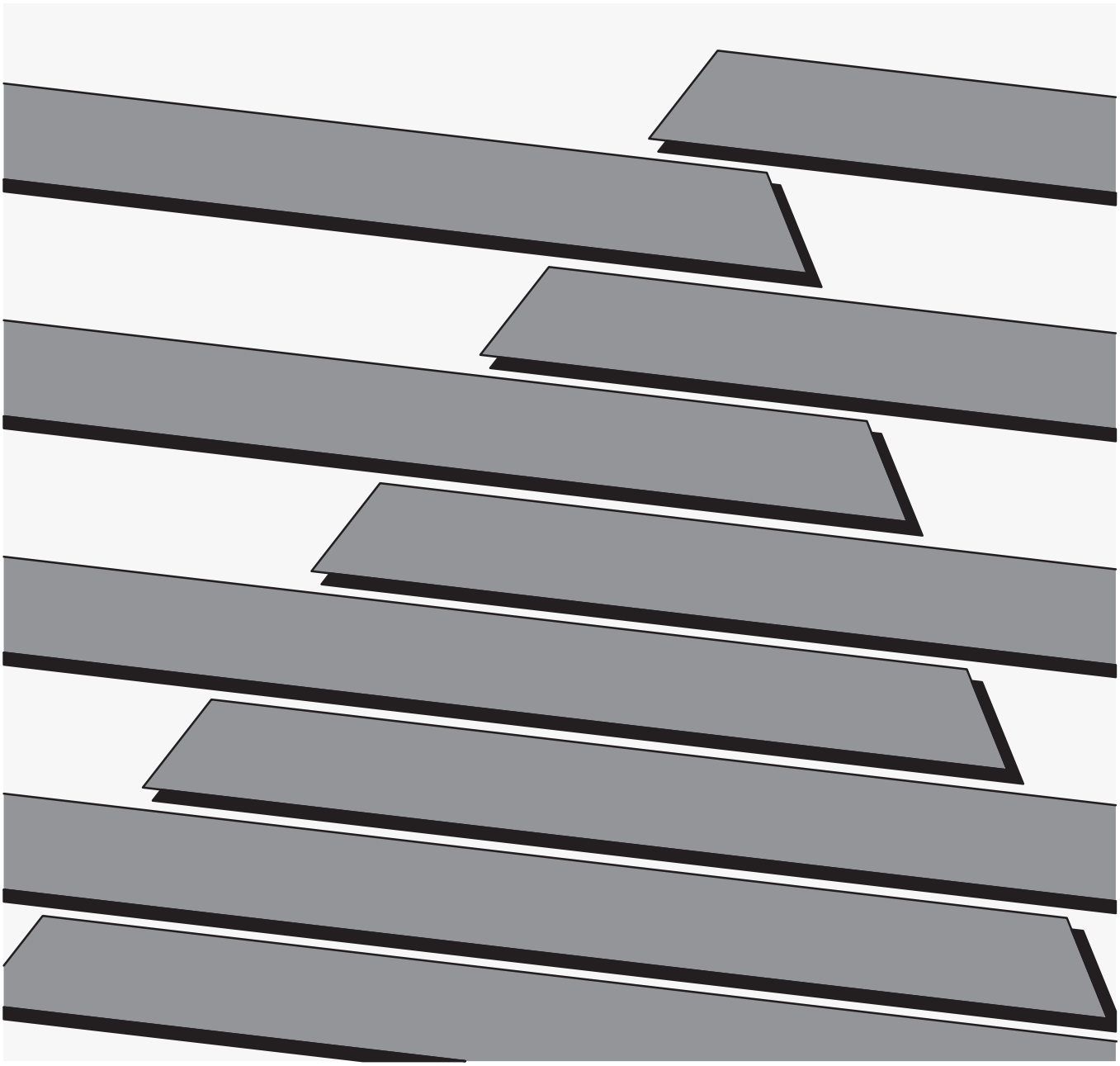
ALLEN-BRADLEY

Multi-Purpose Bar Code Workstation Series B

(Catalog Number 2755-DH1)

User Manual



Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. “Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls” (Publication SGI-1.1) describes some important differences between solid state equipment and hard–wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will the Allen-Bradley Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

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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.

Attentions help you:

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

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

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Chapter 1

Using this Manual

Chapter Objectives

Read this chapter to familiarize yourself with the rest of the manual. You will learn about:

- Contents of the manual.
- Intended audience.
- Conventions used.

Overview of this Manual

This manual will tell you how to install and use your Catalog No. 2755-DH1, Series B, Multi–Purpose Bar Code Workstation. It is divided into the following chapters:

Chapter	Title	Contents
1	Using This Manual	Overview of the manual.
2	Description	Features and capabilities are described.
3	Host Computers and Display Terminals	Cabling and communications link between DH1 and host computer or display terminal
4	Installation and Power Up	System setup and power up
5	Programming Via Escape Sequences	Descriptions and examples of Escape sequence commands
6	Programming Via Bar Codes	Descriptions and examples of bar code commands
7	Data Output Formats	Format of the decoded data
8	Maintenance and Troubleshooting	System maintenance and troubleshooting
9	Specifications	System specifications
App. A	Default Settings	Factory default settings
App. B	Escape Sequence Summary	Alphabetical organization of escape sequences including defaults.
App. C	Non–displayable ASCII Characters	Non–displayable ASCII Characters
App. D	Code 39 Values of ASCII Characters	Code 39 Values of ASCII Characters

Intended Audience

No special knowledge is needed to read this manual and follow its directions. If the system will be used to communicate with a higher level controller, we assume you are familiar with communication terminology.

Conventions Used

Some chapters in this manual contain examples of how to enter data or commands. The following conventions are used:

- The Catalog No. 2755-DH1 Multi–Purpose Bar Code Workstation will be referred to as the *decoder.*
- The programming command names will be italicized as shown below:

  Enable Next Read

- Carets, < >, are used when you are to enter variable data. For example, <n>, means you enter the value of *n* at that point.
- Escape sequences and variables will be shown in another type style, for example:

  Esc – y 5 Z

Attention

ATTENTION: This laser caution symbol appears where laser radiation is present.

Chapter 2

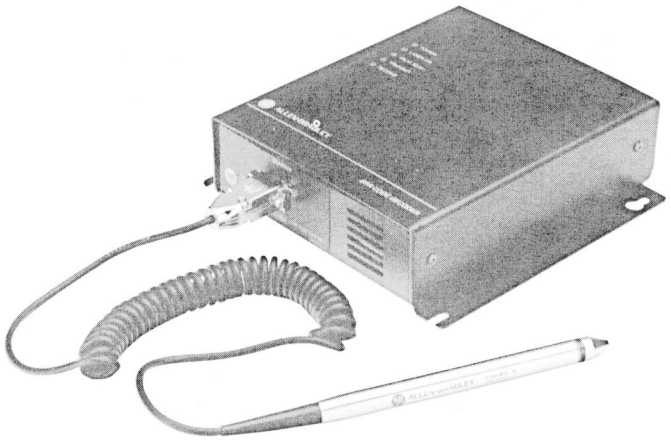
Description

Chapter Objectives

The decoder's capabilities are briefly described. Key features are shown and explained.

Overview

The Catalog No. 2755-DH1, Multi-Purpose Bar Code Workstation is a dedicated bar code decoder capable of supporting one of many Allen-Bradley scanning devices.



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You can use any Allen-Bradley attended scanning device with the decoder. Attended devices include hand-held laser scanners (guns), wands, and slot scanners. In addition, you can use a Low-Speed Material Handling Scan Head (Catalog No. 2755-L2) for unattended scanning.

The decoder is ready to use *right out of the box*. The default configuration will support many applications. You can, however, alter its operation by sending it escape sequences from the host, or by scanning the configuration bar code symbols supplied in this User's Manual.

The decoder's *Host Computer port* is used to transmit decoded bar code data and configuration information to the host computer. The host computer uses this port for programming, or reconfiguring, the decoder.

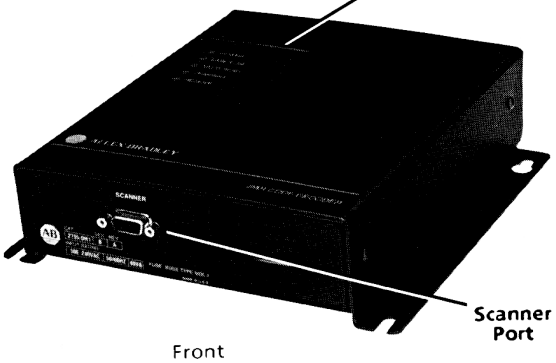
A *Terminal Display port* is also supplied to allow:

- Viewing of decoded information
- Viewing of the decoder's configuration
- The entry of supplemental information
- The entry of bar code data to the host in case a symbol cannot be read by your system

Features

An important feature is the decoder's integral power supply used to power the decoder and your scanning devices. This feature allows you to avoid the inconvenience normally experienced with separate power supplies. In addition, it will accept a wide range of input power from 100 to 240 VAC (nominal). Other features include:

- Autodiscrimination of one or more of the following symbologies:
  - Code 39
  - Interleaved 2 of 5
  - UPC and UPC with supplemental digits
  - EAN and EAN with supplemental digits
  - Codabar
  - Code 128
  - Code 11
- Can be used *"right out of the box"*.
- Bar code or escape sequence programming.
- Nonvolatile memory (EEPROM) used for storing configuration parameters.
- Full duplex RS-232-C or RS-422 port for communication with a host computer. The decoder transmits decoded data to the host. The host computer programs the decoder by sending it escape sequences.
- A separate RS-232-C port for a display terminal. This port can be used to display the decoder's configuration, or decoded bar code data sent by the decoder to the host. In addition, it is used to manually enter and transmit bar code data to the host computer when the bar code symbol cannot be read.
- LED indicators to monitor system status and assist in programming.
- Built-in speaker with variable volume and tone.
- External speaker jack.
- Automatic laser scanner shutoff.
- Detachable, IEC 320 power cable.
- Compatibility with a variety of scanning devices including hand-held laser scanners, wands and unattended scanners.
- High electrical noise immunity for the industrial environment.
- Heavy gauge, NEMA 1 steel enclosure.
- Designed to meet UL and CSA standards.
- Label on bottom provides a quick reference guide to connector pinouts.



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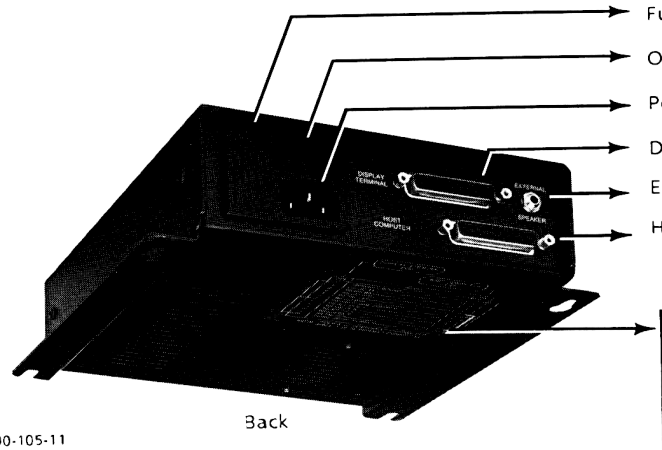
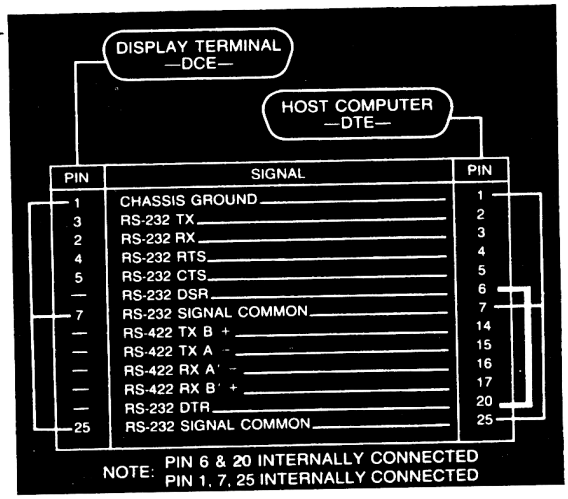
Label	Color of LED	Function
Power On	Green	Decoder is receiving power, +5 volt power supply voltage is operating correctly
Laser On	Red	This LED lights whenever a laser scanning device is triggered. This LED will not light if a wand is connected.
Valid Read	Green	This Led will pulse: **Once** during initialization **Once** for every good read **Twice** for every no-read if no-read recognition is enabled
Transmit	Red	Decoder or local terminal is transmitting data to the host computer.
Receive	Red	Decoder or local terminal is receiving data from the host computer.

The Scanner port is used to connect your scanning device to the decoder. **Always remove power before connecting or disconnecting a scanning device.** Supported symbologies are:

- Interleaved 2 of 5
- Code 39
- Codabar
- Code 128
- Code 11
- UPC and UPC with supplemental digits
- EAN and EAN with supplemental digits
- Any subset of the above listed codes



90-105-11



Chapter 3

Host Computers and Display Terminals

Chapter Objectives

This chapter discusses communications between a decoder, host computer, and display terminal.

Communications Ports

The decoder has two independent communications ports, the *Host Computer port* and *Display Terminal port.*

The Host Computer port supports both RS-232-C and RS-422 communications. The Display Terminal port only supports RS-232-C. **All communication parameters, such as baud rate, parity, stop bits, etc. are common to both ports.**

The Host Computer port is used by the:

- Decoder to send decoded bar code data to the host for processing
- Host computer to display the configuration screen
- Host computer to send messages to the display terminal
- Host computer to download commands (escape sequences) to the decoder. These commands customize the operating parameters.

The Display Terminal port provides a convenient connection point for a local terminal or serial printer. If the bar code symbol is illegible, the terminal can be used to manually enter and transmit bar code data to the host. You cannot enter data into this port when the decoder is scanning.

A display terminal can receive decoded bar code data:

- Directly from the decoder
- As an echo from the host

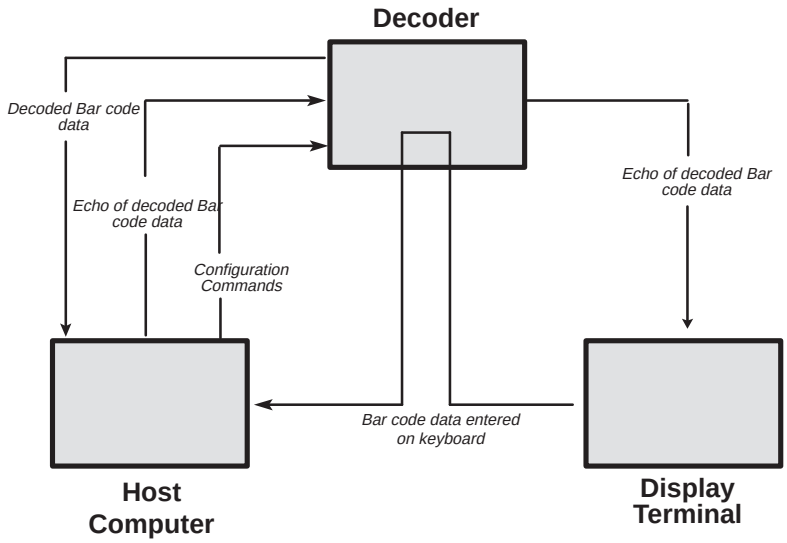
The Display Terminal port can be enabled or disabled, as described on pages 3-2 and 3-3.

Display Terminal Port Disabled

The decoder's ability to transmit decoded bar code data to a display terminal can be enabled or disabled. If your host computer echoes all received data, you should disable the Display Terminal port using the *Disable Terminal Port* configuration bar code symbol. If you do not disable the Display Terminal port you will receive duplicate messages, one from the host and the other from the decoder. This function's default setting is *Display Terminal Port Enabled*.

When the decoder decodes a bar code symbol, it will transmit the decoded data to the host. When the host receives the data, it may echo the data through the decoder's Display Terminal port, to the attached display terminal. Refer to Figure 3.1.

Figure 3.1
Display Terminal Port Disabled



Transmit	Receive
Host	Decoder and Display Terminal
Display Terminal	Host
Decoder	Host

*Use this mode if your host computer **does** echo all data transmissions to local terminals.*

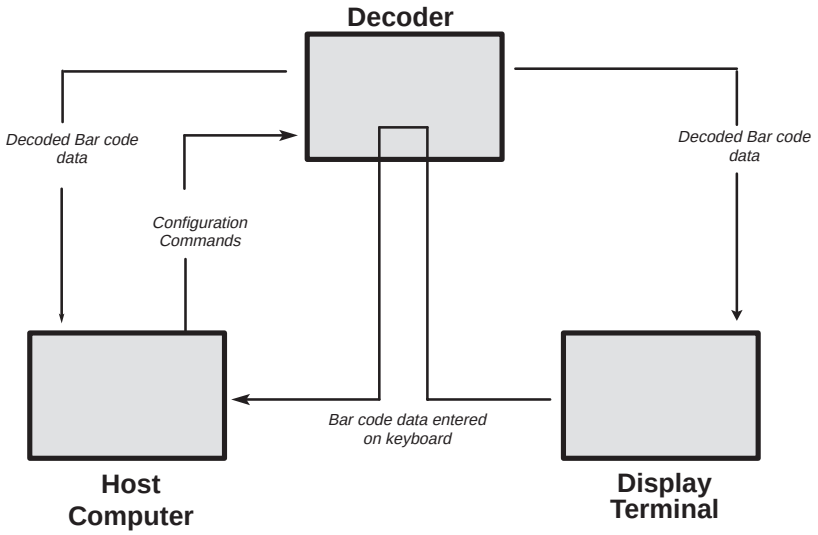
Note: With the Display Terminal port disabled, all escape sequences sent to the decoder will also be sent to any local terminal connected to the decoder. Make sure these escape sequences will not affect your terminal's operation.

Note: If the decoder receives a *Show Configuration* command, the configuration display screen will be sent only to the Host Computer port.

Display Terminal Port Enabled

The decoder's ability to transmit decoded bar code data to a display terminal can be enabled or disabled. If your host computer does not echo data, you can enable the Display Terminal port using the *Enable Terminal Port* configuration bar code symbol. When the decoder decodes a bar code symbol, it will be transmitted simultaneously to the Host Computer and Display Terminal ports. Refer to Figure 3.2.

