RTscan

RT211

OEM Barcode Engine

User Guide

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Chapter 1 Getting Started

Introduction

The RT211 hand-held barcode scanner (hereinafter referred to as **"RT211 scanner"** or **"the scanner"**), armed with a computerized image recognition system-on-chip, bring about a new era of 2D barcode scanner.

The RT211's 2D barcode decoder chip ingeniously blends image recognition algorithm and advanced chip design & manufacturing, which significantly simplifies application design and delivers superior performance and solid reliability with low power consumption.

The RT211 supports all mainstream 1D and standard 2D barcode symbologies (e.g., PDF417, QR Code, Data Matrix and Chinese Sensible Code) as well as GS1-DataBar™(RSS) (Limited/Stacked/Expanded versions). It can read barcodes on virtually any medium - paper, plastic card, mobile phones and LCD displays.

This compact, lightweight engine fits easily into even the most space-constrained equipment such as data collectors, meter readers, ticket validators and PDAs.

The RT211's instant start-up feature allows for a complete shutdown of the current in the application.

Instantly starting bar code recognition when needed, and bring convenience and quickness to applications with ultra-low power consumption.

About This Guide

This guide provides programming instructions for the RT211. Users can configure the RT211 by scanning the programming barcodes included in this manual.

The RT211 has been properly configured for most applications and can be put into use without further configuration. Users may check ***Appendix A: Factory Defaults Table*** for reference. Throughout the manual, asterisks (**) indicate factory default values.

Connecting EVK to PC

The EVK tool is provided to assist users in application development for the RT211. You can connect the EVK to PC via a USB connection or an RS-232 connection. In case of USB connection, a driver is required if PC wants to communicate with RT211 and receive decoded data through virtual serial port.

Barcode Scanning

Powered by area-imaging technology, the RT211 features fast scanning and accurate decoding. Barcodes rotated at any angle can still be read with ease. When scanning a barcode, simply center the aiming beam or pattern projected by the RT211 over the barcode.

Barcode Programming

The user can use the setup bar code or serial port instructions to set the reading engine.

Configuring the RT211

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

Barcode Programming

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

Command Programming

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

Read Register

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

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

Prefix1 : 0x7E 0x00

Types : 0x07

Lens : 0x01

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

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

FCS : CRC-CCITT checksum, 2 bytes.

Computation sequence: Types+ Lens+Address+Datas;

calculate method is CRC_CCITT

polynomial: X16+X12+X5+1(0x1021), initial value: 0x0000.

The highest bit is calculated first for a single byte, and there is no need to invert the direct output. The following C language program is provided for reference.

```
unsigned int crc_cal_by_bit (unsigned char* ptr, unsigned int len)
{
unsigned int crc = 0;
while(len-- != 0)
{
for(unsigned char i = 0x80; i != 0; i /= 2)
{
crc *= 2;
if((crc&0x10000) !=0) //After previvous CRC multiplied by 2, if the first bit is 1, then divide by 0x11021
crc ^= 0x11021;
if((*ptr&i) != 0) //If current bit is 1, then CRC = Previous CRC + current/CRC_CCITT, Crc ^= 0x1021
crc ^= 0x1021;
}
ptr++;
}
return crc;
}
```

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

1) Success message:

Prefix2 : 0x02 0x00

Types : 0x00 (success)

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

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

FCS : CRC-CCITT checksum. Computation sequence: Types+ Lens+Address+Datas;
calculate method is CRC_CCITT
polynomial: X16+X12+X5+1(0x1021), initial value: 0x0000.
The highest bit is calculated first for a single byte, and there is no need to invert the direct output. （reference code is as above）.

