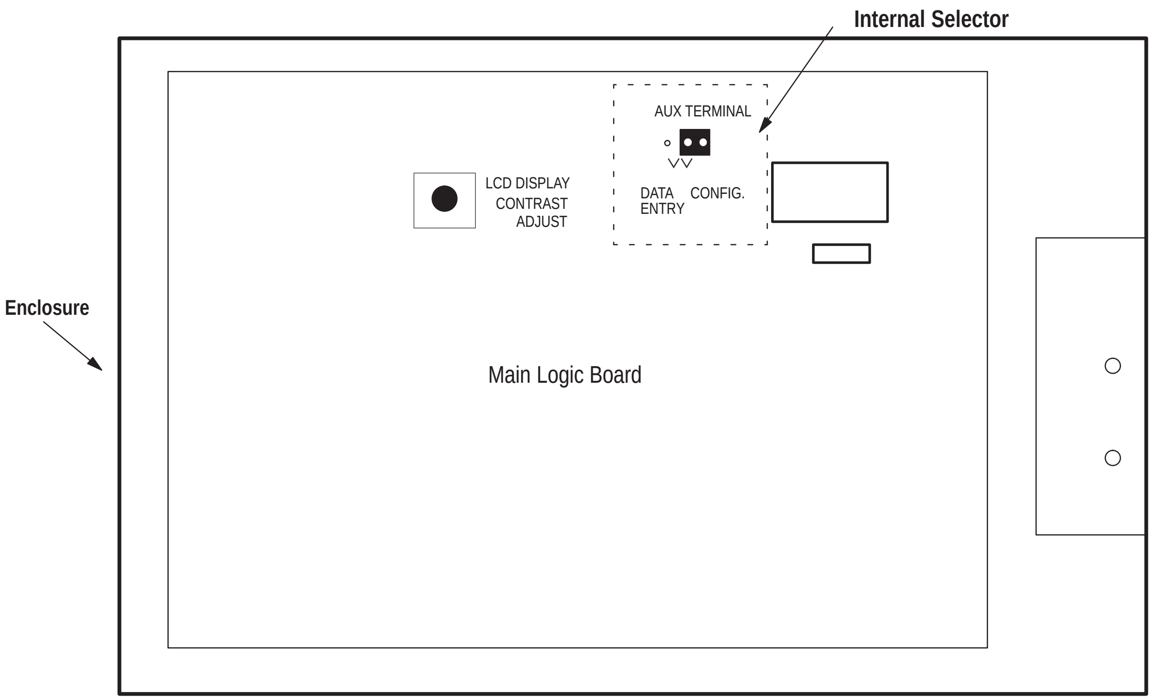
- Internal Selector (jumper on main logic board)
- External Selector (pin connections on AUX port connector)

Note: Manual data entry and configuration modes are mutually exclusive.

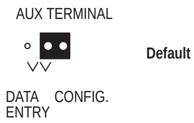
Internal Selector

The Internal Selector is a jumper on the main logic board, labelled AUX Terminal. The figure below shows the location of this jumper on the board.

Internal Selector (AUX Terminal Jumper)

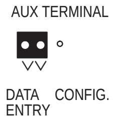


The jumper has two positions, which determine the mode of operation that is enabled for the AUX port terminal.



CONFIG (Jumper Right)

With the jumper positioned as shown on the upper left, you can use the AUX terminal for configuration only. Configuration menus and screens are enabled. This is the factory default setting.



DATA ENTRY (Jumper Left)

With the jumper positioned as shown on the lower left, you can use the AUX terminal for manual data entry and display functions only. Configuration menus and screens are disabled.

External Selector

The other way to switch from configuration to manual data entry mode is to connect pins 15 and 16 (NEMA Type 1) or G and H (NEMA Type 4) in the AUX port connector. See Chapter 4 for a description of the AUX port connector pins.

Note: If either the external selector or the the internal selector is set to data entry, the decoder will be in manual data entry mode, and will not display the Configuration screens.

Data Entry and Display Operations

After switching to manual data entry mode, you can:

- Display bar code data, decoder performance indicators, counter data, and host messages on the AUX terminal.
- Enter data at the AUX terminal keyboard.

Both of these operations are controlled by parameters on the **AUX and LCD Display Format** and **AUX Terminal Data Entry** configuration screens. The parameters defining display parameters are discussed in Chapter 9.

The sections that follow show how these parameters directly affect the display of data on the AUX terminal, and control the type of data entry operations that are allowed at the AUX terminal.

Displaying Data at the AUX Terminal

This section shows how to configure the AUX terminal for display operations. You can configure the AUX terminal to display:

- Bar code data
- Decoder performance indicators
- Counter data
- Host messages

The parameters on the **AUX and LCD Display Format** configuration screen determine what data is displayed, where the data is displayed, and on which device. Detailed definitions of these parameters appear in Chapter 9.

```
                   ---------AUX and LCD DISPLAY FORMAT-----
                                 DISPLAY DATA: None
                               MESSAGE FORMAT: Unformatted
                                   SCROLL LCD: No
                 POSITION
                     0 BAR CODE STRINGS
                     0 DECODER PERFORMANCE
                     0 PACKAGE COUNTER
                     0 SYMBOLS NOT READ COUNTER

                    ---PRIMARY COUNTERS---
                     0 1) None
                     0 2) None
                     0 3) None
                     0 4) None
                     0 5) None
                     0 6) None
                     0 7) None
                     0 8) None

 ______________________________________________________________________________
       Commands:ESC    Change:SPACE    Cursor Control:ARROWS
 ______________________________________________________________________________
```

Displaying Host Messages

The AUX terminal can display text messages that are sent from the host using the *Display Text Message* command. Typically, this command is used during manual data entry to prompt the user to enter bar code data or take some other action. The last section in this chapter describes manual data entry operations.

To accommodate the many variations in display terminals, messages sent from the host always display in position 1.

If the host sends the *Display Text Message* command to the decoder with a text string length set to zero, the decoder will display the *Default Prompt Message* instead (if defined). The text string from the host and the default prompt message are always preceded by a carriage return and line feed, and display at the beginning of the line in position 1.

The following parameter defines the *Default Prompt Message*:

```
DEFAULT PROMPT MESSAGE:
```

Defines 1 to 20 character prompt message. Initially, the default prompt message is undefined.

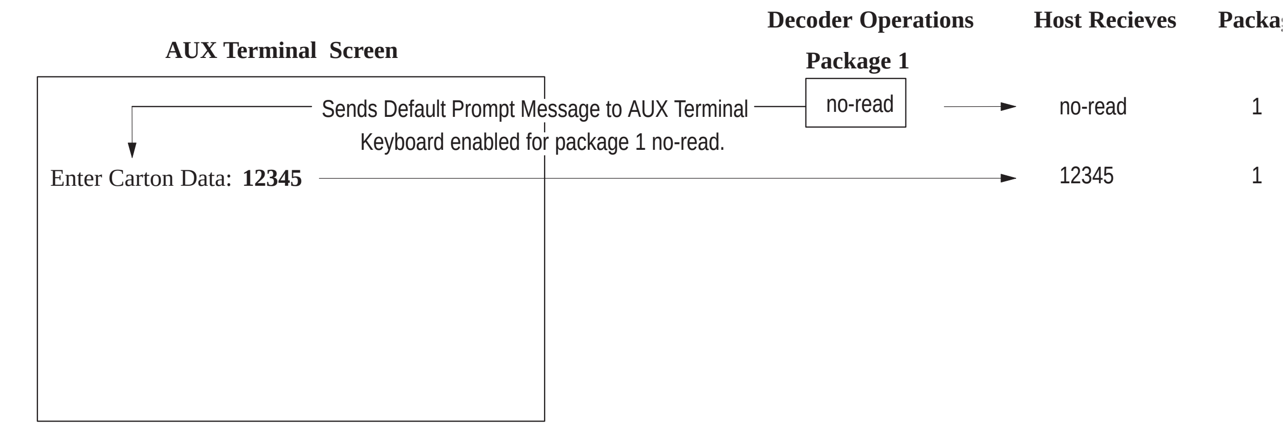
The amount of data to be displayed is restricted by the size of the terminal display. For example, most terminals support an 80 character display. Formatted data (other than host messages) that exceeds the size of the display is truncated. Text messages from the host that are longer than the size of the display will truncate.

Processing No-Reads

This section includes some examples to illustrate how the decoder handles subsequent packages while waiting for you to respond to a no-read. All examples assume that manual data entry is enabled only for no-reads and the *Default Prompt Message* is defined as ”Enter Carton Data:”.

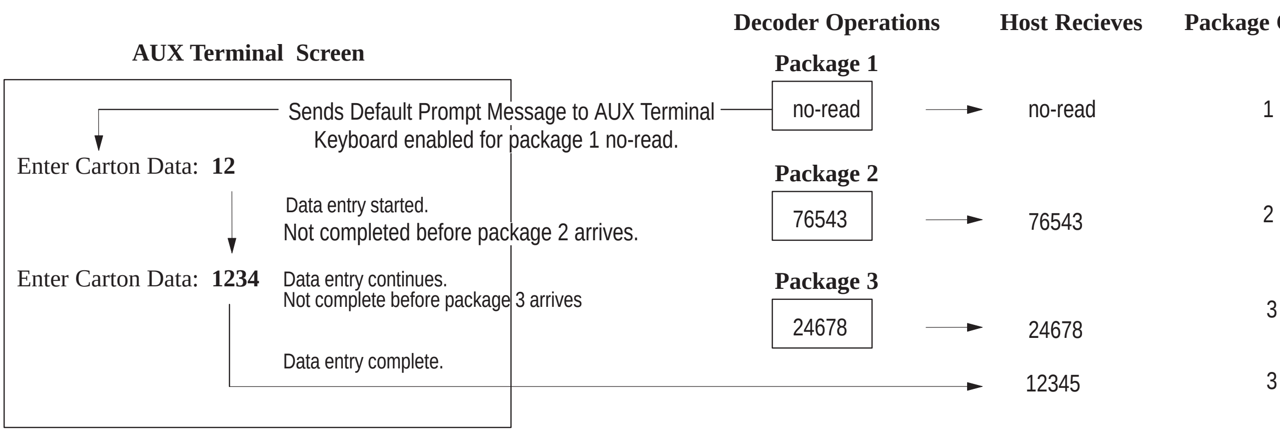
Example 1: What happens if you respond to a no-read before the next package arrives?

If you complete the data entry process for a no-read before the next package arrives, the package count of the manually entered data (which is sent to the host if the data is host formatted) will be the same as the no-read package.

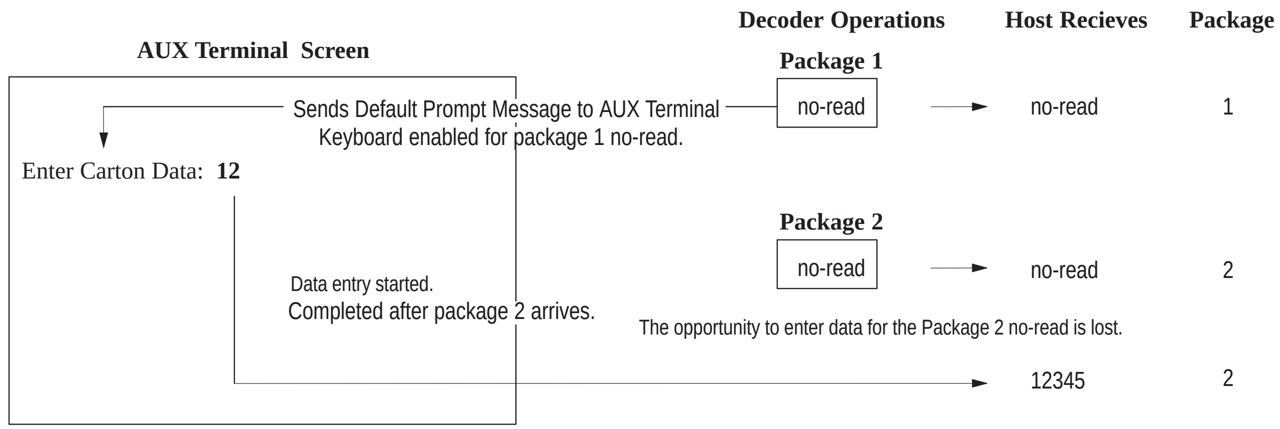


Example 2: **What happens if you have not completed entering the data at the keyboard and the next package arrives?**

If the next package is a valid read, it will be sent to the discretes I/O and the host. The package count will increment. This will continue with each subsequent *valid read*. When the manual data entry is complete, it will be sent to the host with the package count of the last package read.



If the next package (or any of the packages processed before the manual data entry is completed) is a no-read, the decoder will send only a single message. The opportunity for entering data for additional no-reads that occurred during manual data entry will be lost. In other words, if you can enter data manually more quickly than no-reads occur, then you will lose no data. If two no-reads occur before you have completed entering data for the first, then you will have no opportunity to enter data for the second no-read in the sequence.



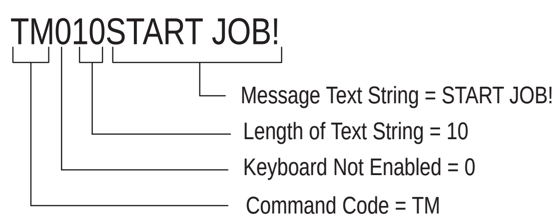
Important: To process a no-read and guarantee that the package count of the manually entered data corresponds to the scanned data, prevent future triggers from occurring. You can configure a discrete output for the no-read condition or a host message containing ”no-read” to prevent subsequent packages from being processed.

Using ASCII and PCCC Commands

ASCII Commands

The *Display Text Message* (TM) command allows you to send a message to the AUX terminal and optionally enable the AUX terminal keyboard for
one entry.

The following TM command sends the message ”START JOB!” but does not enable the keyboard.



When the host sends this command to the decoder, the text string displays on the AUX terminal at the beginning of the line in position 01.

START JOB!

Messages that are longer than the size of the AUX terminal display truncate.

If the TM command is sent with a string length of zero (no message defined), the decoder displays the *Default Prompt Message* instead.

The following TM command sends the message ”ENTER DATA:” to the AUX Terminal and enables the keyboard for **one** entry.

TM111ENTER DATA:

Message Text String = ENTER DATA:
Length of Text String = 11
1 = Enables Keyboard for Data Entry
Command Code = TM

When the host sends this command to the decoder, the following text string displays on the AUX terminal prompting you to enter data. The message displays at the beginning of the line in position 01.

ENTER DATA:

If the TM command is sent without a message defined, the decoder displays the *Default Prompt Message* instead.

Messages that are longer than the size of the AUX terminal display truncate.

When receiving the host or default prompt message, the keyboard is enabled for **one** entry. Type the data and press [Enter].

ENTER DATA: **123456** **[Enter]**

After pressing [Enter], the keyboard is immediately disabled until receiving the next host command. To cancel the data entry operation without entering data, press [Esc].

Format of Manually Entered Data

After entering data, the decoder sends it to the host. The format in which the data is sent is controlled by the *AUX Data Format* parameter, which is described earlier in this chapter.

PCCC Commands

You can also send a PCCC command to the decoder to display a message at the AUX terminal and optionally enable the AUX terminal keyboard.

The following PCCC command sends the message ”START JOB!” to the AUX terminal. The command address 900H sends a message for display, but does not enable the keyboard. Bytes 6 – 15 in the example below define the characters of the message

Display Message at AUX Terminal (900H)

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 08H	**0**
3	TNS		**2**
5	Command Address = 900H		**4**
7	”T”	”S”	**6**
9	”R”	”A”	**8**
11	” ”	”T”	**10**
13	”O”	”J”	**12**
15	”!”	”B”	**14**

Messages that are longer than the size of the AUX terminal display will truncate.

When the host sends this command to the decoder, the message displays on the AUX terminal at the beginning of the line in position 01.

START JOB!

If the PCCC (900H) command is sent with a string length of zero (no message defined), the decoder displays the *Default Prompt Message* instead.

The following PCCC command sends the message ”ENTER CARTON DATA:” to the AUX terminal and enables the keyboard for data entry. The command address 901H distinguishes this command function from the 900H command. Bytes 6 – 23 define the characters of the message.

Display Message on AUX Terminal/
Enable Aux Terminal for Keyboard Entry (901H)

	MSB High Byte	Low Byte LSB	
1	STS= 00H	CMD= 08H	0
3	TNS		2
5	Command Address = 901H		4
7	”N”	”E”	6
9	”E”	”T”	8
11	” ”	”R”	10
13	”A”	”C”	12
15	”T”	”R”	14
17	”N”	”O”	16
19	”D”	” ”	18
21	”T”	”A”	20
23	”:”	”A”	22

Messages that are longer than the size of the AUX terminal display will truncate.

When the host sends the command to the decoder, the text string displays on the AUX terminal prompting you to enter data. The message always displays at the beginning of the line in position 01.

ENTER CARTON DATA:

If the command is sent with a string length of zero (no message defined), the decoder displays the *Default Prompt Message*. When receiving the host or default prompt message, the keyboard is enabled for **one** entry. Type the data and press [Enter].

ENTER CARTON DATA: **123456** **[Enter]**

After pressing [Enter], the keyboard is disabled until receiving the next host command. To cancel the operation, press [Esc].

Display and System Configuration

Chapter Objectives

This chapter describes how to use the bar code decoder configuration software to:

- Display bar code strings
- Display decoder performance indicators and counters
- Reset status and counters
- Restart the system
- Select a new language option
- Save the current configuration.

Connect and Set Up AUX Terminal

To use the built-in configuration menus and screens, you must first connect a terminal to the RS-232 AUX port of the decoder.

Appendix D provides details on how to connect and setup each terminal. The AUX port communication parameters are:

- 8 Data Bits
- 1 Stop Bit
- 9600 Baud Rate
- Parity None
- XON/XOFF Flow Control

Refer to Chapter 5 for information on getting started with the AUX communication software.

Display Bar Code Strings

The **Display Bar Code Strings** function on the **Select Operation** menu allows you to monitor bar code labels as they are decoded.

```
2755-DD1P/DD4P                               Bar Code Decoder
                  Copyright 1992 Allen-Bradley Company, Inc.

CONFIGURATION
  1) Symbology
  2) Scanner Control, Primary Match Table, Discrete I/O
  3) Extended Match Table and Counters
  4) Aux and LCD Display Format
  5) Host Message Replacement Rules
  6) Host Message Format
  7) Host Communications
  8) Aux Terminal Data Entry

Display                              System
  A) Bar Code Strings                  C) Reset Status and Primary Counters
  B) Status and Primary Counters       D) Reset Extended Match Counters
                                       E) Restart System
                                       F) Select Language
                                       G) Save Configuration

                           Press 1...8, A...G or ESC
```

To select this function, press the “A” or “a” key. The screen will clear and display decoded bar code strings. You might see:

```
19876367 3456721
59874292
45763019
56474821
10945280
45674895 7689577
87599039
35426881
11987454
54664778
87997070
56400982
54664747
09585746
53647747
No-Read
65454565
76845329
43623123
98967587
89654934
34592345
22134232
35647465
65454565
```

The data from each string displays on a separate line. If several symbols are decoded in one scan, the symbols are displayed on a single line, separated by a space.

Each line displays a maximum of 80 characters. If the data consists of more than 80 characters, it continues to the next line until the entire string is displayed.

If the decoder is unable to decode a bar code label, the no-read message (if defined during configuration) is displayed.

The display continuously scrolls upward, displaying new bar code data at the bottom of the screen.

To exit this function and return to the **Select Operation** menu, press [ESC].

Display Status and Primary Counters

The **Display Status and Primary Counters** function on the **Select Operation** menu allows you to monitor system status and counters maintained by the decoder.

To select this function, press the “B” or “b” key. The following screen displays:

```
      2755-DD1P/DD4P                       Bar Code Decoder
                Copyright 1992 Allen-Bradley Company, Inc.

               Decoder Performance :    0 (Scanner A)
               Decoder Performance :    0 (Scanner B)
                  Symbols Not Read :      0
                   Package Counter :      0

                 Primary Counters
                 1)      0 A:B None
                 2)      0 A:B None
                 3)      0 A:B None
                 4)      0 A:B None
                 5)      0 A:B None
                 6)      0 A:B None
                 7)      0 A:B None
                 8)      0 A:B None

    Press 1..8 to Reset Counter, SPACE to Reset All, ESC to Exit
```

The decoder performance indicators and counters are updated on the display once each second. Following is a description of each display item.

Decoder Performance (Scanner A and B)

In continuous mode, the performance indicators display the percent of decoded scans for each scanner.

In triggered mode, the performance indicators display the number of valid scans (up to 100) during a trigger active period for Scanner A and Scanner B.

Note: The decoder performance will never exceed the capture count if *Send Message to Host* is set to Immediately After Valid Package.

Decoder performance indicators are useful during:

- initial setup (when the decoder is in continuous mode) to determine the optimum location of the scanner relative to the bar code labels.

- decoder operation to identify a decrease in performance. For example, if the number of good reads drops significantly, the label quality may have degraded or the scan head window may require cleaning.

Note: If a buffer overflow occurs while collecting data for the sample scans, the value 999 displays until the condition is corrected. This occurs if host communications is suspended.

Symbols Not Read Counter

Displays the number of symbols not read in the triggered mode of operation.

A no-read occurs when the decoder does not decode the correct number of symbols on a package as defined by the *Symbols per Package* parameter.

The counter increments for ***each*** symbol not read in a package.

Package Counter

Displays the number of packages detected by the decoder.

The package counter increments each time a trigger is generated by the package detector, a host command, or the internal timer. It also increments each time a package is read in the continuous or continuous/unique operation modes.

Primary Counters (1-8)

Displays the number of output conditions that occur for each discrete output (1-8).

Each output counter increments when a TRUE condition occurs for that output.

The counters are six digit values that increment up to 999999. When exceeding 999999, the display automatically advances to 000000.

To exit this function and return to the **Select Operation** menu, press [ESC].

Resetting the Counters

You can reset the decoder status and counters to zero from the **Display Status and Counters** screen. You can reset individual counters by pressing a number 1 through 8, and answering [Y] to the confirmation request that appears on the bottom of the screen.

You can reset reset the decoder status and all primary counters to zero by pressing the [Space] bar. Press [Y] to reset the status and counters. Press [N] or [Esc] to cancel the operation. This operation is identical to the **Reset Status and Counters** function on the **Select Operation** menu.

Note: The counters also reset when you restart the system with function **Restart System**.

There is a second way to reset the decoder performance indicators and all counters to zero from the **Select Operation** menu, select the **Reset Status and Primary Counters** function. Press the “C” or “c” key. Press [Y] to reset the decoder performance indicators and counters to zero. Press [N] or [Esc] to cancel the operation. This operation is identical to pressing [Space] on the **Display Status and Counters** screen.

Restart System

The **Restart System** function allows you restart the decoder. This operation reboots the decoder, enables autoload functions, and enables lotting, and activates certain host communications parameters (Refer to Chapter 12).

To restart the decoder, press the “E” or “e” key. Press [N] or [Esc] to cancel the operation and return to the **Select Operation** menu. Press [Y] to restart the decoder.

During a restart, all configuration parameters are reset to the values last saved to storage memory, and the **Select Language** screen is displayed.

Select Language

The **Select Language** function allows you to access the **Select Language** screen. Press the “F” or “f” key from the **Select Operation** menu.

```
SELECT LANGUAGE          CHOIX DU LANGAGE          WAEHLE SPRACHE
  1) English               1) Anglais                1) Englisch
  2) French                2) Francais               2) Franzoesisch
  3) German                3) Allemand               3) Deutsch
  4) Italian               4) Italien                4) Italienisch
  5) Spanish               5) Espagnol               5) Spanisch

Press 1,2,3,4,5 or ESC   Appuyer 1,2,3,4,5 ou ESC   Druecke 1,2,3,4,5 oder ESC



SELEZIONARE LINGUA       SELECCIONAR LENGUA
  1) Inglese               1) Ingles
  2) Francese              2) Frances
  3) Tedesco               3) Aleman
  4) Italiano              4) Italiano
  5) Spagnolo              5) Castellano

Premere 1,2,3,4,5 o ESC  Pulsar 1,2,3,4,5 o ESC
```

Press the number key that corresponds to the language you want to use. All subsequent screens display in the selected language.

Save Configuration

To save the current system settings in storage memory, type “G” or “g” or select **Save Configuration** on the **Select Operation** menu. Press [N] or [Esc] to cancel the save operation and return to the **Select Operation** menu. Press [Y] to save the current configuration. All configuration parameters are saved to storage memory.

ASCII Host Commands

Chapter Objectives

This chapter defines ASCII commands you can send from a host to the decoder using the RS-232, RS-422, or DH485 communication interfaces.

Using RS-232/RS-422

The RS-232, RS-422, and DH485 interfaces allow you to send single or two character ASCII commands from the host to the decoder. All commands and command responses are ASCII character strings.

The single character commands control scanning (*Start/Stop Scan* characters), and the transmission (*ACK/NAK characters*) of data to the host. They are not used to configure or monitor decoder operations. The single character commands are configured on the **Host Communications** screen described elsewhere in this manual.

The two character commands perform the same functions as the settings on the configuration screens, and can be used to configure and monitor decoder operations. The rest of this chapter defines the two character ASCII commands.

ATTENTION: When controlling discrete outputs locally using AUX port configuration, suspend host communications to prevent outputs from unintentionally changing state.

Using DH485

The DH485 interface supports the two character ASCII commands. To use these commands, the decoder requires you to set the *Host Protocol* parameter on the **Host Communications** screen to one of the following:

- DH485 ASCII-1 Protocol with Responses
- DH485 ASCII-2 Protocol without Responses

Note: The DH485 ASCII-2 Protocol (without responses) reduces data traffic on the link. Responses are unnecessary since the link layer of the Allen-Bradley DH485 network insures that a command is properly received.

