baracoda™

Wireless Technology

BL 1000 Wireless Bar Code Scanner Developer's Guide

Version 1.0

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1 Getting Started

The BL 1000 is a flexible product that supports both new and existing applications. The BL1000 flexibility makes it ideal for a wide range of data collection applications. For portable applications such as asset tracking, the BL 1000 can store a minimum of 500 UPC bar codes in memory. The saved bar codes can be easily downloaded for processing. For tethered uses such as library or wired network applications, the BL 1000 can be attached to a host for immediate data entry. If you require a little of both, BL 1000 can operate tethered and then be removed and used in store-and-forward ("batch") mode for applications like healthcare, where it might be easier to bring the scanner to the patient rather than the patient to the scanner.

The BL 1000 supports two transmission modes, tethered or store-and-forward, and two data formats, legacy compatible and XML:

- When the scanner is attached to a computer or other host, it is tethered. In this mode, when the user presses the button, the scanner immediately transmits the decoded bar code to the host.
- When the scanner is not attached to a host, it operates in batch mode. In this mode, when the user presses the button, the scanner stores the decoded bar code. Then when the user attaches the scanner to the host, the scanner immediately begins downloading the stored bar codes.
- The compatible data format allows the BL 1000 scanner to work with legacy systems. Therefore, you do not need to change your existing applications.
- The XML data format gives access to the enhanced features of the scanner, such as timestamp, device and user IDs. It supports PC- and web-based applications.

1.1 Developer Options

Baracoda provides two ways for you, a developer, to interact with the BL1000 scanner:

1. The BaracodaManager application.
2. The BaracodaManager SDK

   For more information, contact customer support at support@baracoda.com
3. The device interface defined in this developer guide supports full, customized programming.

1.2 Determining the Version of Firmware Installed on Your Scanner

To determine the firmware version installed on your scanner: Start the BaracodaManager application by selecting Start > Programs > BaracodaManager and go and click on the settings button.

1.3 Firmware Version History

In this guide, features that have been implemented after firmware version 1.5.0 are denoted by a FWV code, followed by the implementation version number. The version changes are summarized below.

1.3.1 Changes in Version 1.8.0

- Implemented expansion of UPC-A bar codes to EAN-13 format. If both the expand UPC-E codes (byte 09, bit 4) and the convert UPC-A codes (byte 0B, bit 2) are enabled, then the scanner will expand all UPC-E codes to the EAN-13 format.
- Implemented standard vs. aggressive scanning selectability via control bar code. Standard scanning meets all UPC scanning specifications. Aggressive scanning ignores the UPC/EAN-13 requirement for the amount of blank space (quiet zone) that should surround a bar code.

1.3.2 Changes in Version 1.7.0

- Changed the NCR symbology identifiers for Code 39 and Code 128.
- Implemented combined bar code feature for supplemental bar codes. For more information, see "6.9 Transmitting Supplemental Bar Codes" on page 36.
- Implemented selectable baud rates, 4800 and 9600.

1.3.3 Changes in Version 1.6.0

- Changed the inter-bar code delay to have four selectable settings: no delay, 500ms, 1.1s and 1.6s.
- Added support for supplemental bar codes with EAN-8.
- Changed how the scanner appends supplemental bar codes to the base bar code when using NCR identifiers.

1.4 Customer Support

Website: www.baracoda.com

Email: support@baracoda.com

2 The BL 1000 Device Features

2.1 Visual and Audio Scan Status Indicators

The BL1000 has a green LED and a piezo beeper to provide visual and audible indicators of the status of a scan. The combination of the two indicates various device conditions as shown in the table below. By default, both the LED and beeper are enabled. Either the LED or the beeper can be turned on or off by using the bar codes listed in "7.5.1 Device Option Control Bar Codes" in the Appendices on page 43, or by setting the appropriate control bits through the command interface.

Table 1: LED and Beeper Signals

	Green LED	Beeper
Good Scan	On for 200 msec.	Single beep, higher pitch than the Invalid Command beep.
Device Memory Full	Blinks 3 times.	Beeps 3 times.

