NLS-EM3095

Embedded 2D Barcode Scan Engine

User Guide

Disclaimer

Please read through the manual carefully before using the product and operate it according to the manual. It is advised that you should keep this manual for future reference.

Do not disassemble the device or remove the seal label from the device. Otherwise, Fujian Newland Auto-ID Tech. Co., Ltd. does not assume responsibility for the warranty or replacement.

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Revision History

Version	Description	Date
V1.0.0	Initial release.	November 20, 2013

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Chapter 1 Getting Started

Introduction

The NLS-EM3095 embedded 2D barcode scan engine, armed with the Newland patented UIMG®, a computerized image recognition system, brings about a new era of 2D barcode scan engines.

The EM3095 ingeniously blends 2D barcode decoder chip UIMG® technology and advanced chip design & manufacturing, which significantly simplifies application design and delivers superior performance and solid reliability with low power consumption.

The EM3095 supports all mainstream 1D as well as PDF417, QR Code (QR1、QR2、Micro QR), Data Matrix and GS1-DataBarTM(RSS) (RSS-Limited, RSS-14, RSS-14 Stacked and RSS-Expand).

The EM3095 can read barcodes on virtually any medium - paper, plastic card, mobile phones and LCD displays. It provides an ideal solution for both emerging mobile phone-based barcode applications, like coupons, e-tickets and boarding passes, and traditional applications.

This compact engine weighs only 4.4 grams and fits easily into even the most space-constrained equipments such as data collectors, meter readers, ticket validators and PDAs. Moreover, the instant power on/off feature along with ultra low power consumption brings greater efficiency and convenience in barcode scanning.

About This Guide

This guide provides programming instructions for the EM3095. Users can configure the EM3095 by scanning the programming barcodes included in this manual.

The EM3095 has been properly configured for most applications and can be put into use without further configuration. Users may check the ***Factory Defaults Table*** in Appendix for reference. Throughout the manual, programming barcodes marked with asterisks (**) are factory default values.

Connecting EVK and PC

The EVK tool is provided to assist users in application development for the EM3095. The EM3095 can be connected to the EVK via a 12-pin flat flexible cable. Either USB connection or RS-232 connection can be used when connecting the EVK to PC. A driver is required if EVK wants to communicate with EM3095 and receive decoded data through USB COM port.

Barcode Scanning

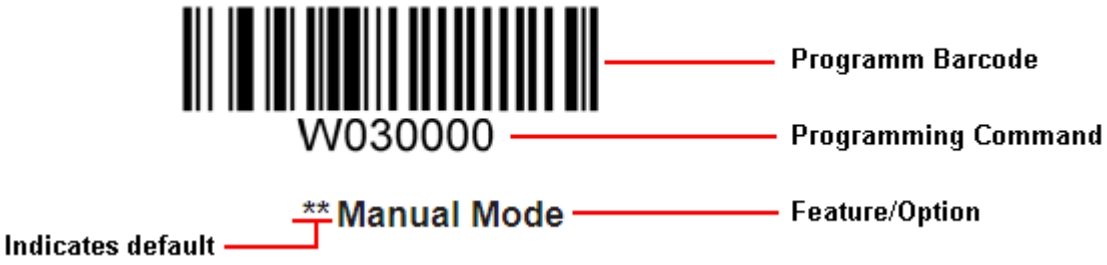
Powered by area-imaging technology and Newland patented UIMG® technology, the EM3095 features fast scanning and accurate decoding. Barcodes rotated at any angle can still be read with ease. When scanning a barcode, simply center the aiming pattern projected by the EM3095 over the barcode.

Configuring the EM3095

There are two ways to configure the engine: barcode programming and command programming.

Barcode Programming

The EM3095 can be configured by scanning programming barcodes. All user programmable features/options are described along with their programming barcodes/commands in the following sections.



Command Programming

Besides the barcode programming method, the EM3095 can also be configured by serial commands sent from the host device. Note that communication parameters on the engine and the host must match so that two devices can communicate with each other. The default settings of the engine are 9600bps, no parity check, 8 data bits, 1 stop bit, and no flow control. The engine uses 8-bit registers.

Read Register

The read command is used to read the contents of 1 to 256 contiguous registers in the engine.

Syntax: {Prefix1} {Types} {Lens} {Address} {Datas} {FCS}

Prefix1 : 0x7E 0x00

Types : 0x07

Lens : 0x01

Address: 0x0000~0x00FF, starting register address.

Datas : 0x00~0xFF, number of registers to be read. When Datas=0x00, 256 contiguous registers are to be read.

FCS : CRC-CCITT checksum, 2 bytes.

Computation sequence: Types+ Lens+Address+Datas;
polynomial: $X^{16}+X^{12}+X^{5}+1$ (0x1021), initial value: 0x0000.

The following C language program is provided for reference.

```
unsigned int crc_cal_by_bit(unsigned char* ptr, unsigned int len)
{
unsigned int crc = 0;
while(len-- != 0)
{
for(unsigned char i = 0x80; i != 0; i /= 2)
{
crc *= 2;
if((crc&0x10000) !=0)
crc ^= 0x11021;
if((*ptr&i) != 0)
crc ^= 0x1021;
}
ptr++;
}
return crc;
}
```

Reply: {Prefix2} {Types} {Lens} {Datas} {FCS}

1) Success message:

Prefix2 : 0x02 0x00

Types : 0x00 (success)

Lens : The number of data returned. If Lens=0x00, that means values of 256 contiguous registers are returned.

Datas : 0x00~0xFF, data that are returned.

FCS : CRC-CCITT checksum.

2) CRC check failure message:

Prefix2 : 0x02 0x00

Types : 0x01 (CRC check failure)

Lens : 0x01

Datas : 0x00

FCS : CRC-CCITT checksum (0x04 0x01)

3) Invalid command message:

Prefix2 : 0x02 0x00

Types : 0x03 (invalid command)

Lens : 0x01

Datas : 0x00

FCS : CRC-CCITT checksum (0x6A 0x61)

Example:

Read the content (0x3E) of register 0x000A

1) Read operation succeeds:

Command sent: 0x7E 0x00 0x07 0x01 0x00 0x0A 0x01 0xEE 0x8A

Message received: 0x02 0x00 0x00 0x01 0x3E 0xE4 0xAC

2) CRC check fails:

Command sent: 0x7E 0x00 0x07 0x01 0x00 0x0A 0x01 0x11 0x22

Message received: 0x02 0x00 0x01 0x01 0x00 0x04 0x01

3) Situations that may cause the engine to respond with an invalid command message: Command sent is shorter than the required length, or the third byte is not sent out within 400ms after the first two bytes “0x7e 0x00” are sent

Command sent: 0x7E 0x00 0x07 0x01 0x00 0x0A 0x01

Message received:0x02 0x00 0x03 0x01 0x00 0x6A 0x61

Write Register

The write command is used to write contiguous registers (1 to 256 registers) in the engine.

Syntax: {Prefix1} {Types} {Lens} {Address} {Datas} {FCS}

Prefix1 : 0x7E 0x00 (2 bytes)

Types : 0x08 (1 byte)

Lens : 0x00~0xFF (1 byte), byte count, i.e. number of registers written. When Lens=0x00, 256 contiguous registers are to be written.

Address : 0x0000~0xFFFF (2 bytes), starting register address.

Datas : 0x00~0xFF (1~256 bytes), data to be written into the register(s)

FCS : CRC-CCITT checksum, 2 bytes.

Computation sequence: Types+ Lens+Address+Datas; polynomial: $X^{16}+X^{12}+X^5+1$ (0x1021), initial value: 0x0000.

The following C language program is provided for reference.

```
unsigned int crc_cal_by_bit(unsigned char* ptr, unsigned int len)
{
unsigned int crc = 0;
while(len-- != 0)
{
for(unsigned char i = 0x80; i != 0; i /= 2)
{
crc *= 2;
if((crc&0x10000) !=0)
crc ^= 0x11021;
if((*ptr&i) != 0)
crc ^= 0x1021;
}
ptr++;
}
return crc;
}
```

Reply: {Prefix2} {Types} {Lens} {Datas} {FCS}

1) Success message:

Prefix2 : 0x02 0x00

Types : 0x00 (success)

Lens : 0x01

Datas : 0x00

FCS : CRC-CCITT checksum (0x33 0x31)

2) CRC check failure message:

Prefix2 : 0x02 0x00

Types : 0x01 (CRC check failure)

Lens : 0x01

Datas : 0x00

FCS : CRC-CCITT checksum (0x04 0x01)

3) Invalid command message:

Prefix2 : 0x02 0x00

Types : 0x03 (invalid command)

Lens : 0x01

Datas : 0x00

FCS : CRC-CCITT checksum (0x6A 0x61)

Example:

Write 0x3E into register 0x000A

1) Write operation succeeds:

Command sent: 0x7E 0x00 0x08 0x01 0x00 0x0A 0x3E 0x4C 0xCF

Message received: 0x02 0x00 0x00 0x01 0x00 0x33 0x31

2) CRC check fails:

Command sent: 0x7E 0x00 0x08 0x01 0x00 0x0A 0x3E 0x11 0x22

Message received: 0x02 0x00 0x01 0x01 0x00 0x04 0x01

3) Situations that may cause the engine to respond with an invalid command message: Command sent is shorter than the required length, or the third byte is not sent out within 400ms after the first two bytes “0x7e 0x00” are sent

Command sent: 0x7E 0x00 0x08 0x01 0x00 0x0A 0x3E

Message received: 0x02 0x00 0x03 0x01 0x00 0x6A 0x61

Save Register Data in EEPROM

The save command is used to save register data into an external EEPROM.

Syntax: {Prefix1} {Types} {Lens} {Address} {Datas} {FCS}

Prefix1 : 0x7E 0x00

Types : 0x09

Lens : 0x01

Address: 0x0000

Datas : 0x00

FCS : CRC-CCITT checksum (0xDE 0xC8)

Reply: {Prefix2} {Types} {Lens} {Datas} {FCS}

1) Success message:

Prefix2 : 0x02 0x00

Types : 0x00 (success)

Lens : 0x01

Datas : 0x00

FCS : CRC-CCITT checksum (0x33 0x31)

2) CRC check failure message:

Prefix2 : 0x02 0x00

Types : 0x01 (CRC check failure)

Lens : 0x01

Datas : 0x00

FCS : CRC-CCITT checksum (0x04 0x01)

3) Invalid command message:

Prefix2 : 0x02 0x00

Types : 0x03 (invalid command)

Lens : 0x01

Datas : 0x00

FCS : CRC-CCITT checksum (0x6A 0x61)

Relationship between Programming Command and Serial Command

1. Program general parameter with serial command

A programming command (i.e. the characters under programming barcode) contains 7 characters. The function of each character is described in the table below.