2) CRC check failure message:

Prefix2 : 0x02 0x00

Types : 0x01 (CRC check failure)

Lens : 0x01 (the number of data returned)

Datas : 0x00 (no practical significance (1 byte)

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

3) Invalid command message:

Prefix2 : 0x02 0x00

Types : 0x03 (invalid command)

Lens : 0x01 (the number of data returned)

Datas : 0x00 (no practical significance (1 byte)

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

Example:

Read the content of register 0x000A

1) Read operation succeeds: 0x3E returned

Enter: 0x7E 0x00 0x07 0x01 0x00 0x0A 0x01 0xEE 0x8A

Response: 0x02 0x00 0x00 0x01 0x3E 0xE4 0xAC

2) FCS check fails:

Enter: 0x7E 0x00 0x07 0x01 0x00 0x0A 0x01 0x11 0x22

Response: 0x02 0x00 0x01 0x01 0x00 0x04 0x01

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

Enter: 0x7E 0x00 0x07 0x01 0x00 0x0A 0x01

Response: 0x02 0x00 0x03 0x01 0x00 0x6A 0x61

Write Register

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

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

Prefix1 : 0x7E 0x00 (2 bytes)

Types : 0x08 (1 byte)

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

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

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

FCS : CRC-CCITT checksum, 2 bytes.

Computation sequence: Types+ Lens+Address+Datas;

polynomial: X16+X12+X5+1 (0x1021), initial value: 0x0000.

The highest bit is calculated first for a single byte, and it is directly output without reversing.The following C language program is provided for reference.

```
unsigned int crc_cal_by_bit(unsigned char* ptr, unsigned int len)
{
unsigned int crc = 0;
while(len-- != 0)
{
for(unsigned char i = 0x80; i != 0; i /= 2)
{
crc *= 2;
if((crc&0x10000) !=0) // After previvous CRC multiplied by 2, if the first bit is 1, then divide by 0x11021
crc ^= 0x11021;
if((*ptr&i) != 0) // If current bit is 1, then CRC = Previous CRC + current/CRC_CCITT, Crc ^= 0x1021;
crc ^= 0x1021;
}
ptr++;
}
return crc;
}
```

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

1) Success message:

Prefix2 ： 0x02 0x00

Types : 0x00 (success)

Lens : 0x01

Datas : 0x00

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

2) FCS check failure message:

Prefix2 : 0x02 0x00

Types : 0x01 (FCS check failure)

Lens : 0x01

Datas : 0x00

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

3) Invalid command message:

Prefix2 : 0x02 0x00

Types : 0x03 (invalid command)

Lens : 0x01

Datas : 0x00

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

Example:

Write 0x3E into register 0x000A

1) Write operation succeeds:

Enter: 0x7E 0x00 0x08 0x01 0x00 0x0A 0x3E 0x4C 0xCF

Response: 0x02 0x00 0x00 0x01 0x00 0x33 0x31

2) FCS check fails:

Enter: 0x7E 0x00 0x08 0x01 0x00 0x0A 0x3E 0x11 0x22

Response: 0x02 0x00 0x01 0x01 0x00 0x04 0x01

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

Enter: 0x7E 0x00 0x08 0x01 0x00 0x0A 0x3E

Response: 0x02 0x00 0x03 0x01 0x00 0x6A 0x61

Save Register Data in EEPROM

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

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

Prefix1 : 0x7E 0x00

Types : 0x09

Lens : 0x01

Address: 0x0000

Datas : 0x00

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

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

1) Success message:

Prefix2 : 0x02 0x00

Types : 0x00 (success)

Lens : 0x01

Datas : 0x00

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

2) FCS check failure message:

Prefix2 : 0x02 0x00

Types : 0x01 (FCS check failure)

Lens : 0x01

Datas : 0x00

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

3) Invalid command message:

Prefix2 : 0x02 0x00

Types : 0x03 (invalid command)

Lens : 0x01

Datas : 0x00

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

Relationship between Programming Command and Serial Command

1. Program general parameter with serial command

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

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

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

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

3. **BITPOSITION**: Bit(s) the value is written to. For example, the BITPOSITION = "08", only bit 3 is to be written; the BITPOSITION = "FF", if all bits Bit7 ~ Bit0 should to be written.