The decoder supports the following DH485 communication addresses:

DH485 LSAP	Function
0	Diagnostic Commands (Perform Application Layer)
1 or 128	ASCII Commands (Perform Application Layer)
129	Perform Link Reset-immediate Block

Table 15.A Two–character ASCII commands (grouped by function)

Page Number	Command Code	Command Function
Symbologies		
15–8	CT	Configure Bar Code Symbology and Supplements
15–9	SL	Configure Bar Code Specific Length
15–11	CC	Configure Code 39, I 2-of-5, Codabar Check Characters
15–12	CG	Configure I 2-of-5 Guard Bar
15–13	CQ	Configure Quiet Zone
15–14	CF	Configure Code 128 FNC1 Character
15–15	CV	Configure Code Verification List
15–16	CP	Configure Pharma–Code
Scanner Control		
15–18	SC	Configure Scanner A Control
15–20	PB	Configure Scanner B Control
15–21	IF	Configure Scanner A Package Detect Filter and Sense
15–22	BF	Configure Scanner B Package Detect Filter and Sense
15–23	BL	Configure Scanner B Laser Mode
Primary Match Code Table		
15–24	SW	Write Scanner Source to Match Code Table
15–25	AB	Auto-load Begin
15–25	AE	Auto-load End
15–26	AL	Auto-load
15–28	OS	Set Output Normally Open/Normally Closed
15–29	OC	Set Output Condition and Duration
15–31	OH	Hold Output Open/Closed
15–33	MR	Read Primary Match Code Table Entry (1-8)
15–34	MW	Write Primary Match Code Table Entry (1-8)
15–35	CM	Clear Primary Counter (1-8)
15–36	CO	Clear All Primary Output Counters
Extended Match Code Table		
15–25	AB	Auto-load Begin
15–25	AE	Auto-load End
15–26	AL	Auto-load
15–36	CA	Clear Extended Match Counters
15–37	SE	Set Extended Match Counter
15–38	RC	Read Extended Match Counter
15–39	SM	Set Extended Match Data
15–41	RP	Read Extended Match Data
15–43	RA	Read All Extended Counters
15–45	CS	Disable Extended Match Code Set
15–46	RS	Read Extended Match Set Status

Page Number	Command Code	Command Function
AUX and LCD Display Format		
15–47	DF	Enable AUX Terminal and LCD to Display Formatted Data
15–48	DP	Configure Data Display Positions for AUX Terminal and LCD
15–49	SD	Enable LCD Scrolling
Host Message Replacement Rules		
15–50	SR	Set Search and Replace Rule for Host Message Fields
15–52	SF	Set No-Read Replacement String
Host Communications & Host Message Format		
15–53	HC	Configure Host Communications
15–55	HB	Configure Scanner B Start & Stop Characters
15–56	MF	Configure Host Message Format
15–58	HF	Set the Number of Fields in Host Message
15–59	IX	Configure AUX Terminal Source Identifier
15–60	IM	Configure Scanner A Source Identifier
15–61	IB	Configure Scanner B Source Identifier
15–62	HM	Configure Header Message
15–63	NM	Configure Default No-Read String
AUX Terminal Data Entry		
15–64	AX	Configure AUX Terminal Data Entry Operations
15–66	TM	Display Text Message at AUX Terminal and LCD
15–68	PM	Configure Default Prompt Message for AUX Terminal and LCD
Status & Counters		
15–69	PI	Read Decoder Performance Indicators
15–70	PR	Read Package Counter
15–71	NR	Read the Symbols Not Read Counter
15–72	MC	Read Output Counter
15–73	PC	Clear Package Counter
15–73	NC	Clear Symbols Not Read Counter
15–35	CM	Clear Primary Counters (1–8)
15–36	CO	Clear All Primary Output Counters
System Commands		
15–74	RN	Save Configuration to Storage Memory and Restart
15–74	SA	Save Configuration to Storage Memory (No Restart)
15–75	DD	Set Configuration to Factory Defaults
15–75	RD	Set Configuration to Defaults, Save and Restart
15–76	RE	Restart
15–76	ID	Version of Software
Obsolete Commands (For Reference)		
15–77	DM	Configure Bar Code Data Mask
15–77	PD	Configure Data Pad Character

Table 15.B lists the **two character ASCII commands in alphabetical order**, by command code.

Table 15.B Two–character host commands (Alphabetical Order)

Page Number	Command Code	Command Function
15–25	AB	Auto-load Begin
15–25	AE	Auto-load End
15–26	AL	Auto-load
15–64	AX	Configure AUX Terminal Data Entry Operations
15–22	BF	Configure Scanner B Package Detect Filter and Sense
15–23	BL	Configure Scanner B Laser Mode
15–36	CA	Clear Extended Match Count
15–11	CC	Configure Code 39, I 2-of-5, Codabar Check Characters
15–14	CF	Configure Code 128 FNC1 Character
15–12	CG	Configure I 2-of-5 Guard Bar
15–35	CM	Clear Counter (1-8)
15–36	CO	Clear All Primary Output Counts
15–16	CP	Configure Pharma–Code
15–13	CQ	Configure Quiet Zone
15–45	CS	Disable Extended Match Code Set
15–8	CT	Configure Bar Code Symbology and Supplements
15–15	CV	Configure Code Verification List
15–75	DD	Set Configuration to Factory Defaults
15–47	DF	Enable AUX Terminal and LCD to Display Formatted Data
15–77	DM	Configure Bar Code Data Mask
15–48	DP	Configure Data Display Positions for AUX Terminal and LCD
15–55	HB	Configure Scanner B Start & Stop Characters
15–53	HC	Configure Host Communications
15–58	HF	Set the Number of Fields in Host Message
15–62	HM	Configure Header Message
15–61	IB	Configure Scanner B Source Identifier
15–76	ID	Version of Software
15–21	IF	Configure Scanner A Package Detect Filter and Sense
15–60	IM	Configure Scanner A Source Identifier
15–59	IX	Configure AUX Terminal Source Identifier
15–72	MC	Read Output Counter
15–56	MF	Configure Host Message Format
15–33	MR	Read Match Code Table Entry (1-8)
15–34	MW	Write Match Code Table Entry (1-8)
15–73	NC	Clear Symbols Not Read Counter
15–63	NM	Configure Default No-Read String
15–71	NR	Read the Symbols Not Read Counter
15–29	OC	Set Output Condition and Duration
15–31	OH	Hold Output Open/Closed
15–28	OS	Set Output Normally Open/Normally Closed
15–20	PB	Configure Scanner B Control
15–73	PC	Clear Package Counter

Page Number	Command Code	Command Function
15–77	PD	Configure Pad Data Character (Obsolete Command)
15–69	PI	Read Decoder Performance Indicators
15–68	PM	Configure Default Prompt Message for AUX Terminal and LCD
15–70	PR	Read Package Counter
15–43	RA	Read All Extended Counts
15–38	RC	Read Extended Match Count
15–75	RD	Set Configuration to Defaults, Save and Restart
15–76	RE	Restart
15–74	RN	Save Configuration to Storage Memory and Restart
15–41	RP	Read Extended Match Data
15–46	RS	Read Extended Match Set Status
15–74	SA	Save Configuration to Storage Memory (No Restart)
15–18	SC	Configure Scanner A Control
15–49	SD	Enable LCD Scrolling
15–37	SE	Set Extended Match Count
15–52	SF	Set Default Search Strings
15–9	SL	Configure Bar Code Specific Length
15–39	SM	Set Extended Match Data
15–50	SR	Set Search and Replace Rule for Host Message Fields
15–24	SW	Write Scanner Source to Match Code Table
15–66	TM	Display Text Message at AUX Terminal and LCD

Command Format

The format or structure of the two character commands is:

1 Start Command Sequence	2 Command Code	3 Parameters	4 Terminator

1. **Start Command Sequence.** Contains the escape sequence <ESC>=!. The table below defines the ASCII and Hexadecimal equivalents of each character of the command sequence

ASCII and Hexadecimal Equivalents - Start Command Sequence

Character	ASCII	Hex
ESC	27	1B
=	61	3D
!	33	21

Note: The start command sequence is optional. The <ESC>=! sequence differentiates two character commands from single character commands. **If any of the characters below are used as single character commands (*ACK/NAK* or *Start/Stop Scan Characters*), then the escape sequence (ESC=!) must be used with all two character commands that start with that character.**

A B C D H I M N O P R S T

If the single character commands do not use these uppercase characters, you do not have to use the start command sequence. For example, if N is used as the NAK command, then it would be impossible to send the NR command without preceding it with the ESC=! start command sequence. If n is used instead, then no start command sequence would be necessary to send an NR command. **Therefore, we recommend using only lowercase letters for single character commands.**

Note: The start command sequence <ESC>=! is not valid when sending ASCII commands using the DH485 interface.

2. **Command Code.** Two characters that specify the command.
3. **Parameters.** Data that further determines the command action. Some commands do not have parameters.
4. **Terminator.** An ASCII control code (less than decimal 32) that terminates the command. Typical control codes are: <CR>, <LF>, <CRLF>, <ETX>.

Command Replies

The decoder sends a reply in response to each command sent from the host. Command replies have the following structure:

1 Parameter	2 End of Parameter Code	3 =	4 Response Code	5 End of Message Code

Note: The first two parts of the response may not be present depending on the command.

1. **Parameters.** Contains data requested by the command parameters. Some commands do not return any parameters.
2. **End of Parameter Code.** Delimiter that indicates the end of the parameter list. This code is the same as the End of Message Code.
3. **=** Response delimiter.
4. **Response Code.** Indicates the status of the processed command. The table below lists the response codes and what they mean.

   Response Codes and Descriptions

Response	Description
00	Command complete (normal termination).
01	Valid and successful command. Applies only to TM command.
02	Display buffer is full. Applies only to TM command.
11	Valid command but format is invalid.
50	Unknown command.
97	Reset to new configuration received.
98	Reset to default configuration received.

5. **End of Message Code.** Indicates the end of the message. Typical end of message control codes are CR, CRLF, LF, ETX, or None.

   All examples in this chapter use <end> to represent the end of message control code.

   The *End Message* configuration parameter defines the end of message control code. Refer to the **Host Message Format** screen described elsewhere in this manual for additional details.

CT - Configure Bar Code Symbology and Supplements

Command Format: CTfccs

Function: Enables or disables the decoding of a specific bar code symbology and supplements.

Parameters: fccs

Command Parameter	Parameter Function	Valid Values
f	Enable a bar code symbology?	1=Yes 0=No
cc	Specifies a bar code symbology.①	01=Code 39 02=Interleaved 2-of-5 03=Codabar 04=UPC-A 05=UPC-E 06=EAN-8 07=EAN-13 08=Code 128
s	Specifies supplements for a bar code symbology. ②	0=None 1=2 character supplement 2=5 character supplement 3=2 or 5 character supplement 4= Auto (None, 2 or 5 character supplement)

① See the CP command for Pharma-Code configuration.

② Supplements are valid for UPC–A, UPC–E, EAN–8, EAN 13. For other symbologies, select 0=None or omit the “s” parameter.

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: CT1041

Parameters: 1041

Command Parameter	Parameter Functions	Values
f	Enable bar code symbology?	1= Yes
cc	Select bar code symbology.	04= UPC-A
s	Enable supplements for selected symbology.	1= 2 character supplement.

00 = command complete response code
CR = end of message control code for Carriage Return

SL - Configure Specific Length for Bar Code Symbology

Command Format: SLccssttuuvvwwxxyyzz

Function: Configures specific lengths for Code 39, Interleaved 2-of-5, Codabar, and Code 128 symbologies.

Parameters: ccssttuuvvwwxxyyzz

Command Parameter	Parameter Function	Valid Values
cc	Bar code symbology	01= Code 39 02= Interleaved 2-of-5 03= Codabar 08= Code 128
ss	1st specific length	00 through 64 ①
tt	2nd specific length	00 through 64 ①
uu	3rd specific length	00 through 64 ①
vv	4th specific length	00 through 64 ①
ww	5th specific length	00 through 64 ①
xx	6th specific length	00 through 64 ①
yy	7th specific length	00 through 64 ①
zz	8th specific length	00 through 64 ①

① A value of 00 in the leftmost field indicates a variable length up to 64. A nonzero value in the left of each field indicates a specific length. The specific length for Interleaved 2-of-5 must be an even number. A two character Interleaved 2-of-5 symbol requires a length of 2.

Response: = rr <end>

rr = response code
<end>= end of message control code for Carriage Return.

SL - Configure Specific Length for Bar Code Symbology (continued)

Example:

Command: SL021416000000000000

Parameters: 021416000000000000

Command Parameter	Parameter Function	Values
cc	Bar code type	02= Interleaved 2-of-5
ss	1st specific length	14①
tt	2nd specific length	16①
uu	3rd specific length	00①
vv	4th specific length	00①
ww	5th specific length	00①
xx	6th specific length	00①
yy	7th specific length	00①
zz	8th specific length	00①

① Only Interleaved 2-of-5 symbols with 14 and 16 characters will be decoded.

Response: = 00CRLF

00 = command complete response code
CRLF = end of message control code for Carriage Return and Line Feed.

CC - Configure Code 39, I 2-of-5, Codabar Check Characters

Command Format: CCabcdef

Function: Enables or disables bar code check characters.

Parameters: abcdef

a through f are Yes (1) and No (0) responses to the following parameters (in sequence shown):

Command Parameters	Parameter Function	Valid Values
a	Code 39 check character?	1=Yes, 0=No
b	Send Code 39 check character?	1=Yes, 0=No
c	I 2-of-5 check character?	1=Yes, 0=No
d	Send I 2-of-5 check character?	1=Yes, 0=No
e	Codabar check character?	1=Yes, 0=No
f	Send Codabar check character?	1=Yes, 0=No

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: CC111100

Parameters: 111100

Command Parameters	Parameter Function	Values
a	Code 39 check character?	1=Yes
b	Send Code 39 check character?	1=Yes
c	I 2-of-5 check character?	1=Yes
d	Send I 2-of-5 check character?	1=Yes
e	Codabar check character?	0=No
f	Send Codabar check character?	0=No

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

CG - Configure Interleaved 2-of-5 Guard Bar

Command Format: CGa

Function: Enables verification of guard bars on Interleaved 2-of-5 symbols.

Parameters: a

Command Parameters	Parameter Function	Valid Values
a	Enable verification of guard bar on I 2/5 symbols	1=Yes, 0=No

Response: = rr <end>

rr = response code
<end>= end of message control code

Example:

Command: CG1

Parameters: 1

Command Parameters	Parameter Function	Values
a	Enable verification of guard bar on I 2/5 symbols	1=Yes

Response: = 00CR

00 = command complete response code
CR= end of message control code for Carriage Return.

CQ - Configure Quiet Zone

Command Format: CQaa

Function: Configures the General Quiet Zone Ratio.

Parameters: aa

Command Parameters	Parameter Function	Valid Values
aa	The Quiet Zone Ratio	00 = Defaults 04 – 10

Response: = rr <end>

rr = response code
<end>= end of message control code

Example:

Command: CQ07

Parameters: 07

Command Parameters	Parameter Function	Values
aa	Set Quiet Zone Ratio to 7	07

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

CF - Configure Code 128 FNC1 Character

Command Format: CFaaa

Function: Selects return value for Code 128 FNC1 Character.

Parameters: aaa

Command Parameters	Parameter Function	Valid Values
aaa	Select Code 128 FNC1 Character	000 = Discard 001...255 = FNC1 Character

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: CF130

Parameters: 029

Command Parameters	Parameter Function	Values
aaa	Set Code 128 FNC1 return value to 1Dh (029 decimal)	029 (GS group separator)

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

CV - Code Verification List

Command Format: CVaabbbb

Function: Defines numeric values for specific data locations of a Pharma-Code bar code symbol.

Parameters: aabbbb

Command Parameters	Parameter Function	Valid Values
aa	Field location	00 to 16 00 means clear Code Verification List (all 16 locations)
bbbb	Pharma-Code data value	0000, 0007 to 8190 0000 clears data value at specified location.

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: CV011122

Parameters: 011122

Command Parameters	Parameter Function	Valid Values
aa	Field location	01
bbbb	Pharma-Code data value	1122

Response: =00CR

00 = command complete response code
CR = end of message control code for Carriage Return

CP - Configure Pharma-Code Symbology

Command Format: CPabccddeefgg

Function: Enables the Pharma-Code symbology and configures parameters of the symbology.

Parameters: abccddeefgg

Command Parameters	Parameter Function	Valid Values
a	Enable symbology	0= No 1= Yes
b	Decode direction	0= Forward 1= Reverse 2= Forward Scanner A Reverse Scanner B① 3= Reverse Scanner A Forward Scanner B①
cc	Quiet zone ratio	04 to 10
dd	Space tolerance	00=Ignore 05 to 40
ee	Bar tolerance	00=Ignore 05 to 40
f	Wide to narrow bar ratio	0=midrange 2 to 4
gg	Minimum number of bars	03 to 12

① Applies only to Dual-Head Decoder.

Response: = rr <end>

rr = response code
<end>= end of message code

CP - Configure Pharma-Code Symbology (continued)

Example:

Command: CP10040000005

Parameters: 10040000005

Command Parameters	Parameter Function	Valid Values
a	Enable symbology	1= Yes
b	Decode direction	0= Forward
cc	Quiet zone ratio	04
dd	Space tolerance	00=Ignore
ee	Bar tolerance	00=Ignore
f	Wide to narrow bar ratio	0=midrange
gg	Minimum number of bars	05

Response: =00CR

00 = command complete response code
CR = end of message control code for Carriage Return

SC - Configure Scanner A Control

Command Format: SCldcsprrrrtttttm

Function: Specifies the operating parameters for Scanner A or Scanners A and B in coordinated mode.

Parameters: ldcsprrrrtttttm

Command Parameters	Parameter Function	Valid Values
l	Laser-light	0= On 1= Triggered 2= Off
d	Trigger mode	0= Package Detect 1= Host 2= Internal Timer 3= Continuous 4= Continuous/unique
c	Capture count.	0, 1 through 8 (0= Verify)
s	Bar code symbols per scan	0 through 6 0= ANY (1,2,3,4,5,6)
p	Bar code symbols per package	1 -9, A-G (where A=10,...G=16)
rrrr	No-read timer value (in milliseconds)	0000, 0010 - 9999 (in milliseconds) 0000 disables timeout
tttt	Inter–scan timer value (in milliseconds)	0000, 0010 - 9999 (in milliseconds) 0000 disables timeout
m	Match complete count	1 -9, A-G (where A=10,...G=16)

Important: See Chapter 6 for a description of the Scanner Control parameters.

Response: = rr <end>

rr = response code
<end> = end of message control code

SC - Configure Scanner A Control (continued)

Example:

Command: SC01211005500001

Parameters: 01211005500001

Command Parameters	Parameter Function	Values
l	Laser-light	0=Continuous scanning
d	Decode trigger mode	1= Host
c	Capture count	2
s	Bar code symbols per scan	1
p	Bar code symbols per package	1
rrrr	No-read timer value (in milliseconds)	0055= 55 millisecond timer value
tttt	Inter–scan timer value (in milliseconds)	0000= Disables inter-scan timer
m	Match complete count	1

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

PB - Configure Scanner B Control

Command Format: PBabtttt

Function: Configures Scanner B to operate in coordinated or independent mode. This command also defines the operating parameters for Scanner B when the scanning mode is set to independent.

NOTE: This command is valid only for dual head decoders.

Parameters: abtttt

Command Parameters	Parameter Function	Valid Values
a	Scanning mode of scanner B	0= Coordinated 1 1= Independent Package Detect 2= Independent Host Triggered 3= Coordinated 2
b	Reserved	Ignored①
tttt	Trigger timeout for scanner B (in milliseconds)	0000, 0010 - 9999 (in milliseconds) 0000 disables timeout

① Decoder ignores character but it must be supplied to maintain compatibility with previous decoders.

Important: See Chapter 7 for a description of the Scanner Control parameters.

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: PB110100

Parameters: 110100

Command Parameters	Parameter Function	Values
a	Scanning mode of scanner B	1= Independent Package Detect
b	Ignored	1 (Ignored)
tttt	Trigger timeout for scanner B (in milliseconds)	0100= 100 milliseconds

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

IF - Configure Scanner A Package Detect Filter and Sense

Command Format: IFf

Function: Enables or disables the 15 ms input filter and determines the sense of the package detect signal for Scanner A.

Parameters: f = disable or enable filter/select sense.

Command Parameter	Parameter Function	Valid Values
f	Enable or disable filter/select sense	0=disable filter, LO when package is present 1=enable filter, LO when package is present 2=disable filter, HI when package is present 3=enable filter, HI when package is present

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: IF1

Parameters: 1

Command Parameter	Parameter Function	Value
f	Enable or disable filter/select sense	1=enable filter, LO when package is present

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

BF - Configure Scanner B Package Detect Filter and Sense

Command Format: BFf

Function: Enables or disables the 15 ms input filter and determines the sense of the package detect signal for Scanner B.

NOTE: This command is valid only for dual head decoders.

Parameters: f = disable or enable filter/select sense.

Command Parameter	Parameter Function	Valid Values
f	Enable or disable filter/select sense	0=disable filter, LO when package is present 1=enable filter, LO when package is present 2=disable filter, HI when package is present 3=enable filter, HI when package is present

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: BF1

Parameters: 1

Command Parameter	Parameter Function	Value
f	Enable or disable filter/select sense	1=enable filter, LO when package is present

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

BL - Configure Scanner B Laser Mode

Command Format: BLa

Function: Configures the laser light for scanner B.

NOTE: This command is valid only for dual head decoders.

Parameters: a

Command Parameters	Parameter Function	Valid Values
a	Scanner B laser light	0= On 1= Triggered 2= Off

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: BL1

Parameters: 1

Command Parameters	Parameter Function	Values
a	Scanner B laser light	1=Triggered

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

SW - Write Scanner Source to Match Code Table

Command Format: SWab

Function: Configures the source of an event.

Parameters: ab

Command Parameters	Parameter Function	Valid Values
a	Match code table entry number	1 through 8
b	Source of event	1=Scanner A 2=Scanner B① 3=A|B① 4=Illegal 5=A–B①

① Applies only to Dual-Head Decoder.

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: SW11

Parameters: 1

Command Parameters	Parameter Function	Values
a	Match code table entry number	1
b	Source of event	1=Scanner A

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

AB - Auto-load Begin

Command Format: AB

Function: Resets autoloads. Once received, the decoder loads match code table positions set to autoload with decoded bar code data until it receives an AE (Autoload End command. Equivalent to manual autoload input.

Response: = rr <end>

rr = response code
<end>= end of message control code

Example:

Command: AB

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

AE - Autoload End

Command Format: AE

Function: Stops loading data into position set to autoload. This command follows an AB (Autoload Begin) command. Equivalent to releasing a manual autoload input.

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: AE

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

AL - Autoload

Command Format: ALabeestring

Function: Load the match pattern into the next available position set to autoload, checking first the primary match table, and then the extended match table. This is the equivalent of a manual Autoload, except the data is supplied by the host instead of a scanner.

Parameters: abeestring

Command Parameters	Parameter Function	Valid Values
a	Source	1=A 2=B
b	Symbology	1=Code 39 2=Interleaved 2-of-5 3=Codabar 4=UPC-A 5=UPC-E 6=EAN-8 7=EAN-13 8=Code 128 9=Pharma–Code
ee	Length of match string	00 to 32
string	Match string	Up to 32 ASCII characters

Response: = rr <end>

rr = response code
<end>= end of message control code

AL - Autoload (continued)

Example:

Command: AL

Parameters: 1110ABCDE12345

Command Parameters	Parameter Function	Valid Values
a	Source	1=A
b	Symbology	1=Code 39
ee	Length of match string	10 Characters
String	Match string	ABCDE12345

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

OS - Set Output Normally Open/Closed

Command Format: OSnf

Function: Sets the state of a discrete output to normally open or normally closed.

Parameters: nf

Command Parameters	Parameter Function	Valid Values
n	Discrete output number	1 through 8
f	Switch operation normally open or normally closed	0= Normally Open 1= Normally Closed

Response: = rr <end>

rr = response code
<end>= end of message control code

Example:

Command: OS20

Parameters: 20

Command Parameters	Parameter Function	Values
n	Discrete output number	2
f	Switch operation normally open or normally closed	0= Normally Open

Response: =00CR

00 = command complete response code
CR = end of message control code for Carriage Return

OC - Set Output Condition and Output Duration

Command Format: OCnctttt

Function: Sets the condition that will activate an output and the length of time (in milliseconds) the output is activated.

Parameters: nctttt

Command Parameters	Parameter Function	Valid Values
n	Output number	1 through 8
c	Condition activates output	0= None 1= Read (Package) 2= No-Read (Package) 3= Match Complete 4= Match Entry 5= Read and No-Match 6= No-Read or No–Match 7= Auto Load 8= Auto Load (Input)① 9= Host buffer full A= Host buffer overflow
tttt	Time (in milliseconds) that output is activated.	0000, 0010 to 9999 (milliseconds) 0000 disables condition

① The AutoLoad (Input) function applies only to output 8.

Response: = rr <end>

rr = response code
<end> = end of message control code

OC - Set Output Condition and Output Duration (continued)

Example:

Command: OC510110

Parameters: 510110

Command Parameters	Parameter Function	Values
n	Output number	5
c	Condition that activates output	1= Read (Package)
tttt	Time (in milliseconds) that output is activated.	0110= 110 milliseconds

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

OH - Hold Output Open/Closed

Command Format: OHnffttt

Function: Allows the host to control the discrete outputs (regardless of their "normal" state) for a set duration.① When the duration expires, the output reverts to its previous state.

Note: If a normally open output is held open (or a normally closed output is held closed), the state of the output will not change.

ATTENTION: An output held open or closed will reestablish itself after a power loss (all other conditions will be deactivated if power is lost). A Restart command will deactivate a held output.

Parameters: nffttt

Command Parameters	Parameter Function	Valid Values
n	Discrete output number	1 through 8
ff	Hold switch operation in open or closed state?	00= Hold Open① 11= Hold Close
tttt	Time (in milliseconds) that output remains in held state. When the time expires, the output returns to its previous state.	0000, 0010 to 9999 (milliseconds) 0000 holds output in state until changed.

Response: = rr <end>

rr = response code
<end> = end of message control code

① **A duration of 0000 holds the specified output in the programmed state until it is changed with host command or via the AUX terminal configuration screens. The condition field on the AUX will display Open or Closed.**

OH - Hold Output Open/Closed (continued)

Example:

Command: OH2001000

Parameters: 2001000

Command Parameters	Parameter Function	Values
n	Discrete output number	2
ff	State of discrete output	00= Hold Open
tttt	Time (in milliseconds) that output remains held open.	1000 milliseconds

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

MR - Read Primary Match Code Table Entry

Command Format: MRn

Function: Read match code configuration for table entry 1 – 8.

Parameters: n = match code table entry number 1 through 8.

Command Parameters	Parameter Function	Valid Values
n	Match code table entry number	1 through 8
f	RESERVED	1①
cc	Bar code symbology	01=Code 39 02=Interleaved 2 of 5 03=Codabar 04=UPC-A 05=UPC-E 06=EAN-8 07=EAN-13 08=Code 128 09=Pharma–Code 16=Any
ll	Length of match string	00 to 32
string	Match string	up to 32 characters

① This value is always returned as 1.

Response: nfccllstring<end> = rr <end>

<end> = end of message control code
rr = response code
<end> = end of message control code

Example:

Command: MR3

Parameters: 3 = match code entry #3

Command Parameters	Parameter Function	Values
n	Match code table entry number	3
f	RESERVED	1①
cc	Bar code symbology	01=Code 39
ll	Length of match string	05
string	Match string	12345

① This value is always returned as 1.

Response: 31010512345CR = 00CR

CR = end of message control code
00 = command complete response code
CR = end of message control code

MW - Write Primary Match Code Table Entry

Command Format: MWnfcc llstring

Function: Configure a match code for table entry 1 – 8.

