



# DRAGON™ DISI READERS

Reference Manual

## DATALOGIC

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# **DRAGON™ D151**

**REFERENCE MANUAL**



# DATALOGIC

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DRAGON™ REFERENCE MANUAL

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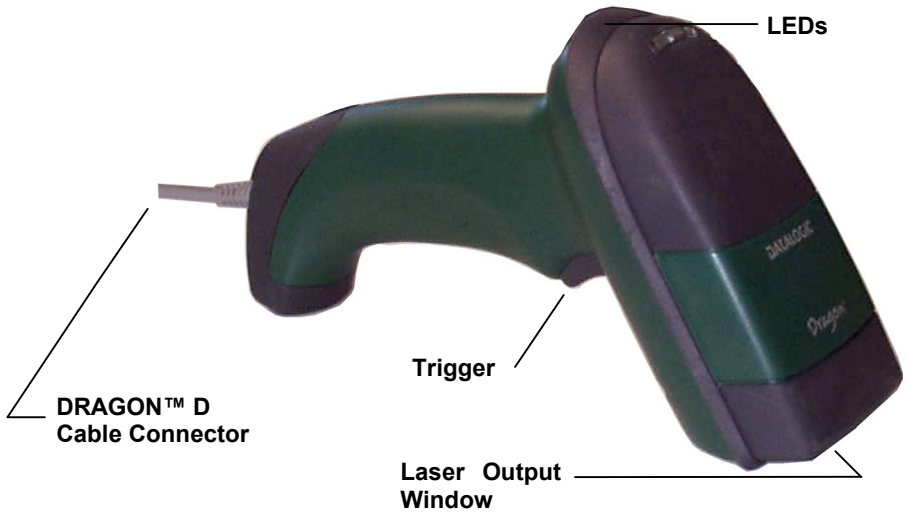
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# GENERAL VIEW

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## DRAGON™ D151 READERS



## DRAGON™ D151 Readers



# 1 INTRODUCTION

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Datalogic introduces the newest addition to the Dragon™ Desk family of industrial scanners, the D151 Extra Long Range (XLR) reader. Robustness and ergonomics remain unsurpassed, as well as a clearly audible beeper and bright "good read" LEDs for areas where noise levels are normally high. The aiming system helps point to the right code. Optical parts are completely suspended on shock absorbers and a careful choice of the body materials, such as the co-moulded rubber, protect the Dragon™ from damage due to "falls".

Your Dragon™ reader is supplied with its own Quick Reference Manual which provides connection diagrams, reading diagrams, basic application parameter settings, default values, and specific technical features. This manual provides all the necessary information for complete mechanical installation and system software configuration.

## 2 INSTALLATION

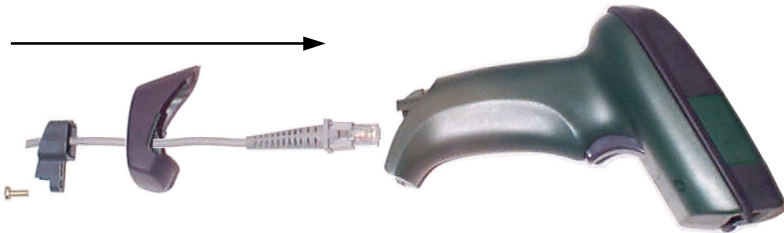


CAUTION

*Connections should always be made with power OFF!*

### 2.1 DRAGON™ D INTERFACE CABLE CONNECTIONS

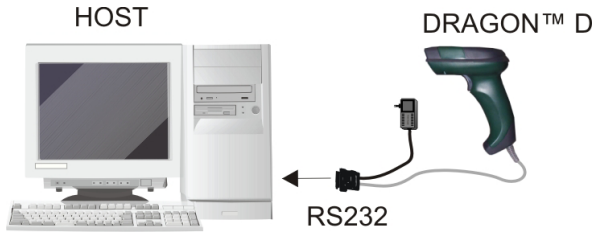
The DRAGON™ D reader can be connected to a Host by plugging an RS232 cable into the connector and closing the cable cover as shown below.



To disconnect the cable, unscrew the cover screw, pull down on the front part of the cover and insert a paper clip or other similar object onto the cable connector while unplugging the cable from the DRAGON™ D body.



## 2.2 RS232 CONNECTION



## 3 PARAMETER MENUS

---

This chapter describes the programmable parameters, provides barcodes for programming, and hexadecimal equivalents for host parameter programming through SSI.

### 3.1 OPERATIONAL PARAMETERS

The reader is shipped with the default parameter settings shown in the [Default Table](#). These default settings are stored in non-volatile memory and are preserved even when the reader is powered down.

To change the parameter values:

Scan the appropriate barcodes included in this chapter. The new value replaces the existing memory value. The default parameter values can be recalled by scanning the [SET ALL DEFAULTS](#) barcode.

or

Send the parameter through the reader's serial port using the SSI command PARAM\_SEND. Instructions for changing parameters using this method are found in chapter 4, [Simple Serial Interface](#).

The [Default Table](#) lists the defaults for all parameters. To change a parameter value(s), scan the appropriate barcode(s).

### 3.2 DEFAULT TABLE

Parameter	Default
<b>Serial Interface</b>	
Baud Rate	9600
Parity	None
Stop Bits	1 Stop Bit
ACK/NACK Protocol	Enable
Decode Data Packet Format	Unpacketed
Host Serial Response Timeout	2 sec
Inter-character Delay	0
Host Character Timeout	200 msec

Parameter	Default	
<b>Data Format</b>		
Transmit "No Read" Message	Disable	
Transmit Code ID Character	None	
Header/Terminators	Header	NULL
	Terminator 1	LF
	Terminator 2	CR
Scan Data Transmission Format	Data as is	
<b>Power Save</b>		
Sleep State	Enable	
<b>Reading Parameters</b>		
Beeper Tone	High Frequency	
Aiming System	0.0 sec	
Beep After Good Decode	Enable	
<b>Decoding Parameters</b>		
Linear Code Type Security Levels	1	
Bi-directional Redundancy	Disable	
Security Level	0	
<b>Code Selection</b>		
<b>UPC/EAN</b>		
UPC A	Enable	
UPC E	Enable	
EAN 8	Enable	
EAN 13	Enable	
Decode UPC/EAN Supplementals	Ignore	
Decode UPC/EAN Supplemental Redundancy	7	
Transmit UPC A Check Digit	Enable	
Transmit UPC E Check Digit	Enable	
Convert UPC E to A	Disable	
EAN 8 Zero Extend	Disable	
Convert EAN 8 to EAN 13 Type	Type is EAN 13	
<b>Interleaved 2 of 5</b>		
Interleaved 2 of 5	Enable	
Set Length(s) for I 2 of 5	14	
I 2 of 5 Check Digit Verification	Disable	
Transmit I 2 of 5 Check Digit	Disable	
Convert I 2 of 5 to EAN 13	Disable	
<b>Discrete 2 of 5</b>		
Discrete 2 of 5	Disable	
Set Length(s) for D 2 of 5	12	

Parameter	Default
<b>Code 39</b>	
Code 39	Enable
Convert Code 39 to Code 32	Disable
Code 32 Header	Disable
Set Length(s) for Code 39	2-55
Code 39 Check Digit Verification	Disable
Transmit Code 39 Check Digit	Disable
Code 39 Full ASCII Conversion	Disable
<b>Code 128</b>	
USS-128	Enable
UCC/EAN 128	Enable
ISBT 128	Enable
<b>Code 93</b>	
Code 93	Disable
Set Length(s) for Code 93	4-55
<b>Codabar</b>	
Codabar	Disable
Set Lengths for Codabar	5-55
START/STOP Character	Transmit
<b>MSI</b>	
MSI	Disable
Set Length(s) for MSI	6-55
MSI Check Digits	One
Transmit MSI Check Digit	Disable
MSI Check Digit Algorithm	Mod 10/Mod 10
<b>RSS</b>	
Enable/Disable RSS-14	Disable
Enable/Disable RSS-Limited	Disable
Enable/Disable RSS-Expanded	Disable

---

### **SET DEFAULT PARAMETERS**

Scan this barcode to return all parameters to the default values listed in the [Default Table](#).




**SET ALL DEFAULTS**

# RS232

⊙	<b>BAUD RATE</b>	⊙
⊙	<b>PARITY</b>	⊙
⊙	<b>STOP BITS</b>	⊙
⊙	<b>ACK/NACK PROTOCOL</b>	⊙
⊙	<b>DECODE DATA PACKET FORMAT</b>	⊙
⊙	<b>HOST SERIAL RESPONSE TIMEOUT</b>	⊙
⊙	<b>INTER-CHARACTER DELAY</b>	⊙
⊙	<b>HOST CHARACTER TIMEOUT</b>	⊙

Read configuration codes from the desired groups.

 = Read the code and follow the procedure given

◆ = Default value

# RS232

---

## ***BAUD RATE***

Baud rate is the number of bits of data transmitted per second. The reader's baud rate setting should match the data rate setting of the host device. If not, data may not reach the host device or may reach it in distorted form.



***BAUD RATE 300***



***BAUD RATE 600***



***BAUD RATE 1200***



***BAUD RATE 2400***



***BAUD RATE 4800***



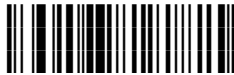
## RS232



◆ *BAUD RATE 9600*



*BAUD RATE 19,200*



*BAUD RATE 38,400*

---

### *PARITY*

A parity check bit is the most significant bit of each ASCII coded character. Select the parity type according to host device requirements. If you select **Odd** parity, the parity bit has a value 0 or 1, based on data, to ensure that an odd number of 1 bits is contained in the coded character.



*ODD*

## RS232

If you select **Even** parity, the parity bit has a value 0 or 1, based on data, to ensure that an even number of 1 bits is contained in the coded character.



*EVEN*

Select **MARK** parity and the parity bit is always 1.



*MARK*

Select **SPACE** parity and the parity bit is always 0.



*SPACE*

If no parity is required, select **NONE**.



◆ *NONE*

## RS232

---

### ***STOP BITS***

The stop bit(s) at the end of each transmitted character marks the end of transmission of one character and prepares the receiving device for the next character in the serial data stream. Set the number of stop bits (one or two) to match host device requirements.



◆ ***1 STOP BIT***



***2 STOP BITS***

---

### ***ACK/NACK PROTOCOL***

This parameter offers control of the data transmission process in addition to that offered by hardware handshaking. Hardware handshaking is always enabled and cannot be disabled by the user.

#### **Disable ACK/NAK Protocol**

When this option is selected, the reader neither generates nor expects ACK/NAK handshaking packets.



***DISABLE ACK/NAK***

## RS232

### Enable ACK/NAK Protocol

When this option is selected, after transmitting data, the reader expects either an ACK or NAK response from the host.

The reader also ACKs or NAKs messages from the host. The reader waits up to the programmable Host Serial Response Timeout to receive an ACK or NAK. If the reader does not get a response in this time, it resends its data up to two times before discarding the data and declaring a transmit error.



◆ *ENABLE ACK/NAK*

---

### *DECODE DATA PACKET FORMAT*

This parameter selects whether decoded data is transmitted in raw format (unpacketed), or transmitted with the packet format as defined by the serial protocol. If the raw format is selected, ACK/NAK Handshaking is disabled for decode data.