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

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

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

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

Enter: 0x7E 0x00 0x08 0x01 0x00 0xD9 0xD8 0x91 0x53

Respose: 0x02 0x00 0x00 0x01 0x00 0x33 0x31

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

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

Step 1: Read the content of register 0x0000.

Enter: 0x7E 0x00 0x07 0x01 0x00 0x00 0x01 0x01 0x41

Response: 0x02 0x00 0x00 0x01 0xD4 0xB8 0xC8

Step 2: Calculate the value written to the register.

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

Step 3: Write the value into the register.

Enter: 0x7E 0x00 0x08 0x01 0x00 0x00 0xD5 0xEF 0x41

Response: 0x02 0x00 0x00 0x01 0x00 0x33 0x31

2. Program special parameter with serial command

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

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

Note: Red: Address of register.

Blue: Value written to register. For example, to set the sensitivity level to 10, 0xTT should be 0x0A.

Pink: CRC checksum calculated.

3. Save register data in EEPROM

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

Enter: 0x7E 0x00 0x09 0x01 0x00 0x00 0xDE 0xC8

Response: 0x02 0x00 0x00 0x01 0x00 0x33 0x31

Programming Barcode Data

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

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

Transmit Programming Barcode Data

Factory Defaults

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

Note: Use this feature with discretion.

Restore All Factory Defaults

Chapter 2 Communication Interfaces

The RT211 provides an RS-232 interface and a USB interface to communicate with the host device. The host device can receive scanned data and send commands to control the scanner or to access/alter the configuration information of the scanner via the RS-232 or USB interface.

RS-232 Interface

Serial communication interface is usually used to connect the scanner to a host device (like PC, POS). When the RT211 is connected to a host device through its RS-232 interface, serial communication is enabled by default. However, you need to set communication parameters (including baud rate, parity check, data bit and stop bit) to match the host device so that the two devices can communicate with each other.

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

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

Baud Rate

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

**** 9600**

1200

19200

2400

38400

4800

57600

14400

115200

USB Interface

When the RT211 is connected to a host device through its USB interface, **USB COM Port Emulation** is enabled by default. User can switch between **USB DATAPIPE**, **USB HID-KBW**, **USB COM Port Emulation** and **HID-POS**, upon actual need.

USB DATAPIPE

USB DATAPIPE is a custom USB transfer protocol. This feature requires the appropriate driver to be installed on the host.

USB DATAPIPE

USB HID-KBW

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

USB HID-KBW

Standard Keyboard

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

**** Standard Keyboard**

Emulate ALT+Keypad

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

1. Hold the key "ALT"
2. Enter the number corresponding to the ASCII character on the keypad.
3. ALT Break

W066004

Emulate ALT+Keypad

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

Function Key Mapping

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

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

W066002

Function Key Mapping

ASCII Function Key Mapping Table

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

USB Country Keyboard Types

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

**** U.S.**

Belgium

Brazil

Canada

Czech

Denmark

Finland

France

WFF6B08

Germany, Austria

WFF6B09

Greece

WFF6B0A

Hungary

WFF6B0B

Israel

WFF6B0C

Italy

WFF6B0D

Latin America, South America

WFF6B0E

Netherland

WFF6B0F

Norway

WFF6B10

Poland

WFF6B11

Portugal

Romania

Russia

Slovakia

Spain

Sweden

Switzerland

Turkey 1

Turkey 2

27 - UK

28 - Japan

Beep on Unknown Character

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

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

**** Beep on Unknown Character**

Do Not Beep on Unknown Character

Inter-Keystroke Delay

This parameter specifies the delay between emulated keystrokes.

**** No Delay**

Short Delay (5ms)

Medium Delay (10ms)

Long Delay (15ms)

Caps Lock

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

**** Caps Lock OFF**

Caps Lock ON

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

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

Convert Case

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

W306F00

**** No Case Conversion**

W306F30

Convert All to Lower Case

W306F20

Convert All to Upper Case

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

Emulate Numeric Keypad

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

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

W046F04

Emulate Numeric Keypad

W046F00

**** Do Not Emulate Numeric Keypad**

Note: Make sure the Num Lock light of the Host is turned ON when using this feature.