1st Char	2nd Char ~3rd Char	4th Char~5th Char	6th Char~7th Char	Remark
CMD	BITPOSITION	ADDR	DATA	
"W"	"00"~"FF"	"00"~"FF"	"00"~"FF"	Write a value (DATA) to the specified bits (BITPOSITION) of the register (ADDR).

Note:1. **CMD**: Command type.

2. **ADDR**: Address of register to be written.

3. **BITPOSITION**: Bit(s) the value is written to. For example, if only bit 3 is to be written, the BITPOSITION should be "08"; if all bits are to be written, the BITPOSITION should be "FF".

4. **DATA**: Value written to the BITPOSITION.

The **ADDR** and **DATA** in programming command correspond to **Address** and **Datas** in serial command, respectively:

1) If BITPOSITION="FF", the values of ADDR and DATA can be used directly in the write command.

e.g., programming command: WFFD9D8 (write value 0xD8 to register 0x00D9)

serial command sent : 0x7E 0x00 0x08 0x01 0x00 0xD9 0xD8 0x91 0x53

reply received : 0x02 0x00 0x00 0x01 0x00 0x33 0x31

2) If BITPOSITION≠"FF", users need to read the register content, calculate the value (Datas) and then write the value into the register, as shown in the following example.

e.g., programming command: W030002 (write value 0x02 to bit1and bit0 of register 0x0000)

Step 1: Read the content of register 0x0000.

serial command sent : 0x7E 0x00 0x07 0x01 0x00 0x00 0x01 0x01 0x41

reply received : 0x02 0x00 0x00 0x01 0xD4 0xB8 0xC8

Step 2: Calculate the value written to the register.

Datas = (0xD4 & (! 0x03)) + 0x02 = 0xD5

Step 3: Write the value into the register.

serial command sent : 0x7E 0x00 0x08 0x01 0x00 0x00 0xD5 0xEF 0x41

reply received : 0x02 0x00 0x00 0x01 0x00 0x33 0x31

2. Program special parameter with serial command

The serial commands used for programming the following parameters are practically irrelevant to their programming commands.

Feature	Serial Command
Program the sensitivity level	**0x7E 0x00 0x08 0x01 0x00 0x03 0xTT 0xSS 0xSS**
Program the image stabilization timeout	**0x7E 0x00 0x08 0x01 0x00 0x04 0xTT 0xSS 0xSS**
Program the timeout between decodes	**0x7E 0x00 0x08 0x01 0x00 0x05 0xTT 0xSS 0xSS**
Program the decode session timeout	**0x7E 0x00 0x08 0x01 0x00 0x06 0xTT 0xSS 0xSS**

Note: Red: Address of register.
Blue: Value written to register. For example, to set the sensitivity level to 10, 0xTT should be 0x0A.
Pink: CRC checksum calculated.

3. Save register data in EEPROM

Scanning a programming barcode can change register value and save register data in EEPROM as well. As for command programming, it requires a write command and a save command to perform these two tasks. To save register data in an external EEPROM, users need to send the save command to the engine.

save command sent: 0x7E 0x00 0x09 0x01 0x00 0x00 0xDE 0xC8

reply received : 0x02 0x00 0x00 0x01 0x00 0x33 0x31

Registers

Register	*0x0000*
Bit	**Feature**
Bit 7	1: Good read LED on 0: Good read LED off
Bit 6	1: Disable the mute mode 0: Enable the mute mode
Bit 5-4	Aiming: 00: OFF 01: Normal 10/11: Always ON
Bit 3-2	Illumination: 00: OFF 01: Normal 10/11: Always ON
Bit 1-0	Scan Mode: 00: Manual Mode 01: Command Trigger Mode 10: Continuous Mode 11: Sense Mode
Register	*0x0002*
Bit	**Feature**
Bit 7	1: Enable CODE ID prefix for all symbologies 0: Disable CODE ID prefix for all symbologies
Bit 6	1: Enable decode result notification 0: Disable decode result notification
Bit 5	Reserved
Bit 4	1: Video reverse ON 0: Video reverse OFF
Bit 3-0	Reserved
Register	*0x0004*
Bit	**Feature**
Bit 7-0	Image Stabilization Timeout: 0x00-0xFF: 0.0-25.5s
Register	*0x0005*
Bit	**Feature**
Bit 7-0	Timeout between Decodes: 0x00-0xFF: 0.0-25.5s
Register	*0x0006*
Bit	**Feature**
Bit 7-0	Decode Session Timeout: 0x00-0xFF: 0.0-25.5s

Register	*0x0009*		
Bit	**Feature**		
Bit 7-0	Good Read Beep Frequency 0xDA: Low	0x4B: Medium	0x25: High
Register	*0x000A*		
Bit	**Feature**		
Bit 7-0	Good Read Beep Duration 0x1F: 40ms	0x3E: 80ms	0x5D: 120ms
Register	*0x000C*		
Bit	**Feature**		
Bit 7-4	Reserved		
Bit 3	1: Enable Data Matrix	0: Disable Data Matrix	
Bit 2	1: Enable 1D symbologies	0: Disable 1D symbologies	
Bit 1	1: Enable AIM ID prefix for PDF417	0: Disable AIM ID prefix for PDF417	
Bit 0	1: Enable PDF417	0: Disable PDF417	
Register	*0x000D*		
Bit	**Feature**		
Bit 7	1: Enable QR Code	0: Disable QR Code	
Bit 6-2	Reserved		
Bit 1-0	00: USB DATAPIPE	01: USB HID-KBW	
	10: USB COM Port Emulation	11: HID-POS	
Register	*0x000E*		
Bit	**Feature**		
Bit 7-4	Reserved		
Bit 3	1: Beep on unknown character	0: Do not beep on unknown character	
Bit 2	1: Good read beep on	0: Good read beep off	
Bit 1-0	Reserved		

Register	*0x0010*
Bit	**Feature**
Bit 7-5	Reserved
Bit 4-3	00: Disable AIM ID prefix for 1D symbologies 01: Allow to enable/disable AIM ID prefix for individual 1D symbology 10/11: Enable AIM ID prefix for 1D symbologies
Bit 2-0	Reserved
Register	*0x0011*
Bit	**Feature**
Bit 7	1: Enable AIM ID prefix for ISSN 0: Disable AIM ID prefix for ISSN Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 6	1: Enable ISSN 0: Disable ISSN
Bit 5	1: Enable EAN-13 5-digit add-on code 0: Disable EAN-13 5-digit add-on code
Bit 4	1: Enable EAN-13 2-digit add-on code 0: Disable EAN-13 2-digit add-on code
Bit 3	1: EAN-13 add-on code required 0: EAN-13 add-on code not required
Bit 2	1: Transmit EAN-13 check digit 0: Do not transmit EAN-13 check digit
Bit 1	1: Enable AIM ID prefix for EAN-13 0: Disable AIM ID prefix for EAN-13 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable EAN-13 0: Disable EAN-13
Register	*0x0012*
Bit	**Feature**
Bit 7	Reserved
Bit 6	1: Transmit Code 93 check digit 0: Do not transmit Code 93 check digit Note: Code 93 check digit verification must be enabled for this parameter to function.
Bit 5	1: Enable Code 93 check digit 0: Disable Code 93 check digit
Bit 4	1: Enable AIM ID prefix for Code 93 0: Disable AIM ID prefix for Code 93 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 3	1: Enable Code 93 0: Disable Code 93
Bit 2	ISBN Format 1: ISBN-10 0: ISBN-13
Bit 1	1: Enable AIM ID prefix for ISBN 0: Disable AIM ID prefix for ISBN Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable ISBN 0: Disable ISBN

Register	*0x0013*	
Bit	**Feature**	
Bit 7	Reserved	
Bit 6	1: Enable EAN-8 zero extend	0: Disable EAN-8 zero extend
Bit 5	1: Enable EAN-8 5-digit add-on code	0: Disable EAN-8 5-digit add-on code
Bit 4	1: Enable EAN-8 2-digit add-on code	0: Disable EAN-8 2-digit add-on code
Bit 3	1: EAN-8 add-on code required	0: EAN-8 add-on code not required
Bit 2	1: Transmit EAN-8 check digit	0: Do not transmit EAN-8 check digit
Bit 1	1: Enable AIM ID prefix for EAN-8 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.	0: Disable AIM ID prefix for EAN-8
Bit 0	1: Enable EAN-8	0: Disable EAN-8
Register	*0x0014*	
Bit	**Feature**	
Bit 7	Reserved	
Bit 6	1: Enable UPC-E 5-digit add-on code	0: Disable UPC-E 5-digit add-on code
Bit 5	1: Enable UPC-E 2-digit add-on code	0: Disable UPC-E 2-digit add-on code
Bit 4	1: UPC-E add-on code required	0: UPC-E add-on code not required
Bit 3	1: Transmit UPC-E system character	0: Do not transmit UPC-E system character
Bit 2	1: Transmit UPC-E check digit	0: Do not transmit UPC-E check digit
Bit 1	1: Enable AIM ID prefix for UPC-E Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.	0: Disable AIM ID prefix for UPC-E
Bit 0	1: Enable UPC-E	0: Disable UPC-E
Register	*0x0015*	
Bit	**Feature**	
Bit 7	1: Enable UPC-E extend	0: Disable UPC-E extend
Bit 6	1: Enable UPC-A 5-digit add-on code	0: Disable UPC-A 5-digit add-on code
Bit 5	1: Enable UPC-A 2-digit add-on code	0: Disable UPC-A 2-digit add-on code
Bit 4	1: UPC-A add-on code required	0: UPC-A add-on code not required
Bit 3	1: Transmit UPC-A preamble character	0: Do not transmit UPC-A preamble character
Bit 2	1: Transmit UPC-A check digit	0: Do not transmit UPC-Acheck digit
Bit 1	1: Enable AIM ID prefix for UPC-A Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.	0: Disable AIM ID prefix for UPC-A
Bit 0	1: Enable UPC-A	0: Disable UPC-A