Downloading	Blinks 2 times per second while the data is downloading.	None.
Download Complete	On for 300 msec.	Three beeps that descend in pitch.
Invalid Command	Not Used.	Single beep, lower pitch than the Good Scan beep.
System Error	Not Used.	Beeps 5 times. This cannot be disabled.

2.2 Standby Power Save Mode

The BL 1000 operates from 3 AAA batteries that will supply over 20,000 scans. In order to conserve power the scanner enters standby mode after two seconds of no activity. When scanning, the device wakes up when you press the scan button. When communicating with a host, the host must follow the wake-up sequence described in "5.4.1 Wake Command" on page 26.

2.3 BL 1000 ID and Data Features

The following information can be configured for each BL 1000. Except for the Time Reference field, the configuration information is stored in non-volatile memory. The Time Reference data is stored in RAM.

Table 2: BL 1000 Scanner Features

BL 1000 Feature	Description
Device ID	Each device has a unique ID number. This number is set at the factory, and it cannot be changed. You can use this feature to associate a particular scanner with a specific application or user.
User ID	You can use this data field to store custom information. This field is targeted to be used as a user ID but can be used to store any information. For example, you can use it to store the employee number, application data, or the installation date. For more information, see "6.6 Writing a Number to the User ID Field" on page 34, and "6.7 Writing an 8-Character String to the User ID Field" on page 35.
Symbology ID	Each bar code scanned is associated with a code that identifies the bar code symbology of the data. This data can optionally be transmitted as part of the bar code data record in either Compatible or XML format. The scanner supports AIM and NCR code symbology identifiers. For more information, see the bar codes in "7.5 Bar Codes" on page 43, and the "2.6 Device Configuration Data" on page 10.
Timestamp	This feature provides the amount of time elapsed since the last scan. You can choose whether to store the relative timestamp with each successful bar code, or with each button push. For more information, see "2.6 Device Configuration

BL 1000 Feature	Description
	Data" on page 10. You can use the timestamp to track time and attendance or for any application where the scanning time is important information. Note: This information is not retained if the scanner loses power, or if you return the scanner to its default configuration.
Time Reference	Use this data field to store an initial time reference value. The timestamp associated with each scan is the amount of time from the last scan. Your application can use the value of this field to calculate the actual time by adding it and the amount of time from the last scan. For more information, see "5.4.6 Initialize Time Reference Setting Command" on page 29, and "6.8 Recovering the Time From a Timestamp" on page 35. If you do not need to calculate time values, you can use this field to store other information. Note: The information in this field is stored in RAM. It is not retained if the scanner loses power, or if you return the scanner 's configuration to the default values.

2.4 Operation Modes

The BL1000 scanner can be used in either real-time tethered mode or store-and-forward batch mode. The scanner runs in tethered mode when the cable is plugged into the scanner. When the cable is not plugged in, the scanner operates in batch mode. The scanner automatically detects if the cable is plugged in.

When tethered, the scanner operates like a traditional scanner and transmits the scanned data immediately after the scan. In batch mode, the data is stored in memory until the memory is full. The stored data can then be automatically transmitted to the host when the device is plugged in or it can be stored until the host sends a request for the data.

The scanner can transfer data in the Compatible or XML formats. The Compatible data format allows the BL 1000 scanner to work in legacy systems. You can use ACK/NAK handshaking with the Compatible format to insure data security. The XML mode supports PC- and web-based applications. For more information, see "3 Data Formats" on page 18.

Table 3: BL 1000 Operation Modes and Data Formats

Mode	ACK/NAK	Tethered	Batch
Compatible (default)	Enabled	Scanner sends data immediately after the scan. Host sends <ACK>. Scanner deletes data after receiving <ACK>. If the scanner receives a <NAK>, it retransmits the data up to two times. If the scanner does not receive an <ACK>, the scanner stores the data in non-volatile memory. On each successful scan, the first data record stored in memory is sent. This record may not correspond to the most recent data scanned.	Scanner sends the first data record saved in memory when the cable is plugged in. Host sends <ACK>. Scanner deletes data after receiving <ACK>. Then the scanner sends the next record, if one exists. If the scanner receives a <NAK>, it retransmits the data up to two times. If the scanner does not receive an <ACK>, it saves the data in non-volatile memory, and it aborts the download process.
	Disabled	Scanner sends data immediately after the scan. Scanner deletes data. Warning: If the host software is not active, the data will be lost.	Scanner sends data when the cable is plugged in. All of the records are sequentially transmitted and then deleted from memory. Warning: If the host software is not active, the data will be lost.
XML	N/A	Scanner stores data in memory and sends the data immediately. Host sends <ACK> and Clear command. Scanner deletes data when it receives the Clear command. If the scanner does not receive the Clear command, the data remains in memory and will be retransmitted with the next scan.	Scanner sends data when the cable is plugged in. Host sends <ACK> and Clear command. Scanner deletes data when it receives the Clear command. If the scanner does not receive the Clear command, the data remains in memory and will be retransmitted with the next data download. If you have enabled the timestamp feature, then the host should reset the time reference.