◆ *SEND RAW DECODE DATA*



*SEND PACKETED DECODE DATA*

---

## ***HOST SERIAL RESPONSE TIMEOUT***

This parameter specifies how long the reader waits for an ACK or NAK before resending. Also, if the reader wants to send, and the host has already been granted permission to send, the reader waits for the designated timeout before declaring an error.

The delay period can range from 0.0 to 9.9 seconds in 0.1 second increments. After scanning the barcode below, scan two [Numeric Barcodes](#) in appendix C. Values less than 10 require a leading zero. To change the selection or cancel an incorrect entry, scan the [CANCEL](#) barcode in appendix C.



***HOST SERIAL RESPONSE TIMEOUT***

---

## ***INTER-CHARACTER DELAY***

The inter-character delay gives the host system time to service its receiver and perform other tasks between characters. Select the inter-character delay option matching host requirements. The delay period can range from no delay to 99 msec in 1 msec increments. After scanning the barcode below, scan two [Numeric Barcodes](#) in appendix C to set the desired timeout. To change the selection or cancel an incorrect entry, scan the [CANCEL](#) barcode in appendix C.

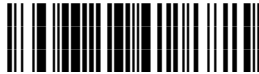


***INTER-CHARACTER DELAY***

---

### *HOST CHARACTER TIMEOUT*

This parameter determines the maximum time the reader waits between characters transmitted by the host before discarding the received data and declaring an error. The timeout is set in 0.01 second increments from 0.01 seconds to 0.99 seconds. After scanning the barcode below, scan two [Numeric Barcodes](#) in appendix C to set the desired timeout. To change the selection or cancel an incorrect entry, scan the [CANCEL](#) barcode in appendix C.




*HOST CHARACTER TIMEOUT*

# DATA FORMAT

- ⊙ *TRANSMIT "NO READ" MESSAGE* ⊙
- ⊙ *TRANSMIT CODE ID CHARACTER* ⊙
- ⊙ *HEADER/TERMINATORS* ⊙
- ⊙ *SCAN DATA TRANSMISSION FORMAT* ⊙

Read configuration codes from the desired groups.

 = Read the code and follow the procedure given

◆ = Default value

## DATA FORMAT

---

### ***TRANSMIT "NO READ" MESSAGE***

Enable this option to transmit "NR" if a 1-D symbol does not decode. Any enabled header or terminators are appended around this message.



***ENABLE NO READ***

When the parameter is disabled, and a symbol can not be decoded, no message is sent to the host.



**◆ *DISABLE NO READ***

---

### ***TRANSMIT CODE ID CHARACTER***

A code ID character identifies the code type of a scanned barcode. This can be useful when decoding more than one code type. The code ID character is inserted between the header character (if selected) and the decoded symbol.

Select no code ID character or an AIM Code ID character. See Miscellaneous Code Information in appendix B for [AIM Code Identifiers](#).



***AIM CODE ID CHARACTER***



**◆ *NONE***



# DATA FORMAT

---

## *HEADER/TERMINATOR*

A header and/or one or two terminators can be appended to scan data for use in data editing. To set these values, find the four-digit number from the Scan Value column in the [Character Equivalents Table](#) in appendix B that corresponds to the desired ASCII values. Scan the four barcodes from the [Numeric Barcodes](#) in appendix C. To change the selection or cancel an incorrect entry, scan the [CANCEL](#) barcode in appendix C. To set the Header/Terminator values via serial commands, see [Setting Headers and Terminators Via Serial Commands](#) in appendix B.

**Note:** *In order to use Header/Terminators, the [Scan Data Transmission Format](#) must be set.*



**SCAN HEADER**



**SCAN TERMINATOR 1**



**SCAN TERMINATOR 2**

# DATA FORMAT

---

## *SCAN DATA TRANSMISSION FORMAT*

To change the Scan Data Transmission Format, scan one of the following eight barcodes corresponding to the desired format.



◆ *DATA AS IS*



*<DATA> < TERMINATOR 1>*



*<DATA> < TERMINATOR 2>*



*<DATA> < TERMINATOR 1> < TERMINATOR 2>*



*< HEADER > < DATA >*

## DATA FORMAT



**< HEADER > <DATA> < TERMINATOR 1>**



**< HEADER > <DATA> < TERMINATOR 2>**



**< HEADER > <DATA> < TERMINATOR 1> < TERMINATOR 2>**

# POWER SAVE



## *SLEEP STATE*



Read configuration codes from the desired groups.



= Read the code and follow the procedure given



= Default value

## POWER SAVE

---

### *SLEEP STATE*

This mode allows the microprocessor in the reader to enter a sleep state for minimum power consumption whenever possible. When the sleep state is disabled, power remains on after each decode attempt.



*DISABLE*




◆ *ENABLE*

# READING PARAMETERS

⊙	<i>AIMING SYSTEM</i>	⊙
⊙	<i>BEEP AFTER GOOD DECODE</i>	⊙
⊙	<i>BEEPER TONE</i>	⊙

Read configuration codes from the desired groups.

 = Read the code and follow the procedure given

◆ = Default value

## READING PARAMETERS

---

### *AIMING SYSTEM*

This parameter sets the duration the aiming pattern is seen before a scan attempt begins. It is programmable in 0.1 second increments from 0.0 to 9.9 seconds. No aim pattern is visible when the value is 0.0.

To set the aiming system, scan the barcode below. Next scan the two **Numeric Barcodes** in appendix C that correspond to the desired aiming system duration. Single digit values must be predefined by a leading zero. For example, to set an aiming system duration of 0.5 seconds, scan the barcode below, then scan the “0” and “5” barcodes. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



*AIMING SYSTEM*

---

### *BEEP AFTER GOOD DECODE*

Scan this symbol to set the reader to beep after a good decode.



◆ *BEEP AFTER GOOD DECODE*

Scan this symbol to set the reader not to beep after a good decode. The beeper still operates during parameter menu scanning and indicates error conditions.



*DO NOT BEEP AFTER GOOD DECODE*

## READING PARAMETERS

---

### *BEEPER TONE*

To select a decode beep frequency (tone), scan the appropriate barcode.



*LOW FREQUENCY*



*MEDIUM FREQUENCY*




◆ *HIGH FREQUENCY*



# DECODING PARAMETERS

⊙	<b><i>LINEAR CODE TYPE</i></b>	⊙
	<b><i>SECURITY LEVEL</i></b>	
⊙	<b><i>BI-DIRECTIONAL</i></b>	⊙
	<b><i>REDUNDANCY</i></b>	
⊙	<b><i>SECURITY LEVEL</i></b>	⊙

Read configuration codes from the desired groups.

 = Read the code and follow the procedure given

◆ = Default value

# DECODING PARAMETERS

---

## ***LINEAR CODE TYPE SECURITY LEVEL***

The reader offers four levels of decode security for linear code types (e.g. Code 39, Interleaved 2 of 5). Select higher security levels for decreasing levels of barcode quality. As security levels increase, the reader's aggressiveness decreases.

Select the security level appropriate for your barcode quality.

### **Linear Security Level 1**

The following code types must be successfully read twice before being decoded:

Code Type	Length
Codabar	All
MSI	4 or less
D 2 of 5	8 or less
I 2 of 5	8 or less



◆ ***LINEAR SECURITY LEVEL 1***

### **Linear Security Level 2**

All code types must be successfully read twice before being decoded.



***LINEAR SECURITY LEVEL 2***

# DECODING PARAMETERS

## Linear Security Level 3

Code types other than the following must be successfully read twice before being decoded. The following codes must be read three times:

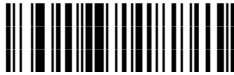
Code Type	Length
MSI	4 or less
D 2 of 5	8 or less
I 2 of 5	8 or less



*LINEAR SECURITY LEVEL 3*

## Linear Security Level 4

All code types must be successfully read three times before being decoded.



*LINEAR SECURITY LEVEL 4*

## DECODING PARAMETERS

---

### ***BI-DIRECTIONAL REDUNDANCY***

This parameter is only valid when a [Linear Code Type Security Level](#) is enabled. When this parameter is enabled, a barcode must be successfully scanned in both directions (forward and reverse) before being decoded.



***ENABLE BI-DIRECTIONAL REDUNDANCY***



◆ ***DISABLE BI-DIRECTIONAL REDUNDANCY***

---

### ***SECURITY LEVEL***

The reader offers four levels of decode security for delta barcodes, which include the Code 128 family, UPC/EAN, and Code 93. Select higher levels of security for decreasing levels of barcode quality. Increasing security decreases the reader's aggressiveness, so choose only that level of security necessary for the application.

#### ***Security Level 0***

This default setting allows the reader to operate in its most aggressive state, while providing sufficient security in decoding most "in-spec" barcodes.



◆ ***SECURITY LEVEL 0***

## DECODING PARAMETERS

### ***Security Level 1***

Select this option if misdecodes occur. This security level eliminates most misdecodes.



***SECURITY LEVEL 1***

### ***Security Level 2***

Select this option if Security level 1 fails to eliminate misdecodes.



***SECURITY LEVEL 2***

### ***Security Level 3***

If misdecodes still occur after selecting Security Level 2, select this security level. Be advised, selecting this option is an extreme measure against misdecoding severely out of spec barcodes. Selecting this level of security significantly impairs the decoding ability of the reader. If this level of security is necessary, try to improve the quality of the barcodes.




***SECURITY LEVEL 3***

# CODE SELECTION

⊙	<b>UPC/EAN FAMILY</b>	⊙
⊙	<b>INTERLEAVED 2/5 FAMILY</b>	⊙
⊙	<b>DISCRETE 2/5</b>	⊙
⊙	<b>CODE 39 FAMILY</b>	⊙
⊙	<b>CODE 128 FAMILY</b>	⊙
⊙	<b>CODE 93</b>	⊙
⊙	<b>CODABAR FAMILY</b>	⊙
⊙	<b>MSI</b>	⊙
⊙	<b>RSS CODES</b>	⊙

Read configuration codes from the desired groups.

 = Read the code and follow the procedure given

◆ = Default value

## CODE SELECTION

---

### *UPC/EAN*

#### **Enable/Disable UPC A**

To enable or disable UPC A, scan the appropriate barcode below.



◆ *ENABLE UPC A*



*DISABLE UPC A*

#### **Enable/Disable UPC E**

To enable or disable UPC E, scan the appropriate barcode below.



◆ *ENABLE UPC E*



*DISABLE UPC E*

## CODE SELECTION

### Enable/Disable EAN 8

To enable or disable EAN 8, scan the appropriate barcode below.



◆ *ENABLE EAN 8*



*DISABLE EAN 8*

### Enable/Disable EAN 13

To enable or disable EAN 13, scan the appropriate barcode below.



◆ *ENABLE EAN 13*



*DISABLE EAN 13*



# CODE SELECTION

## Decode UPC/EAN Supplementals

Supplementals are appended characters (2 or 5) according to specific code format conventions (e.g., UPC A+2, UPC E+2, EAN 8+2). Several options are available:

- If Decode UPC/EAN with Supplemental characters is selected, the reader does not decode UPC/EAN symbols without supplemental characters.
- If Ignore UPC/EAN with Supplemental characters is selected, and the reader is presented with a UPC/EAN symbol with a supplemental, the reader decodes the UPC/EAN and ignores the supplemental characters.
- If Autodiscriminate UPC/EAN Supplementals is selected, scan the **DECODE UPC/EAN SUPPLEMENTAL REDUNDANCY** barcode then select a value from the Numeric Barcodes in appendix C. A value of 5 or more is recommended.