Parameters: nfcc llstring

Command Parameters	Parameter Function	Valid Values
n	Match code table entry number	1 through 8
f	RESERVED	Ignored①
cc	Bar code symbology	01=Code 39 02=Interleaved 2 of 5 03=Codabar 04=UPC-A 05=UPC-E 06=EAN-8 07=EAN-13 08=Code 128 09=Pharma–Code 16=Any
ll	Length of match code string	00 to 32②
string	Match code characters	up to 32 characters③

① Decoder ignores character but it must be supplied to maintain compatibility with previous decoders.

② A zero length string disables a match code entry. A nonzero length string enables the match code entry.

③ The string must be as long as the specified string length (ll).

Response: = rr <end>

rr= response code
<end> = end of message control code

MW - Write Primary Match Code Table Entry (continued)

Example:

Command: MW4102041289

Parameters: 4102041289

Command Parameters	Parameter Function	Values
n	Match code table entry number	4
f	RESERVED	1
cc	Bar code symbology	02=Interleaved 2 of 5
ll	Length of match string	04
string	Match string	1289

Response: = 00LF

00 = command complete response code
LF = end of message control code for Line Feed

CM - Clear Primary Output Counters

Command Format: CMn

Function: Clears the selected output counter to 0.

Parameters: n = output counter number 1 through 8

Response: = rr <end>

rr = response code
<end > = end of message control code

Example:

Command: CM3

Parameters: 3 = output counter #3.

Response: = 00CR

00= command complete response code
CR = end of message control code for Carriage Return

CO - Clear All Primary Output Counters

Command Format: CO

Function: Clears the Primary Counters to zero.

Parameters: None

Response: = rr <end>

rr = response code
<end>= end of message control code

Example:

Command: CO

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

CA - Clear Extended Match Counters

Command Format: CA

Function: Clears the value of the extended counts to zero.

Parameters: None

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: CA

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

SE - Set Extended Match Counters

Command Format: SEnnnmmmmmm

Function: Sets the value of extended count number nnn to mmmmmm.

Parameters: nnnmmmmmm

Command Parameters	Parameter Function	Valid Values
nnn	The number of the Extended match count	001 to 128 000 = All
mmmmmm	The value of the count	000000 to 999999

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: SC012000036

Parameters: 012

Command Parameters	Parameter Function	Values
nnn	The number of the Extended match count.	012
mmmmmm	The value of the count	000036

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

RC - Read Extended Match Counters

Command Format: RCnnn

Function: Reads the value of Extended count number nnn.

Parameters: nnn

Command Parameters	Parameter Function	Valid Values
nnn	The number of the Extended match count	001 to 128

Response: = mmmmmm <end>

mmmmmm = count value
<end> = end of message control code

Example:

Command: RC012

Parameters: 012

Command Parameters	Parameter Function	Values
nnn	The number of the Extended match count.	012

Response: = 000036CR

000036 = value of counter 12
CR = end of message control code for Carriage Return.

SM - Set Extended Match Data

Command Format: SMnnnasccmmmmmmddddddddllstring

Function: Sets the value of the Extended data number nnn.

Parameters: nnnasccmmmmmmddddddddllstring

Command Parameters	Parameter Function	Valid Values
nnn	The number of the Extended match count	000 to 128
a	Mode	A=Auto-load M=Match Entry D=Disabled L=Lot
s	Source	1=Scanner A 2=Scanner B 3=A|B 4=Illegal 5=A–B
cc	symbology	01=Code 39 02=Interleaved 2-of-5 03=Codabar 04=UPC-A 05=UPC-E 06=EAN-8 07=EAN-13 08=Code 128 09=Pharma–Code 16=Any
mmmmmm	The value of the count	000000 to 999999
dddddddd	Loading (8)	0 to 9, or X
ll	Length of match string	00 to 32
string	Match string	up to 32 characters

Response: = rr <end>

rr = response code
<end>= end of message control code

SM - Set Extended Match Data (continued)

Example:

Command: SM002M3010000001000000004 1289

Parameters: 002 M 3 01 000000 10000000 04 1289

Command Parameters	Parameter Function	Valid Values
nnn	The number of the Extended match count	002
a	Mode	M = Match Entry
s	Source	3=A|B
cc	Symbology	01=Code 39
mmmmmm	The value of the count	000000
dddddddd	Loading (8)	10000000
ll	Length of match string	04
string	Match string	1289

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

RP - Read All Extended Match Data

Command Format: RP

Function: Reads the value of all Extended data.

Parameters: None

Response Parameters	Parameter Function	Valid Values
nnn	The number of the Extended match counts	001 to 128
a	Mode	A=Auto-load M=Match Entry D=Disabled L=Lot
ss	Source	01=Scanner A 02=Scanner B 03=A|B 04=A–B
cc	Symbology	01=Code 39 02=Interleaved 2-of-5 03=Codabar 04=UPC-A 05=UPC-E 06=EAN-8 07=EAN-13 08=Code 128 09=Pharma–Code 16=Any
mmmmmm	The value of the count	000000 to 999999
ll	Length of match string	00 to 32
string	Match string	up to 32 characters

Response: 001assccmmmmmmmmmllstring<end>..
...
128assccmmmmmmmmmllstring<end>
=rr<end>

rr = response code
<end>= end of message control code

RP - Read All Extended Match Data (continued)

Example:

Command: RP

Response: 001 M 03 01 001289 04 1289 CR
002 ...
...
128 M 03 01 001289 04 1289 CR
=00CR

Command Parameters	Parameter Function	Values
nnn	The number of the Extended match counts	064
a	Mode	M = Match Entry
s	Source	03=A|B
cc	symbology	01=Code 39
mmmmmm	The value of the count	001289
ll	Length of match string	04
string	Match string	1289
a	Mode	M = Match Entry
s	Source	3=A|B
cc	Symbology	01=Code 39
mmmmmm	The value of the count	000222
ll	Length of match string	04
string	Match string	6247

CR = delimiter and/or end of message control code for Carriage Return
00 = command complete response code
CR = end of message control code for Carriage Return.

RA - Read All Extended Counters

Command Format: RA

Function: Reads all Extended counts.

Parameters: None

Response: nnnmmmmmm<end>...
...
nnnmmmmmm<end>
= rr <end>

Response Parameters	Parameter Function	Valid Values
nnn	The number of the Extended match count	001
mmmmmm	Value of count	000000 to 999999
nnn	The number of the Extended match count	002
mmmmmm	Value of count	000000 to 999999
	...	
nnn	The number of the Extended match count	128
mmmmmm	Value of count	000000 to 999999

rr= response code
<end> = end of message control code

RA - Read All Extended Counters (continued)

Example:

Command: RA

Parameters: None

Response: 001000012CR002000122...
...
128000012CR
=00CR

Response Parameters	Parameter Function	Values
nnn	The number of the Extended match count	001
mmmmmm	Value of count	000012
nnn	The number of the Extended match count	002
mmmmmm	Value of count	000122
	...	
nnn	The number of the Extended match count	128
mmmmmm	Value of count	000000

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

CS - Disable Extended Match Code Set

Command Format: CSnnnnnnnn

Function: Disables a group of Extended Match Codes

Parameters: nnnnnnnn

Command Parameters	Parameter Function	Valid Values
nnnnnnnn	Allows the 128 Extended Match Codes to be treated as eight sets of sixteen each. Each set can be individually marked.	00000000 = All Disabled through 11111111=All enabled

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: CS01100011

Parameters: 01100011

Command Parameters	Parameter Function	Values
nnnnnnnn	Enables positions 17–32, 33–48, 97–112, and 113–128	01100011

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

RS - Read Extended Match Set Status

Command Format: RS

Function: Reads the status of the extended match sets.

Parameters: none

Response: nnnnnnnn = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: RS

Response: 10010001 = 00CR

10010001 = Sets 1, 4, and 8 enabled; all others disabled.
00 = command complete response code
CR = end of message control code for Carriage Return.

DF - Enable Data Display on AUX Terminal and LCD

Command Format: DFab

Function: Enables the AUX terminal and/or the LCD Display to receive and display bar code data.

Note: Before data will display at the AUX terminal, you must set the AUX port to manual data entry mode (as described in Chapter 13).

Parameters: ab

Command Parameter	Parameter Function	Valid Values
a	Enable device to display formatted bar code data.	0= None 1= AUX terminal and LCD Display 2= AUX terminal only 3= LCD Only
b	Specify format of bar code data.	0= Unformatted 1= Host format

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: DF11

Parameters: 11

Command Parameter	Parameter Function	Values
a	Enable device to display formatted bar code data.	1= AUX terminal and LCD Display
b	Specify format of bar code data.	1= Host format

Response: = 00LF

00 = command complete response code
LF = end of message control code for Line Feed

DP - Configure Data Display Positions for AUX Terminal and LCD

Command Format: DPdpp

Function: Enables the display of specific data items on the LCD and/or AUX port terminal starting at a specific character position.

Note: Before data will display at the AUX terminal, you must set the AUX port to manual data entry mode (as described in Chapter 13).

Parameters: dpp

Command Parameter	Parameter Function	Valid Values
d	Data item selector	A= Bar Code Data B= Decoder Performance C= Package Counter D= No-Read Counter 1= Primary Counter 1 2= Primary Counter 2 3= Primary Counter 3 4= Primary Counter 4 5= Primary Counter 5 6= Primary Counter 6 7= Primary Counter 7 8= Primary Counter 8
pp	Character position	00, 01 - 80 00= Disable

Response: = rr <end>

rr= response code
<end>= end of message control code

Example:

Command: DPA01

Parameters: A01

Command Parameter	Parameter Function	Values
d	Data item selector	A= Bar Code Data
pp	Character position	01

Response: = 00LF

00 = command complete response code
LF = end of message control code for Line Feed

SD - Enable LCD Scrolling

Command Format: SDf

Function: Enables or disables scrolling of the LCD display.

Parameters: f

Command Parameters	Parameter Function	Values
f	Enable Scrolling LCD Display	0= No 1= Yes

See Chapter 9 for details on how the LCD Display operates when scrolling is enabled or disabled.

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: SD1

Parameters: 1

Command Parameters	Parameter Function	Values
f	Enable scrolling LCD Display	1= Yes

Response: =00CR

00 = command complete response code
CR = end of message control code for Carriage Return

SR - Set Search and Replace Rule for Host Message Fields

Command Format: SRnnmmsccbbffappp**ll**string**ll**string

Function: Set parameters for the host message replacement rules.

Parameters: nnmmsccbbffappp**ll**string**ll**string

Command Parameters	Parameter Function	Valid Values
nn	The number of the Search and Replace Rule	01 to 16
mm	The host message field number	00=All or 01 to 16
s	Source	1=Scanner A 2=Scanner B 3=A|B 4=Aux
cc	Symbology	01=Code 39 02=Interleaved 2-of-5 03=Codabar 04=UPC–A 05=UPC–E 06=EAN–8 07=EAN–13 08=Code 128 09=Pharma–Code 16=Any
bb	Symbol number	00=All or 01 to 16
ff	Minimum field length	00 to 64
a	Alignment	0=Right 1=Left
ppp	Fill character	000 to 255 (000= No alignment)
ll	Length of search pattern string	00=Empty or 01 to 24
string	Search pattern string	up to 24 characters
ll	Length of replace pattern string	00=Empty or 01 to 24
String	Replace pattern string	up to 24 characters

Response: = rr <end>

rr = response code
<end> = end of message control code

SR - Set Search and Replace Rule for Host Message Fields (continued)

Example:

Command: SR02013010009004807^S(.*)$02\1

Parameters: 02 01 3 01 00 09 0 048 07 ^S(.*)$ 02 \1

Command Parameters	Parameter Function	Values
nn	The number of the Search and Replace Rule	02
mm	The host message field number	01
s	Source	3=A|B
cc	Symbology	01=Code **39**
bb	Symbol number	00=All
ff	Minimum field length	09
a	Alignment	0=Right
ppp	Fill character	048=0
ll	Length of search pattern string	07
String	Search pattern string	^S(.*)$
ll	Length of replace pattern string	02
String	Replace pattern string	\1

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

SF - Set No-Read Replacement Strings

Command Format: SFnnllstring

Function: Set the No-Read Replacement Strings.

Parameters: nnllstring

Command Parameters	Parameter Function	Valid Values
nn	The number of the No-Read Replacement String	01 to 16
ll	Length of the No-Read Replacement String	00=Empty or 01 to 24
String	No-Read Replacement String	up to 24 characters

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: SF0207No–Read

Parameters: 02 07 No–Read

Command Parameters	Parameter Function	Values
nn	The number of the No-Read Replacement String	02
ll	Length of the No-Read Replacement String	07
String	No-Read Replacement String	No–Read

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return.

HC - Configure Host Communications

Command Format: HCaaannnssspppfr

Function: Configures host communication parameters.

Parameters: aaannnssspppfr

Command Parameter	Parameter Function	Valid Values
aaa	ACK (Acknowledge) character	ASCII decimal value 000 to 254 255 = None
nnn	NAK character (Negative Acknowledgement)	ASCII decimal value 000 to 254 255 = None
sss	Start scan character A	ASCII decimal value 000 to 254 255 = None
ppp	Stop scan character A	ASCII decimal value 000 to 254 255 = None
f	Large buffer enable	1=Yes, 0=No
r	Send Message to Host	0 = At end of Trigger 1= Immediately after Valid Package

Response: = rr <end>

rr = response code
<end> = end of message control code

HC - Configure Host Communications (continued)

Example:

Command: HC03603703504311

Parameters: 03603703504311

Command Parameter	Parameter Function	Values
aaa	ACK character	036 = $ character
nnn	NAK character	039 = & character
sss	Start character for Scanner A	035 = # character
ppp	Stop character for Scanner A	043 = + character
f	Large buffer enable	1=Yes
r	Send Message to Host	1=Immediately after Valid Package

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

HB - Configure Scanner B Start & Stop Characters[1]

Command Format: HCsssppp

Function: Configures Scanner B start and stop characters for independent host triggering.

Parameters: sssppp

Command Parameter	Parameter Function	Valid Values
sss	Start character for Scanner B	ASCII decimal value 000 to 254 255 = None
ppp	Stop character for Scanner B	ASCII decimal value 000 to 254 255 = None

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: HB035043

Parameters: 035043

Command Parameter	Parameter Function	Values
sss	Start character for Scanner B	035 = # character
ppp	Stop character for Scanner B	043 = + character

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

① Implemented in Series B Revision C (and later) decoders.

MF - Configure Host Message Format

Command Format: MFabcdefghhhiiijkl

Function: Configures the format of messages sent to the host.

Parameters: abcdefghhhiiijkl

a through g are Yes (1) and No (0) responses to the following parameters (in sequence shown):

Command Parameters	Parameter Function	Valid Values
a	Send bar code data?	1=Yes, 0=No
b	Send package count?	1=Yes, 0=No
c	Send bar code symbology?	1=Yes, 0=No
d	Send source identifier?	Ignored①
e	Send header message?	Ignored①
f	Send no-read message?	Ignored①
g	Expand UPC-E?	1=Yes, 0=No
hhh	Label delimiter character	ASCII Decimal Value 000 to 254 255 = None.
iii	Start character	ASCII Decimal Value 000 to 254 255 = None.
j	End message control character	0 = CRLF 1 = CR 2 = LF 3 = ETX 4 = None 5 = CR ETX 6 = LF ETX 7 = CR LF ETX
k	Transmission check method	0=None 1=LRC 2=Checksum-LSB first 3=Checksum-MSB first
l	Send performance indicator?	1=Yes, 0=No

① These parameters retained for compatibility with existing decoders. The presence of each string type indicates that the string should be sent.

Response: = rr <end>

rr = response code
<end>= end of message control code

MF - Configure Host Message Format (continued)

Example:

Command: MF1101110094042100

Parameters: 1101110094042100

Command Parameters	Parameter Function	Values
a	Send bar code data?	1=Yes
b	Send package count?	1=Yes
c	Send bar code symbology?	0=No
d	Send source identifier?	Ignored①
e	Send header message?	Ignored①
f	Send no-read message?	Ignored①
g	Expand UPC-E?	0=No
hhh	Label delimiter character	094 = ^ character
iii	Start character	042 = * character
j	End message control character	1 = CR
k	Transmission check method	0 = None
l	Send performance indicators?	0 = No

Response: = 00CR

00 = command complete response code
CR= end of message control code for Carriage Return

HF - Set the Number of Fields in Host Message

Command Format: HFnn

Function: Sets the number of fields in the host message.

Parameters: nn

Command Parameter	Parameter Function	Valid Values
nn	Set the number of fields in host message	00 to 16, 00 = All

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: HF02

Parameters: 02

Command Parameter	Parameter Function	Valid Values
nn	Set the number of fields in host message	02

Response: = 00CR

00= command complete response code
CR= end of message control code for Carriage Return

IX - Configure AUX Terminal Source Identifier

Command Format: IXlstring

Function: Defines a source identifier for the AUX port terminal. Source identifiers are included in messages sent to the host. They identify whether the data was scanned (by Scanner A or B) or entered at the AUX terminal.

Note: This command only applies when the AUX port is set for manual data entry operations.

Parameters: lstring

Command Parameter	Parameter Function	Valid Values
l	Length of source identifier	0 to 4①
String	Characters in source identifier	Up to 4 characters

① A zero length string will disable the source identifier.

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: IX3AUX

Parameters: AUX

Command Parameter	Parameter Function	Values
l	Length of source identifier	3
String	Characters in source identifier	AUX

Response: = 00LF

00= command complete response code
LF= end of message control code for Line Feed

IM - Configure Scanner A Source Identifier

Command Format: IMlstring

Function: Defines a source identifier for Scanner A. Source identifiers are included in messages sent to the host. They identify whether the data was scanned (by Scanner A or B) or entered at the AUX terminal.

NOTE: This command is valid only for dual head decoders.

Parameters: lstring

Command Parameter	Parameter Function	Valid Values
l	Length of source identifier	0 to 4①
string	Characters in source identifier	Up to 4 characters

① A zero length string will disable the source identifier.

Response: = rr <end>

rr= response code
<end> = end of message control code

Example:

Command: IM4SCNA

Parameters: 4SCNA

Command Parameter	Parameter Function	Values
l	Length of source identifier	4
String	Characters in source identifier	SCNA

Response: = 00LF

00 = command complete response code
LF = end of message control code for Line Feed

IB - Configure Scanner B Source Identifier

Command Format: IBlstring

Function: Defines a source identifier for Scanner B. Source identifiers are included in messages sent to the host. They identify whether the data was scanned (by Scanner A or B) or entered at the AUX terminal.

NOTE: This command is valid only for dual head decoders.

Parameters: lstring

Command Parameter	Parameter Function	Valid Values
l	Length of source identifier	0 to 4①
String	Characters in source identifier	Up to 4 characters

① A zero length string will disable the source identifier.

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: IB4SCNB

Parameters: 4SCNB

Command Parameter	Parameter Function	Values
l	Length of source identifier	4
String	Characters in source identifier	SCNB

Response: = 00LF

00 = command complete response code
LF= end of message control code for Line Feed

HM - Configure Header Message

Command Format: HMllstring

Function: Defines a header message for bar code data.

Parameters: llstring

Command Parameter	Parameter Function	Valid Values
ll	Length of header message	00 to 32①
String	Header message characters	Up to 32 characters

① A zero length string will disable the header message.

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: HM03A-B

Parameters: 03A-B

Command Parameter	Parameter Function	Values
ll	Length of header message	03
String	Header message characters	A-B

Response: = 00LF

00 = command complete response code
LF = end of message control code for Line Feed

NM - Configure Default No-Read String

Command Format: NMllstring

Function: Defines a no-read message for bar codes that could not be scanned or decoded. No-read messages are optionally included in messages sent to the host.

Parameters: ll*string*

Command Parameter	Parameter Function	Valid Values
ll	Length of no-read message	00 to 32①
String	No-read message characters	Up to 32 characters

① A zero length string disables a no read string.. A nonzero length string enables the no read string

Response: = rr <end>

rr = response code
<end> = end of message control code

Example:

Command: NM07NO-READ

Parameters: 07NO-READ

Command Parameter	Parameter Function	Values
ll	Length of no-read message	07
String	No-read message characters	NO-READ

Response: = 00CR

00 = command complete response code
CR = end of message control code for Carriage Return

AX - Configure AUX Terminal Data Entry Operations

Command Format: AXabceeefgg

Function: Configures AUX terminal data entry parameters. These parameters take effect when the AUX port is set to manual data entry mode (as described in Chapter 13).

Parameters: abceeefgg

Command Parameter	Parameter Function	Valid Values
a	Enable keyboard entry?	0= No 1= Yes 2= No-Read
b	Confirm entry?	0= No 1= Yes
c	Format AUX Keyboard Data?	0= Unformatted 1= Host Format
eee	Rubout character for keyboard data entry?	ASCII Decimal Value 000 to 255 255 = None
f	Echo keyboard data?	0= No 1= Yes
gg	Size of the display.	10 through 80

Response: = rr <end>

rr= response code
<end>= end of message control code

AX - Configure AUX Terminal Data Entry Operations (continued)

Example:

Command: AX111008180

Parameters: 111008180

Command Parameter	Parameter Function	Values
a	Enable keyboard entry?	1= Yes
b	Confirm entry?	1= Yes
c	Format Aux Terminal Keyboard Data?	1= Host Format
eee	Rubout character for keyboard data entry	ASCII Decimal Value 008 = backspace
f	Echo keyboard data?	1= Yes
gg	Size of the display.	80

Response: = 00CR

0= response code
CR= end of message control code

TM - Display Text Message at AUX Terminal and LCD

Command Format: TMfllstring

Function: Sends a message to the AUX port terminal (and/or LCD Display) and optionally enables the keyboard for one message. If a text message is not defined, the *Default Prompt Message* is sent.

Parameters: fllstring

Command Parameters	Parameter Function	Valid Values
f	Enable keyboard entry for one message.	1= Yes 0= No
ll	Length of text message.	00 through 80
String	Text message characters.	Up to 80 characters

Response: = rr <end>

rr= response code (see Table 17.D)
<end>= end of message control code

Note: If the previous message has not displayed, the response returns a code of 02 to indicate the command failed because the display buffer was not available.

If the AUX port is set to configuration mode, (CONFIG jumper is open), the response returns a code of 01. The message will display on the LCD Display but not the AUX terminal.

TM - Display Text Message at AUX Terminal and LCD (continued)

Example:

Command: TM111MESSAGETEXT

Parameters: 111MESSAGETEXT

Command Parameters	Parameter Function	Values
f	Enable keyboard entry for one message.	1= Yes
ll	Length of text message.	11
String	Text message characters.	MESSAGETEXT

Response: =00CR

00 = command complete response code
CR= end of message control code for Carriage Return

PM - Default Prompt Message for AUX Terminal

Command Format: PMllstring

Function: Defines the default prompt message for the AUX port terminal.

Parameters: llstring

Command Parameters	Parameter Function	Valid Values
ll	Length of the AUX terminal prompt message	00 through 20
String	AUX terminal prompt message string.	Up to 20 characters

Response: = rr <end>

rr = response code
<end>= end of message control code

Example:

Command: PM11ENTER DATA:

Parameters: 11ENTER DATA:

Command Parameters	Parameter Function	Values
ll	Length of the AUX terminal prompt message	11
String	AUX terminal prompt message string.	ENTER DATA:

Response: =00CR

00 = command complete response code
CR = end of message control code for Carriage Return

PI - Read Decoder Performance Indicators

Command Format: PI

Function: Reads the decoder performance indicators for Scanners A and B.

Parameters: None

Response Parameters	Parameter Function	Valid Values
aaa	Scanner A Performance Indicator	3 digit value 000 through 100, 999①
bbb	Scanner B Performance Indicator	3 digit value 000 through 100, 999①②

① 999 indicates the decoder is not decoding because of a buffer overflow condition.

② Applicable only with dual head scanner.

Response: aaa<end> = rr <end> for single head scanners, or
aaabbb<end> = rr <end> for dual head scanners.

<end>= end of message code
rr= response code
<end>= end of message code

Example:

Command: PI

Response: 000099LF = 00LF

Response Parameters	Parameter Function	Values
aaa	Scanner A Performance Indicator	000
bbb	Scanner B Performance Indicator	099

LF= end of message control code
00= command complete response code
LF= end of message control code

PR - Read Package Counter

Command Format: PR

Function: Returns the count maintained by the package counter.

Parameters: None

Response: pppppp<end>= rr <end>

pppppp=	package count, up to 999999
<end>=	end of message control code
rr =	response code
<end>=	end of message control code

Example:

Command: PR

Response: 000075LF = 00LF

000075=	number of packages read by decoder
LF=	end of message code for Line Feed
00=	command complete response code
L=	end of message code for Line Feed

NR - Read Symbols Not Read Counter

Command Format: NR

Function: Returns the count in the no-read counter.

Parameters: None

Response: pppppp<end>= rr <end>

pppppp = no-read count, up to 999999
<end> = end of message control code
rr= response code
<end>= end of message control code

Example:

Command: NR

Response: 000016CR = 00CR

000016= no-read count of 16
CR= end of message control code for Carriage Return
00 = command complete response code
CR= end of message control code Carriage Return

MC - Read Output Counter

Command Format: MCn

Function: Reads the selected output counter.

Parameters: n = counter 1 through 8

Response: mmmmmm<end>=rr<end>

mmmmmm=	output counter count. Maximum value of 999999
<end>=	end of message code
rr=	response code
<end>=	end of message code

Example:

Command: MC3

Parameters: 3 = read output counter #3.

Response: 000121LF = 00LF

000121=	Counter activated 121 times since last restart or reset
LF=	end of message code for Line Feed
00=	command complete response code
LF=	end of message code for Line Feed

PC - Clear Package Counter

Command Format: PC

Function: Clears the package counter to 0.

Parameters: None

Response: = rr <end>

rr= response code
<end>= end of message control code

Example:

Command: PC

Response: = 00 <CR>

00= command complete response code
CR= end of message control code

NC - Clear Symbols Not Read Counter

Command Format: NC

Function: Clears the no-read counter to 0.

Parameters: None

Response: = rr <end>

rr= response code
<end>= end of message control code

Example:

Command: NC

Response: = 00CR

0= command complete response code
CR= end of message control code for Carriage Return

RN - Save Configuration to Storage Memory and Restart

Command Format: RN

Function: Saves current configuration in to storage memory and restarts the decoder. Operation then resumes using the new configuration parameters.

Parameters: None

Response: = 97 <end>

97= Indicates the command was received and the decoder is resetting. **The reset takes approximately 5 seconds.**
<end>= end of message code

SA - Save Configuration to Storage Memory (No Restart)

Command Format: SA

Function: Saves current configuration to storage memory.

Parameters: None

Response: = 00 <end>

00 = Indicates the command was received
<end>= end of message code

Important: Host communication parameter changes do not take effect until the decoder is restarted.