Register	*0x0016*
Bit	**Feature**
Bit 7	1: Transmit AIM 128 check digit in the format of “~nnn” (nnn: ASCII decimal value of check digit) 0: Do not transmit AIM 128 check digit
Bit 6	1: FNC1 character in AIM 128 transmitted as “~” (ASCII value: 126) 0: FNC1 character in AIM 128 transmitted as GS (ASCII value: 29)
Bit 5	1: Enable AIM ID prefix for AIM 128 0: Disable AIM ID prefix for AIM 128 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 4	1: Enable AIM 128 0: Disable AIM 128
Bit 3	1: Transmit Code 128 check digit in the format of “~nnn” (nnn: ASCII decimal value of check digit) 0: Do not transmit Code 128 check digit
Bit 2	1: FNC1 character in Code 128 transmitted as “~” (ASCII value: 126) 0: FNC1 character in Code 128 transmitted as GS (ASCII value: 29)
Bit 1	1: Enable AIM ID prefix for Code 128 0: Disable AIM ID prefix for Code 128 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable Code 128 0: Disable Code 128
Register	*0x0017*
Bit	**Feature**
Bit 7	Reserved
Bit 6	1: Transmit programming barcode data (FNC3 Code 128) 0: Do not transmit programming barcode data (FNC3 Code 128)
Bit 5	1: Enable AIM ID prefix for FNC3 Code 128 0: Disable AIM ID prefix for FNC3 Code 128 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 4	1: Enable FNC3 Code 128 0: Disable FNC3 Code 128
Bit 3	1: Transmit UCC/EAN-128 check digit in the format of “~nnn” (nnn: ASCII decimal value of check digit) 0: Do not transmit UCC/EAN-128 check digit
Bit 2	1: FNC1 character in UCC/EAN-128 transmitted as “~” (ASCII value: 126) 0: FNC1 character in UCC/EAN-128 transmitted as GS (ASCII value: 29)
Bit 1	1: Enable AIM ID prefix for UCC/EAN-128 0: Disable AIM ID prefix for UCC/EAN-128 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable UCC/EAN-128 0: Disable UCC/EAN-128

Register	*0x0018*
Bit	**Feature**
Bit 7	1: Transmit ITF-14 check digit 0: Do not transmit ITF-14 check digit
Bit 6	1: Enable AIM ID prefix for ITF-14 0: Disable AIM ID prefix for ITF-14 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 5	1: Enable ITF-14 0: Disable ITF-14
Bit 4	1: Transmit appended “0” of Interleaved 2 of 5 0: Do not transmit appended “0” of Interleaved 2 of 5
Bit 3	1: Transmit Interleaved 2 of 5 check digit 0: Do not transmit Interleaved 2 of 5 check digit Note: Interleaved 2 of 5 check digit verification must be enabled for this parameter to function.
Bit 2	1: Enable Interleaved 2 of 5 check digit 0: Disable Interleaved 2 of 5 check digit
Bit 1	1: Enable AIM ID prefix for Interleaved 2 of 5 0: Disable AIM ID prefix for Interleaved 2 of 5 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable Interleaved 2 of 5 0: Disable Interleaved 2 of 5
Register	*0x0019*
Bit	**Feature**
Bit 7	Reserved
Bit 6	1: Transmit Industrial 2 of 5 check digit 0: Do not transmit Industrial 2 of 5 check digit Note: Industrial 2 of 5 check digit verification must be enabled for this parameter to function.
Bit 5	1: Enable Industrial 2 of 5 check digit 0: Disable Industrial 2 of 5 check digit
Bit 4	1: Enable AIM ID prefix for Industrial 2 of 5 0: Disable AIM ID prefix for Industrial 2 of 5 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 3	1: Enable Industrial 2 of 5 0: Disable Industrial 2 of 5
Bit 2	1: Transmit ITF-6 check digit 0: Do not transmit ITF-6 check digit
Bit 1	1: Enable AIM ID prefix for ITF-6 0: Disable AIM ID prefix for ITF-6 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable ITF-6 0: Disable ITF-6

Register	*0x001A*
Bit	**Feature**
Bit 7	1: Transmit Standard 2 of 5 check digit 0: Do not transmit Standard 2 of 5 check digit Note: Standard 2 of 5 check digit verification must be enabled for this parameter to function.
Bit 6	1: Enable Standard 2 of 5 check digit 0: Disable Standard 2 of 5 check digit
Bit 5	1: Enable AIM ID prefix for Standard 2 of 5 0: Disable AIM ID prefix for Standard 2 of 5 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 4	1: Enable Standard 2 of 5 0: Disable Standard 2 of 5
Bit 3	1: Transmit Matrix 2 of 5 check digit 0: Do not transmit Matrix 2 of 5 check digit Note: Matrix 2 of 5 check digit verification must be enabled for this parameter to function.
Bit 2	1: Enable Matrix 2 of 5 check digit 0: Disable Matrix 2 of 5 check digit
Bit 1	1: Enable AIM ID prefix for Matrix 2 of 5 0: Disable AIM ID prefix for Matrix 2 of 5 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable Matrix 2 of 5 0: Disable Matrix 2 of 5
Register	*0x001B*
Bit	**Feature**
Bit 7	1: Enable AIM ID prefix for RSS-Expand 0: Disable AIM ID prefix for RSS-Expand Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 6	1: Enable RSS-Expand 0: Disable RSS-Expand
Bit 5	1: Transmit RSS-Limited application identifier 0: Do not transmit RSS-Limited application identifier
Bit 4	1: Enable AIM ID prefix for RSS-Limited 0: Disable AIM ID prefix for RSS-Limited Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 3	1: Enable RSS-Limited 0: Disable RSS-Limited
Bit 2	1: Transmit RSS-14 application identifier 0: Do not transmit RSS-14 application identifier
Bit 1	1: Enable AIM ID prefix for RSS-14 0: Disable AIM ID prefix for RSS-14 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable RSS-14 0: Disable RSS-14

Register	*0x001C*
Bit	**Feature**
Bit 7-6	Reserved
Bit 5	1: Enable Code 39 Full ASCII 0: Disable Code 39 Full ASCII
Bit 4	1: Transmit Code 39 check digit 0: Do not transmit Code 39 check digit Note: Code 39 check digit verification must be enabled for this parameter to function.
Bit 3	1: Enable Code 39 check digit 0: Disable Code 39 check digit
Bit 2	1: Transmit Code 39 start/stop characters 0: Do not transmit Code 39 start/stop characters
Bit 1	1: Enable AIM ID prefix for Code 39 0: Disable AIM ID prefix for Code 39 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable Code 39 0: Disable Code 39
Register	*0x001D*
Bit	**Feature**
Bit 7-6	Reserved
Bit 5	1: Transmit Code 11 check digit 0: Do not transmit Code 11 check digit Note: Code 11 check digit verification must be enabled for this parameter to function.
Bit 4-2	Code 11 Check Digit Verification: 000: Disable 001: One check digit, MOD11 010: Two check digits, MOD11/MOD11 011: Two check digits, MOD11/MOD9 100: One check digit, MOD11 (Len <= 11); two check digits, MOD11/MOD11 (Len > 11) 101: One check digit, MOD11 (Len <= 11); two check digits, MOD11/MOD9 (Len > 11)
Bit 1	1: Enable AIM ID prefix for Code 11 0: Disable AIM ID prefix for Code 11 Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable Code 11 0: Disable Code 11

Register	*0x001E*
Bit	**Feature**
Bit 7-6	Reserved
Bit 5	1: Transmit Codabar check digit 0: Do not transmit Codabar check digit Note: Code 39 check digit verification must be enabled for this parameter to function.
Bit 4	1: Enable Codabar check digit 0: Disable Codabar check digit
Bit 3-2	Codabar Start/Stop Character Format: 00: ABCD/ABCD 01: ABCD/TN*E 10: abcd/abcd 11: abcd/tn*e
Bit 1	1: Transmit Codabar start/stop characters 0: Do not transmit Codabar start/stop characters
Bit 0	1: Enable Codabar 0: Disable Codabar
Register	*0x001F*
Bit	**Feature**
Bit 7	Reserved
Bit 6	1: Transmit MSI-Plessey check digit 0: Do not transmit MSI-Plessey check digit Note: MSI-Plessey check digit verification must be enabled for this parameter to function.
Bit 5-4	MSI-Plessey Check Digit Verification: 00: Disable 01: One check digit, MOD10 10: Two check digits, MOD10/MOD10 11: Two check digits, MOD10/MOD11
Bit 3	1: Enable MSI-Plessey 0: Disable MSI-Plessey
Bit 2	1: Transmit Plessey check digit 0: Do not transmit MSI-Plessey check digit Note: Plessey check digit verification must be enabled for this parameter to function.
Bit 1	1: Enable Plessey check digit 0: Disable Plessey check digit
Bit 0	1: Enable Plessey 0: Disable Plessey

Register	*0x0020*
Bit	**Feature**
Bit 7-3	Reserved
Bit 2	1: Enable AIM ID prefix for MSI-Plessey 0: Disable AIM ID prefix for MSI-Plessey Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 1	1: Enable AIM ID prefix for Plessey 0: Disable AIM ID prefix for Plessey Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Bit 0	1: Enable AIM ID prefix for Codabar 0: Disable AIM ID prefix for Codabar Note: Bit4 and Bit3 of register 0x0010 must be set to “01” in order for this parameter to function.
Register	*0x002B，0x2A*
Bit	**Feature**
Bit 15-13	Reserved
Bit 12-0	0x09C4: Baud rate 1200 0x04E2: Baud rate 2400 0x0271: Baud rate 4800 0x0139: Baud rate 9600 0x00D0: Baud rate 14400 0x009C: Baud rate 19200 0x004E: Baud rate 38400 0x0034: Baud rate 57600 0x001A: Baud rate 115200
Register	*0x004A*
Bit	**Feature**
Bit 7-5	Reserved
Bit 4	0: 752*480 image 1: 640*480 image
Bit 3-2	00: Decode unmirrored Data Matrix only 01: Decode mirrored Data Matrix only 10/11: Decode both
Bit 1	1: Decode Data Matrix starting with the character whose ASCII value is 129 0: Do not decode Data Matrix starting with the character whose ASCII value is 129
Bit 0	1: Decode Data Matrix with FNC1 0: Do not decode Data Matrix with FNC1