USB COM Port Emulation

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

**** USB COM Port Emulation**

USB DATAPIPE

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

USB DATAPIPE

HID-POS

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

Features:

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

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

W030D03

USB HID-POS

Access the Scanner with Your Program

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

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

Acquire Scanned Data

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

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

VID/PID

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

Product	Interface	PID (Hex)	PID (Dec)
HR21	USB DATAPIPE	8001	32769
	USB HID-KBW	8003	32771
	USB COM Port Emulation	8006	32774
	HID-POS	8010	32784

Chapter 3 Scan Mode

Manual Mode

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

**** Manual Mode**

Continuous Mode

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

Continuous Mode

Decode Session Timeout

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

Decode Session Timeout

Timeout between Decodes

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

Timeout between Decodes

Sense Mode

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

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

Sense Mode

Decode Session Timeout

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

Decode Session Timeout

Timeout between Decodes

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

M00031C

Timeout between Decodes

Image Stabilization Timeout

This parameter defines the amount of time that the scanner waits for the image to stabilize to a point that it can be decoded with more accuracy. It is programmable in 0.1s increments from 0.1s to 25.5s. The default timeout is 0.4s. To learn how to program this parameter, see ***Appendix E: Parameter Programming Examples***.

M00031B

Image Stabilization Timeout

Sensitivity

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

WFF0308

High Sensitivity

WFF0320

**** Medium Sensitivity**

WFF0340

Low Sensitivity

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

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

M00031A

Custom Sensitivity

Command Trigger Mode

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

W030001

Command Trigger Mode

Decode Session Timeout

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

M00031D

Decode Session Timeout

Chapter 4 Illumination & Aiming

Illumination

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

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

OFF: Illumination LED is OFF all the time.

**** Normal**

OFF

Aiming

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

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

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

OFF: Aiming beam is OFF all the time.

**** Normal**

OFF

Always ON

Chapter 5 Notification

Mute Mode

Scanning the **Enable Mute Mode** can turn off all notification beeps. Scanning the **Disable Mute mode** to disable the Mute mode.

Enable Mute Mode

****Disable Mute Mode**

Good Read Beep

Scanning the **Good Read Beep off** to turn off the beeper when the barcode is good read. Scanning the **Good Read Beep On** to turn on the beeper when the barcode is good read.

**** Good Read Beep On**

Good Read Beep Off

Good Read Beep Frequency

Low

**** Medium**

High

Good Read Beep Duration

40ms

**** 80ms**

120ms

Good Read LED

**** Good Read LED On**

Good Read LED Off

Decode Result Notification

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

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

Enable Decode Result Notification

**** Disable Decode Result Notification**

Chapter 6 Prefix & Suffix

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

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

The scanner can be configured to transmit barcode data in the following format:

["F"/ "S"] + [Code ID] + [AIM ID] + [DATA] + [terminating character]

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

AIM ID Prefix

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

Enable AIM ID Prefix

**** Disable AIM ID Prefix**

CODE ID Prefix

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

Enable CODE ID Prefix

**** Disable CODE ID Prefix**

You can choose to transmit original CODE ID or visible CODE ID by scanning the appropriate barcode below (refer to ***Appendix C: Code ID Table***).

**** Original CODE ID**

Visible CODE ID

Terminating Character Suffix

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

Disable Terminating Character Suffix

Append CR

**** Append CRLF**

Append TAB

Chapter 7 Symbologies

Global Settings

Enable/Disable All Symbologies

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

Enable All Symbologies

Disable All Symbologies

Enable/Disable 1D Symbologies

Scanning the following barcodes to enable or disable reading all 1D symbologies barcodes.

Enable 1D Symbologies

Disable 1D Symbologies

Enable/Disable 2D Symbologies

Scanning the following barcodes to enable or disable reading all 2D symbologies barcodes.