Figure 3.2
Display Terminal Port Enabled



Transmits	Receives
Host	Decoder
Display Terminal	Host
Decoder	Host and Display Terminal

*Use this mode if your host computer **does not** echo data transmissions to local terminals.*

Note: If the decoder receives a *Show Configuration* command, the configuration display screen will be sent to the host and local display terminal simultaneously.

Host Computer Port Pinout

The Host Computer port is configured as a Data Terminal Equipment (DTE) device. Table 3.A defines which pins of the 25 pin (female) D-shell connector are used to provide RS-232-C and RS-422 communications.

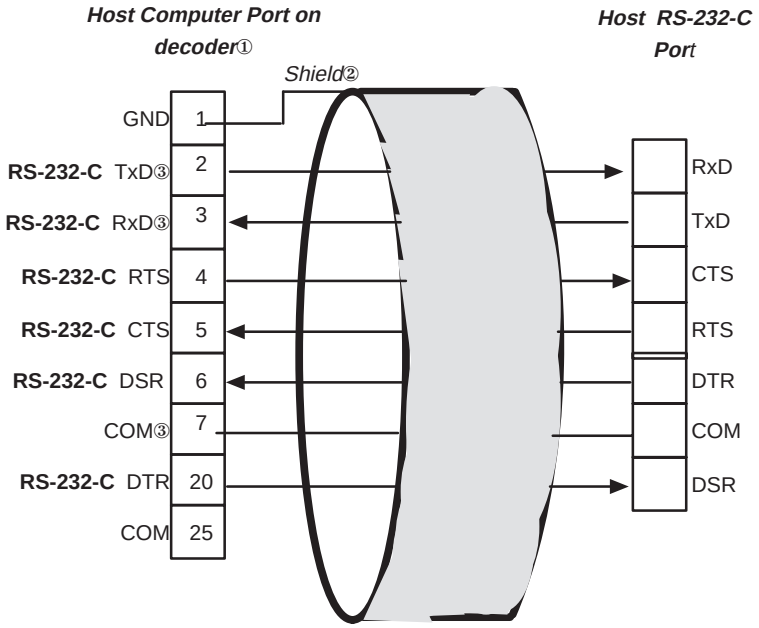
Pin	Function	Abb.	What This Pin Does
1	Protective Ground	GND	Electrically bonded to the chassis and to the metal shell of the 25-pin connector. When plastic shell (non-shielded) connectors are used on the communications cable, the cable shield drain wire should be connected to this pin.
2	**RS-232-C** Transmitted Data (Output)	TxD	Serial output from the decoder.
3	**RS-232-C** Received Data (Input)	RxD	Serial input data from the host computer. Escape sequence commands for programming and control are sent to this pin.
4	**RS-232-C** Request To Send	RTS	Indicates to the host computer that the decoder is on-line. When RTS/CTS handshaking is enabled, RTS will go high when the terminal or decoder wishes to transmit.
5	**RS-232-C** Clear To Send	CTS	The CTS input must be driven greater than +3 VDC or left unconnected to allow the decoder to output decoded label information. When CTS is less than -3 VDC, transmission from the decoder will cease within 1-character transmission time. When the host is receiving input from the local display terminal, CTS is driven low.
6	**RS-232-C** Data Set Ready	DSR	Internally connected to Pin 20 to provide loopback of DTR signal.
7	Signal Common	COM	This is the signal reference common which must be connected to signal common on the host computer. Pins 1, 7, and 25 are tied together in the decoder and tied to chassis ground.
14	**RS-422** Transmitted Data (output)	TxB+	This RS-422 line is used to send data from the decoder to the host.
15	**RS-422** Transmitted Data (output)	TxA-	This RS-422 line is used to send data from the decoder to the host.
16	**RS-422** Receive Data (input)	RxA'-	This RS-422 line is used to receive data from the host.
17	**RS-422** Receive Data (input)	RxB'+	This RS-422 line is used to receive data from the host.
20	**RS-232-C** Data Terminal Ready	DTR	Internally connected to pin 6 to provide loopback of DSR Signal.
25	Signal Common	COM	See comments for Pin 7.

Note: When RTS/CTS Handshaking is enabled, both the Host and Display Terminal ports must either support the RTS/CTS Handshaking protocol, or the Display Terminal port's RTS/CTS lines must be unconnected.

RS-232-C Host Computer Interface

Figure 3.3 shows how to connect the decoder to your host computer using RS-232-C. We recommend using Belden (or equivalent) type 9363, 9533, 9535, or 9537 cable.

Figure 3.3
Connecting A Host Computer Via RS-232-C



① *DTE = **D**ata **T**erminal **E**quipment*

② *When non-metallic connector shells are used. (If cable has a metal connector shell, connect shield to the shell.)*

③ *Pins 2, 3 and 7 are the minimum connections that can be used. All unused pins should be left open.*

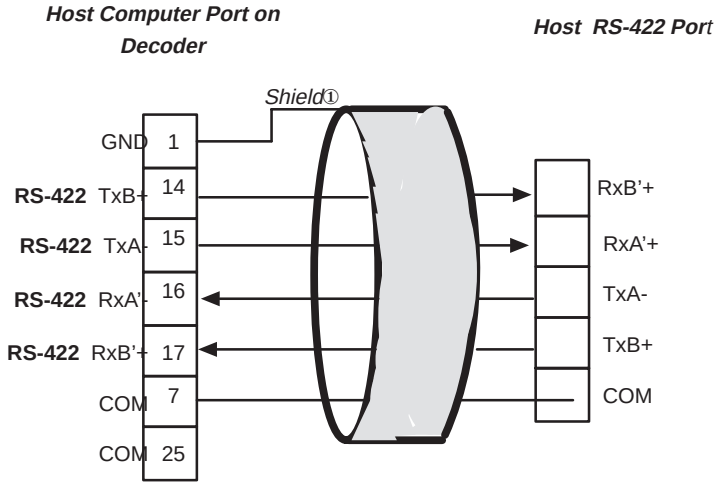
When the host computer wishes to receive data from the local display terminal, it must set Pin 5 (CTS) on the host computer port to OFF (less than -3 V). This prevents the decoder from transmitting and insures a clear channel for communications between the host computer and the local display terminal.

If the decoder receives data from a scanning device, it will force RTS low preventing communications between the host and display terminal.

RS-422 Host Computer Interface

Figure 3.4 shows how to connect the decoder to your host computer using RS-422. We recommend using Belden (or equivalent) type 9512 cable.

Figure 3.4
Connecting A Host Computer Via RS-422



① *When non-metallic connector shells are used. (If cable has a metal connector shell, connect shield to the shell.)*

Display erminal Port Pinout

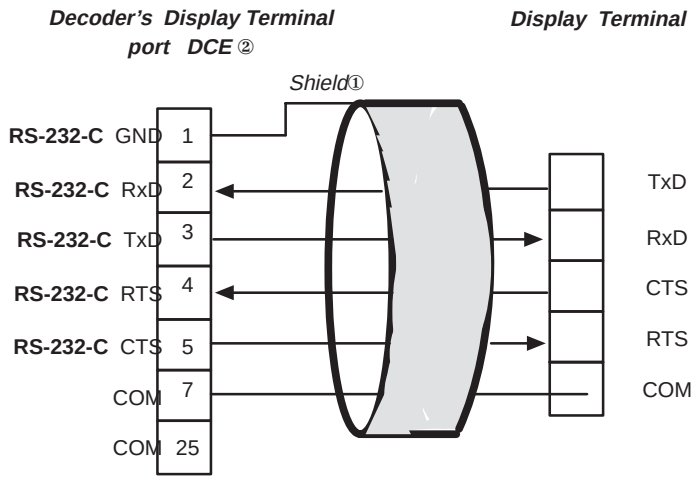
The Display Terminal port is configured as Data Communication Equipment (DCE). Table 3.B defines which pins of the 25-pin (female) D-shell connector are used.

Pin	Function	Abb.	Additional Information
1	Protective Ground	GND	This pin is electrically bonded to the chassis and to the metal shell of the 25-pin connector. When plastic shell (non-shielded) connectors are used on the communications cable, the cable shield drain wire should be connected to this pin.
2	Received Data	RxD	Serial input data from the display terminal is received on this pin.
3	Transmitted Data	TxD	Serial output data from the decoder is passed to the display terminal on this pin.
4	Request To Send	RTS	RTS is an input to the decoder. It may be used to notify the host of a forthcoming transmission.
5	Clear To Send	CTS	CTS is an output from the decoder. It is driven to less than -3 VDC whenever the decoder transmits.
7	Signal Common	COM	This must be connected to signal common on the display terminal, Pins 1, 7, and 25 are tied together in the decoder.
25	Signal Common	COM	See comments for Pin 7.

RS-232-C Display Terminal Port Interface

Figure 3.5 shows how to connect the decoder to the display terminal. RS-232-C is the only supported interface for display terminals. We recommend using Belden (or equivalent) type 9363, 9533, or 9535 cable.

Figure 3.5
Connecting the Display Terminal Via RS-232-C



① *When non-metallic connector shells are used. (If cable has a metal connector shell, connect shield to the shell.)*

② *DCE = **D**ata **C**ommunication **E**quipment*

Chapter 4

Installation

Chapter Objectives

Carefully read this chapter before installing the decoder. We will present recommendations and procedures for installing the decoder.

Attention

ATTENTION: Do not make adjustments to the decoder. Only use procedures specified in this manual.

ATTENTION: No user maintenance of the decoder is required. **Do not open the enclosure!**

Electrical Precautions

Install this equipment using publication NFPA 70E, *Electrical Safety Requirements for Employee Workplaces*. We have set up a few specific guidelines for you to follow in addition to the general guidelines of NFPA 70E.

With solid-state systems, grounding helps to limit the effects of noise due to electromagnetic interference (EMI). To avoid problems caused by EMI, shielded cables should be used.

Grounding Recommendations

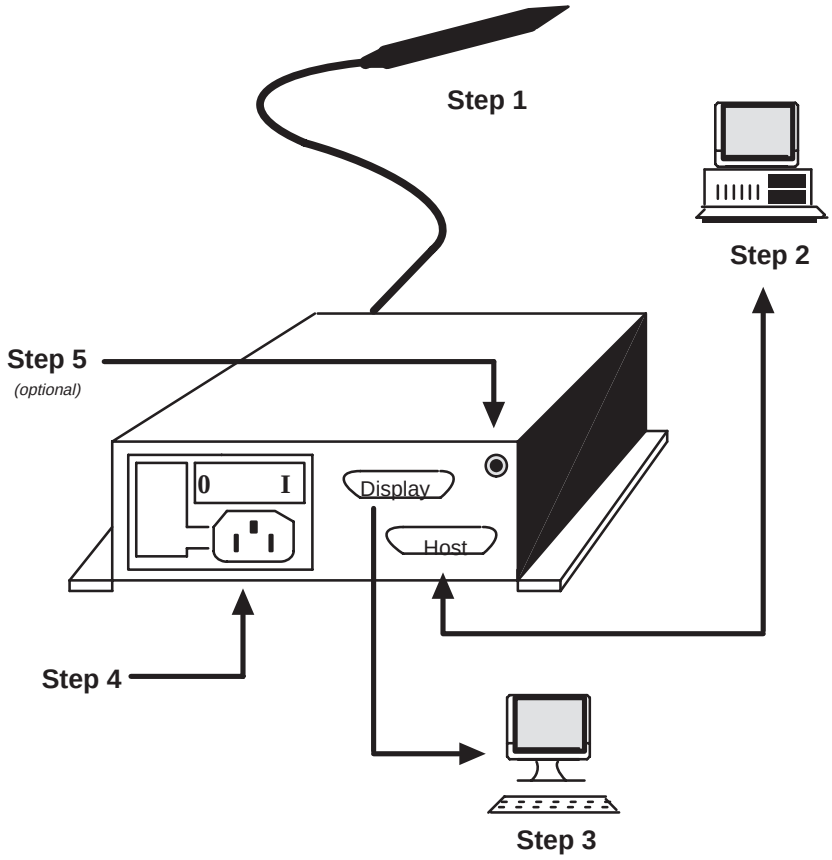
Grounding is an important safety measure in electricalinstallations. With solid-state systems, grounding also helps limit the effects of noise due to electromagnetic interference (EMI).

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

How to Connect Your Equipment

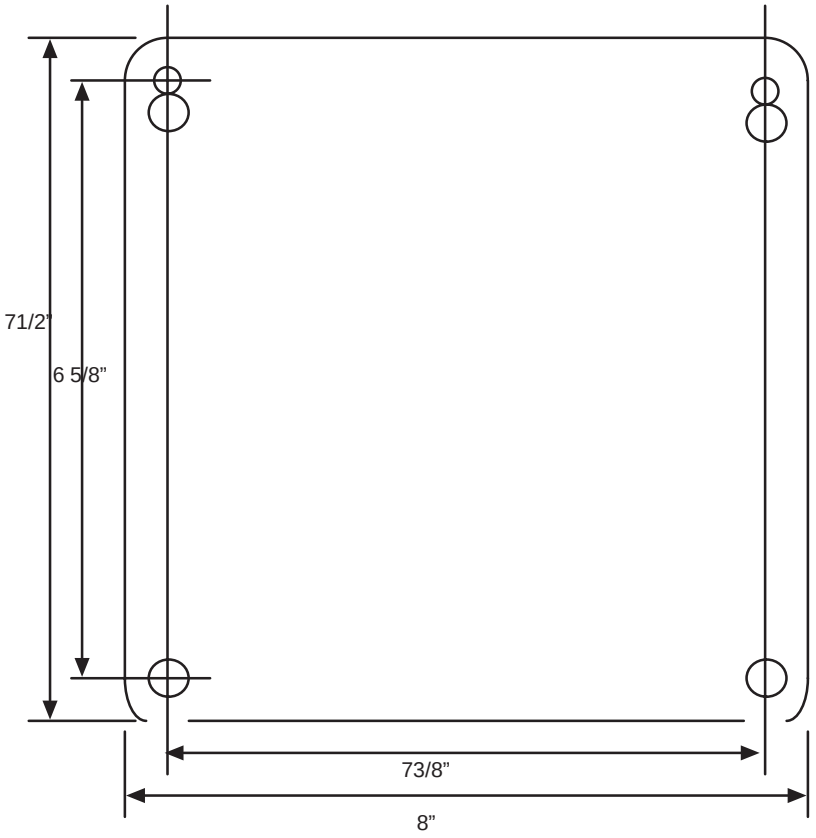
Connect your equipment as shown in Figure 4.1. A step-by-step procedure follows.

Figure 4.1
Connecting the Decoder to a Host Computer and Display Terminal



For your convenience, mounting flanges are built into the unit. The decoder can be either table or wall mounted The mounting dimensions are shown in Figure 4.2.

Figure 4.2
Mounting Dimensions



Step 1. Connect your scanning device to the 9-pin connector labeled *Scanner.*

Step 2. Connect the host computer to the 25-pin connector labeled *Host Computer,* shown in Chapter 3.

Step 3. Set the Host's communication parameters to match those of the decoder.

Step 4. (Optional) Connect a display terminal to the 25-pin connector labeled *Display Terminal* shown in Chapter 3.

Set the display terminal's baud rate, parity and other communication parameters to match those of the decoder and the host computer.

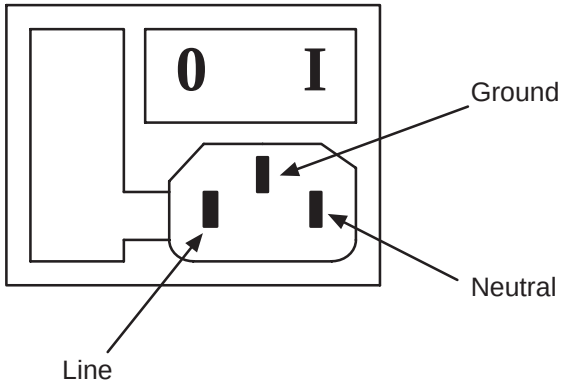
Step 5. Connect the decoder to the power source using the supplied cable.

Step 6. (Optional) Connect your external speaker, or headphones, to the external speaker jack. Adjust the volume and tone to a comfortable level.

Incoming Power Cable

The incoming power connector is a standard IEC 320. This connector is widely used on computing equipment and instrumentation. Replacement cables are readily available in different lengths. Figure 4.3 shows the polarization of the connector.

Figure 4.3
Polarization of the Power Connector



Power Up Sequence

When the decoder is turned ON, the following sequence will occur:

1. The green LED labeled *Power* will light and remain lit.

2. The decoder resets, ROM/RAM tests are performed, and the decoder is configured according to the contents stored in EEPROM.

If any of the following messages appear on the connected display terminal, return your decoder for repair:

- ▶ EEPROM Self Test Failed
- ▶ ROM Self Test Failed
- ▶ RAM Self Test Failed

3. When all tests are passed,

a. The green LED labeled *Valid Read* will flash once.

b. A single tone will be emitted from the decoder.

If the *Laser Connection Detection* function is enabled and:

A laser scanner is detected

a. The laser scanner will briefly flash

b. The red LED labeled *Laser ON* will flash once

c. A high pitched series of tones will be produced

A wand is detected

a. A series of low pitched tones will be produced

Note: When using a hand-held laser scanner or Catalog No. 2755-L2 scan head, do not trigger either device during power up. If you hold the trigger, the decoder will act as if a wand is connected. The decoder will not recognize any laser scanners until it is reset by an escape sequence or by turning the decoder OFF and then ON.

Chapter 5

Programming Via Escape Sequences

Programmable Features

The table below lists the decoder's configuration commands and indicates the supported programming methods.