Register	*0x004B*
Bit	**Feature**
Bit 7-2	Reserved
Bit 1	1: Decode rectangular Data Matrix 0: Do not decode rectangular Data Matrix
Bit 0	Reserved
Register	*0x0060*
Bit	**Feature**
Bit 7	Reserved
Bit 6-5	Terminating Character Suffix: 00/11: CR (0x0D) 01: CRLF (0x0D,0x0A) 10: TAB (0x09)
Bit 4	Reserved
Bit 3	1: Caps Lock ON 0: Caps Lock OFF
Bit 2-1	00: Standard Keyboard 01: Emulate ALT+Keypad 10/11: Function Key Mapping
Bit 0	1: Enable terminating character suffix 0: Disable terminating character suffix
Register	*0x006B*
Bit	**Feature**
Bit 7-0	USB country keyboard types 00: U.S. 01: Belgium 02: Brazil 03: Canada 04: Czech 05: Denmark 06: Denmark 07: France 08: Austria 09: Greece 0A: Hungary 0B: Israel 0C: Italy 0D: Latin America 0E: Netherland 0F: Norway 10: Poland 11: Portugal 12: Romania 13: Russia 15: Slovakia 16: Spain 17: Sweden 18: Switzerland 19: Turkey1 1A: Turkey2 1B: UK 1C: Japan

Register	*0x006F*
Bit	**Feature**
Bit 7-6	Inter-keystroke delay 00: No delay 01: Short delay (5ms) 10: Medium delay (10ms) 11: Long delay (15ms)
Bit 5-4	Convert case 00: No case conversion 10: Convert All to Upper Case 11: Convert All to Lower Case
Bit 3	Reserved
Bit 2	1: Emulate numeric keypad 0: Do not emulate numeric keypad
Bit 1-0	Reserved
Register	*0x008A*
Bit	**Feature**
Bit 7-1	Reserved
Bit 0	1: Visible Code ID (original+0x40) 0: Original Code ID
Register	*0x0099*
Bit	**Feature**
Bit 7-4	Reserved
Bit 3	1: Decode mirrored Micro QR 0: Do not decode mirrored Micro QR
Bit 2	1: Enable Micro QR 0: Disable Micro QR
Bit 1	1: Enable AIM ID prefix for QR 0: Disable AIM ID prefix for QR
Bit 0	Reserved

Programming Barcode Data

Programming barcode data (e.g. WFFD980) can be transmitted to the Host. To enable this feature, scan the barcode below. After the feature is enabled, programming barcodes will be handled as non-programming barcodes and they cannot be used to configure the scan engine. The barcode data will be sent to the Host when a programming barcode is scanned and decoded. By default, the EM3095 does not transmit programming barcode data.

After the engine is powered down and re-energized, this feature will be automatically disabled (i.e. the engine does not transmit programming barcode data) and the ability of programming barcodes to configure the engine will be restored.

Transmit Programming Barcode Data

Factory Defaults

Scanning the following barcode can restore the engine to the factory defaults. See ***Appendix A: Factory Defaults Table*** for more information.

Note: Use this feature with discretion.

Restore All Factory Defaults

Chapter 2 Communication Interfaces

The EM3095 provides a TTL-232 interface and a USB interface to communicate with the host device. The host device can receive scanned data and send commands to control the engine or to access/alter the configuration information of the engine via the TTL-232 or USB interface.

TTL-232 Interface

Serial communication interface is usually used to connect the engine to a host device (like PC, POS). When the EM3095 is connected to a host device through its TTL-232 interface, serial communication is enabled by default. However, to ensure smooth communication and accuracy of data, you need to set communication parameters (including baud rate, parity check, data bit and stop bit) to match the host device.

The serial communication interface provided by the engine is based on TTL signals. TTL-232 can be used for most application architectures. For those requiring RS-232, an external conversion circuit is needed.

Default serial communication parameters are listed below, among which only baud rate can be altered.

Parameter	Factury Default
Serial Communication	Standard TTL-232
Baud Rate	9600
Parity Check	None
Number of Data Bits	8
Number of Stop Bits	1
Hardware Flow Control	None

Baud Rate

Baud rate is the number of bits of data transmitted per second. Set the baud rate to match the Host requirements.

WFFD9D3

**** 9600**

WFFD9D0

1200

WFFD9D5

19200

WFFD9D1

2400

WFFD9D6

38400

WFFD9D2

4800

WFFD9D7

57600

WFFD9D4

14400

WFFD9D8

115200

USB Interface

When the EM3095 is connected to a host device through its USB interface, **USB DATAPIPE** is enabled by default. User can switch between options – **USB DATAPIPE**, **USB HID-KBW**, **USB COM Port Emulation** and **HID-POS**, upon actual need.

USB DATAPIPE

A driver is required when using this protocol to communicate with the engine.

**** USB DATAPIPE**

USB HID-KBW

When the engine is connected to the Host via a USB connection, you can enable the **USB HID-KBW** feature by scanning the barcode below. Then the engine's transmission will be simulated as USB keyboard input. The Host receives keystrokes on the virtual keyboard. It works on a Plug and Play basis and no driver is required.

USB HID-KBW

Standard Keyboard

When the USB HID-KBW feature is enabled, the engine selects **Standard Keyboard** by default. Besides that, the other two options are provided: **Emulate ALT+Keypad** and **Function Key Mapping**.

**** Standard Keyboard**

Emulate ALT+Keypad

When **Emulate ALT+Keypad** is enabled, any ASCII character (0x00 - 0xFF) is sent over the numeric keypad no matter which keyboard type is selected. Since sending a character involves multiple keystroke emulations, this method appears less efficient.

1. ALT Make
2. Enter the number corresponding to the ASCII character on the keypad.
3. ALT Break

Emulate ALT+Keypad

Note: It is recommended to turn on the Num Lock light on the host when using this feature.

Function Key Mapping

When **Function Key Mapping** is enabled, function character (0x00 - 0x1F) are sent as ASCII sequences over the numeric keypad.

1. CTRL Make
2. Press function key (Refer to the **ASCII Function Key Mapping Table** on the following page)
3. CTRL Break

W066002

Function Key Mapping

ASCII Function Key Mapping Table

ASCII Value （HEX）	Function Key	ASCII Value （HEX）	Function Key
00	2	10	P
01	A	11	Q
02	B	12	R
03	C	13	S
04	D	14	T
05	E	15	U
06	F	16	V
07	G	17	W
08	H	18	X
09	I	19	Y
0A	J	1A	Z
0B	K	1B	[
0C	L	1C	\
0D	M	1D	]
0E	N	1E	6
0F	O	1F	.

USB Country Keyboard Types

Keyboard layouts vary from country to country. All supported keyboard types are listed below. The default setting is US keyboard.

**** 1 - U.S.**

2 - Belgium

3 - Brazil

4 - Canada

5 - Czech

6 - Denmark

7 - Finland

8 - France

9 - Austria

10 - Greece

11 - Hungary

12 - Israel

13 - Italy

14 - Latin America

15 - Netherland

16 - Norway

17 - Poland

18 - Portugal

19 - Romania

20 - Russia

21 - Slovakia

22 - Spain

23 - Sweden

24 - Switzerland

25 - Turkey1

26 - Turkey 2

27 - UK

28 - Japan

Beep on Unknown Character

Due to the differences in keyboard layouts, some characters contained in barcode data may be unavailable on the selected keyboard. As a result, the engine fails to transmit the unknown characters.

Scan the appropriate barcode below to enable or disable the emission of beep when an unknown character is detected.

**** Beep on Unknown Character**

Do Not Beep on Unknown Character

Inter-Keystroke Delay

This parameter specifies the delay between emulated keystrokes.

**** No Delay**

Short Delay (5ms)

Medium Delay (10ms)

Long Delay (15ms)

Caps Lock

The **Caps Lock ON** option can invert upper and lower case characters contained in barcode data. This inversion occurs regardless of the state of Caps Lock key on the Host's keyboard.

W086000

**** Caps Lock OFF**

W086008

Caps Lock ON

Note: Emulate ALT+Keypad ON/ **Convert All to Upper Case**/ **Convert All to Lower Case** prevails over **Caps Lock ON**.

Example: When the **Caps Lock ON** is selected, barcode data "AbC" is transmitted as "aBc".

Convert Case

Scan the appropriate barcode below to convert all bar code data to your desired case.

**** No Case Conversion**

Convert All to Lower Case

Convert All to Upper Case

Example: When the **Convert All to Lower Case** feature is enabled, barcode data “AbC” is transmitted as “abc”.

Emulate Numeric Keypad

When this feature is disabled, sending barcode data is emulated as keystroke(s) on main keyboard.

To enable this feature, scan the **Emulate Numeric Keypad** barcode. Sending a number (0-9) is emulated as keystroke on numeric keypad, whereas sending other character like “+”, “_”, “*” , “/” and “.” is still emulated as keystroke on main keyboard. However, this feature is influenced by the state of the Num Lock key on the host: if the Num Lock light on the host is ON, numbers are sent over numeric keypad, if it is OFF, numbers are sent over main keyboard.

Emulate Numeric Keypad

**** Do Not Emulate Numeric Keypad**

Note: Make sure the Num Lock light of the Host is turned ON when using this feature.
Emulate ALT+Keypad ON prevails over **Emulate Numeric Keypad**.

USB COM Port Emulation

If you connect the engine to the Host via a USB connection, the USB COM Port Emulation feature allows the Host to receive data in the way as a serial port does. However, you need to set communication parameters on the engine to match the Host requirements. A driver is required for this feature.

USB COM Port Emulation

HID-POS

The HID-POS interface is recommended for new application programs. It can send up to 56 characters in a single USB report and appears more efficient than USB HID-KBW.

Features:

- ✧ HID based, no custom driver required.
- ✧ Way more efficient in communication than USB HID-KBW and traditional RS-232 interface.

Note: HID-POS does not require a custom driver. However, a HID interface on Windows 98 does. All HID interfaces employ standard driver provided by the operating system. Use defaults when installing the driver.

HID-POS

Access the Scanner with Your Program

1. Use CreateFile to access the engine as a HID device.
2. Use ReadFile to deliver the scanned data to the application program.
3. Use WriteFile to send data to the engine.

For detailed information about USB and HID interfaces, go to www.USB.org.

Acquire Scanned Data

After a barcode is decoded, the engine sends an input report as below:

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x02							
1	Barcode Length							
2-57	Decoded Data (1-56)							
58-61	Reserved (1-4)							
62	0x00							
63	-	-	-	-	-	-	-	Decoded Data

VID/PID

USB uses VID (Vendor ID) and PID (Product ID) to identify and locate a device. The VID is assigned by USB Implementers Forum. Newland's vendor ID is 1EAB (Hex). A range of PIDs are used for each Newland product family. Every PID contains a base number and interface type (keyboard, COM port, etc.).

