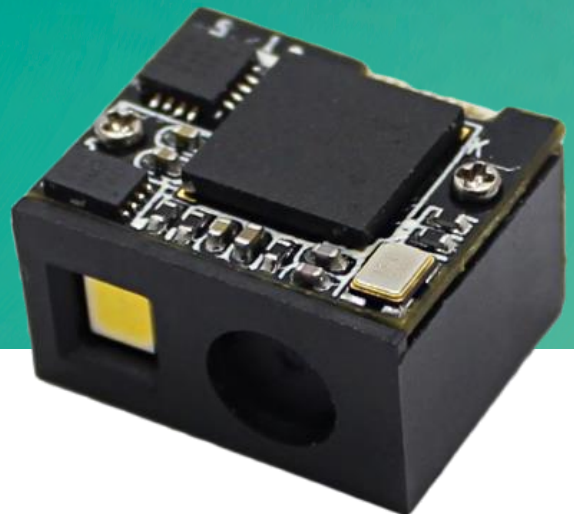




Newland

SCANNING MADE SIMPLE



EM3080-W

OEM scan engine

user guide

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Fujian Newland Auto-ID Tech. Co., Ltd.

3F, Building A, No.1, Rujiang West Rd., Mawei, Fuzhou, Fujian, China 350015

<http://www.newlandaidc.com>

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Chapter 1 Getting Started

Introduction

The NLS-EM3080-W OEM scan engine (hereinafter referred to as “the EM3080-W” or “the engine”), armed with the Newland patented **UIMG**, a computerized image recognition system, brings about a new era of 2D barcode scan engines.

The EM3080-W 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 EM3080-W supports all mainstream 1D as well as PDF417, QR Code (QR1, QR2, Micro QR), Data Matrix, GS1-DataBar™(RSS) (RSS-Limited, RSS-14, RSS-14 Stacked and RSS-Expand) and Chinese Sensible Code.

The EM3080-W 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, lightweight engine fits easily into even the most space-constrained equipment 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 EM3080-W. Users can configure the EM3080-W by scanning the programming barcodes included in this manual.

The EM3080-W has been properly configured for most applications and can be put into use without further configuration. Users may check **Appendix A: Factory Defaults Table** 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 EM3080-W. The EM3080-W 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 EM3080-W and receive decoded data through USB COM port.

Barcode Scanning

Powered by area-imaging technology and Newland patented **UIMG** technology, the EM3080-W 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 EM3080-W over the barcode.

Configuring the EM3080-W

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

Barcode Programming

The EM3080-W 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 EM3080-W 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+Ddatas; 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 bit1 and 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.

$$\text{Datas} = (0xD4 \& (! 0x03)) + 0x02 = 0xD6$$

Step 3: Write the value into the register.