DD - Set Configuration to Default Values

Command Format: DD

Function: Sets configuration in operating memory to the default values.

Important: Host port communication parameters and the contents of storage memory are not changed with the DD command.

Parameters: None

Response: = rr<end>

rr = response code
<end>= end of message control code

Example: DD

Command: DD

Response: = 00CRLF

00 = command complete response code
CRLF = end of message control code for Carriage Return and Line Feed.

RD - Set Configuration to Factory Defaults and Restart

Command Format: RD

Function: Resets decoder to factory defaults, saves the configuration in storage memory, and then restarts the decoder. Operation then resumes using the new configuration parameters. Refer to Appendix B for factory default settings.

Important: Host port communication parameters are not changed to default values with this command.

Parameters: None

Response: = 98 <end>

98 = Indicates the command was received and the decoder is resetting. **The reset takes approximately 5 seconds.**
<end>= end of message control code

RE - Reset Decoder

Command Format: RE

Function:	Resets decoder. Recalls the configuration from storage memory and restarts the decoder.
Parameters:	None
Response:	= 97 <end>

97 = Indicates the command was received and the decoder is resetting. T**he reset takes approximately 5 seconds.**
<end>= end of message code

ID - Version of Software

Command Format: ID

Function:	Read the version of decoder software presently running.
Parameters:	None
Response:	aa.aa <end>=00<end>

aa.aa = Software revision number
00 = Complete and successful response code
<end>= end of message control code

DM – Configure Bar Code Data Mask

Command Format: DM

Function: Obsolete command. Formerly used to define a data mask to return and/or suppress selected characters in each field sent to the host. Host Message Replacement Rules replace this function.

Response: =50 rr <end>

50=	Unknown Command response code
<end>=	end of message control code

PD - Configure Pad Data Character

Command Format: PD

Function: Obsolete command. Formerly used to define thepad character for the bar code data mask command (DM), which is not used in this series.

Response: =50 rr <end>

50=	Unknown Command response code
<end>=	end of message control code

Chapter 16

PCCC Host Commands

Chapter Objectives

This chapter defines PCCC (Programmable Controller Communications Commands) commands you can send from a host to the decoder using the DH485 interface. These commands allow you to use binary data exchange to configure the decoder, read data from the decoder, and obtain diagnostic information.

Protocol Options

The PCCC host commands use the Allen-Bradley DH485 link protocol. To use these commands, the *Host Protocol* configuration parameter on the **Host Communications** configuration screen must be set to one of these options:

- DH485 PCCC-1 Protocol with Write Replies
- DH485 PCCC-2 Protocol without Write Replies

The decoder supports the following DH485 communication addresses:

DH485 LSAP	Function
0	Diagnostic Commands (Perform Application Layer)
1 or 128	PCCC Commands (Perform Application Layer)
129	Perform Link Reset-immediate Block

PCCC Commands

The PCCC commands perform the same functions as the configuration screens and fall into three categories:

1. **Unprotected Read Command** The unprotected read command is used to read bar code data, configuration data, counter values, performance indicators and the last message sent to host.
2. **Unprotected Write Command** The unprotected write command is used to modify (or write over) configuration data, clear counters, flush data, set defaults, and perform other functions.
3. **Diagnostic Command** The diagnostic command is used to read link layer diagnostic counters and statuses, reset diagnostic counters, and perform a diagnostic loop.

ATTENTION: When controlling discrete outputs locally using AUX port configuration, suspend host communications to prevent outputs from unintentionally changing state.

Command Format

The general structure and definitions of all commands is shown below. The structure shows the high and low byte of each data word (word= 2 bytes). Data is always transmitted with the low byte of each data word first and then the high byte. In the command explanations below, MSB stands for Most Significant Bit, and LSB stands for Least Significant Bit.

	High Byte (MSB)	Low Byte (LSB)	
1	STS	CMD	0
3	Transaction Number Sequence (TNS)		2
5	High Address	FNC Code or Low Address	4
7 . . . 127	Data 122 or 124 bytes maximum		6 . . . 126

- **CMD**

  Byte 0 specifies the command to perform.

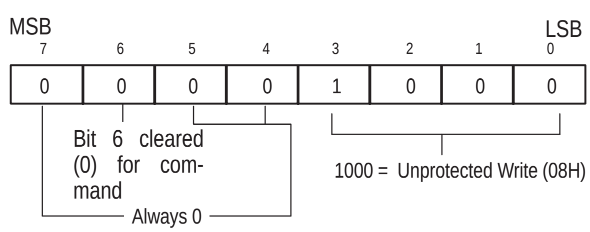
  Bits 0, 1, 2 and 3 of the CMD byte contain the command code. The options are:

  – 0001(01H) = Unprotected Read Command
  – 1000 (08H) = Unprotected Write Command
  – 0110 (06H) = Diagnostic Command

  Bit 6 is cleared (0) for the command and set (1) for the reply.

  Bit 4, 5, and 7 are always zero.

  To send an unprotected write command, CMD byte 0 would look like this:



- **STS**

  Byte 1 specifies the command status which is always 0.
- **TNS**

  Bytes 2 and 3 contain a unique transaction number sequence that links each command to a reply. The TNS is user defined.
- **FNC Code**

  When the CMD byte = 06H (diagnostic command), byte 4 specifies a diagnostic function. For example, FNC = 01 means read diagnostic counters.
- **Low Address**

  When the CMD byte = 01H (unprotected read command) or 08H (unprotected write command) byte 4 contains the low byte of a two byte address.

  The low address (byte 4) and high address (byte 5) map to a specific area in decoder memory for a read or write operation.
- **High Address**

  When the CMD byte = 01H (unprotected read command) or 08H (unprotected write command) byte 5 contains the high byte of a two byte address.

  The low address (byte 4) and high address (byte 5) map to a specific area in decoder memory for a read or write operation.
- **Data**

  The data area is command dependent. The starting byte for the data area is also command dependent.

Command Reply Format

The general format and definition of a command reply is:

	MSB High Byte	Low Byte LSB	
1	STS	CMD Reply	0
3	TNS		2
5 . . . 127	Optional Data 124 bytes maximum		4 . . . 126

- **CMD Reply**

  Byte 0 contains the response to a command. Bit 6 is set for the reply and responses are:

– 41H – Response to an unprotected read (01H) command
– 46H – Response to a diagnostic link (06H) command
– 48H – Response to an unprotected write (08H) command

If the CMD byte sent in any of the commands is invalid, the STS byte will contain 10H.

- **STS**

  Byte 1 contains the status of a processed command. The table below lists the STS codes for all commands.

Status Response Codes

Hex Value	Meaning
00H	Command successful (no errors).
01H	Command complete and successful.①
02H	Display buffer is full. ①
10H	Valid command but invalid format or address.
20H	Invalid or unsupported command.
30H	Hardware fault (reserved and unused).
40H	Command successful but no data available (read command only)
80H	Command successful but data truncated. (read command only)

① Applies only to CMD Address 900H or 901H. See page 16–12

- **TNS**

  Bytes 2 and 3 contain the same transaction number sequence as the command. The TNS value links the reply to the command.

- **Data**

  The data area contains data requested by a read command. The write commands do not return data.

Unprotected Read Command

The unprotected read command (01H) performs these decoder functions:

- Reads current bar code data
- Reads decoder configuration data
- Reads decoder performance indicator, counters, and diagnostics
- Reads last message to host

Each command returns data to the host that is read from a specific address of the decoder's memory. The following sections define each read command.

Appendix A contains a summary of the memory addresses for all decoder functions or commands.

Read Current Bar Code Data

Bar code data is stored as a packet in the host buffer of the decoder at address 100H to 3BFH. Each packet contains data from one read operation. The maximum number of bytes in one packet is 704 bytes.

To read the current bar code data, send this command structure:

Read Current Bar Code Data Command

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00	CMD= 01H	0
3	TNS		2
5	Host Buffer Address= 100H		4
7	00H	Size = n	6

Each command can return up to 124 (7C Hex) bytes of data, which is determined by the size byte (byte 6). The amount of data in the host buffer is variable.

The size of the reply varies depending on how much data is in the host buffer and the number of bytes specified in the size byte.

If the host buffer is empty, the reply is returned without data and a status of 40H (no data in host buffer).

Reply - No Data in Host Buffer

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 40H	CMD Reply = 41H	0
3	TNS		2

If the host buffer contains data ≤ the number of bytes specified in the size byte, the reply returns all data and a status of 00H (no errors).

Reply - All Data Returned in Host Buffer

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD Reply = 41H	0
3	TNS		2
5	Data		4

If the host buffer contains more data than the number of bytes specified in the size byte, the reply is returned with truncated data and a status of 80H (data truncated).

Reply - Truncated Data (Host Buffer Contains More Data)

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 80H	CMD Reply = 41H	0
3	TNS		2
5	Data		4

To read the rest of the data in the buffer, send one or more additional read commands. In each command, offset the address appropriately from the previous command. A status of 00H is returned in the reply when the last segment of data from a bar code packet is read. Here is an example.

The host buffer contains a bar code packet that is 200 bytes. To read the entire packet, you need to send two read commands. The first command would read 124 bytes (62 words) of data. The second command would read the remaining 76 bytes (38 words) of data.

The following table shows the start and end address for each read command.

Read Commands	Address HEX	Address Decimal	Read 100 words (200 bytes)
1st Read Command Start Address	100	256	62 words (124 bytes)
2nd Read Command Start Address	17C	380	38 words (76 bytes)

Note: By always setting the size of 7C Hex, you will know that the decoder will always return *up to* 124 bytes.

Read Counters and Performance Indicator

Counter values (package, output, no-read) and performance data are stored at addresses 600H to 6FFH. The command format for reading this data is:

Read Counters and Performance Indicator

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00	CMD= 01H	0
3	TNS		2
5	Read Counter or Performance Indicator Address		4
7	00H	Size = n	6

Appendix A lists the address and byte size for each counter and the decoder performance indicator.

The following command reads the value of output counter 1:

Read Output Counter 1

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00	CMD= 01H	0
3	TNS		2
5	604H		4
7	00H	Size = 4	6

Read Reply

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD Reply = 41H	0
3	TNS		2
5	Counter Data		4
7			6

You can read more than one counter, however the read operation must specify an address within the valid address range and start on an address boundary. If you try to read outside a valid address range, the reply returns with a status of 10H (invalid address).

Read Last Host Message

The last message sent to the host is stored at address 800H. The command and reply format for reading the last host message is:

Read Last Host Message

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 01H	0
3	TNS		2
5	Address = 800H		4
7	00H	Size (Unused)	6

Reply

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD Reply = 41H	0
3	TNS		2
5	Data from Last Host Message		4

Read Decoder Configuration Data

Appendix A lists the address location for each configuration parameter along with the byte size of the data and the default value. To read or examine one or more parameters, send the read command with the appropriate starting address and byte size referenced in Appendix A.

Read Configuration Data

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 01H	0
3	TNS		2
5	Configuration Data Address (300H to 5FFH)		4
7	00H	Size = n	6

The reply returns the configuration data at the specified address.

Reply to Read Configuration Data

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD Reply = 41H	0
3	TNS		2
5	Configuration Data		4

You can read more than one parameter, however the read operation must specify an address within the valid address range and start on a parameter boundary. If you try to read outside a valid address range, the reply returns with a status of 10H (invalid address).

Unprotected Write Command

The unprotected write command (08H) performs these decoder functions:

- Modifies (or writes over) decoder configuration data
- Executes a decoder function
- Sends a repeat read command
- Sends a message to the AUX port terminal and LCD Display
- Holds a discrete output on or off

Each command modifies (or overwrites) data at a specific address in decoder memory or executes a specific decoder function. The following sections define each of the write commands.

Important: If the configuration date is a text string, you must send the length of the string as the first byte of the string.

Modify Configuration Data

Appendix A lists the address location for each configuration parameter along with the byte size of the data and the default value. To modify a specific parameter, send the write command with the appropriate starting address and the appropriate data referenced in Appendix A.

To modify the configuration data, send this command structure:

Modify or (Write Over) Configuration Data

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 08H	0
3	TNS		2
5	Configuration Data Address (3C0H to 5FFH)		4
7 . . 127	New Configuration Data 122 bytes maximum		6 . . 128

The command includes new configuration data for specified parameters.

Reply - Modify or (Write Over) Configuration Data

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD Reply = 48H	0
3	TNS		2

An invalid configuration data address returns a status code of 10H (invalid address).

Execute Decoder Functions

The unprotected write (08H) command is also used to execute decoder functions or commands. Appendix A lists the decoder functions you can perform and their respective addresses.

To execute a command listed in Appendix A, send an unprotected write command to the specified command address.

The command and reply format for executing a decoder function is:

Execute Decoder Function

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 08H	0
3	TNS		2
5	Command Address = 600H through 639H,640H, 641H		4

Reply

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD Reply = 48H	0
3	TNS		2

If you send a command with an invalid address, the reply returns a status code of 10H (invalid address).

To set the current configuration to the factory defaults, send this command:

Set Decoder Configuration to Defaults

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 08H	0
3	TNS		2
5	Command Address = 633H		4

To save the current configuration and restart the decoder, send this command:

Save Configuration and Restart Decoder

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 08H	0
3	TNS		2
5	Command Address = 632H		4

To clear output counter 4 to all zeros, send this command:

Clear Output Counter 4

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 08H	0
3	TNS		2
5	Command Address = 610H		4

Send Repeat Read Command

The Repeat Read command tells the decoder to wait for bar code data. When data is available, the decoder sends it to a specific address in host memory using the unprotected write (08H) command. The host does not have to request data at each poll when a 2760-RB is used (RB polls automatically). The decoder automatically sends bar code data as it is decoded.

The command structure for sending a repeat read command is:

Repeat Read Command

	High Byte MSB	Low Byte LSB	
1	STS= 00	CMD= 08H	0
3	TNS		2
5	Command Address= 640H		4
7	Starting Target Host Address		6
9	Repeat Count= n	Size = n	8

- **Command Address**

  Bytes 4 and 5 contain address 640H. This address tells the decoder to perform a repeat read command.
- **Target Host Address**

  Specifies the host address to which the decoder will send the read reply data.
- **Size**

  Byte 8 specifies the maximum number of bytes sent to the host in each read reply. The maximum size is 122 bytes.
- **Repeat Count**

  Byte 9 specifies the maximum number of bar code packets that can be sent to the host. A value of 0 means the decoder can send packets until terminated by a “Cancel Repeat Read” command..

After the host sends the repeat read command, the decoder generates an unprotected write command to send the bar code data to the host.

The decoder continues to send data to the host until the repeat count is reached or until a Cancel Repeat command is sent to the decoder.

The amount of data returned in the read reply is determined by the size parameter and the amount of data in the host buffer.

If the repeat count is non zero, the repeat count automatically decrements by one and the repeat read command continues processing. When the repeat count decrements to zero, the repeat read command terminates.

Cancel Repeat Read Command

To terminate the processing of a Repeat Read command, send the Cancel Repeat Read command to the decoder.

Cancel Repeat Read Command

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 08H	**0**
3	TNS		**2**
5	Cancel Repeat Read Command Address = 641H		**4**

Display Text Message on AUX Terminal / Enable AUX Terminal Keyboard.A

To configure a message for display on the AUX terminal (and/or LCD Display), use the command address 900H or 901H. The 900H command address configures a message for display at the AUX terminal but does not enable the keyboard. The 901H command configures a message for display and enables the keyboard for one entry.

Display Message on AUX Terminal (900H)
Display Message and Enable Keyboard Entry (901H)

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 08H	**0**
3	TNS		**2**
5	Command Address = 900H, 901H		**4**
7		Length of message string	**6**
	Message Data to AUX Port		

If the message exceeds the size of the AUX terminal display, it will be truncated.

If the LCD is enabled to display data and scrolling is disabled, data that exceeds 40 characters is truncated. If scrolling is enabled for the LCD, data that exceeds 20 characters is truncated.

If you do not enter message data, the *Default Prompt Message* (defined during AUX terminal configuration) is used.

Below is the reply to both the 900H and 901H command:

Command Replies

	High Byte	Low Byte	
	MSB	LSB	
1	STS= 00H	CMD Reply = 48H	0
3	TNS		2

If the AUX port is not set to manual data entry mode (CONFIG jumper is open), the LCD will display the message but not the AUX terminal. The command returns a status of 01H.

If the decoder has not processed the previous text message, the command returns a status of 02H indicating the command failed because the display buffer was not available.

Hold Discrete Output Open or Closed

Allows the host to control the discrete outputs (regardless of their ”normal” state) for a set duration. When the specified duration expires, the output reverts to its previous state.

If a normally open (or closed) output is held open (or closed), the state of the output will not change due to other conditions.

Holds Discrete Output Open or Closed

	High Byte	Low Byte	
	MSB	LSB	
1	STS= 00H	CMD= 08H	0
3	TNS		2
5	Command Address = (see Appendix A)		4
7	Pulse Duration (in milliseconds)		6

Command Reply

	High Byte	Low Byte	
	MSB	LSB	
1	STS= 00H	CMD Reply = 48H	0
3	TNS		2

Appendix A lists the command addresses for holding a discrete output (1-8) open or closed. Valid duration values (in milliseconds) are 0010 through 9999. Note that the duration must be expressed in hex format (0A through 270F hexadecimal).

Example (holds output closed for 10 milliseconds)

	High Byte (MSB)	Low Byte (LSB)	
1	00H	08H	0
3	TNS		2
5	06H	60H	4
7	00H	0AH	6

Important: A duration of 0000 holds the specified output in the programmed state until it is changed with another host command or via the AUX terminal configuration screens. The condition field on the AUX terminal will display Open or Closed.

Diagnostic Link Commands

The diagnostic commands (06H) allow you to obtain diagnostic data on an DH485 communications link. The decoder supports these diagnostic commands:

- Diagnostic Loop (CMD= 06H, FNC= 00H)
- Read Diagnostic Counters (CMD= 06H, FNC= 01H)
- Read Diagnostic Status (CMD= 06H, FNC= 03H)
- Reset Diagnostic Counters (CMD= 06H, FNC= 07H)

The command code for all diagnostic functions is 06H. A function code (FNC) identifies each command and specifies which command to perform.

Diagnostic Loop

The Diagnostic Loop Command (CMD= 08H, FNC= 00H) echoes data back to the host. The reply returns the same data sent in the Diagnostic Loop Data area of the command. The data area can contain up to 122 bytes.

Diagnostic Loop Command

	High Byte MSB	Low Byte LSB	
1	STS= 00H	CMD= 06H	0
3	TNS		2
5		FNC=00H	4
	Diagnostic Loop Data 122 bytes maximum		

Diagnostic Loop Reply

	High Byte MSB	Low Byte LSB	
1	STS= 00H	CMD Reply = 46H	0
3	TNS		2
5	Diagnostic Loop Data (same data as in command)		4

Read Diagnostic Counters

The Read Diagnostic Counters command (CMD= 06H, FNC= 01H) returns diagnostic counter values. The command structure looks like this:

Read Diagnostic Counters Command

	High Byte MSB	Low Byte LSB	
1	STS= 00H	CMD= 06H	0
3	TNS		2
		FNC=01H	4

The reply returns values for ten diagnostic counters. The reply format looks like this:

Read Diagnostic Counters Reply

	High Byte MSB	Low Byte LSB	
1	STS= 00H	CMD Reply = 46H	0
3	TNS		2
5	Total Message Packets Received (2 bytes)		4
7	Total Message Packets Transmitted (2 bytes)		6
9	Msg Retry Failures	Msg ACK-Timeout/Retries	8
11	Msg Recvd: NAK-NoMemory	Msg Replies: NAK-NoMemory	10
13	Msg Replies: NAK-NoService	Bad Messages Received	12
15	Msg Replies: NAK-TooBig	Msg Replies: NAK-Solicit	14

Each diagnostic counter increments when the event occurs. The Reset Diagnostic Counters command resets all counter values to zero (0).

Reset Diagnostic Counters

The Reset Diagnostic Counters (CMD= 06H, FNC= 07) sets all diagnostic counter values to zero (0). The command and reply formats look like this:

Reset Diagnostic Counters Command

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 06H	0
3	TNS		2
		FNC=07H	4

Reset Diagnostic Counters Reply

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD Reply = 46H	0
3	TNS		2

Read Diagnostic Status

The Read Diagnostic Status command (CMD= 06H, FNC= 03H) returns seven diagnostic parameters in the reply:

Diagnostic Return Parameters

Parameter	Value	Bytes Size
Mode/Status	00	1 byte
Extended Type	EEH	1 byte
Interface Type	22H	1 byte
Processor Type	21H	1 byte
Series/Revision	22H (Series B, Revision C)	1 byte
Bulletin Number/Product Name	ASCII characters	11 bytes
Product Information	unused	8 bytes

The command and reply format for the Read Diagnostic Status Command is:

Read Diagnostic Status Command

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD= 06H	**0**
3	TNS		**2**
		FNC=03H	**4**

Read Diagnostic Status Reply

	High Byte (MSB)	Low Byte (LSB)	
1	STS= 00H	CMD Reply = 46H	**0**
3	TNS		**2**
5	EE	00	**4**
7	21	22	**6**
9	”2”	22	**8**
11	”5”	”7”	**10**
13	”–”	”5”	**12**
15	”D” (or “S”)	”D”	**14**
17	” ”	”1”	**16**
19	” ”	” ”	**18**
21	00	00	**20**
23	00	00	**22**
25	00	00	**24**
27	00	00	**26**

The Series/Revision byte indicates the product series and revision levels. The three most significant bits indicate the series and the other five bits indicate the revision. For example, a value of 0 = A, 1 = B, 2 = C.

Series A, Revision A returns as $\underbrace{000}_{A}\ \underbrace{00000}_{A}$

Series B, Revision C returns as $\underbrace{001}_{B}\ \underbrace{00010}_{C}$

Chapter 17

Maintenance and Troubleshooting

Chapter Objectives

This chapter provides troubleshooting information to assist with problem detection and resolution. It also shows how to replace the I/O module protection fuses.

ATTENTION: Always use caution when replacing fuses or installing accessories within the decoder.

Replacing the Battery

The optional lithium backup battery (Catalog Number 1747–BA) will last up to five years. If installed, replace the battery five years from the date imprinted on the side of the battery cell. No other battery–related maintenance or service is required.

The battery clip is used only to hold the battery in position. It is not used to create an electrical circuit. Instead, the battery is equipped with a female connector which attaches to the three–pronged male connector below it on the main circuit board.

To remove the battery, squeeze the narrow edges of the connector, and gently pull it away from the board. The connector is equipped with a locking mechanism which releases when squeezed. Gently remove the battery from the mounting clip.

ATTENTION: Be sure to follow all safety precautions regarding the handling and disposal of lithium batteries. Be sure to read and understand all materials accompanying the battery before attempting to install it.

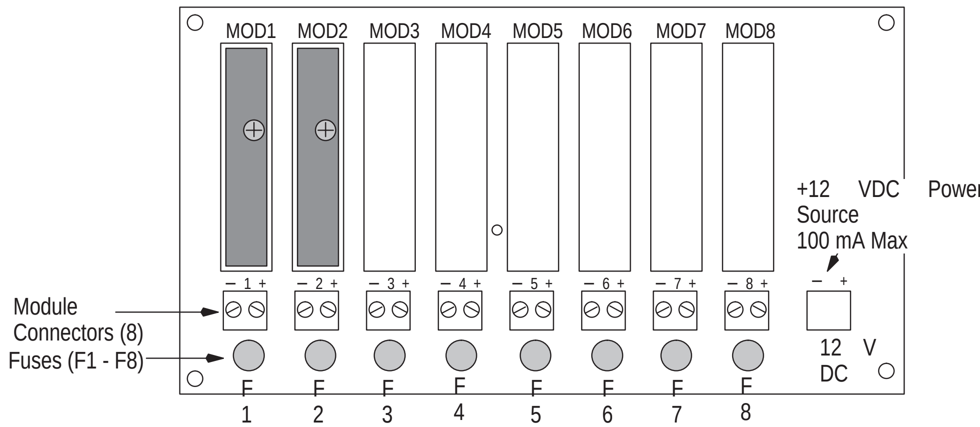
To install a new battery, insert the battery in the retaining clip on the main circuit board. Orientation of the battery in the clip makes no difference, as the clip serves only to secure the battery in position. Place the female connector attached to the battery on the three–pronged plug on the main circuit board. The plug will fit in only one direction. If you feel resistance, reverse the plug and try again.

You will hear a click when the connector locking mechanism engages.

Replacing Module Fuses

The I/O Module Board has fuses for each of the eight modules. The module fuses are located below the module connectors. When replacing fuses, use Replacement Part No. 77104-899-01.

Figure 17.1 Module fuses



To replace a module fuse on the I/O board:

1. Disconnect power from decoder and module connectors.
2. Isolate cause of blown fuse and correct problem. See Appendix G for details on the use of output modules with inductive loads.
3. Loosen the two screws which secure the cover of the decoder and open.
4. Remove defective fuse by pulling it from the I/O board.
5. Align fuse pins over sockets in board before inserting fuse. Insert new fuse into correct position (F1 - F8).

   Note: The pins must puncture the silicon seal of the I/O board sockets.
6. Close cover of decoder and tighten screws.

Note: The discrete I/O LED indicators still operate when a fuse is blown.

Troubleshooting

This section lists problems that may occur with the decoder and/or connected equipment. Each problem lists possible causes and solutions.

Problem: Decoder ”Power On” indicator does not light.

Cause: Decoder power switch is in OFF position.
Solution: Turn decoder power switch to ON position.

Cause: No incoming power.
Solution: Verify power source.

Cause: Improper connection to power source.
Solution: Check connections.

Cause: Faulty decoder.
Solution: Return decoder to Allen-Bradley for repair.

Problem: Decoder ”Power On” indicator lights but ”CPU Active” indicator does not stay lit.

Cause: Internal decoder failure.
Solution: Return decoder to Allen-Bradley for repair.

Problem: Decoder ”Laser On” indicator lights but scanner ”Laser On” indicator does not light.

Cause: Cable connections between decoder and scanner are loose or defective.
Solution: Check cable and connections.

Problem: Decoder ”Laser On” indicator does not light.

Cause: Wrong configuration.
Solution: Configure the *Laser-On Mode* parameter of the decoder to ON.

Cause: Trigger not active. (*Laser-on Mode* parameter of decoder is set to *Triggered*).
Solution: Activate trigger and look at the Trigger Active indicator on decoder. When the trigger is activated, the indicator should light.

Problem: ”Laser On” indicators on both the decoder and scanner light but the scanner does not emit the laser light.

Cause: Mechanical shutter on scanner closed (2755-L4/L5 scanners only).

Solution: Open shutter.

Cause: Scanner Laser On switch is in OFF position (2755-L7/L9 scanners only).

Solution: Turn on switch.

Cause: Cable connections between decoder and scanner are loose or defective.