Enable 2D Symbologies

Disable 2D Symbologies

Video Reverse

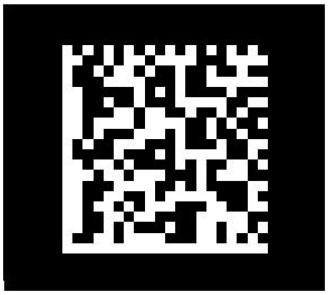
The **Video Reverse** feature only applies to 2D barcodes.

Regular barcode: Dark image on a bright background.

Inverse barcode: Bright image on a dark background.

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

Regular Barcode



Inverse Barcode

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

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

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

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

W100210

Video Reverse ON

W100200

**** Video Reverse OFF**

1D Symbologies

Code 128

Restore Factory Defaults

WFFD990

Restore the Factory Defaults of Code 128

Enable/Disable Code 128

W011601

**** Enable Code 128**

W011600

Disable Code 128

UCC/EAN-128 (GS1-128)

Restore Factory Defaults

WFFD991

Restore the Factory Defaults of UCC/EAN-128

Enable/Disable UCC/EAN-128

W011701

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

W011700

Disable UCC/EAN-128

AIM 128

Restore Factory Defaults

WFFD992

Restore the Factory Defaults of AIM 128

Enable/Disable AIM 128

W101610

**** Enable AIM 128**

W101600

Disable AIM 128

EAN-8

Restore Factory Defaults

Restore the Factory Defaults of EAN-8

Enable/Disable EAN-8

**** Enable EAN-8**

Disable EAN-8

Transmit Check Digit

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

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

Do Not Transmit EAN-8 Check Digit

Add-On Code

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

Enable 2-Digit Add-On Code

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

Enable 5-Digit Add-On Code

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

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

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

Add-On Code Required

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

EAN-8 Add-On Code Required

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

EAN-8 Extension

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

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

Enable EAN-8 Zero Extend

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

EAN-13

Restore Factory Defaults

Restore the Factory Defaults of EAN-13

Enable/Disable EAN-13

**** Enable EAN-13**

Disable EAN-13

Transmit Check Digit

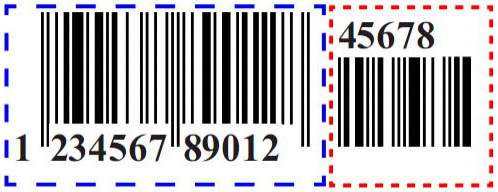
EAN-13 is 13 digits in length with the last one as its check digit used to verify the integrity of the data.

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

Do Not Transmit EAN-13 Check Digit

Add-On Code

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



Enable 2-Digit Add-On Code

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

Enable 5-Digit Add-On Code

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

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

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

Add-On Code Required

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

EAN-13 Add-On Code Required

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

ISSN

Restore Factory Defaults

Restore the Factory Defaults of ISSN

Enable/Disable ISSN

Enable ISSN

**** Disable ISSN**

ISBN

Restore Factory Defaults

Restore the Factory Defaults of ISBN

Enable/Disable ISBN

**** Enable ISBN**

Disable ISBN

Set ISBN Format

**** ISBN-13**

ISBN-10

UPC-E

Restore Factory Defaults

Restore the Factory Defaults of UPC-E

Enable/Disable UPC-E

**** Enable UPC-E**

Disable UPC-E

Transmit Check Digit

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

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

Do Not Transmit UPC-E Check Digit

Add-On Code

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

Enable 2-Digit Add-On Code

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

Enable 5-Digit Add-On Code

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

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

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

Add-On Code Required

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

UPC-E Add-On Code Required

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

Transmit System Character

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

Transmit System Character "0"