Function	Bar Code Symbol	Escape Sequence	Tab
Enter Configuration Mode	•		Getting Started
Show Configuration	•	•	
Exit Configuration Mode	•		
Disable Decoding		•	
Reset	•	•	
Default Configuration	•		
Store Configuration	Auto	•	
ROM/RAM Self Test		•	
Code Selection	•	•	Code Selection
Check Characters (Code 39, I 2 of 5, Code 11)	•	•	
Minimum and Maximum Length Checking	•	•	
Interleaved 2 of 5 Length Checking Options	•	•	
UPC/EAN Options	•	•	
Codabar Options	•	•	
Code 39 Full ASCII Conversion	•	•	
Code ID Character Assignment	•	•	
Code ID Character Transmission	•	•	
Serial Port Configuration	•	•	Serial Port Configuration
RTS/CTS Handshaking	•		
Intercharacter Delay Time	•	•	
XON/XOFF Pacing	•	•	
Single Read Mode	•	•	
Enable Next Read		•	
Header	•	•	Message Supplements
Trailer	•	•	
No – Read Recognition	•	•	
No – Read Message	•	•	
Reader Address	•	•	
System Serial Number	•		

Function	Bar Code Symbol	Escape Sequence	Tab
Good Read Beep Tone	•	•	Speaker/LED
Speaker Volume	•	•	
Speaker/LED Control	•	•	
Pulse Speaker		•	
Laser Shutoff Delay	•	•	Laser Scanning Options
Laser Redundancy Check	•	•	
Laser Connection Detection	•	•	
Continuous Read Mode	•	•	
Trigger Latch Mode	•	•	

The decoder's configuration may be changed by either sending an escape sequence to the decoder or by scanning a series of configuration bar code symbols. Programming via bar codes is covered in Chapter 6.

Default parameters are indicated by an asterisk (*). Appendix A also lists the decoder's default settings.

Escape Sequence Programming

The decoder's configuration may be customized by commands sent from a host system. Using this feature, your host's application program can reconfigure the decoder by sending the appropriate escape sequences.

Note: Use only the escape sequences that we have provided information on. The use of undocumented escape sequences or <n> values could cause unpredictable results.

Note: Configurations changed by escape sequences *are not* stored in nonvolatile memory (EEPROM) until the *Store Configuration* command Esc – y 5 Z is received by the decoder. Configurations that are changed by using the configuration bar code symbols are automatically stored in EEPROM.

Escape Sequence Syntax

Commands are sent to the decoder as groups of characters beginning with the ASCII escape character Esc, and are therefore referred to as *escape sequences*. Each escape sequence has the following format:

Esc – y <n> <alpha> <optional>

where:

Esc is the ASCII escape character (hexadecimal 1B or decimal 27) .

– is an ASCII '–' character (hexadecimal 2D or decimal 45).

y is a lower case ASCII 'y' character (hexadecimal 79 or decimal 121).

<n> is a decimal number, one or two ASCII digits.

<alpha> is an ASCII letter of the alphabet, usually upper case. The exception is when using it in a concatenated sequence (discussed later).

<optional> is supplemental character data or optional data used for concatenating, or stringing, several escape sequences together.

The following rules apply to all escape sequences:

1. Escape sequences must have no embedded spaces.

2. For every <alpha> there is a valid <n> range, as listed in the command description.

3. The ASCII "y" must be lower case.

4. The last <alpha> of a command sequence must be upper case.

Determining the <n> Value

In the following escape sequences, the <n> number in the transmitted escape sequence may be specified in two different ways.

Method #1 is used when all of the configurable options are mutually exclusive. In this case, find the option of choice in the table and read off the value of <n> directly from the table. The first column of the table will be labeled *n*. For example, the escape sequence Esc – y 1 Z will immediately reset the decoder.

Method #2 is used when several different options may be selected simultaneously. Where the *n* values are not mutually exclusive, the first column heading will be *Binary Value*. To determine <n>, choose the wanted functions and add up the corresponding binary values.

For example, Esc – y 1 F is the escape sequence used to select Code 39, because its binary value is 1. The binary value of Interleaved 2 of 5 is 2. To select both, add the binary values 1+2 to determine <n>, which is 3. The new sequence is
Esc – y 3 F.

Concatenating Escape Sequences

Most of the escape sequences sent to the decoder may be concatenated, or strung together, to reduce the number of escape sequences sent to the decoder.

Concatenated escape sequences must have no embedded spaces. Spaces have been added in this manual for clarity.

Concetenation Rules

All alpha characters, with exception of the last one in the string, must be lower case. The last alpha character must be upper case. Typically, the last character will be Z because you need to save your new configuration. The following escape sequences may be concatenated in any order.

Esc – y <n> B Good Read Beep Tone

Esc – y <n> C Speaker/LED Control

Esc – y <n> D Intercharacter Delay Time

Esc – y <n> F Code Selection

Esc – y <n> G Check Characters

Esc – y <n> H Decoding Options

Esc – y <n> J Single Read Mode

Esc – y <n> K Enable Next Read

Esc – y <n> M Interleaved 2 of 5 Message Length

Esc – y <n> Q Code ID Character Transmission

Esc – y <n> R Laser Scanning Options

Esc – y <n> S Show Configuration

Esc – y <n> T Pulse Speaker

Esc – y <n> U Minimum and Maximum Length Checking

Esc – y <n> V Laser Shutoff Delay

Esc – y <n> W Disable Decoding

Esc – y <n> X XON / XOFF Pacing

Esc – y <n> Z Configuration Control

Although the ESC – y <n> Z escape sequence can be anywhere in a concatenated sequence, when <n> = 5, the 5 Z, in most cases, must be the last character in the string. This is because when the decoder receives the 5 Z the current configuration status is saved in the EEPROM. If any configuration changes occur after the 5 Z, they will not be saved.

The exception to the above rule is the following escape sequence that *may* be concatenated, but *must* be the last escape sequence in the string. This is because the decoder will change the serial port to the new configuration immediately after the receipt of this command.

Esc – y <n> P Serial Port Configuration

The following escape sequences *cannot* be concatenated with any other escape sequences.

Esc – y <n> A	Reader Address
Esc E	Reset
Esc – y <n> I	Code ID Character
Esc – y <n> N	Header
Esc – y <n> O	Trailer
Esc – y <n> Y	No–Read Message Selection

Concatenation Examples

To change your configuration to the following,

- Selected codes are to be UPC and Code 39 – [5f]
- Code 39 check characters are to be verified and transmitted – *[9 g]*
- XON/XOFF pacing is to be enabled – *[1 x]*

you could send any one of the following six escape sequences to your decoder:

Esc – y 5 f 9 g 1 X	Esc – y 9 g 1 x 5 F	Esc – y 5 f 1 x 9 G
Esc – y 1 x 5 f 9 G	Esc – y 9 g 5 f 1 X	Esc – y 1 x 9 g 5 F

To save the new configuration in EEPROM you could send Esc – y 5 Z as a separate escape sequence, or append it to the end of any one of the above escape sequences.

For example, Esc – y 5 f 9 g 1 X would become Esc – y 5 f 9 g 1 x 5 Z. Note that the capital X became lower case to accommodate the 5Z.

Getting Started

The table below lists the escape sequences used to configure the decoder in a step–by–step manner. The escape sequences are separated by tabs. For your convenience, the configuration bar code symbols in Chapter 6 are also separated by the same tabs. Appendix B lists the escape sequences in alphabetical order. Also provided are the values, defaults and page numbers.

Tab	Command	Escape Sequence	Page
Getting Started	Show Configuration	Esc – y <n> ***S***	5–7
	Disable Decoding	Esc – y <n> ***W***	5–9
	Reset	Esc – y <n> ***Z***	5–10
	Store Configuration		5–11
	ROM/RAM Self Test	Esc – y <n> ***Q***	5–12
Code Selection	Code Selection	Esc – y <n> ***F***	5–13
	Check Characters (Code 39, I 2 of 5, Code 11)	Esc – y <n> ***G***	5–14
	Minimum and Maximum Length Checking	Esc – y <n> ***U***	5–17
	Interleaved 2 of 5 Length Checking Options	Esc – y <n> ***M***	5–18
	UPC/EAN Options		
	Codabar Options	Esc – y <n> ***H***	5–20
	Code 39 Full ASCII Conversion		
	Code ID Character Assignment	Esc – y <n> ***I***	5–24
	Code ID Character Transmission	Esc – y <n> ***Q***	5–25
Serial Port Configuration	Serial Port Configuration	Esc – y <n> ***P***	5–26
	Intercharacter Delay Time	Esc – y <n> ***D***	5–29
	XON/XOFF Pacing	Esc – y <n> ***X***	5–30
	Single Read Mode	Esc – y <n> ***J***	5–31
	Enable Next Read	Esc – y <n> ***K***	5–32
Message Supplements	Header	Esc – y <n> ***N***	5–33
	Trailer	Esc – y <n> ***O***	5–34
	No – Read Recognition	Esc – y <n> ***Q***	5–35
	No – Read Message	Esc – y <n> ***Y***	5–36
	Reader Address	Esc – y <n> ***A***	5–37
Speaker/LED	Good Read Beep Tone	Esc – y <n> ***B***	5–38
	Speaker /LED Control	Esc – y <n> ***C***	5–39
	Pulse Speaker	Esc – y <n> ***T***	5–40
Laser Scanning Options	Laser Scanning Options ▶ Laser Redundancy Check ▶ Laser Connection Detection ▶ Continuous Read Mode ▶ Trigger Latch Mode	Esc – y <n> ***R***	5–41
	Laser Shutoff Delay	Esc – y <n> ***V***	5–45

Show Configuration Esc – y 4 S

The *Show Configuration* command summarizes the decoder's current configuration by displaying the Configuration Display Screen. To see the Configuration Display Screen, you must connect the decoder to a terminal or host display that can support a minimum of 24 lines by 80 characters. This screen may be requested from the decoder by either an escape sequence or by scanning a configuration bar code symbol.

Reading the Screen

All of the items shown in brackets [ ] are configurable. All non–displayable characters of the Message components (such as carriage return) are represented as a control character represented by a caret (^) and an ASCII letter. The Non–displayable ASCII characters are shown in Appendix C.

The Configuration Display Screen's column marked *OTHER CONFIG. SETTINGS* will only have data if an option is enabled. For example, in the screen shown below, Interleaved 2 of 5 is shown to have length checking to be variable. UPC has an option to enable the decoding of supplemental characters. Since they are not enabled, nothing is printed in the column marked *OTHER CONFIG. SETTINGS.*

Show Configuration Syntax

Esc – y <n> S	
n	**Function**
4	Show Configuration Display Screen

Values of n: 4

Show Configuration Example

To display the Configuration Display Screen, on the host computer anddisplay terminal (if enabled) send the following escape sequence:

Esc – y 4 S

If a serial printer is connected to the Display Terminal port, the contents of the display screen will be printed.

Disdable Decoding Esc – y ,n. W

When n=0 the decoder is programmed to *not* decode any scanned bar code symbols, including configuration bar code symbols.

By disabling the decoding and transmission of data, the host computer can download escape sequences eliminating the risk of data collisions resulting from the use of the scanning device or keyboard.

This option is not stored in EEPROM. Upon reset, decoding is enabled.

Disable Decoding Syntax

Esc – y <n> W	
n	**Function**
0	Do Not Decode Bar Code Symbols
1*	Decode Bar Code Symbols

Values of n: 0, 1
* Default

Disable Decoding Example 1

To cause the decoder not to decode bar code symbols, send the following escape sequence:

Esc – y 0 W

Disable Decoding Example 2

To enable decoding of bar code symbols, send the following escape sequence:

Esc – y 1 W

Reset
Esc – y 1 Z or Esc E

Reset tests and verifies the contents of EEPROM, initiates the ROM/RAM self tests, and configures the decoder according to the contents of EEPROM.

Note: When using a hand–held laser scanner or Catalog No. 2755–L2 scan head, do not trigger either device during power up. If you hold the trigger, the decoder will act as if a wand is connected. The decoder will not recognize any laser scanners until it is reset by an escape sequence, or by turning the decoder OFF and then ON.

Reset Syntax

Esc – y <n> Z	
n	**Function**
1	**Reset**
5	Store Configuration In EEPROM

Values of n: 1,5

Reset Examples

To reset the decoder, send either of the following escape sequences:

Esc – y 1 Z

Esc E

Note: Esc E can also be used to reset the decoder. Make certain that you do not use this escape sequence as part of your application program.

Store Configuration
Esc – y 5 Z

The configuration that is stored and recalled from the nonvolatile memory (EEPROM) is controlled with an escape sequence.

Important: Whenever the decoder is configured using the bar code menus, new configurations are automatically stored in the EEPROM. Configuration via escape sequences is different. Once an escape sequence is received, the new configuration takes effect, but is not stored. **To store the configuration in EEPROM, the** *Store Configuration* **escape sequence must be sent.**

Store Configuration Syntax

Esc – y <n> Z	
n	**Function**
1	Reset
5	**Store Configuration In EEPROM**

Values of n: 1,5

Store Configuration Example

To store the current decoder configuration into EEPROM,send the following escape sequence:

Esc – y 5 Z

ROM/RAM Self-test
Esc – y 16 Q

A self-test of the ROM/ RAM can be performed after a reset. The self-test takes approximately a half second to complete. When enabled, a single beep indicates the successful completion of the self-test.

Note: Two additional beeps may follow the self test beep if the Laser Connection Detection function is enabled.

ROM/RAM Self-test Snytax

Esc – y <n> Q

Binary Value	Function
0	All Functions Disabled
1	Code ID Characters Transmitted
2	No–Read Recognition On
16*	**ROM/RAM Self Test Enabled**

Values of n: 0, 1, 2, 3, 16, 17, 18, 19
* Default

The default value of <n> is 16. The ROM/RAM self test is enabled. The code ID characters are not transmitted,
no–read recognition is disabled.

Note: This command allows several functions to be selected simultaneously. To determine <n> choose the wanted functions and add up the corresponding binary values.

ROM/RAM Self-test Examples

To enable the ROM/RAM self test, send the following escape sequence:

Esc – y 16 Q

Note: The above example assumes that all features other than ROM/RAM self-test are disabled.

Sending the following escape sequence will enable ROM/RAM self tests and no–read recognition:

Esc – y 18 Q

Code Selection
Esc – y –<n> F

Each code type, or symbology, supported by the decoder may be individually enabled or disabled.

Once a particular bar code symbology is enabled, symbols of that bar code type will be decoded, provided that the symbol satisfies any other decode parameters that are configured, such as code length, check characters, etc.

Code Selection Snytax

Esc – y <n> F	
Binary Value	**Function**
1	Code 39
2	Interleaved 2 of 5
4	UPC/EAN
8	Codabar
16	Code 128
32	Code 11

Values of n: 0 . . . 63

The default value of <n> is 63, all codes enabled.

Code Selection Example

To enable Code 39, Interleaved 2 of 5, UPC/EAN and Code 128, <n> is constructed by adding up the binary values.

Code 39	1	
Interleaved 2 of 5	2	
UPC/EAN	4	
Code 128	16	
Total	23	<n> = 23

The escape sequence to be sent to the decoder is Esc – y 23 F

Note: Since the binary values for Codabar and Code 11 were not included in the calculation of <n>, these bar code symbologies will be disabled.

Check Characters
Esc – y – <n> G

Check characters are supplemental characters added to a bar code symbol to allow the verification of decoded data.

Using Check Characters

Each of the bar code symbologies supported by the decoder has one of the following 3 types of check characters:

- Optional
- Mandatory
- Undefined

Optional Check Character

The following codes have an optional check character. Check character verification is configurable.

- Code 39
- Interleaved 2 of 5

Mandatory Check Character

The following bar codes have a mandatory check character. The decoder will always verify the check character.

- UPC/EAN
- Code 128
- Code 11 (1 or 2 check characters)

Undefined Check Character

The following code has no defined check character.

- Codabar

Verifying Check Character

If check character verification is enabled and the check character cannot be verified, the bar code symbol will be ignored. If no–read recognition is enabled, a no–read message will be transmitted.

Whenever check character verification has been disabled, bar code symbols will be read and decoded characters will be transmitted (regardless of whether or not check characters are present).

Transmitting Check Character

Whenever check character verification is enabled for Code 39 and Interleaved 2 of 5, the transmission of the verified check character may be:

- Deleted from the message
- Transmitted as a data character along with the decoded data

This option applies to both symbologies only if check character verification is enabled.

The table below lists the codes with the mandatory check characters and indicates whether the check characters are transmitted.

Code	Transmit check characters?
UPC A	Yes
UPC E	No
UPC E Expanded to UPC A	Yes
EAN 8	Yes
EAN 13	No
CODE 128	Yes
CODE 11	

Selecting the Number of Code 11 Check Characters

Check character verification of Code 11 is mandatory. The number of check characters is configurable and may be one or two. If the length of the data is less than or equal to ten, one check character is normally used. If more than ten data characters are present, two check characters are used.

Check Character Syntax

Esc – y <n> G

Binary Value	Function
0*	Disabled
1	Code 39 Check Character *Verification*
2	Interleaved 2 of 5 Check Character *Verification*
8	Check Character *Transmission* for Code 39 & Interleaved 2 of 5
16	Code 11, Use 2 Check Characters

Values of n: 0 –3, 8–11, 16–19, 24–27
*Default

The default value of <n> is 0. Check characters will not be verified and Code 11 is configured to have only one check character.

Check Character Example

To enable Code 39 check character verification and Code 11 with 2 check characters, <n> =17

Code 39 check character verification	1	
Code 11, 2 check characters	16	
Total	17	<n> = 17

The escape sequence to be sent to the decoder is Esc – y 17 G

Note: The binary value for Interleaved 2 of 5 check character verification and transmission was not included in the calculation of <n>, these features will be disabled.

Minimum and Maximum Length Esc – y <n>, <i>, <j> U

The length of a decoded bar code may be checked to see if it matches a set of predefined (configurable) limits. If the length of the bar code is within these limits, it is accepted as valid. If it's outside the limits, a no–read condition exists.

The length to be checked includes any check characters but does not include start and stop characters. If you want to check for a specific length, the minimum and the maximum should be set to the same number. Setting the maximum less than the minimum (or the minimum greater than the maximum) will cause a syntax error.

The default lengths are shown in the table below.

Code	Minimum	Maximum
Code 39	1	32
Codabar	1	32
Code 128	1	32
Code 11	1	32
I 2 of 5①	4	32

① Must be even increments

Minimum and Maximum Length Syntax

Esc –y <n>, <i>, <j> U

n	Function
1	Code 39
2	Interleaved 2 of 5
4	Codabar
5	Code 128
6	Code 11

Values of n: 1, 2, 4, 5, 6
Values of i: 1 . . . 32
Values of j: 1 . . . 32

n – Code type to be length checked
i – The new minimum length for the code type (i must be less than or equal to j). For I 2 of 5, this must be an even number betwen 4 and 32.
j – The new maximum length for the code type. For 1 2 of 5, this must be an even number between 4 and 32.

Note: The commas must be included as shown above.