2.5 Bar Code Data Storage

In batch mode, the BL 1000 stores the bar code information in its internal non-volatile memory. The BL 1000 can store a minimum of 500 UPC bar codes. Since Code 39 and Code 128 have variable length data, the minimum number will vary for these bar codes. You can mix bar code styles without penalty.

When the scanner's memory is full, the scanner's LED will blink three times, and the beeper will sound three times. This is the Device Full alert. Once full, the scanner cannot perform any additional scans. If the user tries to scan by pushing the button, the BL 1000 scanner will repeat the Device Full alert without activating the laser. In order to enable further scans, you must clear the bar code memory. For information on clearing the memory, see "5.4.7 Download Bar Code Data Command" on page 30, and "5.4.8 Clear Bar Code Data Command" on page 30.

2.6 Device Configuration Data

This section describes the device configuration bits. The table below shows the data that the scanner stores, and the memory locations of the data. Since all data values in the scanner are formatted in hexadecimal, the start and stop memory addresses listed below are in hexadecimal. The data is stored as two characters per byte, with each character giving the value of a nibble.

Table 4: Device Configuration Data

Description	Size	Start Memory Address (ASCII)	Stop Memory Address (ASCII)	Read/Write Access
User ID Data	8 bytes	0	7	R/W
Device Configuration Setup	4 bytes	8	B	R/W
Device ID	4 bytes	C	F	R
Hardware Version	2 bytes	10	11	R
Firmware Version	3 bytes	12	14	R

For information on the User ID Data, see "6.6 Writing a Number to the User ID Field" on page 34, and "6.7 Writing an 8-Character String to the User ID Field" on page 35. The section below gives more information on the Device Configuration Setup. The Device ID, Hardware Version and Firmware Version fields are factory defined.

For information about the features added in each firmware upgrade, see "1.3 Firmware Version History" on page 5.

2.6.1 Device Configuration Bytes and Bits

Tables 5, to 8 give the definitions of the bits of each byte in the Device Configuration Setup memory.

Table 5: Configuration of First Byte (Address 08)

Bit	Description	Values
0	Beep. Enable or disable the beeper.	0 – Off 1 – On*#
2 and 1	Timestamp. Enable or disable setting timestamps for each decoded bar code or for any button press even without a decoded bar code. The timestamp is a relative time difference calculated from the last scan or button press, depending on the mode. The timestamp only can be accessed in XML mode. The time stamp data is transmitted as the DT (delta time) attribute. The timestamp value is a maximum of 4-bytes, with each count representing one second. Leading zero bytes will not be transmitted. The host is also responsible for setting the initial time reference value using the I command. For more information, see "5.4.6 Initialize Time Reference Setting Command" on page 29, and "6.8 Recovering the Time From a Timestamp" on page 35. Warning: When switching time stamp modes, the bar code information stored in the device's memory can be corrupted. Therefore, you should download all data before changing the configuration.	00 – Off*# 01 – On, timestamp decoded bar codes only 10 – On, timestamp any button press 11 – Off. This is saved in memory as 00
3	LED. Enable or disable the LED indicator.	0 – Off 1 – On*#
4	STX. Enable or disable sending the <STX> prefix character in Compatible format.	0 – Off# 1 – On*
5	AIM Code. Enable or disable transmission of AIM Code in both Compatible and XML formats. See the AIM code definitions in "7.4 AIM Symbol Codes" on page 41. This field works in combination with the Enable Combined Bar Codes, and the NCR Symbol Identifiers settings. For more information, see "6.9 Transmitting Supplemental Bar Codes" on page 36.	0 – Off*# 1 – On
6	Linefeed. Enable or disable sending the linefeed character, <LF>, after each carriage return, <CR>, in both Compatible and XML formats.	0 – Off# 1 – On*
7	Acknowledgment Protocol. Enable or disable the ACK/NAK protocol	0 – Off*#