Product	Interface	PID (Hex)	PID (Dec)
EM3095	USB DATAPIPE	8001	32769
	USB HID-KBW	8003	32771
	USB COM Port Emulation	8006	32774
	HID-POS	8010	32784

Chapter 3 Scan Mode

Manual Mode

Manual Mode (default): A trigger pull activates a decode session. The decode session continues until the barcode is decoded or the trigger is released.

****Manual Mode**

Continuous Mode

Continuous Mode: The engine automatically activates a decode session. The decode session continues until the barcode is decoded or the decode session timeout expires. When a decode session is completed, the engine waits until the timeout between decodes expires and then starts next session. The engine continues to work in this pattern if the following situation does not happen: no barcode is presented to the engine or passed in front of it in a decode session, the engine will automatically suspend barcode reading. Pressing the trigger can suspend/resume barcode reading.

Continuous Mode

Decode Session Timeout

This parameter sets the maximum time decode session continues during a scan attempt. It is programmable in 0.1s increments from 0.1s to 25.5s. The default timeout is 5.0s. If the parameter is set to 0, the engine scans and decodes barcode continuously. To learn how to program this parameter, see ***Appendix E: Parameter Programming Examples***.

Decode Session Timeout

Timeout between Decodes

This parameter sets the timeout between decode sessions. When a decode session ends, next session will not happen until the timeout between decodes expires. It is programmable in 0.1s increments from 0.1s to 25.5s. The default timeout is 1.0s. To learn how to program this parameter, see ***Appendix E: Parameter Programming Examples***.

Timeout between Decodes

Sense Mode

Sense Mode: The engine waits for the image stabilization timeout to expire before activating a decode session every time it detects a change in ambient illumination. Decode session continues until the barcode is decoded or the decode session timeout expires. After a decode session ends, the engine waits for the timeout between decodes to expire before beginning to monitor ambient illumination. If no barcode is presented to the engine or passed in front of it in a decode session, the engine will automatically suspend barcode reading and start to monitor ambient illumination.

In the Sense mode, a trigger pull can also activate a decode session. The decode session continues until the barcode is decoded or the trigger is released. When the session ends, the engine will continue to monitor ambient illumination.

Sense Mode

Decode Session Timeout

This parameter sets the maximum time decode session continues during a scan attempt. It is programmable in 0.1s increments from 0.1s to 25.5s. The default timeout is 5.0s. If the parameter is set to 0, the engine scans and decodes barcode continuously. To learn how to program this parameter, see ***Appendix E: Parameter Programming Examples***.

Decode Session Timeout

Timeout between Decodes

After a decode session ends, the engine waits for the timeout between decodes to expire before beginning to monitor ambient illumination. This parameter is programmable in 0.1s increments from 0.1s to 25.5s. The default timeout is 1.0s. To learn how to program this parameter, see ***Appendix E: Parameter Programming Examples***.

Timeout between Decodes

Image Stabilization Timeout

The engine waits for the image stabilization timeout to expire before activating a decode session every time it detects a change in ambient illumination. This parameter is programmable in 0.1s increments from 0.1s to 25.5s. The default timeout is 0.4s. To learn how to program this parameter, see ***Appendix E: Parameter Programming Examples***.

Image Stabilization Timeout

Sensitivity

Sensitivity specifies the degree of acuteness of the engine's response to changes in ambient illumination. The higher the sensitivity, the lower requirement in illumination change to trigger the engine. You can select an appropriate degree of sensitivity that fits the ambient environment. The default setting is **Medium Sensitivity**.

WFF0308

High Sensitivity

WFF0320

**** Medium Sensitivity**

WFF0340

Low Sensitivity

Sensitivity levels range from 0 to 255. The smaller the number, the higher the sensitivity.

Users can select a desired sensitivity level that helps achieve greater efficiency. To learn how to program this parameter, see ***Appendix E: Parameter Programming Examples***.

M00031A

Custom Sensitivity

Command Trigger Mode

Command Trigger Mode: Decode session is activated by a host command (i.e. set the bit0 of register 0x0002 to “1”). The decode session continues until the barcode is decoded or the decode session timeout expires.

Command Trigger Mode

Decode Session Timeout

This parameter sets the maximum time decode session continues during a scan attempt. It is programmable in 0.1s increments from 0.1s to 25.5s. The default timeout is 5.0s. If the parameter is set to 0, the engine scans and decodes barcode continuously. To learn how to program this parameter, see ***Appendix E: Parameter Programming Examples***.

Decode Session Timeout

Chapter 4 Illumination & Aiming

Illumination

A couple of illumination options are provided to improve the lighting conditions during every image capture:

Normal (default): Illumination LED is turned on during image capture.

Always ON: Illumination LED keeps ON after the engine is powered on.

OFF: Illumination LED is OFF all the time.

W0C0004

**** Normal**

W0C0000

OFF

W0C000C

Always ON

Aiming

When scanning/capturing image, the engine projects an aiming beam which allows positioning the target barcode within its field of view and thus makes decoding easier.

Normal (default): The engine projects an aiming beam only during barcode scanning/capture.

Always ON: Aiming beam is constantly ON after the engine is powered on.

OFF: Aiming beam is OFF all the time.

W300010

**** Normal**

W300000

OFF

W300030

Always ON

Chapter 5 Notification

Mute Mode

Scanning the **Enable Mute Mode** can turn off all notification beeps. By default, mute mode is disabled.

Enable Mute Mode

****Disable Mute Mode**

Good Read Beep

**** Good Read Beep On**

Good Read Beep Off

Good Read Beep Frequency

Low

**** Medium**

High

Good Read Beep Duration

40ms

****80ms**

120ms

Good Read LED

**** Good Read LED On**

Good Read LED Off

Decode Result Notification

When enabled, if a barcode does not decode, “F” is transmitted; if a barcode is decoded, “S” is appended to the barcode data as the most left character.

Enable Decode Result Notification

**** Disable Decode Result Notification**

Chapter 6 Data Formatting

In many applications, barcode data needs to be edited and distinguished from one another.

Usually AIM ID and Code ID can be used as identifiers, but in some special cases terminating character suffix like Carriage Return or Line Feed can also be the alternative.

The engine can be configured to transmit barcode data in the following format:
["F"/ "S"] + [Code ID] + [AIM ID] + [DATA] + [terminating character]

Note: [DATA] must be transmitted while user can decide whether to transmit any of the rest parts.

["F"/ "S"]: decode result notification.

AIM ID Prefix

AIM (Automatic Identification Manufacturers) IDs define symbology identifiers and data carrier identifiers. For the details, see ***Appendix B: AIM ID Table***. If AIM ID prefix is enabled, the engine will add the symbology identifier before the scanned data after decoding.

Enable AIM ID Prefix

**** Disable AIM ID Prefix**

CODE ID Prefix

Code ID can also be used to identify barcode type. For more information, refer to ***Appendix C: Code ID Table***.

Enable CODE ID Prefix

**** Disable CODE ID Prefix**

User can choose to transmit original CODE ID or visible CODE ID by scanning the appropriate barcode below.

**** Original CODE ID**

Visible CODE ID

Terminating Character Suffix

A terminating character such as carriage return (CR) or carriage return/line feed pair (CRLF) or horizontal tab (TAB) can be used to mark the end of data.

W616000

**** Disable Terminating Character Suffix**

W616001

Append CR

W616021

Append CRLF

W616041

Append TAB

Chapter 7 Symbologies

Global Settings

Enable/Disable All Symbologies

If all symbologies are disabled, the engine can only identify programming barcodes.

Enable All Symbologies

Disable All Symbologies

Enable/Disable 1D Symbologies

Enable 1D Symbologies

Disable 1D Symbologies

Enable/Disable 2D Symbologies

Enable 2D Symbologies

Disable 2D Symbologies

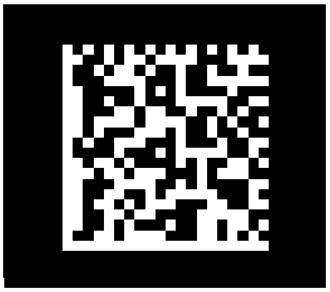
Video Reverse

Regular barcode: Dark image on a bright background.

Inverse barcode: Bright image on a dark background.

The examples of regular barcode and inverse barcode are shown below.

Regular Barcode



Inverse Barcode

Video Reverse is used to allow the engine to read barcodes that are inverted.

Video Reverse ON: Read both regular barcodes and inverse barcodes.

Video Reverse OFF (default): Read regular barcodes only.

The engine shows a slight decrease in scanning speed when Video Reverse is ON.

W100210

Video Reverse ON

W100200

**** Video Reverse OFF**

1D Symbologies

Code 128

Restore Factory Defaults

Restore the Factory Defaults of Code 128

Enable/Disable Code 128

**** Enable Code 128**

Disable Code 128

UCC/EAN-128 (GS1-128)

Restore Factory Defaults

Restore the Factory Defaults of UCC/EAN-128

Enable/Disable UCC/EAN-128

**** Enable UCC/EAN-128**

Disable UCC/EAN-128

AIM 128

Restore Factory Defaults

Restore the Factory Defaults of AIM 128

Enable/Disable AIM 128

**** Enable AIM 128**

Disable AIM 128

EAN-8

Restore Factory Defaults

Restore the Factory Defaults of EAN-8

Enable/Disable EAN-8

**** Enable EAN-8**

Disable EAN-8

Transmit Check Digit

EAN-8 is 8 digits in length with the last one as its check digit used to verify the integrity of the data.

**** Transmit EAN-8 Check Digit**

Do Not Transmit EAN-8 Check Digit

Add-On Code

An EAN-8 barcode can be augmented with a two-digit or five-digit add-on code to form a new one. In the examples below, the part surrounded by blue dotted line is an EAN-8 barcode while the part circled by red dotted line is add-on code.

Enable 2-Digit Add-On Code

**** Disable 2-Digit Add-On Code**

Enable 5-Digit Add-On Code

**** Disable 5-Digit Add-On Code**

Enable 2-Digit Add-On Code/ Enable 5-Digit Add-On Code: The engine decodes a mix of EAN-8 barcodes with and without 2-digit/5-digit add-on codes.

Disable 2-Digit Add-On Code/ Disable 5-Digit Add-On Code: The engine decodes EAN-8 and ignores the add-on code when presented with an EAN-8 plus add-on barcode. It can also decode EAN-8 barcodes without add-on codes.