Minimum and Maximum Length Example

To configure your decoder to check for a minimum of 6 and maximum of 10 characters in a Code 39 symbol, enter:

Esc – y 1, 6, 10 U

Interleaved 2 of 5 Length Checking Options Esc – y <n> M

The length checking for Interleaved 2 of 5 is different from the length checking for the other codes. Since the I 2 of 5 symbology decodes in pairs, even lengths should be specified.

Note: Select the minimum and maximum length with the Esc –y <n>, <i>, <j> U escape sequence.

There are three mutually exclusive options available to check the length of Interleaved 2 of 5 symbols:

1. The allowed length of the symbols may be variable, with a minimum length of 4 and a maximum length of 32. The minimum and maximum values may be set to other even values between 4 and 32 to narrow the range of lengths to be read. Reading symbols of length 2 is not available when symbol length is variable. These values are selected using the Esc –y <n>, <i>, <j> U escape sequence mentioned above.

2. The symbols may be checked for a particular **even length between 2 and 32** characters.

3. The symbols may be checked to see if they are **exactly 6 or exactly 14** characters long, with no other lengths readable. The minimum and maximum lengths do not apply.

Interleaved 2 of 5 Length Checking Options Syntax

Esc – y <n> M

n	Function
0*	Length Variable From 4 to 32 Digits.①
2 ... 32	Specific Length is <n> Digits (must be an even number)
33	Length Is Exactly 6 or 14.

Values of n: 0 . . . 33
*Default

① Select min. and max. lengths with Esc – y <n>, <i>, <j> U

The default value of <n> is 0, variable length.

Interleaved 2 of 5 Length Checking Options Examples

To check Interleaved 2 of 5 symbols for a length of exactly 16 characters, send the following escape sequence:

Esc – y 16 M

To set variable length for Interleaved 2 of 5 symbols, send the following escape sequence:

Esc – y 0 M

UPC/EAN Options Esc – y <n> H

The UPC and EAN codes have several options that may be enabled or disabled.

- All versions (UPC A, UPC E, EAN 8, or EAN 13) may be automatically recognized and decoded.
- You may restrict the code to only UPC–A and UPC–E. EAN–13 and EAN–8 symbols will not be decoded.
- UPC–E symbols may be expanded into the UPC–A format.
- Supplemental characters may be enabled. If they are enabled, the symbol must be scanned in the forward direction, supplemental characters last.

If the symbol is scanned backwards, for instance with the reverse sweep of a laser scanner, or the symbol does not have supplemental characters, the symbol will not be decoded.

By specifying the length of the supplement (for example 2 or 5), you will not miss the supplemental characters if scanned incorrectly (unless they are not present). There are three configurable options:

▶ Symbols with two digit supplemental characters may be read.
▶ Symbols with five digit supplemental characters may be read.
▶ Symbols with two or five digit supplemental characters may be read.

- Automatic recognition of supplemental characters may be enabled. This allows you to decode a symbol with or without supplemental characters.

Note: If supplemental characters are present in the symbol, the symbol must be scanned in the forward direction, supplements last.

If the symbol is scanned in the opposite directions, with the supplements first, or the scan misses the supplemental characters, the supplements will not be decoded.

Note: This function should not be used with bidirectional scanning devices, or in applications where the symbol may be inverted.

UPC/EAN Options Syntax

Esc – y <n> H

Binary Value	Function
0*	Disabled
1	Code 39 Full ASCII Conversion①
2	Codabar Start/Stop Character Suppression②
4	**UPC/EAN UPC Decode Only**
8	**UPC/EAN 2 Digit Supplements**
16	**UPC/EAN 5 Digit Supplements**
32	**UPC/EAN Expand UPC E to UPC A**
64	**UPC/EAN Autodiscriminate Supplements**

Values of n: 0 . . . 127
*Default

① Page 5-23
② Page 5-22

The default value of <n> is 0, none of the UPC/EAN options are enabled.

Note: Whenever the H command is used, make sure that all of the needed configuration parameters are used in constructing the <n> number. In this case, the Full ASCII conversion and the Codabar start and stop character transmission modes need to be known before the <n> number is determined.

UPC/EAN Options Example

The following examples assume that Code 39 full ASCII conversion is disabled and that the Codabar start and stop characters are transmitted.

To restrict the UPC/EAN decoding to UPC only and to expand UPC E to UPC A, <n>=

UPC Only	4
Expand UPC E	32
Total	36

The escape sequence to send the decoder is Esc – y 36 H

Codabar Options
Esc – y 2 H

Codabar has the option to either transmit the start and stop characters with the message or to suppress them from the message. When suppressed, the start/stop characters are stripped from the decoded message.

Codabar is the only bar code that has user information contained in the start and stop characters.

Codabar Options Syntax

Esc – y <n> H

Binary Value	Function
0*	Disabled
1	Code 39 Full ASCII Conversion
2	**Codabar Start/Stop Character Suppression**
4	UPC/EAN UPC Decode Only
8	UPC/EAN 2 Digit Supplements
16	UPC/EAN 5 Digit Supplements
32	UPC/EAN Expand UPC E to UPC A
64	UPC/EAN Autodiscriminate Supplements

Values of n: 0 . . . 127
*Default

The default value of <n> is 0, Codabar start/stop characters are transmitted.

Note: This command allows several functions to be selected simultaneously. To determine <n> choose the wanted functions and add the corresponding binary values.

Codabar Options Example

To suppress the transmission of the Codabar start and stop characters, send the following escape sequence:

Esc – y 2 H

The example assumes no UPC/EAN options are enabled and Code 39 full ASCII conversion is disabled.

Code 39 Full ASCII Esc – y 1 H

Code 39 has an option that allows the full ASCII character set to be decoded using the 43 characters of the Code 39 character set.

The Full ASCII conversion is done by pairing Code 39 characters. When Code 39 full ASCII conversion is enabled, all valid character pairs will be converted into their corresponding ASCII characters before being transmitted.

When disabled, all decoded characters will be transmitted without being converted.

Code 39 Full ASCII Syntax

Esc – y <n> H

Binary Value	Function
0*	Disabled
1	**Code 39 Full ASCII Conversion**
2	Codabar Start/Stop Character Suppression
4	UPC/EAN UPC Decode Only
8	UPC/EAN 2 Digit Supplements
16	UPC/EAN 5 Digit Supplements
32	UPC/EAN Expand UPC E to UPC A
64	UPC/EAN Autodiscriminate Supplements

Values of n: 0 . . . 127
*Default

The default value of <n> is 0, full ASCII conversion disabled.

Note: This command allows several functions to be selected simultaneously. To determine <n> choose the wanted functions and add the corresponding binary values.

Code 39 Full ASCII Example

The following example assumes no UPC/EAN options are enabled and that Codabar start and stop characters are transmitted. To cause the decoder to enable Code 39 full ASCII conversion, send the following sequence:

Esc – y 1 H

Code ID Character Assignment Esc – y <n> / <one character>

Code ID characters are single ASCII characters that can be added to the beginning of decoded bar code data. These characters indicate the symbology used to encode the data.

All decoded bar code messages may have a single character which identifies the code symbology added to the beginning of each message. This character is configurable, and may be any single ASCII character. This code ID character may be suppressed or transmitted with the bar code message.

The default ID Characters are shown in the table below.

Code	Default ID Character
Code 39	a
Interleaved 2 of 5	b
UPC/EAN	c
Codabar	d
Code 128	e
Code 11	f

Code ID Character Assignment Syntax

Esc – y <n> I <ID character>

n	Symbology
1	Code 39
2	Interleaved 2 of 5
3	UPC/EAN
4	Codabar
5	Code 128
6	Code 11

Values of n: 0 . . . 6

<n> is the symbology

<ID character>may be any character from the 128 character ASCII character set. The new code ID character will not be transmitted until code ID transmission is enabled.

Note: This escape sequence cannot be concatenated.

Code ID Character Assignment Example

If you wish to have the letter ”s” to be the code ID character for Code 128, send the following escape sequence to the decoder.

Esc – y 5 I s

Code ID Character Transmission Esc – y 1 Q

The transmission or suppression of the code ID characters is configurable.

Note: The Q escape sequence controls many different configuration options. Make sure that all wanted options are included when the <n> number is calculated.

Code ID Character Transmission Syntax

Esc – y <n> Q

Binary Value	Function
0	All Functions Disabled
1	**Code ID Characters Transmitted**
2	No–Read Recognition On
16*****	ROM/RAM Self Test Enabled

Values of n: 0, 1, 2, 3, 16, 17, 18, 19
* Default

The default value of <n> is 16. The ROM/RAM self test is enabled. No–read recognition is OFF and code ID characters are not transmitted.

Code ID Character Transmission Example

To enable the transmission of the code ID characters, send the following escape sequence:

Esc – y 1 Q

Since the binary values for the no–read recognition (2), and ROM/RAM self test (16) were not used in the construction of <n>, they will be disabled.

Serial Port Configuration Esc – y <n> P

"Serial Port" refers to the Display Terminal and Host Computer port communication parameters.

The parameters of the serial port may be changed by escape sequences or configuration bar code symbols.

Baud Rate Parameters

The baud rate, used for communications to the serial ports, is programmable. The available baud rates are:

- 600
- 1200
- 2400
- 4800
- 9600
- 19200

Parity Selection

The parity of the transmitted data may be configured as odd, even, 0's (space) or 1's (mark).

Data Bits

Data bits are set to seven and are *not* configurable.

Stop Bits

One or two stop bits may be transmitted at the end of each character.

Intercharacter Delay

A delay time can be inserted between transmitted characters. If the intercharacter delay is disabled, then there will be no delay between characters. If the delay is enabled, then the delay period, configured independently, specifies the number of milliseconds that elapses between the completed transmission of one character and the beginning of transmission of the next.

The default delay time is 20 ms. Delay time is set using the *Intercharacter Delay Time* escape sequence or by scanning configuration bar code symbols.

Serial Port Syntax

Esc – y <n> P	
Binary Value	**Function**
2	600 baud
3	1200 baud
4	2400 baud
5	4800 baud
6*	**9600 baud**
7	19200 baud
0*	1 stop bit
8	2 stop bits
0*	0's parity
16	1's parity
32	Even parity
48	Odd parity
0*	Intercharacter delay off①
64	Intercharacter delay on①

Values of n: 2 . . . 127
* Default

① Default Delay is 20 ms. Any other delay time must be using the Interchanger Character Delay Time escape sequence or the Dely = configuration bar code symbol.

The default value of <n> is 6, 9600 baud, 1 stop bit, 0's parity, and the intercharacter delay disabled.

Note: The new configuration of the Serial Port is effective immediately after receipt of the command. Your host must also be able to switch communication parameters to maintain communications.

Note: Data bits are set to seven and are *not* configurable.

If you have trouble communicating with the decoder, scan the Fixed Serial Port Configuration symbol *Enable At Reset*, then reset the decoder.

The *Enable At Reset* symbol causes the serial port configuration to be set to the following values when the decoder is reset, or the power is cycled:

Baud rate	9600
Parity	0
Stop bits	1

The configuration of intercharacter delay and RTS/CTS handshake is not effected by this option, they remain in their last configured values

Serial Port Configuration Example

To select the following new configuration of 2400 baud, 2 stop bits, odd parity, intercharacter delay on (with the default 20 millisecond delay) <n> is constructed as follows:

2400 baud	4
2 stop bits	8
odd parity	48
delay on	64
Total	124

The escape sequence to send the decoder is Esc – y 124 P

Intercharacter Delay Time Esc – y <n> D

The delay time is set using the *Intercharacter Delay Time* escape sequence.

Note: The intercharacter delay is enabled and disabled using the *Serial Port Configuration* escape sequence Esc – y <n> P.

Intercharacter Delay Time Syntax

Esc – y <n> D

Values of n: 2 . . . 127

The default intercharacter delay time is 20 ms.

Intercharacter Delay Time Example

To change the intercharacter delay time to 10 ms, enter the following escape sequence:

Esc – y 10 D

XON/XOFF Pacing
Esc – y <n> X

The decoder has the capability to have the flow of the data transmitted to the host computer paced by an XON/XOFF protocol.

Whenever this pacing protocol is enabled, the decoder will stop transmission of data to the host whenever it receives an XOFF character. Transmission will resume after reception of an XON character. When pacing is disabled, the decoder will ignore these characters.

XON/XOFF Pacing Syntax

Esc – y <n> X	
n	**Function**
0*	Disable XON/XOFF Pacing
1	Enable XON/XOFF Pacing

Values of n: 0, 1
* Default

The default value of <n> is 0, pacing disabled.

XON/XOFF Example 1

Enable XON/XOFF pacing by sending

Esc – y 1 X

XON/XOFF Example 2

Disable XON/XOFF pacing by sending

Esc – y 0 X

Single Read Mode
Esc – y <n> J

The decoder supports a single read mode that allows the host computer to cue the decoder for a single decode.

Single Read Mode Operation

Single read mode places the decoder into a mode whereby a single bar code symbol may be read only after an *Enable Next Read* command has been received by the decoder. This allows the software in the host computer to control when bar code data is entered into the system.

When Single Read Mode is enabled, bar code symbols will not be decoded until the *Enable Next Read (Esc – y 1 K)* escape sequence is sent from the host to the decoder.

Single Read Mode Syntax

Esc – y <n> J	
n	**Function**
0*	Single Read Mode Disabled
1	Single Read Mode Enabled

Values of n: 0, 1
* Default

The default value of <n> is 0, *Single Read Mode Disabled*.

Single Read Mode Example 1

To place the decoder into single read mode, send the following escape sequence to the decoder:

ESC – y 1 J

To allow the data from one decode to be passed to the host, send the following *Enable Next Read* escape sequence:

Esc – y 1 K

Single Read Mode Example 2

To cause the decoder to exit single read mode send the following escape sequence:

ESC – y 0 J

Enable Next Read Esc – y 1 K

With the decoder in single read mode, the *Enable Next Read* escape sequence must be sent, from the host, before a symbol will be decoded.

Enable Next Read Syntax

Esc – y <1> K	
n	**Function**
1	Enable next read

There is no default value for <n>.

Note: If no–read recognition is enabled and an *Enable Next Read* command is sent, but the label cannot be read, the no–read message will be sent.

Enable Next Read Example

When the escape sequence Esc – y 1 K is sent to the decoder, it allows the decoder to decode the next bar code symbol.

After one bar code symbol has been decoded and before another bar code symbol may be read, another Esc – y 1 K will have to be sent to the decoder.

Header Esc – y <n> N <characters>

The header is a group of characters that are transmitted before the bar code data. The number of characters can vary from zero to ten. Refer to page 7–1 for the placement of the header.

Header Syntax

Esc – y <n> N <characters>

Values of n: 0 . . . 10
The default for the header is 0 (empty).

The <n> value in the escape sequence tells the decoder how many characters after the N to load into the header buffer.

<characters> can be any valid ASCII character.

Note: This escape sequence cannot be concatenated.

Header Example

If you name a header *Wand#3*, <n> is equal to six because *Wand#3* is 6 characters long. The escape sequence that should be transmitted to the decoder is:

Esc – y 6 N Wand#3

Note: Spaces are added to the manual for clarity. Do not include spaces in the actual escape sequence. If spaces are wanted in the header, make sure that they are counted when <n> is determined.

Trailer
Esc – y <n> 0 <characters>

The trailer contains characters that are transmitted after:

- The bar code data
- The no–read message

The number of characters can vary from zero to ten.

Refer to page 7–1 for the placement of the trailer.

Trailer Syntax

Esc – y <n> O <Characters>

Values of n: 0 . . . 10
The default trailer is CR LF which is shown on the Configuration Display Screen as ^M ^J.

The <n> value in the escape sequence tells the decoder how many ASCII characters after the O to load into the trailer buffer.

<characters> can be any valid ASCII characters.

Note: This escape sequence cannot be concatenated.

Trailer Example

If you want a trailer to consist of *CR LF ET*, <n> is equal to three. The escape sequence transmitted to the decoder is:

Esc – y 3 O CR LF ET

Note: Spaces are added to the manual for clarity. Do not include spaces in the actual escape sequence. If the spaces are wanted in the trailer, make sure that they are counted when <n> is determined.

No-Read Recognition Esc – y 2 Q

The decoder can be configured to recognize a no–read condition. A no–read occurs when a scan is completed but the bar code is not decoded.

When no–read recognition is enabled, and a no–read occurs, the decoder will output the contents of the no–read message buffer and pulse the Valid Read LED and speaker twice.

No-Read Recognition Syntax

Esc – y <n> Q

Binary Value	Function
0	All Functions Disabled
1	Code ID Characters Transmitted
2	**No–Read Recognition Enabled**
16*****	ROM/RAM Self Test Enabled

Values of n: 0, 1, 2, 3, 16, 17, 18, 19
* Default

The default value of <n> is 16. The ROM/RAM self test is enabled. The code ID character transmission and no–read recognition is disabled.

Note: This command allows several functions to be selected simultaneously. To determine <n> choose the wanted functions and add up the corresponding binary values.

Note: If a unique reader address has been programmed into the decoder and a no–read occurs, the reader address and no–read messages will be transmitted to the Host and/or Display Terminal port.

No-Read Recognition Example 1

To enable no–read recognition, send the following escape sequence:

Esc – y 2 Q

No-Read Recognition Example 2

To enable no–read recognition and ROM/RAM self test, send the following escape sequence:

Esc – y 18 Q

No-Read Message
Esc – y <n> y <characters>

The contents of the no–read message buffer is transmitted whenever no–read recognition is enabled and a bar code was scanned, but not decoded. The number of characters in the buffer may vary between zero (empty buffer) and ten.

No-Read Recognition Syntax

Esc – y <n> Y <characters>

Values of n: 0 . . . 10

The default no–read message is 0 (empty).

The <n> value in the above escape sequence tells the decoder how many characters after the Y to load into the no–read message buffer.

Note: This escape sequence cannot be concatenated.

No-Read Message Example

If you want a no–read message of *Try Again*, <n> is equal to nine (the space is counted as a character). The escape sequence transmitted to the decoder is:

Esc – y 9 Y Try Again

If n=0, no characters will be transmitted.

Note: Spaces are added to the manual for clarity. Do not include spaces in the actual escape sequence. If spaces are wanted in the no–read message, make sure that they are counted when <n> is determined. In the above example, the space between Try and Again was counted.