serial command sent : 0x7E 0x00 0x08 0x01 0x00 0x00 0xD6 0xDF 0x22

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 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 | Reserved | |
| Bit 3-2 | Illumination: 00: OFF 01: Normal 10: 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 3-1 | Reserved | |
| Bit 0 | 1: Activate a decode session in the Command Trigger Mode (This decode session continues until the barcode is decoded or the decode session timeout expires.) | |
| 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 10: USB COM Port Emulation | 01: USB HID Keyboard 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 5-3 | EAN-13 add-on code: 000/001: Only decode EAN-13 barcodes without 2-digit/5-digit add-on code 010: Decode a mix of EAN-13 barcodes with and without 2-digit add-on code 011: Only decode EAN-13 barcodes with 2-digit add-on code 100: Decode a mix of EAN-13 barcodes with and without 5-digit add-on code 101: Only decode EAN-13 barcodes with 5-digit add-on code 110: Decode a mix of EAN-13 barcodes with and without 2-digit/5-digit add-on code 111: Only decode EAN-13 barcodes with 2-digit/5-digit add-on code | |
| Bit 2 | 1: Transmit EAN-13 check character 0: Do not transmit EAN-13 check character | |
| 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 character 0: Do not transmit Code 93 check character Note: Code 93 check character verification must be enabled for this parameter to function. | |
| Bit 5 | 1: Enable Code 93 check character 0: Disable Code 93 check character | |
| 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 5-3 | EAN-8 add-on code: 000/001: Only decode EAN-8 barcodes without 2-digit/5-digit add-on code 010: Decode a mix of EAN-8 barcodes with and without 2-digit add-on code 011: Only decode EAN-8 barcodes with 2-digit add-on code 100: Decode a mix of EAN-8 barcodes with and without 5-digit add-on code 101: Only decode EAN-8 barcodes with 5-digit add-on code 110: Decode a mix of EAN-8 barcodes with and without 2-digit/5-digit add-on code 111: Only decode EAN-8 barcodes with 2-digit/5-digit add-on code | |
| Bit 2 | 1: Transmit EAN-8 check character | 0: Do not transmit EAN-8 check character |
| Bit 1 | 1: Enable AIM ID prefix for EAN-8 | 0: Disable 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. | |
| Bit 0 | 1: Enable EAN-8 | 0: Disable EAN-8 |
| Register | 0x0014 | |
| Bit | Feature | |
| Bit 7 | Reserved | |
| Bit 6-4 | UPC-A add-on code: 000/001: Only decode UPC-A barcodes without 2-digit/5-digit add-on code 010: Decode a mix of UPC-A barcodes with and without 2-digit add-on code 011: Only decode UPC-A barcodes with 2-digit add-on code 100: Decode a mix of UPC-A barcodes with and without 5-digit add-on code 101: Only decode UPC-A barcodes with 5-digit add-on code 110: Decode a mix of UPC-A barcodes with and without 2-digit/5-digit add-on code 111: Only decode UPC-A barcodes with 2-digit/5-digit add-on code | |
| Bit 3 | Transmit UPC-A preamble character | |
| | 1: System character & country code | 0: System character |
| Bit 2 | 1: Transmit UPC-A check character | 0: Do not transmit UPC-A check character |
| Bit 1 | 1: Enable AIM ID prefix for UPC-A | 0: Disable 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. | |
| Bit 0 | 1: Enable UPC-A | 0: Disable UPC-A |

| Register | 0x0015 | |
|----------|---|---|
| Bit | Feature | |
| Bit 7 | 1: Enable UPC-E extend | 0: Disable UPC-E extend |
| Bit 6-4 | UPC-E add-on code: 000/001: Only decode UPC-E barcodes without 2-digit/5-digit add-on code 010: Decode a mix of UPC-E barcodes with and without 2-digit add-on code 011: Only decode UPC-E barcodes with 2-digit add-on code 100: Decode a mix of UPC-E barcodes with and without 5-digit add-on code 101: Only decode UPC-E barcodes with 5-digit add-on code 110: Decode a mix of UPC-E barcodes with and without 2-digit/5-digit add-on code 111: Only decode UPC-E barcodes with 2-digit/5-digit add-on code | |
| Bit 3 | 1: Transmit UPC-E system character | 0: Do not transmit UPC-E system character |
| Bit 2 | 1: Transmit UPC-E check character | 0: Do not transmit UPC-E check character |
| Bit 1 | 1: Enable AIM ID prefix for UPC-E | 0: Disable 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. | |
| Bit 0 | 1: Enable UPC-E | 0: Disable UPC-E |
| Register | 0x0016 | |
| Bit | Feature | |
| Bit 7 | 1: Transmit AIM 128 check character in the format of "~nnn" (nnn: ASCII decimal value of check character) 0: Do not transmit AIM 128 check character | |
| 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 character in the format of "~nnn" (nnn: ASCII decimal value of check character) 0: Do not transmit Code 128 check character | |
| 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 character in the format of "~nnn" (nnn: ASCII decimal value of check character) 0: Do not transmit UCC/EAN-128 check character | |
| 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 character 0: Do not transmit ITF-14 check character | |
| 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 character 0: Do not transmit Interleaved 2 of 5 check character Note: Interleaved 2 of 5 check character must be enabled for this parameter to function. | |
| Bit 2 | 1: Enable Interleaved 2 of 5 check character 0: Disable Interleaved 2 of 5 check character | |
| 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 character Note: Industrial 2 of 5 check character must be enabled for this parameter to function. | 0: Do not transmit Industrial 2 of 5 check character |
| Bit 5 | 1: Enable Industrial 2 of 5 check character | 0: Disable Industrial 2 of 5 check character |
| Bit 4 | 1: Enable 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. | 0: Disable AIM ID prefix for Industrial 2 of 5 |
| Bit 3 | 1: Enable Industrial 2 of 5 | 0: Disable Industrial 2 of 5 |
| Bit 2 | 1: Transmit ITF-6 check character | 0: Do not transmit ITF-6 check character |
| Bit 1 | 1: Enable 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. | 0: Disable AIM ID prefix for ITF-6 |
| Bit 0 | 1: Enable ITF-6 | 0: Disable ITF-6 |
| Register | 0x001A | |
| Bit | Feature | |
| Bit 7 | 1: Transmit Standard 2 of 5 check character Note: Standard 2 of 5 check character must be enabled for this parameter to function. | 0: Do not transmit Standard 2 of 5 check character |
| Bit 6 | 1: Enable Standard 2 of 5 check character | 0: Disable Standard 2 of 5 check character |
| Bit 5 | 1: Enable 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. | 0: Disable AIM ID prefix for Standard 2 of 5 |
| Bit 4 | 1: Enable Standard 2 of 5 | 0: Disable Standard 2 of 5 |
| Bit 3 | 1: Transmit Matrix 2 of 5 check character Note: Matrix 2 of 5 check character must be enabled for this parameter to function. | 0: Do not transmit Matrix 2 of 5 check character |
| Bit 2 | 1: Enable Matrix 2 of 5 check character | 0: Disable Matrix 2 of 5 check character |
| Bit 1 | 1: Enable 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. | 0: Disable AIM ID prefix for Matrix 2 of 5 |
| Bit 0 | 1: Enable Matrix 2 of 5 | 0: Disable Matrix 2 of 5 |