**Note:** *To minimize the risk of invalid data transmission, we recommend selecting whether to read or ignore supplemental characters.*

Select the desired option by scanning one of the following barcodes.



**DECODE UPC/EAN WITH SUPPLEMENTALS**



◆ **IGNORE UPC/EAN WITH SUPPLEMENTALS**



**AUTODISCRIMINATE UPC/EAN SUPPLEMENTALS**

## CODE SELECTION

### Decode UPC/EAN Supplemental Redundancy

With *Auto discriminate UPC/EAN Supplementals* selected, this option adjusts the number of times a symbol without supplementals will be decoded before transmission. The range is from 2 to 20 times. Five or above is recommended when decoding a mix of UPC/EAN symbols with and without supplementals, and the auto discriminate option is selected.

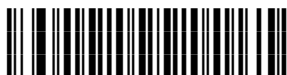
Scan the barcode below to select a decode redundancy value. Next scan two [Numeric Barcodes](#) in appendix C. Single digit values must be predefined by a leading zero. To change the selection or cancel an incorrect entry, scan the [CANCEL](#) barcode in appendix C.



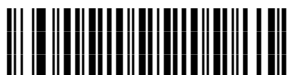
***DECODE UPC/EAN SUPPLEMENTAL REDUNDANCY***

### Transmit UPC A Check Digit

Scan the appropriate barcode below to transmit the symbol with or without the UPC A check digit.



**◆ *TRANSMIT UPC A CHECK DIGIT***



***DO NOT TRANSMIT UPC A CHECK DIGIT***

## CODE SELECTION

### Transmit UPC E Check Digit

Scan the appropriate barcode below to transmit the symbol with or without the UPC E check digit.



◆ *TRANSMIT UPC E CHECK DIGIT*



*DO NOT TRANSMIT UPC E CHECK DIGIT*

### Convert UPC E to UPC A

This parameter converts UPC E (zero suppressed) decoded data to UPC A format before transmission. After conversion, data follows UPC A format and is affected by UPC A programming selections (e.g. Check Digit).

Scan **DO NOT CONVERT UPC E TO UPC A** to transmit UPC E (zero suppressed) decoded data.



*CONVERT UPC E TO UPC A  
(ENABLE)*



◆ *DO NOT CONVERT UPC E TO UPC A  
(DISABLE)*

## CODE SELECTION

### EAN Zero Extend

When enabled, this parameter adds five leading zeros to decoded EAN 8 symbols to make them compatible in format to EAN 13 symbols.

Disable this parameter to transmit EAN 8 symbols as is.



*ENABLE EAN ZERO EXTEND*



◆ *DISABLE EAN ZERO EXTEND*

---

## *INTERLEAVED 2 OF 5*

### Enable/Disable Interleaved 2 of 5

To enable or disable Interleaved 2 of 5, scan the appropriate barcode below.



◆ *ENABLE INTERLEAVED 2 OF 5*



*DISABLE INTERLEAVED 2 OF 5*

# CODE SELECTION

## Set Lengths for Interleaved 2 of 5

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Lengths for I 2 of 5 can be set for any length, one or two discrete lengths, or lengths within a specific range. To set lengths via serial commands, see [Setting Code Lengths Via Serial Commands](#) in appendix B.

**Note:** *When setting lengths, single digit numbers must always be preceded by a leading zero.*

**One Discrete Length** - Select this option to decode only those codes containing a selected length. For example, select **I 2 of 5 One Discrete Length**, then scan **1, 4 Numeric Barcodes** in appendix C to decode only I 2 of 5 symbols containing 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



***I 2 of 5 - ONE DISCRETE LENGTH***

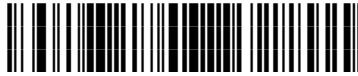
**Two Discrete Lengths** - Select this option to decode only those codes containing two selected lengths. For example, select **I 2 of 5 Two Discrete Lengths**, then scan **0, 6, 1, 4 Numeric Barcodes** in appendix C to decode only I 2 of 5 symbols containing 6 or 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



***I 2 of 5 - TWO DISCRETE LENGTHS***

## CODE SELECTION

**Length Within Range** - Select this option to decode only codes within a specified range. For example, to decode 1 2 of 5 symbols containing between 4 and 12 characters, first scan **1 2 of 5 Length Within Range**, then scan **0, 4, 1** and **2** (single digit numbers must always be preceded by a leading zero) **Numeric Barcodes** in appendix C. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



*1 2 of 5 - LENGTH WITHIN RANGE*

**Any Length** - Scan this option to decode 1 2 of 5 symbols containing any number of characters.

**Note:** *Selecting this option may lead to misdecodes for 1 2 of 5 codes.*



*1 2 of 5 - ANY LENGTH*

### 1 2 of 5 Check Digit Verification

When enabled, this parameter checks the integrity of an 1 2 of 5 symbol to ensure it complies with a specified algorithm, either USS (Uniform Symbology Specification), or OPCC (Optical Product Code Council).



◆ *DISABLE*



*USS CHECK DIGIT*

## CODE SELECTION



*OPCC CHECK DIGIT*

### Transmit I 2 of 5 Check Digit

Scan this symbol to transmit the check digit with the data.



*TRANSMIT I 2 of 5 CHECK DIGIT  
(ENABLE)*

Scan this symbol to transmit data without the check digit.



◆ *DO NOT TRANSMIT I 2 of 5 CHECK DIGIT  
(DISABLE)*

### Convert I 2 of 5 to EAN 13

This parameter converts a 14 character I 2 of 5 code into EAN 13, and transmits to the host as EAN 13. To accomplish this, I 2 of 5 must be enabled, one length must be set to 14, and the code must have a leading zero and a valid EAN 13 check digit.



*CONVERT I 2 of 5 to EAN 13  
(ENABLE)*

## CODE SELECTION



◆ *DO NOT CONVERT I 2 of 5 to EAN 13  
(DISABLE)*

---

### *DISCRETE 2 OF 5*

#### **Enable/Disable Discrete 2 of 5**

To enable or disable Discrete 2 of 5, scan the appropriate barcode below.



*ENABLE DISCRETE 2 OF 5*



◆ *DISABLE DISCRETE 2 OF 5*

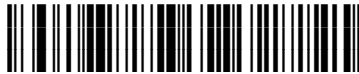


# CODE SELECTION

## Set Lengths for Discrete 2 of 5

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Lengths for D 2 of 5 can be set for any length, one or two discrete lengths, or lengths within a specific range. To set lengths via serial commands, see [Setting Code Lengths Via Serial Commands](#) in appendix B.

**One Discrete Length** - Select this option to decode only those codes containing a selected length. For example, select **D 2 of 5 One Discrete Length**, then scan **1, 4** Numeric Barcodes in appendix C to decode only D 2 of 5 symbols containing 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



*D 2 of 5 - ONE DISCRETE LENGTH*

**Two Discrete Lengths** - Select this option to decode only those codes containing two selected lengths. For example, select **D 2 of 5 Two Discrete Lengths**, then scan **0, 2, 1, 4** Numeric Barcodes in appendix C to decode only D 2 of 5 symbols containing 2 or 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



*D 2 of 5 - TWO DISCRETE LENGTHS*

**Length Within Range** - Select this option to decode codes within a specified range. For example, to decode D 2 of 5 symbols containing between 4 and 12 characters, first scan **D 2 of 5 Length Within Range**, then scan **0, 4, 1** and **2** (single digit numbers must be preceded by a leading zero) Numeric Barcodes in appendix C. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.

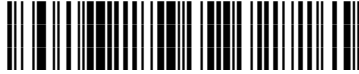


*D 2 of 5 - LENGTH WITHIN RANGE*

## CODE SELECTION

**Any Length** - Scan this option to decode D 2 of 5 symbols containing any number of characters.

**Note:** *Selecting this option may lead to misdecodes of D 2 of 5 codes.*



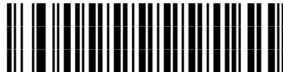
*D 2 of 5 - ANY LENGTH*

---

### CODE 39

#### Enable/Disable Code 39

To enable or disable Code 39, scan the appropriate barcode below.



◆ *ENABLE CODE 39*



*DISABLE CODE 39*

## CODE SELECTION

### Convert Code 39 to Code 32

Code 32 is a variant of Code 39 used by the Italian pharmaceutical industry. Scan the appropriate barcode below to enable or disable converting Code 39 to Code 32.

**Note:** Code 39 must be enabled for this parameter to function.



**CONVERT CODE 39 TO CODE 32  
(ENABLE)**



**◆ DO NOT CONVERT CODE 39 TO CODE 32  
(DISABLE)**

### Code 32 Header

Enable this parameter to add the header character "A" to all Code 32 barcodes. The **Convert Code 39 to Code 32** option must be enabled for this parameter to function.



**ENABLE CODE 32 HEADER**



**◆ DISABLE CODE 32 HEADER**

# CODE SELECTION

## Set Lengths for Code 39

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Lengths for Code 39 may be set for any length, one or two discrete lengths, or lengths within a specific range. If Code 39 Full ASCII is enabled, **Length Within a Range** or **Any Length** are the preferred options. To set lengths via serial commands, see [Setting Code Lengths Via Serial Commands](#) in appendix B.

**Note:** *When setting lengths, single digit numbers must always be preceded by a leading zero.*

**One Discrete Length** - This option limits decodes to only those Code 39 symbols containing a selected length. Lengths are selected from the [Numeric Barcodes](#) in appendix C. For example, to decode only Code 39 symbols with 14 characters, scan **Code 39 - One Discrete Length**, then scan **1** followed by **4**. To change the selection or to cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



**CODE 39 - ONE DISCRETE LENGTH**

**Two Discrete Lengths** - This option limits decodes to only those Code 39 symbols containing either of two selected lengths. Lengths are selected from the [Numeric Barcodes](#) in appendix C. For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select **Code 39 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



**CODE 39 - TWO DISCRETE LENGTHS**

## CODE SELECTION

**Length Within Range** - This option limits decodes to only those Code 39 symbols within a specified range. For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan **Code 39 Length Within Range**. Then scan **0, 4, 1** and **2** (single digit numbers must always be preceded by a leading zero) **Numeric Barcodes** in appendix C. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



**CODE 39 - LENGTH WITHIN RANGE**

**Any Length** - Scan this option to decode Code 39 symbols containing any number of characters.



**CODE 39 - ANY LENGTH**

### Code 39 Check Digit Verification

When this feature is enabled, the reader checks the integrity of all Code 39 symbols to verify that the data complies with specified check digit algorithm. Only those Code 39 symbols which include a modulo 43 check digit are decoded. Only enable this feature if the Code 39 symbols contain a modulo 43 check digit.



**VERIFY CODE 39 CHECK DIGIT**



**◆ DO NOT VERIFY CODE 39 CHECK DIGIT**

## CODE SELECTION

### Transmit Code 39 Check Digit

Scan this symbol to transmit the check digit with the data.



***TRANSMIT CODE 39 CHECK DIGIT  
(ENABLE)***

Scan this symbol to transmit data without the check digit.



