Newland

NLS-EM2027

2D Barcode Scan Engine

Integration Guide

Pre-release version 09/08/26

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About this guide

Introduction

This NLS-EM2027 (“EM2027”) Scan Engine Integration Guide provides general instructions for OEM integration.

Chapter Description

About EM2027/EM2027M: The chapter of About EM2027 gives a brief description of the EM2027. It covers the general, overall specifications of the EM2027/EM2027M.

Mechanical Interface: The chapter of Mechanical Interface describes the mechanical interface of the EM2027/EM2027M. It includes the dimensions and locations of EM2027/EM2027M mechanical components.

Electrical Interface: The chapter of Electrical Interface describes the electrical interface of the EM2027. It mainly explains the EM2027/EM2027M interface socket and flex cable. Samples of schematics are also included.

Software Interface: The chapter of Software Interface describes the software interface of EM2027/ EM2027M. It has the serial communication protocols for queries and commands.

Development Tools: The chapter of EM2027/EM2027M Development Tools lists the development tools and brief descriptions of the tools.

Programming the Engine: The chapter of Configuration lists all the configurations of EM2027/EM2027M. The configuration can be done through pre-printed configuration barcodes, serial port commands, and/or Quickset, a Newland Auto-ID software package.

Graphic Notations

Tool – Handy item for a task.

Attention – Important subject to be aware of or to avoid.

Tips – Helpful information about a topic or a feature.

Example – Illustration of how to use a feature.

Newland Auto-ID Support Center

If you have any problem with your equipment, contact the Newland Support Center in your region. Before calling, have the model number, serial number, and several of your barcodes at hand.

Call the support Center from a phone near the scanning equipment so that the service person can try to talk you through your problem. If the equipment is found to be working properly and the problem is barcode readability, the Support Center will request samples of your bar codes for analysis at our plant.

If your problem cannot be solved over the phone, you may need to return your equipment for servicing. I f that is necessary, you will be given specific directions.

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About EM2027/EM2027M

Introduction

EM2027/EM2027M is an embedded barcode reading engine. Its gray scale CMOS image capturer and the Newland patented UIMG, a Computerized Image Recognition System, ensure the fast scanning and decoding accuracy on different barcode media such as paper, plastic card, and metal surface. It can be easily integrated into OEM equipments or systems (hand-held, portable, and mounted) to provide solutions for image capture, barcode reading, and barcode message processing.

EM2027 opens its image acquisition interface and camera control to OEM developers to allow their special integration needs. EM2027/EM2027M Software Development Kit is provided for easy and quick development of OEM applications.

Highlights of the EM2027/EM2027M

- Compact design allowing easy integration into OEM equipments and systems.
- Outstanding decoding performance for major 1D and 2D barcodes.
- High performance CPU and image capture module ensuring fast and accurate scans.
- Easy OEM software development and firmware upgrade.

Unpacking

Remove EM2027 and accessories from the package. Check for missing parts and inspect for damage. EM2027/EM2027M is packed in anti-static bag. Please handle accordingly.

If there is any damage or missing parts, please contact your supplier at once. Keep the original package for return services, if necessary.

Outline of EM2027/EM2027M

The EM2027/2027M is made of an image capture module and a decoding board connected by a 24-pin flex cable.

The outlines of EM2027 and EM2027M image capture modules are shown in Figure 1 and Figure 2, respectively. The topside of either module has the electrical control components, including a flex cable socket through which the module connects to the decoding board.

The front side has the optical components, such as Image Lens, through which EM2027/EM2037M captures images, Aiming Light, which projects a rectangular, green light beam for aiming, and illumination lights, which illuminate the barcode.

A bracket covers the sides and bottom of the Engine. Mounting holes on the bottom side are available for mounting the Engine to external device.

The back side is CMOS circuit for image capture.

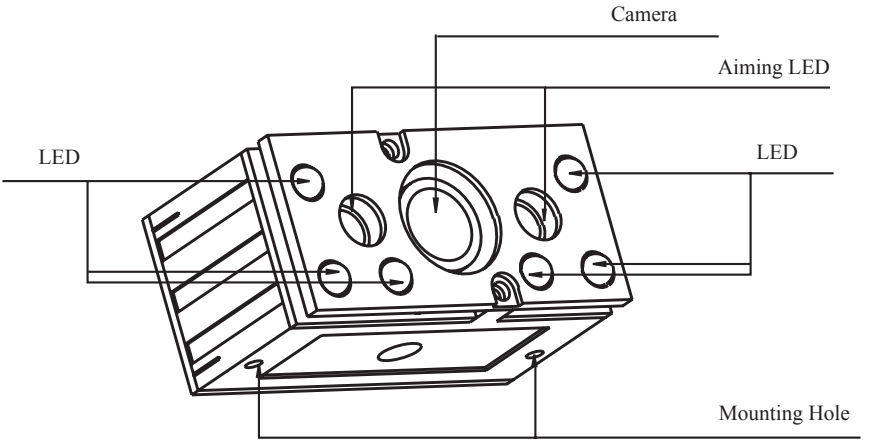


Figure 1. EM2027 Scan Engine

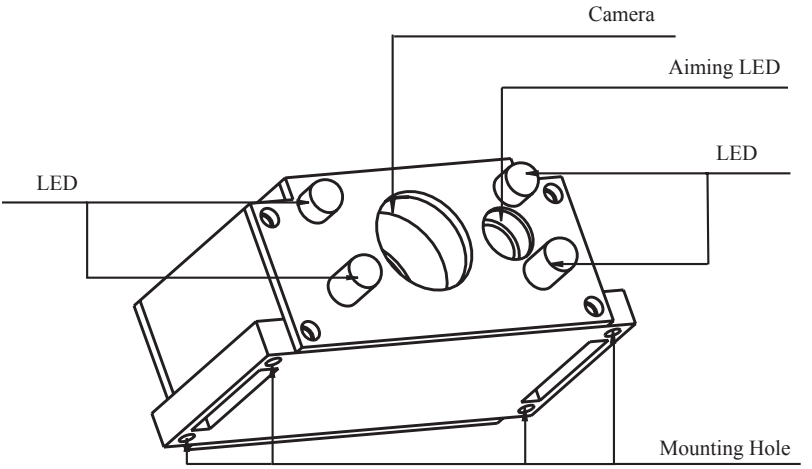


Figure 2. EM2027M Scan Engine

Figure 3 shows the outline of EM2027/EM2027M decoding board. It has a 24-pins flex cable socket that connects to the image capture module. There are 4 sockets to connect to external dsevices/components. A 14-Pins flex cable socket is for RS232 serial port and power connection; a 4-pins socket is for USB and power connection; another 14-pins flex cable socket is for LEDs and trigger control; a 2-pins socket is for beeper control. The beeper is optional for EM2027/EM2027M. It is recommended that power be provided through RS232 and power socket or USB and power socket, but not both.

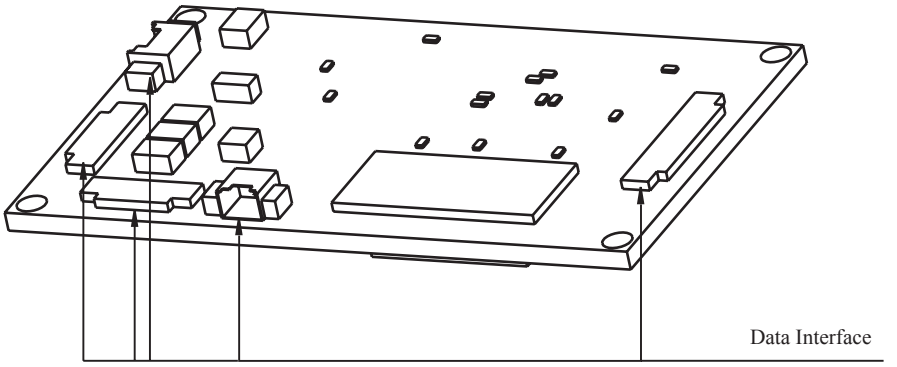
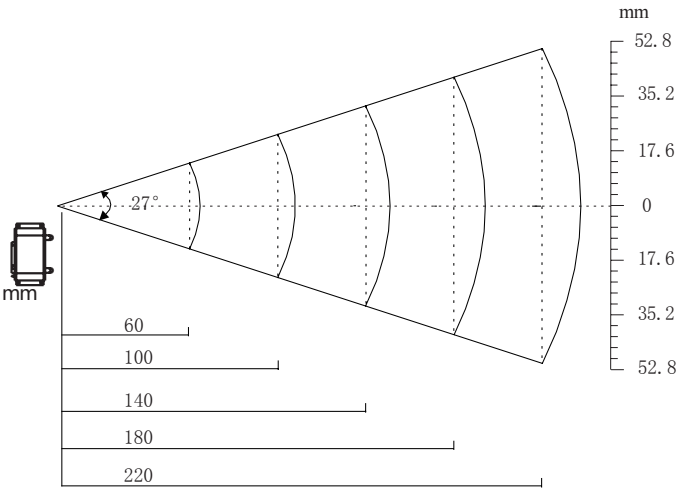


Figure 3. EM2027/EM2027M Decoding Board

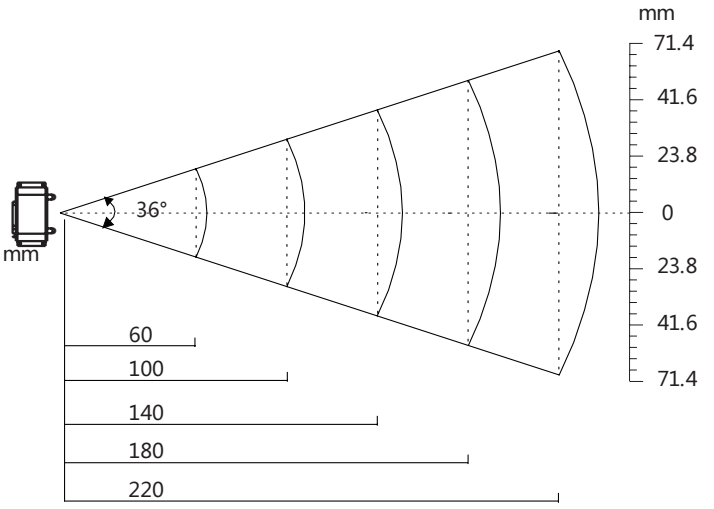
EM2027 Decode Zone

Here is the EM2027 Decode Zone.
The view angle of the EM2027 camera is 27° . Following figure shows the decode zone of the engine.



EM2027M Decode Zone

Here is the EM2027M Decode Zone.
The view angle of the camera is 36° . Following figure shows the decode zone of the engine.



Following table lists the decode ranges of EM2027/EM2027M for different barcode types and densities.

Barcode	Density(mil)	Near(mm)	Far(mm)
1D Code	5	40	90
2D Code	10	30	180
PDF417	5	40	90
PDF417	10	30	180
QR Code	10	30	110
QR Code	15	30	190
Data Matrix	10	30	120
Data Matrix	15	30	170

Image Capture Specifications		
Image Sensor		CMOS, gray scale
Resolution	EM2027	640*480
	EM2027M	752*480
Barcode Scan Specifications		
Symbols	2D	PDF417, QRCode(Model1/2), DataMatrix(ECC200, ECC000, 050, 080,100,140), Aztec, Chinese-Sensible Code, Maxi-code, LP Code, etc.
	1D	Code128, EAN-13, EAN-8, Code39, UPC-A, UPC-E, Codabar, China post 25, Interleaved 2of 5, ISBN/ISSN, Code 93, etc
Precision		≥ 3mil
Depth of Scan Field		45 mm ~ 450 mm
Print Contrast Ratio		≥ 25%
Roll		360°
Pitch		45°
Yaw (skew)		45°
Illumination Specifications		
Light Source		LED (630nm ± 10nm)
Light Intensity		330 LUX (130 mm)
Electrical and Mechanical Specifications		
Voltage		DC 5 V
Current	Max	400 mA
	Working	300 mA
Height		13.5 mm
Width		28 mm
Length		24.5 mm
Weight		28 g
Environment Specification		
Operating Temperature		-5℃ - +45℃
Storage Temperature		-40℃ - +60℃
Humidity		5% - 95% (non-condensing)
Ambient Illumination		0 ~ 100,000 LUX
Compliance		
Compliance		FCC Part15 Class B, CE EMC Class B
Other Packages		
Configuration and Testing Software		QuickSet
Evaluation Kit		EVK2027
Software Development Package		SDK

Mechanical Interface

Introduction

This section describes the Mechanical Interface.

Following figures show the dimensions of EM2027. Figure 4 EM2027 Front View has the width and height dimensions. The height of the EM2027 is from the bottom of EM2027 to the top of highest component on the topside.

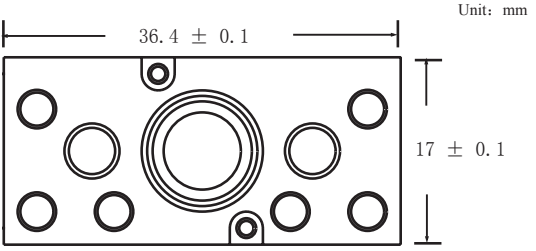


Figure 4. EM2027 Sensor Front View

The Figure 5 EM2027 Right Side View has the length dimensions.

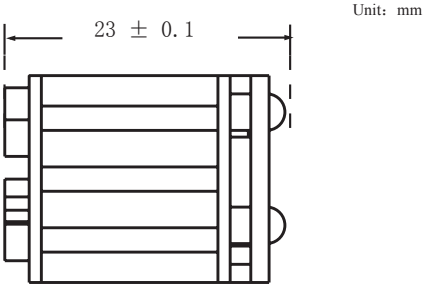


Figure 5. EM2027 Sensor Right Side View

The figure 6 EM2027 Bottom View has the mounting screw specification. The mounting screw is M2, 2mm screw. The length of the screw into EM2027 must be less than 3 mm.

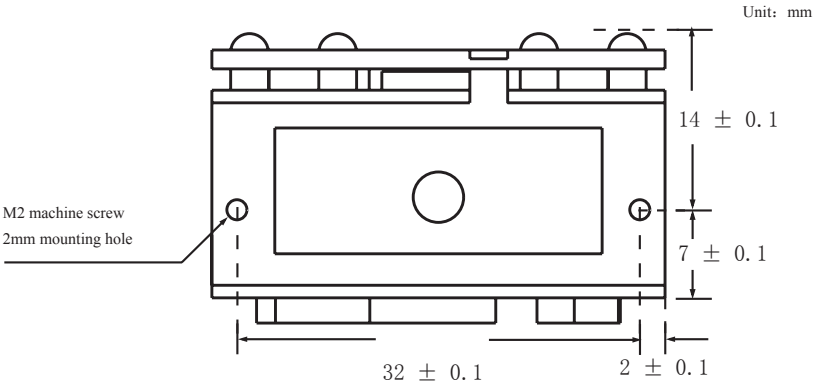


Figure 6. M2027 Sensor Bottom View

Following figures show the dimensions of EM2027M. Figure 7 EM2027M Front View has the width and height dimensions. The height of the EM2027M is from the bottom of EM2027M to the top of highest component on the topside.