Reader Address
Esc – y <n> A

The reader address is a unique, one character address that you assign to your decoder. The address can be any one of 128 ASCII characters. Refer to page 7–1 for the placement of the reader address.

Reader Address Syntax

Esc –y <n> A <character>	
n	**Function**
0	Reader Address Mode Disabled
1	Reader Address Mode Enabled

Values of n: 0 ,

<character> can be one of 128 ASCII characters

The <n> value tells the decoder how many characters after the A to load into the reader address buffer.

Note: This escape sequence cannot be concatenated.

Reader Address Example

To assign an address of 3 to your decoder, send the following escape sequence:

Esc – y 1 A 3

Good Read Beep Tone
Esc – y <n> B

The good read beep sounds upon a successful completion of a decode. As the range of <n> increases, so does the frequency of the tone. Setting the tone to zero will disable the beep.

Good Read Beep Tone Syntax

Esc –y <n> B	
n	**Frequency (Hz)**
0	Disabled
1	516
2	539
3	580
4	612
5	648
6	687
7	724
8	767
9	812
10	859
11	914
12*	967
13	1037
14	1827
15	2398
16	3032

Values of n: 0 . . . 16
* Default

The default value of <n> is 12.

Tones 1 through 12 form a rough chromatic scale.

Good Read Beep Tone Example

To set the tone to a frequency of 687 Hz, send the following escape sequence:

Esc – y 6 B

Speaker/LED Control
Esc – y <n> C

This function controls the volume of the speaker and toggles the speaker and LEDs on/off.

Note: If an external speaker is connected, the internal speaker will be disconnected.

Speaker/LED Control Syntax

Esc –y <n> C

n	Function
33	Speaker Off
34	Speaker Volume Low
36*	Speaker Volume Medium
38	Speaker Volume High
40	Speaker and LEDs Off

Values of n: 33, 34, 36, 38, 40
* Default

The default value of <n> is 36.

Speaker/LED Control Example

To set the volume to low, send the following escape sequence:

Esc – y 34 C

Pulse Speaker
Esc – y <n> T

This function causes the decoder to sound a tone at the selected pitch for approximately 100 milliseconds. This tone can be used as an alert signal to a remote decoder.

While a tone is being generated, another tone command can be accepted and executed as soon as the first tone finishes. Only one tone command can be buffered in this way. If two or more tone commands are sent before the initial tone finishes, only the last is buffered.

If multiple tone commands are to be sent in a string, a delay of at least 100 ms should be placed between each command to ensure that each tone occurs. The approximate frequencies versus tone (n) are given below. Tones 1 through 12 form a rough chromatic scale.

Pulse Speaker Syntax

Esc –y <n> T	
n	**Frequency (Hz)**
1	516
2	539
3	580
4	612
5	648
6	687
7	724
8	767
9	812
10	859
11	914
12	967
13	1037
14	1827
15	2398
16	3032

Values of n: 1 . . . 16

Note: The volume for this command is controlled by the *Speaker/LED Control* escape sequence.

Pulse Speaker Example

To make the decoder sound a 580 Hz tone, send the following escape sequence:

Esc – y 3 T

Laser Scanning Options Esc – y <n> R

Laser scanning options are comprised of four independent functions.

- Laser Redundancy Check
- Automatic Laser Connection Detection
- Continuous Read Mode
- Trigger Latch Mode

Laser Redundancy Check Esc – y 1 R

When the laser redundancy check is enabled, two consecutive, identical decodes of a symbol must occur (after the laser scanner is triggered) before a good read is recognized by the decoder.

When disabled, only one decode is required. The redundancy check produces greater immunity to substitution errors with poor quality labels.

Laser Redundancy Check Syntax

Esc –y <1> R	
Binary Value	**Function**
0	All Options Disabled
1	**Laser Redundancy Check Enable**
2	Laser Connection Detection ON
4	Continuous Read Mode
8*	Trigger Latch Mode On

Values of n: 0 . . . 15
* Default

The default value of <n> is 8.

Note: This command allows several functions to be enabled simultaneously. To determine <n>, choose the wanted functions and add up their corresponding binary values.

Laser Redundancy Check Example

To enable the laser redundancy check, send the following escape sequence:

Esc – y 1 R

This example assumes that laser connection detection, continuous read mode, and trigger latch mode are disabled.

Laser Connection Detection Esc – y 2 R

Use this function to automatically determine the type of scanning device connected to the decoder.

If upon power up or reset a laser scanner is detected, a combination of high pitched tones is produced. For wands, a low pitched combination is heard.

Note: When using a hand–held laser scanner or Catalog No. 2755–L2 scan head do not trigger either device during power up. If you hold the trigger, the decoder will act as if a wand is connected. The decoder will not recognize any laser scanners until it is reset by an escape sequence, or by turning the decoder OFF and then ON.

Laser Connection Detection Syntax

Esc –y <n> R	
Binary Value	**Function**
0	All Options Disabled
1	Laser Redundancy Check Enable
2	**Laser Connection Detection ON**
4	Continuous Read Mode
8*	Trigger Latch Mode On

Values of n: 0 . . . 15
* Default

The default value of <n> is 8.

Note: This command allows several functions to be selected simultaneously. To determine <n>, chose the wanted functions and add the corresponding binary values.

Note: If laser connection detection is ON and a power up or reset occurs, the laser will flash briefly.

Laser Connection Detection Example

To enable the laser connection detection, send the following escape sequence:

Esc – y 2 R

This example assumes that the laser redundancy check, continuous read mode, and trigger latch mode are disabled.

Continuous Read Mode Esc – y 4 R

When enabled, the laser is turned on constantly instead of waiting for the trigger to be pulled. Scanning, decoding, and transmitting decoded messages occur continuously.

Certain functions can now only be performed periodically. Examples are responding to commands such as to sound a tone or to send a no–read response if a symbol has not been decoded within the laser shutoff delay period. The shorter the laser shutoff delay, the more often system functions are performed. System functions are also performed every time there is a good read.

When disabled, the trigger is used to initiate and terminate laser scanning.

Note: Do not use this function with a Catalog No. 2755–G5 Hand–Held Laser Scanner.

Note: When using a Catalog No. 2755–L2 scan head in continuous read mode, the Package Detector must be disconnected.

Continuous Read Mode Syntax

Esc –y <n> R	
Binary Value	**Function**
0	All Options Disabled
1	Laser Redundancy Check Enable
2	Laser Connection Detection ON
4	**Continuous Read Mode**
8*	Trigger Latch Mode On

Values of n: 0 . . . 15
* Default

The default value of <n> is 8.

Note: This function allows several functions to be selected simultaneously. To determine <n>, choose the wanted functions and add the corresponding binary values.

Continuous Read Mode Example

To enable the continuous read mode, send the following escape sequence:

Esc – y 4 R

Trigger Latch Mode
Esc – y 8 R

When enabled, the laser scanner is turned on when triggered, but is not shut off when the trigger is released. Instead, the laser continues scanning until either the laser shutoff delay period has elapsed or a good read occurs.

When this mode is disabled, the laser is shut off immediately when the trigger is released.

Note: This must be enabled when using a Catalog No. 2755–L2 scan head.

Trigger Latch Mode Syntax

Esc –y <n> R	
Binary Value	**Function**
0	All Functions Disabled
1	Laser Redundancy Check Enable
2	Automatic Laser Connection Detection ON
4	Continuous Read Mode
8*	**Trigger Latch Mode On**

Values of n: 0 . . . 15
* Default

The default value of <n> is 8.

Note: This function allows several functions to be selected simultaneously. To determine <n>, choose the wanted functions and add the corresponding binary values.

Trigger Latch Mode Example

To enable the trigger latch mode, send the following escape sequence:

Esc – y 8 R

Laser Shutoff Delay
Esc – y <n> V

The laser shutoff delay determines how long the laser will remain enabled after the trigger is pulled. The laser will remain on until a read is completed or the laser shutoff period has elapsed. If the shutoff delay is set to 0, the laser will not turn on at all when the trigger is pulled.

Laser Shutoff Delay Syntax

Esc –y <n> V

Values of n: 0 . . . 100

The default value of <n> is 120. Each unit of <n> equals 4 sweeps of the laser beam

Note: Communications with the decoder will be postponed until scanning is complete.

Laser Shutoff Delay Example

To set the laser shutoff delay to 16 sweeps, send the following escape sequence:

Esc – y 4 R

Chapter 6

Programming Via Configuration Bar Code Symbols

Programming Features

The table below lists the decoder's configuration commands and indicates the supported programming methods.

Function	Bar Code Symbol	Escape Sequence	Tab
Enter Configuration Mode	•		Getting Started
Show Configuration	•	•	
Exit Configuration Mode	•		
Disable Decoding		•	
Reset	•	•	
Default Configuration	•		
Store Configuration	Auto	•	
ROM/RAM Self Test		•	
Code Selection	•	•	Code Selection
Check Characters (Code 39, I 2 of 5, Code 11)	•	•	
Minimum and Maximum Length Checking	•	•	
Interleaved 2 of 5 Length Checking Options	•	•	
UPC/EAN Options	•	•	
Codabar Options	•	•	
Code 39 Full ASCII Conversion	•	•	
Code ID Character Assignment	•	•	
Code ID Character Transmission	•	•	
Serial Port Configuration	•	•	Serial Port Configuration
RTS/CTS Handshaking	•		
Intercharacter Delay Time	•	•	
XON/XOFF Pacing	•	•	
Single Read Mode	•	•	
Enable Next Read	•	•	
Header	•	•	Message Supplements
Trailer	•	•	
No – Read Recognition	•	•	
No – Read Message	•	•	
Reader Address	•	•	
System Serial Number	•		

Function	Bar Code Symbol	Escape Sequence	Tab
Good Read Beep Tone	•	•	Speaker/LED
Speaker Volume	•	•	
Speaker/LED Control	•	•	
Pulse Speaker		•	
Laser Shutoff Delay	•	•	Laser Scanning Options
Laser Redundancy Check	•	•	
Laser Connection Detection	•	•	
Continuous Read Mode	•	•	
Trigger Latch Mode	•	•	

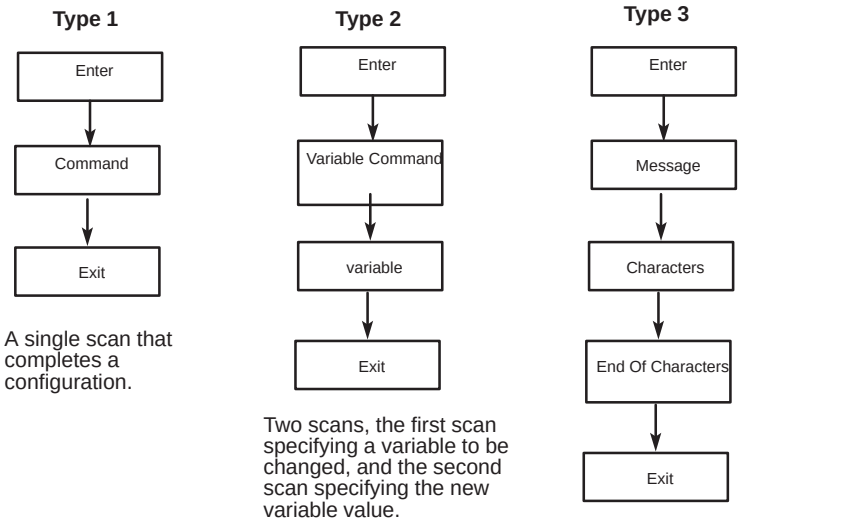
Programming Features

The decoder's configuration may be changed by either scanning a series of configuration bar code symbols or sending an escape sequence to the decoder. Programming via escape sequences is covered in Chapter 5.

Default parameters are indicated by an asterisk (*****). Appendix A lists the decoder's default settings.

Configuration Bar Code Symbols

To best use the configuration bar code symbols, it is important to understand that there are three configuration types:



Type 1 is the most commonly used configuration type. An example of a Type 1 symbol is the *Enable Decoding* symbol under the *Code 39* heading. Another example is the *UPC Only* symbol in the UPC heading. Scans of Type 1 may be done in any order, since each controls an independent function, and each configuration option is complete as soon as the symbol has been scanned.

All of the available numbers are encoded as single symbols. Several Type 2 symbols require a single character instead of a number. The character is scanned from the character menu in the same way.

Type 3 configurations begin by scanning a symbol such as *Header =*. Then characters are scanned one by one from the character menu. The data entry is terminated by scanning the *End Of Characters* symbol. As soon as the *End Of Characters* symbol has been scanned, the configuration is complete.

The *Show Configuration* symbol causes the decoder to transmit its configuration to the host computer (and display terminal, if enabled) in the form of a configuration display screen. This screen shows the current settings of the most significant configuration options. Use this symbol to verify your changes to the decoder's configuration.

Type 1 is the most commonly used configuration type. An example of a Type 1 symbol is the *Enable Decoding* symbol under the *Code 39* heading. Another example is the *UPC Only* symbol in the UPC heading. Scans of Type 1 may be done in any order, since each controls an independent function, and each configuration option is complete as soon as the symbol has been scanned.

Syntax Errors

You may encounter syntax errors while using the bar code menus. When a configuration label has been read and accepted, the decoder will respond with 4 high pitched beeps. The decoder will emit 4 low pitched beeps if any of the following faults occur:

1. Not entering the configuration mode by scanning the enter symbol before scanning a configuration symbol. When the decoder is not in bar code configuration mode, the only configuration symbol that the decoder will recognize is the *Enter Configuration Mode* symbol.

2. Scanning normal bar code symbols while in the bar code configuration mode will generate a syntax error, but will not change any configuration values. The correct configuration symbol should be scanned.

3. Scanning arguments of the wrong type, in the wrong order, or numerically out of range when in a Type 2 or Type 3 configuration.

As soon as a syntax error occurs you may continue the configuration operation by scanning the correct bar codes. You may also restart the

configuration session by scanning the *Enter Configuration Mode* symbol again to clear the error and then begin scanning the first symbol in the configuration sequence.

As long as each configuration operation is individually completed, configuration operations may be carried out independently. There is no constraint against moving from category to category while configuring separate items. However, you may not interrupt a Type 2 or a Type 3 configuration to begin another. If this is attempted, a syntax error will occur, the second configuration operation will be ignored, and you will have to recover from the syntax error to continue the interrupted configuration operation as described previously.

Syntax Error Example

For example, suppose you scan the *Trailer* = symbol, and then the *UPC Only* symbol. Since the decoder was expecting a character argument, it responds with a syntax error.

You may correct the error by scanning the following configuration bar code symbols:

- *Enter Configuration Mode*
- *Trailer =*
- Character symbols from the character menu
- *End Of Characters*

Getting Started

The table on page 6–5 lists the configuration bar code symbols used to configure the decoder. They are separated by tabs and grouped by function.

For your convenience, the escape sequences in Chapter 5 are also separated by the same tabs.

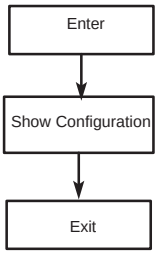
Enter Configuration Mode

To configure the decoder using the bar code menu symbols, the decoder must be placed into the configuration mode by scanning the *Enter Configuration Mode* symbol. Configuration bar code symbols can then be scanned until all configuration changes are complete. To resume normal operation, the *Exit Configuration Mode* symbol is scanned. The *Enter Configuration Mode* and *Exit Configuration Mode* symbols provide an extra safeguard against inadvertently reconfiguring the decoder. When the decoder is in the configuration mode, scanning normal bar code symbols generates a syntax error, but will not change any configuration.

Show Configuration

The *Show Configuration* command generates the Configuration Display Screen, which summarizes the decoder's current configuration.

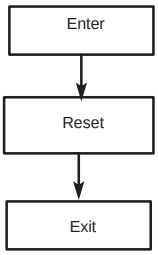
For an explanation of the Configuration Display Screen, refer to page 5–7.



Reset

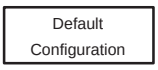
Reset tests and verifies the contents of EEPROM,initiates the ROM/RAM self tests, and configures the decoder according to the contents of EEPROM.

Note: When using a hand–held scanner (gun) do not hold the trigger during reset or power up. If you hold the trigger, the decoder will act as if a wand is connected. The decoder will not recognize any laser scanners until it is reset by sending an escape sequence, or by turning the decoder OFF and then ON.



Default Configuration

This symbol returns the decoder to the default settings listed in Appendix A.

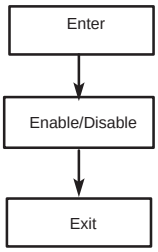


Exit Configuration Mode

Code 39

Used to enable and disable Code 39.

*Default is Code 39 enabled.



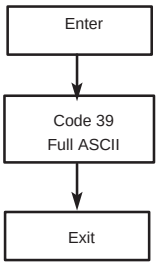
Full ASCII Conversion

Code 39 has an option that allows the full ASCII character set to be decoded using the 43 characters of the Code 39 character set.

The full ASCII conversion is done by pairing Code 39 characters. When Code 39 full ASCII conversion is enabled, all valid character pairs will be converted into their corresponding ASCII characters before being transmitted.

When disabled, all decoded characters will be transmitted without being converted.

*Default is *Full ASCII Conversion Off*.



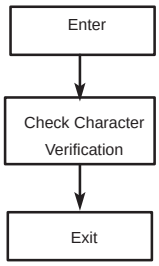
Check Character Verification

Check characters are supplemental characters added to a bar code symbol to allow the verification of decoded data.

If the check character verification is enabled and the check character cannot be verified, then the bar code symbol will be ignored. If no–read recognition is enabled, a no–read message will be transmitted.

For more information on Check Characters, refer to page 5–14.

*Default is *Verification Disabled*.

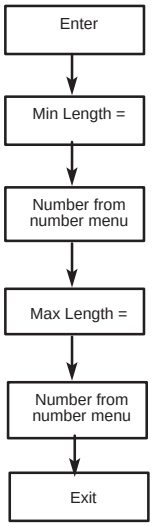


Minimum and Maximum Lengths

The length of a decoded bar code may be checked to see if it matches a set of predefined (configurable) limits. If the length of the bar code is within these limits, it is accepted as valid. If the length is outside the limits, a no–read condition exists.

Default minimum length is 1, default maximum length is 32

The length to be checked includes any check characters but does not include start and stop characters. If you want to check for a specific length, the minimum and the maximum should be set to the same number. Setting the maximum less than the minimum (or the minimum greater than the maximum) will cause a syntax error.