**◆ *DO NOT TRANSMIT CODE 39 CHECK DIGIT  
(DISABLE)***

### Enable/Disable Code 39 Full ASCII

Code 39 Full ASCII is a variant of Code 39 which pairs characters to encode the full ASCII character set. To enable or disable Code 39 Full ASCII, scan the appropriate barcode below.



***ENABLE CODE 39 FULL ASCII***



**◆ *DISABLE CODE 39 FULL ASCII***

## CODE SELECTION

---

### *CODE 128*

#### **Enable/Disable Code 128**

To enable or disable Code 128, scan the appropriate barcode below.



◆ *ENABLE CODE 128*



*DISABLE CODE 128*

#### **Enable/Disable UCC/EAN 128**

To enable or disable UCC/EAN 128, scan the appropriate barcode below.



◆ *ENABLE UCC/EAN 128*



*DISABLE UCC/EAN 128*

## CODE SELECTION

### Enable/Disable ISBT 128

To enable or disable ISBT 128, scan the appropriate barcode below.



◆ *ENABLE ISBT 128*



*DISABLE ISBT 128*

### Lengths for Code 128

No length setting is required for Code 128.

---

## CODE 93

### Enable/Disable Code 93

To enable or disable Code 93, scan the appropriate barcode below.



*ENABLE CODE 93*



◆ *DISABLE CODE 93*



# CODE SELECTION

## Set Lengths for Code 93

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Lengths for Code 93 can be set for any length, one or two discrete lengths, or lengths within a specific range. To set lengths via serial commands, see [Setting Code Lengths Via Serial Commands](#) in appendix B.

**One Discrete Length** - Select this option to decode only those codes containing a selected length. For example, select **Code 93 One Discrete Length**, then scan **1, 4**, Numeric Barcodes in appendix C to limit the decoding to only Code 93 symbols containing 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



**CODE 93 - ONE DISCRETE LENGTH**

**Two Discrete Lengths** - Select this option to decode only those codes containing two selected lengths. For example, select **Code 93 Two Discrete Lengths**, then scan **0, 2, 1, 4** Numeric Barcodes in appendix C to limit the decoding to only Code 93 symbols containing 2 or 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



**CODE 93 - TWO DISCRETE LENGTHS**

**Length Within Range** - This option sets the unit to decode a code type within a specified range. For example, to decode Code 93 symbols containing between 4 and 12 characters, first scan **Code 93 Length Within Range**, then scan **0, 4, 1** and **2** Numeric Barcodes (single digit numbers must always be preceded by a leading zero) in appendix C. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



**CODE 93 - LENGTH WITHIN RANGE**

## CODE SELECTION

**Any Length** - Scan this option to decode Code 93 symbols containing any number of characters.



*CODE 93 - ANY LENGTH*

---

## CODABAR

### Enable/Disable Codabar

To enable or disable Codabar, scan the appropriate barcode below.



*ENABLE CODABAR*



◆ *DISABLE CODABAR*

# CODE SELECTION

## Set Lengths for Codabar

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Lengths for Codabar can be set for any length, one or two discrete lengths, or lengths within a specific range. To set lengths via serial commands, see [Setting Code Lengths Via Serial Commands](#) in appendix B.

**One Discrete Length** - Select this option to decode only those codes containing a selected length. For example, select **Codabar One Discrete Length**, then scan **1, 4 Numeric Barcodes** in appendix C to decode only Codabar symbols containing 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



***CODABAR - ONE DISCRETE LENGTH***

**Two Discrete Lengths** - This option sets the unit to decode only those codes containing two selected lengths. For example, select **Codabar Two Discrete Lengths**, then scan **0, 2, 1, 4 Numeric Barcodes** in appendix C to decode only Codabar symbols containing 6 or 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



***CODABAR - TWO DISCRETE LENGTHS***

**Length Within Range** - Select this option to decode a code within a specified range. For example, to decode Codabar symbols containing between 4 and 12 characters, first scan **Codabar Length Within Range**, then scan **0, 4, 1 and 2** (single digit numbers must always be preceded by a leading zero) **Numeric Barcodes** in appendix C. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



***CODABAR - LENGTH WITHIN RANGE***

## CODE SELECTION

**Any Length** - Scan this option to decode Codabar symbols containing any number of characters.

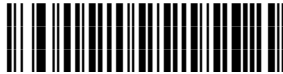


*CODABAR - ANY LENGTH*

### START/STOP Character Transmission



*NO TRANSMISSION*



◆ *TRANSMISSION*

---

## *MSI*

### Enable/Disable MSI

To enable or disable MSI, scan the appropriate barcode below.



*ENABLE MSI*



◆ *DISABLE MSI*

# CODE SELECTION

## Set Lengths for MSI

The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits. Lengths for MSI can be set for any length, one or two discrete lengths, or lengths within a specific range. To set lengths via serial commands, see [Setting Code Lengths Via Serial Commands](#) in appendix B.

**One Discrete Length** - Select this option to decode only those codes containing a selected length. For example, select **MSI One Discrete Length**, then scan **1, 4 Numeric Barcodes** in appendix C to decode only MSI symbols containing 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



*MSI - ONE DISCRETE LENGTH*

**Two Discrete Lengths** - Select this option to decode only those codes containing two selected lengths. For example, select **MSI Two Discrete Lengths**, then scan **0, 6, 1, 4 Numeric Barcodes** in appendix C to decode only MSI symbols containing 6 or 14 characters. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



*MSI - TWO DISCRETE LENGTHS*

**Length Within Range** - Select this option to decode codes within a specified range. For example, to decode MSI symbols containing between 4 and 12 characters, first scan **MSI Length Within Range**, then scan **0, 4, 1** and **2** (single digit numbers must always be preceded by a leading zero) **Numeric Barcodes** in appendix C. To change the selection or cancel an incorrect entry, scan the **CANCEL** barcode in appendix C.



*MSI - LENGTH WITHIN RANGE*

## CODE SELECTION

**Any Length** - Scan this option to decode MSI symbols containing any number of characters.

**Note:** *Selecting this option can cause misdecodes for MSI codes.*



*MSI - ANY LENGTH*

### MSI Check Digits

These check digits at the end of the barcode verify the integrity of the data. At least one check digit is required. Check digits are not automatically transmitted with the data.



◆ *ONE MSI CHECK DIGIT*

If two check digits is selected, also select an **MSI Check Digit Algorithm**:



*TWO MSI CHECK DIGIT*

## CODE SELECTION

### Transmit MSI Check Digit

Scan this symbol to transmit the check digit with the data.



***TRANSMIT MSI CHECK DIGIT  
(ENABLE)***

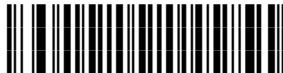
Scan this symbol to transmit data without the check digit.



**◆ *DO NOT TRANSMIT MSI CHECK DIGIT  
(DISABLE)***

### MSI Check Digit Algorithm

When the Two MSI check digits option is selected, an additional verification is required to ensure integrity. Select one of the following algorithms.



***MOD 10/ MOD 11***



**◆ *MOD 10/ MOD 10***

## CODE SELECTION

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### *RSS*

#### **Enable/Disable RSS-14**

To enable or disable RSS-14, scan the appropriate barcode below.



*ENABLE RSS-14*



◆ *DISABLE RSS-14*

#### **Enable/Disable RSS-Limited**

To enable or disable RSS-Limited, scan the appropriate barcode below.



*ENABLE RSS-LIMITED*



◆ *DISABLE RSS-LIMITED*



## CODE SELECTION

### Enable/Disable RSS-Expanded

To enable or disable RSS-Expanded, scan the appropriate barcode below.



*ENABLE RSS-EXPANDED*



◆ *DISABLE RSS-EXPANDED*

## 4 SIMPLE SERIAL INTERFACE

---

This chapter describes the system requirements of the Simple Serial Interface, which provides a communications link between readers and a serial host. SSI allows the host to control the reader.

### 4.1 COMMUNICATIONS

All communications between the reader and host occur over the hardware interface lines using the SSI protocol. See [Serial Interface Specification](#) in appendix A.

The host and the reader exchange messages in packets. (A packet is a collection of bytes framed by the proper SSI protocol formatting bytes.) The maximum number of bytes per packet allowed by the SSI protocol for any transaction is 257 (255 bytes + 2 byte checksum).

Decode data may be sent as ASCII data (unpacked), or as part of a larger message (packeted), depending on the reader configuration.

SSI performs the following functions for the host device:

- Maintains a bi-directional interface with the reader
- Allows the host to send commands which can control the reader
- Passes data from the reader to a host device in the formatted SSI packet format or straight decode message.

The SSI environment consists of a reader, a serial cable which attaches to the host device, and in some instances, a power supply.

All commands sent between the reader and host must use the format described in [SSI Message Formats](#). [SSI Transactions](#) describes the required sequence of messages in specific cases.

The [SSI Commands Table](#) lists the SSI opcodes supported by the reader. It identifies the SSI partner allowed to send a message of each type. The host transmits type **H** opcodes, the reader transmits type **D** opcodes, and either partner can transmit Host/Reader (**H/D**) types.

## SSI Commands Table

Name	Type	Opcode	Description
<b>CMD_ACK</b>	H/D	0xD0	Positive acknowledgment of received packet.
<b>CMD_NAK</b>	H/D	0xD1	Negative acknowledgment of received packet
<b>DECODE_DATA</b>	D	0xF3	Decode data in SSI packet format.
<b>PARAM_DEFAULTS</b>	H	0xC8	Set parameter default values.
<b>PARAM_SEND</b>	H	0xC6	Send parameter values.
<b>SCAN_DISABLE</b>	H	0xEA	Prevent the operator from scanning barcodes.
<b>SCAN_ENABLE</b>	H	0XE9	Permit barcode scanning.
<b>SLEEP</b>	H	0xEB	Request to place the reader into sleep state.
<b>WAKEUP</b>	H	N/A	Wakeup reader after it's been powered down.
<b>Note:</b> D = Reader, H = Host, H/D = Host/Reader			

The Figure below shows the general packet format for SSI messages, and the [Field Descriptions Table](#) lists the descriptions of fields that occur in all messages. These descriptions are repeated for each opcode in the SSI message formats section. For messages that use the *Data* field, the specific type of data is shown in that field.

Length	Opcode	Message Source	Status	Data	Checksum
--------	--------	----------------	--------	------	----------

**General Packet Format**

## Field Descriptions Table

Field Name	Format	Sub-Field	Meaning
<b>Length</b>	1 Byte	Length	Length of message not including the check sum bytes. Maximum value is 0xFF.
<b>Opcode</b>	1 Byte	See the <a href="#">SSI Commands Table</a> for details	Identifies the type of packet data being sent.
<b>Message Source</b>	1 Byte	0 = Reader 4 = Host	Identifies where the message is coming from.
<b>Status</b>	Bit 0	Retransmit	0 = First time packet is sent 1 = Subsequent transmission attempts
	Bit 1	Reserved	Always set to zero
	Bit 2	Reserved	Always set to zero
	Bit 3	Change Type (applies to parameters)	0 = Temporary change 1 = Permanent change
	Bits 4 - 7		Unused bits must be set to 0.
<b>Data</b>	Variable number of bytes	See individual sections for details.	
<b>Checksum</b>	2 Bytes	2's complement sum of message contents excluding checksum.	Checksum of message formatted as HIGH BYTE LOW BYTE
<b>Note:</b> The checksum is a 2 byte checksum and must be sent as HIGH BYTE followed by LOW BYTE.			