| Register | <i>0x001B</i> | |
|-----------------|--|--|
| Bit | Feature | |
| Bit 7 | 1: Enable 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. | 0: Disable AIM ID prefix for RSS-Expand |
| 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 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 RSS-Limited |
| 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 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 RSS-14 |
| Bit 0 | 1: Enable RSS-14 | 0: Disable RSS-14 |
| Register | <i>0x001C</i> | |
| 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 character Note: Code 39 check character must be enabled for this parameter to function. | 0: Do not transmit Code 39 check character |
| Bit 3 | 1: Enable Code 39 check character | 0: Disable Code 39 check character |
| 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 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 Code 39 |
| 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 character | 0: Do not transmit Code 11 check character Note: Code 11 check character verification must be enabled for this parameter to function. |
| Bit 4-2 | Code 11 Check Character Verification: 000: Disable 001: One check character, MOD11 010: Two check characters, MOD11/MOD11 011: Two check characters, MOD11/MOD9 100: One check character, MOD11 (Len <= 11); two check characters, MOD11/MOD11 (Len > 11) 101: One check character, MOD11 (Len <= 11); two check characters, 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 character | 0: Do not transmit Codabar check character Note: Codabar check character must be enabled for this parameter to function. |
| Bit 4 | 1: Enable Codabar check character | 0: Disable Codabar check character |
| Bit 3-2 | Codabar Start/Stop Character Format: 00: ABCD/ABCD 10: abcd/abcd 01: ABCD/TN*E 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 character Note: MSI-Plessey check character verification must be enabled for this parameter to function. | 0: Do not transmit MSI-Plessey check character |
| Bit 5-4 | MSI-Plessey Check Character Verification: 00: Disable 01: One check character, MOD10 10: Two check characters, MOD10/MOD10 11: Two check characters, MOD10/MOD11 | |
| Bit 3 | 1: Enable MSI-Plessey | 0: Disable MSI-Plessey |
| Bit 2 | 1: Transmit Plessey check character Note: Plessey check character must be enabled for this parameter to function. | 0: Do not transmit Plessey check character |
| Bit 1 | 1: Enable Plessey check character | 0: Disable Plessey check character |
| 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 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 MSI-Plessey |
| Bit 1 | 1: Enable AIM ID prefix for Plessey 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 Plessey |
| Bit 0 | 1: Enable AIM ID prefix for Codabar 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 Codabar |

| Register | <i>0x002B, 0x2A</i> | |
|-----------------|--|--|
| 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 | <i>0x004A</i> | |
| Bit | Feature | |
| Bit 7-4 | Reserved | |
| 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 | Reserved | |
| Register | <i>0x004B</i> | |
| Bit | Feature | |
| Bit 7 | Reserved | |
| Bit 6 | 1: Enable AIM ID prefix for Data Matrix 0: Disable AIM ID prefix for Data Matrix | |
| Bit 5-2 | Reserved | |
| Bit 1-0 | 11: Decode rectangular Data Matrix 00: Do not decode rectangular Data Matrix | |