**** Do Not Transmit System Character "0"**

UPC-E Extension

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

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

Enable UPC-E Extend

****Disable UPC-E Extend**

UPC-A

Restore Factory Defaults

Restore the Factory Defaults of UPC-A

Enable/Disable UPC-A

**** Enable UPC-A**

Disable UPC-A

Transmit Check Digit

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

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

Do Not Transmit UPC-A Check Digit

Add-On Code

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

Enable 2-Digit Add-On Code

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

Enable 5-Digit Add-On Code

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

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

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

Add-On Code Required

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

UPC-A Add-On Code Required

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

Transmit Preamble Character

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

System Character & Country Code

**** System Character**

Interleaved 2 of 5

Restore Factory Defaults

Restore the Factory Defaults of Interleaved 2 of 5

Enable/Disable Interleaved 2 of 5

**** Enable Interleaved 2 of 5**

Disable Interleaved 2 of 5

Check Digit Verification

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

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

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

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

**** Disable**

Do Not Transmit Check Digit After Verification

Transmit Check Digit After Verification

Transmit Appended "0"

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

**** Transmit Appended "0"**

Do Not Transmit Appended "0"

ITF-6

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

Restore the Factory Defaults of ITF-6

**** Disable ITF-6**

Enable ITF-6 But Do Not Transmit Check Digit

Enable ITF-6 and Transmit Check Digit

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

ITF-14

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

Restore the Factory Defaults of ITF-14

Disable ITF-14

Enable ITF-14 But Do Not Transmit Check Digit

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

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

Matrix 2 of 5

Restore Factory Defaults

Restore the Factory Defaults of Matrix 2 of 5

Enable/Disable Matrix 2 of 5

**** Enable Matrix 2 of 5**

Disable Matrix 2 of 5

Check Digit Verification

**** Disable**

Do Not Transmit Check Digit After Verification

Transmit Check Digit After Verification

Industrial 25

Restore Factory Defaults

Restore the Factory Defaults of Industrial 25

Enable/Disable Industrial 25

**** Enable Industrial 25**

Disable Industrial 25

Check Digit Verification

**** Disable**

Do Not Transmit Check Digit After Verification

Transmit Check Digit After Verification

Standard 25

Restore Factory Defaults

Restore the Factory Defaults of Standard 25

Enable/Disable Standard 25

**** Enable Standard 25**

Disable Standard 25

Check Digit Verification

**** Disable**

Do Not Transmit Check Digit After Verification

Transmit Check Digit After Verification

Code 39

Restore Factory Defaults

Restore the Factory Defaults of Code 39

Enable/Disable Code 39

**** Enable Code 39**

Disable Code 39

Transmit Start/Stop Character

Code39 has each character before and after the barcode data as start character and stop character, it can be configured whether to output it.

Transmit Start/Stop Character

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

Check Digit Verification

W081C00

**** Disable**

W181C08

Do Not Transmit Check Digit After Verification

W181C18

Transmit Check Digit After Verification

Enable/Disable Code 39 Full ASCII

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

W201C20

Enable Code 39 Full ASCII

W201C00

**** Disable Code 39 Full ASCII**

Codabar

Restore Factory Defaults

Restore the Factory Defaults of Codabar

Enable/Disable Codabar

**** Enable Codabar**

Disable Codabar

Check Digit Verification

W101E00

**** Disable**

W301E10

Do Not Transmit Check Digit After Verification

W301E30

Transmit Check Digit After Verification

Transmit Start/Stop Character

Codabar has each character before and after the barcode data as start character and stop character, the scanner can be configured whether to output it.

W021E02

**** Transmit Start/Stop Character**

W021E00

Do Not Transmit Start/Stop Character

Start/Stop Character Format

Codabar's start and stop characters can be configured as one of the following formats.