## 4.2 SSI MESSAGE FORMATS

The following sections describe each of the SSI messages that can be communicated between the reader and host. See [SSI Transactions](#) for the protocol required to transmit these messages.

### CMD\_ACK

**Description:** *Positive acknowledgment of received packet*

#### Packet Format

Length	Opcode	Message Source	Status	Data	Checksum
0x04	0XD0				

#### Field Descriptions

Field Name	Format	Size	Description
<b>Length</b>	Length of message (not including checksum).	1 Byte	Length Field
<b>Opcode</b>	0xD0	1 Byte	Identifies this opcode type.
<b>Message Source</b>	0 = Reader 4 = Host	1 Byte	Identifies where the message is coming from.
<b>Status</b>	Bit 0: Retransmit Bit 1-7: Unused	1 Byte	Identifies the transmission status. Unused bits must be set to 0.
<b>Data</b>			None
<b>Checksum</b>	2's complement sum of message contents excluding checksum.	2 Byte	Checksum of message.

This message is sent to the SSI packet transmitter when the received packet passes the checksum check and no negative acknowledgment conditions apply (see CMD\_NAK).

**Note:** *ACK/NAK handshaking can be disabled, but this is not recommended. It is not necessary to respond to a valid ACK or NAK message.*

## Host Requirements

The reader must send a CMD\_ACK within the programmable Serial Response Timeout to acknowledge receipt of all messages, unless noted otherwise in the message description section. If the host sends data and does not receive a response within the programmable serial response timeout, it resends the message (with the retransmit status bit set) before declaring a failure. The host should limit the number of retries.

## Reader Requirements

The host must send a CMD\_ACK within the programmable Serial Response Timeout to acknowledge receipt of all messages, unless noted otherwise in the message description section. If the reader does not receive an ACK within this time period, it sends the previous message again. The reader retries twice more (with the retransmit status bit set) before declaring a transmit error.

## CMD\_NAK

**Description:** *Negative acknowledgment of received packet*

### Packet Format

Length	Opcode	Message Source	Status	Cause	Checksum
0x05	0xD1				

### Field Descriptions

Field Name	Format	Size	Description
<b>Length</b>	Length of message (not including checksum).	1 Byte	Length Field
<b>Opcode</b>	0xD1	1 Byte	Identifies this opcode type.
<b>Message Source</b>	0 = Reader 4 = Host	1 Byte	Identifies where the message is coming from.
<b>Status</b>	Bit 0: Retransmit Bit 1-7: Unused	1 Byte	Identifies the transmission status. Unused bits must be set to 0.
<b>Cause</b>	Reason Cause	1 Byte	Identifies the reason the NAK occurred: 0 = Reserved 1 = (RESEND) Checksum failure 2 = (BAD_CONTEXT) Unexpected or Unknown message 3 = Reserved 4 = Reserved 5 = Reserved 6 = (DENIED) Host Directive Denied 7 = Reserved 8 = Reserved 9 = Reserved
<b>Checksum</b>	2's complement sum of message contents excluding checksum.	2 Byte	Checksum of message.

This message is sent when the received packet fails the checksum verification or some error occurred while handling the message.

**Note:** *ACK/NAK Handshaking can be disabled, but this is not recommended.*

*It is not necessary to respond to a valid ACK or NAK message.*

The [Reader-Supported NAK Types Table](#) describes NAK types supported by the reader.

### Reader-Supported NAK Types Table

NAK Type	Meaning	Receiver Action
<b>NAK_RESEND</b>	Checksum incorrect.	Ensure checksum is correct. Limit number of resends. Send packet again with resend bit set.
<b>NAK_DENIED</b>	Host is unable to comply with the requested message (e.g., beep code is out of range).	Do not send data with this message again. Developer should check values with specified values. Developer should ensure the proper character is sent, if using wake-up character.
<b>NAK_BAD_CONTEXT</b>	Host does not recognize the command.	

The reader only resends a message twice. If the message is not sent successfully either time, the reader declares a transmit error and issues transmit error beeps (LO-LO-LO- LO).



## DECODE\_DATA

*Description: Decode data in SSI packet format*

### Packet Format

Length	Opcode	Message Source	Status	Barcode Type	Decode Data	Checksum
	0XF3	0x00				

### Field Descriptions

Field Name	Format	Size	Description
<b>Length</b>	Length of message (not including checksum).	1 Byte	Length Field
<b>Opcode</b>	0xF3	1 Byte	Identifies this opcode type.
<b>Message Source</b>	0 = Reader	1 Byte	Identifies where the message is coming from.
<b>Status</b>	Bit 0: Retransmit Bit 1-7: Unused	1 Byte	Identifies the transmission status. Unused bits must be set to 0.
<b>Barcode Type</b>	See the <a href="#">Supported Code Types Table</a>	1 Byte	Identifies the scanned data code type.
<b>Decode Data</b>	<data>	Variable	Data is decoded data including header and terminator sent in ASCII format.
<b>Checksum</b>	2's complement sum of message contents excluding checksum.	2 Byte	Checksum of message.

The reader uses this opcode when packeted data is selected to send decoded barcode data to the host. The decoded message is contained in the Decode Data field.

The [Supported Code Types Table](#) lists all reader's supported code types. The associated hex value for each code (as required) is entered in the Code Type field.

## Supported Code Types Table

<b>Not Applicable</b>	0x00	<b>ISPT</b>	
<b>Code 39</b>	0x01	<b>SSI INS</b>	
<b>Codabar</b>	0x02	<b>EAN 8</b>	0x0A
<b>Code 128</b>	0x03	<b>EAN 8 with 2 Supps.</b>	0x4A
<b>Discrete 2 of 5</b>	0x04	<b>EAN 8 with 5 Supps</b>	0x8A
<b>Code 32</b>		<b>EAN 13</b>	0x0B
<b>Interleaved 2 of 5</b>	0x06	<b>EAN 13 with 2 Supps.</b>	0x4B
<b>Code 93</b>	0x07	<b>EAN 13 with 5 Supps.</b>	0x8B
<b>UPC A</b>	0x08	<b>MSI</b>	0x0E
<b>UPC A with 2 Supps.</b>	0x48	<b>EAN 128</b>	0x0F
<b>UPC A with 5 Supps.</b>	0x88	<b>RSS Limited</b>	0x23
<b>UPC E</b>	0x09	<b>RSS 14</b>	0x24
<b>UPC E with 2 Supps.</b>	0x49	<b>RSS Expanded</b>	0x25
<b>UPC E with 5 Supps</b>	0x89		

## Reader Requirements

Decode data is sent in this format if packeted decode data is selected via parameter. The host responds to this message with a CMD\_ACK, if ACK/NAK handshaking is enabled.

## PARAM\_DEFAULTS

*Description: Sets the parameters to their factory default values*

### Packet Format

Length	Opcode	Message Source	Status	Checksum
0x04	0XC8	0x04		

### Field Descriptions

Field Name	Format	Size	Description
<b>Length</b>	Length of message (not including checksum).	1 Byte	Length Field
<b>Opcode</b>	0XC8	1 Byte	Identifies this opcode type.
<b>Message Source</b>	4 = Host	1 Byte	Identifies where the message is coming from.
<b>Status</b>	Bit 0: Retransmit Bit 1-7: Unused	1 Byte	Identifies the transmission status. Unused bits must be set to 0.
<b>Checksum</b>	2's complement sum of message contents excluding checksum.	2 Byte	Checksum of message.

This command returns all parameters to their factory default settings.

### Host Requirements

The host sends this command to reset the reader's parameter settings to the factory default values.

### Reader Requirements

Upon receiving this command, the reader resets all its parameters to the factory default values. The behavior is the same as scanning a SET DEFAULTS barcode.

## PARAM\_SEND

**Description:** *Change particular parameter values*

### Packet Format

Length	Opcode	Message Source	Status	Beep Code	Param Data	Checksum
	0XC6					

### Field Descriptions

Field Name	Format	Size	Description
<b>Length</b>	Length of message (not including checksum).	1 Byte	Length Field
<b>Opcode</b>	0XC6	1 Byte	Identifies this opcode type.
<b>Message Source</b>	4 = Host	1 Byte	Identifies where the message is coming from.
<b>Status</b>	Bit 0: Retransmit Bit 1, 2: Unused Bit 3: Change Type Bit 4-7: Unused	1 Byte	Bit 0: 1 indicates a retransmit Bit 3: 1 Permanent change 0 Temporary change – lost when power removed. Unused bits must be set to 0.
<b>Beep Code</b>			set this field to 0xFF.
<b>Param Data</b>	See <a href="#">Parameter Data Format Table</a> and <a href="#">Parameter Data Values Table</a> .		The parameter numbers and data to be sent to the requester.
<b>Checksum</b>	2's complement sum of message contents excluding checksum.	2 Byte	Checksum of message.

This message is sent by the host to change the reader's parameter values.

Parameter numbers 0xF0 (+256), 0xF1 (+512), 0xF2 (+768) are used to access parameters whose numbers are 256 and higher. For example, to access the first parameter in the 256-511 range, use 0xF0 and 0x00.

## Parameter Data Format Table

Parameter Number	Data Format
0 through 0xEF	<param_num> <value>
0xF0, 0xF1, 0xF2	<extended parameter code> <param_num offset> <value>

### Host Requirements

**Note:** *Due to the processing time of interpreting and storing parameters contained in the message, the reader may not be able to send an ACK within the programmable Serial Response timeout. This is not an error; to compensate, increase the timeout.*

The host transmits this message to change the reader's parameters. Be sure the Change Type bit in the Status byte is set as desired. The beep code must be set to 0xFF.

### Reader Requirements

When the reader receives a PARAM\_SEND, it interprets and stores the parameters, then ACKs the command (if ACK/NAK Handshaking is enabled). These parameters are stored permanently only if the Change Type (bit 3 of the Status byte) is set to 1. If bit 3 is set to 0 the changes are temporary, and are lost when the reader is powered down.

## Parameter Data Values Table

RS232			
DESCRIPTION		PARAMETER	
		Number	Value
Baud rate	300	9C	01
	600	9C	02
	1200	9C	03
	2400	9C	04
	4800	9C	05
	9600	9C	06
	19200	9C	07
Parity	38400	9C	08
	odd	9E	00
	even	9E	01
	mark	9E	02
	space	9E	03
Stop Bits	none	9E	04
	1 Stop Bit	9D	01
ACK/NACK Protocol	2 Stop Bit	9D	02
	disable ACK/NACK	9F	00
Decode Data Packet Format	enable ACK/NACK	9F	01
	Send Raw Decode Data	EE	00
	Send Packeted Decode Data	EE	01
Host Serial Response Timeout (100 ms)		9B	(0-99)*
Inter-character delay (ms)		6E	(0-99)*
Host character Timeout (10 ms)		EF	(1-99)*

POWER SAVE			
DESCRIPTION		PARAMETER	
		Number	Value
Sleep State	disable	80	00
	enable	80	01

READING PARAMETERS			
DESCRIPTION		PARAMETER	
		Number	Value
Beeper Tone	low frequency	91	02
	medium frequency	91	01
	high frequency	91	00
Aiming System (s)		ED	(0-99)*
Beep After Good Decode	enable	38	01
	disable	38	00

\* The value is 1 byte represented in decimal notation.