Bit	Description	Values
	in Compatible format. This does not affect XML format.	1 – On

* Factory Default Setting
# NCR Factory Default Setting

Table 6: Configuration of Second Byte (Address 09)

<table>
<tr><th>Bit</th><th>Description</th><th>Values</th></tr>
<tr><td>0</td><td>Download Format. Set the data transmission format for scanner.</td><td>0 – Compatible*#
1 – XML</td></tr>
<tr><td>1</td><td>ETX Enable. Enable or disable replacing the <CR> or <CR><LF> line termination characters with the <ETX> character.</td><td>0 – Off*#
1 – On</td></tr>
<tr><td>2</td><td>Disable Auto-Download. Enable or disable automatically downloading the bar code data when the scanner detects the cable being plugged in.
When automatic data download is disabled, the host must issue a D command to tell the scanner to send the data. For more information, see “5.4.7 Download Bar Code Data Command” on page 30.</td><td>0 – Enable automatic data download*#
1 – Disable automatic data download</td></tr>
<tr><td>3</td><td>NCR Symbol Identifiers. Enable or disable using NCR symbol identifiers. The identifier is a one or two character string that precedes each bar code. When you enable this bit, you must disable AIM codes because the AIM codes have higher precedence.
When enabled, the transmitted bar code will be prefixed with a letter that identifies the bar code’s symbology:
<table>
<tr><td>Code</td><td>A</td><td>E</td><td>F</td><td>FF</td><td>a</td><td>f</td></tr>
<tr><td>Symbology</td><td>UPC-A</td><td>UPC-E</td><td>EAN-13</td><td>EAN-8</td><td>Code 39</td><td>Code 128</td></tr>
</table>
This field works in combination with the AIM Code, and the Enable Combined Bar Codes settings. For more information, see “6.9 Transmitting Supplemental Bar Codes” on page 36.</td><td>0 – Off*
1 – On#</td></tr>
<tr><td>4</td><td>Expand UPC-E Codes (FWV 1.8.0). Enable or disable expanding UPC-E codes to the equivalent UPC-A code.</td><td>0 – Do not expand*#
1 – Expand</td></tr>
<tr><td>5</td><td>Reserved.</td><td>0</td></tr>
<tr><td>6</td><td>Code 39 Strip Check Character. Enable or disable stripping the checksum character from the data. When enabled, the scanner will force checksum verification regardless of the setting of the Code 39 Checksum bit.</td><td>0 – Off*#
1 – On</td></tr>
<tr><td>7</td><td>Code 39 Checksum. Enable or disable verifying the checksum before storing the data.</td><td>0 – Off*#
1 – On</td></tr>
</table>

* Factory Default Setting
# NCR Factory Default Setting

The bits defined in Table 7 are used to disable individual bar code symbology identifiers or to configure supplemental data. All of the disable bits are set to 0 by default, meaning the code is not disabled, that is, it is enabled. When these bits are set to 1, the corresponding symbology is disabled.

Table 7: Configuration of Third Byte (Address 0A)

Bit	Description	Values
0	Disable Code 39	0 – Off*# 1 – On
1	Disable Code 128	0 – Off*# 1 – On
2	Disable UPC-E	0 – Off*# 1 – On
3	Disable EAN-8	0 – Off*# 1 – On
4	Disable UPC-A/EAN-13	0 – Off*# 1 – On
5	Enable Combined Bar Codes. This field works in combination with the AIM Code, and the NCR Symbol Identifier settings. For more information, see "6.9 Transmitting Supplemental Bar Codes" on page 36.	0 – Off*# 1 – On
7 and 6	Require and Disable Supplemental Bar Codes. Bit 6 defines the Require Supplemental setting, and bit 7 defines the Disable Supplemental setting. These bits define how supplemental fields are scanned.	00 – Auto-Detect supplemental bar codes* 01 – Require supplemental bar codes for UPC-A, UPC-E and EAN-13. Bar codes without supplements are not scanned. 10 – Ignore supplemental bar codes. Only decode the base bar code.# 11 – Ignore supplemental bar codes. Only decode the base bar code.