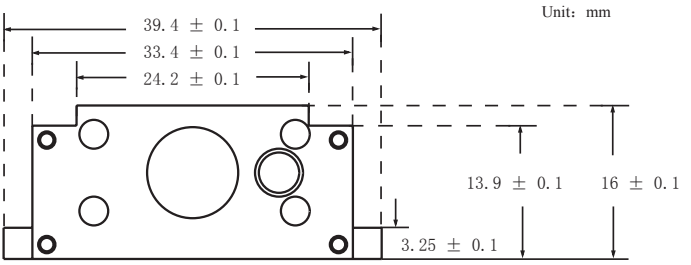


Figure 7. EM2027M Sensor Front View

The Figure 8 EM2027M Right Side View has the length dimensions.

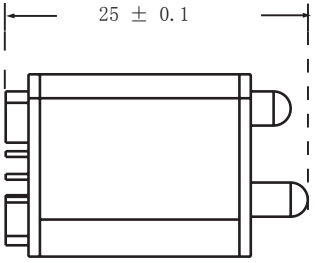


Figure 8. EM2027M Sensor Right Side View

The figure 9 EM2027M Bottom View has the mounting screw specification. The mounting screw is M2, 2mm screw. The length of the screw into EM2027M must be less than 3 mm.

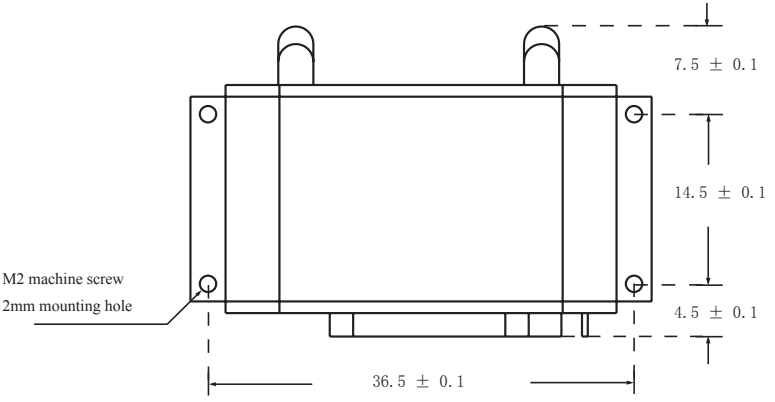


Figure 9. M2027M Sensor Bottom View

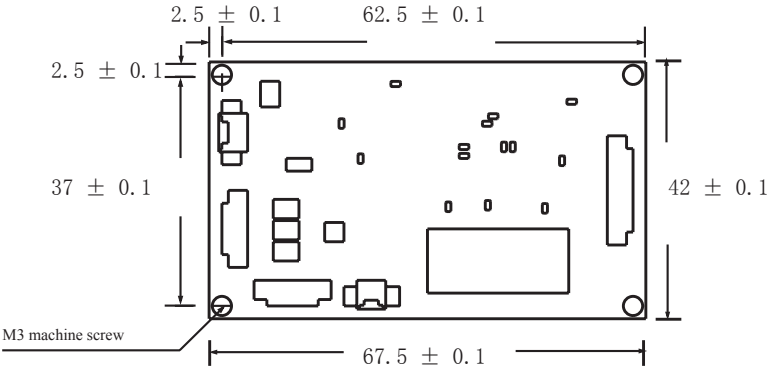


Figure 10. EM2027/EM2027M Decoding Board Bottom View

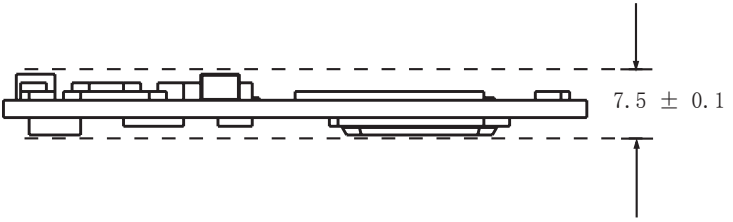


Figure 11. EM2027/EM2027M Decoding Board Right Side View

There are 5 sockets on EM2027/EM2027M decoding board. The socket on the right in the figure 10 below is the socket that connect to the image module. Please use the provided flex cable to connect them.

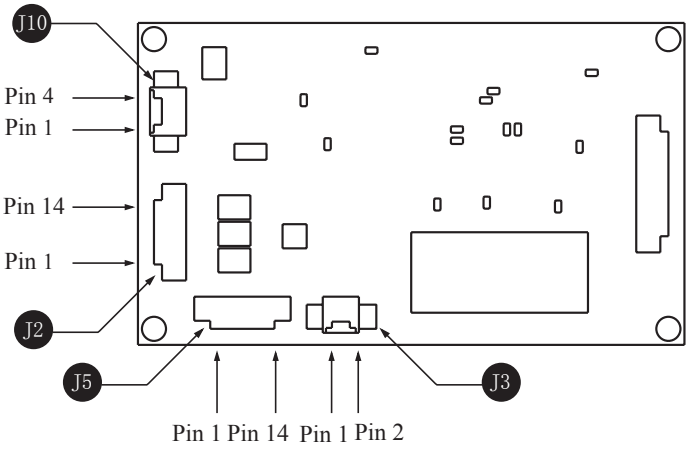


Figure 12. Interface Socket Position

Socket J2 – RS232 and Power Port

J2 is a 14-pins flex cable. Its part number is Molex 52746-1470.
The definitions of the Pins are listed below.

Pin	Function
Pin 1	Power pin, VDD:5.0V
Pin 2	Power pin, VDD:5.0V
Pin 3	Power pin, VDD:5.0V
Pin 4	No Connection
Pin 5	No Connection
Pin 6	Serial data output, RS
Pin 7	Serial data input, RS
Pin 8	No Connection
Pin 9	No Connection
Pin 10	No Connection
Pin 11	No Connection
Pin 12	Power and Signal Ground
Pin 13	Power and Signal Ground
Pin 14	Power and Signal Ground

If power is provided through this socket, it is recommended not to provide power through USB and Power socket at the same time.

Socket J5 – LED and Trigger Port

LED and Trigger port is a flex socket. Its part number is Molex 52745-1496.
The definitions of Pins are listed below.

Pin	Function
Pin 1	No Connection
Pin 2	No Connection
Pin 3	No Connection
Pin 4	No Connection
Pin 5	No Connection
Pin 6	No Connection
Pin 7	No Connection
Pin 8	No Connection
Pin 9	No Connection
Pin 10	LED 1 Anode
Pin 11	LED 1 Cathnode
Pin 12	LED 2 Anode
Pin 13	LED 2 Cathnode
Pin 14	Trigger Signal, pull low longer than 10ms to initial reading

Socket J3 – Beeper Port

Beeper port is a DuPont JS-1147H-02 socket.
The definitions of the Pins are listed below.

Pin	Function
Pin 1	Cathnode
Pin 2	Anode

Beeper is optional.

Socket J10 – USB and Power Port

USB and Power Port is a DuPont JS-1147H-04.
The definitions of the Pins are listed below.

Pin	Function
Pin 1	Power pin, VDD:5.0V
Pin 2	D-
Pin 3	D+
Pin 4	Power and Signal Ground

If power is provided through this socket, it is recommended not to provide power through RS232 and Power socket at the same time.

Housing Structure

The housing for the Engine should be wide enough not to put any pressure on the Engine. There should be sufficient space for the flexible cable, and stress release of the cable should also be considered.

Scan Window

A scan window is needed to protect camera lens, aiming light, and illumination lights. This scan window design should follow:

- » Housing must not block or shade illumination LED’ s, aiming light, and camera lens.
- » Use high transparent and scratch resistant material. Please refer to following specifications:

Total light transmittance (%)	≥90% (ASTM D 1008)
Haze (%)	<1.0% (ASTM D 1008)
Stylus	≥4H (JIS K 5400)

- » The gap between housing window and illumination LED (highest point) should be less than 5 mm.
- » The window must be perpendicular to the surface of the front plate of the EM2027/EM2027M.

Temperature

Electrical and other components generate heat. Especially under continuous operation, the temperature of the Engine will be high. The methods below are for heat concerns:

- » A radiator on top of the engine is recommended
- » Do not surround or wrap the Engine by rubber or any material that obstruct the heat dissipation.

Electrical Interface

Introduction

This section describes the electrical specifications of the interface signals.

The table below lists the interface input and output level voltage ranges

Symbol	Description	Min	Max	Units
Input DC Operating Conditions				
VIH[1]	Input high voltage, all standard input and I/O pins, relative to applicable VCC (VCC_IO, VCC_MEM, VCC_BB, VCC_LCD, VCC_USB, or VCC_USIM)	2.64	3.4	V
VIL[1]	Input low voltage, all standard input and I/O pins, relative to applicable VCC (VCC_IO, VCC_MEM, VCC_BB, VCC_LCD, VCC_USB, or VCC_USIM)	-0.1	0.66	V
Output DC Operating Conditions				
VOH[1]	Output high voltage, all standard input and I/O pins, relative to applicable VCC (VCC_IO, VCC_MEM, VCC_BB, VCC_LCD, VCC_USB, or VCC_USIM)	3.0	3.3	V
VOL[1]	Output low voltage, all standard input and I/O pins, relative to applicable VCC (VCC_IO, VCC_MEM, VCC_BB, VCC_LCD, VCC_USB, or VCC_USIM)	0	0.3	V

Notes:

1、Programmable drive strengths set to 0x5 for memory and LCD programmable signals.

2、The current for the high-strength pins are MA<25:0>, MD<31:0>, nOE, nWE, nSDRAS, nSDCAS, DQM<3:0>, nSDCS<3:0>, SDCKE<1>, SDCLK<3:0>, RDnWR, nCS<5:0>, and nPWE.

3、The current for all other output and I/O pins are low strength.

Input Signals

» Trigger Input

When the Trigger line is pull low for 10 ms, the Engine starts a read. The Engine keeps reading until a successful reading or the line is high. After a successful reading, the line must go high in order to make another reading.

Output Signals

Here are the descriptions of the output signals, beeper and LED. They can be used to detect the status of the scanning and the state of the Engine.

» LED Outputs

When the Engine completes the initialization, the LED 1 line is high. The LED 2 line goes low for 50 ms twice with 50 ms in between after a successful reading and, if programmed, transmission of the code message.

» Beeper Output

Table below is the definitions of the beeper outputs:

Beep Pattern	Definition
Low-higher-higher-higher	Power ON completed
1 beep	Successful reading of an ordinary barcode
2 beeps	Successful reading of an programming barcode
3 short low-2 high	Reading failure
1 long low	Unknown Character, Virtual Keypad (USB connection)

A sample schematic of beeper circuit

Here is a beeper circuit used in the evaluation board, EVK2027. The beeper can be TDK RU2240L75CG.

Figure 13. Beeper Circuit

A sample schematic of LED circuit

Here is the LED circuit and the trigger used in the evaluation board, EVK2027.

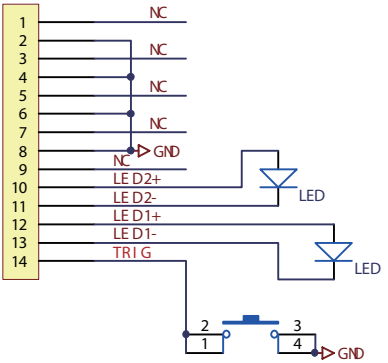


Figure 14. LED Circuit

A sample schematic of RS232 circuit

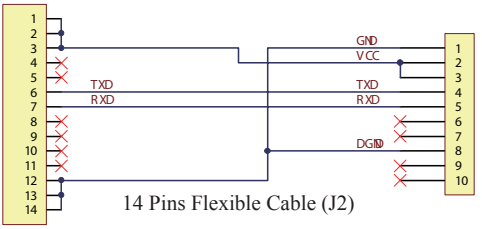


Figure 15. RS232 Circuit

A sample schematic of USB circuit

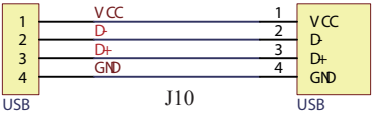


Figure 16. USB Circuit

Here is the timing diagram illustrates a typical reading sequence.

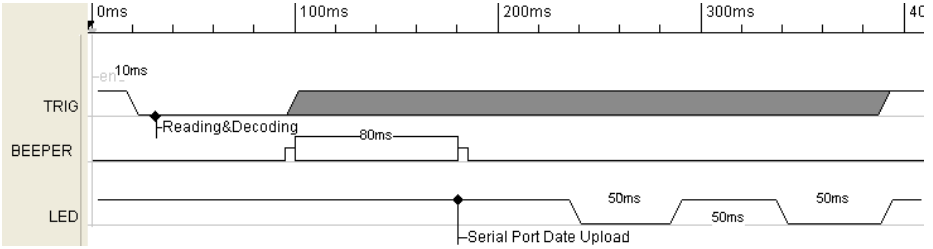


Figure 17. Typical Reading Sequence Timing Diagram

Software Interface

Introduction

The simpliest way to interface with EM2027/EM2027M is to just listen to the serial output from the Engine. Leave the trigger, reset, beeper, and LED signals to the hardware. With proper configuration, the default firmware will send the decoded barcode messages through the serial output. However, if more controls of the Engine are required, the rest of this section describes the software interface with the Engine.

Trigger EM2027/EM2027M for a Reading

EM2027/EM2027M will start a reading when the trigger pin of the flex cable is pulled low (hard trigger) or when EM2027/EM2027M is in the sensor mode and it senses the trigger condition is met (auto scan).

Hard Trigger

If the trigger line is connected to an output port of external device, the control software of the external device (Host) can pull the line low. The Engine will start to read barcode after 10 ms. The engine will keep reading until it acquired a barcode image that has a recognized barcode, valid or not.

If a valid reading is found, the default function is that the beeper line will send a 1-beep pattern and the decoded barcode message will be sent through the serial out line.

After the barcode message is transmitted or the recognized image containing invalid image, the LED line will go low for 50 ms twice with 50 ms apart.

To start next reading, the trigger line must be pulled high before next trigger to read.

Auto Scan

The Engine can be in sensor mode (or auto scan mode.) See Configuration section for detail. When the ambient light changes, the Engine will automatically make a read. If a valid read is found, the default function is to send the decoded barcode messages.

Continuous Scan Mode

Another scan mode is continuous scan mode. When the Engine is in this mode, it will keep acquiring images and trying to read a code. When it reads a code, it sends the code to the serial port.

This section introduces the serial communication. The default serial port configuration is baud rate of 9600, 8 data bits, no parity bit, and 1 stop bit. It is important to match the serial port configuration between EM2027/EM2027M and the Host. Both EM2027/EM2027M and Host can initiate communication.
Here are some conventions used in this section:

0xHH	A hexadecimal number. For example, 0xAB and 0x1234 are hexadecimal values of 171 and 4660, respectively.
<xxx>	ASCII control character. For example, <ACK> and <NAK> means ASCII control characters, 0x06 and 0x1F, respectively.
“…” or ‘…’	ASCII String. For example, “AUTO-ID” and ‘AUTO-ID’ means same ASCII string, AUTO-ID.

EM2027/EM2027M Initiated Data Upload

EM2027/EM2027M initiates communication only to send system information on power on, when enabled, and barcode messages. No reply from Host is expected.