DATA FORMAT			
DESCRIPTION		PARAMETER	
		Number	Value
Transmit "No Read Message"	enable	5E	01
	disable	5E	00
Transmit Code ID Character	AIM Code ID Character	2D	01
	None	2D	00
Header/Terminators	Scan Header	69	(0-255)*
	Scan Terminator 1	68	(0-255)*
	Scan Terminator 2	6A	(0-255)*
Scan Data Transmission Format	Data as is	EB	00
	<Data>< Terminator 1>	EB	01
	<Data>< Terminator 2>	EB	02
	<Data>< Terminator 1>< Terminator 2>	EB	03
	< Header >< Data >	EB	04
	< Header ><Data>< Terminator 1>	EB	05
	< Header ><Data>< Terminator 2>	EB	06
< Header ><Data>< Terminator 1>< Terminator 2>	EB	07	

DECODING PARAMETERS			
DESCRIPTION		PARAMETER	
		Number	Value
Linear Code type Security Level	Linear Security Level 1	4E	01
	Linear Security Level 2	4E	02
	Linear Security Level 3	4E	03
	Linear Security Level 4	4E	04
Bi-directional Redundancy	enable	43	01
	disable	43	00
Security level	Security level 0	4D	00
	Security level 1	4D	01
	Security level 2	4D	02
	Security level 3	4D	03

CODE SELECTION			
DESCRIPTION		PARAMETER	
		Number	Value
UPC/EAN	UPC A	enable	01
		disable	01
	UPC E	enable	02
		disable	02
	EAN 8	enable	04
		disable	04

\* The value is 1 byte represented in decimal notation.

CODE SELECTION (continued)					
DESCRIPTION			PARAMETER		
			Number	Value	
UPC/EAN	EAN 13	enable		<b>03</b>	<b>01</b>
		disable		<b>03</b>	<b>00</b>
	Decode UPC / EAN Supplementals	Decode UPC / EAN with Supplementals		<b>10</b>	<b>01</b>
		Ignore UPC / EAN with Supplementals		<b>10</b>	<b>00</b>
		Autodiscriminate UPC / EAN Supplementals		<b>10</b>	<b>02</b>
	Decode UPC / EAN with Supplemental redundancy			<b>50</b>	<b>(2-20)*</b>
	Transmit check digit	UPC A	enable	<b>28</b>	<b>01</b>
			disable	<b>28</b>	<b>00</b>
		UPC E	enable	<b>29</b>	<b>01</b>
			disable	<b>29</b>	<b>00</b>
	conversions	UPC E to UPC A	enable	<b>25</b>	<b>01</b>
			disable	<b>25</b>	<b>00</b>
EAN Zero Extend	enable		<b>27</b>	<b>01</b>	
	disable		<b>27</b>	<b>00</b>	
Code 128	Code 128	enable		<b>08</b>	<b>01</b>
		disable		<b>08</b>	<b>00</b>
	UCC/EAN 128	enable		<b>0E</b>	<b>01</b>
		disable		<b>0E</b>	<b>00</b>
	ISBT 128	enable		<b>54</b>	<b>01</b>
disable		<b>54</b>	<b>00</b>		
Code 39	Code 39	enable		<b>00</b>	<b>01</b>
		disable		<b>00</b>	<b>00</b>
	convert	Code 39 to Code 32	enable	<b>56</b>	<b>01</b>
			disable	<b>56</b>	<b>00</b>
	Code 32 Header	enable		<b>E7</b>	<b>01</b>
		disable		<b>E7</b>	<b>00</b>
	Transmit check digit	enable		<b>2B</b>	<b>01</b>
		disable		<b>2B</b>	<b>00</b>
	Verify check digit	enable		<b>30</b>	<b>01</b>
		disable		<b>30</b>	<b>00</b>
	Set Length for code 39	L 1		<b>12</b>	●
		L 2		<b>13</b>	●
Code 39 Full ASCII	enable		<b>11</b>	<b>01</b>	
	disable		<b>11</b>	<b>00</b>	

\* The value is 1 byte represented in decimal notation.

- See [Setting Code Lengths Via Serial Commands](#)



CODE SELECTION (continued)				
DESCRIPTION			PARAMETER	
			Number	Value
Code 93		enable	<b>09</b>	<b>01</b>
		disable	<b>09</b>	<b>00</b>
	Set Length for code 93	L 1	<b>1A</b>	●
		L 2	<b>1B</b>	●
Interleaved 2 of 5		enable	<b>06</b>	<b>01</b>
		disable	<b>06</b>	<b>00</b>
	Transmit check digit	enable	<b>2C</b>	<b>01</b>
		disable	<b>2C</b>	<b>00</b>
	Verify check digit	disable	<b>31</b>	<b>00</b>
		USS check digit	<b>31</b>	<b>01</b>
		OPCC check digit	<b>31</b>	<b>02</b>
	Convert I 2 of 5 to EAN 13	enable	<b>52</b>	<b>01</b>
		disable	<b>52</b>	<b>00</b>
	Set Length for I 2 of 5	L 1	<b>16</b>	●
L 2		<b>17</b>	●	
Discrete 2 of 5		enable	<b>05</b>	<b>01</b>
		disable	<b>05</b>	<b>00</b>
	Set Length for discrete 2 of 5	L 1	<b>14</b>	●
		L 2	<b>15</b>	●
Codabar		enable	<b>07</b>	<b>01</b>
		disable	<b>07</b>	<b>00</b>
	Set Length for Codabar	L 1	<b>18</b>	●
		L 2	<b>19</b>	●
	Transmit Start/Stop character	No transmission	<b>37</b>	<b>01</b>
		Transmission	<b>37</b>	<b>00</b>
MSI		enable	<b>0B</b>	<b>01</b>
		disable	<b>0B</b>	<b>00</b>
	Transmit check digit	enable	<b>2E</b>	<b>01</b>
		disable	<b>2E</b>	<b>00</b>
	MSI check digit	One MSI check digit	<b>32</b>	<b>00</b>
		Two MSI check digit	<b>32</b>	<b>01</b>
	MSI check digit Algorithm	MOD 10 / MOD 11	<b>33</b>	<b>00</b>
		MOD 10 / MOD 10	<b>33</b>	<b>01</b>
	Set Length for MSI	L 1	<b>1E</b>	●
		L 2	<b>1F</b>	●

- See [Setting Code Lengths Via Serial Commands](#)

<b>CODE SELECTION (continued)</b>				
<b>DESCRIPTION</b>			<b>PARAMETER</b>	
			Number	Value
RSS	RSS-14	enable	<b>F052</b>	<b>01</b>
		disable	<b>F052</b>	<b>00</b>
	RSS-Limited	enable	<b>F053</b>	<b>01</b>
		disable	<b>F053</b>	<b>00</b>
	RSS-Expanded	enable	<b>F054</b>	<b>01</b>
		disable	<b>F054</b>	<b>00</b>

## SCAN\_DISABLE

**Description:** Prevent the reader from scanning barcodes

### Packet Format

Length	Opcode	Message Source	Status	Data	Checksum
0X04	0XEA	0X04			

### Field Descriptions

Field Name	Format	Size	Description
<b>Length</b>	Length of message (not including checksum).	1 Byte	Length Field
<b>Opcode</b>	0XEA	1 Byte	Identifies this opcode type.
<b>Message Source</b>	4 = Host	1 Byte	Identifies where the message is coming from.
<b>Status</b>	Bit 0: Retransmit Bit 1-7: Unused	1 Byte	Identifies the transmission status. Unused bits must be set to 0.
<b>Data</b>			None
<b>Checksum</b>	2's complement sum of message contents excluding checksum.	2 Byte	Checksum of message.

### Host Requirements

All scan attempts are disabled by this command until either a SCAN\_ENABLE is sent, or the reader is reset.

### Reader Requirements

When the reader receives this command, it ignores all trigger requests until a SCAN\_ENABLE command is received.

## SCAN\_ENABLE

**Description:** *Permit the reader to scan barcodes*

### Packet Format

Length	Opcode	Message Source	Status	Data	Checksum
0X04	0XE9	0X04			

### Field Descriptions

Field Name	Format	Size	Description
<b>Length</b>	Length of message (not including checksum).	1 Byte	Length Field
<b>Opcode</b>	0XE9	1 Byte	Identifies this opcode type.
<b>Message Source</b>	4 = Host	1 Byte	Identifies where the message is coming from.
<b>Status</b>	Bit 0: Retransmit Bit 1-7: Unused	1 Byte	Identifies the transmission status. Unused bits must be set to 0.
<b>Data</b>			None
<b>Checksum</b>	2's complement sum of message contents excluding checksum.	2 Byte	Checksum of message.

### Host Requirements

The host sends the SCAN\_ENABLE command to enable scanning in the reader. Scanning is enabled upon power-up, so this command need only be sent if a prior SCAN\_DISABLE command was sent.

### Reader Requirements

The reader allows scanning and decoding upon receipt of this command.

**Note:** *At initial power-up, the reader assumes SCAN\_ENABLED.*

## SLEEP

**Description:** Request to place the reader into sleep state

### Packet Format

Length	Opcode	Message Source	Status	Data	Checksum
0X04	0XE8	0X04			

### Field Descriptions

Field Name	Format	Size	Description
<b>Length</b>	Length of message (not including checksum).	1 Byte	Length Field
<b>Opcode</b>	0XE8	1 Byte	Identifies this opcode type.
<b>Message Source</b>	4 = Host	1 Byte	Identifies where the message is coming from.
<b>Status</b>	Bit 0: Retransmit Bit 1-7: Unused	1 Byte	Identifies the transmission status. Unused bits must be set to 0.
<b>Data</b>			None
<b>Checksum</b>	2's complement sum of message contents excluding checksum.	2 Byte	Checksum of message.

### Host Requirements

The host sends this command to place the reader into sleep state. If the sleep state parameter is enabled, the reader goes into sleep state automatically, and the SLEEP command is not necessary.

**Note:** *The reader may not sleep immediately upon acknowledging the command if it is busy processing data.*

### Reader Requirements

None.

## WAKEUP

### ***Description: Wakeup reader after it's been put into sleep state***

If the reader is in sleep state, sending the single character, **NULL** (0x00) wakes up the reader. This character is only needed when hardware handshaking is not used or is bypassed.

### **Host Requirements**

Once the WAKEUP character is sent, the host must wait at least 10 msec, but less than 1 second before sending additional data, since the reader is required to wait 1 second after waking up before going back to sleep (if sleep state is enabled).

### **Reader Requirements**

The reader must not return to sleep state for at least 1 second after waking up.

**Note:** *The mechanism to wake up a reader in this manner also works if characters other than WAKEUP are sent to the reader. There is, however, no guarantee that these commands are interpreted correctly upon power-up. Therefore, it is not recommended that characters other than WAKEUP be used to awaken the reader.*

The WAKEUP character has no effect if sent when the reader is awake. If the host is unsure of the reader state, it can send the wakeup character anytime it wants to communicate with the reader.

## 4.3 SSI TRANSACTIONS

### General Data Transactions

#### ACK/NAK Handshaking

If ACK/NAK handshaking is enabled, all packeted messages must have a CMD\_ACK or CMD\_NAK response, unless the command description states otherwise. This parameter is enabled by default. This handshaking should remain enabled to provide feedback to the host. Raw decode data and WAKEUP do not use ACK/NAK handshaking since they are not packeted data.