| 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 10/11: Function Key Mapping | | 01: Emulate ALT+Keypad |
| 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: Finland 07: France 08: Austria, Germany 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 | |
| Register | 0x00C0 | |
| Bit | Feature | |
| Bit 7-5 | Reserved | |
| Bit 4 | 1: Enable AIM ID prefix for Chinese Sensible Code 0: Disable AIM ID prefix for Chinese Sensible Code | |
| Bit 3-1 | Reserved | |
| Bit 0 | 1: Enable Chinese Sensible Code | 0: Disable Chinese Sensible Code |

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 EM3080-W 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 EM3080-W 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 EM3080-W 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 | Factory 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 EM3080-W is connected to a host device through its USB interface, **USB COM Port Emulation** is enabled by default. User can switch between options – **USB DATAPIPE**, **USB HID Keyboard**, **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.



W030D00

USB DATAPIPE

USB HID Keyboard

When the engine is connected to the Host via a USB connection, you can enable the **USB HID Keyboard** 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.



W030D01

**** USB HID Keyboard**

Standard Keyboard

When the USB HID Keyboard 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



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.



WFF6B00

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



WFF6B01

2 - Belgium



WFF6B02

3 - Brazil



WFF6B03

4 - Canada



WFF6B04

5 - Czech



WFF6B05

6 - Denmark



WFF6B06

7 - Finland



WFF6B07

8 - France



WFF6B08

9 - Austria, Germany



WFF6B09

10 - Greece



WFF6B0A

11 - Hungary



WFF6B0B

12 - Israel



WFF6B0C

13 - Italy



WFF6B0D

14 - Latin America



WFF6B0E

15 - Netherland



WFF6B0F

16 - Norway



WFF6B10

17 - Poland



WFF6B11

18 - Portugal



WFF6B12

19 - Romania



WFF6B13

20 - Russia



WFF6B15

21 - Slovakia



WFF6B16

22 - Spain



WFF6B17

23 - Sweden



WFF6B18

24 - Switzerland



WFF6B19

25 - Turkey 1



WFF6B1A

26 - Turkey 2



WFF6B1B

27 - UK



WFF6B1C

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.



W080E08

**** Beep on Unknown Character**



W080E00

Do Not Beep on Unknown Character

Inter-Keystroke Delay

This parameter specifies the delay between emulated keystrokes.



WC06F00

**** No Delay**



WC06F40

Short Delay (5ms)



WC06F80

Medium Delay (10ms)



WC06FC0

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.



** Caps Lock OFF



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.



W030D02

**** 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 Keyboard.

Features:

- ✧ HID based, no custom driver required.
- ✧ Way more efficient in communication than USB HID Keyboard and traditional serial 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.



W030D03

HID-POS

Access the Engine 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:

| Byte | Bit | | | | | | | |
|-------|---------------------|---|---|---|---|---|---|------------------------|
| | 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 Continued |

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) |
|----------|------------------------|-----------|-----------|
| EM3080-W | USB DATAPIPE | 8001 | 32769 |
| | USB HID Keyboard | 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 timeout is infinite. 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.



W030003

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 timeout is infinite. To learn how to program this parameter, see **Appendix E: Parameter Programming Examples**.



M00031D

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

This parameter defines the amount of time that the engine waits for the image to stabilize to a point that it can be decoded with more accuracy. It 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: A 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.



W030001

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 timeout is infinite. To learn how to program this parameter, see **Appendix E: Parameter Programming Examples**.



M00031D

Decode Session Timeout

Chapter 4 Illumination

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.



**** Normal**



OFF



Always ON

Chapter 5 Notification

Mute Mode

Scanning the **Enable Mute Mode** can turn off all notification beeps.



W400000

Enable Mute Mode



W400040

****Disable Mute Mode**

Good Read Beep



W040E04

**** Good Read Beep On**



W040E00

Good Read Beep Off

Good Read Beep Frequency



WFF09DA

Low



WFF094B

** Medium



WFF0925

High

Good Read Beep Duration



WFF0A1F

40ms



WFF0A3E

** 80ms



WFF0A5D

120ms

Good Read LED



W800080

**** Good Read LED On**



W800000

Good Read LED Off

Decode Result Notification

If enabled, when a bad read occurs, “F” will be transmitted; when a good read occurs, “S” will be appended to the barcode data as the most left character.