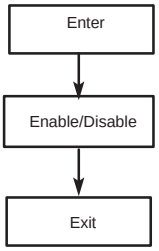


Enable I 2 of 5 *

Interleaved 2 of 5

Used to enable and disable Interleaved 2 of 5.

*Default is I 2 of 5 enabled.



Disable I 2 of 5

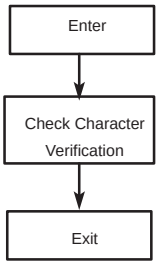
Check Character Verification

Check characters are supplemental characters added to a bar code symbol to allow the verification of decoded data.

If the check character verification is enabled and the check character cannot be verified, then the bar code symbol will be ignored. If no–read recognition is enabled, a no–read message will be transmitted.

For more information on check characters, refer to page 5–14.

*Default is *Verification Disabled*.



Verification Enable

Verification Disabled *

Interleaved 2 of 5 Length Checking

There are four mutually exclusive options available to check the length of Interleaved 2 of 5 symbols:

1. The allowed length of the symbols may be variable, with a minimum length of 4 and a maximum length of 32. The minimum and maximum values may be set to other even values between 4 and 32 to narrow the range of lengths to be read. Reading symbols of length 2 is not available when symbol length is variable.

2. The symbols may be checked to see if they are exactly 2 characters long, with no other lengths readable. The minimum and maximum values do not apply.

3. The symbols may be checked to see if they are exactly 6 or exactly 14 characters long, with no other lengths readable. The minimum and maximum values do not apply.

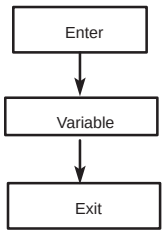
4. The symbols may be checked for a particular even length from 4 to 32. this may be done by scanning the *Length =* symbol, or by setting the minimum and maximum length to the same value.

Specific Length =

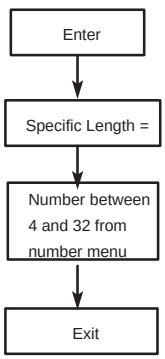
6 or 14 only

Length = 2

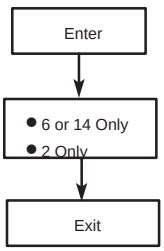
Default 4, 32



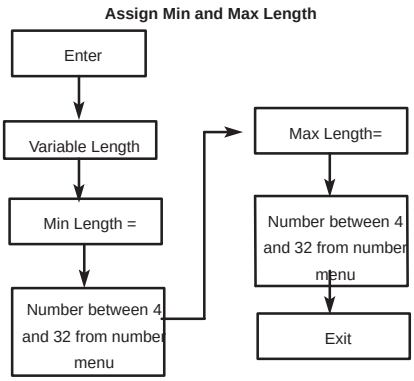
Specific Length =



6 or 14



Interleaved 2 of 5 Length Checking
(continued)



Variable Length *

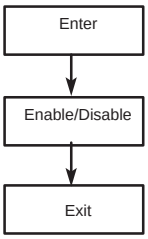
Min Length =

Max Length =

Code 128

Used to enable and disable Code 128.

*Default is Code 128 enabled.



Enable Code 128 *

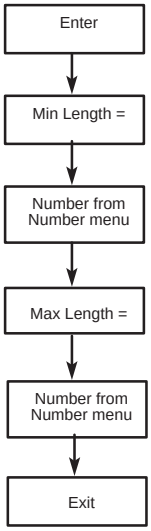
Disable Code 128

Minimum and Maximum Lengths

The length of a decoded bar code may be checked to see if it matches a set of predefined (configurable) limits. If the length of the bar code is within these limits, it is accepted as valid. If the length is outside the limits, a no–read condition exists.

Default minimum length is 1, default maximum length is 32.

The length to be checked includes any check characters but does not include start and stop characters. If you want to check for a specific length, the minimum and the maximum should be set to the same number. Setting the maximum less than the minimum (or the minimum more than the maximum) will cause a syntax error.



Min Length =

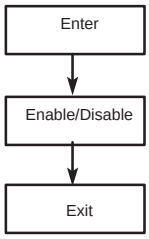
Max Length =

Enable Code 11 *

Code 11

Used to enable and disable Code 11.

*Default is Code 11 enabled.



Disable Code 11

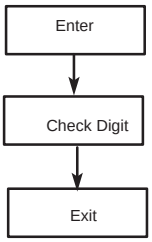
Selecting the Number of Code 11 Check Characters

Check character verification of Code 11 is mandatory. The number of check characters may be one or two. If the length of the data is less than or equal to ten, one check character is normally used. If more than ten data characters are present, two check characters are used.

If the check character is incorrect, then the bar code symbol will be ignored, or if no–read recognition is enabled, a no–read message will be transmitted.

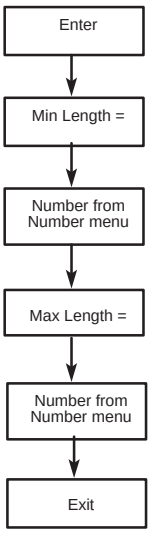
For more information on check characters, refer to page 5–14.

*Default is *1 Check Character*.



1 Check Character *

2 Check Characters



Min Length =

Max Length =

Minimum and Maximum Lengths

The length of a decoded bar code may be checked to see if it matches a set of predefined (configurable) limits. If the length of the bar code is within these limits, it is accepted as valid. If the length is outside the limits, a no–read condition exists.

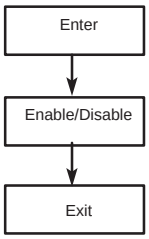
Default minimum length is 1, default maximum length is 32

The length to be checked includes any check characters but does not include start and stop characters. If you want to check for a specific length, the minimum and the maximum should be set to the same number. Setting the maximum less than the minimum (or the minimum more than the maximum) will cause a syntax error.

Enable UPC/EAN

Used to enable and disable UPC/EAN.

*Default is UPC/EAN enabled.



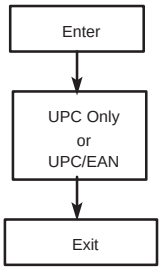
Enable UPC/EAN *

Disable UPC/EAN

Read UPC Versus UPC/EAN

All versions (UPC A, UPC E, EAN 8, or EAN 13) may be automatically recognized and decoded. You may restrict the code to only UPC–A and UPC–E. EAN–13 and EAN–8 symbols will not be decoded.

*Default is *Read UPC or EAN*.



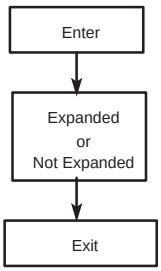
Read UPC Only

Read UPC or EAN *

Expand UPC

UPC–E symbols may be expanded into the UPC–A format.

*Default is *UPC–E Not Expanded*.



UPC-E Not Expanded *

Expanded UPC-E

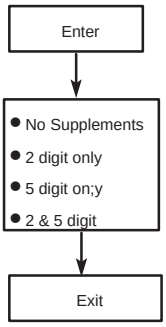
No Supplements** **

2 Digit Only

5 Digit Only

2 & 5 Digit Supplement

Supplemental Digits (UPC/EAN)



Supplemental characters may be enabled. If they are enabled, the symbol must be scanned in the forward direction, supplemental characters last.

If the symbol is scanned backwards, for instance with the reverse sweep of a laser scanner, or the symbol does not have supplemental characters, the symbol will not be decoded.

By specifying the supplement, you will not miss the supplemental characters (unless they are not present). There are three configurable options:

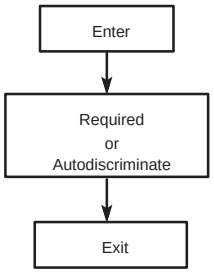
- Symbols with two digit supplemental characters may be read.
- Symbols with five digit supplemental characters may be read.
- Symbols with two or five digit supplemental characters may be read.

*Default is *No Supplements*.

Supplements Required If Enabled** **

Autodiscriminate

Autodiscriminate Supplements (UPC/EAN)



Automatic recognition of supplemental characters may be enabled. This allows you to decode a symbol with or without supplemental characters.

If supplemental characters are present in the symbol, the symbol must be scanned in the forward direction, supplements last.

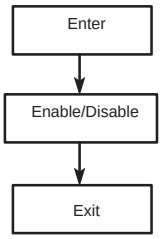
If the symbol is scanned in the opposite direction, with the supplements first, or the scan misses the supplemental characters, the supplements will not be decoded.

*Default is *Supplements Required If Enabled*.

Codabar

Used to enable and disable Codabar.

*Default is Codabar enabled.

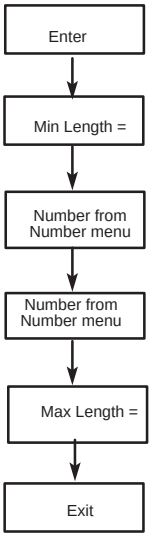


Minimum and Maximum Lengths (Codabar)

The length of a decoded bar code may be checked to see if it matches a set of predefined (configurable) limits. If the length of the bar code is within these limits, it is accepted as valid. If the length is outside the limits, a no–read condition exists.

Default minimum length is 1, default maximum length is 32

The length to be checked includes any check characters but does not include start and stop characters. If you want to check for a specific length, the minimum and the maximum should be set to the same number. Setting the maximum less than the minimum (or the minimum more than the maximum) will cause a syntax error.

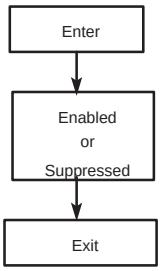


Start/Stop Character Transmission (Codabar)

Codabar has the option to either transmit the start and stop characters with the message or to suppress them from the message. When suppressed, the start/stop characters are stripped from the decoded message.

Codabar is the only bar code that has user information contained in the start and stop characters.

*The default is start/stop character transmission *Enabled*.



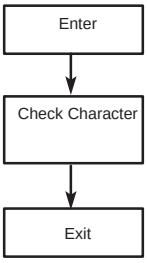
Check Character Transmission

Transmitted

When check character verification is enabled for Code 39 and Interleaved 2 of 5, the transmission of the verified check character may be deleted from the message, or transmitted, as a data character, along with the decoded data. This option applies to both symbologies only if check character verification is enabled.

The table below lists codes with mandatory check characters and indicates whether the check characters are transmitted.

*Default is check character *Removed*.



Removed *

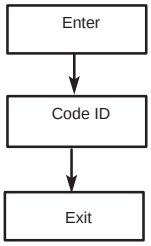
Code	Transmit
UPC A	Yes
UPC E	Unavailable
UPC E expanded to UPC A	Yes
EAN 8	Yes
EAN 13	Yes
CODE 128	unavailable
CODE 11	Yes

Code ID Character Transmission

Transmit Code ID Characters

Code ID characters are single ASCII characters that can be added to the beginning of decoded bar code data. These characters indicate the symbology used to encode the data.

*Default is code ID characters suppressed.



Suppress Code ID Characters *

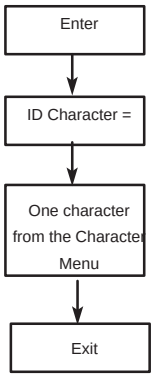
Code ID Character Assignment

Code ID characters are single ASCII characters that can be added to the beginning of decoded bar code data. These characters indicate the symbology used to encode the data.

The code ID character may be suppressed or transmitted with the bar code message. See *Code ID Character Transmission*.

The table below lists the Default ID Characters.

Code	Default
Code 39	a
Interleaved 2 of 5	b
UPC/EAN	c
Codabar	d
CODE 128	e
CODE 11	f



Code 39 ID Character =

Interleaved 2 of 5 ID Character =

UPC/EAN ID Character =

Codabar ID Character =

Code 128 ID Character =

Code 11 ID Character =

600 Baud

1200 Baud

2400 Baud

4800 Baud

*9600 Baud **

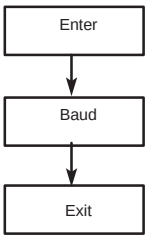
19.2K Baud

Baud Rate Selection

Baud rate is programmable. The available baud rates are:

- 600
- 1200
- 2400
- 4800
- 9600
- 19.2K

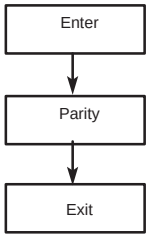
*Default is *9600 Baud*.



Parity

The parity of the transmitted data may be configured as odd, even, 0's (space) or 1's (mark).

*Default parity is 0's.



*0's (space) **

1's (mark)

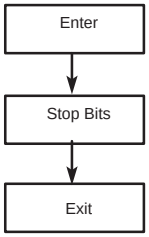
Odd

Even

Stop Bits

One or two stop bits may be transmitted at the end of each character.

*Default is *1 Stop Bit.*



*1 Stop Bit **

2 Stop Bits

RTS/CTS Enabled*

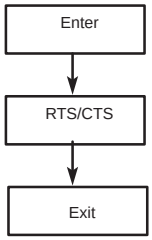
RTS/CTS Disabled

RTS/CTS Handshaking

When this option is enabled, the Request To Send (RTS) line is activated when the decoder has characters to transmit. Transmission proceeds when the Clear To Send (CTS) line is active.

When disabled, RTS remains inactive and CTS is ignored.

* Default is *RTS/CTS Enabled*.



Intercharacter Delay ON

Intercharacter Delay OFF *

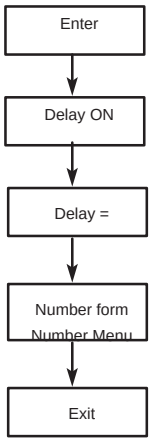
Delay =

Intercharacter Delay

A delay time can be inserted between transmitted characters. If the intercharacter delay is disabled, then there will be no delay between characters. If the delay is enabled, then the delay period, configured independently, specifies the number of milliseconds that elapses between completed transmission of one character and beginning of the transmission of the next.

* Default is *Intercharacter Delay OFF*.

If enabled, the default delay time is 20 ms.



Enable at Reset

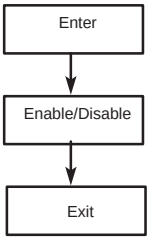
Disable at Reset *

Fixed Serial Port Configuration at Reset

When enabled, the *Fixed Serial Port Configuration at Reset* will set the serial port to its default configuration as soon as you reset the decoder.

*Default is *Disable At Reset*.

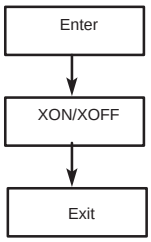
Note: When using a laser scanner with laser connection detection enabled, do not hold the laser scanner's trigger during reset. If the trigger is held, the decoder will treat the laser scanner as a wand. The decoder will not recognize a laser scanner until it is reset by an escape sequence or by turning the decoder Off and then On.



XON/XOFF Pacing

Whenever this pacing protocol is enabled, the decoder will stop transmission of data to the host whenever it receives an XOFF character. Transmission will resume after reception of an XON character. When pacing is disabled, the decoder will ignore these characters.

*Default is *XON/XOFF Disabled*.



XON/XOFF Enabled

XON/XOFF Disabled *

Single Read Mode

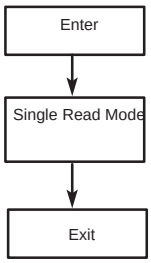
In this mode, a single bar code symbol may be read only after an *Enable Next Read* command has been received by the decoder. This allows the software in the host computer to control when bar code data is entered into the system.

When single read mode is enabled, bar code symbols will not be decoded until the *Enable Next Read* escape sequence is sent from the host to the decoder.

The *Enable Next Read* command can be found on page 5–32

*Default is Single *Read Mode Disabled*.

Note: These symbols should only be used in conjunction with host programming.



Single Read Mode Enable

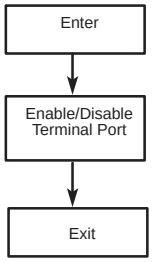
Single Read Mode Disabled *

Display Terminal Port

Scan these symbols to enable and disable bar code data from being transmitted to the display terminal in case the host echoes data to the terminal.

For More information on the Display Terminal port, refer to *Chapter 3, Host Computers and Display Terminals.*

*Default is Terminal Port enabled.



Enable Terminal Port *

Disable Terminal Port

Header =

Trailer =

Reader Address =

Header

The header is a group of characters transmitted before any bar code data. The number of characters can vary from 0 to 10.

The default header is none (empty buffer).

Trailer

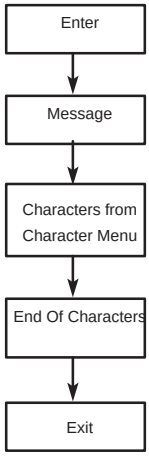
The trailer is a group of characters transmitted after the bar code data. The number of characters can vary from 0 to 10.

The default trailer is Cr Lf shown on the Configuration Display Screen as ^M^J.

Reader Address

The reader address is a unique, one character address that you assign to the decoder. The address can be any one of 128 ASCII characters.

The default reader address is none (empty buffer).



No-Read Recognition ON

*No-Read Recognition OFF **

No-Read Message =

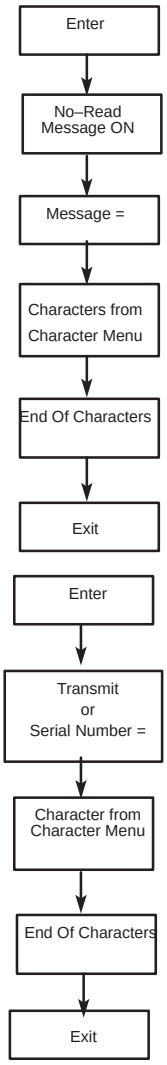
No–Read Recognition

If no–read recognition is enabled and a bar code symbol was scanned but not decoded, the no–read message is transmitted, the Valid Read LED and speaker will be pulsed twice.

The number of characters can vary from 0 to 10.

* Default is *No–Read Recognition OFF*.

The default no–read message is none (empty buffer).



Serial Number

A unique serial number, up to 10 digits, can be stored in each decoder. Serial numbers can consist of numbers, characters, or any combination of the two.

Numbers and characters must be scanned from the character menu.

The default serial number is 00000000.

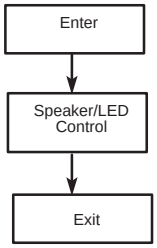
Transmit Serial Number

Serial Number =

Speaker/LED Control

When this feature is enabled, the Configuration Display Screen will show LED control and good read beep configuration information. Good reads will produce LED activity or a beep. Scans of the configuration bar code symbols will produce beeps and flashes.