Solution: Check cable and connections.

Cause: Laser tube or diode burned out or defective.

Solution: Replace scanner.

Problem: Decoder ”Trigger Active” indicator will not light.

Cause: Wrong or improperly wired trigger source. (D*ecode Mode* is set to *Triggered*).

Solution: Verify that an appropriate package detector is properly connected to the scanner. Most photoelectric package detectors have a built-in LED. Verify operation of this package detect LED. Some photoelectric switches have sensitivity adjustments. Check adjustment.

Cause: Cable connections between decoder and scanner are loose or defective.

Solution: Check cables and connections.

Problem: Decoder cannot read label.

Cause: Decoder not configured correctly.

Solution: Check decoder configuration to verify that parameters are set appropriately for your application.

Cause: Loose cables or connections.

Solution: Check cables and connections.

Problem: Decoder cannot read label.

Cause: Scanner is at incorrect angle or distance from the bar code.

Solution: Determine the optimum reading angle by using a static bar code label position and checking the Decoder Performance Indicators with the *Decode Mode* set to *Continuous*. Fix the scanner at a position that produces a high decoder performance value. After properly positioning the scanner, return the decoder configuration to the correct triggered mode of operation.

Cause: Scanner lens is incorrect for the label size.

Solution: Select a scanner with a lens appropriate for the label size. Refer to scanner User Manual.

Cause: Label out of specification.

Solution: Use labels that are within industry standards.

Problem: Excessive ”No-Reads” during decoding.

Cause: Poor or marginal quality bar code labels.

Solution: Use labels that meet Automatic Identification Manufacturer’s (AIM) specifications for the selected symbology.

Cause: Incorrect scanner selected for application.

Solution: Measure narrow bar width (or space, whichever is narrowest) of bar code and note minimum and maximum reading distance. Consult your scanner’s User Manual to verify that these specifications are within the proper guidelines for your scanner.

Cause: Scanner is at incorrect angle or distance from the bar code.

Solution: Determine the optimum reading angle by checking the Decoder Performance Indicators while the *Decode Mode* is set to *Continuous* and using a static bar code label position. Fix the scanner at a position that produces a high decoder performance value. After properly positioning the scanner, return the decoder configuration to the correct triggered mode of operation.

Cause: Package detect positioning.

Solution: Make sure the package detect signal is active before the bar code enters the laser beam. Check that package detect is continually blocked while in scanning area of laser. The ”Trigger Active” indicator should light when a bar code is scanned in triggered mode.

Cause: Scan speed not high enough or product line speed to high.

Solution: Calculate ”scans per label” based on line speed and bar code orientation (picket fence or step ladder). Calculate at least five scans per label at full line speed. If calculation is less than five scans per label, select a higher speed scanner or reduce product line speed.

Problem: Output LED indicator does not operate.

Cause: Configuration parameters are not set correctly.

Solution: Review configuration parameters. The LED indicators are active for the duration set by the *output duration* parameter. If a duration is set to 0000, the LED will not change (although the counters still increment). After making corrections, we recommend you, SAVE the changes and RESTART the decoder.

Cause: Outputs disabled.

Solution: Restart decoder.

Problem: Output LED indicator operates but output does not.

Cause: Improper connections.

Solution: Check connections to output modules. Verify that power is present. **Check polarity of DC modules.**

Cause: Output module fuse blown.

Solution: Determine reason for blown fuse, correct problem, and then replace fuse.

Cause: Defective output module.

Solution: Replace defective module with new module.

Problem: Output module fuse 77104-899-01 blows.

Cause: Inductive device used with module has an inrush current that exceeds module specifications.

Solution: Replace the fuse and use a device rated within the specification.

Problem: Output module (Catalog No. 2755-OB5S) blows.

Cause: Excessive back EMF of inductive load.

Solution: Install a rectifier diode in parallel with the module. See Appendix G.

Problem: Characters do not display or are difficult to read on the LCD Display.

Cause: Inadequate contrast.

Solution: Improve readability of characters on LCD Display by adjusting LCD Display potentiometer on main logic board. See Chapter 9 for details.

Problem: AUX Terminal is set to manual data entry mode, and terminal is displaying duplicate characters.

Cause: The terminal itself is set to echo data and the *Echo to Terminal* configuration parameter is also set to *Yes*.

Solution: Set the *Echo to Terminal* parameter to *No.*

Problem: AUX Terminal is set to manual data entry mode, and terminal is not displaying any characters.

Cause: Neither the terminal nor the decoder configuration is set to echo data.

Solution: Set the *Echo to Terminal* parameter to *Yes.*

Problem: No communication between decoder and AUX terminal.

Cause: Incorrect terminal selected from **Select CRT Type** screen.

Solution: Select the correct terminal type. See Chapter 5.

Cause: Improperly connected cable.

Solution: Check connections. See Appendix D.

Cause: Improperly fabricated cable.

Solution: Verify connections. See Appendix D.

Cause: Incorrect terminal setup.

Solution: Verify that your terminal is set for 9600 baud, no parity, 1 stop bit. See Appendix D.

Problem: You cannot access the configuration screens on the AUX terminal.

Cause: The AUX port is set to manual data entry mode, not configuration mode.

Solution: Place the AUX Terminal jumper on the logic board in the CONFIG position and make sure the AUX port connector does **not** have a jumper between pins 15 and 16 (NEMA Type 1) or G and H (NEMA Type 4).

Problem: You are unable to perform manual data entry functions at the AUX terminal.

Cause: The AUX port is set to configuration mode, not manual data entry mode.

Solution: Using one of the AUX Terminal Selectors, switch the AUX port to manual data entry mode. See Chapter 13.

Problem: No communication between decoder and host device.

Cause: Communication parameters (baud rate, parity, stop bits, host protocol) of decoder are not set correctly or the parameters were not saved, and the decoder restarted.

Solution: Make appropriate changes to communication parameters, SAVE the configuration, and RESTART the decoder.

Cause: Improperly connected cable.

Solution: Check connections.

Cause: Improperly fabricated cable.

Solution: Verify connections using Appendix E.

Cause: Flexible Interface Module (Catalog No. 2760-RB) is not configured properly.

Solution: Check module configuration.

Specifications

Bar Code Decoders Catalog Numbers 2755-DD1_ 2755-DD4_ 2755-DS1_ 2755-DS4_

Electrical

Input Line Voltage	85 (Min) to 264 (Max) VAC 100 to 240 VAC Nominal
Input Line Frequency Nominal	47 (Min) to 63 (Max) Hz; 50 to 60 Hz
Power	80 VA Max (DD decoderss) 55 VA Max (DS decoders)
I/O Module Protection	Fuse (Replacement Part No. 77104-899-01)
Output Module Voltage/Current	
Catalog No. 2755-0B5S	3-60 VDC, 0.5A Max
Catalog No. 2755-0A5S	12-140 VAC, 0.5A Max
Catalog No. 2755-0M5S	24-280 VAC, 0.5A Max
Input Module Voltage	
Catalog No. 2755-IB5S	3.3-32 VDC
Catalog No. 2755-IA5S	90-140V RMS/DC
Catalog No. 2755-IM5S	180-280V RMS/DC

Mechanical

Enclosure	
Catalog No. 2755-D_1_	NEMA Type 1
Catalog No. 2755-D_4_	NEMA Type 4
LED Indicators	
POWER ON	Green
CPU ACTIVE	Green
COMMUNICATIONS	Yellow
LASER ON A	Red
TRIGGER ACTIVE A	Yellow
VALID READ A	Green
LASER ON B	Red
TRIGGER ACTIVE B	Yellow
VALID READ B	Green
DISCRETE I/O 1 to 8	Red
Weight	10 lbs (4.5 kg) maximum, with all options installed
Dimensions	
Inches	10.25 (H) x 12 (W) x 4.57 (D)
Centimeters	26.0. (H) x 30.5 (W) x 11.6 (D)

Environment

Ambient Temperature	
Operating	0 to 50° C (32 to 122° F)
Storage	-40 to 85° C (-40 to 185° F)
Relative Humidity	5 to 95%, noncondensing

Scanner Ports

Scanner Ports A and B	
Connector (NEMA Type 1)	25-pin (female) subminiature D
Connector (NEMA Type 4)	19-pin (male) circular Cannon KPT series

Communications

HOST Port	
Electrical Standards	RS232, RS422, RS485
Protocols	ASCII (RS232, RS422, DH485) Allen-Bradley PCCC (RS485 only)
Connector (NEMA Type 1)	25-pin (female) subminiature D
Connector (NEMA Type 4)	19-pin (male) circular Cannon KPT series①
Baud Rate	300, 1200, 2400, 4800, 9600, 19200, 38400
Parity	None, Odd, Even
Data Bits	8 or 7
Stop Bits	1 or 2
Flow Control	None, XON/XOFF, RTS/CTS
AUX Port	
Electrical Standard	RS232
Connector (NEMA Type 1)	25-pin (female) subminiature D
Connector (NEMA Type 4)	19-pin (male) circular Cannon KPT series ①
Data Bits	8
Stop Bit	1
Baud Rate	9600
Parity	None

LCD Display (Optional)

Number of lines	2
Number of characters/line	20 characters/line
Backlighting	Continuous LED backlighting

Decoded Symbologies	Code 39 (Standard Character Set) Interleaved 2-of-5 Code 128 UPC-A with optional 2 or 5 digit supplements UPC-E with optional 2 or 5 digit supplements EAN-8 with optional 2 or 5 digit supplements EAN-13 with opt. 2 or 5 digit supplements Codabar Pharma-Code
Certifications	UL Listed Listed to Canadian Safety Standards Electromagentic Compatibility Directive (89/336/EEC) EN 50081-2 (Generic Emission Standard – Industrial Environment) EN 50082-2 (Generic Immunity Standard – Industrial Environment)

① Catalog Number 2755-NC17 Connector Kit is available for the NEMA Type 4 HOST and AUX port.

Output Modules

Catalog Number	2755-OB5S	2755-OA5S	2755-OM5S
Nominal Line Voltage	—	120 VAC	240 VAC
Maximum Line Voltage	60 VDC	140 VAC	280 VAC
Minimum Line Voltage	3.0 VDC	12 VAC	24 VAC
Maximum Peak Off State Voltage	60 VDC	400 V peak	600 V peak
Maximum Peak Off State Leakage	1.0 mA	2.5 mA RMS	4.5 mA RMS
Static off-state dv/dt	—	200 V/usec	200 V/usec
Maximum On-State Current	0.5 A DC	0.5 A RMS	0.5 A RMS
Minimum On-State Current	10 mA DC	50mA RMS	50mA RMS
Maximum 1 Cycle Surge	—	4 A peak	4 A peak
Maximum 1 Second Surge	1.5 A DC	—	—
Peak On-State Voltage	1.5 V DC	1.6 V peak	1.6 V peak

Input Modules

Catalog Number	2755-IB5S	2755-IA5S ①	2755-IM5S ①
Maximum Input Voltage	32 VDC	140V RMS/VDC	280 V RMS/VDC
Minimum Input Voltage	3.3 VDC	90V RMS/VDC	180 V RMS/VDC
Input Resistance	1 k ohm	–	–
Maximum Input Current	32mA DC@ 32 VDC	10mA RMS@ 140 VRMS	8mA RMS@ 280VRMS
Drop Out Current	1.0 mA DC	2.5 mA RMS	1.5 mA RMS
Allowable Off-State Input Current	1.0 mA DC	3.0 mA RMS	2.0 mA RMS
Allowable Off-State Input Voltage	2.0 VDC	50 VRMS/VDC	120 VRMS/VDC

① AC or DC input module

Decoder Configuration Addresses

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
3C0	Reserved	1	
3C1	AUX Terminal Enable Keyboard Entry	1	**0 = No** 1 = Yes 2 = No Read
3C2	AUX Terminal Confirm Entry	1	**0 = No** 1 = Yes
3C3	AUX Terminal Aux Data Format	1	**0 = Unformatted** 1 = Host Format
3C4	AUX Terminal Rubout Char for Keyboard Entry	1	ASCII 0 – 255, 255 = None **8 = BS**
3C5	Echo Keyboard Data	1	**0 = No** 1 = Yes
3C6	Size of Display	1	10 – **80**
3C7	AUX Terminal – Source Identifier String Length String	 1 4	 0–4, **0 = Empty** 4 characters
3CC	AUX Terminal – Default Prompt Message String Length String	 1 20	 0–20, **0 = Empty** 20 characters
3E1	Scroll LCD	1	**0 = No** 1 = Yes
3E2	Scanner B Trigger Source	1	**0 = Port A (Coordinated1)** 1 = Port B (Ind., Package Det) 2 = Port B (Ind., Host Control) 3 = Port B (Coordinated2)
3E3	Reserved	1	Ignored
3E4	Scanner B Trigger Timeout	2	**0**, 10 ... 9999
3E6	Scanner B – Source Identifier String Length String	 1 4	 0–4, **0 = Empty** 4 characters
3EB	Enable UPC–A Supplement	1	**0 = No** 1 = 2 Char 2 = 5 Char 3 = 2 or 5 Char 4 = Auto
3EC	Enable UPC–E Supplement	1	**0 = No** 1 = 2 Char 2 = 5 Char 3 = 2 or 5 Char 4 = Auto
3ED	Enable EAN–8 Supplement	1	**0 = No** 1 = 2 Char 2 = 5 Char 3 = 2 or 5 Char 4 = Auto

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
3EE	Enable EAN–13 Supplement	1	**0 = No** 1 = 2 Char 2 = 5 Char 3 = 2 or 5 Char 4 = Auto
3EF	Display Formatted Data	1	**0 = None** 1 = AUX/LCD 2 = AUX Only 3 = LCD Only
3F0	AUX Terminal/LCD message display format	1	**0 = Unformatted** 1 = Host Format
3F1	Starting Position bar_code_strings	1	**00** – 80 00 = Disable
3F2	Starting Position decoder performance	1	**00** – 80 00 = Disable
3F3	Starting Position package counter	1	**00** – 80 00 = Disable
3F4	Starting Position symbols not read counter	1	**00** – 80 00 = Disable
3F5	Starting Position primary counter 1	1	**00** – 80 00 = Disable
3F6	Starting Position primary counter 2	1	**00** – 80 00 = Disable
3F7	Starting Position primary counter 3	1	**00** – 80 00 = Disable
3F8	Starting Position primary counter 4	1	**00** – 80 00 = Disable
3F9	Starting Position primary counter 5	1	**00** – 80 00 = Disable
3FA	Starting Position primary counter 6	1	**00** – 80 00 = Disable
3FB	Starting Position primary counter 7	1	**00** – 80 00 = Disable
3FC	Starting Position primary counter 8	1	**00** – 80 00 = Disable
3FD	Send Performance indicator in *host_message*	1	**0 = No** 1 = Yes
3FE	Enable Filter and Sense of Package_Detect_B Input	1	**0 = No filter, LO=Package** 1 = Filter (15 ms), LO = Package 2 = No filter, HI = Package 3 = Filter, HI = Package
3FF	Ignored	1	
400	Send *bar_code_strings* in *host_message*	1	0 = No **1 = Yes**
401	Send package count in *host_message*	1	**0 = No** 1 = Yes
402	Send bar code symbology in host message	1	**0 = No** 1 = Yes
403	Ignored	1	
404	Ignored	1	
405	Ignored	1	
406	Expand UPC–E	1	0 = No 1 = Yes

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
407	Field delimiter	1	ASCII 1 – 255, **255 = None**
408	Start Character	1	ASCII 1 – 255, **255 = None**
409	End Message	1	**0 = CrLf** 1 = Cr 2 = Lf 3 = Etx 4 = None 5 = CrEtx 6 = LfEtx 7 = CrLfEtx
40A	Transmission Check	1	**0 = None** 1 = LRC 2 = Checksum–LSB 3 = Checksum–MSB
40B	Code 39 Check Character	1	**0 = No** 1 = Yes
40C	Include Code 39 Check Character	1	**0 = No** 1 = Yes
40D	Interleaved 2–of 5 Check Character	1	**0 = No** 1 = Yes
40E	Include Interleaved 2–of 5 Check Character	1	**0 = No** 1 = Yes
40F	Codabar Check Character	1	**0 = No** 1 = Yes
410	Include Codabar Check Character	1	**0 = No** 1 = Yes
411	Host Port – Baud Rates	1	**0 = 9600** 1 = 4800 2 = 2400 3 = 1200 4 = 300 5 = 38400 6 = 19200
412	Host Port – Bits/Char	1	**0 = 8 Data, 1 Stop** 1 = 8 Data, 2 Stop 2 = 7 Data, 1 Stop 3 = 7 Data, 2 Stop
413	Host Port – Parity	1	**0 = None** 1 = Even 2 = Odd
414	Host Port – ACK Char	1	ASCII 0 – 255, **255 = None**
415	Host Port – NAK Char	1	ASCII 0 – 255, **255 = None**
416	Scanner A Start Scan Char	1	ASCII 0 – 255, **255 = None**
417	Scanner A Stop Scan Char	1	ASCII 0 – 255, **255 = None**
418	Enable Large Buffer	1	**0 = No** 1 = Yes
419	Send Message to Host	1	**0 = End of Trigger** 1 = After *valid_package*

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
41A	Host Protocol (*read*–ONLY)	1	**0 = *RS232** 1 = RS232 XON/XOFF 2 = RS232 CTS/RTS – 1 3 = RS232 CTS/RTS – 2 4 = RS422 5 = RS422 XON/XOFF 6 = RS485 PCCC – 1 7 = RS485 PCCC – 2 8 = RS485 ASCII – 1 9 = RS485 ASCII – 2
41B	Device Address (*read*–ONLY)	1	00, **01**, ... 31
41C	Enable Filter and Sense of Package_Detect_A Input	1	**0 = No Filter, LO=Package** 1 = Filter (15 msec), LO=Package 2 = No Filter, HI=Package 3 = Filter (15 msec), HI=Package
41D	Enable Code 39	1	0 = No **1 = Yes (No for Pharma–code units)**
41E thru 425	Code 39 Specific Lengths	8	**0** ... 64
426	Enable Interleaved 2–of 5	1	**0 = No** 1 = Yes
427 thru 42e	Interleaved 2–of 5 Specific Lengths (Must be even)	8	**0** ... 64
42F	Enable Code 128	1	**0 = No** 1 = Yes
430 thru 437	Code 128 Specific Lengths	8	**0** ... 64
438	Enable Codabar	1	**0 = No** 1 = Yes
439 thru 440	Codabar Specific Lengths	8	**0**, 2... 64
441	Enable UPC–A	1	**0 = No** 1 = Yes
442	Enable UPC–E	1	**0 = No** 1 = Yes
443	Enable EAN–8	1	**0 = No** 1 = Yes
444	Enable EAN–13	1	**0 = No** 1 = Yes
445	LASER Light (A)	1	0 = On **1 = Triggered** 2 = Off
446	Decode Mode	1	**0 = Package Detect** 1 = Host 2 = Internal Timer 3 = Continuous 4 = Continuous/Unique
447	Capture Count	1	0, 1, 2, ... 8, 0 = Verify
448	symbols/scan	1	0 = Any **1 = 1** 2 = 2 3 = 3 4 = 4 5 = 5 6 = 6
449	symbols/package	1	**1** ... 16

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
44A	Match Complete Count	1	**1** ... 16
44B	Scanner A – Source Identifier String Length String	 1 4	 0–4, **0 = Empty** 4 characters
450	Header string String Length String	 1 32	 0–32, **0 = Empty** 32 characters
471	No–Read String Length String	 1 32	 0–32, **0 = Empty** 32 characters
492	No–Read Timer	2	0, 10 ... 9999 **0 = None**
494	Inter–Scan Timer	2	0, 10 ... 9999 **0 = None**
496	symbology in Match Code Table Entry 1	1	0 = Code 39 1 = Interleaved 2 of 5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma-Code **15 = ANY**
497	Enable Match Code Table Entry 1	1	Ignored
498	Match Code 1 String Length String	 1 32	 0–32, **0 = Empty** 32 characters
4B9	Output 1 Event	1	**0 = None** 1 = Read Package 2 = No–Read Package 3 = Match Complete 4 = Match Entry 5 = Read and *no–match* 6 = No–Read or *no–match* 7 = Auto Load 8 = Invalid 9 = Host Buffer Full A = Host Buffer Overflow B = Open C = Closed
4BA	Output 1 Duration	2	0, 10 ... 9999 **0 = None**
4BC	symbology in Match Code Table Entry 2	1	0 = Code 39 1 = Interleaved 2 of 5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma-Code **15 = Any**
4BD	Enable Match Code Table Entry 2	1	Ignored
4BE	Match Code 2 String Length String	 1 32	 0–32, **0 = Empty** 32 characters

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
4DF	Output 2 Event	1	**0 = None** 1 = Read Package 2 = No–Read Package 3 = Match Complete 4 = Match Entry 5 = Read and *no–match* 6 = No–Read or *no–match* 7 = Auto Load 8 = Invalid 9 = Host Buffer Full A = Host Buffer Overflow B = Open C = Closed
4E0	Output 2 Duration	2	0, 10 ... 9999 **0 = None**
4E2	symbology in Match Code Table Entry 3	1	0 = Code 39 1 = Interleaved 2 of 5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma-Code **15 = Any**
4E3	Enable Match Code Table Entry 3	1	Ignored
4E4	Match Code 3 String Length String	 1 32	 0–32, **0 = Empty** 32 characters
505	Output 3 Event	1	**0 = None** 1 = Read Package 2 = No–Read Package 3 = Match Complete 4 = Match Entry 5 = Read and *no–match* 6 = No–Read or *no–match* 7 = Auto Load 8 = Invalid 9 = Host Buffer Full A = Host Buffer Overflow B = Open C = Closed
506	Output 3 Duration	2	0, 10 ... 9999 **0 = None**
508	symbology in Match Code Table Entry 4	1	0 = Code 39 1 = Interleaved 2 of 5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma-Code **15 = Any**
509	Enable Match Code Table Entry 4	1	Ignored
50A	Match Code 4 String Length String	 1 32	 0–32, **0 = Empty** 32 characters

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
52B	Output 4 Event	1	**0 = None** 1 = Read Package 2 = No–Read Package 3 = Match Complete 4 = Match Entry 5 = Read and *no–match* 6 = No–Read or *no–match* 7 = Auto Load 8 = Invalid 9 = Host Buffer Full A = Host Buffer Overflow B = Open C = Closed
52C	Output 4 Duration	2	0, 10 ... 9999 **0 = None**
52E	symbology in Match Code Table Entry 5	1	0 = Code 39 1 = Interleaved 2 of 5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma-Code **15 = Any**
52F	Enable Match Code Table Entry 5	1	Ignored
530	Match Code 5 String Length String	 1 32	 0–32, **0 = Empty** 32 characters
551	Output 5 Event	1	**0 = None** 1 = Read Package 2 = No–Read Package 3 = Match Complete 4 = Match Entry 5 = Read and *no–match* 6 = No–Read or *no–match* 7 = Auto Load 8 = Invalid 9 = Host Buffer Full A = Host Buffer Overflow B = Open C = Closed
552	Output 5 Duration	2	0, 10 ... 9999 **0 = None**
554	symbology in Match Code Table Entry 6	1	0 = Code 39 1 = Interleaved 2 of 5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma-Code **15 = Any**
555	Enable Match Code Table Entry 6	1	Ignored
556	Match Code 6 String Length String	 1 32	 0–32, **0 = Empty** 32 characters

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
577	Output 6 Event	1	**0 = None** 1 = Read Package 2 = No–Read Package 3 = Match Complete 4 = Match Entry 5 = Read and *no–match* 6 = No–Read or *no–match* 7 = Auto Load 8 = Invalid 9 = Host Buffer Full A = Host Buffer Overflow B = Open C = Closed
578	Output 6 Duration	2	0, 10 ... 9999 **0 = None**
57A	symbology in Match Code Table Entry 7	1	0 = Code 39 1 = Interleaved 2 of 5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma-Code **15 = Any**
57B	Enable Match Code Table Entry 7	1	Ignored
57C	Match Code 7 String Length String	 1 32	 0–32, **0 = Empty** 32 characters
59D	Output 7 Event	1	**0 = None** 1 = Read Package 2 = No–Read Package 3 = Match Complete 4 = Match Entry 5 = Read and *no–match* 6 = No–Read or *no–match* 7 = Auto Load 8 = Invalid 9 = Host Buffer Full A = Host Buffer Overflow B = Open C = Closed
59E	Output 7 Duration	2	0, 10 ... 9999 **0 = None**
5A0	symbology in Match Code Table Entry 8	1	0 = Code 39 1 = Interleaved 2 of 5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma-Code **15 = Any**
5A1	Enable Match Code Table Entry 8	1	Ignored
5A2	Match Code 8 String Length String	 1 32	 0–32, **0 = Empty** 32 characters

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
5C3	Output 8 Event	1	**0 = None** 1 = Read Package 2 = No–Read Package 3 = Match Complete 4 = Match Entry 5 = Read and *no–match* 6 = No–Read or *no–match* 7 = Auto Load 8 = Auto Load Input 9 = Host Buffer Full A = Host Buffer Overflow B = Open C = Closed
5C4	Output 8 Duration	2	0, 10 ... 9999 **0 = None**
5C6	Ignored	32	
5E6	Output 1 Normally Open or Closed	1	**0 = Normally Open** 1 = Normally Closed
5E7	Output 2 Normally Open or Closed	1	**0 = Normally Open** 1 = Normally Closed
5E8	Output 3 Normally Open or Closed	1	**0 = Normally Open** 1 = Normally Closed
5E9	Output 4 Normally Open or Closed	1	**0 = Normally Open** 1 = Normally Closed
5EA	Output 5 Normally Open or Closed	1	**0 = Normally Open** 1 = Normally Closed
5EB	Output 6 Normally Open or Closed	1	**0 = Normally Open** 1 = Normally Closed
5EC	Output 7 Normally Open or Closed	1	**0 = Normally Open** 1 = Normally Closed
5ED	Output 8 Normally Open or Closed	1	**0 = Normally Open** 1 = Normally Closed

Decoder Function or Command Addresses

Refer to Chapter 16 for additional information on the use of these commands and functions.