System Information

Name	Description
Dev	Device type
Ver	BIOS version
Date	BIOS version establishing time
S/N	Device serial number
ESN	User-defined device serial number
Interface	3 types of communication interfaces: 1. USB, HID-KBW, DataPipe, Virtual RS232. 2. RS232, baud rate, parity check, data bits, stop bit 3. PS/2
1D	List of enabled 1D symbols. Each code is divided by comma. Additional features of the code are appended as: 1. “+” connects features 2. Min Message Length -> Max Message Length 3. “No Check Digit” or “Check Digit” 4. “Fixed Lengths: 2~64, even value” in the form of 2 4 6 8 10 12...
2D	List of enabled 2D.symbols. Each code is divided by comma. Additional feature of the code is appended as: Min Message Length -> Max Message Length
Scan Mode	Scan Mode: 1. Manual Scan = “Hand-held Mode” 2. Auto Scan = “Continuous Mode” 3.Induced Scan = “Sensor(smart) Mode”

The message upload format is in binary. It is the binary value of the decoded barcode value including prefix, suffix, and so on.

There are three methods to determine the end of barcode message.

Method 1: LED Signal

At end of the data upload the Engine will set the LED line low for 50 ms twice with 50 ms apart.

Host can read the LED line input to detect the end of data upload if the line is connected to the input port.

Method 2: Inter-Character Timeout

Host could use inter-character timeout to determine the end of data upload. An inter-character timeout means the longest delay time between 2 consecutive (binary) characters in a sequence of (binary) characters sent over serial line. It is usually enabled only after the first character is received to avoid unwanted timeout events during the waiting of a message.

The inter-character timeout value should be set to about 5 times of a character’s transmission time. When the inter-character timeout occurs, it is the end of data upload. For example, 5 ms can be used as an inter-character timeout for the baud rate of 9600, 8 data bit, no parity bit, and one stop bit.

Method 3 : Message packing

Message pack uses framing protocol format. The Engine has 3 message pack options, Normal Pack, ESC_BANK, and ESC_AddLen. Factory default has message pack disabled. More detail about message Pack option is in next chapter. Here only the reason of each pack option can be used to determine end of transmission is discussed.

Normal Pack format: <STX> + <NULL> + LEN + AL_TYPE + DATA + LRC
Host listens to <STX>(0x02) and <NULL>(0x00) as beginning of a message. Using the LEN field, which has the size of the message, the Host can determine how many bytes to receive. The receiving timeout can then be treated as fault condition. Along with the ending <ETX>(0x03, and LRC) check sum byte, field, the Host can further determine the correctness of the message received.

ESC_BANK format : <STX> + DATA + <ETX> + BCC
The Host listens to <STX> as beginning of a message. It stops receiving after the <ETX> and BCC, check sum, byte. BCC is used to check the correctness of a message. However, because the Engine does not do byte-stuffing, DATA field cannot contain <ETX>; otherwise, error will occur.

ESC_AddLen format: : <STX> + LEN + DATA + <ETX> + BCC
This format is an improved format of ESC_BANK. Using the LEN field could prevent the error of having <ETX> in the DATA field.

Host can initiate following commands.

1. Are-You-There Command

This command is to query RS232 connection between the Host and EM2027/EM2027M.

Host Command	'?' (or 0x3F)	
EM2027/EM2027M Reply		'!' (or 0x21)

The maximum delay of EM2027/EM2027M reply is 500 ms.

2. Pro CMD Commands

This set of commands are to configure the Engine. To confirm that a command is properly executed, use query command to retrieve the actual value in EM2027/EM2027M.

2.1. Pro CMD Format

Host can send Pro CMD command following prefix, "NLS" (all upper case) or "nls" (all lower case). A Pro CMD command consists of command code and optional command parameter. If command parameter is consisted, it should be a '=' before parameter in the Pro CMD command.

"nls" + Command Code [+ '=' + parameter]

The Pro CMD command is an ASCII string. The parameter can be decimal, such as '9876', hexadecimal, such as '0x0a0d', or ASCII string, such as ' "AUTO-ID" '.

NOTE: The double quotes in the ASCII string are part of the parameter, not the convention for ASCII string. The Engine uses them to know the beginning and the end of string parameter.

Upon receiving Pro CMD command(s), the Engine will reply a <ACK>(0x06) or <NAK>(0x15) within 500 ms. The Engine replies <ACK> when command is correct; otherwise, it replies <NAK>.

2.2. Sample Pro CMD Commands

This Pro CMD command sets the Engine in auto (sensor) reading mode: "NLS0302010".
This setting command sets sensitivity value of the auto reading mode to 10:
"NLS0312040=10".
This setting command set the user defined prefix to AUTO-ID: 'nls0300000="AUTO-ID"'
More Pro CMD commands are in Programming the Engine chapter.

3. Query Commands

Host uses query command to query data from the Engine. The maximum delay of the Engine’s reply is 500 ms.

3.1 The Query Command Format:

The format of query Command Format:

Command Prefix		Lens		Data1	LRC
0x7E	0x00	Len Hi	Len Low		LRC

Where:

Command Prefix – A two-byte prefix field. Always 0x7E, 0x00.

Lens – A two-byte length field.
Len Hi is the high (most significant) byte of the Lens field. Len Low is the low byte of the field.

Data1 – Command dependent Data1 field. Maximum size depends on the value of Len HI.

LRC – A one-byte LRC field.
LRC = 0xFF xor Len Hi xor Len Low xor Type xor Data1.

3.2. The Query Reply Format:

Reply Prefix		Lens		Data Type	Data1	LRC
0x02	0x00	Len Hi	Len Low	0x34		LRC

Where:

Reply Prefix – A two-byte prefix field. Always 0x02, 0x00.

Lens – A two-byte length field. The total number of bytes in Data Type field and Data1field.
Len Hi is the high (most significant) byte of the Lens field. Len Low is the low byte of the field.

Data Type – Always 0x34 for reply.

Data1 – Command dependable Data1 field. Maximum size depends on the value of Len HI.

LRC – A one-byte LRC field.
LRC = 0xFF xor Len Hi xor Len Low xor Type xor Data1.

3.3. Sample Query Command

Here is a sample of query command for ESN:

Command Prefix		Lens		Data1					LRC
0x7E	0x00	0x00	0x05	0x33	0x48	0x30	0x32	0x30	0xB3

Where
Data1 = '3H020'
LRC = 0xFF xor 0x00 xor 0x05 xor 0x33 xor 0x48 xor 0x30 xor 0x32 xor 0x30 = 0xB3.

Engine Reply:

Reply Prefix		Lens		Data Type	Data1			
0x02	0x00	0x00	0x12	0x34	0x30	0x32	0x31	0x33

Data 1									
0x53	0x57	0x30	0x35	0x38	0x33	0x38	0x33	0x4B	0x48

Data1		LRC	
0x2D	0x35	0x36	0xF5

Where
Data1 = '0213SW058383KH-56'
The meaning of the reply is that the ESN is SW058383KH-56.
See Appendix A for more detail.

4. Image Upload

The image captured in EM2027/EM2027M can be uploaded to Host. The image is gray scale of the size of 752x480 pixels.
Image Upload Command:

Command Prefix		Lens		Data1		LRC
0x7E	0x00	0x00	0x03	Ratio	0x00	lrc

Where
Ratio = 0x00 for 1:1 upload, i.e. upload 752x480 pixels, lrc=0x80
0x01 for 1:4 upload, i.e., upload 188x120 pixels, lrc=0x81
0x02 for 1:16 upload, i.e. upload 47x30 pixels, lrc=0x82

Image Reply Format:
EM2027/EM2027M uploads the image data as binary data. The data sequence are:
For 1:1 ration: pixel[0,0], ⋯, pixel[0,751],
pixel[1,0], ⋯, pixel[1,751],
⋯
pixel[479,0], ⋯, pixel[479,751]

For 1:4 ration: pixel[0,0], ⋯, pixel[0,119],
pixel[1,0], ⋯, pixel[1,199],
⋯
pixel[187,0], ⋯, pixel[187,751]

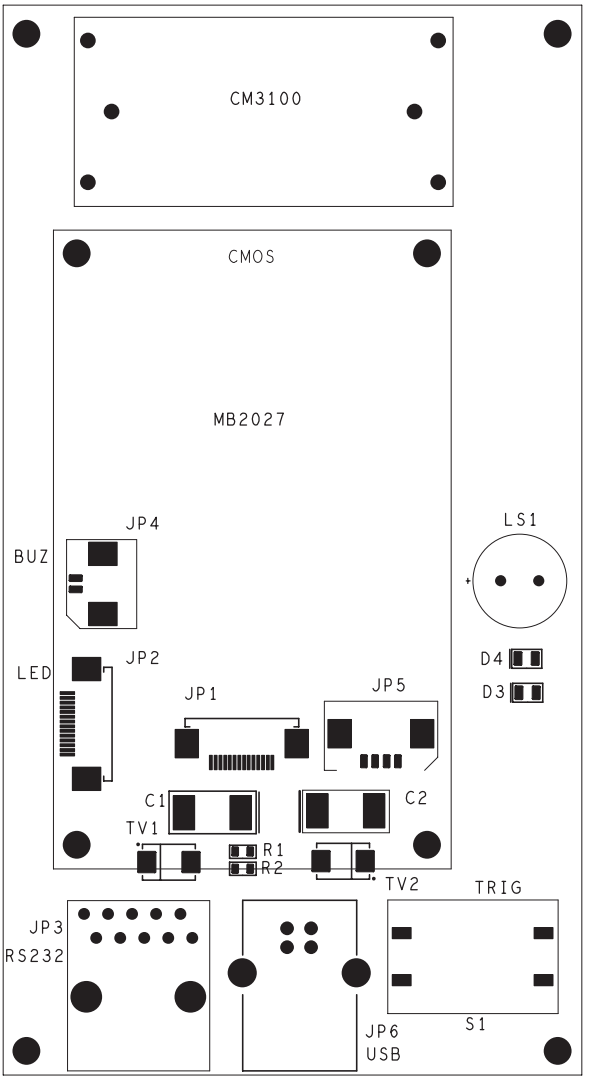
For 1:16 ration: pixel[0,0], ⋯, pixel[0,46],
pixel[1,0], ⋯, pixel[1,46],
⋯
pixel[29,0], ⋯, pixel[29,46].

Development Tools

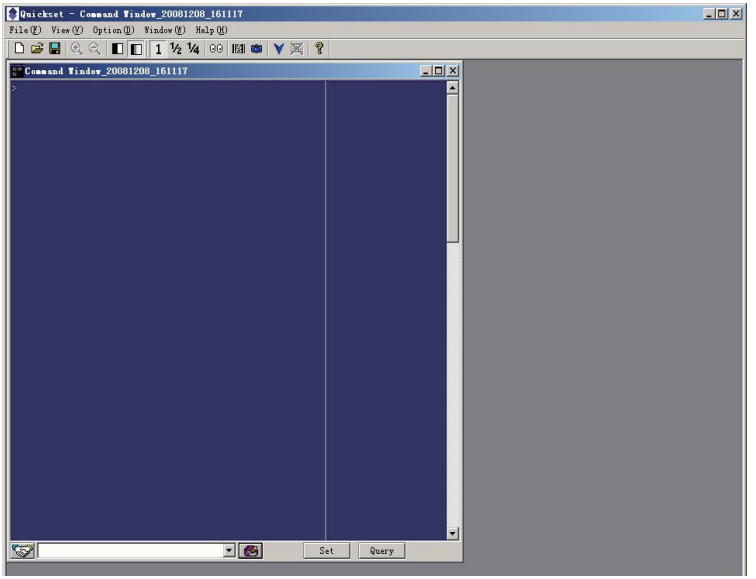
Introduction

Sections below lists some EM2027/EM2027M development tools. A brief introduction to each tool is included.

Here is a brief introduction to the EM2027/EM2027M Evaluation Kit, EKV2027. The layout of the EVK32027 circuit board is shown in figure below. The board contains beeper, LED, trigger button, and reset button. A USB connector is for the power and communication. An alternative RS232 is for communication. The J1 connector is where the EM2027/EM2027M flex cable connects to.



QuickSet is a Windows based GUI program for Newland Auto-ID barcode readers. It can be used in development and for programming EM2027/EM2027M and troubleshooting. The Host may implement some functions of QuickSet for the equipments or systems.



Software Development Kit

A software development kit is available for all EM series embedded engines. It allows Customers to develop their applications in EM series engines.

Programming the Engine

Introduction

There are 3 ways to program (configure) the Engine, Code Programming, Command Programming, and QuickSet Programming.

Code Programming

The Engine reads a set of specially encoded barcodes to program options and features. In the following sections, we will explain the options and features available and provide the barcodes to program them.

This method of programming the Engine is most straight forward. However, it requires manually readings of each barcode. As all manual operations, errors are more likely to occur.

Command Programming

The Host can send the Pro CMD strings (see the chapter of Software Interface) to program the Engine. In the following sections, the Pro CMD strings will be included with the barcodes for Code Programming.

A fixture, such as EVK3000 or other simplier circuit board, could be used to program the Engines before they are installed into your equipments or systems. Another alternative is to design the configuration capability in your equipments or systems.

This method of programming the Engine could be automated. A software program can be developed to download all the configuration data to the Engine. The program can also verify the download.

QuickSet Programming

QuickSet is a Windows based GUI program for Newland Auto-ID bar code readers. It displays decoded data and captured images. The engine with its circuit board can be easily configured through the interface of QuickSet.

This method of programming the Engine is similar as the Command Programming. QuickSet is a software program developed for Newland Auto-ID products .

Note: The programming results are restored in non-volatile memory. They will not be lost when the Engine is powered off.

Code Programming ON

** Code Programming Off
【Pro CMD：0006000】

Code Programming OFF

This is the notation to disable the Code Programming.

There are 3 parts of a notation:

» The first part of the notation is the barcode for Code Programming

» The second part of the notation is the name of the options or features, such as Disable Code Programming. If there is “**” in front of the name, it means the notation is factory default.

» The third part of the notation is the corresponding Pro CMD string of the Code Programming.

Code Programming ON

Read the “Code Programming ON” barcode to activate “Code Programming” function. More than one Code Programming barcodes can be read to configure the Engine.
If an option or feature needs additional parameters, such as digits, they can be found at the end of this chapter.
To exit Code Programming, read “Code Programming OFF” or any normal barcode.

Code Programming OFF

** Code Programming OFF
【Pro CMD：0006000】

Code Programming ON
【Pro CMD：0006010】

The value of code programming can be sent to the Host. For factory default, “No Send Pro Code Value”, the value of programming codes will not be sent to the Host; by reading “Send Pro Code Value”, the reader will send the value of Programming Code to the Host.

Illumination LED lighting up barcodes are used to capture better images. There are 4 modes:

Code Programming ON

Code Programming OFF

» “Illumination Wink”: LED keeps flashing when reading
» “Illumination Keep ON”: LED keeps on when Power ON
» “Illumination Read ON”: LED keeps on when reading
» “Illumination OFF”: LED is off all the time

** Illumination Wink
【Pro CMD：0200000】

Illumination Read ON
【Pro CMD：0200030】

Illumination Keep ON
【Pro CMD：0200010】

Illumination OFF
【Pro CMD：0200020】

There are 3 modes:

- » “Aim Wink”: LED keeps flashing when reading
- » “Aim Keep ON”: LED keeps on when Power ON
- » “Aim OFF”: LED is off all the time

Code Programming ON

Code Programming OFF

** Aim Wink
【Pro CMD：0201000】

Aim Keep ON
【Pro CMD：0201010】

Aim OFF
【Pro CMD：0201020】

» Hand-held Mode: Pull and keep holding the trigger line to read. Complete one reading or release the trigger to terminate reading status.