Add-On Code Required

When **EAN-8 Add-On Code Required** is selected, the engine will only read EAN-8 barcodes that contain add-on codes.

EAN-8 Add-On Code Required

**** EAN-8 Add-On Code Not Required**

EAN-8 Extension

Disable EAN-8 Zero Extend: Transmit EAN-8 barcodes as is.

Enable EAN-8 Zero Extend: Add five leading zeros to decoded EAN-8 barcodes to extend to13 digits.

Enable EAN-8 Zero Extend

**** Disable EAN-8 Zero Extend**

EAN-13

Restore Factory Defaults

Restore the Factory Defaults of EAN-13

Enable/Disable EAN-13

**** Enable EAN-13**

Disable EAN-13

Transmit Check Digit

EAN-13 is 13 digits in length with the last one as its check digit used to verify the integrity of the data.

**** Transmit EAN-13 Check Digit**

Do Not Transmit EAN-13 Check Digit

Add-On Code

An EAN-13 barcode can be augmented with a two-digit or five-digit add-on code to form a new one. In the examples below, the part surrounded by blue dotted line is an EAN-13 barcode while the part circled by red dotted line is add-on code.

Enable 2-Digit Add-On Code

**** Disable 2-Digit Add-On Code**

Enable 5-Digit Add-On Code

**** Disable 5-Digit Add-On Code**

Enable 2-Digit Add-On Code/ Enable 5-Digit Add-On Code: The engine decodes a mix of EAN-13 barcodes with and without 2-digit/5-digit add-on codes.

Disable 2-Digit Add-On Code/ Disable 5-Digit Add-On Code: The engine decodes EAN-13 and ignores the add-on code when presented with an EAN-13 plus add-on barcode. It can also decode EAN-13 barcodes without add-on codes.

Add-On Code Required

When **EAN-13 Add-On Code Required** is selected, the engine will only read EAN-13 barcodes that contain add-on codes.

W081108

EAN-13 Add-On Code Required

W081100

**** EAN-13 Add-On Code Not Required**

ISSN

Restore Factory Defaults

WFFD996

Restore the Factory Defaults of ISSN

Enable/Disable ISSN

W401140

Enable ISSN

W401100

**** Disable ISSN**

ISBN

Restore Factory Defaults

Restore the Factory Defaults of ISBN

Enable/Disable ISBN

**** Enable ISBN**

Disable ISBN

Set ISBN Format

**** ISBN-13**

ISBN-10

UPC-E

Restore Factory Defaults

Restore the Factory Defaults of UPC-E

Enable/Disable UPC-E

**** Enable UPC-E**

Disable UPC-E

Transmit Check Digit

UPC-E is 8 digits in length with the last one as its check digit used to verify the integrity of the data.

**** Transmit UPC-E Check Digit**

Do Not Transmit UPC-E Check Digit

Add-On Code

A UPC-E barcode can be augmented with a two-digit or five-digit add-on code to form a new one. In the examples below, the part surrounded by blue dotted line is a UPC-E barcode while the part circled by red dotted line is add-on code.

W201520

Enable 2-Digit Add-On Code

W201500

**** Disable 2-Digit Add-On Code**

W401540

Enable 5-Digit Add-On Code

W401500

**** Disable 5-Digit Add-On Code**

Enable 2-Digit Add-On Code/ Enable 5-Digit Add-On Code: The engine decodes a mix of UPC-E barcodes with and without 2-digit/5-digit add-on codes.

Disable 2-Digit Add-On Code/ Disable 5-Digit Add-On Code: The engine decodes UPC-E and ignores the add-on code when presented with a UPC-E plus add-on barcode. It can also decode UPC-E barcodes without add-on codes.

Add-On Code Required

When **UPC-E Add-On Code Required** is selected, the engine will only read UPC-E barcodes that contain add-on codes.

UPC-E Add-On Code Required

**** UPC-E Add-On Code Not Required**

Transmit System Character

The first character of UPC-E barcode is the system character “0”.

Transmit System Character “0”

**** Do Not Transmit System Character “0”**

UPC-E Extension

Disable UPC-E Extend: Transmit UPC-E barcodes as is.

Enable UPC-E Extend: Extend UPC-E barcodes to make them compatible in length to UPC-A.

Enable UPC-E Extend

****Disable UPC-E Extend**

UPC-A

Restore Factory Defaults

Restore the Factory Defaults of UPC-A

Enable/Disable UPC-A

**** Enable UPC-A**

Disable UPC-A

Transmit Check Digit

UPC-A is 13 digits in length with the last one as its check digit used to verify the integrity of the data.

**** Transmit UPC-A Check Digit**

Do Not Transmit UPC-A Check Digit

Add-On Code

A UPC-A barcode can be augmented with a two-digit or five-digit add-on code to form a new one. In the examples below, the part surrounded by blue dotted line is a UPC-A barcode while the part circled by red dotted line is add-on code.

W201420

Enable 2-Digit Add-On Code

W201400

**** Disable 2-Digit Add-On Code**

W401440

Enable 5-Digit Add-On Code

W401400

**** Disable 5-Digit Add-On Code**

Enable 2-Digit Add-On Code/ Enable 5-Digit Add-On Code: The engine decodes a mix of UPC-A barcodes with and without 2-digit/5-digit add-on codes.

Disable 2-Digit Add-On Code/ Disable 5-Digit Add-On Code: The engine decodes UPC-A and ignores the add-on code when presented with a UPC-A plus add-on barcode. It can also decode UPC-A barcodes without add-on codes.

Add-On Code Required

When **UPC-A Add-On Code Required** is selected, the engine will only read UPC-A barcodes that contain add-on codes.

UPC-A Add-On Code Required

**** UPC-A Add-On Code Not Required**

Transmit Preamble Character

Transmit Preamble Character "0"

**** Do Not Transmit Preamble Character "0"**

Note: The preamble character "0" usually does not appear in printed UPC-A barcodes.

Interleaved 2 of 5

Restore Factory Defaults

Restore the Factory Defaults of Interleaved 2 of 5

Enable/Disable Interleaved 2 of 5

**** Enable Interleaved 2 of 5**

Disable Interleaved 2 of 5

Check Digit Verification

A check digit is optional for Interleaved 2 o 5 and can be added as the last digit. It is a calculated value used to verify the integrity of the data.

Disable: The engine transmits Interleaved 2 of 5 barcodes as is.

Do Not Transmit Check Digit After Verification: The engine checks the integrity of all Interleaved 2 of 5 barcodes to verify that the data complies with the check digit algorithm. Barcodes passing the check will be transmitted except the last digit, whereas those failing it will not be transmitted.

Transmit Check Digit After Verification: The engine checks the integrity of all Interleaved 2 of 5 barcodes to verify that the data complies with the check digit algorithm. Barcodes passing the check will be transmitted, whereas those failing it will not be transmitted.

**** Disable**

Do Not Transmit Check Digit After Verification

Transmit Check Digit After Verification

Transmit Appended “0”

If an Interleaved 2 of 5 barcode contains an odd number of characters, a leading zero must be appended. Scan the appropriate barcode to choose whether to transmit the appended “0”.

**** Transmit Appended “0”**

Do Not Transmit Appended “0”

ITF-6

ITF-6 is a special kind of Interleaved 2 of 5 with a length of 6 characters and the last character as the check character.

Restore the Factory Defaults of ITF-6

**** Disable ITF-6**

Enable ITF-6 But Do Not Transmit Check Digit

Enable ITF-6 and Transmit Check Digit

Note: It is advisable not to enable ITF-6 and Interleaved 2 of 5 at the same time.

ITF-14

ITF-14 is a special kind of Interleaved 2 of 5 with a length of 14 characters and the last character as the check character.

WFFD99C

Restore the Factory Defaults of ITF-14

W201800

Disable ITF-14

WA01820

Enable ITF-14 But Do Not Transmit Check Digit

WA018A0

**** Enable ITF-14 and Transmit Check Digit**

Note: It is advisable not to enable ITF-14 and Interleaved 2 of 5 at the same time.

Matrix 2 of 5

Restore Factory Defaults

Restore the Factory Defaults of Matrix 2 of 5

Enable/Disable Matrix 2 of 5

**** Enable Matrix 2 of 5**

Disable Matrix 2 of 5

Check Digit Verification

W041A00

**** Disable**

W0C1A04

Do Not Transmit Check Digit After Verification

W0C1A0C

Transmit Check Digit After Verification

Industrial 25

Restore Factory Defaults

Restore the Factory Defaults of Industrial 25

Enable/Disable Industrial 25

**** Enable Industrial 25**

Disable Industrial 25

Check Digit Verification


W201900

**** Disable**


W601920

Do Not Transmit Check Digit After Verification


W601960

Transmit Check Digit After Verification

Standard 25

Restore Factory Defaults

Restore the Factory Defaults of Standard 25

Enable/Disable Standard 25

**** Enable Standard 25**

Disable Standard 25

Check Digit Verification


W401A00

**** Disable**


WC01A40

Do Not Transmit Check Digit After Verification


WC01AC0

Transmit Check Digit After Verification

Code 39

Restore Factory Defaults

Restore the Factory Defaults of Code 39

Enable/Disable Code 39

**** Enable Code 39**

Disable Code 39

Transmit Start/Stop Character

Transmit Start/Stop Character

**** Do Not Transmit Start/Stop Character**

Check Digit Verification

**** Disable**

Do Not Transmit Check Digit After Verification

Transmit Check Digit After Verification

Enable/Disable Code 39 Full ASCII

The engine can be configured to identify all ASCII characters by scanning the appropriate barcode below.