Note: This feature is NOT available in USB DATAPIPE mode.



W400240

Enable Decode Result Notification



W400200

**** Disable Decode Result Notification**

Chapter 6 Prefix & Suffix

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

You 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.



WFFD981

Enable All Symbologies



WFFD982

Disable All Symbologies

Enable/Disable 1D Symbologies



WFFD983

Enable 1D Symbologies



WFFD984

Disable 1D Symbologies

Enable/Disable 2D Symbologies



WFFD985

Enable 2D Symbologies



WFFD986

Disable 2D Symbologies

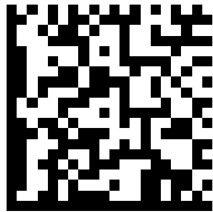
Video Reverse

The **Video Reverse** feature only applies to 2D barcodes.

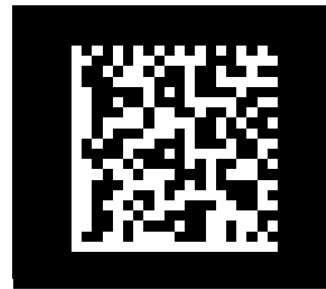
Regular barcode: Dark image on a bright background.

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



WFFD991

Restore the Factory Defaults of UCC/EAN-128

Enable/Disable UCC/EAN-128



W011701

** Enable UCC/EAN-128



W011700

Disable UCC/EAN-128

AIM 128

Restore Factory Defaults



WFFD992

Restore the Factory Defaults of AIM 128

Enable/Disable AIM 128



W101610

** Enable AIM 128



W101600

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 Character

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



** Transmit EAN-8 Check Character



Do Not Transmit EAN-8 Check Character

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 to 13 digits.



Enable EAN-8 Zero Extend



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

EAN-13

Restore Factory Defaults



WFFD995

Restore the Factory Defaults of EAN-13

Enable/Disable EAN-13



W011101

** Enable EAN-13



W011100

Disable EAN-13

Transmit Check Character

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



W041104

** Transmit EAN-13 Check Character



W041100

Do Not Transmit EAN-13 Check Character

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



WFFD997

Restore the Factory Defaults of ISBN

Enable/Disable ISBN



W011201

** Enable ISBN



W011200

Disable ISBN

Set ISBN Format



W041200

** ISBN-13



W041204

ISBN-10

UPC-E

Restore Factory Defaults



WFFD998

Restore the Factory Defaults of UPC-E

Enable/Disable UPC-E



W011501

** Enable UPC-E



W011500

Disable UPC-E

Transmit Check Character

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



W041504

** Transmit UPC-E Check Character



W041500

Do Not Transmit UPC-E Check Character

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.



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 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 Character

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



** Transmit UPC-A Check Character



Do Not Transmit UPC-A Check Character

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.



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 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.



W101410

UPC-A Add-On Code Required



W101400

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

Transmit Preamble Character

Preamble characters (Country Code and System Character) can be transmitted as part of a UPC-A barcode. Select one of the following options for transmitting UPC-A preamble to the host device: transmit system character only or transmit system character and country code ("0" for USA).



W081408

System Character & Country Code



W081400

**** System Character**

Interleaved 2 of 5

Restore Factory Defaults



WFFD99A

Restore the Factory Defaults of Interleaved 2 of 5

Enable/Disable Interleaved 2 of 5



W011801

** Enable Interleaved 2 of 5



W011800

Disable Interleaved 2 of 5

Check Character Verification

A check character is optional for Interleaved 2 of 5 and can be added as the last character. 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 Character After Verification: The engine checks the integrity of all Interleaved 2 of 5 barcodes to verify that the data complies with the check character algorithm. Barcodes passing the check will be transmitted except the last digit, whereas those failing it will not be transmitted.

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



W0C1800

** Disable



W0C1804

Do Not Transmit Check Character After Verification



W0C180C

Transmit Check Character After Verification

Transmit Appended "0"

If an Interleaved 2 of 5 barcode contains an odd number of characters, a leading zero must be appended to the barcode. 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.