» Sensor Mode: The ambient luminance change in front of the engine automatically initiates reading. After completion of reading, the engine goes to idle. Both luminance change and the Trigger can initiate reading when idle.

» Continuous Mode: Pull the Trigger line low to start reading. The engine will keep reading. To stop, pull trigger line low again.

Code Programming ON

Code Programming OFF

**Hand-held Mode
【Pro CMD：0302000】

Sensor Mode
【Pro CMD：0302010】

Continuous Mode
【Pro CMD：0302020】

Sensor Mode Timeout

When the engine is in the Sensor Mode, it will switch to idle after this timeout period if it fails to read the bar code, or it does not sense any change of ambient illumination, or there is no external pull down on Trigger line. The default timeout is 2000ms.

Sensor Mode Timeout
【Pro CMD：0313000】

» Sensitivity is how sensitive the engine is to ambient illumination change.

» Sensitivity value is [0 .. 20]

» The lower the sensitivity value is the higher sensitivity will be. The lower the sensitivity value is the smaller illumination change will initiate reading.

Code Programming ON

Code Programming OFF

**High Sensitivity (= 4)
【Pro CMD：0312020】

Enhanced Sensitivity (= 1)
【Pro CMD：0312030】

Normal Sensitivity (= 7)
【Pro CMD：0312010】

Program Sensitivity
【Pro CMD：0312040】

Low Sensitivity (= 10)
【Pro CMD：0312000】

Constrain Multi-reading (Timeout between same barcodes)

Tools

Code Programming ON

“Constrain Multi-reading” is used to avoid misreading on the same barcode (the same format and message) in a multi-reading constrain period.

Code Programming OFF

Multi-reading Timeout
【Pro CMD：0313010】

There are two options available:

» (Multi-reading) Prohibit: The same symbol can be read after timeout.

» (Multi-reading) Semi-prohibit: the same symbol can be read more than once in the timeout period if ambient illumination is changed, for example the bar code is removed out of reading area and moved back.

** Multi-reading Prohibit
【Pro CMD：0313020】

Multi-reading Semi-prohibit
【Pro CMD：0313030】

Factory Default

Code Programming ON

Read “Load All Factory Default” to reset all parameters to factory default.

Applicable conditions:

Code Programming OFF

» User options programming wrong configuration leads to reading malfunction

» Forget details of previous programming and start over.

» Restore to default after unusual settings are not needed.

*Load All Factory Default
【Pro CMD：0001000】

User Default

» All user options can be saved as User Default. It will be restored in non-volatile memory.

» Read “Save as User Default” to save all the current user options to be User Default, and erase the previous User Default.

Save as User Default
【Pro CMD：0001150】

Load User Default
【Pro CMD：0001160】

Code Programming ON

Code Programming OFF

Beep Denotation (Beeper Definitions)

Beep	Denotation
low-higher-higher-higher	Power ON completed
1 beep	successful reading of an ordinary barcode
2 beeps	successful reading of an programming barcode
3 short low-2 high	reading failure
1 long low	Unknown Character, Virtual Keypad (USB connection)

Program Beeper

Read “Beep ON” to enable all beep denotation and read “Beep OFF” to disable.

**Beep ON
【Pro CMD：0203010】

Beep OFF
【Pro CMD：0203000】

- “Send Sys Info”, the engine sends system information to the Host immediately.
- “Power ON, Send Sys Info”, the engine sends system information to the Host after Power ON.

Code Programming ON

Code Programming OFF

Send Sys Info
【Pro CMD：0003000】

**Power ON, Do not Send Sys Info
【Pro CMD：0007000】

Power ON, Send Sys Info
【Pro CMD：0007010】

The system information is provided as follows:
Title: contents (append narration 1, narration 2)

Title	Remarks
Dev	Device type
Ver	BIOS version
Date	BIOS version establishing time
S/N	Device serial number
ESN	User-defined device serial number
Interface	3 types of communication interfaces: 1. USB, HID-KBW, DataPipe, Virtual RS232. 2. RS232, baud rate, parity check, data bits, stop bit 3. PS/2
1D	Indicate that reading 1D is allowed. Symbols are divided by comma. Additional features format: 1. “+” connect features 2. Min Message Length -> Max Message Length 3. “No Check Digit” or “Check Digit” 4. “Fixed Length: 2~64 even value”. It is in this format: Fixed Length: 2 4 6 8 10 12...
2D	Indicate that reading 2D is allowed. Symbols are divided by comma. Additional feature format: Min Message Length -> Max Message Length
Scan Mode	Scan Mode: 1. Manual Scan = “Hand-held Mode” 2. Auto Scan = “Continuous Mode” 3. Induced Scan = “Sensor Mode”

The engine and the Host should use the same RS232 parameters: baud rate, parity check, data bits and stop bits. The sequence is as follows: 9600 (baud rate), null (parity check), 8 (data bits), 1 (stop bits).

Code Programming ON

Code Programming OFF

Baud Rate

Baud rate is the number of bits of data transmitted per second. Set your scan engine baud rate to match the baud rate setting of the Host device. Otherwise, they can not communicate.

The engine supports the following baud rates (The default baud rate is 9600):

**9600
【Pro CMD：0100030】

19200
【Pro CMD：0100050】

1200
【Pro CMD：0100000】

38400
【Pro CMD：0100060】

2400
【Pro CMD：0100010】

57600
【Pro CMD：0100070】

4800
【Pro CMD：0100020】

115200
【Pro CMD：0100080】

14400
【Pro CMD：0100040】

Code Programming ON

Parity Check

Parity check options should be the same on the engine and the Host.

Code Programming OFF

» Select Odd parity and the parity bit value is set to 0 or 1, based on data, to ensure that an odd number of 1 bits are contained in the coded character.

» Select Even parity and the parity bit value is set to 0 or 1, based on data, to ensure that an even number of 1 bits are contained in the coded character.

» Select No Parity Check and parity bit will not be sent.

**No Parity Check
【Pro CMD：0101000】

Odd Check
【Pro CMD：0101020】

Even Check
【Pro CMD：0101010】

Data Bits Transmitted

Code Programming ON

Select data bits transmitted to be 5, 6, 7 and 8. Ensure the selections on the engine and the Host are the same.

Code Programming OFF

** 8 Data Bits
【Pro CMD：0103030】

6 Data Bits
【Pro CMD：0103010】

7 Data Bits
【Pro CMD：0103020】

5 Data Bits
【Pro CMD：0103000】

Stop Bits

Stop bit follows every byte to indicate the end of transmission and the start of the next transmission.
Default 1 stop bit.

**1 Stop Bits
【Pro CMD：0102000】

2 Stop Bits
【Pro CMD：0102010】

Symbols

Introduction

This chapter lists all the available symbols and provides the programming barcodes to enable/disable them.

Disabling reading of the symbols which do not apply, will improve reading performance.

Available Symbols

Barcode Type	Factory Default
1D Barcode	
Code 128	Allow Reading
UCC/EAN-8	Allow Reading
EAN-13	Allow Reading
UPC-E	Allow Reading
UPC-A	Allow Reading
Interleaved 2 of 5	Allow Reading
China Post 25	Allow Reading
Code 39	Allow Reading
Codabar	Allow Reading
Code 93	Allow Reading
UCC/EAN-128	Allow Reading
2D Barcode	
PDF 417	Allow Reading
QR Code	Allow Reading
Aztec	Allow Reading
Data Martix	Allow Reading
Chinese-Sensible Code	Allow Reading

Code Programming ON

Code Programming OFF

Disable Reading All

Disable Reading All = Allow reading Programming Codes only.

Disable Reading All
【Pro CMD：0001010】

Enable Reading All

Enable Reading All = Enable to read all symbols and Programming Codes.

Enable Reading All
【Pro CMD：0001020】

Enable Reading All 1D

Enable Reading All 1D
【Pro CMD：0001040】

Disable Reading All 1D

Disable Reading All 1D = Enable reading 2D symbols and Programming Codes.

Disable Reading All 1D
【Pro CMD：0001030】

Code Programming ON

Code Programming OFF

Enable Reading All 2D

Enable Reading All 2D
【Pro CMD：0001060】

Disable Reading All 2D

Disable Reading All 2D = Allow reading 1D symbols and Programming Codes.

Disable Reading All 2D
【Pro CMD：0001050】

Load Factory Default

Code Programming ON

** Load Code 128 Factory Default
【Pro CMD：0400000】

Code Programming OFF

Enable/Disable Code 128

Disable Code 128
【Pro CMD：0400010】

** Enable Code 128
【Pro CMD：0400020】

When the engine can not read Code 128, please read “Enable Code 128” and try again.

Select Message Length

It is used to program the valid reading length of Code 128. The engine will send an error beep, if the decoded data length does not match the valid length.

Code 128 Message Length is defined by “Min. Message Length” and “Max. Message Length”.

Code Programming ON

Code Programming OFF

Min Message Length (default: 1)
【Pro CMD：0400030】

Max Message Length (default: 48)
【Pro CMD：0400040】

TIPS

1D bar code Message Length should not exceed 127 bytes. Max Message Length should not be less than Min Message Length.
To read a fixed length Code 128, Please program Max & Min Message Length to the same value.

Example

To set Min Message Length of Code 128 to 8 bytes and Max Message Length to 12 bytes, read these programming codes

1、“Code Programming ON”
2、“Select Min Message Length”
3、Digit Code “8”, see Digit Code
4、“Save Programming”, see Digit Code
5、“Select Max Message Length”
6、Digit Code “1”
7、Digit Code “2”
8、“Save Programming”
9、“Code Programming OFF”

Code Programming ON

Code Programming OFF

Load Factory Default

** Load UCC/EAN-8 Factory Default
【Pro CMD：0401000】

Enable/Disable UCC/EAN-8

** Enable UCC/EAN-8
【Pro CMD：0401020】

Disable UCC/EAN-8
【Pro CMD：0401010】

Check Digit

UCC/EAN-8 is fixed 8 digits barcode and the last digit is check digit.

**Transmit Check
【Pro CMD：0401040】

Do Not Transmit Check
【Pro CMD：0401030】

Code Programming ON

Code Programming OFF

2 Digits Addenda Code

Addenda Code is the one to the right of an ordinary code. Picture below shows an ordinary code with a 2 digits Addenda Code. The left one in blue lines is an ordinary code. The right one in red lines is the 2 digits Addenda Code.

** Disable 2 Digits Addenda Code
【Pro CMD：0401050】

Enable 2 Digits Addenda Code
【Pro CMD：0401060】

5 Digits Addenda Code

5 Digits Addenda Code is the one to the right of an ordinary code. Picture below shows an ordinary code with a 5 digits Addenda Code. The left one in blue lines is an ordinary code. The right one in red lines is the 5 digits Addenda Code.

** Disable 5 Digits Addenda Code
【Pro CMD：0401070】

Enable5 Digits Addenda Code
【Pro CMD：0401080】

TIPS

“ Enable 2 Digits Addenda Code “ — read an ordinary code and 2 digits Addenda Code.
“ Enable 5 Digits Addenda Code “ — read an ordinary code and 5 digits Addenda Code.
Disable 2 Digits Addenda Code “ — read an ordinary code only, and ignore 2 digits Addenda Code.

EAN-8 expand to EAN-13

Expand EAN-8 to EAN-13, by adding 5 bytes of “0” to the left, and then transmit.

Code Programming ON

Code Programming OFF

** Do Not Expand to EAN-13
【Pro CMD：0401090】

Expand to EAN-13
【Pro CMD：0401100】

Code Programming ON

Load Factory Default

** Load EAN-13 Factory Default
【Pro CMD：0402000】

Code Programming OFF

Disable/EnableEAN-13

** Enable EAN-13
【Pro CMD：0402020】

Disable EAN-13
【Pro CMD：0402010】

Check Digit

** Transmit Check
【Pro CMD：0402040】

Do Not Transmit Check
【Pro CMD：0402030】

Code Programming ON

Code Programming OFF

2 Digits Addenda Code

Addenda Code is the one to the right of an ordinary code. Picture below shows an ordinary code with a 2 digits Addenda Code. The left one in blue lines is an ordinary code. The right one in red lines is the 2 digits Addenda Code.

** Disable 2 Digits Addenda Code
【Pro CMD：0402050】

Enable 2 Digits Addenda Code
【Pro CMD：0402060】

5 Digits Addenda Code

5 Digits Addenda Code is the one to the right of an ordinary code. Picture below shows an ordinary code with a 5 digits Addenda Code. The left one in blue lines is an ordinary code. The right one in red lines is the 5 digits Addenda Code.

** Disable 5 Digits Addenda Code
【Pro CMD：0402070】

Enable5 Digits Addenda Code
【Pro CMD：0402080】

TIPS

“ Enable 2 Digits Addenda Code “ — read an ordinary code and 2 digits Addenda Code.
“ Enable 5 Digits Addenda Code “ — read an ordinary code and 5 digits Addenda Code.
Disable 2 Digits Addenda Code “ — read an ordinary code only, and ignore 2 digits Addenda Code.

Load Factory Default

** Load UPC-E Factory Default
【Pro CMD：0403000】

Code Programming ON

Code Programming OFF

Disable/Enable UPC-E

** Enable UPC-E
【Pro CMD：0403020】

Disable UPC-E
【Pro CMD：0403010】

TIPS When the engine can not read UPC-E, please read “Enable UPC-E” and try again.

Check Digit

UPC-E is fixed 8 digits barcode and the last digit is check digit.

** Transmit Check
【Pro CMD：0403040】

Do Not Transmit Check
【Pro CMD：0403030】

Code Programming ON

Code Programming OFF

2 Digits Addenda Code

Addenda Code is the one to the right of an ordinary code. Picture below shows an ordinary code with a 2 digits Addenda Code. The left one in blue lines is an ordinary code. The right one in red lines is the 2 digits Addenda Code.

** Abort 2 Digits Addenda
【Pro CMD：0403050】

Enable 2 Digits Addenda Code
【Pro CMD：0402060】

5 Digits Addenda Code

5 Digits Addenda Code is the one to the right of an ordinary code. Picture below shows an ordinary code with a 5 digits Addenda Code. The left one in blue lines is an ordinary code. The right one in red lines is the 5 digits Addenda Code.

** Disable 5 Digits Addenda Code
【Pro CMD：0402070】

Enable 5 Digits Addenda Code
【Pro CMD：0402080】

TIPS

“ Enable 2 Digits Addenda Code “ — read an ordinary code and 2 digits Addenda Code.
“ Enable 5 Digits Addenda Code “ — read an ordinary code and 5 digits Addenda Code.
Disable 2 Digits Addenda Code “ — read an ordinary code only, and ignore 2 digits Addenda Code.

Code Programming ON

Code Programming OFF

Transmit Default “0”

The first byte of UPC-E is default to “0”.