Enable Code 39 Full ASCII

**** Disable Code 39 Full ASCII**

Codabar

Restore Factory Defaults

Restore the Factory Defaults of Codabar

Enable/Disable Codabar

**** Enable Codabar**

Disable Codabar

Check Digit Verification

**** Disable**

Do Not Transmit Check Digit After Verification

Transmit Check Digit After Verification

Transmit Start/Stop Character

**** Transmit Start/Stop Character**

Do Not Transmit Start/Stop Character

Start/Stop Character Format

**** ABCD/ABCD as the Start/Stop Character**

ABCD/TN*E as the Start/Stop Character

abcd/abcd as the Start/Stop Character

abcd/tn*e as the Start/Stop Character

Code 93

Restore Factory Defaults

Restore the Factory Defaults of Code 93

Enable/Disable Code 93

**** Enable Code 93**

Disable Code 93

Check Digit Verification


W201200

Disable


W601220

**** Do Not Transmit Check Digit After Verification**


W601260

Transmit Check Digit After Verification

Code 11

Restore Factory Defaults

Restore the Factory Defaults of Code 11

Enable/Disable Code 11

**** Enable Code 11**

Disable Code 11

Check Digit Verification

Disable

**** One Check Digit, MOD11**

Two Check Digits, MOD11/MOD11

Two Check Digits, MOD11/MOD9

One Check Digit, MOD11 (Len <= 11)
Two Check Digits, MOD11/MOD11 (Len > 11)

One Check Digit, MOD11 (Len <= 11)
Two Check Digits, MOD11/MOD9 (Len > 11)

**** Transmit Check Digit**

Do Not Transmit Check Digit

Plessey

Restore Factory Defaults

Restore the Factory Defaults of Plessey

Enable/Disable Plessey

**** Enable Plessey**

Disable Plessey

Check Digit Verification


W021F00

Disable


W061F02

**** Do Not Transmit Check Digit After Verification**


W061F06

Transmit Check Digit After Verification

MSI-Plessey

Restore Factory Defaults

Restore the Factory Defaults of MSI-Plessey

Enable/Disable MSI-Plessey

**** Enable MSI-Plessey**

Disable MSI-Plessey

Check Digit Verification

Disable

**** One Check Digit, MOD10**

Two Check Digits, MOD10/MOD10

Two Check Digits, MOD10/MOD11

**** Transmit Check Digit**

Do Not Transmit Check Digit

RSS-14

Restore Factory Defaults

Restore the Factory Defaults of RSS-14

Enable/Disable RSS-14

**** Enable RSS-14**

Disable RSS-14

Transmit Application Identifier “01”

**** Transmit Application Identifier “01”**

Do Not Transmit Application Identifier “01”

RSS-Limited

Restore Factory Defaults

Restore the Factory Defaults of RSS-Limited

Enable/Disable RSS-Limited

**** Enable RSS-Limited**

Disable RSS-Limited

Transmit Application Identifier “01”

**** Transmit Application Identifier “01”**

Do Not Transmit Application Identifier “01”

RSS-Expand

Restore Factory Defaults

Restore the Factory Defaults of RSS-Expand

Enable/Disable RSS-Expand

**** Enable RSS-Expand**

Disable RSS-Expand

2D Symbologies

PDF417

Restore Factory Defaults

Restore the Factory Defaults of PDF417

Enable/Disable PDF417

****Enable PDF417**

Disable PDF417

Data Matrix

Restore Factory Defaults

Restore the Factory Defaults of Data Matrix

Enable/Disable Data Matrix

****Enable Data Matrix**

Disable Data Matrix

Rectangular Barcodes

**** Decode Rectangular Barcodes**

Do Not Decode Rectangular Barcodes

Mirror Images

**** Decode Unmirrored DM Only**

Decode Mirrored DM Only

Decode Both

QR Code

Restore Factory Defaults

Restore the Factory Defaults of QR Code

Enable/Disable QR Code

****Enable QR Code**

Disable QR Code

Micro QR

****Enable Micro QR**

Disable Micro QR

Mirrored Micro QR

Decode Mirrored Micro QR

**** Do Not Decode Mirrored Micro QR**

Appendix

Appendix A: Factory Defaults Table

Parameter		Factory Default	Remark
Programming Barcode			
Barcode Programming		Enabled	
Programming Barcode Data		Do not send	If Send Programming Barcode Data is enabled, barcode programming will be disabled.
Communication Interfaces			
TTL-232 Interface	Baud Rate	9600	
	Parity Check	None	
	Number of Data Bits	8	
	Number of Stop Bits	1	
	Hardware Flow Control	None	
USB Interface		USB DATAPIPE	Other options: USB HID-KBW, USB COM Port Emulation, HID-POS.
USB HID-KBW	Input Mode	Standard Keyboard	
	USB Country Keyboard Type	U.S.	
	Beep on Unknown Character	Enabled	
	Inter-Keystroke Delay	No delay	
	Caps Lock	Disabled	
	Convert Case	No conversion	
	Emulate Numeric Keypad	Disabled	
Scan Mode			
Scan Mode		Manual mode	Other options: Continuous Mode, Sense Mode, Command Trigger Mode.

Parameter		Factory Default	Remark
Continuous Mode	Decode Session Timeout	3.0s	0.1-25.5s; 0: infinite.
	Timeout between Decodes	1.0s	0-25.5s
Sense Mode	Decode Session Timeout	3.0s	0.1-25.5s; 0: infinite.
	Timeout between Decodes	1.0s	0-25.5s
	Image Stabilization Timeout	0.4s	0-25.5s
	Sensitivity	Medium	
Command Trigger Mode	Decode Session Timeout	3.0s	0.1-25.5s; 0: infinite.
Illumination & Aiming			
Illumination		Normal	Turn on when scanning barcode
Aiming		Normal	Turn on when scanning barcode
Notification			
Mute Mode		Disabled	
Good Read Beep	Beep on Good Read	Enabled	
	Beep Frequency	Medium	
	Beep Duration	80ms	Other options: 40ms, 120ms.
Good Read LED		Enabled	
Decode Result Notification		Disabled	“S”: Good read; ”F”: No read. NOT applicable to USB DATAPIPE.
Data Formatting			
AIM ID Prefix		Disabled	
Code ID Prefix		Disabled	
Code ID Type		Original Code ID	
Terminating Character Suffix		Disabled	Terminating character options:CR, CRLF,TAB.

Parameter	Factory Default	Remark
Symbologies		
Video Reverse	Disabled	Applicable to all symbologies.
Code 128		
Code 128	Enabled	
UCC/EAN-128（GS1-128）		
UCC/EAN-128	Enabled	
AIM 128		
AIM 128	Enabled	
EAN-8		
EAN-8	Enabled	
Check Digit	Transmit	
2-Digit Add-On Code	Disabled	
5-Digit Add-On Code	Disabled	
Add-On Code	Not required	
Extend to EAN-13	Disabled	
EAN-13		
EAN-13	Enabled	
Check Digit	Transmit	
2-Digit Add-On Code	Disabled	
5-Digit Add-On Code	Disabled	
Add-On Code	Not required	
ISSN		
ISSN	Disabled	
ISBN		
ISBN	Enabled	
ISBN Format	ISBN-13	

Parameter	Factory Default	Remark
UPC-E		
UPC-E	Enabled	
Check Digit	Transmit	
2-Digit Add-On Code	Disabled	
5-Digit Add-On Code	Disabled	
Add-On Code	Not required	
Extend to UPC-A	Disabled	
System Character “0”	Do not transmit	
UPC-A		
UPC-A	Enabled	
Check Digit	Transmit	
2-Digit Add-On Code	Disabled	
5-Digit Add-On Code	Disabled	
Add-On Code	Not required	
Preamble Character “0”	Do not transmit	
Interleaved 2 of 5		
Interleaved 2 of 5	Enbled	
Check Digit Verification	Disabled	
Check Digit	Do not transmit	
Appended “0”	Transmit	For Interleaved 2 of 5 barcodes that contain an odd number of characters
ITF-6		
ITF-6	Disabled	
Check Digit	Do not transmit	
ITF-14		
ITF-14	Enabled	
Check Digit	Transmit	
Matrix 2 of 5		
Matrix 2 of 5	Enabled	
Check Digit Verification	Disabled	
Check Digit	Do not transmit	

Parameter	Factory Default	Remark
Industrial 25		
Industrial 25	Enabled	
Check Digit Verification	Disabled	
Check Digit	Do not transmit	
Standard 25		
Standard 25	Enabled	
Check Digit Verification	Disabled	
Check Digit	Do not transmit	
Code 39		
Code 39	Enabled	
Check Digit Verification	Disabled	
Check Digit	Do not transmit	
Start/Stop Character	Do not transmit	
Code 39 Full ASCII	Disabled	
Codabar		
Codabar	Enabled	
Check Digit Verification	Disabled	
Check Digit	Do not transmit	
Start/Stop Character	Transmit	
Start/Stop Character Format	ABCD/ABCD	
Code 93		
Code 93	Enabled	
Check Digit Verification	Enabled	
Check Digit	Do not transmit	
Code 11		
Code 11	Enabled	
Check Digit Verification	One check digit, MOD11	
Check Digit	Transmit	

Parameter	Factory Default	Remark
Plessey		
Plessey	Enabled	
Check Digit Verification	Enabled	
Check Digit	Do not transmit	
MSI-Plessey		
MSI-Plessey	Enabled	
Check Digit Verification	One check digit, MOD10	
Check Digit	Transmit	
RSS-14		
RSS-14	Enabled	
AI (Application Identifier)	Transmit	
RSS-Limited		
RSS-Limited	Enabled	
AI (Application Identifier)	Transmit	
RSS-Expand		
RSS-Expand	Enabled	
PDF417		
PDF417	Enabled	
Data Matrix		
Data Matrix	Enabled	
Rectangular Barcodes	Decode	
Mirror Images	Decode unmirrored DM only	
QR Code		
QR Code	Enabled	
Micro QR	Enabled	
Mirrored Micro QR	Do not decode	

Appendix B: AIM ID Table

Symbology	AIM ID	Remark
Code 128	]C0	Standard Code 128
UCC/EAN 128 (GS1-128)	]C1	FNC1 is the character right after the start character
AIM 128	]C2	FNC1 is the 2nd character after the start character
EAN-8	]E4	Standard EAN-8
	]E4….]E1…	EAN-8 + 2-Digit Add-On Code
	]E4….]E2…	EAN-8 + 5-Digit Add-On Code
EAN-13	]E0	Standard EAN-13
	]E3	EAN-13 + 2/5-Digit Add-On Code
ISSN	]X5	Standard ISSN
ISBN	]X4	Standard ISBN
UPC-E	]E0	Standard UPC-E
	]E3	UPC-E + 2/5-Digit Add-On Code
UPC-A	]E0	Standard UPC-A
	]E3	UPC-A + 2/5-Digit Add-On Code
Interleaved 2 of 5	]I0	No check digit verification
	]I1	Transmit check digit after verification
	]I3	Do not transmit check digit after verification
ITF-6	]I1	Transmit check digit
	]I3	Do not transmit check digit
ITF-14	]I1	Transmit check digit
	]I3	Do not transmit check digit
Matrix 2 of 5	]X1	No check digit verification
	]X2	Transmit check digit after verification
	]X3	Do not transmit check digit after verification
Industrial 25	]S0	Not specified
Standard 25	]R0	No check digit verification
	]R8	One check digit, MOD 7; do not transmit check digit
	]R9	One check digit, MOD 7; transmit check digit