Address	Command
0600H	Clear package counts
0604H	Clear primary count 1
0608H	Clear primary count 2
060CH	Clear primary count 3
0610H	Clear primary count 4
0614H	Clear primary count 5
0618H	Clear primary count 6
061CH	Clear primary count 7
0620H	Clear primary count 8
0624H	Clear symbols not read count
0630H	Clear all primary counts
0631H	Clear all primary counts and symbols not read count
0632H	Save configuration to Storage Memory and restart
0633H	Set configuration to default values
0634H	Start scan A
0635H	Stop scan A
0636H	Flush current packet from host buffer
0637H	Restart decoder
0640H	Send repeat read
0641H	Cancel repeat read
0642H	Clear all Extended counts
0643H	Auto–Load Start
0644H	Auto–load End
0650H	Hold output 1 open[1]
0651H	Hold output 2 open[1]
0652H	Hold output 3 open[1]
0653H	Hold output 4 open[1]
0654H	Hold output 5 open[1]
0655H	Hold output 6 open[1]
0656H	Hold output 7 open[1]
0657H	Hold output 8 open[1]
0660H	Hold output 1 closed[1]
0661H	Hold output 2 closed[1]

[1] The AUX port supports a terminal for **either** configuring the decoder **or** for man entry. For information on use of the AUX port for manual data entry, consult Cha

Address	Command
0662H	Hold output 3 closed[1]
0663H	Hold output 4 closed[1]
0664H	Hold output 5 closed[1]
0665H	Hold output 6 closed[1]
0666H	Hold output 7 closed[1]
0667H	Hold output 8 closed[1]
0668H	Start Scanner B Trigger
0669H	Stop Scanner B Trigger

Pharma–Code Configuration 0700H–0725H

The decoder shall use the existing ’set match table symbology type’ command with a value of 9 to set the match table symbology type to PHARMA.

The table below shows the mapping between the PCCC Host Commands and the parameters described in the PHARMA–CODE CONFIGURATION PARAMETERS section.

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
700H	enable Pharma–Code	1	0 = No **1 = Yes**
701H	decode direction	1	**0 = Forward** 1 = Reverse 2 = Forward A Reverse B 3 = Reverse A Forward B
702H	quiet zone ratio	1	4 – 10, **5 = Default**, 0 = Use Default
703H	space tolerance	1	0 = Ignore 5 to 40, **15**
704H	bar tolerance	1	0 = Ignore 5 to 40, **15**
705H	minimum number of bars	1	3 to 12, **5**
706H	wide to narrow bar ratio	1	0 = Midrange **2** to 4
707H	code verification list entry 1	2	**0 = none** 7 to 8190
709H to 725H	code verification list entry 2 through 16	2 bytes per entry	**0 = none** 7 to 8190

[1] The AUX port supports a terminal for **either** configuring the decoder **or** for man
entry. For information on use of the AUX port for manual data entry, consult Ch

Series B Configuration Parameters 0900H–0901H

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
900H	write text message to AUX/LCD string length string	 1 128	 0 – 128, **0 = Empty** 128 characters
901H	write text message to AUX/LCD and enable keyboard entry string length string	1 128	0 – 128, **0 = Empty** 128 characters

Series B Configuration Parameters 0E00H–0EFFH

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
E10	Verify Interleaved 2 of 5 guard bars	1	**0 = No** 1 = Yes
E11	Scanner source of event 1	1	1 = Scanner A 2 = Scanner B **3 = A|B** 5 = A–B
E12	Scanner source of event 2	1	1 = Scanner A 2 = Scanner B **3 = A|B** 5 = A–B
E13	Scanner source of event 3	1	1 = Scanner A 2 = Scanner B **3 = A|B** 5 = A–B
E14	Scanner source of event 4	1	1 = Scanner A 2 = Scanner B **3 = A|B** 5 = A–B
E15	Scanner source of event 5	1	1 = Scanner A 2 = Scanner B **3 = A|B** 5 = A–B
E16	Scanner source of event 6	1	1 = Scanner A 2 = Scanner B **3 = A|B** 5 = A–B
E17	Scanner source of event 7	1	1 = Scanner A 2 = Scanner B **3 = A|B** 5 = A–B
E18	Scanner source of event 8	1	1 = Scanner A 2 = Scanner B **3 = A|B** 5 = A–B
E19	Laser B On mode	1	0 = Continuous **1 = Triggered** 2 = Off
E1A	Set number of Fields in *host_message*	1	0 – 16, **0 = ALL**
E1B	FNC1 Character	1	00–FFh, **00 = Ignore**
E1C	Quiet Zone Ratio	1	4–10, **5 = Default**, 0 = Use Default

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
E1D	Scanner B Start Scan Character	1	ASCII 0 – 255, **255 = None**
E1E	Scanner B Stop Scan Character	1	ASCII 0 – 255, **255 = None**
E1F	Extended Match Set 1 (1 – 16)	1	0 = Disabled **1 = Enabled**
E20	Extended Match Set 2 (17 – 32)	1	0 = Disabled **1 = Enabled**
E21	Extended Match Set 3 (33 – 48)	1	0 = Disabled **1 = Enabled**
E22	Extended Match Set 4 (49 – 64)	1	0 = Disabled **1 = Enabled**
E23	Extended Match Set 5 (65 – 80)	1	0 = Disabled **1 = Enabled**
E24	Extended Match Set 6 (81 – 96)	1	0 = Disabled **1 = Enabled**
E25	Extended Match Set 7 (97 – 112)	1	0 = Disabled **1 = Enabled**
E26	Extended Match Set 8 (113 – 128)	1	0 = Disabled **1 = Enabled**

Host Message Replacement Rules 1000H–143FH

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
1000H+i*40H	host_message Field	1	0 to 16, **0 = ALL**
1001H+i*40H	Source	1	1 = Scanner A 2 = Scanner B **3 = A|B** 4 = AUX
1002H+i*40H	symbology	1	0 = Code 39 1 = Interleaved 2–of–5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma–Code **0fh = ANY**
1003H+i*40H	symbol_number	1	0 to 16, **0 = ALL**
1004H+i*40H	Minimum Field Length	1	**0** to 64
1005H+i*40H	Alignment	1	**0 = Right** 1 = Left
1006H+i*40H	Fill Character	1	0 to 255, **0 = None**
1007H+i*40H	Reserved	1	1
1008H+i*40H	Search Pattern Length Search Pattern	1 24	0–24, **0 = Empty** up to 24 characters
1021H+i*40H	Reserved	3	1
1024H+i*40H	Replace Pattern Length Replace Pattern	1 24	0–24, **0 = Empty** up to 24 characters
103DH+i*40H	Reserved	3	1

Where i ranges from 1 to 16. The *decoder* shall return status 10H for references to 1000H–103FH.

Host Message No Read Replacement Strings 2000H–21B9H

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
2000H+i*1AH	Search Fail String Length Search Fail String	1 24	0–24 **0 = Empty** up to 24 characters
2019H+i*1AH	Reserved	1	1

Where i ranges from 1 to 16. The *decoder* shall return status 10H for references to 2000H–2019H.

Extended Count Values D800H–DA03H

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
D800H+i*4	Extended Count Value n	4	0 to 999999

Where i ranges from 1 to 128. The *decoder* shall return status code 10H for references to addresses D800H–D803H.

Extended Match Data 8000H–A03FH

Writes to address 8000 will be interpreted as Autoload. The data attached to the write must follow the byte order listed in the following table. The data will be inserted in the next available autoload position, searching first the primary and then the extended data table. That entry will be marked as “Match Entry”. If no entries are available in either table, a code 02 (memory not available) will be returned. Writes to any location other than 8000 will return of code 10, and the write request will be ignored.

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
8000H	Source	1	1 = Scanner A 2 = Scanner B
	symbology	1	0 = Code 39 1 = Interleaved 2–of–5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma–Code
	Match pattern – Length Match pattern – *String*	1 32	0–32, **0 = Empty** up to 32 characters

Extended Match Data 8000H–A03FH

The following table lists the configuration parameters for the Extended Match Data Table. Address the counters by adding the offset *i * 40 H* to the base address 8000, where i represents the counter number, 1 to 128.

PCCC Address	Configuration Parameter	Number of Bytes	Acceptable Values (Default in bold)
8000H+i*40H	Mode	1	**0 = Disabled** 1 = Match_entry 2 = Auto–Load 3 = Lot
8001H+i*40H	Source	1	1 = Scanner A 2 = Scanner B **3 = A|B** 5 = A–B
8002H+i*40H	symbology	1	0 = Code 39 1 = Interleaved 2–of–5 2 = Codabar 3 = UPC–A 4 = UPC–E 5 = EAN–8 6 = EAN–13 7 = Code 128 8 = Pharma–Code **F = ANY**
8003H+i*40H	Reserved	1	1
8004H+i*40H	Count	4	**0** to 999999
8008H+i*40H	Loading: Discrete 1	8	**0 = no discrete** 1 to 9, or 0aH = always
8009H+i*40H	Loading: Discrete 2	8	**0 = no discrete** 1 to 9, or 0aH = always
800AH+i*40H	Loading: Discrete 3	8	**0 = no discrete** 1 to 9, or 0aH = always
800BH+i*40H	Loading: Discrete 4	8	**0 = no discrete** 1 to 9, or 0aH = always
800CH+i*40H	Loading: Discrete 5	8	**0 = no discrete** 1 to 9, or 0aH = always
800DH+i*40H	Loading: Discrete 6	8	**0 = no discrete** 1 to 9, or 0aH = always
800EH+i*40H	Loading: Discrete 7	8	**0 = no discrete** 1 to 9, or 0aH = always
8008F+i*40H	Loading: Discrete 8	8	**0 = no discrete** 1 to 9, or 0aH = always
8010H+i*40H	Reserved	14	1
801EH+i*40H	Match pattern – Length Match pattern – *String*	1 32	0–32, **0 = Empty** up to 32 characters
803FH+i*40H	Reserved	1	1

Factory Default Settings

Category of Parameters	Parameter	Default Setting
Bar Code Symbology	Enable Code 39	Yes (No on Pharma-Code Units)
	Enable Interleaved 2-of-5	No **Guard Bars:** No
	Enable Codabar	No
	Enable Code 128	No
	Code 128 FNC1 Character	None
	Enable UPC-A	No **Supplements:** None
	Enable UPC-E	No **Supplements**: None
	Expand UPC-E	No
	Enable EAN-8	No **Supplements**: None
	Enable EAN-13	No **Supplements:** None
Check Characters	Code 39	No **Include:** No
	I 2 of 5	No **Include:** No
	Codabar	No **Include:** No
Bar Code Symbology Lengths	Code 39	00, 00, 00, 00, 00, 00, 00, 00
	Interleaved 2-of-5	00, 00, 00, 00, 00, 00, 00, 00
	Code 128	00, 00, 00, 00, 00, 00, 00, 00
	Codabar	00, 00, 00, 00, 00, 00, 00, 00
Pharma–Code	Enable Pharma–Code	Yes (On Pharma-Code units only)
	Quiet Zone Ratio	Default
	Space Tolerance	15
	Bar Tolerance	15
	Wide to Narrow Bar Ratio	2
	Minimum Number of Bars	5
	Scanner A Decode Direction	Forward
	Scanner B Decode Direction	Forward
	Code Verification List	Blank
Scanner A Control	Laser Light	Triggered
	Decode Mode	Package Detect
	No-Read Timer	None (0000 msec)
	Inter-Scan Timer	None (0000 msec)
	Capture Count	2
	Symbols/Scan	1
	Symbols/Package	1
	Match Complete	1
Scanner B Control	Laser Light	Triggered
	Decode Mode	Coordinated 1
	Trigger Timeout	None (0000 msec)

Category of Parameters	Parameter	Default Setting
Match Code Table (1 - 8)	Bar Code Symbology	Any
	Match Code Text String	Blank
	Normal State	O (Normally Open)
	Source	A for DS, A|B (A or B) for DD
	Duration	0 msec
Package Detect Input	Scanner A Filter	No
	Scanner A Sense	LO= Package
	Scanner B Filter	No
	Scanner B Sense	LO= Package
Extended Match Code Table	Counter Status	Auto Refresh
	Status of Counter Set	Enabled
	Mode	Disabled
	Source	A for DS, A|B (A or B) for DD
	Symbology	Any
	Match Pattern String	Blank
	Count	0
	Loading	Blank (no outputs selected)
AUX and LCD Display Format	Display Data	None
	Message Format	Unformatted
	Scroll LCD Display	No
	Bar Code Strings Position	0
	Decoder Performance Position	0
	Package Counter Position	0
	Symbols Not Read Counter Position	0
	Primary Counter 1 Position	0
	Primary Counter 2 Position	0
	Primary Counter 3 Position	0
	Primary Counter 4 Position	0
	Primary Counter 5 Position	0
	Primary Counter 6 Position	0
	Primary Counter 7 Position	0
	Primary Counter 8 Position	0
Host Message Replacement Rules	Rule Number	1
	Source	A|B (A or B)
	Symbology	Any
	Symbol Number	All
	Find String Containging	Blank
	Replace Entire String With	Blank
	Minimum Field Length	0
	Alignment	Right
	Fill Character	None
	Host Message Field Number	All
	Bar Code String Examples	Blank

Category of Parameters	Parameter	Default Setting
Host Message Format	Start Character	255 (None)
	Source Identifier (for AUX)	Blank
	Source Identifier (for A)	Blank
	Source Identifier (for B)	Blank
	Header String	Blank
	Field Delimiter	None
	Number of Fields in Message	All
	Send Symbology	No
	Send Package Count	No
	Send Bar Code Strings	Yes
	Send Decoder Performance	No
	End Message	CrLf
	Default No-Read String	Blank
	No-Read Replacements Strings (1–16)	Blank
Host Communications Parameters marked with an asterisk require a save and restart to take effect	Baud Rate*	9600
	Bits/Character*	8 Data, 1 Stop
	Parity*	None
	Host Protocol*	RS232
	Device Address*	1
	ACK Character*	255 (None)
	NAK Character*	255 (None)
	Start Character Scanner A	255 (Disabled)
	Stop Character Scanner A	255 (Disabled)
	Start Character Scanner B	255 (Disabled)
	Stop Character Scanner B	255 (Disabled)
	Large Buffer	No
	Send Host Message	At End of Trigger
	Transmission Check	None
Aux Terminal Data Entry	Enable Keyboard Entry	No
	Confirm Entry	No
	AUX Data Format	Unformatted
	Rubout Character	008 BS (Backspace)
	Echo Data to Terminal	No
	Size of Display	80
	Default Prompt Message	Blank

Transmission Check

The decoder can generate three types of transmission checks:

- **Longitudinal Redundancy Check**
  A byte developed by an exclusive OR of all bytes in a message.
- **Checksum, Most Significant Byte First**
  Sixteen bit sum of all the bytes in a message with the most significant byte transmitted first.
- **Checksum, Least Significant Byte First**
  Sixteen bit sum of all the bytes in a message with the least significant byte transmitted first.

The following example illustrates a transmission check. The message contains the following data:

Start Character = *
Label Delimiter = $
End of Message = CR LF
Symbol Data = ABC

The message transmits in this sequence:

* $ A B C $ $ CR LF TRANSMISSION CHECK

The table below shows transmission checks for the message.

Transmission Check	ASCII Character	Hex Value	Binary Value
	*	2A	0010 1010
	$	24	0010 0100
	A	41	0100 0001
	B	42	0100 0010
	C	43	0100 0011
	$	24	0010 0100
	$	24	0010 0100
	CR	OD	0000 1101
	LF	OA	0000 1010
LRC Check	I	49	0100 1001
Checksum MSB	SOH s	01 73	0000 0001 0111 0011
Checksum LSB	s SOH	73 01	0111 0011 0000 0001

The sum of all bytes in the message is 173 Hex. Checksums are transmitted in a sixteen bit format. The value 01 Hex is equivalent to the ASCII control code SOH, 73 Hex is equivalent to the ASCII character “s”.

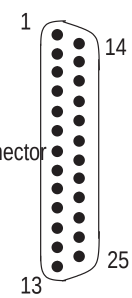
Setting Up Terminals

Appendix Objectives

This appendix provides instructions on how to setup and connect the following terminals to the AUX port of the NEMA Type 1 or Type 4 decoder.

- Lear Siegler ADM 3E
- DEC VT100
- 1784-T45
- 1771-T1, -T2, -T3

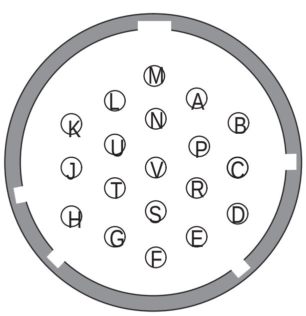
Connecting Terminal to AUX Port on NEMA Type 1 Decoder



Pin	Abb.	Function
1	GND	Chassis Ground
2	TD	Transmit Data carries data from terminal to decoder. (input to decoder)
3	RD	Receive Data carries data from decoder to terminal. (Output from decoder)
7	SIG GND	Signal Ground
15	AUX Terminal Selector +	AUX Terminal Selector. Determines whether the AUX terminal is used for configuration or manual data entry. To use the AUX terminal for manual data entry, tie pin 15 to 16. To use the AUX terminal for configuration, leave pins 15 and 16 open.
16	AUX Terminal Selector –	Connect to pin 15 to use the AUX terminal for manual data entry functions. When connected to 15, you cannot access the configuration menus.
17 25	IN8+ IN8–	Auto Load Input. You can connect a normally opened (N.O.) contact between pins 17 and 25. Close the contacts to activate the AutoLoad Function. See Chapter 6 and Appendix H.

Connecting Terminal to AUX Port of NEMA Type 4 Decoder

AUX PORT (male) Connector

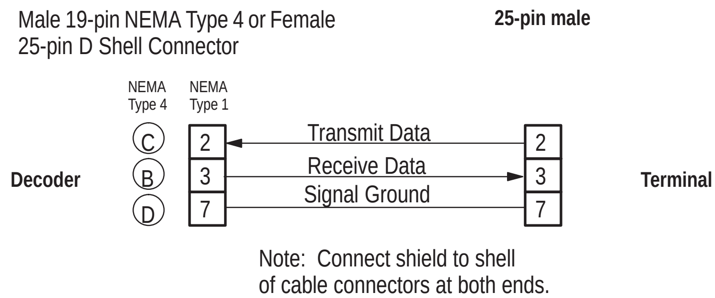


Pin	Abb.	Function
A	GND	Chassis Ground
B	TD	Transmit Data carries data from terminal to decoder (Input to decoder).
C	RD	Receive Data carries data from decoder to terminal (Output from decoder).
D	SIG GND	Signal Ground
G	AUX Terminal Selector +	AUX Terminal Selector. Determines whether the AUX terminal is used for configuration or manual data entry. To use the AUX terminal for manual data entry, tie pin G to H. To use the AUX terminal for configuration, leave pins G and H open.
H	AUX Terminal Selector –	Connect to pin G to use the AUX terminal for manual data entry functions. When connected to G, you cannot access the configuration menus.
K L	IN8+ IN8–	Auto Load Input. You can connect a normally opened (N.O.) contact between pins K and L. Close the contacts to activate the AutoLoad Function. See Chapter 6 and Appendix H.

Lear Siegler ADM 3E Terminal

Follow these steps if using a Lear Siegler ADM 3E terminal:

1. Construct a cable to connect the terminal to the decoder. Use a Belden 8303, Alpha 45123, or equivalent type of cable. Use the following connector pinouts:

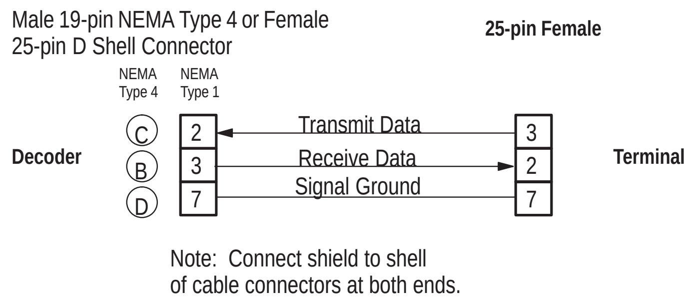


2. Plug terminal into power supply.
3. Power on terminal.
4. Press [Shift] [SETUP] to enter setup mode.
5. Use the arrow keys to set the following parameters on the terminal:
   - Full Duplex (FDX)
   - 9600 Baud Rate
   - 8 Data Bits per Character
   - No Parity
   - XON/XOFF Flow Control or Handshake
   - Blinking Block Cursor
6. To save the selected parameters, press [Ctrl] [S].
7. Exit setup mode by pressing [Shift] [SETUP].
8. You are now ready to configure the decoder. See Chapter 5.

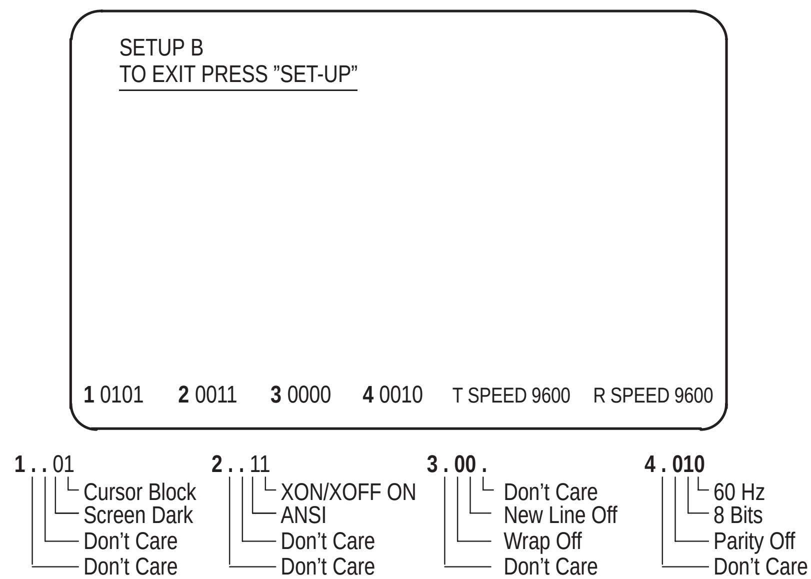
DEC VT100 Terminal

Follow these steps if using a DEC VT100 terminal:

1. Construct a cable to connect the VT100 to the decoder. Use a Belden 8303, Alpha 45123, or equivalent type of cable. Use the following connector pinouts:



2. Plug terminal into power supply.
3. Power on terminal.
4. Enter Set-Up B on terminal. The following figure shows one setup.

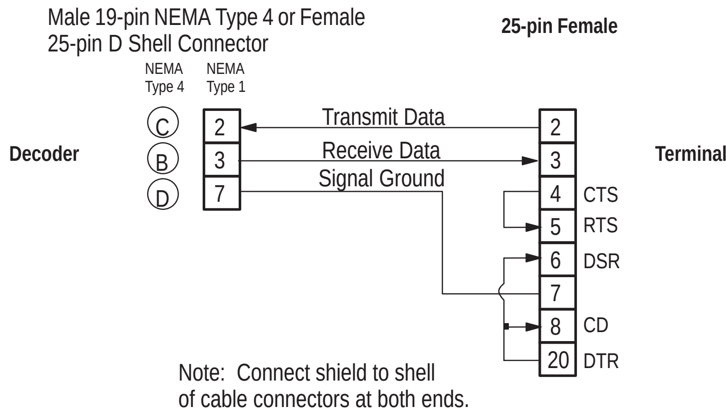


5. You are now ready to configure the decoder. See Chapter 5.

Allen-Bradley 1784-T45 or T47 Programming Terminal

Follow these steps if using an Allen-Bradley 1784-T45 or -T47 computer:

1. Construct a cable to connect the terminal to the decoder. Use a Belden 8303, Alpha 45123, or equivalent type of cable. Use the following connector pinouts:



2. Power on the terminal. The switch is located on the left side of the unit.

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

3. Press [CTRL][ALT][CMD] key sequence to display the system Main Menu (Press the [CMD] key while holding down both the [ALT] and [CTRL] keys.

4. Set the T45 terminal emulation to the following settings (Refer to the terminal documentation for additional information):

- F1 DGC D200 Terminal
- F2 Modem = External
- F3 Flow Control = On
- F4 Duplex = Full
- F6 Print = Off

5. Set the COM1 parameters to:

- F1 Baud Rate = 9600
- F2 Parity = None
- F3 Data Bits = 8
- F4 Stop Bits = 1
- F5 Type = Standard PC Compatible Com

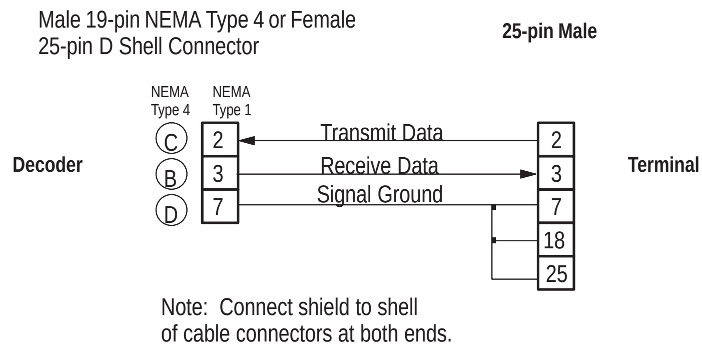
Note: If using an internal modem, disable it using the MODE command.

6. When the Select CRT Type menu appears, select Data General DT100 emulation.
7. You are now ready to configure the decoder. See Chapter 5.

Allen-Bradley 1770-T1, -T2, -T3 Terminals

Follow these steps if using an Allen-Bradley 1770-T1, -T2, or -T3 terminal:

1. Construct a cable to connect the decoder to Channel B of the terminal. Use a Belden 8303, Alpha 45123, or equivalent type of cable. Use the following connector pinouts:



2. Plug terminal into power supply.
3. Install the alphanumeric keytop overlay on the terminal keyboard.
4. Power on terminal. Enter *12* to select alphanumeric.
5. Select Alphanumeric Mode and set the following parameters (Refer to your terminal documentation for additional information):

Baud Rate	**9600**
Parity =	**No**
Stop Bits =	**1**
Channel Config. =	**B IN/OUT**
Duplex =	**Full**
Channel C =	**On or Off**
Cursor =	**On**
Auto Line Feed after Return =	**Off**
Control Code Display =	**Off**

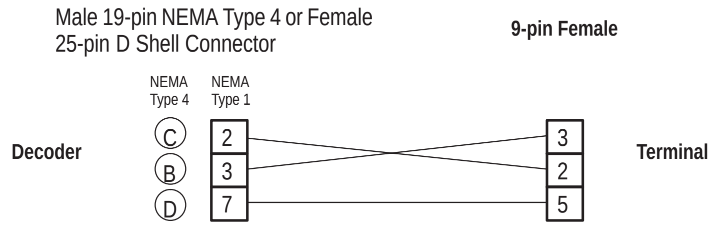
6. You are now ready to configure the decoder. See Chapter 5.

Note: Because there is no flow control with the 1770-T1, -T2, or -T3 terminals, the Series B Revision A decoder could transmit data too quickly. This caused the terminal to display garbled characters or lock up. To resolve that problem, the Revision B decoder sends data in smaller bursts to these terminals.

2708-DH5 Attended Workstations

Follow these steps if using one of the Allen-Bradley 2708-DH5 Attended Workstations:

1. Construct a cable to connect the decoder to the COM1 port of the 2708-DH5 terminal. Use a Belden 8303, Alpha 45123, or equivalent type of cable. Use the following connector pinouts:



2. Plug terminal into power supply.
3. Power on terminal.
4. Select Network Menu (option 1) and set the following parameters:

Terminal Number =	**0**
Terminal Type =	**Normal**

   The rest of the network parameters are not applicable.