** Do Not Transmit “0”
【Pro CMD：0403090】

Transmit “0”
【Pro CMD：0403100】

UPC-E Expand to UPC-A

Follow the standard algorithm to expand UPC-E to UPC-A.

**Do Not Expand to UPC-A
【Pro CMD：0403110】

Expand to UPC-A
【Pro CMD：0403120】

Code Programming ON

Load Factory Default

** Load UPC-A Factory Default
【Pro CMD：0404000】

Code Programming OFF

Disable/Enable UPC-A

** Enable UPC-A
【Pro CMD：0404020】

Disable UPC-A
【Pro CMD：0404010】

TIPS

When the engine can not read UPC-A, please read “Enable UPC-A” and try again.

Check Digit

UPC-A is fixed 13 digits barcode and the last digit is Check Digit.

**Transmit Check
【Pro CMD：0404040】

(Do) Not Transmit Check
【Pro CMD：0404030】

Code Programming ON

Code Programming OFF

2 Digits Addenda Code

Addenda Code is the one to the right of an ordinary code. Picture below shows an ordinary code with a 2 digits Addenda Code. The left one in blue lines is an ordinary code. The right one in red lines is the 2 digits Addenda Code.

** Disable 2 Digits Addenda Code
【Pro CMD：0404050】

Enable 2 Digits Addenda Code
【Pro CMD：0404060】

5 Digits Addenda Code

5 Digits Addenda Code is the one to the right of an ordinary code. Picture below shows an ordinary code with a 5 digits Addenda Code. The left one in blue lines is an ordinary code. The right one in red lines is the 5 digits Addenda Code.

** Disable 5 Digits Addenda Code
【Pro CMD：0404070】

Enable 5 Digits Addenda Code
【Pro CMD：0404080】

TIPS

“ Enable 2 Digits Addenda Code “ — read an ordinary code and 2 digits Addenda Code.
“ Enable 5 Digits Addenda Code “ — read an ordinary code and 5 digits Addenda Code.
Disable 2 Digits Addenda Code “ — read an ordinary code only, and ignore 2 digits Addenda Code.

Transmit Default “0”

The first byte of UPC-A is default to “0”.

Code Programming ON

Code Programming OFF

**Do Not Transmit “0”
【Pro CMD：0404090】

Transmit “0”
【Pro CMD：0404100】

UPC-A has the default “0” but it is not printed out, unlike UPC-E. Read “Transmit 0” will add a “0” to transmit.

Load Factory Default

Code Programming ON

Code Programming OFF

** Load Interleaved 2 of 5 Factory Default
【Pro CMD：0405000】

Disable/Enable Interleaved 2 of 5

** Enable Interleaved 2 of 5
【Pro CMD：0405020】

Disable Interleaved 2 of 5
【Pro CMD：0405010】

TIPS

When the engine can not read Interleaved 2 of 5, please read “Enable Interleaved 2 of 5” and try again

Code Programming ON

Code Programming OFF

Select Message Length

It is used to program the valid reading length of Interleaved 2 of 5. The engine will send an error beep, if the decoded data length does not match the valid length.

Interleaved 2 of 5 Message Length is defined by “Min. Message Length” and “Max. Message Length”

Min Message Length (default: 4)
【Pro CMD：0405030】

Max Message Length (default: 80)
【Pro CMD：0405040】

TIPS

1D bar code Message Length should not exceed 127 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length Interleaved 2 of 5, Please program Max & Min Message Length to the same value.

Example

To set Min Message Length of Interleaved 2 of 5 as 8 bytes, and Max Message length as 12 bytes, read these programming codes:

1. “Code Programming ON”
2. “Select Min Message Length”
3. Digit Code “8”, see Digit Code Appendix (Pxxx)
4. “Save Programming”, see Digit Code Appendix (Pxxx)
5. “Select Max Message Length”
6. Digit Code “1”
7. Digit Code “2”
8. “Save Programming”
9. “Code Programming OFF”

Code Programming ON

Code Programming OFF

Check Digit

Interleaved 2 of 5 may include Check Digit (not compulsory) following its barcode messages. It verifies the barcode message.

» “NO Check, Transmit All” means to read without check and transmit all bytes including barcode message and Check digit.

» “Check, Do Not Transmit Check Digit” means to read and check. If verification is successful, transmits barcode message; if not, engine sends an error beep.

» “Check, Transmit All” means to read and check. If verification is successful, transmits all messages; if not, engine sends an error beep.

** “NO Check, Transmit All”
【Pro CMD：0405050】

Check, Do Not Transmit Check Digit
【Pro CMD：0405060】

Check, Transmit All
【Pro CMD：0405070】

When “Check, Do Not Transmit Check digit” is enabled and barcode message length minus one is less than Min Message Length, it will lead to error beep.
E.g.：Reading a 4-byte (include check Digit) Interleaved 2 of 5 with the Min Message Length being 4 bytes and “Check, Do Not Transmit Check digit” enabled leads to error beep.

Interleaved 2 of 5, specified Lengths

Program the engine to read specified lengths or ranges of specified lengths for Interleaved 2 of 5. The length value must be 3 decimal digits. And the length value MUST be an even number between 2 to 64.
Read “Enable Specified Length” to enable this feature or “Disable Specified Length” to disable.

Code Programming ON

Code Programming OFF

**Disable Specified Length
【Pro CMD：0405140】

Add Code Length
【Pro CMD：0405160】

Enable Specified Length
【Pro CMD：0405150】

Remove Code Length
【Pro CMD：0405170】

Example

The engine only read Interleaved 2 of 5 which are 12 and 24 bytes.
1. “Code Programming ON”
2. “Add Code Length”
3. Digit Code “0”, “1”, “2”
4. “Save Programming”
5. “Add code length”
6. Digit Code “0”, “2”, “4”
7. “Save Programming”
8. “Code Programming OFF”

The engine only read Interleaved 2 of 5 between 12 bytes and 24 bytes.
1. “Code Programming ON”
2. “Add Code Length”
3. Digit Code “0”, “1”, “2”
4. Digit Code “0”, “2”, “4”
5. “Save Programming”
6. “Code Programming OFF”

ITF-14 is a fixed length, 14 bytes Interleaved 2 of 5 barcode with Check digit. By factory default, it is disabled.

When enabled, ITF-14 precedes 14-byte Interleaved 2 of 5 barcode.

Code Programming ON

Code Programming OFF

**Disable ITF-14
【Pro CMD：0405080】

Enable ITF-14, Do Not Transmit Check Digit
【Pro CMD：0405090】

Enable ITF-14, Transmit Check Digit
【Pro CMD：0405100】

For instance, when ITF-14 is enabled and Interleaved 2 of 5 is disabled, the ITF-14 and 14 bytes Interleaved 2 of 5 with check digit can be read, but other Interleaved 2 of 5 can not.

Code Programming ON

ITF-6 is a fixed length 6 bytes Interleaved 2 of 5 barcode with check digit.
When enabled, ITF-6 precedes 6-byte Interleaved 2 of 5 barcode.

Code Programming OFF

**Disable ITF-6 User Selection
【Pro CMD：0405110】

ITF-6, Read, Do Not Transmit Check Digit
【Pro CMD：0405120】

ITF-6, Read, Transmit Check Digit
【Pro CMD：0405130】

For instance, when ITF-6 is enabled and Interleaved 2 of 5 is disabled, the ITF-6 and 6 bytes Interleaved 2 of 5 with check digit can be read, but other Interleaved 2 of 5 can not

Code Programming ON

Code Programming OFF

Load Factory Default

** Load China Post 25 Factory Default
【Pro CMD：0406000】

Enable/ Disable China Post 25

**Disable China Post 25
【Pro CMD：0406010】

Enable China Post 25
【Pro CMD：0406020】

TIPS

When the engine can not read China Post 25, please read “Enable China Post 25” and try again.

Select Message Length

Code Programming ON

It is used to program the valid reading length of China Post 25. The engine will send an error beep, if the decoded data length does not match the valid length.
China Post 25 Message Length is defined by “Min. Message Length” and “Max. Message Length”.

Code Programming OFF

Min Message Length (default: 4)
【Pro CMD：0406030】

Max Message Length (default: 80)
【Pro CMD：0406040】

TIPS

1D bar code Message Length should not exceed 127 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length China Post 25, Please program Max & Min Message Length to the same value.

Example

To set Min Message Length of Code 128 to 8 bytes and the Max Message Length to 12 bytes. Read these programming code:

1. “Code Programming ON”
2. “Select Min Message Length”
3. Digit Code “8”, see Digit Code (Appendix Pxxx)
4. “Save Programming”, see Digit Code (Appendix Pxxx)
5. “Select Max Message Length”
6. Digit Code “1”
7. Digit Code “2”
8. “Save Programming”
9. “Code Programming OFF”

Code Programming ON

Code Programming OFF

Check Digit

China Post 25 may include Check Digit (not compulsory) following its barcode messages. It verifies the barcode message.

» “NO Check, Transmit All” means to read without check and transmit all bytes including barcode message and Check Digit.

» “Check, Do Not Transmit Check Digit” means to read and check. If verification is successful, transmits barcode message; if not, engine sends an error beep.

» “Check, Transmit All” means to read and check. If verification is successful, transmits all messages; if not, engine sends an error beep.

** NO Check, Transmit All
【Pro CMD：0406050】

Check, Transmit All
【Pro CMD：0406070】

Check, Do Not Transmit Check Digit
【Pro CMD：0406060】

When “Check, Do Not Transmit Check Digit” is enabled and barcode message length minus one is less than Min Message Length, it will lead to error beep.
E.g.：Reading a 4-byte (include Check Digit) Interleaved 2 of 5 with the Min Message Length being 4 bytes and “Check, Do Not Transmit Check Digit” enabled leads to error beep.

Load Factory Default

Code Programming ON

** Load Code 39 Factory Default
【Pro CMD：0408000】

Code Programming OFF

Enable/Disable Code 39

** Enable Code 39
【Pro CMD：0408020】

Disable Code 39
【Pro CMD：0408010】

TIPS

When the engine can not read Code 39, please read “Enable Code 39” and try again

Transmit Start & Stop Character

Transmission of “*” can be selected.

**Transmit Both “*”
【Pro CMD：0408090】

Transmit Neither “*”
【Pro CMD：0408080】

Select Message Length

It is used to program the valid reading length of Code 39. The engine will send an error beep, if the decoded data length does not match the valid length. Code 39 Message Length is defined by “Min. Message Length” and “Max. Message Length “.

Code Programming ON

Code Programming OFF

Min Message Length (default: 1)
【Pro CMD：0408030】

Max Message Length (default: 48)
【Pro CMD：0408040】

TIPS

1D bar code Message Length should not exceed 127 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length Code 39, Please program Max & Min Message Length to the same value.

Example

To set Min Message Length of Code 39 to 8 bytes, and Max Message Length to 12 bytes, read these programming codes:

1. “Code Programming ON”
2. “Select Min Message Length”
3. Digit Code “8”, see Digit Code (Appendix Pxxx)
4. “Save Programming”, see Digit Code (Appendix Pxxx)
5. “Select Max Message Length”
6. Digit Code “1”
7. Digit Code “2”
8. “Save Programming”
9. “Code Programming OFF”

Code Programming ON

Code Programming OFF

Check Digit

Code 39 may include Check Digit (not compulsory) following its barcode message. It verifies the barcode message.

» "NO Check, Transmit All" means to read without check and transmit all bytes including barcode message and Check Digit.

» "Check, Do Not Transmit Check Digit" means to read and check. If verification is successful, transmits barcode message; if not, engine sends an error beep.

» "Check, Transmit All" means to read and check. If verification is successful, transmits all messages; if not, engine sends an error beep.

** NO Check, Transmit All
【Pro CMD：0408050】

Check, Transmit All
【Pro CMD：0408070】

Check, Do not transmit Check Digit
【Pro CMD：0408060】

When “Check, Do not Transmit Check digit” is enabled and barcode message length minus one is less than Min Message Length, it will lead to error beep.
E.g.：Reading a 4-byte (include check byte) Code 39 with the Min Message Length being 4 bytes and “Check, Do not transmit Check Digit” enabled leads to error beep.

Decode ASCII

Code 39 can include full ASCII characters. For factory default, the engine only decodes part of them. Read “Enable Full ASCII decode” to decode full ASCII characters.

**Partial ASCII Decode
【Pro CMD：0408100】

Full ASCII Decode
【Pro CMD：0408110】

Load Factory Default

Code Programming ON

Code Programming OFF

** Load Codabar Factory Default
【Pro CMD：0409000】

Enable/Disable Codabar

** Enable Codabar
【Pro CMD：0409020】

Disable Codabar
【Pro CMD：0409010】

TIPS

When the engine can not read Codabar, please read “Enable Codabar” and try again.

Code Programming ON

Code Programming OFF

Transmit Start & Stop Character

Codabar uses either one of “A”, “B”, “C” and “D” as the start character and the stop character. Transmission of them can be selected.

**Transmit Both Start & Stop
【Pro CMD：0409090】

Transmit Neither Start & Stop
【Pro CMD：0409080】

Select Message Length

It is used to program the valid reading length of Codabar. The engine will send an error beep, if the decoded data length does not match the valid length.
Codabar Message Length is defined by “Min. Message Length” and “Max. Message Length “.

Min Message Length (default: 2)
【Pro CMD：0409030】

Max Message Length (default: 60)
【Pro CMD：0409040】

TIPS

1D bar code Message Length should not exceed 127 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length Codabar, Please program Max & Min Message Length to the same value.

Load Factory Default

Code Programming ON

** Load Code 93 Factory Default
【Pro CMD：0410000】

Code Programming OFF

Enable /Disable Code 93

** Disable Code 93
【Pro CMD：0410010】

Enable Code 93
【Pro CMD：0410020】

TIPS

When the engine can not read Code 93, please read “Enable Code 93” and try again.

Select Message Length

It is used to program the valid reading length of Code 93. The engine will send an error beep, if the decoded data length does not match the valid length. Code 93 Message Length is defined by “Min. Message Length” and “Max. Message Length .”

Code Programming ON

Code Programming OFF

Min Message Length (default: 1)
【Pro CMD：0410030】

Max Message Length (default: 48)
【Pro CMD：0410040】

TIPS

1D bar code Message Length should not exceed 127 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length Code 93, Please program Max & Min Message Length to the same value.

Example

To set Min Message Length of Code 93 to 8 bytes and Max Message Length to 12 bytes, read these programming codes:
1. “Code Programming ON”
2. “Select Min Message Length”
3. Digit Code “8”, see Digit Code (Appendix Pxxx)
4. “Save Programming”, see Digit Code (Appendix Pxxx)
5. “Select Max Message Length”
6. Digit Code “1”
7. Digit Code “2”
8. “Save Programming”
9. “Code Programming OFF”

Code Programming ON

Load Factory Default

** Load UCC/EAN-128 Factory Default
【Pro CMD：0412000】

Code Programming OFF

Enable/Disable UCC/EAN-128

** Enable UCC/EAN-128
【Pro CMD：0412020】

Disable UCC/EAN-128
【Pro CMD：0412010】

TIPS

When the engine can not read UCC/EAN-128, please read “Enable UCC/EAN-128” and try again.