WFFD99B

Restore the Factory Defaults of ITF-6



W011900

**** Disable ITF-6**



W051901

Enable ITF-6 But Do Not Transmit Check Character



W051905

Enable ITF-6 and Transmit Check Character

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.



Restore the Factory Defaults of ITF-14



Disable ITF-14



Enable ITF-14 But Do Not Transmit Check Character



** Enable ITF-14 and Transmit Check Character

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



WFFD99F

Restore the Factory Defaults of Matrix 2 of 5

Enable/Disable Matrix 2 of 5



W011A01

** Enable Matrix 2 of 5



W011A00

Disable Matrix 2 of 5

Check Character Verification



W041A00

**** Disable**



W0C1A04

Do Not Transmit Check Character After Verification



W0C1A0C

Transmit Check Character After Verification

Industrial 25

Restore Factory Defaults



WFFD9A0

Restore the Factory Defaults of Industrial 25

Enable/Disable Industrial 25



W081908

** Enable Industrial 25



W081900

Disable Industrial 25

Check Character Verification



W201900

**** Disable**



W601920

Do Not Transmit Check Character After Verification



W601960

Transmit Check Character After Verification

Standard 25

Restore Factory Defaults



WFFD9A1

Restore the Factory Defaults of Standard 25

Enable/Disable Standard 25



W101A10

** Enable Standard 25



W101A00

Disable Standard 25

Check Character Verification



**** Disable**



Do Not Transmit Check Character After Verification



Transmit Check Character After Verification

Code 39

Restore Factory Defaults



WFFD9A2

Restore the Factory Defaults of Code 39

Enable/Disable Code 39



W011C01

** Enable Code 39



W011C00

Disable Code 39

Transmit Start/Stop Character



W041C04

Transmit Start/Stop Character



W041C00

** Do Not Transmit Start/Stop Character

Check Character Verification



W081C00

**** Disable**



W181C08

Do Not Transmit Check Character After Verification



W181C18

Transmit Check Character After Verification

Enable/Disable Code 39 Full ASCII

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



W201C20

Enable Code 39 Full ASCII



W201C00

**** Disable Code 39 Full ASCII**

Codabar

Restore Factory Defaults



WFFD9A3

Restore the Factory Defaults of Codabar

Enable/Disable Codabar



W011E01

** Enable Codabar



W011E00

Disable Codabar

Check Character Verification



W101E00

**** Disable**



W301E10

Do Not Transmit Check Character After Verification



W301E30

Transmit Check Character After Verification

Transmit Start/Stop Character



W021E02

**** Transmit Start/Stop Character**



W021E00

Do Not Transmit Start/Stop Character

Start/Stop Character Format



W0C1E00

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



W0C1E04

ABCD/TN*E as the Start/Stop Character



W0C1E08

abcd/abcd as the Start/Stop Character



W0C1E0C

abcd/tn*e as the Start/Stop Character

Code 93

Restore Factory Defaults



WFFD9A4

Restore the Factory Defaults of Code 93

Enable/Disable Code 93



W081208

** Enable Code 93



W081200

Disable Code 93

Check Character Verification



Disable



**** Do Not Transmit Check Character After Verification**



Transmit Check Character After Verification

Code 11

Restore Factory Defaults



WFFD9A5

Restore the Factory Defaults of Code 11

Enable/Disable Code 11



W011D01

** Enable Code 11



W011D00

Disable Code 11

Check Character Verification



W1C1D00

Disable



W1C1D04

** One Check Character, MOD11



W1C1D08

Two Check Characters, MOD11/MOD11



W1C1D0C

Two Check Characters, MOD11/MOD9



W1C1D10

One Check Character, MOD11 (Len <= 11)
Two Check Characters, MOD11/MOD11 (Len > 11)



W1C1D14

One Check Character, MOD11 (Len <= 11)
Two Check Characters, MOD11/MOD9 (Len > 11)