Following is an example of a problem that can occur when ACK/NAK handshaking is disabled:

- The host sends a PARAM\_SEND message to the reader to change the baud rate from 9600 to 19200.
- The reader cannot interpret the message.
- The reader does not implement the changes requested by the host.
- The host assumes that the parameter changes have occurred and acts accordingly.
- Communications are lost because the change did not occur on both sides.

If the ACK/NAK handshaking is enabled, the following occurs:

- The host sends a PARAM\_SEND message.
- The reader cannot interpret the message.
- The reader CMD\_NAKs the message.
- The host resends the message.
- The reader receives the message successfully, responds with CMD\_ACK, and implements parameter changes.

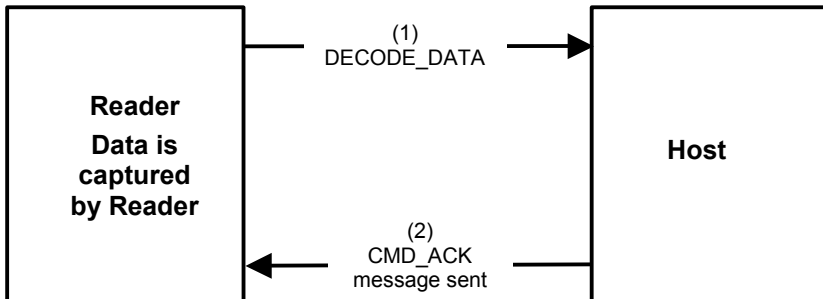
## Transfer of Decode Data

The Decode Data Packet Format parameter controls how decode data is sent to the host. When this parameter is set, the data is sent in a DECODE\_DATA packet. When the parameter is cleared, the data is transmitted as raw ASCII data.

**Note:** *When decode data is transmitted as raw ASCII data, ACK/NAK handshaking does not apply regardless of the state of the ACK/NAK handshaking parameter.*

### ACK/NAK Enabled and Packeted Data

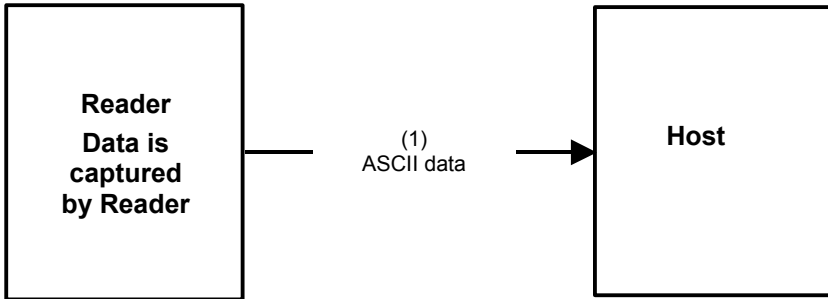
The reader sends a DECODE\_DATA message after a successful decode. The reader waits a programmable timeout for a CMD\_ACK response. If it does not receive the response, the reader tries to send twice more before issuing a host transmission error. If the reader receives a CMD\_NAK from the host, it may attempt a retry depending on the cause field of the CMD\_NAK message.





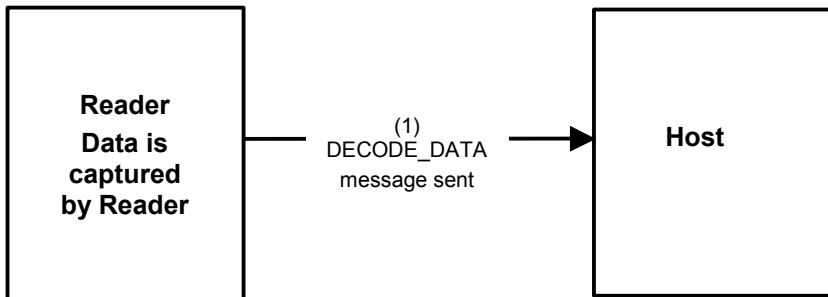
### ACK/NAK Enabled and Unpacketed ASCII Data

Even though ACK/NAK handshaking is enabled, no handshaking occurs because the handshaking applies only to packeted data. In this example the `packeted_decode` parameter is disabled.



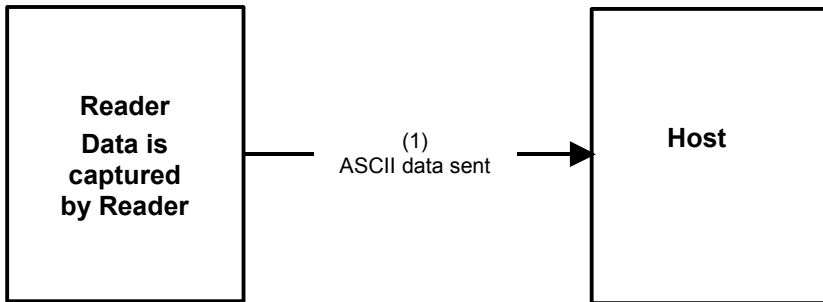
### ACK/NAK Disabled and Packeted DECODE\_DATA

In this example ACK/NAK does not occur even though `packeted_decode` is enabled because the ACK/NAK handshaking parameter is disabled.



## ACK/NAK Disabled and Unpacketed ASCII Data

Data captured by the reader is sent to the host.



## COMMUNICATION SUMMARY

### RTS/CTS Lines

All communication must use RTS/CTS handshaking as described in [Serial Interface Specification](#) in appendix A.

### ACK/NAK Option

ACK/NAK handshaking can be enabled or disabled. This handshaking is enabled by default; disabling this is not recommended as it can lead to communication problems, since handshaking is the only indication that a message was received and if it was received correctly. ACK/NAK is not used with unpacketed decode data regardless of whether or not this option is enabled.

### Number of Data Bits

All communication with the reader must use eight bit data.

### Serial Response Timeout

The Serial Response Timeout parameter determines how long to wait for a handshaking response before trying again, or aborting any further attempts. Both the host and reader should use the same value for this parameter.

**Note:** *A temporary change can be made to the Serial Response Timeout when the host takes longer to process an ACK, or longer data string. Frequent permanent changes are not recommended due to limited write cycles of non-volatile memory.*

### Retries

When sending data, the host should resend twice after the initial send if the reader does not respond with an ACK or NAK (if ACK/NAK handshaking is enabled). If the reader replies with a NAK RESEND, the host resends the data. All resent messages must have the resend bit set in the Status byte. The reader resends data two times after the initial send if the host fails to reply with an ACK or NAK (if ACK/NAK handshaking is enabled).

## Baud Rate, Stop Bits, Parity, Response Timeout, ACK/NAK Handshake

If these serial parameters are changed using PARAM\_SEND, the ACK response to the PARAM\_SEND uses the previous values for these parameters. The new values then take effect for the subsequent transaction.

### Errors

The reader generates a communication error when:

- The CTS line is asserted when the reader tries to transmit, and is still asserted on each of 2 successive retries
- Failure to receive an ACK or NAK after initial transmit and two resends.

### SSI COMMUNICATION NOTES

If hardware handshaking is not used, messages should be spaced sufficiently apart, and the host must not communicate with the reader if the reader is sending.

If hardware handshaking is used, frame each message properly with the handshaking signals. Do not try to send two commands within the same handshaking frame.

There is a permanent/temporary bit in the PARAM\_SEND message. Temporary changes are lost when power is removed from the READER. Permanent changes are written to non-volatile memory. Frequent changes shorten the life of the non-volatile memory.

Do not scan parameter barcodes and send parameters via SSI simultaneously. All parameters can be accessed via SSI, so parameter barcode scanning is not necessary.

### Host Interruption

The host can interrupt reader transmission by asserting host RTS. The reader must detect this, halt transmission, and assert reader RTS (host CTS).

If the host does not transmit at least one byte before de-asserting host RTS the reader does not detect a transmission (and de-assert to the reader RTS). The reader resumes the transmission (from where it left off) with the next byte.

If the host transmits (at least one byte) before deasserting host RTS the reader detects the transmission and does not resume transmission. When the host deasserts host RTS, the reader begins re-transmitting the data from the beginning.

## 5 TECHNICAL FEATURES

### 5.1 DRAGON™ D

<b>Electrical Features</b>	
Power supply	4 to 20 Vdc
Consumption	
@ 4V	250 mA
@ 5V	180 mA
@ 20 V	50 mA
<b>Laser Features</b>	
Power (max) in mW	1.3 mW
Scan Angle	13.5° ± 0.7
Laser Safety Class (EN 60825-1 / CDRH)	2
Resolution maximum	
mm	0.19
mils	7.5
PCS minimum (Datalogic Test Chart)	25%
Indicators	Laser On LED (red)
	Good read LED (green)
	Beeper
<b>Environmental Features</b>	
Working Temperature (°C)	-30 to +50
Storage Temperature (°C)	-30 to +70
Humidity	90% non condensing
Drop resistance	IEC 68-2-32 Test ED
Protection	sealed against rain and dust
<b>Mechanical Features</b>	
Weight (without cable)	about 270 g.
Cable length	2 m

## 5.2 STATUS INDICATORS

The reader has two indicator LEDs and a Beeper. They signal several operating conditions which are described in the tables below.

### DRAGON™ D151 READER CONFIGURATION

Beeper	Meaning
H L H L	Good read of a complete command
H L	Good read of a partial command
L H	Cancel or error

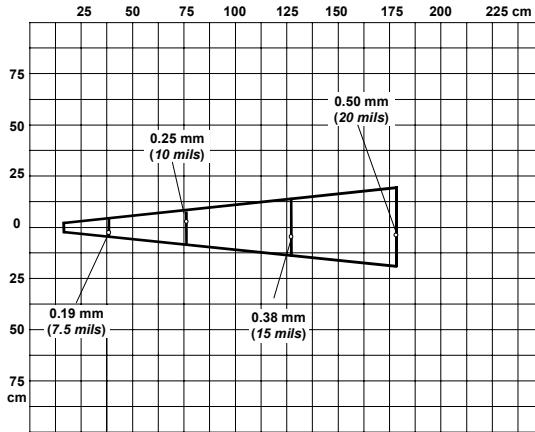
### DRAGON™ D151 READER DATA ENTRY

Beeper	Red LED	Green LED	Meaning
	ON		Laser ON
H <sup>1</sup>		ON	Correct read of a code
L L L long			Timeout expired
		OFF	Ready to read a code

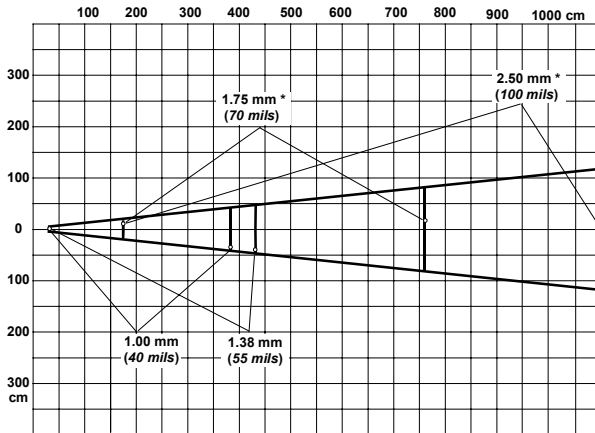
<sup>1</sup> The data entry good read tone is user-configurable.