Load Factory Default

Code Programming ON

** Load PDF417 Factory
【Pro CMD：0501000】

Code Programming OFF

Enable/Disable PDF417

** Enable PDF417
【Pro CMD：0501020】

Disable PDF417
【Pro CMD：0501010】

When the engine can not read PDF417, please read “Enable PDF417” and try again.

Select Message Length

It is used to program the valid reading length of PDF417. The engine will send an error beep, if the decoded data length does not match the valid reading length. PDF417 Message Length is defined by "Min. Message Length" and "Max. Message Length ".

Code Programming ON

Code Programming OFF

Min Message Length (default: 1)
【Pro CMD：0501030】

Max Message Length (default: 2710)
【Pro CMD：0501040】

TIPS

2D bar code Message Length should not exceed 65535 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length PDF417, Please program Max & Min Message Length to the same value.

Example

To set Min Message Length of PDF417 to 8 bytes and Max Message Length to 12 bytes, read these programming codes:

1. “Code Programming ON”
2. “Select Min Message Length”
3. Digit Code “8”, see Digit Code
4. “Save Programming”,see Digit Code
5. “SelectMax Message Length”
6. Digit Code “1”
7. Digit Code “2”
8. “Save Programming”
9. “Code Programming OFF”

Load Factory Default

Code Programming ON

** Load QR Code Factory Default
【Pro CMD：0502000】

Code Programming OFF

Enable/Disable QR Code

** Enable QR Code
【Pro CMD：0502020】

Disable QR Code
【Pro CMD：0502010】

When the engine can not read QR Code, please read “Enable QR Code” and try again.

Select Message Length

It is used to program the valid reading length of QR Code. The engine will send an error beep, if the decoded data length does not match the valid length.
QR Code Message Length is defined by "Min. Message Length" and "Max. Message Length ".

Code Programming ON

Code Programming OFF

Min Message Length (default: 1)
【Pro CMD：0502030】

Max Message Length (default: 7098)
【Pro CMD：0502040】

TIPS

2D bar code Message Length should not exceed 65535 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length QR Code, Please program Max & Min Message Length to the same value

Example

To set Min Message Length of QR Code to 8 bytes and Max Message Length to 12 bytes, read these programming codes:

1. “Code Programming ON”
2. “Select Min Message Length”
3. Digit Code “8”, see Digit Code Appendix Pxxx“
4. Save Programming”, see Digit Code Appendix Pxxx“
5. Select Max Message Length”
6. Digit Code “1”
7. Digit Code “2”
8. “Save Programming”
9. “Code Programming OFF”

Code Programming ON

Code Programming OFF

QR Twin Code

QR twin code is 2 QR barcodes paralleled vertically or horizontally.
There are 3 options for reading QR twin code:

1、Single QR Only: Read either QR code.

2、Twin QR Only: Read both QR codes. The transmission sequence is: left (upper) QR code followed by right (lower) QR code.

3、Both Single & Twin: Read both QR codes. If successful, transmit as twin QR only. Otherwise, try single QR only.

**Single QR Only
【Pro CMD：0502070】

Twin QR Only
【Pro CMD：0502080】

Both Single & Twin
【Pro CMD：0502090】

Load Factory Default

Code Programming ON

** Load Aztec Factory Default
【Pro CMD：0503000】

Code Programming OFF

Enable/Disable Aztec

** Enable Aztec
【Pro CMD：0503020】

Disable Aztec
【Pro CMD：0503010】

When the engine can not read Aztec, please read “Enable Aztec” and try again.

Select Message Length

It is used to program the valid reading length of Aztec. The engine will send an error beep, if the decoded data length does not match the valid length.
Aztec Message Length is defined by “Min. Message Length” and “Max. Message Length “.

Code Programming ON

Code Programming OFF

Min Message Length (default: 1)
【Pro CMD：0503030】

Max Message Length (default: 3832)
【Pro CMD：0503040】

TIPS

2D bar code Message Length should not exceed 65535 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length Aztec, Please program Max & Min Message Length to the same value.

Example

To set Min Message Length of Aztec to 8 bytes and Max Message Length to 12 bytes, read these programming codes.

1. “Code Programming ON”
2. “Select Min Message Length”
3. Digit Code “8”, see Digit Code Appendix Pxxx “
4. Save Programming”, see Digit Code Appendix Pxxx “
5. Select Max Message Length”
6. Digit Code “1”
7. Digit Code “2”
8. “Save Programming”
9. “Code Programming OFF”

Load Factory Default

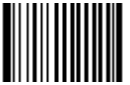
Code Programming ON

** Load Data Matrix Factory Default
【Pro CMD：0504000】

Code Programming OFF

Enable/Disable Data Matrix

** Enable Data Matrix
【Pro CMD：0504020】



Disable Data Matrix
【Pro CMD：0504010】

When the engine can not read Data Matrix, please read “Enable Data Matrix” and try again.

Select Message Length

It is used to program the valid reading length of Data Matrix. The engine will send an error beep, if the decoded data length does not match the valid reading length. Data Matrix Message Length is defined by "Min. Message Length" and "Max. Message Length ".

Code Programming ON

Code Programming OFF

Min Message Length (default: 1)
【Pro CMD：0504030】

Max Message Length (default: 7098)
【Pro CMD：0504040】

TIPS

2D bar code Message Length should not exceed 65535 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length Data Matrix, Please program Max & Min Message Length to the same value.

Example

To set Min Message Length of Data Matrix to 8 bytes and Max Message Length to 12 bytes, read these programming codes.

1. “Code Programming ON”
2. “Select Min Message Length”
3. Digit Code “8”, see Digit Code Appendix Pxxx “
4. Save Programming”, see Digit Code Appendix Pxxx “
5. Select Max Message Length”
6. Digit Code “1”
7. Digit Code “2”
8. “Save Programming”
9. “Code Programming OFF”

Code Programming ON

Code Programming OFF

Data Matrix Twin Code

Data Matrix twin code is 2 Data Matrix barcodes paralleled vertically or horizontally.
There are 3 options for reading Data Matrix:

1、Single Data Matrix Only: Read either Data Matrix.

2、Twin Data Matrix Only: Read both Data Matrix. The transmission sequence is: left (upper) Data Matrix followed by right (lower) Data Matrix.

3、Both Single & Twin: Read both Data Matrix. If successful, transmit as twin Data Matrix. Otherwise, try single Data Matrix only.

**Single Data Matrix Only
【Pro CMD：0504070】

Twin Data Matrix Only
【Pro CMD：0504080】

Both Single & Twin
【Pro CMD：0504090】

Load Factory Default

Code Programming ON

Code Programming OFF

** Load Chinese-Sensible Code Factory Default
【Pro CMD：0508000】

Enable/Disable Chinese-Sensible Code

** Enable Chinese-Sensible Code
【Pro CMD：0508020】

Disable Chinese-Sensible Code
【Pro CMD：0508010】

TIPS

When the engine can not read Chinese-Sensible Code, please read “Enable Chinese-Sensible Code” and try again.

Select Message Length

It is used to program the valid reading length of Chinese-Sensible Code. The engine will send an error beep, if the decoded data length does not match the valid length.

Chinese-Sensible Code Message Length is defined by "Min. Message Length" and "Max. Message Length ".

Code Programming ON

Code Programming OFF

Min Message Length (default: 1)
【Pro CMD：0508030】

Max Message Length (default: 7827)
【Pro CMD：0508040】

TIPS

2D bar code Message Length should not exceed 65535 bytes.
Max Message Length should not be less than Min Message Length.
To read a fixed length Chinese-Sensible Code, Please program Max & MinMessage Length to the same value.

Example

To set Min Message Length of Chinese-Sensible Code to 8 bytes and Max Message Length to 12 bytes, read these programming codes：

1. “Code Programming ON”
2. “Select Min Message Length”
3. Digit Code “8”, see Digit Code Appendix Pxxx “
4. Save Programming”, see Digit Code Appendix Pxxx “
5. Select Max Message Length”
6. Digit Code “1”
7. Digit Code “2”
8. “Save Programming”
9. “Code Programming OFF”

OCR

Introduction

OCR (Optical Character Recognition) is the technology that captures image of printed information, and recognizes the image to editable characters. The engine supports OCR B standard and specific typefaces.

** Disable OCR
【Pro CMD：0600010】

Enable OCR
【Pro CMD：0600020】

Prefix/Suffix

Introduction

1D barcodes could contain digits, letters and symbols, etc. 2D barcodes could contain more data, such as Chinese characters and other multi-byte characters. However, in reality, they do not and should not have all the information we need, such as barcode type, date and time of scan, delimiter, and so on, in order to keep the code short and flexible.

Prefix and Suffix are how to fulfill the needs mentioned above. They can be added, removed, and modified while the original barcode message is still in tact.

Barcode processing sequences:

1. Intercept barcode message
2. Add Prefix/Suffix
3. Pack
4. Terminate with Stop Suffix and transmit

Disable or Enable Prefix/Suffix

Code Programming ON

Disable All Prefix/Suffix: Transmit barcode message with no Prefix/Suffix.

Enable All Prefix/Suffix: Allow appending Code ID prefix, AIM prefix, User prefix, User suffix and Stop suffix to the barcode message.

Code Programming OFF

** Disable All Prefix/Suffix
【Pro CMD：0311000】

Enable All Prefix/Suffix
【Pro CMD：0311010】

Prefix Sequences

6 options of Prefix Sequences:

Code Programming ON

Code Programming OFF

** CodeID + AIM + User Prefix
【Pro CMD：0317000】

AIM + User Prefix + CodeID
【Pro CMD：0317030】

CodeID + User Prefix + AIM
【Pro CMD：0317010】

User Prefix + CodeID + AIM
【Pro CMD：0317040】

AIM + CodeID + User Prefix
【Pro CMD：0317020】

User Prefix + AIM + CodeID
【Pro CMD：0317050】

Disable or Enable User Prefix

Code Programming ON

User Prefix is added before barcode message. For example, if the user prefix is “AB” and the barcode message is “123”, the Host receives “AB123”.

Code Programming OFF

** Disable User Prefix
【Pro CMD：0305000】

Enable User Prefix
【Pro CMD：0305010】

Program User Prefix

Enable “Program User Prefix”. Then program user prefix byte(s). To end the prefix, read “Save programming” The user prefix byte is programmed in its hex values. See example below.

Note: The maximum length for user prefix is 10 bytes.

Program User Prefix
【Pro CMD：0300000】

Example

Program “CODE” as user prefix (The hex of “CODE” are 0x43/0x4F/0x44/0x45):

1. Read “Code Programming ON”
2. Read “Program User Prefix”
3. Read “4,3,4,F,4,4,4,5” in order
4. Read “Save Programming”
5. Read “Code Programming OFF”.
6. Read “Allow User Prefix” to enable above programming. “CODE” will appear to the left of a barcode.

AIM Prefix

Tools

AIM (Automatic Identification Manufactures) defines AIM prefix for many standard barcode formats.

Code Programming ON

\There are 3 types of AIM prefix.

1、 Character Mode: Add AIM prefix. For example, add “C” for Code128.

2、 Characters Mode: Add AIM prefix + “0”

3、Full Characters Mode: Add “]” + AIM prefix + “0”

Code Programming OFF

**No AIM Prefix
【Pro CMD：0308000】

2 Characters Mode
【Pro CMD：0308020】

1 Character Mode
【Pro CMD：0308010】

Full Characters Mode
【Pro CMD：0308030】

AIM Prefix definitions

Symbols	AIM ID	Hex
Code128 / UCC/EAN-128	C	43
UPC-E / UPC-A / EAN-8 / EAN-13	E	45
Interleaved 2 OF 5 / China Post25	I	49
Code39	A	41
Codabar	F	46
Code93	G	47
PDF417	L	4C
QR Code	Q	51
Aztec	Z	7A
DataMatrix	D	6D
China Information Code	X	58

Note: AIM ID is not customizable

Code ID Prefix

Tools

Code Programming ON

Besides AIM prefix, Code ID prefix can be used to denote barcode format and can be customized.

The Code ID prefix MUST be one (1) visible English letter, only.

Code Programming OFF

** No Code ID Prefix
【Pro CMD：0307000】

Allow Code ID Prefix
【Pro CMD：0307010】

Code ID Default

1D, Load Code ID Factory Default
【Pro CMD：0307020】

2D, Load Code ID Factory Default
【Pro CMD：0307020】

Symbols	Code ID Default	Hex
Code128 / UCC/EAN-128	j	6A
UPC-E / UPC-A	c	63
EAN-8 / EAN-13	d	64
Interleaved 2 OF 5 / China Post25	e	65
Code39	b	62
Codabar	a	61
Code93	i	69
PDF417	r	72
QR Code	s	73
Aztec	z	7A
DataMatrix	u	75
China Information Code	h	68
User-defined Format	x	58

Modify Code ID

Tools

See the examples below for how to modify a code ID and restore factory default code ID.

Code Programming ON

Code Programming OFF

Example

Modify PDF417 Code ID to be “p” (hex value is 0x70)

1. Read “Code Programming ON”
2. Read “Modify PDF417”
3. Read Digit Code “7”, “0”
4. Read “Save Programming”
5. Read “Code Programming OFF”.

Load Code ID factory default (including PDF417)

1. Read “Code Programming ON”
2. Read “2D, Load Code ID Factory Default”
3. Read “Code Programming OFF”.

Modify PDF417
【Pro CMD：0005000】

Modify China Information Code
【Pro CMD：0005070】

Modify QR Code
【Pro CMD：0005010】

Modify User Define Barcode Format
【Pro CMD：0005090】

Modify Aztec
【Pro CMD：0005020】

Modify Code 128
【Pro CMD：0004020】

Modify Data Matrix
【Pro CMD：0005030】

Modify UCC/EAN-128
【Pro CMD：0004030】

Code Programming ON

Code Programming OFF

Modify EAN-8
【Pro CMD：0004040】

Modify EAN-13
【Pro CMD：0004050】

Modify UPC-E
【Pro CMD：0004060】

Modify UPC-A
【Pro CMD：0004070】

Modify Interleaved 2 of 5
【Pro CMD：0004080】

Modify China Post25
【Pro CMD：0004110】

Modify Code 39
【Pro CMD：0004130】

Modify Codabar
【Pro CMD：0004150】

Modify Code 93
【Pro CMD：0004170】

Disable or Enable User Suffix

Code Programming ON

Code Programming OFF

User suffix is appended to the right of barcode message. For example, if user suffix is “AB”, and the barcode message is “123”, The Host receives “123AB”.

**Disable User Suffix
【Pro CMD：0306000】

Enable User Suffix
【Pro CMD：0306010】

Program User Suffix

Read “Program User Suffix”. Then program user suffix byte(s). To end the suffix, read “Save programming”. The user suffix byte is programmed in its hex values. See example below.

Note: The maximum length for user suffix is 10 bytes.

Program User Suffix
【Pro CMD：0301000】

Example

Program “CODE” as user suffix (The hex of “CODE” are 0x43, 0x4F, 0x44, and 0x45):

1. Read “Code Programming ON”
2. Read “Program User Suffix”
3. Read “4,3,4,F,4,4,4,5” in order
4. Read “Save Programming”
5. Read “Code Programming OFF”
6. Read “Allow User Suffix” to enable above programming. “CODE” will appear to the right of a barcode.