W201D20

** Transmit Check Character



W201D00

Do Not Transmit Check Character

Plessey

Restore Factory Defaults



WFFD9A6

Restore the Factory Defaults of Plessey

Enable/Disable Plessey



W011F01

** Enable Plessey



W011F00

Disable Plessey

Check Character Verification



W021F00

Disable



W061F02

**** Do Not Transmit Check Character After Verification**



W061F06

Transmit Check Character After Verification

MSI-Plessey

Restore Factory Defaults



WFFD9A7

Restore the Factory Defaults of MSI-Plessey

Enable/Disable MSI-Plessey



W081F08

** Enable MSI-Plessey



W081F00

Disable MSI-Plessey

Check Character Verification



W301F00

Disable



W301F10

** One Check Character, MOD10



W301F20

Two Check Characters, MOD10/MOD10



W301F30

Two Check Characters, MOD10/MOD11



W401F40

** Transmit Check Character



W401F00

Do Not Transmit Check Character

RSS-14

Restore Factory Defaults



WFFD9A8

Restore the Factory Defaults of RSS-14

Enable/Disable RSS-14



W011B01

** Enable RSS-14



W011B00

Disable RSS-14

Transmit Application Identifier "01"



W041B04

** Transmit Application Identifier "01"



W041B00

Do Not Transmit Application Identifier "01"

RSS-Limited

Restore Factory Defaults



WFFD9A9

Restore the Factory Defaults of RSS-Limited

Enable/Disable RSS-Limited



W081B08

** Enable RSS-Limited



W081B00

Disable RSS-Limited

Transmit Application Identifier "01"



W201B20

** Transmit Application Identifier "01"



W201B00

Do Not Transmit Application Identifier "01"

RSS-Expand

Restore Factory Defaults



WFFD9AA

Restore the Factory Defaults of RSS-Expand

Enable/Disable RSS-Expand



W401B40

** Enable RSS-Expand



W401B00

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



WFFD9B1

Restore the Factory Defaults of Data Matrix

Enable/Disable Data Matrix



W080C08

** Enable Data Matrix



W080C00

Disable Data Matrix

Rectangular Barcodes



W034B03

** Decode Rectangular Barcodes



W034B00

Do Not Decode Rectangular Barcodes

Mirror Images



**** Decode Unmirrored DM Only**



Decode Mirrored DM Only



Decode Both

QR Code

Restore Factory Defaults



WFFD9B2

Restore the Factory Defaults of QR Code

Enable/Disable QR Code



W800D80

** Enable QR Code



W800D00

Disable QR Code

Micro QR



W049904

** Enable Micro QR



W049900

Disable Micro QR

Mirrored Micro QR



W089908

Decode Mirrored Micro QR



W089900

** Do Not Decode Mirrored Micro QR

Chinese Sensible Code

Restore Factory Defaults



WFFD9B3

Restore the Factory Defaults of Chinese Sensible Code

Enable/Disable Chinese Sensible Code



W01C001

**** Enable Chinese Sensible Code**



W01C000

Disable Chinese Sensible Code

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 COM Port Emulation | Other options: USB HID Keyboard, USB DATAPIPE, HID-POS. |
| USB HID Keyboard | 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 | | | |
| Illumination | | 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 | | CRLF | Options: Disabled, CR, TAB. |

| Parameter | Factory Default | Remark |
|------------------------------|-----------------|-------------------------------|
| Symbologies | | |
| Video Reverse | Disabled | Applicable to 2D 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 Character | 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 Character | 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 Character | 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 Character | Transmit | |
| 2-Digit Add-On Code | Disabled | |
| 5-Digit Add-On Code | Disabled | |
| Add-On Code | Not required | |
| System Character | Transmit | |
| Country Code | Do not transmit | |
| Interleaved 2 of 5 | | |
| Interleaved 2 of 5 | Enabled | |
| Check Character Verification | Disabled | |
| Check Character | 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 Character | Do not transmit | |
| ITF-14 | | |
| ITF-14 | Enabled | |
| Check Character | Transmit | |
| Matrix 2 of 5 | | |
| Matrix 2 of 5 | Enabled | |
| Check Character Verification | Disabled | |
| Check Character | Do not transmit | |

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

| Parameter | Factory Default | Remark |
|------------------------------|----------------------------|--------|
| Plessey | | |
| Plessey | Enabled | |
| Check Character Verification | Enabled | |
| Check Character | Do not transmit | |
| MSI-Plessey | | |
| MSI-Plessey | Enabled | |
| Check Character Verification | One check character, MOD10 | |
| Check Character | 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 | |
| Chinese Sensible Code | | |
| Chinese Sensible Code | Enabled | |