*Default is Speaker/LED Enabled.



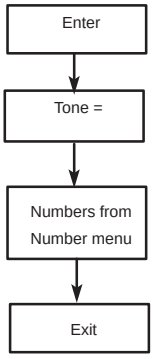
Good Read Beep

The good read beep sounds upon a successful completion of a decode. Setting the tone to zero will disable the beep.

As shown in the scale, 1 through 12 form a rough chromatic scale.

* Default tone is 12,

Tone	Frequency
0	No Beep
1	516
2	539
3	580
4	612
5	648
6	687
7	724
8	767
9	812
10	859
11	914
12*	967
13	1037
14	1827
15	2398
16	3032



Speaker Volume

Speaker volume can be set to one of four volumes.

* Default volume is *Medium*.

Laser Redundancy Check On

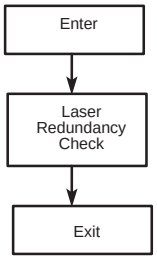
Laser Redundancy Check Off *

Laser Redundancy Check

When the laser redundancy check is enabled, two consecutive, identical decodes of a symbol must occur (after the laser scanner is triggered) before a good read is recognized by the decoder.

When disabled, only one decode is required. The redundancy check produces greater immunity to substitution errors when scanning poor quality labels.

*Default is *Laser Redundancy Check Off*.



On

Off *

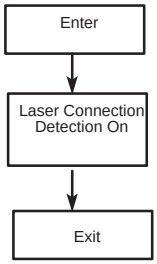
Laser Connection Detection

Use this function to automatically determine the type of scanning device connected to the decoder.

If a laser scanner is detected, a combination of high pitched tones is produced. For wands, a low pitched combination is heard.

For more information, refer to the *Power Up Sequence* found in Chapter 4.

*Default is laser connection detection *Off*.



Note: When using a hand–held laser scanner or Catalog No. 2755–L2 scan head with Laser Connection Detection enabled, do not trigger either device during power up or reset. If you hold the trigger, the decoder will act as if a wand is connected. The decoder will not recognize any laser scanners until it is reset by sending an escape sequence, or by turning the decoder OFF and then ON.

Continuous Read Mode

When enabled, the laser is turned on continuously instead of waiting for the trigger to be pulled. Scanning, decoding, and transmitting decoded messages occur continuously.

Certain functions can now only be performed periodically. Examples are responding to commands such as to sound a tone or to send a no–read response if a symbol has not been decoded within the laser shutoff delay period. The shorter the laser shutoff delay, the more often system functions are performed. System functions are also performed every time there is a good read.

When disabled, the trigger is used to initiate and terminate laser scanning.

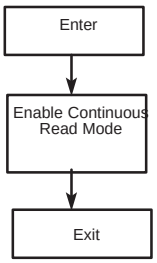
Enable Continuous Read

Disable Continuous Read *

Note: Do not use this function with a Catalog No. 2755–G5 Hand–Held Laser Scanner.

Note: When using a Catalog No. 2755–L2 Scan Head, the Package Detector must be disconnected. The laser is ON continuously. If the laser makes several sweeps, several decoded messages will be sent. If only one decode message per symbol is required, enable the single read mode and allow the host to control decoded transmissions using the *Enable Next Read* command.

*Default is continuous read mode disabled.



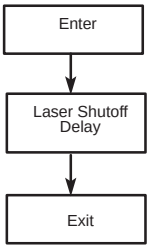
Laser Shutoff Delay

The laser shutoff delay determines how long the laser will remain ON while the trigger is enabled. The laser will remain on until a read is completed, the laser shutoff period has elapsed, or the trigger has been disabled.

Regardless of the laser shutoff delay time, the laser will always be turned off when the trigger is released (unless the *Trigger Latch Mode* function is enabled).

If the delay is set to 0, the laser will not turn on at all when triggered.

*Default is 120 sweeps.




40 Sweeps


120 Sweeps *


200 Sweeps

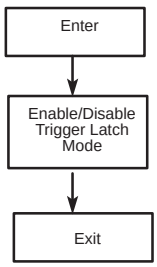

400 Sweeps

Trigger Latch Mode

When enabled, the laser is turned on when triggered, but is not shut off immediately when the trigger is disabled. The laser will remain on until a read is completed or the laser shutoff period has elapsed.

Note: This must be enabled when using a Catalog No. 2755–L2 scanner with a package detector. This allows the scanner to continue scanning until the laser shutoff delay elapses, or a good read occurs.

*Default is trigger latch mode enabled.




Disable Trigger Latch


Enable Trigger Latch *

Number Menu


0


1


2


3


4


5


6


7


8


9


10


11

Number Menu


12


13


14


15


16


17


18


19


20


21


22


23

Number Menu


24


25


26


27


28


29


30


31


32


33


40

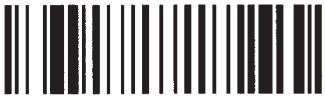

50

Number Menu


60


70


80


90


100


110


120


130


140


150


160


170

Number Menu

180

190

200

210

220

230

240

250

Character Menu

a

b

c

d

e

f

g

h

i

End Of Characters

Character Menu


j


k


l


m


n


o


p


q


r


End Of Characters

Character Menu


s


t


u


v


w


x


y


z


End Of Characters

Character Menu


A


B


C


D


E


F


G


H


I


End Of Characters

Character Menu

J

K

L

M

N

O

P

Q

R

End Of Characters

Character Menu

S

T

U

V

W

X

Y

Z

End Of Characters

Character Menu


0


1


2


3


4


5


6


7


8


9


Space


End Of Characters

Character Menu

!

"

#

$

%

&

'

end single quote

(

)

*

+

End Of Characters

Character Menu


,
comma


-


.


/


:


;


<


=


>


?


@


End Of Characters

Character Menu


[


\


]


^


_
underscore


`
begin single quote


{


|


}


~


End Of Characters

Character Menu


NUL (^@)


SOH (^A)


STX (^B)


ETX (^C)


EOT (^D)


ENQ (^E)


ACK (^F)


BELL (^G)


BKSP (^H)


HT (^I)


LF (^J)


End Of Characters

Character Menu


VT (^K)


FF


CR


SO


SI


DLE


DC1


DC2


DC3


DC4


NAK


End Of Characters

Character Menu


SYN


ETB


CAN


EM


SUB


ESC


FS


GS


RS


US


End Of Characters

Chapter 7

Data Output Formats

Data Output Formats

The format of the decoded messages transmitted from the decoder to the host computer can vary depending upon the type of bar code scanned and the configuration of the decoder.

Generic Output Formats

The generic output formats for the decoder are as follows:

After a good read:

Reader Address 1 Character	Header 0 - 10 Characters	Code ID Character 0 - 1 Character	Decoded Data 1 - 62 Characters	Trailer 0 - 10 Characters

After a misread with No–Read Recognition enabled:

Reader Address 1 Character	Header 0 - 10 Characters	No Read Message 0 - 10 Character	Trailer 0 - 10 Characters

Individual Bar Code Symbology Output Formats

Each bar code symbology has a different data format, depending upon which decoding options have been selected. The exception is Code 128, which has no decoding options. The output formats for each of the bar code symbologies are described on the following pages.

Code 39 Data Output

Enabled Decoding Options	Check Character Printed in Label?	Output Format	Minimum Transmitted Message Length	Maximum Transmitted Message Length
None	No	a...a	1	32
None	Yes	a...ac	2	32
Check character verification	No	no output	–	–
Check character verification	Yes	a...a	1	31
Check character verification and transmission	Yes	a...ac	2	32

Output Format Key: a = message character
c = check character

Note: The minimum number of printed Code 39 characters is one, the maximum number is 32.

Code 39 Example

The following table shows the output of the decoder for two different Code 39 symbols. The first symbol, *ABCX*, has a valid check character. The second symbol, *ABCD*, does not have a valid check character.

Enabled Decoding Options	Input	Output
None	ABCX ABCD	ABCX ABCD
Check character verification (no transmission)	ABCX ABCD	ABC –
Check character verification and transmission	ABCX ABCD	ABCX –

Interleaved 2 of 5

Enabled Decoding Options	Check Character Printed in Label?	Output Format	Minimum Transmitted Message Length	Maximum Transmitted Message Length
None	No	dd...dd	2	32
None	Yes	dd...dc	2	32
Check character verification	No	no output	–	–
Check character verification	Yes	dd...d	1	31
Check character verification and transmission	Yes	dd...dc	2	32

Output Format Key: d = message digit
c = check character

Note: Due to the structure of Interleaved 2 of 5, an even number of characters must be printed in the bar code symbol. An even number of data characters will be transmitted except if check character verification is on and check character verification is suppressed. In this case, the check character is stripped off and an odd number of characters will be transmitted.

Interleaved 2 of 5 Example

The following table shows the output of the decoder for two different Interleaved 2 of 5 symbols. The first symbol, *123457* has a valid check character. The second symbol, *123456*, does not have a valid check character.

Enabled Decoding Options	Input	Output
None	123457 123456	123457 123456
Check character verification (no transmission)	123457 123456	12345 –
Check character verification and transmission	123457 123456	123457 –

UPC/EAN

Code	Decoding Options	Output Format	Length
UPC A	Standard	Andddddddddddc	13
UPC A	with 2 digit supplement	Andddddddddddcss	15
UPC A	with 5 digit supplement	Andddddddddddcssssss	18
UPC E	Standard	E0ddddddd	8
UPC E	with 2 digit supplement	E0dddddddss	10
UPC E	with 5 digit supplement	E0ddddddssssss	13
UPC E	Expanded	A0ddddddddddc	13
UPC E	with 2 digit supplement	A0ddddddddddcss	15
UPC E	with 5 digit supplement	A0ddddddddddcssssss	18
EAN 13	Standard	Fffddddddddddc	14
EAN 13	with 2 digit supplement	Fffddddddddddcss	16
EAN 13	with 5 digit supplement	Fffddddddddddcssssss	19
EAN 8	Standard	FFffddddddc	10
EAN 8	with 2 digit supplement	FFffddddddcss	12
EAN 8	with 5 digit supplement	FFffddddddcssssss	15

Output Format Key:
A = character “A”
E = character “F”
n = number system digit
f = flag digit
d = data digit
c = checksum digit
s = supplemental digit
0 = digit 0

Note: All UPC/EAN symbols are fixed in length.

Codabar

Decoding Options	Output Format	Minimum Length	Maximum Length
None	a...a	1	32
Start and Stop Characters transmitted	sa...as	3	34

Note: The leading start/stop character may differ from the trailing start/stop character.

Codabar Example

The following table shows the output when a Codabar symbol *A1234C* is scanned.

Enabled Decoding Options	Input	Output
None	A1234C	1234
Start and Stop Characters transmitted	A1234C	A1234C

Code 128

Code 128 has three code subsets, Code A, Code B, and Code C. Code A and Code B represent the normal ASCII characters. Code C represents a special double density numeric format.

Code Subset	Output Format	Minimum Length	Maximum Length
A & B	a...a	1	31
C	a...a	2	62

Output Format Key: a = message character

Note:
1. The check character printed is not transmitted.
2. There are no decoding options for Code 128.

Code 11

Decoding Options	Output Format	Minimum Length	Maximum Length
One check character	a...ac	2	32
Two check characters	a...ack	3	32

Output Format Key: a = message character
c = first check character
k = second check character

Note: All characters encoded are transmitted, including the check character or characters.

Code 11 Example

You need to be aware of the three following cases:

1. The last data character is the check character.

2. The next to the last character is the first check character, and the last data character is the second check character.

3. Case 3 shows one packet of bar code data and how it will be interpreted when using one and two check characters.

If one check character is enabled, 8 will be interpreted as the first check character.

If two check characters are enabled, the second to last character, 2, will be interpreted as the first check character. The last character, 8, will be interpreted as the second check character.

An example of each case is shown below.

Case #	Data	Check Character
1	0123456789–01	1 (last character)
2	0123456789–06	0 (second to last character) 6 (last character)
3	01234528	8 (last character) 2 (second to last character) 8 (last character)

The output for each of these inputs versus checking for one or two check characters is shown below.

Enabled Decoding Options	Input	Output
One check character	0123456789–01 0123456789–06 01234528	0123456789–01 – 01234528
Two check characters	0123456789–01 0123456789–06 01234528	– 0123456789–06 01234528

Chapter 8

Maintenance and Troubleshooting

Chapter Objectives

Troubleshooting guidelines are presented in this chapter.

Maintaining the Equipment

ATTENTION: No user maintenance of the decoder is required. **Do not open the enclosure!**

Replacing the Fuse

Follow these steps to replace the decoder's fuse.

Step 1. Turn the decoder OFF.

Step 2. Remove power cable from decoder to gain access to fuse housing.

Step 3. Remove the fuse housing from its enclosure with a small flat–head screwdriver.

Step 4. Lift black prong of the housing and at the same time slide metal fuse holder out of black plastic jacket.

Step 5. Replace the blown fuse with a 1/4x 1 1/4 inch or 5 x 20 mm, 1 amp, time delay fuse.

Communications

Upon sending the escape sequence Esc – y <n> P, the new configuration of the serial port is immediately effective. Your host must be able to switch communications parameters to maintain communications.

If you have problems communicating with the decoder, scan the *Fixed Serial Port At Reset* symbol. The decoder will be returned to its default configuration of:

Baud Rate	9600
Parity	0
Stop Bits	1

For more information on serial port configurations, refer to Chapters 5 and 6, under the tab *Serial Port Configuration.*

Troubleshooting the System

Problem	Probable Cause	Possible Solution
POWER ON indicator does not light.	Decoder is not turned ON.	Turn decoder ON. Switch is on rear of unit.
	Improper connection to power supply.	Reconnect power cable to source and decoder. If cable is defective, replace it.
	Fuse is blown.	Replace fuse.
	No incoming power.	Check that voltage is present at service outlet.
POWER ON indicator is lit, but laser scanner or wand does not operate	Scanner is improperly connected	Check cable and connection.
	Scanner's cable is damaged	Replace wand or laser scanner.
No laser beam emitted from window of laser scanner.	Disable Decoding command sent from host	Send Enable Decoding command from host.
	Timeout for laser scanner is set to 0	Change timeout value to 120 using Esc – y 120 V.
	Decoder is in single read mode and is awaiting *Enable Next Read* command.	Send *Enable Next Read* command.
	RTS/CTS Handshaking configuration is incompatible between Decoder and host.	Check host computer's protocol setup.
	Scanner or Scanner's cable is defective.	Replace scanner cable, replace scanner.
Unable to read a label	Poor quality labels.	Check that labels are good quality and within specifications.
	Decoder is not set up correctly.	Make sure you programmed the decoder to match your application. Check: • Check character verification • Code type. • Length of code. • Minimum number of reads required for a valid read.
	Loose cables or connections.	Check cables and connections.
	Improper wand technique.	Make sure you are holding wand correctly
No communication with host computer or display terminal	Communications parameters are incompatible.	Verify decoder, host, and display terminal communications parameters.
	Improperly fabricated cable.	Refabricate or replace cable.
	Improperly connected cable.	Check that the communication cable is securely connected.
	Host port CTS is driven OFF.	Disconnect CTS or Drive CTS ON

Chapter 9

Specifications

Mult-Purpose Bar Code Workstation (Catalog Number 2755-DH1)

Electrical

Input Line Voltage:	90 – 264 VAC, 50/60 Hz.
Operating Current	0.5 Amp, max.
Power Consumption	40 VA, max.
Speaker Impedance	8 – 32 Ohms (tip positive)

Mechanical

Enclosure	Heavy gauge steel, NEMA 1
LED Indicators	• Power • Laser On • Valid Read • Transmit • Receive
Weight	4 lbs. 4 oz. (2.0 kg).
Dimensions	8”L x 8”W x 2–1/4”H (20.3 x 20.3 x 5.7 cm).