Tools

Code Programming ON

Code Programming OFF

Disable or Enable Stop Suffix

“Stop Suffix” is the termination for a string of barcode messages. It can not be formatted like other suffix and prefix. It is fixed to the right and the very end of a barcode transmission.

**Disable Stop Suffix
【Pro CMD：0309000】

Enable Stop Suffix
【Pro CMD：0309010】

Program Stop Suffix

Read “Program Stop Suffix”. Then program stop suffix byte(s). To end the suffix, read “Save programming”. The stop suffix byte is programmed in its hex values. See example below.

Note: The maximum length for stop suffix is 10 bytes.

Program Stop Suffix
【Pro CMD：0310000】

Example

Program “CODE” as stop suffix (The hex of “CODE” are 0x43, 0x4F, 0x44, and 0x45):

1. Read “Code Programming ON”
2. Read “Program Stop Suffix”
3. Read “4,3,4,F,4,4,4,5” in order
4. Read “Save Programming”
5. Read “Code Programming OFF”
6. Read “Allow Stop Suffix” to enable above programming. “CODE” will appear to the right of a barcode.

Message Interception & Pack

Introduction

Barcode message could divide information into different sections, such as product ID, manufacture ID, and so on. They are important overall. However, at certain situations, some of them are not of interest. This is where message interception comes in. Message interception feature allows transmission of selected section(s). Message intercept only applies to “raw” barcode messages.

The sequence of a read to transmit without message intercept is: Read a “raw” barcode —> Add prefix —> Append suffix and stop suffix —> transmit to Host.

The sequence of a read to transmit with message intercept is: Read a “raw” barcode —> Intercept Message —> Add prefix—> Append suffix and stop suffix —> transmit to Host.

A special programming, pack, can insert barcode messages into a certain message format.

Then the processing sequence is: “read to obtain barcode message” —> “intercept” —> “append prefix/suffix” —> “pack” —> “append stop suffix” - “transmit”.

Code Programming ON

Code Programming OFF

Interception Rule No.1: It only intercepts selected symbols' raw barcode messages and it effects all barcodes of the barcode format.

Interception Rule No.2: There are maximum 3 interception options restored in the non-volatile memory. If more than 3 are programmed, the last 3 are stored. For example, if there are 4 options are programmed in the order of Code 128，Code 39，QR Code, and UPC-A and "Save". The 3 options are restored in the order of: Code 39，QR Code, UPC-A.

Interception Rule No.3: If there are more than one options programmed for a barcode format, the later one is used. For example, there are 3 options restored, Code 128 option A, QR Code option, Code 128 option B. The Code 128 option B is used when a Code 128 barcode is read.

Program Intercept Option
【Pro CMD：0316000】

Enable Interception
【Pro CMD：0315010】

**Disable Interception
【Pro CMD：0315000】

Code Programming ON

Code Programming OFF

Programming 1D Intercept Option

To enable 1D interception, read “Enable Message Interception” and read interception command. The interception command format of 1D interception command consists of a 3-digit symbol ID (see table below) and up to 5 interception sections. An interception section begins with a 3-digit direction flag; “000’ denotes ascending (left to right) and “001” descending. The flag is followed by a 3-digit start digit and a 3-digit end digit.
For example, intercept EAN-13 from 1st digit to 3rd ascending and from reciprocal 4th to reciprocal 1st.

1、Read “Code Programming ON”

2、Read “Allow Interception”

3、Read “Program Intercept Option”

4、Check Symbols ID Number table for EAN-13

5、Read below digit barcodes

digit	005	000	001	003	001	004	001
Denotes	symbol ID	ascending	the 1st digit	the 3rd digit	descending	the 4th digit	the 1st digit

The format of 1D interception command consists of a 3-digit symbol ID (see table below) and up to 5 interception sections. An interception section begins with a 3-digit direction flag; “000’ denotes ascending (left to right or beginning to end) and “001” descending (right to left or end to beginning). The flag is followed by a 3-digit start digit and a 3-digit end digit.

Note：

1、Maximum sections of barcode message interception are 5.

2、Maximum value is 127 for both start digital and end digital

3、Overlaps of barcode message sections are allowed and work independently.

4、Start digital and end digital determine its message section. In the above example, descending “004” and “001” means the section of “last 4th”, “last 3rd”, “last 2nd”, and “last one” digits.

5、To intercept only one digit, program start digital and end digital to be the same value

Programming 2D Intercept Option

Code Programming ON

Code Programming OFF

A command input consists of 3 or 6 decimals.
The first input is for barcode format; Refer to PXXX for “Symbols ID Number”. The second input is for intercepting direction; “000” denotes ascending and “001” denotes descending. The following 2 inputs are for start digital and end digital.

Start digital and end digital value consist of 4 digits: thousand, hundred, decimal, figure. And they are programmed by 6 digits: “0”, thousand, hundred, “0”, decimal, figure. For example, program 001013 for 113.

To enable 2D interception, read “Enable Message Interception” and read interception command. The interception command format of 2D interception command consists of a 3-digit symbol ID (see table below) and up to 3 interception sections. An interception section begins with a 3-digit direction flag; “000’ denotes ascending (left to right) and “001” descending. The flag is followed by a start digit and a end digit.
The start digit and end digit uses 6 digits to present 4-digit value. The first two digits are for thousandth and next two digits for hundredth. For example, 001013 means 113.

Example

For example, intercept QR Code from 1st digit to 20th ascending and from 113th digit to 140th ascending.

1. Read “Code Programming ON”
2. Read “Enable Interception”
3. Read “Program Intercept Option”
4. Check Symbols ID Number table for QR Code
5. Read below digit barcodes

digit	033	000	000001	000020	000	001013	001040
Denote	symbol ID	ascending	The 1st digit	The 20th digit	ascending	The 113th digit	The 140th digit

Rules：

1、Maximum intercept 3 barcode message sections

2、Maximum value is 9999 for start digital and end digital

3、Overlaps of barcode message sections are allowed and work independently.

4、Start digital and end digital determine its message section. In the above example, ascending “000001” and “000020” means the first 20 digits.

5、To intercept only one digit, program start digital and end digital to be the same value

Symbols	ID Number
Code 128	002
UCC/EAN128	003
EAN-8	004
EAN-13	005
UPC-E	006
UPC-A	007
Interleaved 2 OF 5	008
China Post25	011
Code 39	013
Codabar	015
Code 93	017
PDF417	032
QR Code	033
Aztec	034
DataMatrix	035
Chinese-Sensible Code	039
User-Define Code	041
SPEC_OCR_B	064

Code Programming ON

Code Programming OFF

Introduction

Data Pack is for the special requirements of barcode message. There are 3 types of data pack. Data pack effects all data formats, in that be sure to load the default “Disable Pack” if pack is not required.

** Disable Pack
【Pro CMD：0314000】

Normal Pack

Normal pack format:：

[STX + ATTR + LEN] + [AL_TYPE + DATA] + [LRC]

» STX：0x02

» ATTR：0x00

» LEN：Barcode message length is expressed by 2 bytes, range “0x0000~0xFFFF” which is between 0 and 65535.

» AL_TYPE：0x36

» DATA：Barcode message

» LRC：Parity byte

The algorithm:

1、computation sequence is LRC=0xFF+STX+ATTR+LEN+AL_TYPE+DATA

2、computation method is XOR, byte by byte.

Normal Pack
【Pro CMD：0314010】

Code Programming ON

ESC_Bank Pack

ESC_BANK pack format:

[STX] + [DATA] + [ETX] + [BCC]

Code Programming OFF

- » STX：0x02。
- » DATA：Barcode message
- » ETX：0x03。
- » BCC：Parity byte

The algorithm:

1、computation sequence is BCC = [STX] + [DATA] + [ETX]

2、computation method is XOR, byte by byte

ESC_Bank Pack
【Pro CMD：0314020】

Code Programming ON

Code Programming OFF

ESC_AddLen Pack

ESC_AddLen pack format:
[STX] +[LEN] + [DATA] + [ETX] + [BCC]
STX：0x02。
LEN：Barcode message length is expressed by 4 bytes. Every byte for an ASCII, and thus it ranges “0~9999”. For example, LEN=0x30303137, refer to the ASCII chart for decimal value. 0x30303137=0017 (0x30=0, 0x31=1, 0x37=7).
DATA：Barcode message
ETX：0x03。
BCC：Parity byte.
The algorithm:
1. computation sequence is BCC = [STX] +[LEN] + [DATA] + [ETX]
2. computation method is XOR, byte by byte

ESC_AddLen Pack
【Pro CMD：0314040】

Batch Programming

Tools

Introduction

Batch Programming can integrate a programming sequence into one barcode.
Batch Programming Rules:

1、Sub-command is in this format: Programming Command + Parameters

2、Sub-commands are terminated by semicolons. Note that there is no blank between a sub-command and its terminator semicolon.

3、 “Save Programming”(0000160) to terminate

4、Use Barcode Generator software to make the 2D batch barcode.

For example, to generate a batch barcode for “Illumination Keep ON”(0200030), “Sensor Mode”(0302010), “Sensor Mode Timeout = 2 seconds”(0313000), and “Disable Fixed Length Selection”(0405140)for Interleaved 2 of 5.
0200030; 0302010; 0313000 = 2000; 0405140; 0000160; Generate a batch code.

Code Programming ON

Code Programming OFF

Allow Read Batch Code
【Pro CMD：0001110】

How to build a batch command

Batch command can contain many commands. Each command is divided by semicolon. Batch command must be ended with save command.
Command structure: command (+ equal mark + setting information)
The setting command list is provided below
There are 4 setting command modes

1、Setting syntax 1: Command

The most command is the one can be set at one time without the command.
e.g.:
The command setting the baud rate as 38400 bps: 0100060
The command setting auto barcode reading: 0302010

2、Setting syntax 2: Command + equal mark + number

This command is used for setting the value of parameter, including the longest and shortest length of the barcode, barcode reading delay setting, same delay time setting, sensitive value setting, barcode reading times setting, non-standard parameter, etc.
e.g.:
The command setting the delay of barcode reading as 3000ms: 0313000 = 3000
The command setting the sensitive value as 10: 0312040 = 10

3、Setting syntax 3: command + equal mark + hex (e.g., 0x101a，0x2C03)

This command can be used as setting the user-defined prefix, user-defined suffix, ending suffix, CodeID, increase or cancel the barcode length value, information intercepting, etc. Note: every two hexes in the command stand for a setting character
e.g.:
Append the fixed length 4 of interleaved 2of 5 to 26: 0405160 = 0x041a
Setting the suffix information of the ending as CR/LF: 0310000 = 0x0d0a

4、Setting syntax 4: command + equal mark+ double quotation marks

If the setting information is viewable character, then this mode of setting is appropriate.
e.g.:
The command setting the user-defined prefix information as AUTO-ID： 0300000 = “AUTO-ID”

Produce setting code

Make the command list (ended with save command) to a PDF417, QR code or DataMatrix.
For example, to produce a batch command means: light Always On, Auto Scan, change delay time to 2 seconds, Disable Fixed Length of I 2 of 5. Firstly find commands as follows

0200030;（light Always On）
0302010;（Auto Scan）
0313000 = 2000;（change delay time to 2 seconds）
0405140;（Disable Fixed Length of I 2 of 5）
0000160;（Save）

The batch setting code (PDF417) is as follow,

Use batch setting code

Tools

Read “Code Programming ON”, then read “enable batch setting code”, and then read the batch setting code produced just now, finally Read “Code Programming Off”

Code Programming ON

Code Programming OFF

Code Programming ON
【Pro CMD：0006010】

Allow Read Batch Code
【Pro CMD：0001110】

Batch setting code

Code Programming OFF
【Pro CMD：0006000】

Digit Code

It is must to be read save after read digit code.

0

【Pro CMD：0000000】

4

【Pro CMD：0000040】

1

【Pro CMD：0000010】

5

【Pro CMD：0000050】

2

【Pro CMD：0000020】

6

【Pro CMD：0000060】

3

【Pro CMD：0000030】

7

【Pro CMD：0000070】

8
【Pro CMD：0000080】

C
【Pro CMD：0000120】

9
【Pro CMD：0000090】

D
【Pro CMD：0000130】

A
【Pro CMD：0000100】

E
【Pro CMD：0000140】

B
【Pro CMD：0000110】

F
【Pro CMD：0000150】

In order to save the received data “Save” has to be read after data transition completed. If error occurs when reading data,
the wrong data can be deleted and the setting up can be done again..

Eg, after a program code is received then ‘1 2 3” in order is received, if then read “Abort One Data of Current Setting” the “3” will be deleted; if read “Abort One String of Current Setting” the ‘123’ will be deleted; if read “Abort Current Setting” both the program code and ‘123’ will be deleted, the device will be on status of “initiating program code”

Code Programming ON

Code Programming OFF

Save
【Pro CMD：0000160】

Abort One Data of Current Setting
【Pro CMD：0000170】

Abort Current Setting
【Pro CMD：0000190】

Abort One String of Current Setting
【Pro CMD：0000180】

Introduction

Glossary of Newland Auto-ID Technology & Products

Alphabet

A B C | D E F | G H I | J K L | M N O | P Q R | S T U V | W X Y Z

A

API
An interface by means of which one software component communicates with or controls another. Usually used to refer to services provided by one software component to another, usually via software interrupts or function calls

Aperture
The opening in an optical system defined by a lens or baffle that establishes the field of view.

Application Programming Interface.
See API.

ANSI Terminal
A display terminal that follows commands in the ANSI standard terminal language. For example, it uses escape sequences to control the cursor, clear the screen and set colors. Communications programs support the ANSI terminal mode and often default to this terminal emulation for dial-up connections to online services.

ASCII
American Standard Code for Information Interchange. A 7 bit-plus-parity code representing 128 letters, numerals, punctuation marks and control characters. It is a standard data transmission code in the U.S.

Auto_discrimination
The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content is decoded.

B

Bar
The dark element in a printed bar code symbol.

Bar Code
A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a bar code symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbol uses its own unique format. See Symbols.

Bar Code Density
The number of characters represented per unit of measurement (e.g., characters per inch).

Bar Height
The dimension of a bar measured perpendicular to the bar width.

Bar Width
Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.

BIOS
Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.

Bit
Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

Bits per Second (bps)
Bits transmitted or received.

bps.
See Bits Per Second.

Byte
On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory is used to store one ASCII character.

BOOTP
A protocol for remote booting of diskless devices. Assigns an IP address to a machine and may specify a boot file. The client sends a BOOTP request as a broadcast to the BOOTP server port (67) and the BOOTP server responds using the BOOTP client port (68). The BOOTP server must have a table of all devices, associated MAC addresses and IP addresses.

boot or boot-up.
The process a computer goes through when it starts. During boot-up, the computer can run self-diagnostic tests and configure hardware and software.

C

CDRH
Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.

CDRH Class 1
This is the lowest power CDRH laser classification. This class is considered intrinsically safe, even if all laser output were directed into the eye’ s pupil. There are no special operating procedures for this class.

CDRH Class 2
No additional software mechanisms are needed to conform to this limit. Laser operation in this class poses no danger for unintentional direct human exposure.

Character
A pattern of bars and spaces which either directly represents data or indicates a control function, such as a number, letter, punctuation mark, or communications control contained in a message.