Symbology	AIM ID	Remark
Code 39	]A0	Transmit barcodes as is; Full ASCII disabled; no check digit verification
	]A1	One check digit, MOD 43; transmit check digit
	]A3	One check digit, MOD 43; do not transmit check digit
	]A4	Full ASCII enabled; no check digit verification
	]A5	Full ASCII enabled; MOD43; transmit check digit
	]A7	Full ASCII enabled; MOD43; do not transmit check digit
Codabar	]F0	Standard Codabar
	]F2	Transmit check digit after verification
	]F4	Do not transmit check digit after verification
Code 93	]G0	Not specified
Code 11	]H0	One check digit, MOD11; transmit check digit
	]H1	Two check digits, MOD11/MOD11; transmit check digit
	]H3	Do not transmit check digit after verification
	]H8	Two check digits, MOD11/MOD9; transmit check digit
	]H9	No check digit verification
Plessey	]P0	Not specified
MSI Plessey	]M0	One check digit, MOD10; transmit check digit
	]M1	One check digit, MOD10; do not transmit check digit
	]M7	Two check digits, MOD10 /MOD11; do not transmit check digit
	]M8	Two check digits, MOD10 /MOD11; transmit check digit
	]M9	No check digit verification
RSS-14/RSS-Limited RSS-Expand	]e0	
PDF417	]L0	Comply with 1994 PDF417 specifications
Data Matrix	]d0	ECC 000 - 140
	]d1	ECC 200
	]d2	ECC 200; FNC1 is the 1st or 5th character after the start character
	]d3	ECC 200; FNC1 is the 2nd or 6th character after the start character
	]d4	ECC 200, ECI protocol supported
	]d5	ECC 200; FNC1 is the 1st or 5th character after the start character;

Symbology	AIM ID	Remark
		ECI supported
	]d6	ECC 200; FNC1 is the 2nd or 6th character after the start character; ECI supported
QR Code	]Q0	QR1 (comply with AIM ISS 97-001 specifications)
	]Q1	QR2 (2005 symbol), ECI protocol not supported
	]Q2	QR2 (2005 symbol), ECI protocol supported
	]Q3	QR2 (2005 symbol), ECI protocol not supported; FNC1 is the character right after the start character
	]Q4	QR2 (2005 symbol), ECI protocol supported; FNC1 is the character right after the start character
	]Q5	QR2 (2005 symbol), ECI protocol not supported; FNC1 is the 2nd character right after the start character
	]Q6	QR2 (2005 symbol), ECI protocol supported; FNC1 is the 2nd character right after the start character

Reference: ISO/IEC 15424:2008 Information technology – Automatic identification and data capture techniques – Data Carrier Identifiers (including Symbology Identifiers)

Appendix C: Code ID Table

Symbology	Original Code ID	Visible Code ID
Code 128 FNC3	1	A(0x41)
Code 128	2	B(0x42)
UCC/EAN 128	3	C(0x43)
EAN-8	4	D(0x44)
EAN-13	5	E(0x45)
UPC-E	6	F(0x46)
UPC-A	7	G(0x47)
Interleaved 2 of 5	8	H(0x48)
ITF-14	9	I(0x49)
ITF-6	10	J(0x4A)
Code 39	13	M(0x4D)
Codabar	15	O(0x4F)
Standard 25	16	P(0x50)
Code 93	17	Q(0x51)
AIM 128	21	U(0x55)
MSI Plessey	22	V(0x56)
ISBN	23	W(0x57)
Industrial 25	24	X(0x58)
Matrix 2 of 5	25	Y(0x59)
RSS-14	26	Z(0x5A)
RSS Limited	27	[(0x5B)
RSS Expand	28	\(0x5C)
Code 11	29	](0x5D)
Plessey	30	^(0x5E)
ISSN	31	_(0x5F)
PDF417	32	`(0x60)
QR	33	a(0x61)
Data Matrix	35	c(0x63)

Appendix D: ASCII Table

Hex	Dec	Char
00	0	NUL (Null char.)
01	1	SOH (Start of Header)
02	2	STX (Start of Text)
03	3	ETX (End of Text)
04	4	EOT (End of Transmission)
05	5	ENQ (Enquiry)
06	6	ACK (Acknowledgment)
07	7	BEL (Bell)
08	8	BS (Backspace)
09	9	HT (Horizontal Tab)
0a	10	LF (Line Feed)
0b	11	VT (Vertical Tab)
0c	12	FF (Form Feed)
0d	13	CR (Carriage Return)
0e	14	SO (Shift Out)
0f	15	SI (Shift In)
10	16	DLE (Data Link Escape)
11	17	DC1 (XON) (Device Control 1)
12	18	DC2 (Device Control 2)
13	19	DC3 (XOFF) (Device Control 3)
14	20	DC4 (Device Control 4)
15	21	NAK (Negative Acknowledgment)
16	22	SYN (Synchronous Idle)
17	23	ETB (End of Trans. Block)
18	24	CAN (Cancel)
19	25	EM (End of Medium)
1a	26	SUB (Substitute)
1b	27	ESC (Escape)
1c	28	FS (File Separator)
1d	29	GS (Group Separator)

Hex	Dec	Char
1e	30	RS (Request to Send)
1f	31	US (Unit Separator)
20	32	SP (Space)
21	33	! (Exclamation Mark)
22	34	" (Double Quote)
23	35	# (Number Sign)
24	36	$ (Dollar Sign)
25	37	% (Percent)
26	38	& (Ampersand)
27	39	` (Single Quote)
28	40	((Right / Closing Parenthesis)
29	41	) (Right / Closing Parenthesis)
2a	42	* (Asterisk)
2b	43	+ (Plus)
2c	44	, (Comma)
2d	45	- (Minus / Dash)
2e	46	. (Dot)
2f	47	/ (Forward Slash)
30	48	0
31	49	1
32	50	2
33	51	3
34	52	4
35	53	5
36	54	6
37	55	7
38	56	8
39	57	9
3a	58	: (Colon)
3b	59	; (Semi-colon)
3c	60	< (Less Than)
3d	61	= (Equal Sign)

Hex	Dec	Char
3e	62	> (Greater Than)
3f	63	? (Question Mark)
40	64	@ (AT Symbol)
41	65	A
42	66	B
43	67	C
44	68	D
45	69	E
46	70	F
47	71	G
48	72	H
49	73	I
4a	74	J
4b	75	K
4c	76	L
4d	77	M
4e	78	N
4f	79	O
50	80	P
51	81	Q
52	82	R
53	83	S
54	84	T
55	85	U
56	86	V
57	87	W
58	88	X
59	89	Y
5a	90	Z
5b	91	[(Left / Opening Bracket)
5c	92	\ (Back Slash)
5d	93	] (Right / Closing Bracket)

Hex	Dec	Char
5e	94	^ (Caret / Circumflex)
5f	95	_ (Underscore)
60	96	' (Grave Accent)
61	97	A
62	98	B
63	99	C
64	100	d
65	101	e
66	102	f
67	103	g
68	104	h
69	105	i
6a	106	j
6b	107	k
6c	108	l
6d	109	m
6e	110	n
6f	111	o
70	112	p
71	113	q
72	114	r
73	115	s
74	116	t
75	117	u
76	118	v
77	119	w
78	120	x
79	121	y
7a	122	z
7b	123	{ (Left/ Opening Brace)
7c	124	| (Vertical Bar)
7d	125	} (Right/Closing Brace)
7e	126	~ (Tilde)
7f	127	DEL (Delete)

Appendix E: Parameter Programming Examples

The following examples show you how to program parameters by scanning programming barcodes.

Program the Decode Session Timeout

Example: Set the decode session timeout to 5.0s

1. Scan the **Decode Session Timeout** barcode.
2. Scan the numeric barcodes “5” and “0”.
3. Scan the **Save** barcode.

Program the Timeout between Decodes

Example: Set the timeout between decodes to 5.0s

1. Scan the **Timeout between Decodes** barcode.
2. Scan the numeric barcodes “5” and “0”.
3. Scan the **Save** barcode.

Program the Image Stabilization Timeout

Example: Set the image stabilization timeout to 5.0s

1. Scan the **Image Stabilization Timeout** barcode.
2. Scan the numeric barcodes “5” and “0”.
3. Scan the **Save** barcode.

Program the Sensitivity Level

Example: Set the sensitivity level to 5

1. Scan the **Custom Sensitivity** barcode.
2. Scan the numeric barcode “5”.
3. Scan the **Save** barcode.

Appendix F: Digit Barcodes

0 ~ 5

0

1

2

3

4

5

6~ 9

6

7

8

9

A ~ F

A

B

C

D

E

F

Appendix G: Save/Cancel Barcodes

After reading numeric barcode(s), you need to scan the **Save** barcode to save the data. If you scan the wrong digit(s), you can either scan the **Cancel the Last Digit** barcode and then the correct digit, or scan the **Cancel All Digits** barcode and then the digits you want.

For instance, after reading the **Decode Session Timeout** barcode and numeric barcodes “1”, “2” and “3”, you scan:

- **Cancel the Last Digit:** The last digit “3” will be removed.
- **Cancel All Digits:** All digits “123” will be removed.

Save

Cancel the Last Digit

Cancel All Digits

Appendix H: Requently-Used Serial Commands

Feature	Serial Command
Set baud rate to 9600	7E 00 08 01 00 D9 D3 20 38
Set baud rate to 115200	7E 00 08 01 00 D9 D8 91 53
Save register data in EEPROM	7E 00 09 01 00 00 DE C8
Query the baud rate	7E 00 07 01 00 2A 02 D8 0F

After receiving the Query Baud Rate serial command, the engine may respond with one of the following messages.

Message	Baud Rate
02 00 00 02 C4 09 SS SS	1200
02 00 00 02 E2 04 SS SS	2400
02 00 00 02 71 02 SS SS	4800
02 00 00 02 39 01 SS SS	9600
02 00 00 02 D0 00 SS SS	14400
02 00 00 02 9C 00 SS SS	19200
02 00 00 02 4E 00 SS SS	38400
02 00 00 02 34 00 SS SS	57600
02 00 00 02 1A 00 SS SS	115200

Note: SS SS: CRC-CCITT checksum.

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