### 5.3 READING DIAGRAMS

**DRAGON™ D151 – High Density Codes**



**DRAGON™ D151 – Low Density Codes**



\* on reflective labels.

# A SERIAL INTERFACE SPECIFICATION

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## PURPOSE

The Serial Interface Specification (SIF) describes the requirements that two digital systems must meet to exchange asynchronous serial data. SIF deals only with the physical flow control and asynchronous serial transmission of data between two digital systems. This specification does not impose any requirements on how the data is packaged and the number of characters exchanged.

SIF data exchange generates errors under certain conditions but does not specify the actions to take to correct the error. This is the responsibility of the software/hardware layer above SIF.

## TERMS AND DEFINITIONS

### Systems

Unless otherwise noted, the systems described in this specification are digital systems.

### Inactive

Each system interprets what physical quantity represents inactive. To communicate, two systems must have the same interpretation of inactive.

### The Reader and the Host

The two systems described in this specification are the reader and the host. Only one host is allowed to exist at any time.

### A Character

This chapter uses the term *character* to generalize a unit piece of information. This unit could be in bit, byte, word, etc.

### Data

*Data* refers to a group of characters.



## COMMON ATTRIBUTES

This section describes requirements common to the reader and the host.

**Note:** *SIF is a half-duplex communication protocol. To maintain proper communication, the requirements in this section must be met.*

All SIF systems have four signal lines. Two are for handshaking and two are for transmitting and receiving serial data.

Many communications packages do not properly use the handshaking lines for half duplex communications. If using a PC communications package such as Windows Terminal, verify that the terminal RTS line (CTS reader's line) is active or disconnect the reader RTS/CTS lines. In this case, connect the PC (Host) RTS/CTS lines together.

The [Reader Signal Lines Table](#) lists the reader's signal lines, and the [Host Signal Lines Table](#) lists the host's signal lines.

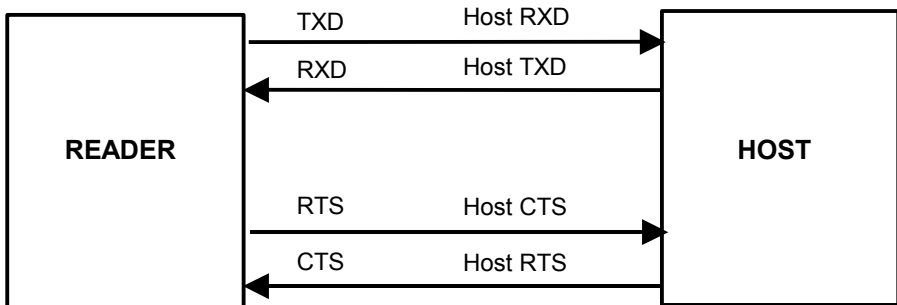
### Reader Signal Lines Table

<b>TXD</b>	Serial data transmit output. Drives the serial data receive input of the host.
<b>RXD</b>	Serial data receive input. Driven by the serial data transmit output of the host.
<b>RTS</b>	Request-to-send handshaking line (output).
<b>CTS</b>	Clear-to-send handshaking line (input).

## Host Signal Lines Table

<b>HOST RXD</b>	Serial data receive input. Driven by the serial data transmit output of the reader.
<b>HOST TXD</b>	Serial data transmit output. Drives the serial data receive input of the reader.
<b>HOST CTS</b>	Reader transmit request (input).
<b>HOST RTS</b>	Reader transmit request granted (output)

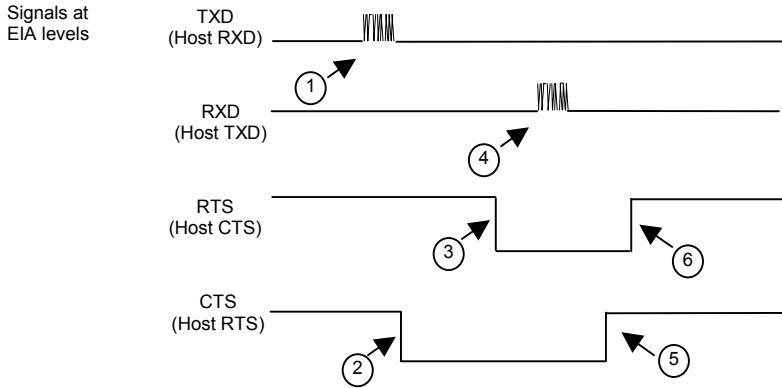
The figure below shows the reader and host signal relationships.



**Reader and Host Signals**

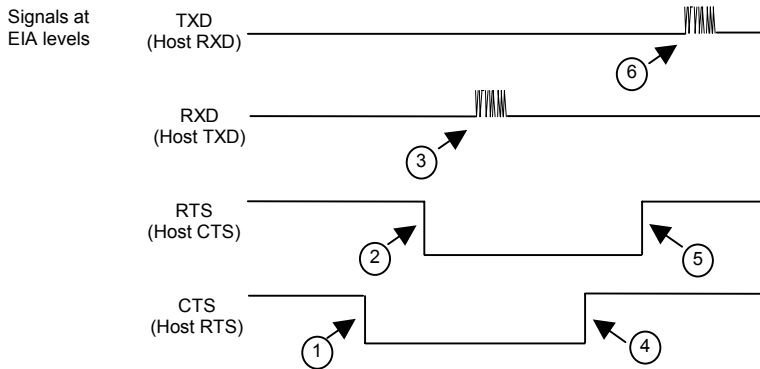
## TRANSACTION EXAMPLES

Transaction examples are shown in the following figures.



1. Reader data
2. Host requests to send
3. Reader grants permission
4. ACK response
5. Host removes request
6. Reader removes permission

### Basic Reader Initiated Transaction



1. Host requests to send
2. Reader grants permission
3. Command sent
4. Host removes request
5. Reader removes permission
6. Reader ACKs

### Basic Host Initiated Transaction

## B MISCELLANEOUS CODE INFORMATION

### AIM CODE IDENTIFIERS

CODE	AIM STANDARD
2/5 interleaved	] I y
2/5 discrete	] S y
EAN 8	] E 4
EAN 13	] E 0
UPC A	] X y
UPC E	] X y
EAN 8 with 2 ADD ON	] E 5
EAN 8 with 5 ADD ON	] E 6
EAN 13 with 2 ADD ON	] E 1
EAN 13 with 5 ADD ON	] E 2
UPC A with 2 ADD ON	] X y
UPC A with 5 ADD ON	] X y
UPC E with 2 ADD ON	] X y
UPC E with 5 ADD ON	] X y
Code 39	] A y
CODABAR	] F y
Code 128	] C y
EAN 128	] C y
Code 93	] G y
MSI	] M y
RSS Expanded	] e 0
RSS Limited	] e 0
RSS 14	] e 0

## SETTING CODE LENGTHS VIA SERIAL COMMANDS

There are two lengths (L1 and L2) for each variable length code type. See the individual code types in the [Parameter Data Values Table](#) in chapter 4, for the L1 and L2 parameter numbers.

Depending on the selected option, the reader will decode:

- One discrete length barcode
- Two discrete length barcodes
- Barcodes within a range of lengths
- Any length of barcodes.

The table below lists the requirements for each option.

### Setting Variable Code Lengths Table

Code length option	L1 value	L2 value
One discrete length will be decoded	Discrete length to decode	0x00
Two discrete lengths will be decoded	Higher length value	Lower length value
Lengths within a range will be decoded	Lower length value	Higher length value
Any length barcode will be decoded	0x00	0x00

## SETTING HEADERS AND TERMINATORS VIA SERIAL COMMANDS

To append a header and Terminators to the decode data:

1. Set the Scan Data Transmission Format (parameter 0xE2) to the desired option.
2. Enter the required value(s) for Header (0x68), Terminator1 (0x69) or Terminator2 (0x6A) using the hex values for the desired ASCII value from the [Character Equivalents Table](#).

### Character Equivalents Table

Scan Value	Hex Value	ASCII Char.
1000	00h	NUL
1001	01h	SOH
1002	02h	STX
1003	03h	ETX
1004	04h	EOT
1005	05h	ENQ
1006	06h	ACK
1007	07h	BEL
1008	08h	BS
1009	09h	HT
1010	0Ah	LF
1011	0Bh	VT
1012	0Ch	FF
1013	0Dh	CR
1014	0Eh	SO
1015	0Fh	SI
1016	10h	DLE
1017	11h	DC1
1018	12h	DC2
1019	13h	DC3
1020	14h	DC4
1021	15h	NAK
1022	16h	SYN
1023	17h	ETB
1024	18h	CAN
1025	19h	EM
1026	1Ah	SUB
1027	1Bh	ESC
1028	1Ch	FS
1029	1Dh	GS

Scan Value	Hex Value	ASCII Char.
1030	1Eh	RS
1031	1Fh	US
1032	20h	SPACE
1033	21h	!
1034	22h	"
1035	23h	#
1036	24h	\$
1037	25h	%
1038	26h	&
1039	27h	'
1040	28h	(
1041	29h	)
1042	2Ah	*
1043	2Bh	+
1044	2Ch	,
1045	2Dh	-
1046	2Eh	.
1047	2Fh	/
1048	30h	0
1049	31h	1
1050	32h	2
1051	33h	3
1052	34h	4
1053	35h	5
1054	36h	6
1055	37h	7
1056	38h	8
1057	39h	9
1058	3Ah	:
1059	3Bh	;
1060	3Ch	<
1061	3Dh	=
1062	3Eh	>
1063	3Fh	?
1064	40h	@
1065	41h	A
1066	42h	B
1067	43h	C
1068	44h	D
1069	45h	E



Scan Value	Hex Value	ASCII Char.
1070	46h	F
1071	47h	G
1072	48h	H
1073	49h	I
1074	4Ah	J
1075	4Bh	K
1076	4Ch	L
1077	4Dh	M
1078	4Eh	N
1079	4Fh	O
1080	50h	P
1081	51h	Q
1082	52h	R
1083	53h	S
1084	54h	T
1085	55h	U
1086	56h	V
1087	57h	W
1088	58h	X
1089	59h	Y
1090	5Ah	Z
1091	5Bh	[
1092	5Ch	\
1093	5Dh	]
1094	5Eh	^
1095	5Fh	_
1096	60h	`
1097	61h	a
1098	62h	b
1099	63h	c
1100	64h	d
1101	65h	e
1102	66h	f
1103	67h	g
1104	68h	h
1105	69h	i
1106	6Ah	j
1107	6Bh	k
1108	6Ch	l
1109	6Dh	m
1110	6Eh	n

Scan Value	Hex Value	ASCII Char.
1111	6Fh	o
1112	70h	p
1113	71h	q
1114	72h	r
1115	73h	s
1116	74h	t
1117	75h	u
1118	76h	v
1119	77h	w
1120	78h	x
1121	79h	y
1122	7Ah	z
1123	7Bh	{
1124	7Ch	
1125	7Dh	}
1126	7Eh	~
1127	7Fh	DEL

Values from 1128 through 1255 (hex values 80h through FFh for SSI) may also be set. Conversion of these characters to printable characters is not standardized, therefore they are not included in the table.

## C NUMERIC BARCODES

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For parameters requiring specific numeric values, scan the appropriately numbered barcode(s).



0



1



2



3



4



5



6



7



8



9

**Cancel**

To change the selection or cancel an incorrect entry, scan the barcode below.

**CANCEL**