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 character verification |
| |]I1 | Transmit check character after verification |
| |]I3 | Do not transmit check character after verification |
| ITF-6 |]I1 | Transmit check character |
| |]I3 | Do not transmit check character |
| ITF-14 |]I1 | Transmit check character |
| |]I3 | Do not transmit check character |
| Matrix 2 of 5 |]X1 | No check character verification |
| |]X2 | Transmit check character after verification |
| |]X3 | Do not transmit check character after verification |
| Industrial 25 |]S0 | Not specified |
| Standard 25 |]R0 | No check character verification |
| |]R8 | One check character, MOD 7; do not transmit check character |
| |]R9 | One check character, MOD 7; transmit check character |

| Symbology | AIM ID | Remark |
|-------------------------------------|--------|---|
| Code 39 | JA0 | Transmit barcodes as is; Full ASCII disabled; no check character verification |
| | JA1 | One check character, MOD 43; transmit check character |
| | JA3 | One check character, MOD 43; do not transmit check character |
| | JA4 | Full ASCII enabled; no check character verification |
| | JA5 | Full ASCII enabled; MOD43; transmit check character |
| | JA7 | Full ASCII enabled; MOD43; do not transmit check character |
| Codabar | JF0 | Standard Codabar |
| | JF2 | Transmit check character after verification |
| | JF4 | Do not transmit check character after verification |
| Code 93 | JG0 | Not specified |
| Code 11 | JH0 | One check character, MOD11; transmit check character |
| | JH1 | Two check characters, MOD11/MOD11; transmit check character |
| | JH3 | Do not transmit check character after verification |
| | JH8 | Two check characters, MOD11/MOD9; transmit check character |
| | JH9 | No check character verification |
| Plessey | JP0 | Not specified |
| MSI Plessey | JM0 | One check character, MOD10; transmit check character |
| | JM1 | One check character, MOD10; do not transmit check character |
| | JM7 | Two check characters, MOD10 /MOD11; do not transmit check character |
| | JM8 | Two check characters, MOD10 /MOD11; transmit check character |
| | JM9 | No check character verification |
| RSS-14 RSS-Limited RSS-Expand | Je0 | |
| PDF417 | JL0 | Comply with 1994 PDF417 specifications |
| Data Matrix | jd0 | ECC 000 - 140 |
| | jd1 | ECC 200 |
| | jd2 | ECC 200; FNC1 is the 1st or 5th character after the start character |
| | jd3 | ECC 200; FNC1 is the 2nd or 6th character after the start character |

| Symbology | AIM ID | Remark |
|-----------------------|--------|--|
| |]d4 | ECC 200, ECI protocol supported |
| |]d5 | ECC 200; FNC1 is the 1st or 5th character after the start character; 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 |
| Chinese Sensible Code |]h0 | ECI protocol not supported |
| |]h1 | ECI protocol supported |

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) |
| Chinese Sensible Code | 39 | g(0x67) |

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 | ((Left / Opening 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



D000000

0



D000001

1



D000002

2



D000003

3



D000004

4



D000005

5

6~ 9



6



7



8



9

A ~ F



D00000A

A



D00000B

B



D00000C

C



D00000D

D



D00000E

E



D00000F

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.



D 0 0 0 0 1 2

Save



D 0 0 0 0 1 0

Cancel the Last Digit



D 0 0 0 0 1 1

Cancel All Digits

Appendix H: Frequently-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.



Newland

SCANNING MADE SIMPLE

Newland EMEA HQ

+31 (0) 345 87 00 33
info@newland-id.com
newland-id.com

D-A-C-H

+49 (0) 6182 82916-16
info@newland-id.de

Benelux

+31 (0) 345 87 00 33
benelux@newland-id.com

Italy

+39 (0) 342 0562227
italy@newland-id.com

United Kingdom

+44 (0) 1442 212020
sales@newland-id.co.uk

South Africa

Gauteng: +27 (0) 11 553 8010
Cape Town: +27 (0) 21 9140819
info@newland-id.co.za

Turkey

+90 (0) 544 538 40 49
turkey@newland-id.com

France

+39 (0) 345 8804096
france@newland-id.com

Ibérica

+31 (0) 345 87 00 33
info@newland-id.com

Nordic & Baltic

+46 (0) 70 88 47 767
nordic@newland-id.com

Russia

+31 (0) 345 87 00 33
russia@newland-id.com

Middle East

+39 (0) 345 8804096
middleeast@newland-id.com

Iran

+90 (0) 544 538 40 49
iran@newland-id.com