Character Set
Those characters available for encoding in a particular bar code symbol.

Check Digit
A digit used to verify a correct symbol decode. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbols. Using check digits decreases the chance of substitution errors when a symbol is decoded.

Codabar
A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (-$: / , +).

Code 128
A high density symbol which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.

Code 3 of 9 (Code 39)
A versatile and widely used alphanumeric bar code symbol with a set of 43 character types, including all uppercase letters, numerals from 0 to 9 and 7 special characters (- . / + % $ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.

Code 93
An industrial symbol compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.

Code Length
Number of data characters in a bar code between the start and stop characters, not including those characters.

C (continue)

Cold Boot
A cold boot restarts the mobile computer and erases all user stored records and entries.

COM port
Communication port; ports are identified by number, e.g., COM1, COM2.

Continuous Code
A bar code or symbol in which all spaces within the symbol are parts of characters. There are no inter-character gaps in a continuous code. The absence of gaps allows for greater information density.

Convolution Code
In telecommunication, a convolution code is a type of error-correcting code in which (a) each m-bit information symbol (each m-bit string) to be encoded is transformed into an n-bit symbol, where m/n is the code rate ($n \geq m$) and (b) the transformation is a function of the last k information symbols, where k is the constraint length of the code

Cradle
A cradle is used for charging the terminal battery and for communicating with a host computer, and provides a storage place for the terminal when not in use.

D

Data Communications Equipment (DCE)
A device (such as a modem) which is designed to attach directly to a DTE (Data Terminal Equipment) device.

DCE See **Data Communications Equipment.**

DCP See **Device Configuration Package.**

Dead Zone
An area within a scanner’ s field of view, in which specular reflection may prevent a successful decode.

Decode.
To recognize a bar code symbol (e.g., UPC/EAN) and then analyze the content of the specific bar code scanned.

Decode Algorithm.
A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.

Decryption
Decryption is the decoding and unscrambling of received encrypted data. Also see, Encryption and Key.

Depth of Field
The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.

Device Configuration Package
The Symbol Device Configuration Package provides the Product Reference Guide (PRG), flash partitions, Terminal Configuration Manager (TCM) and the associated TCM scripts. With this package hex images that represent flash partitions can be created and downloaded to the mobile computer.

Discrete Code
A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

Discrete 2 of 5
A binary bar code symbol representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.

DRAM
Dynamic random access memory.

E

EAN
European Article Number. This European/International version of the UPC provides its own coding format and symbol standards. Element dimensions are specified metrically. EAN is used primarily in retail.

Element
Generic term for a bar or space.

Embedded Operating System
An embedded operating system is an operating system for embedded computer systems. These operating systems are designed to be very compact and efficient, forsaking many functions that non-embedded computer operating systems provide, and which may not be used by the specialized applications they run. They are frequent also real-time operating systems.

Encoded Area
Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.

ENQ (RS-232)
ENQ software handshaking is also supported for the data sent to the host.

ESD
Electro-Static Discharge

F

Flash Disk
An additional megabyte of non-volatile memory for storing application and configuration files.

Flash Memory.
Flash memory is nonvolatile, semi-permanent storage that can be electronically erased in the circuit and reprogrammed. Series 9000 mobile computers use Flash memory to store the operating system (ROM-DOS), the terminal emulators, and the Citrix ICA Client for DOS.

File Transfer Protocol (FTP)
A TCP/IP application protocol governing file transfer via network or telephone lines. See TCP/IP

FTP. See **File Transfer Protocol**

Flash Memory
Flash memory is responsible for storing the system firmware and is non-volatile. If the system power is cut off, the data will not be lost.

G

H

Hard Reset. See **Cold Boot.**

Hz
Hertz; A unit of frequency equal to one cycle per second.

Host Computer
A computer that serves other terminals in a network, providing such services as computation, database access, supervisory programs and network control.

I

IDE
Intelligent drive electronics. Refers to the solid-state hard drive type.

IEC
International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.

IEC (825) Class
This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 second window and an automatic laser shutdown if the scanner’s oscillating mirror fails.

Interleaved 2 of 5
A binary bar code symbol representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

IOCTL Input/Output Control.

Intercharacter Gap
The space between two adjacent bar code characters in a discrete code.

Interleaved Bar Code.
A bar code in which characters are paired together, using bars to represent the first character and the intervening spaces to represent the second.

Interleaved 2 of 5
A binary bar code symbol representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

Internet Protocol Address. See **IP.**

I (continue)

I/O Ports
Interface the connection between two devices, defined by common physical characteristics, signal characteristics, and signal meanings. Types of interfaces include RS-232 and PCMCIA.

Input/Output Ports
I/O ports are primarily dedicated to passing information into or out of the terminal’s memory. Series 9000 mobile computers include Serial and USB ports.

IP
Internet Protocol. The IP part of the TCP/IP communications protocol. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or subnetwork.
IP accepts “packets” from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a “datagram” to the layer 2 data link protocol. It may also break the packet into fragments to support the maximum transmission unit (MTU) of the network.

IP Address
(Internet Protocol address) The address of a computer attached to an IP network. Every client and server station must have a unique IP address. A 32-bit address used by a computer on a IP network. Client workstations have either a permanent address or one that is dynamically assigned to them each session. IP addresses are written as four sets of numbers separated by periods; for example, 204.171.64.2.

IPX/SPX
Internet Package Exchange/Sequential Packet Exchange. A communications protocol for Novell. IPX is Novell’s Layer 3 protocol, similar to XNS and IP, and used in NetWare networks. SPX is Novell’s version of the Xerox SPP protocol.

IS-95
Interim Standard 95. The EIA/TIA standard that governs the operation of CDMA cellular service. Versions include IS-95A and IS-95B. See CDMA.

J

K

Key
A key is the specific code used by the algorithm to encrypt or decrypt the data. Also see, Encryption and Decrypting.

L

Laser scanner
A type of bar code reader that uses a beam of laser light.

LASER
Light Amplification by Stimulated Emission of Radiation.The laser is an intense light source. Light from a laser is all the same frequency, unlike the output of an incandescent bulb. Laser light is typically coherent and has a high energy density.

Laser Diode
A gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.

LCD. See **Liquid Crystal Display.**

LED Indicator
A semiconductor diode (LED - Light Emitting Diode) used as an indicator, often in digital displays. The semiconductor uses applied voltage to produce light of a certain frequency determined by the semiconductor’ s particular chemical composition.

Liquid Crystal Display (LCD)
A display that uses liquid crystal sealed between two glass plates. The crystals are excited by precise electrical charges, causing them to reflect light outside according to their bias. They use little electricity and react relatively quickly. They require external light to reflect their information to the user.

Light Emitting Diode. See **LED.**

M

MC. Mobile Computer.

MDN
Mobile Directory Number. The directory listing telephone number that is dialed (generally using POTS) to reach a mobile unit. The MDN is usually associated with a MIN in a cellular telephone -- in the US and Canada, the MDN and MIN are the same value for voice cellular users. International roaming considerations often result in the MDN being different from the MIN.

MIL
1 mil = 1 thousandth of an inch.

MIN
Mobile Identification Number. The unique account number associated with a cellular device. It is broadcast by the cellular device when accessing the cellular system.

Misread (Mis-decoded).
A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.

Mobile Computer.
In this text, mobile computer refers to the Symbol Series 9000 wireless portable computer. It can be set up to run as a stand-alone device, or it can be set up to communicate with a network, using wireless radio technology.

N

Nonvolatile memory (NOVRAM)
Non-volatile memory, nonvolatile memory, NVM or **non-volatile storage,** is computer memory that can retain the stored information even when not powered.

Nominal
The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.

Nominal Size.
Standard size for a bar code symbol. Most UPC/EAN codes are used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).

NVM. Non-Volatile Memory.

O

ODI. See **Open Data-Link Interface.**

Open Data-Link Interface (ODI)
Novell’s driver specification for an interface between network hardware and higher-level protocols. It supports multiple protocols on a single NIC (Network Interface Controller). It is capable of understanding and translating any network information or request sent by any other ODI-compatible protocol into something a NetWare client can understand and process.

Open System Authentication
Open System authentication is a null authentication algorithm.

Opto-isolator (Optical Coupler, OC) Chipset
In electronics, an opto-isolator (or optical isolator, optocoupler, photocoupler, or photoMOS) is a device that uses a short optical transmission path to transfer a signal between elements of a circuit, typically a transmitter and a receiver, while keeping them electrically isolated---since the signal goes from an electrical signal to an optical signal back to an electrical signal, electrical contact along the path is broken.

P

PAN
Personal area network. Using Bluetooth wireless technology, PANs enable devices to communicate wirelessly. Generally, a wireless PAN consists of a dynamic group of less than 255 devices that communicate within about a 33-foot range. Only devices within this limited area typically participate in the network.

Parameter
A variable that can have different values assigned to it.

PC Card
A plug-in expansion card for laptop computers and other devices, also called a PCMCIA card. PC Cards are 85.6mm long x 54 mm wide, and have a 68 pin connector. There are several different kinds:
Type I; 3.3 mm high; use - RAM or Flash RAM
Type II; 5 mm high; use - modems, LAN adaptors
Type III; 10.5 high; use - Hard Disks

PCMCIA
Personal Computer Memory Card Interface Association. See PC Card.
Percent Decode
The average probability that a single scan of a bar code would result in a successful decode. In a well-designed bar code scanning system, that probability should approach near 100%.

Pixel
In digital imaging, a pixel is the smallest piece of information in an image. Pixels are normally arranged in a regular 2-dimensional grid, and are often represented using dots, squares, or rectangles. Each pixel is a sample of an original image, where more samples typically provide a more accurate representation of the original. The intensity of each pixel is variable; in color systems, each pixel has typically three or four components such as red, green, and blue, or cyan, magenta, yellow, and black.

PING
(Packet Internet Groper) An Internet utility used to determine whether a particular IP is online. It is used to test and debug a network by sending out a packet and waiting for a response.

Print Contrast Signal (PCS)
Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. PCS = (RL - RD) / RL, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.

Programming Mode
The state in which a scanner is configured for parameter values. See Scanning Mode.

Q

Quiet Zone
A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.

QWERTY.
A standard keyboard commonly used on North American and some European PC keyboards. “QWERTY” refers to the arrangement of keys on the left side of the third row of keys.

R

RAM
Random Access Memory. Data in RAM can be accessed in random order, and quickly written and read.

Reflectance
Amount of light returned from an illuminated surface.

Resolution
The narrowest element dimension which is distinguished by a particular reading device or printed with a particular device or method.

RF
Radio Frequency.

ROM
Read-Only Memory. Data stored in ROM cannot be changed or removed.

Router
A device that connects networks and supports the required protocols for packet filtering. Routers are typically used to extend the range of cabling and to organize the topology of a network into subnets. See Subnet.

RS-232
An Electronic Industries Association (EIA) standard that defines the connector, connector pins, and signals used to transfer data serially from one device to another.

S

Scan Area.
Area intended to contain a symbol.

Scanner.
An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are: 1) Light source (laser or photoelectric cell): illuminates a bar code; 2) Photodetector: registers the difference in reflected light (more light reflected from spaces); 3) Signal conditioning circuit: transforms optical detector output into a digitized bar pattern.

Scanning Mode
The scanner is energized, programmed and ready to read a bar code.

Scanning Sequence
A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.

SDK.
Software Development Kit

Self-Checking Code
A symbol that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.

Shared Key
Shared Key authentication is an algorithm where both the AP and the MU share an authentication key.

SHIP
Symbol Host Interface Program.

SID
System Identification code. An identifier issued by the FCC for each market. It is also broadcast by the cellular carriers to allow cellular devices to distinguish between the home and roaming service.

SMDK.
Symbol Mobility Developer’ s Kit.

Soft Reset. See **Warm Boot.**

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

S (continue)

Specular Reflection
The mirror-like direct reflection of light from a surface, which can cause difficulty decoding a bar code.

Start/Stop Character.
A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.

STEP.
Symbol Terminal Enabler Program.

Subnet
A subset of nodes on a network that are serviced by the same router. See Router.

Subnet Mask
A 32-bit number used to separate the network and host sections of an IP address. A custom subnet mask subdivides an IP network into smaller subsections. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets. Default is often 255.255.255.0.

Substrate
A foundation material on which a substance or image is placed.

SVTP
Symbol Virtual Terminal Program.

Symbol
A scannable unit that encodes data within the conventions of a certain symbol, usually including start/stop characters, quiet zones, data characters and check characters.

Symbol Aspect Ratio
The ratio of symbol height to symbol width.

Symbol Height
The distance between the outside edges of the quiet zones of the first row and the last row.

Symbol Length
Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.

Symbology
The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, qwCode 39, PDF417, etc.).

T

TCP/IP
(Transmission Control Protocol/Internet Protocol) A communications protocol used to internetwork dissimilar systems. This standard is the protocol of the Internet and has become the global standard for communications. TCP provides transport functions, which ensures that the total amount of bytes sent is received correctly at the other end.
UDP is an alternate transport that does not guarantee delivery. It is widely used for real-time voice and video transmissions where erroneous packets are not retransmitted. IP provides the routing mechanism. TCP/IP is a routable protocol, which means that all messages contain not only the address of the destination station, but the address of a destination network. This allows TCP/IP messages to be sent to multiple networks within an organization or around the world, hence its use in the worldwide Internet. Every client and server in a TCP/IP network requires an IP address, which is either permanently assigned or dynamically assigned at startup.

Telnet
A terminal emulation protocol commonly used on the Internet and TCP/IP-based networks. It allows a user at a terminal or computer to log onto a remote device and run a program.
Terminal. See Mobile Computer.

Terminate and Stay Resident (TSR).
A program under DOS that ends its foreground execution to remain resident in memory to service hardware/software interrupts, providing background operation. It remains in memory and may provide services on behalf of other DOS programs.

Terminal Emulation
A “terminal emulation” emulates a character-based mainframe session on a remote non-mainframe terminal, including all display features, commands and function keys. The VC5000 Series supports Terminal Emulations in 3270, 5250 and VT220.

TFTP
(Trivial File Transfer Protocol) A version of the TCP/IP FTP (File Transfer Protocol) protocol that has no directory or password capability. It is the protocol used for upgrading firmware, downloading software and remote booting of diskless devices.

Tolerance
Allowable deviation from the nominal bar or space width.

Transmission Control Protocol/Internet Protocol. See **TCP/IP**

Trivial File Transfer Protocol. See **TFTP**

TSR See **Terminate and Stay Resident.**

U

UPC.
Universal Product Code. A relatively complex numeric symbol. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbol for retail food packages in the United States.

UDP
User Datagram Protocol. A protocol within the IP protocol suite that is used in place of TCP when a reliable delivery is not required. For example, UDP is used for real-time audio and video traffic where lost packets are simply ignored, because there is no time to retransmit. If UDP is used and a reliable delivery is required, packet sequence checking and error notification must be written into the applications.

V

Visible Laser Diode (VLD)
A solid state device which produces visible laser light.

W

Warm Boot
A warm boot restarts the mobile computer by closing all running programs. All data that is not saved to flash memory is lost.

X

Y

Z

Version	Data Source	Description	Date	Approved
Pre-release version			20090826	