5. Select Comm Port Menu (option 2) and set the following parameters:

Comm Mode	**XON/XOFF**
Comm Baud Rate =	**9600**
Comm Data Bits =	**8**
Comm Parity =	**None**
Comm Stop Bits =	**1**
Comm CRLF =	**Disabled**
Comm Echo =	**Disabled**
Comm Handshake =	**Disabled**

   The rest of the parameters are not applicable.

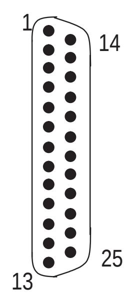
6. You are now ready to configure the decoder. See Chapter 5.

Connecting to a Host

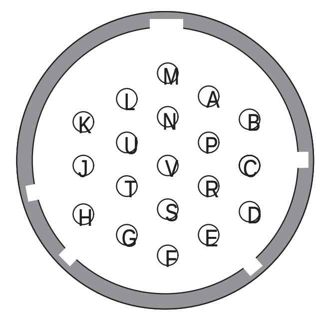
The HOST port of the decoder allows communication with a host device using three standard interfaces: RS-232, RS-422, RS-485. This appendix contains connection diagrams for each interface. Use these diagrams when connecting a host device to the HOST port of the decoder.

The HOST port on the NEMA Type 4 decoder has a 19-pin (male) connector. The HOST port on the NEMA Type 1 decoder has a 25-pin (female) D shell connector.

NEMA Type 1
HOST Port (Female) Connector



NEMA Type 4
HOST Port (Male) Connector



NEMA 1 Pins	NEMA 4 Pins	Abb.	Function
1	A	GND	Chassis Ground
2	C	TD	RS-232 Transmit Data (from decoder to host).
3	B	RD	RS-232 Receive Data (from host).
4	F	RTS	RS-232 Request to Send
5	J	CTS	RS-232 Clear to Send
20	E	DTR	RS-232 Data Terminal Ready
6	H	DSR	RS-232 Data Set Ready
7	D	SIG GND	RS-232 Signal Common
9	L	SHLD	RS-485 Shield Ground
12	M	485 TERM	RS-485 Line Termination. Jumpers to 13 or N. Terminates decoder at each end of network.
13	N	485 A/TERM	RS-485 Line Termination. Jumpers to 12 or M. Terminates decoder at each end of network.
14	P	TxB+	RS-422(B) or RS-485(B) Transmit Data (from decoder to host).
15	R	TxA-	RS-422(A) or RS-485(A) Transmit Data (from decoder to host).
16	S	RxA '–	RS-422(A) Receive Data (from host).
17	T	RxB '+	RS-422(B) Receive Data (from host).
18	U	422/A TERM	RS-422 Line Termination. Jumpers to 19 or V. Terminates decoder at each end of network.
19	V	422 TERM	RS-422 Line Termination. Jumpers to 18 or U. Terminates decoder at each end of network.

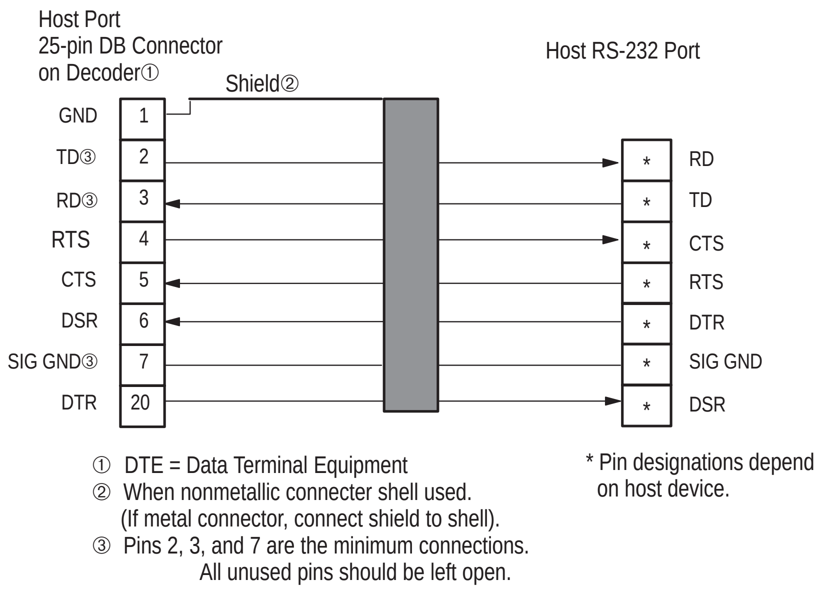
The cable that connects the decoder to the host varies depending on the communication standard and the type of connector on the serial communication port of the host.

Appendix F lists the host protocol options for each communication interface.

RS-232 Interface

Figure E.1 shows how to connect the NEMA Type 1 decoder to a host using RS-232. Use a Belden 8303 cable, Alpha 45123 cable, or equivalent.

Figure E.1 Connecting NEMA Type 1 Decoder to Host using RS-232



Pins 4, 5, and 20 are optional flow control lines. Flow control options are:

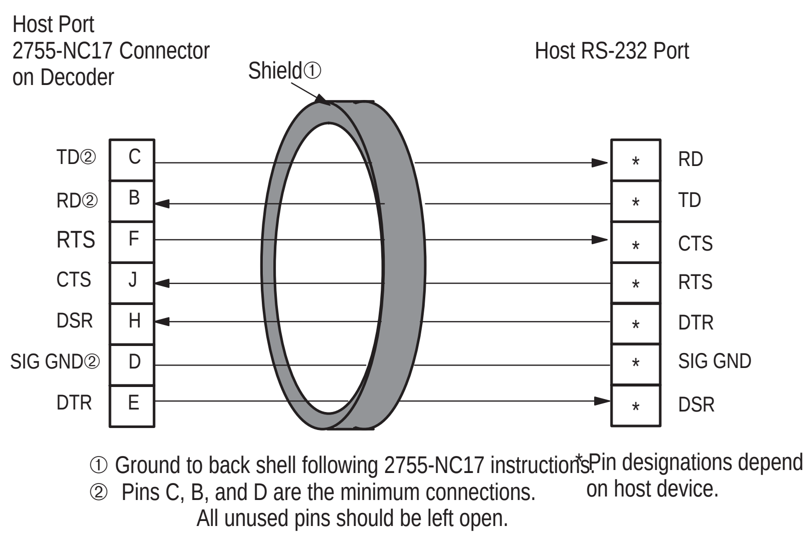
- **RS-232**
  No flow control.
- **RS-232 XON/XOFF**
  The XOFF character from the host suspends transmission and the XON character resumes transmission. The receiving device removes the XON/XOFF characters from the message.
- **RS-232 RTS/CTS-1**
  Enables the RS-232 (RTS and CTS) control lines for flow control.
- **RS-232 RTS/CTS-2**
  Enables the RS-232 (RTS and CTS) control lines for flow control. Use this mode of flow control to communicate with Catalog No. 2760-RA or -RB module.

The RS-232 interface and flow control are selected on the **Host Communications** configuration screen.

Pin #	Modem Control Line	Function	Descriptions
20	DTR	RTS/CTS-1 RTS/CTS-2	The decoder sends a DTR (Data Terminal Ready) signal to tell the host the decoder is online and capable of receiving data from the host. The DTR line remains on while the decoder is on.
4	RTS	RTS/CTS-1	The decoder sends the RTS (Request to Send) signal to tell the host it is ready to send data. When the host receives an RTS signal from the decoder, the host must assert CTS to tell the decoder to begin sending data. When the decoder stops sending an RTS, the host must stop sending a CTS before the decoder can assert RTS again.
4	RTS	RTS/CTS-2	The decoder sends the RTS (Request to Send) signal to tell the host it can accept data. The host only sends data when RTS is on.
5	CTS	RTS/CTS-1 RTS/CTS-2	The host sends the CTS (Clear to Send) signal to the decoder if it can accept data. The decoder only sends data if CTS is on.

Figure E.2 shows how to connect the NEMA Type 4 decoder to a host using RS-232. Use a Belden 8303 cable, Alpha 45123 cable, or equivalent.

Figure E.2 Connecting NEMA Type 4 Decoder to a Host Computer using RS-232



Pins F, J, and E are optional flow control lines. Flow control options are:

- **RS-232**

  No flow control.
- **RS-232 XON/XOFF**

  The XOFF character from the host suspends transmission and the XON character resumes transmission. The receiving device removes the XON/XOFF characters from the message.
- **RS-232 RTS/CTS-1**

  Enables the RS-232 (RTS and CTS) control lines for flow control.

- **RS-232 RTS/CTS-2**

  Enables the RS-232 (RTS and CTS) control lines for flow control. Use this mode of flow control to communicate with Catalog No. 2760-RA or -RB module.

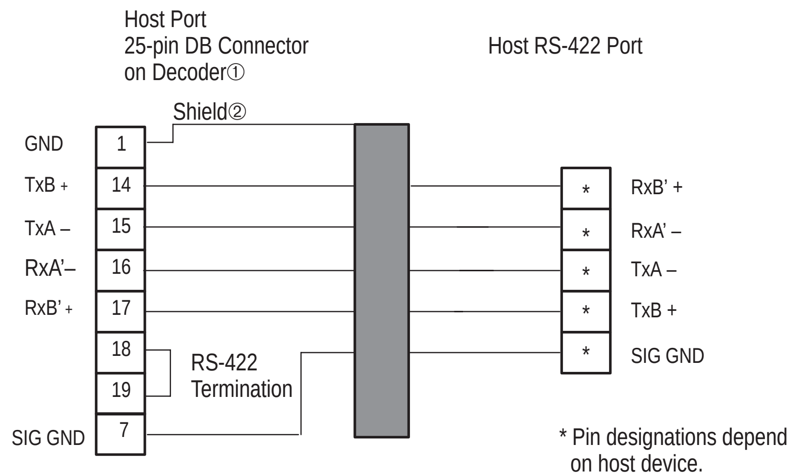
The RS-232 interface and flow control are selected on the **Host Communications** configuration screen.

Pin #	Modem Control Line	Function	Descriptions
E	DTR	RTS/CTS-1 RTS/CTS-2	The decoder sends a DTR (Data Terminal Ready) signal to tell the host the decoder is online and capable of receiving data from the host. The DTR line remains on while the decoder is on.
F	RTS	RTS/CTS-1	The decoder sends the RTS (Request to Send) signal to tell the host it is ready to send data. When the host receives an RTS signal from the decoder, the host must assert CTS to tell the decoder to begin sending data. When the decoder stops sending an RTS, the host must stop sending a CTS before the decoder can assert RTS again.
F	RTS	RTS/CTS-2	The decoder sends the RTS (Request to Send) signal to tell the host it can accept data. The host only sends data when RTS is on.
J	CTS	RTS/CTS-1 RTS/CTS-2	The host sends the CTS (Clear to Send) signal to the decoder if it can accept data. The decoder only sends data if CTS is on.

RS-422 Interface

Figure E.3 shows how to connect the NEMA Type 4 decoder to a host using RS-422. Use Belden cable 9829 (shielded, twisted pair) or equivalent.

Figure E.3 Connecting NEMA Type 4 Decoder to Host using RS-422



① DTE = Data Terminal Equipment
② When nonmetallic connector shells used. (If metal connector shell, connect shield to shell.)

The RS-422 interface uses pins 7, 14, 15, 16, 17, 18, and 19 of the HOST port connector. The transmit data and receive data lines are:

Pin 14	TxB+	Transmits data from the decoder to the host.
Pin 15	TxA–	Transmits data from the decoder to the host.
Pin 16	RxA'–	Receives data from the host.
Pin 17	RxB'+	Receives data from the host.

RS-422 communication lines are unterminated. To enable network termination (120 Ohm resistor in series with a 0.01 microfarad capacitor), connect pins 18 and 19 together.

Important: We recommend you terminate the RS-422 lines if excessive noise occurs on long RS-422 communication links.

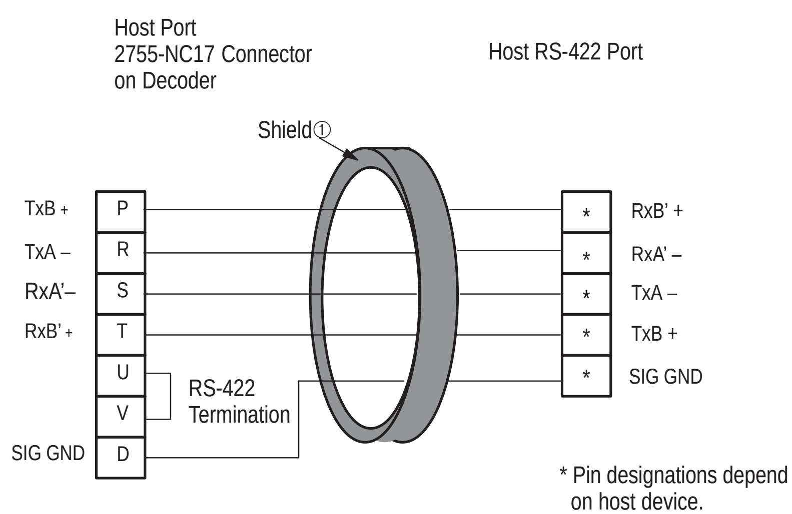
RS-422 does not use modem control lines. However, the configuration software does allow optional flow control using XON/XOFF characters. The options are:

- **RS422**. No flow control.
- **RS422 XON/XOFF**. Enable XON/XOFF flow control.

The RS-422 communication interface and protocol is selected during configuration. See the **Host Communications** configuration screen.

Figure E.4 shows how to connect the NEMA Type 4 decoder to a host using RS-422. Use Belden cable 9829 (shielded, twisted pair) or equivalent.

Figure E.4 Connecting NEMA Type 4 Decoder to Host using RS-422



① Ground to back shell following 2755-NC17 instructions.

The RS-422 interface uses pins D, P, R, S, T, U, and V of the HOST port connector. The transmit data and receive data lines are:

Pin P	TxB+	Transmits data from the decoder to the host.
Pin R	TxA–	Transmits data from the decoder to the host.
Pin S	RxA'–	Receives data from the host.
Pin T	RxB'+	Receives data from the host.

RS-422 communication lines are unterminated. To enable network termination (120 Ohm resistor in series with a 0.01 microfarad capacitor), connect pins U and V together.

Important: We recommend you terminate the RS-422 lines if excessive noise occurs on long RS-422 communication links.

RS-422 does not use modem control lines. However, the configuration software does allow optional flow control using XON/XOFF characters. The options are:

- **RS422**. No flow control.
- **RS422 XON/XOFF**. Enable XON/XOFF flow control.

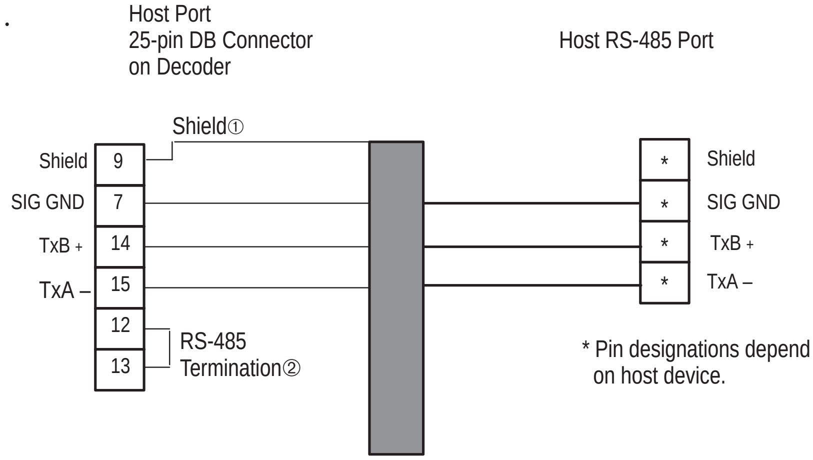
The RS-422 communication interface and protocol is selected during configuration. See the **Host Communications** configuration screen.

RS-485 Using DH485 Protocol

The DH485 interface allows you to multi-drop up to 31 decoders to each port of the Flexible Interface Module (Catalog No. 2760-RB). Each of the three ports of the module operates as a separate communications network.

Figure E.5 shows how to connect the NEMA Type 1 decoder to a DH485 network. Use Belden cable 9842 (or equivalent).

Figure E.5 Connecting NEMA Type 1 Decoder to DH485 Network



① Only one of the devices in the network must have the cable shield connected to chassis ground. Do this by connecting shield to pin 1 instead of pin 9.
② Enable line termination for the device at each end of the network. To enable line termination, connect pins 12 and 13 together. For all other devices in the network, leave these pins open.

The following parameters are fixed for DH485 communications:

- 8 Data bits
- Even parity
- 1 Stop Bit

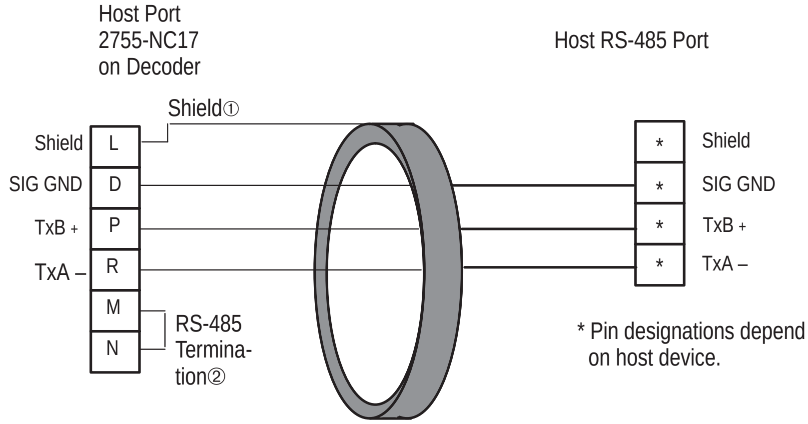
The host protocol options are:

- DH485 PCCC-1. PCCC commands with write replies
- DH485 PCCC-2. PCCC commands without write replies
- DH485 ASCII-1. ASCII commands with responses
- DH485 ASCII-2. ASCII commands without responses.

The communication interface and host protocol is selected during configuration. See the **Host Communications** configuration screen.

Figure E.6 shows how to connect the NEMA Type 4 decoder to a DH485 network. Use Belden cable 9842 (or equivalent).

Figure E.6 Connecting NEMA Type 4 Decoder to DH485 Network



① Only one of the devices in the network must have the cable shield connected to chassis ground. Do this by connecting shield to pin A instead of pin L.
② Enable line termination for the device at each end of the network. To enable line termination, connect pins M and N together. For all other devices in the network, leave pins M and N open.

The following parameters are fixed for DH485 communications:

- 8 Data bits
- Even parity
- 1 Stop Bit

The host protocol options are:

- DH485 PCCC-1. PCCC commands with write replies
- DH485 PCCC-2. PCCC commands without write replies
- DH485 ASCII-1. ASCII commands with responses
- DH485 ASCII-2. ASCII commands without responses.

The communication interface and host protocol is selected during configuration. See the **Host Communications** configuration screen.

Protocol Selection

The following table lists the available options for host communications.

Physical Interface	Flow Control	Communications Link Layer	Application Layer	Configuration Selections
RS-232	None	-	ASCII	RS232
RS-232	None	ACK/NAK	ASCII	RS232 ACK Character Defined NAK Character Defined
RS-232	XON/XOFF	-	ASCII	RS232 XON/XOFF
RS-232	XON/XOFF	ACK/NAK	ASCII	RS232 XON/XOFF ACK Character Defined NAK Character Defined
RS-232	RTS/CTS Modem Controls	-	ASCII	RS232 RTS/CTS-1
RS-232	RTS/CTS Modem Controls	ACK/NAK	ASCII	RS232 RTS/CTS-1 ACK Character Defined NAK Character Defined
RS-232	RTS/CTS Bulletin 2760 Modem Controls	-	ASCII	RS232 RTS/CTS-2
RS-232	RTS/CTS Bulletin 2760 Modem Controls	ACK/NAK	ASCII	RS232 RTS/CTS-2 ACK Character Defined NAK Character Defined
RS-422	None	-	ASCII	RS422
RS-422	None	ACK/NAK	ASCII	RS422 ACK Character Defined NAK Character Defined
RS-422	XON/XOFF	-	ASCII	RS422 XON/XOFF
RS-422	XON/XOFF	ACK/NAK	ASCII	RS422 XON/XOFF ACK Character Defined NAK Character Defined
RS-485	DH485 Local Area Network	DH485 Local Area Network	PCCC with Write Replies	RS485 PCCC-1 LSAP 128 or 1
RS-485	DH485 Local Area Network	DH485 Local Area Network	PCCC without Write Replies	RS485 PCCC-2 LSAP 128 or 1
RS-485	DH485 Local Area Network	DH485 Local Area Network	ASCII with Responses	RS485 ASCII-1 LSAP 128 or 1
RS-485	DH485 Local Area Network	DH485 Local Area Network	ASCII without Responses	RS485 ASCII-1 LSAP 128 or 1

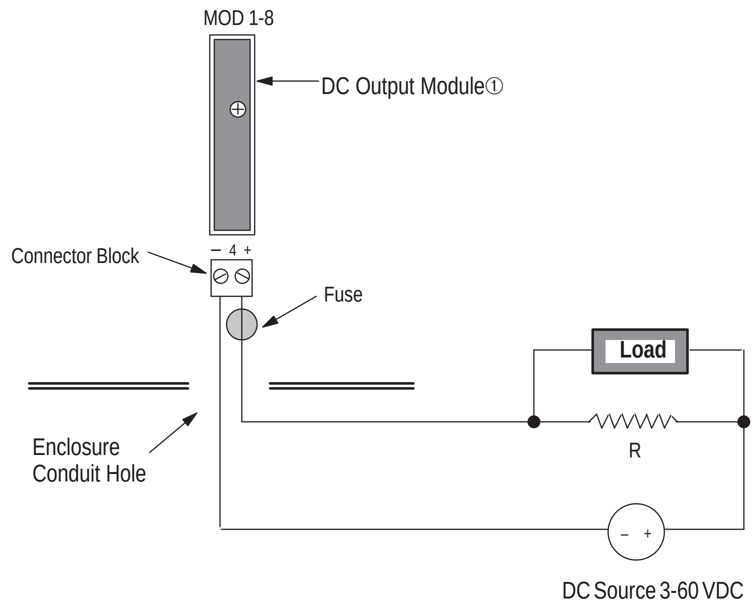
Output Module Applications

Figures G.1 through G.3 show typical output module applications. Outputs are open when power is first applied to the decoder (during initial diagnostics) and again when the decoder is powered off.

DC Output Module Application

Figure G.1 illustrates a typical DC output module application. When using high impedance loads, you may have to add an additional resistor (R) in parallel with the load. Select a value for R that maintains a minimum current of 10mA through the output module in the closed state. Typical R values range from 300 to 6,000 ohms depending on the source voltage.

Figure G.1 DC output module application



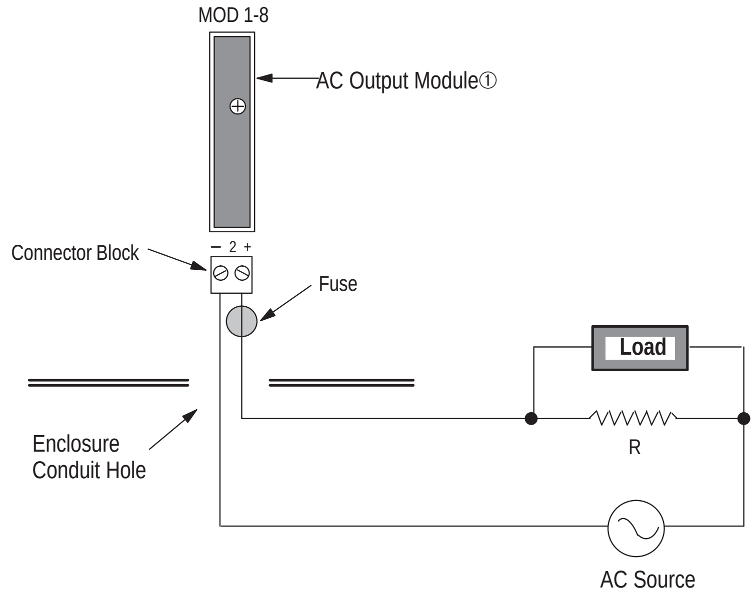
① Output module functions as switch, not a power source.

Note: For highly inductive or capacitive loads, make sure that the current does not exceed the maximum ratings of the fuse or module. You can use a diode to protect the module. See Figure G.3.

AC Output Module Application

Figure G.2 illustrates a typical AC output module application. When using high impedance loads, you may have to add an additional resistor (R) in parallel with the load. Select a value for R that maintains a minimum current of 50 mA RMS through the output module in the closed state.

Figure G.2 AC output module application



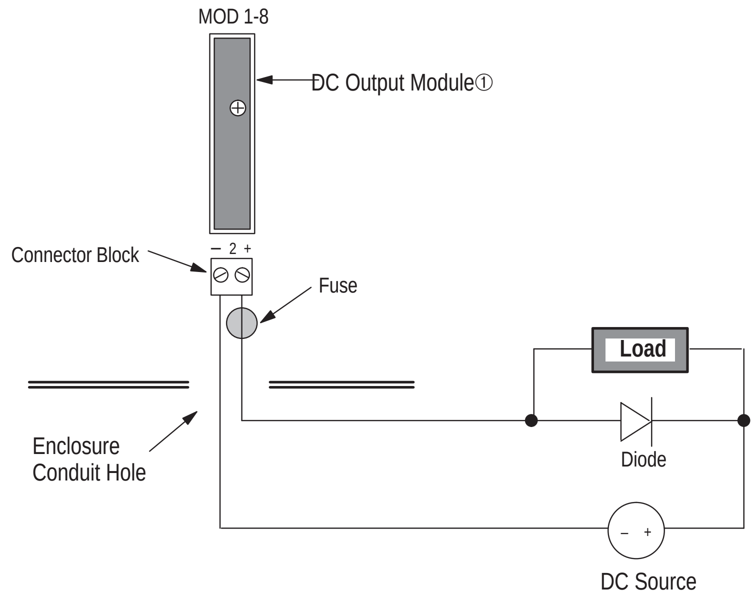
① Output module functions as switch, not a power source.

Note: For highly inductive or capacitive loads, make sure that the current does not exceed the maximum ratings of the fuse or module. You can use a diode to protect the module. See Figure G.3.

Using a Diode to Protect Output Module

Back EMF (Electromotive Force) is sometimes generated when an inductive load is switched off. Back EMF takes the path of least resistance into the output module, which may cause the module to blow. To protect the module from back EMF, insert a diode in parallel with the inductive device to dissipate back EMF.

Figure G.3 Using diode to protect module



① Output module functions as switch, not a power source.