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

ABCD/TN*E as the Start/Stop Character

abcd/abcd as the Start/Stop Character

abcd/tn*e as the Start/Stop Character

Code 93

Restore Factory Defaults

WFFD9A4

Restore the Factory Defaults of Code 93

Enable/Disable Code 93

W081208

**** Enable Code 93**

W081200

Disable Code 93

Check Digit Verification

Disable

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

Transmit Check Digit After Verification

Code 11

Restore Factory Defaults

Restore the Factory Defaults of Code 11

Enable/Disable Code 11

**** Enable Code 11**

Disable Code 11

Check Digit Verification

Disable

**** One Check Digit, MOD11**

Two Check Digits, MOD11/MOD11

Two Check Digits, MOD11/MOD9

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

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

**** Transmit Check Digit**

Do Not Transmit Check Digit

Plessey

Restore Factory Defaults

Restore the Factory Defaults of Plessey

Enable/Disable Plessey

**** Enable Plessey**

Disable Plessey

Check Digit Verification

Disable

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

Transmit Check Digit After Verification

MSI-Plessey

Restore Factory Defaults

Restore the Factory Defaults of MSI-Plessey

Enable/Disable MSI-Plessey

**** Enable MSI-Plessey**

Disable MSI-Plessey

Check Digit Verification

Disable

**** One Check Digit, MOD10**

Two Check Digits, MOD10/MOD10

Two Check Digits, MOD10/MOD11

**** Transmit Check Digit**

Do Not Transmit Check Digit

RSS-Limited

Restore Factory Defaults

Restore the Factory Defaults of RSS-14

Enable/Disable RSS-14

**** Enable RSS-14**

Disable RSS-14

Transmit Application Identifier “01”

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

Do Not Transmit Application Identifier “01”

RSS-Limited

Restore Factory Defaults

WFFD9A9

Restore the Factory Defaults of RSS-Limited

Enable/Disable RSS-Limited

W081B08

**** Enable RSS-Limited**

W081B00

Disable RSS-Limited

Transmit Application Identifier "01"

W201B20

**** Transmit Application Identifier "01"**

W201B00

Do Not Transmit Application Identifier "01"