Environmental

Operating Temp.	0° to 40°C (32° to 104°F)
Storage Temp.	–40° to 85°C (–40° to 185°F)
Relative Humidity	95%, noncondensing.
Vibration	2.5 Gs, 5 – 2000 Hz, 3 axis, operating or 5 Gs nonoperating
Shock	30 Gs, max., operating 50 Gs nonoperating
Regulation Compliance	Designed to meet UL and CSA requirements

Decoding Capabilities

Autodiscriminating	Yes
Code Types	• Code 39 • Extended Code 39 (full ASCII) • Interleaved 2 of 5 • UPC–A, UPC–E, EAN–13, EAN–8 (with 2– and 5– character supplements). • Codabar • Code 128 • Code 11

Communications

Stop bits	1 or 2
Data bits	7
Parity	• 0's (space) • 1's (mark) • even • odd
Baud Rate	• 600 • 1200 • 2400 • 4800 • 9600 • 19.2 K

Electrical Standard

Host Computer Port	RS–232–C or RS–422
Display Terminal Port	RS–232–C

Appendix A

Default Settings

Default Settings

The decoder has a set of default conditions. These conditions may be restored by scanning the *Default Configuration,* configuration bar code symbol. The details of the default configuration are as follows:

Function	Default	Bar Code Symbol	Escape Sequence	Tab
Enter Configuration Mode	–	•		Getting Started
Show Configuration	–	•	•	
Exit Configuration Mode	–	•		
Disable Decoding	Disabled		•	
Reset	–	•	•	
Default Configuration	Factory Set	•		
Store Configuration	–		•	
ROM/RAM Self Test	Enabled	Auto	•	
Code Selection	All Codes	•	•	Code Selection
Check Character Verification (Code 39, I 2 of 5)	Disabled	•	•	
Check Characters (Code 11)	1	•	•	
Check Character Transmission (Code 39, I 2 of 5)	Disabled	•	•	
Minimum and Maximum Length Checking (Code 39, Codabar, Code 128, Code 11)	1, 32	•	•	
Minimum and Maximum Length Checking (I 2 of 5)	4, 32	•	•	
UPC/EAN Options	Disabled	•	•	
Codabar Start/Stop Character Transmission	Enabled	•	•	
Code 39 Full ASCII Conversion	Disabled	•	•	
Code ID Character Assignment	Code 39 a I 2 of 5 b UPC/EAN c Codabar d Code 128 e Code 11 f	•	•	
Code ID Character Transmission	Disabled	•	•	

Function	Default	Bar Code Symbol	Escape Sequence	Tab
Serial Port Configuration	9600 Baud 1 Stop bit 0's parity	•	•	Serial Port Configuration
RTS/CTS Handshaking	Enabled	•		
Intercharacter Delay Enable	Disabled	•	•	
Intercharacter Delay Time	20 ms	•	•	
XON/XOFF Pacing	Disabled	•	•	
Single Read Mode	Disabled	•	•	
Enable Next Read	–	•	•	
Display Terminal Port	Enabled	•		
Fixed Serial Port Configuration At Reset	Disabled	•		
RTS/CTS	Enabled	•		
Header	Empty	•	•	Message Supplements
Trailer	CR LF	•	•	
No – Read Recognition	Disabled	•	•	
No – Read Message	Empty	•	•	
Reader Address	Empty	•	•	
System Serial Number	00000000	•		
Good Read Beep Tone	12	•	•	Speaker/LED
Speaker Volume	Medium	•	•	
Speaker /LED Control	On	•	•	
Pulse Speaker	Enabled		•	
Laser Shutoff Delay	3 seconds	•	•	Laser Scanning Options
Laser Redundancy Check	Disabled	•	•	
Laser Connection Detection	Disabled	•	•	
Continuous Read Mode	Disabled	•	•	
Trigger Latch Mode	Enabled	•	•	

Appendix **B**

Escape Sequence Summary

Escape Sequence	Function	Values of <n>	Default	Page No
Esc - y <n> ***A***	Reader Address	0 - 1	Empty	5-37
Esc - y <n> ***B***	Good Read Beep Tone	0 - 16	12	5-38
Esc - y <n> ***C***	Speaker /LED Control	33, 34, 36, 38, 40	36	5-39
Esc - y <n> ***D***	Intercharacter Delay Time	0 - 250	0	5-29
Esc - y <n> ***F***	Code Selection	0 - 63	63	5-13
Esc - y <n> ***G***	Check Characters	0 - 3, 8 - 11, 16 - 19, 24 -27	0	5-14
Esc - y <n> ***H***	UPC/EAN/Codabar / Code 39 Options	0-127	0	5-20
Esc - y <n> ***I***	Code ID Character Assignment	1 - 6	-	5-24
Esc - y <n> ***J***	Single Read Mode	0 - 1	0	5-31
Esc - y <n> ***K***	Enable Next Read	1	-	5-32
Esc - y <n> ***M***	I 2-of-5 Length Checking Options	0 - 33	0	5-18
Esc - y <n> ***N***	Header	0 - 10	Empty	5-33
Esc - y <n> ***O***	Trailer	0 - 10	Empty	5-34
Esc - y <n> ***P***	Serial Port Configuration	2 - 127	6	5-26
Esc - y <n> ***Q***	Self Test Code ID Character TX No-Read Recognition	0 - 3, 16 - 19	16	5-12 5-25 5-35
Esc - y <n> ***R***	Laser Scanning Options	0 - 15	8	5-41
Esc - y <n> ***S***	Show Configuration	4	-	5-7
Esc - y <n> ***T***	Pulse Speaker	1 - 16	-	5-40
Esc - y <n> ***U***	Minimum and Maximum Length Checking	1 - 6	-	5-17
Esc - y <n> ***V***	Laser Shut Off Delay	0 - 100	30	5-45
Esc - y <n> ***W***	Disable Decoding	0 - 1	1	5-9
Esc - y <n> ***X***	XON / XOFF	0 - 1	0	5-30
Esc - y <n> ***Y***	No Read Message	0 - 10	0	5-36
Esc - y <n> ***Z***	Reset/Store Configuration	1 or 5	-	5-10

Appendix C

Non-Displayable ASCII Characters

Display Screen Representation	Mnemonic
^@	NUL
^A	SOH
^B	STX
^C	ETX
^D	EOT
^E	ENQ
^F	ACK
^G	BELL
^H	BKSP
^I	HT
^J	LF
^K	VT
^L	FF
^M	CR
^N	SO
^O	SI
^P	DLE
^Q	DC1
^R	DC2
^S	DC3
^T	DC4
^U	NAK
^V	SYN
^W	ETB
^X	CAN
^Y	EM
^Z	SUB
^[	ESC
^\	FS
^]	GS
^^	RS
^–	US

Appendix D

Code 39 Values of ASCII Characters

ASCII	Code 39	ASCII	Code 39	ASCII	Code 39	ASCII	Code 39
NUL	%U	SP	Space	@	%V	‘	%W
SOH	$A	!	/A	A	A	a	+A
STX	$B	“	/B	B	B	b	+B
ETX	$C	#	/C	C	C	c	+C
EOT	$D	$	/D	D	D	d	+D
ENQ	$E	%	/E	E	E	e	+E
ACK	$F	&	/F	F	F	f	+F
BEL	$G	’	/G	G	G	g	+G
BS	$H	(	/H	H	H	h	+H
HT	$I	)	/I	I	I	i	+I
LF	$J	*	/J	J	J	j	+J
VT	$K	+	/K	K	K	k	+K
FF	$L	,	/L	L	L	l	+L
CR	$M	–	–	M	M	m	+M
SO	$N	.	.	N	N	n	+N
SI	$O	/	/O	O	O	o	+O
DLE	$P	0	0	P	P	p	+P
DC1	$Q	1	1	Q	Q	q	+Q
DC2	$R	2	2	R	R	r	+R
DC3	$S	3	3	S	S	s	+S
DC4	$T	4	4	T	T	t	+T
NAK	$U	5	5	U	U	u	+U
SYN	$V	6	6	V	V	v	+V
ETB	$W	7	7	W	W	w	+W
CAN	$X	8	8	X	X	x	+X
EM	$Y	9	9	Y	Y	y	+Y
SUB	$Z	:	/Z	Z	Z	z	+Z
ESC	%A	;	%F	[	%K	{	%P
FS	%B	<	%G	\	%L	|	%Q
GS	%C	=	%H	]	%M	}	%R
RS	%D	>	%I	^	%N	¿	%S
US	%E	?	%J	_	%O	DEL	%T,%X,%Y,%Z

Note: Character pairs /M and /N decode as a minus sign and a period respectively. Character pairs /P through /Y decode as 0 through 9.

A

AIM
Acronym for Automatic Identification Manufacturers.

alignment
The relative position of a scanner or light source to the target or the receiving element.

alphanumeric or alphameric
The character set which contains letters, digits, and other characters such as punctuation marks.

aspect ratio
The ratio of height to width of a bar code symbol. A code twice as high as wide would have an aspect ratio of 2; a code twice as wide as high would have an aspect ratio of 1/2 or 0.5.

attended system
A Scanner/decoder combination that must be activated, or attended, by an operator.

average background reflectance
Expressed as a percent, this is the simple arithmetic average of the background reflection reading from at least five different points on a sheet.

average edge
An imaginary line bisecting the irregularities of the character edge.

B

background
The area surrounding a printed symbol.

bar
The dark element of a printed 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 lineal inch.

bar code label
A label that carries a bar code and is suitable to be affixed to an article.

bar code reader
A device used to identify and read a bar code symbol. Also know as a decoder

bar code symbol
A group of vertical bars ,that represents a character or group of characters whose spacing is determined by a specific set of rules. In most cases, human readable characters are also printed below the bars.

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.

bidirectional symbol
A bar code symbol that can be read in complementary (two) directions.

binary code
A power–of–two code; each bit position has a weighted value.

bit
An acronym for Binary Digit. The smallest unit of information in the binary numbering system. Represented by the digits 0 and 1.

C

CCD
Acronym for Charge Couple Device; a linear image sensor that scans at high speeds (approximately 4,000 times per second) and detects the presence or absence of marks passing under the device.

character
A single group of bars and spaces representing an individual number, letter or punctuation mark. A graphic shape representing a letter, number or symbol.

character alignment
The vertical or horizontal position of characters with respect to a given reference line.

character density
The dimension, in linear inches, required to encode one character.

character reading
Reading of alpha or numeric characters,and/or symbols, by optical means.

character set
Those characters available for encoding purposes.

character skew
See skew.

character spacing
The horizontal distance between two adjacent characters.

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.

clear area
A clear space, containing no dark marks, that precedes the start character of a symbol and follows the stop character. That region of a document reserved for OCR characters and the required clear space around these characters.

code
A set of rules governing how the bars and spaces of the symbol will represent characters and groups of characters. bar code.

code medium
The material used to construct a machine readable code. Such materials may be retroreflective or opaque.

code reader or scanner
A device that examines a spatial pattern, one part after another, and generates analog or digital signals corresponding to the pattern.

contact scanner
A code reader that requires physical contact with the code medium.

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.

D

decoder
A device used to decode, or make usable, a digital or analog signal transmitted from a scanning device.

decoder logic
The circuitry which receives the signals from the scanner, interprets the signals into meaningful data and provides the interface to other devices.

depth of field
The distance between the maximum and minimum plane where a symbol can be read.

diffuse reflection
Reflection of light in all directions. Diffuse reflection occurs from non–glossy surfaces. (Also see specular reflection)

dirt
In paper, refers to the presence of relatively non–reflective foreign particles embedded in the sheet. The size and lack of reflectance of the particles may cause the optical scanner to mistake the dirt for inked areas.

discrete code
A bar code or symbol where the space between characters, intercharacter gap, are not part of the code; as with Code 39. (Also see continuous code)

diverging beam
A beam of light that is optically controlled so the light extends in different directions from the source.

E

EAN
Acronym for European Article Numbering System, the international standard bar code for retail food packages.

edge error
Irregularities with respect to the average edge of an element.

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.

extraneous ink
Ink in a scan area not intended to be there.

F

first read rate
The first read rate is the percentage of bar code symbols that are read with the first pass of the bar code wand under ideal conditions. Bar code symbols should have a first read at least 90% of the time. A first read rate of less than 90% usually means that either the bar code symbols or scanning device need some type of adjustment or modification. This does not mean that a system which has a first read rate of less than 90% is unacceptable.

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

hand–held scanner
Refers to any scanning device that must be held over the bar code symbol.

height–of–scan
The maximum vertical scanning dimension of a moving beam scanner at a specific distance from the face of the scanner.

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 since they would be indistinguishable from the background.

horizontal bar code (Picket Fence)
A bar code or symbol presented in such a manner that its overall length dimension is parallel to the horizon. The bars look like a picket fence.

I

incandescent light source
Intense white light used to illuminate an object as it passes under a CCD camera.

intercharacter gap
The space between two adjacent bar code characters. For example, the white space between two characters in AIM USS–39.

interleaved bar code
A bar code in which characters are paired together using bars to represent the first character and spaces to represent the second; as in USS–I 2/5

K

key mark or trigger
A code bit(s) that provides the scanner with the instruction that the code is in a position to be read; used in some fixed beam readers.

L

ladder orientation
See vertical bar code.

laser scanner
An optical bar code reading device using a low energy laser light beam as the source of illumination.

Light Emitting Diode (LED)
A semiconductor diode generally made from gallium arsenide, that can serve as a near infrared light source when voltage is applied continuously or in pulses. LED's have extremely long lifetimes when properly operated; being solid–state, they are very resistant to shock and vibration.

light operated
Condition in which the control operates when the light beam in uninterrupted.

M

mis–encodation
When the characters which were to be represented in symbol form are not correctly encoded. Example: desired number is 1,2, 3, 4; the encoded number is 1, 2, 5, 4.

misread
A condition which occurs when the data output of a reader does not agree with the encoded data presented. See substitution error.

module
The term module is used by the Uniform Product Code Council in it descriptions of the UPC code. A module is the narrowest unit of measure in the code. A module may be “black” or “white”.

modulo check digit or character
A calculated character within a data field used for error detection. The calculated character is determined by applying a code algorithm to the data field contents.

modulus 43 check character
Used in Code 39 for data security in addition to the built–in self–checking characters. The check–character is the modulus 43 sum of all of the character values in a given message and is the last character in the code.

moving beam scanner
A device which dynamically searches for a bar code pattern by sweeping a moving optical beam through a field of view.

N

nanometer
Unit of measure used to define the wavelength of light. 10^{-9} meters.

no–read, non–read, non–scan
The absence of data at the scanner output after an attempted scan due to no code, defective code, scanner failure or operator error.

nominal size
The standard size for a bar code symbol. Most codes can be used over a range of magnifications from 0.80 to 1.20, nominal.

numeric
A machine vocabulary that includes only the numbers as contrasted to alphanumeric which includes both letters and numerals.

O

OCR
Acronym for Optical Character Reader. An information processing device that scans and decodes human readable OCR symbols.

OCR–A
An abbreviation commonly applied to the character set contained in ANSI Standard x3.17–1974.

OCR–B
An abbreviation commonly applied to the character set contained in ANSI Standard x3.49–1975.

off–line
Refers to devices that operate independently of a central processing unit.

on–line
An operation in which peripheral devices are connected directly to the computer central processor unit.

opacity
1) The property of paper that minimizes the show through of printing from the back side or the next sheet. 2) The ratio of the paper reflectance with a black backing to the paper reflectance with a white backing.

optical throw
The distance from the face of the scanning device to the center of the depth of field.

orientation
The alignment of bars and spaces to the scanner. Often referred to as vertical (picket fence) or horizontal (ladder).

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

parallel beam
A beam of light that is optically controlled so the light travels in a parallel path. Generally used when the object is larger than the lens diameter.

parallel code
A code configuration that is optically scanned in its entirety at one time. Since all codes marks are read simultaneously, the code can move pass the reader in either direction.

parity bar, parity bit, parity module
A parity bit is added to a binary array to make the sum of all the bits always odd or always even; a fundamental check.

permanent code
A code which is indefinitely reused in a bar code application.

picket fence code
See horizontal bar code.

pitch
1) Rotation of a code pattern about the X axis. 2) The normal distance between the centerline or adjacent characters.

pre–printed symbol
A symbol which is printed in advance of application either on a label or on the article to be identified.

Print Contrast Signal (PCS)
A measurement of contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a symbol to be scannable.

$PCS = (R_L – R_D)/ R_L$,

where R_L is the reflectance factor of the light background and R_D is the reflectance factor of the dark bars. PCS values can be calculated and displayed automatically on suitable instruments.

print quality
The complete analysis of a printed symbol with regard to reflectance properties as well as bar and space resolution with regard to symbol specification. The inter–relationship of printed material and imprinted material that affects the optimum performance of the scanner.

proximity sensor
A method of object detection in which the source and detector are located on the same side; the detector senses energy from the source which is bounce back by the object being detected.

Q

quiet zone, quiet area
An area preceding and following a bar code symbol that contains no printing.

R

raster scanner
Also available as an optional raster assembly. Raster scanners are similar to standard scanners. The beam still travels from left to right, but it now does so in a sinusoidal, or top to bottom, pattern. This allows the scanner to see different scan paths so if a bar is deformed or soiled in one place it may still be read due to the sinusoidal sweep of the beam.

read
A successful scan of a bar code symbol.

reflectance
The amount of light returned from an illuminated surface.

reflectance, absolute
The ratio of the total reflectance by a document to the total light incident on the document.

reflectance, diffuse
Reflected light whose angle of reflection varies from the angle of incidence of the illuminating light; such as reflection from a non–glossy surface.

reflectance, specular
Reflected light whose angle of reflection is equal, or nearly equal, to the angle of incidence of the illuminating light, as in reflection from a mirror.

reflex
A method of object detection in which the source and detector are located on the same side; a retroreflector on the far side returns the energy from the source to the detector.

reject
See no–read, non–read, non–scan.

resolution
1) The measure of the ability of a lens, a photographic material or a photographic system to distinguish detail under certain specific conditions. 2) The dimension of the smallest element which can be printed employing a particular technique. 3) The narrowest element dimension which can be distinguished by a particular reading device.

retro
See retroreflective.

retroreflective
Characteristic of material causing it to reflect light back to its source regardless of angle of incidence.

retroreflector
A reflector, specially constructed, which reflects energy back to the source from which it came. It is also known as a “corner reflector”.

reverse image
A symbol in which the normal dark areas are represented in the light areas.

S

scan
The search for a symbol or marks which are to be optically recognized.

scan area
The area intended to contain a symbol.

scan head, 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.

scanner rollover
A reset of the raster mechanism that causes the rastering scan beam to rollover, or continue its sweep, as much as 360° until the mechanism resets.

scanning curtain
The effective reading area (width x height) of a moving beam scanner, which is equal to its depth–of–field and height–of– scan at a specific operating range.

scanning range
The combined distance of optical throw and depth of field.

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.

serial code
A bar code symbol typically used with a fixed beam scanner where the scanning action is caused by the motion of the symbol past the scanning head. The bits of the symbol are evaluated one at a time (serially).

skew
Rotation about the Y axis. Rotational deviation from correct horizontal and vertical orientation may apply to a single character, line or the entire encoded item.

space
The lighter element of a bar code formed by the background between bars.

space encoding
See interleaved bar code.

special symbol/character
In a character set, a character that is neither a numeral, letter, or a blank: for example, @ $ % ¢ & *.

spectral response
The variation in sensitivity of a device to light of different wavelengths.

specular reflection
Reflection of light from a surface at an angle equal but opposite to the angle of incidence. See reflectance, specular.

spots
Ink or dirt spots within the spaces or clear area of a bar code which may reduce first read rate.

start/stop character
A bar code character that provides the scanner with start and stop reading instructions as well as code orientation.

stepladder code
See vertical bar code.

substitution error
This error can be seen in a mis–encodation, mis–read, or human operator error. Characters are substituted with erroneous information. Example: correct information is 1, 2, 3, 4; substitution is 1, 2, 5, 4. Substitution errors are usually the result of bar code labels with printing defects. Substitution errors are extremely difficult to determine and are usually not found until the data has been processed and an obvious data error is noticed.

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.

U

unattended system
A Scanner/decoder combination that is triggered, or activated, by an external source such as a computer, PLC or mechanical switch.

UPC
Universal Product Code. The standard bar code symbol for retail food packaging in the United States.

V

vertical bar code (ladder orientation)
A code pattern in which the overall coded area from start to stop is perpendicular to the horizon. The individual bars appear as rungs of a ladder.

void(s)
The absence of ink within printed bars. The absence of ink within the confines of a character.

W

wand
A hand held scanning device used as a contact bar code or OCR reader.

white zone – see quiet zone

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