Electrical Interfaces for AutoLoad Applications

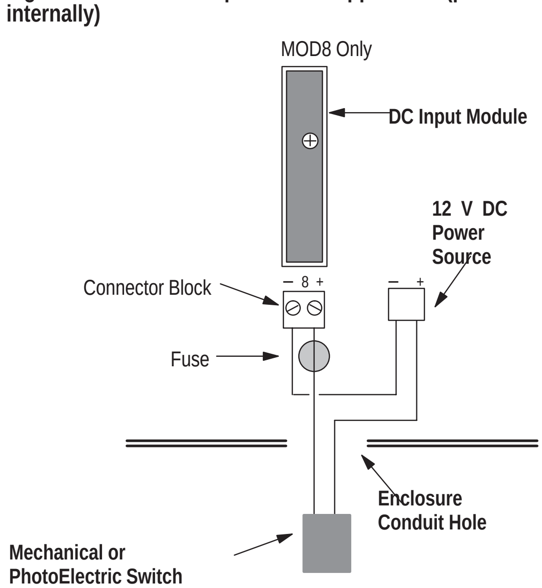
There are three ways to activate the AutoLoad function described in Chapter 5:

1. 12 VDC power supply terminal on I/O Module board connects to input module (in position 8 of I/O Module Board) and a normally opened (N.O.) contact, providing power to the input module. See Figure H.1.
2. External AC or DC power source connects to input module (in position 8 of I/O Module Board) and a normally opened (N.O.) contact, providing power to the input module. See Figure H.2
3. A normally opened (N.O.) contact connects directly to pins in AUX Port Connector. **This method does not require an I/O Module Board with installed input module or a power source.** See Figure H.3.

AutoLoad Input Module Application (powered internally)

Figure H.1 illustrates the AutoLoad Input module application that is powered internally. A DC input module is installed in position 8 of the I/O Module Board. A switch (N.O. contact) provides input to the module to load bar code data into the match code table. The module and switch receive power from the 12 V DC terminal on the I/O board.

Figure H.1 AutoLoad input module application (powered internally)

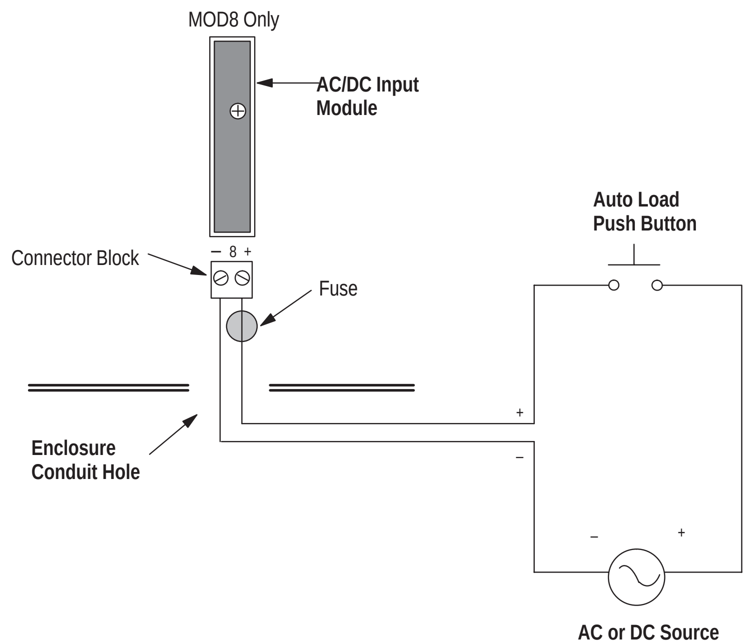


AutoLoad Input Module Application (powered externally)

Figure H.2 illustrates the AutoLoad Input module application that is powered externally. An AC/DC input module is installed in position 8 of the I/O Module Board. A push button (normally opened contact) provides input to the module to load bar code data into the match code table. The module and switch receive power from an external AC or DC source.

ATTENTION: To guard against enclosure damage, align the conduit so as to prevent unnecessary stress on the enclosure walls.

Figure H.2 AutoLoad input module application (powered externally

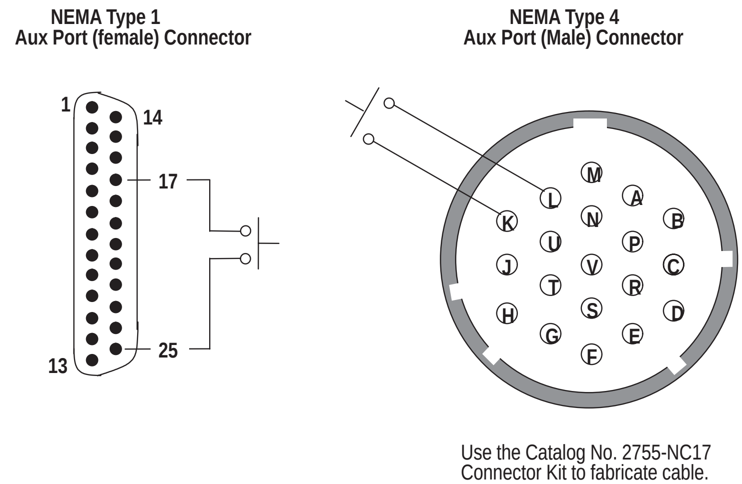


AutoLoad Activated by Aux Port Connector

Another way to activate the AutoLoad function is by connecting a push button (normally opened contact) directly to pins 17 and 25 (or K and L) of the AUX port connector. **This method does not require an I/O Module Board with installed input module or a power source.**

Figure H.3 shows the connection between a normally opened contact and pins on the NEMA Type 1 or NEMA Type 4 connector.

Figure H.3 AutoLoad function activated by AUX connector



ASCII Character Set

Dec.	Oct.	Hex	Char	Control Code	Dec.	Oct.	Hex	Char	Dec.	Oct.	Hex	Char	Dec.	Oct.	Hex	Char
0	000	00	NUL	CTRL @	32	040	20	SP	64	100	40	@	96	140	60	‘
1	001	01	SOH	CTRL A	33	041	21	!	65	101	41	A	97	141	61	a
2	002	02	STX	CTRL B	34	042	22	"	66	102	42	B	98	142	62	b
3	003	03	ETX	CTRL C	35	043	23	#	67	103	43	C	99	143	63	c
4	004	04	EOT	CTRL D	36	044	24	$	68	104	44	D	100	144	64	d
5	005	05	ENQ	CTRL E	37	045	25	%	69	105	45	E	101	145	65	e
6	006	06	ACK	CTRL F	38	046	26	&	70	106	46	F	102	146	66	f
7	007	07	BEL	CTRL G	39	047	27	’	71	107	47	G	103	147	67	g
8	010	08	BS	CTRL H	40	050	28	(	72	110	48	H	104	150	68	h
9	011	09	HT	CTRL I	41	051	29	)	73	111	49	I	105	151	69	i
10	012	0A	LF	CTRL J	42	052	2A	*	74	112	4A	J	106	152	6A	j
11	013	0B	VT	CTRL K	43	053	2B	+	75	113	4B	K	107	153	6B	k
12	014	0C	FF	CTRL L	44	054	2C	,	76	114	4C	L	108	154	6C	l
13	015	0D	CR	CTRL M	45	055	2D	-	77	115	4D	M	109	155	6D	m
14	016	0E	SO	CTRL N	46	056	2E	.	78	116	4E	N	110	156	6E	n
15	017	0F	SI	CTRL O	47	057	2F	/	79	117	4F	O	111	157	6F	o
16	020	10	DLE	CTRL P	48	060	30	0	80	120	50	P	112	160	70	p
17	021	11	DC1	CTRL Q	49	061	31	1	81	121	51	Q	113	161	71	q
18	022	12	DC2	CTRL R	50	062	32	2	82	122	52	R	114	162	72	r
19	023	13	DC3	CTRL S	51	063	33	3	83	123	53	S	115	163	73	s
20	024	14	DC4	CTRL T	52	064	34	4	84	124	54	T	116	164	74	t
21	025	15	NAK	CTRL U	53	065	35	5	85	125	55	U	117	165	75	u
22	026	16	SYN	CTRL V	54	066	36	6	86	126	56	V	118	166	76	v
23	027	17	ETB	CTRL W	55	067	37	7	87	127	57	W	119	167	77	w
24	030	18	CAN	CTRL X	56	070	38	8	88	130	58	X	120	170	78	x
25	031	19	EM	CTRL Y	57	071	39	9	89	131	59	Y	121	171	79	y
26	032	1A	SUB	CTRL Z	58	072	3A	:	90	132	5A	Z	122	172	7A	z
27	033	1B	ESC	CTRL [	59	073	3B	;	91	133	5B	[	123	173	7B	{
28	034	1C	FS	CTRL \	60	074	3C	<	92	134	5C	\	124	174	7C	|
29	035	1D	GS	CTRL]	61	075	3D	=	93	135	5D	]	125	175	7D	}
30	036	1E	RS	CTRL ^	62	076	3E	>	94	136	5E	^	126	176	7E	~
31	037	1F	US	CTRL _	63	077	3F	?	95	137	5F	_	127	177	7F	⌂

Entering Non-Printable ASCII Characters

The following parameters allow you to enter non-printable ASCII characters into the edit field:

- •Source Identification Message
- •Header Message
- •No-Read Message
- •Match Table Entry
- •Default Prompt Message

The table below shows you how to enter non-printable ASCII control characters (ASCII 0 through 31) into a text string. For example, to enter carriage return and line feed control characters, enter %M%J. The decoder interprets %M%J as the ASCII control characters CR and LF. The % character is equivalent to ASCII 37 (decimal).

You always enter non-printable control characters as a 2 character sequence and the second character must be listed in the following table. To enter the % character, use %%.

ASCII Control Character	Enter:	ASCII Control Character	Enter:	ASCII Control Character	Enter:
NUL	%@	VT	%K	SYN	%V
SOH	%A	FF	%L	ETB	%W
STX	%B	CR	%M	CAN	%X
ETX	%C	SO	%N	EM	%Y
EOT	%D	SI	%O	SUB	%Z
ENQ	%E	DLE	%P	ESC	%[
ACK	%F	DC1	%Q	FS	%\
BEL	%G	DC2	%R	GS	%]
BS	%H	DC3	%S	RS	%^
HT	%I	DC4	%T	US	%_
LF	%J	NAK	%U		

Custom Settings

Use a photocopy of the table below to record your own custom parameter settings as you develope new applications. This table is a blank version of the default settings table from Appendix B.

Category of Parameters	Parameter	Default Setting
Bar Code Symbology	Enable Code 39	
	Enable Interleaved 2-of-5	
	Enable Codabar	
	Enable Code 128	
	Code 128 FNC1 Character	
	Enable UPC-A	
	Enable UPC-E	
	Expand UPC-E	
	Enable EAN-8	
	Enable EAN-13	
Check Characters	Code 39	
	I 2 of 5	
	Codabar	
Bar Code Symbology Lengths	Code 39	
	Interleaved 2-of-5	
	Code 128	
	Codabar	
Pharma–Code	Enable Pharma–Code	
	Quiet Zone Ratio	
	Space Tolerance	
	Bar Tolerance	
	Wide to Narrow Bar Ratio	
	Minimum Number of Bars	
	Scanner A Decode Direction	
	Scanner B Decode Direction	
	Code Verification List	
Scanner A Control	Laser Light	
	Decode Mode	
	No-Read Timer	
	Inter-Scan Timer	
	Capture Count	
	Symbols/Scan	
	Symbols/Package	
	Match Complete	
Scanner B Control	Laser Light	
	Decode Mode	
	Trigger Timeout	

Category of Parameters	Parameter	Default Setting
Match Code Table (1 - 8)	Bar Code Symbology	
	Match Code Text String	
	Normal State	
	Source	
	Duration	
Package Detect Input	Scanner A Filter	
	Scanner A Sense	
	Scanner B Filter	
	Scanner B Sense	
Extended Match Code Table	Counter Status	
	Status of Counter Set	
	Mode	
	Source	
	Symbology	
	Match Pattern String	
	Count	
	Loading	
AUX and LCD Display Format	Display Data	
	Message Format	
	Scroll LCD Display	
	Bar Code Strings Position	
	Decoder Performance Position	
	Package Counter Position	
	Symbols Not Read Counter Position	
	Primary Counter 1 Position	
	Primary Counter 2 Position	
	Primary Counter 3 Position	
	Primary Counter 4 Position	
	Primary Counter 5 Position	
	Primary Counter 6 Position	
	Primary Counter 7 Position	
	Primary Counter 8 Position	
Host Message Replacement Rules	Rule Number	
	Source	
	Symbology	
	Symbol Number	
	Find String Containging	
	Replace Entire String With	
	Minimum Field Length	
	Alignment	
	Fill Character	
	Host Message Field Number	
	Bar Code String Examples	

Category of Parameters	Parameter	Default Setting
Host Message Format	Start Character	
	Source Identifier (for AUX)	
	Source Identifier (for A)	
	Source Identifier (for B)	
	Header String	
	Field Delimiter	
	Number of Fields in Message	
	Send Symbology	
	Send Package Count	
	Send Bar Code Strings	
	Send Decoder Performance	
	End Message	
	Default No-Read String	
	No-Read Replacements Strings (1–16)	
Host Communications Parameters marked with an asterisk require a save and restart to take effect	Baud Rate*	
	Bits/Character*	
	Parity*	
	Host Protocol*	
	Device Address*	
	ACK Character*	
	NAK Character*	
	Start Character Scanner A	
	Stop Character Scanner A	
	Start Character Scanner B	
	Stop Character Scanner B	
	Large Buffer	
	Send Host Message	
	Transmission Check	
Aux Terminal Data Entry	Enable Keyboard Entry	
	Confirm Entry	
	AUX Data Format	
	Rubout Character	
	Echo Data to Terminal	
	Size of Display	
	Default Prompt Message	

European Union Directive Compliance

European Union Directive Compliance

If this product is installed within the European Union or EEA regions and has the CE mark, the following regulations apply.

EMC Directive

This apparatus is tested to meet Council Directive 89/336 Electromagnetic Compatibility (EMC):

- EN 50081-2 EMC – Generic Emission Standard, Part 2 – Industrial Environment
- EN 50082-2 EMC – Generic Immunity Standard, Part 2 – Industrial Environment

The product described in this manual is intended for use in an industrial environment.

Intended Use of Product

According to these Standards, the factor which determines, for EMC purposes, whether an apparatus is deemed to be “Industrial” or “Residential, commercial and light industrial”, is given in Clause 1 of EN50081-2 as follows:

> Apparatus covered by this standard is not intended for connection to a public mains network but is intended to be connected to a power network supplied from a high- or medium-voltage transformer dedicated for the supply of an installation feeding a manufacturing or similar plant.

The product described in this manual is intended for use solely in an industrial environment as defined above. When installed in Europe, any other application is in contravention of European Union Directives, and a breach of these laws.

Declaration of Conformity

DECLARATION OF CONFORMITY

This Declaration of Conformity is suitable to the European Standard EN 45014, "General criteria for supplier's declaration of conformity." The basis for the criteria has been found in international documentation, particularly in: ISO/IEC Guide 22, 1982, "Information on manufacturer's declaration of conformity with standards or other technical specifications."

Allen-Bradley liability under this declaration is limited to that set forth in the current Allen-Bradley publication 6500, Terms and Conditions of Sale as well as similar publications from Allen-Bradley affiliates doing business in the European Community.

Applied Council Directive(s):
Electromagnetic Compatability Directive (EMC) 89/336/EEC
and amending directives 91/263/EEC, 92/31/EEC, 93/68/EEC

We,

Manufacturer:	Allen-Bradley Company, Inc. 1201 South 2nd Street Milwaukee, WI 53204 U.S.A.	**Authorized Representative in the Community (and location of Responsible Person):**	Allen-Bradley, subsidary of Rockwell International GmbH Düsselberger Str. 15 D-42781 Haan, Germany

declare under our sole responsibility that the product(s) (name, type/model, batch/serial number):

Industrial barcode reading systems including the Bul 2755-DS and -DD family of decoders and the Bul 2755-LD4 and -LD8 family of scanners

to which this declaration relates is in conformity with the relevant provisions of the following standard(s) or other normative document(s):

EN 50082-2 :1995 Generic Immunity Standard - Industrial
EN 50081-2 :1993 Generic Emission Standard - Industrial

Test Report is maintained at: **Allen-Bradley Company, Inc.** **1201 South Second Street** **Milwaukee, WI 53204**	**Report No. 3530 & 3556 August 1995** **D.L.S. Electronic Systems, Inc** **1250 Peterson Drive** **Wheeling, IL 60090**

We, the undersigned, hereby declare that the product(s) specified above conforms to the listed directive(s) and standard(s).

Manufacturer

Signature: Robert A. Gardiner

Full Name: Robert Gardiner
Position: Manager, Quality Engineering
Date: Nov 3, 1995

Authorized Representative in the Community through its Responsible Person

Signature: Viktor Schiffer

Full Name: Viktor Schiffer
Position: Engineering Manager
Date: Nov 3, 1995

Glossary

A

ACK
See acknowledgement.

acknowledgement
An ASCII control character used to acknowledge the reception and acceptance of a transmission block.

address
1) A character string that uniquely identifies a memory location.
2) A character string that uniquely identifies the physical location of an input or output circuit.

AIM
Acronym for Automatic Identification Manufacturers.

alphanumeric
The character set containing letters, numbers, punctuation marks, and symbols.

ASCII
American standards code for information interchange. It is a seven-bit code with an optional parity bit used to represent alphanumeric, punctuation marks, and control code characters.

AutoLoad
The ability to automatically fill the match code table with character strings and symbology types by scanning bar codes.

AUX Port
Serial port that communicates with a standard ASCII terminal. The AUX port can switch between two modes of operation; configuration or manual data entry.

AUX Terminal
Terminal that connects to the AUX port and is used for configuration or manual data entry functions.

AUX Terminal Selector
Mechanism that switches the AUX port between configuration and manual data entry mode.

B

bar
The dark element of a printed bar code symbol.

bar code
The vertical bars and spaces found in a bar code symbol.

bar code density
The number of characters which can be represented in a linear inch.

bar code label
A label that carries a bar code and is suitable to be affixed to an article.

bar code symbol
A group of vertical bars that represent a character or group of characters whose spacing is determined by a specific set of rules. In most cases, human readable characters are printed below the bars. Also referred to as a field.

bar length
The bar dimension perpendicular to the bar width.

bar width
The thickness of a bar measured from the edge closest to the symbol’s start character to the trailing edge of the same bar.

bit
Binary digit. The smallest unit of information in the binary numbering system. Represented by the digits 0 and 1. The smallest unit of memory.

buffer
Storage register for the temporary storage of data that allows data to be decoded at different rates.

buffer full
An output condition that occurs when the buffer is full.

buffer overflow
An output condition that occurs when the buffer is full and the decoder produces additional bar code data.

byte
8 bits operated on as a unit.

C

capture count
The number of identical and valid scans which must be decoded for a valid read to occur.

When capture count is set to V, a valid read occurs only if the decoded data matches an entry in the match code table.

character
A single groups of bars and spaces representing an individual number, letter or punctuation mark. A graphic shape representing a letter, number or symbol.

check digit
A digit included within a symbol whose value is based mathematically on other characters included in the symbol. It is used to mathematically check the accuracy of the read.

code type
See symbology.

coordinated mode
A scanning mode in which the symbols per package setting can be satisfied by either or both scanners.

continuous code
A bar code or symbol that does not use an intercharacter gap between characters in the code. Code 128 is an example of a continuous code.

controller
A unit, such as a programmable controller, which controls machine or process elements.

CRT
A terminal containing a cathode ray tube.

D

decode
The process of translating a bar code into data characters using a specific set of rules for each symbology.

decoder
A device used to decode, or make usable, a digital or analog signal transmitted from a scanning device.

decode mode
The method by which the decoder starts and stops the decoding process. The two basic methods of decoding are triggered and continuous.

decoder logic
The circuitry which receives the signals from the scanner, interprets the signals into meaningful data and provides the interface to other devices.

discrete code
A bar code or symbol where the space between characters, intercharacter gap, are not part of the code; as with Code 39. See continuous code.

E

EAN
Acronym for European Article Numbering System, the international standard bar code for retail food packages.

element
1) A single binary position in a character. 2) Dimensionally the narrowest width in a character, bar or space.

encoded area
The total linear dimension consisting of all the characters of a code pattern, including start/stop characters and data.

G

guard bars
The bars at the ends and center of a UPC and EAN symbol. They ensure a complete scan of the bar code.

H

helium neon laser
The type of laser most commonly used in bar code scanners. Because the laser beam is bright red, bars must not be printed with red ink. The bars would be indistinguishable from the background.

hex
Abbreviated form of the word hexadecimal. See hexadecimal.

hexadecimal numbering system.
A base-16 numbering system that uses the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F.

host
(1) A central controlling computer in a network system. (2) Any device on a network system that provides a controlling function to another device on the network. (3) Any intelligent device for which another device is providing a communication interface to a network.

host port
Serial port supporting RS-232, RS-422, RS-485 communications interfaces through which a device can control the operation of the decoder and receive decoded information.

I

Independent Mode
A scanner mode in which each scanner operates independently of the other.

Interleaved 2-of-5
A bar code in which characters are paired together using bars to represent the first character and spaces to represent the second.

Inter-Scan Timer
A timer that inhibits decoding for a set time interval after a valid read.

L

LAN
Local area network.

LSAP
An acronym for Link Service Access Point. Used by the DH-485 protocol. Effectively a secondary address for an application service.

M

match
A condition in which decoded data matches data in the match code table.

match code
A sequence that specifies a symbology (code type) and character string which can be compared against decoded (valid) bar codes.

match code table
A list of match codes that is compared to each valid read. The decoder offers primary and extended match code tables, each of which offers different capabilities.

match complete
An output condition in which decoded data matches a set number of entries in the match code table.

match entry
An output condition in which decoded data matches an entry in the match code table.

misread
A condition which occurs when the data output of a reader does not agree with the encoded data presented.

modulo check digit or character
A calculated character within a data field used for error detection. The calculated character is determined by a modulus calculation on the sum or the weighted sum of the data field contents.

msec
Abbreviation for millisecond (1/1,000 of one second).

multi-drop link
A link that has more than 2 stations (contrasted with a point-to-point link.)

multiplexer
The incorporation of 2 or more signals into a single wave from which the individual signal can be recovered.

N

NAK
See negative acknowledgement.

Negative Acknowledgment
An ASCII control character transmitted by a receiver as a negative response to the sender.

NEMA standards
Consensus standards for electrical equipment by the members of the National Electrical Manufacturers Association (NEMA).

NEMA Type 1
Enclosure intended for indoor use. Provides a degree of protection against contact with the enclosed equipment in locations where unusual service conditions do
not exist. The enclosure is sheet steel, treated to resist corrosion.

NEMA Type 4
Enclosure intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose directed water; and to be undamaged by the formation of ice on the enclosure.

No-Match
An output condition in which decoded data does not match an entry in the match code table.

No-Read
An output condition in which bar codes on a package are not read correctly or are incomplete (fields per package count not satisfied).

numeric
A character set that includes only the numbers as contrasted to alphanumeric which includes both letters and numerals.

O

orientation
The alignment of bars and spaces the the scanner. Often referred to as vertical (picket fence) or horizontal (ladder).

output counter
A counter that is associated with each output condition. The counter increments by 1 each time the condition occurs.

overhead
The fixed number of characters required for start, stop and checking in a given symbol. For example, a symbol requiring a start/stop and two check characters contains four characters of overhead. To encode three characters of data, seven characters are required.

P

PCCC
Acronym for Programmable Controller Communications Commands. A set of commands used to communicate with Allen-Bradley programmable controllers.

percent good reads
The number of successful reads per 100 attempts to read a particular symbol.

parity bit
An additional non-data bit attached to a binary word to provide a check of the data integrity by making the sum of the number of ones in a word always even or odd.

picket fence code
A code pattern in which the direction of travel of the symbol is perpendicular to the bars and spaces of the code.

R

RS232, RS422, RS485
Electrical standards for data communications.

read
An output condition in which an entire package is correctly decoded. In the continuous decode modes, read and valid read (see valid read) have the same meaning.

S

scan
The search for a symbol or marks which are to be optically recognized.

scan area
The area intended to contain a bar code symbol.

scanner
A device that optically scans bar code symbols and converts the optical information into digital or analog form and sends it to a decoder.

self-checking
A bar code or symbol using a checking algorithm which can be applied to each character to guard against undetected errors. Non-self-checked codes may employ a check digit or other redundancy in addition to the data message.

space
The lighter element of a bar code formed by the background between bars.

start/stop character
A bar code character that provides the scanner with information about how the code is bounded and its orientation. The start character is normally at the left-hand end of a horizontal code and adjacent to the most significant character. The stop character is normally at the right-hand end of a horizontal code and adjacent to the least significant character.

step ladder orientation
A bar code or symbol presented in such a manner that the direction of travel of the symbol is parallel to the cars and spaces of the code

string
A sequence of ASCII characters.

symbol
A combination of characters, including start/stop characters and check characters, as required, which form a complete scannable entity.

symbol density
The number of characters per linear inch.

symbol length
The length of the symbol measured from the beginning of the quiet area adjacent to the start character to the end of the quiet area adjacent to a stop character.

symbology
The conventions, or rules, which govern the formation of characters and strings of characters in bar codes. The language of the bar code symbol. See bar code symbol.

symbols per package
A value that indicates the number of bar code symbols that comprise a complete package. This value applies only to the triggered mode of operation.

symbols per scan
A value that indicates the number of bar code symbols expected in a single sweep of the scanning beam.

U

UPC
Acronym for Universal Product Code. The standard bar code type for retail food packaging in the United States.

V

valid package
A scan (or group of scans) that is comprised of valid reads and satisfies the fields per package parameter.

valid read
A condition that occurs when sufficient valid scans have been decoded to satisfy the capture count.

valid scan
A condition that occurs when sufficient valid fields have been decoded to satisfy fields/scan.

W

word
A unit of data which contains two bytes (16 bits).

Numbers

A

Q

R

S

T

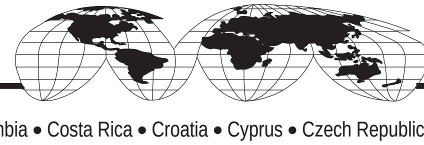
U

V

Rockwell Automation

Allen-Bradley

Allen-Bradley, a Rockwell Automation Business, has been helping its customers improve productivity and quality for more than 90 years. We design, manufacture and support a broad range of automation products worldwide. They include logic processors, power and motion control devices, operator interfaces, sensors and a variety of software. Rockwell is one of the world's leading technology companies.



Worldwide representation.

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Allen-Bradley Headquarters, 1201 South Second Street, Milwaukee, WI 53204 USA, Tel: (1) 414 382-2000 Fax: (1) 414 382-4444

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