RSS-Expand

Restore Factory Defaults

Restore the Factory Defaults of RSS-Expand

Enable/Disable RSS-Expand

**** Enable RSS-Expand**

Disable RSS-Expand

2D Symbologies

PDF417

Restore Factory Defaults

Restore the Factory Defaults of PDF417

Enable/Disable PDF417

**** Enable PDF417**

Disable PDF417

Data Matrix

Restore Factory Defaults

Restore the Factory Defaults of Data Matrix

Enable/Disable Data Matrix

**** Enable Data Matrix**

Disable Data Matrix

Rectangular Barcodes

**** Decode Rectangular Barcodes**

Do Not Decode Rectangular Barcodes

Mirror Images

**** Decode Unmirrored DM Only**

Decode Mirrored DM Only

Decode Both

QR Code

Restore Factory Defaults

Restore the Factory Defaults of QR Code

Enable/Disable QR Code

**** Enable QR Code**

Disable QR Code

Micro QR

**** Enable Micro QR**

Disable Micro QR

Mirrored Micro QR

Decode Mirrored Micro QR

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

Chinese Sensible Code

Restore Factory Defaults


WFFD9B3

Restore the Factory Defaults of Chinese Sensible Code

Enable/Disable Chinese Sensible Code


W01C001

**** Enable Chinese Sensible Code**


W01C000

Disable Chinese Sensible Code

Appendix

Appendix A: Factory Defaults Table

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

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

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

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

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

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

Appendix B: AIM ID Table

Symbology	AIM ID	Remark
Code 128	]C0	Standard Code 128
UCC/EAN 128 (GS1-128)	]C1	FNC1 is the character right after the start character
AIM 128	]C2	FNC1 is the 2nd character after the start character
EAN-8	]E4	Standard EAN-8
	]E4....]E1...	EAN-8 + 2-Digit Add-On Code
	]E4....]E2...	EAN-8 + 5-Digit Add-On Code
EAN-13	]E0	Standard EAN-13
	]E3	EAN-13 + 2/5-Digit Add-On Code
ISSN	]X5	
ISBN	]X4	
UPC-E	]E0	Standard UPC-E
	]E3	UPC-E + 2/5-Digit Add-On Code
UPC-A	]E0	Standard UPC-A
	]E3	UPC-A + 2/5-Digit Add-On Code
Interleaved 2 of 5	]I0	No check digit verification
	]I1	Transmit check digit after verification
	]I3	Do not transmit check digit after verification
ITF-6	]I1	Transmit check digit
	]I3	Do not transmit check digit
ITF-14	]I1	Transmit check digit
	]I3	Do not transmit check digit
Matrix 2 of 5	]X1	No check digit verification
	]X2	Transmit check digit after verification
	]X3	Do not transmit check digit after verification
Industrial 25	]S0	Not specified
Standard 25	]R0	No check digit verification
	]R8	One check digit, MOD 7; do not transmit check digit
	]R9	One check digit, MOD 7; transmit check digit
Code 39	]A0	Transmit barcodes as is; Full ASCII disabled; no check digit verification

Symbology	AIM ID	Remark
	]A1	One check digit, MOD 43; transmit check digit
	]A3	One check digit, MOD 43; do not transmit check digit
	]A4	Full ASCII enabled; no check digit verification
	]A5	Full ASCII enabled; MOD43; transmit check digit
	]A7	Full ASCII enabled; MOD43; do not transmit check digit
Codabar	]F0	Standard Codabar
	]F2	Transmit check digit after verification
	]F4	Do not transmit check digit after verification
Code 93	]G0	Not specified
Code 11	]H0	One check digit, MOD11; transmit check digit
	]H1	Two check digits, MOD11/MOD11; transmit check digit
	]H3	Do not transmit check digit after verification
	]H8	Two check digits, MOD11/MOD9; transmit check digit
	]H9	No check digit verification
Plessey	]P0	Not specified
MSI Plessey	]M0	One check digit, MOD10; transmit check digit
	]M1	One check digit, MOD10; do not transmit check digit
	]M7	Two check digits, MOD10 /MOD11; do not transmit check digit
	]M8	Two check digits, MOD10 /MOD11; transmit check digit
	]M9	No check digit verification
RSS-14 RSS-Limited RSS-Expand	]e0	
PDF417	]L0	Comply with 1994 PDF417 specifications
Data Matrix	]d0	ECC 000 - 140
	]d1	ECC 200
	]d2	ECC 200; FNC1 is the 1st or 5th character after the start character
	]d3	ECC 200; FNC1 is the 2nd or 6th character after the start character
	]d4	ECC 200, ECI protocol supported
	]d5	ECC 200; FNC1 is the 1st or 5th character after the start character; ECI supported
	]d6	ECC 200; FNC1 is the 2nd or 6th character after the start character; ECI supported

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

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

Appendix C: Code ID Table

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

Appendix D: ASCII Table

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

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

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

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

Appendix E: Parameter Programming Examples

The following examples show you how to program parameters by scanning programming barcodes. The “xxxxx” in text points the setup code of the this function.

Program the Decode Session Timeout

Example: Set the decode session timeout to 5.0s, please follow:

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

Program the Timeout between Decodes

Example: Set the timeout between decodes to 5.0s, please follow

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

Program the Image Stabilization Timeout

Example: Set the image stabilization timeout to 5.0s, please follow:

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

Program the Sensitivity Level

Example: Set the sensitivity level to 5, please follow:

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

Appendix F: Digit Barcodes

0 ~ 5

0

1

2

3

4

5

6 ~ 9

6

7

8

9

A ~ F

A

B

C

D

E

F

Appendix G: Save/Cancel Barcodes

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

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

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

Save

Cancel the Last Digit

Cancel All Digits

Appendix H: Frequently-Used Serial Commands

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

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

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

Note: SS SS: CRC-CCITT checksum.

RTSCAN TECHNOLOGY LIMITED
3A, BIT innovation building, Gaoxin South 9th Rd, Nanshan District, Shenzhen, China
Tel: +86 - (0) 755-23762089
Fax: +86 - (0) 755-82037749
Email: info@rtscan.net
Web: www.rtscan.net
Tech Support: support@rtscan.net