* Factory Default Setting
# NCR Factory Default Setting

Table 8: Configuration of Fourth Byte (Address 0B)

Bit	Description	Values
0	Reserved	0
1	Reserved	0
2	Convert UPC-A Bar Codes to EAN-13 Format (FWV 1.8.0)	0 – Off*# 1 – On
3	Standard vs. Aggressive Scanning (FWV 1.8.0). Standard scanning meets all UPC scanning specifications. Aggressive scanning ignores the UPC/EAN-13 requirement for the amount of blank space (quiet zone) that should surround a bar code. If your bar code implementation does not have the standard blank space, you can turn this bit on to scan these codes. Note: Aggressive scanning can introduce decoding errors. Therefore, enabling this feature may reduce your data reliability.	0 – Standard*# 1 – Aggressive
5 and 4	Delay. This applies only to the Compatible mode with ACK/NAK disabled. In batch mode the scanner saves the bar codes in memory. When the cable is plugged in, these codes can be automatically transferred to the host. Some systems cannot handle receiving the bar codes one right after another. For these systems you can set the amount of time to wait between transmissions. During the delay, the scanner is unable to communicate. FWV 1.6.0 and later use the values listed to the right. FWV 1.5.0. Bit 5 is reserved. Bit 4 has the following values: 0 – No delay 1 – 25ms	00 – No delay* 01 - 500ms 10 – 1100ms# 11 – 1600ms
6	Reserved	0
7	Reserved	0

* Factory Default Setting
# NCR Factory Default Setting

3 Data Formats

The scanner can transmit data in two different formats:

- The Compatible mode supports legacy applications. It can batch process the data. For more information see below.
- The XML mode transmits data in an XML format. It provides access to the advanced features of the BL 1000, such as timestamp, device and user IDs. The XML mode supports PC- and web-based applications. For more information, see "3.2 XML Data Format" below.

3.1 Compatible Data Format

In the Compatible format, a transmitted bar code can have one of the following formats:

```
[<STX>][symbol code]data<CR>[<LF>]
[<STX>][symbol code]data<ETX>
```

The fields enclosed in brackets [ ] are configured by the format options set by the device's configuration. For more information, see "2.6 Device Configuration" on page 10.

The following examples show how bar codes are downloaded in the default and default formats in compatible mode.

The first example shows how a typical UPC bar code is downloaded in the default format:

```
<STX>768268017788<CR><LF>
```

Downloading the same bar code in the NCR default format gives:

```
A768268017788<CR>
```

The next example shows how a typical Code 39 bar code is downloaded in the default format:

```
<STX>QM30840RCR-A<CR><LF>
```

Downloading the same bar code in the NCR format yields:

```
aQM30840RCR-A<CR>
```

And finally, downloading the same bar code with AIM symbology identifiers, you get:

```
<STX>]A0QM30840RCR-A<CR><LF>
```

3.2 XML Data Format

3.2.1 XML Tags and Attributes

The XML data format uses the tags and attributes listed in the table below. You should ignore any XML information in your output that is not included in this table.

Table 9: XML Tags and Attributes

Tag	Attribute	Definition
upload		
device		Defines the attributes for a particular scanner.
	type	Type of device downloading data. The only valid value within the `device` tag is `BL 1000`.
	id	Factory programmed identification number.
	hwv	Hardware version.
	fwv	Firmware version.
	ud	User-programmed data.
	it	Time reference or user-programmed data.
tag		
	type	Type of record. The valid values within this tag are: `bc` –Bar code `t` – Timestamp. A `t` record is used to give a time stamp that is not associated with a bar code. In time stamp mode two, this would indicate a button press without a successful scan. The final `t` record gives the time between the last record and the download by the BL 1000. This record will only appear if the timestamp feature has been enabled.
	dt	Delta time in seconds from previous scan or button press, depending on the mode. This record will only appear if the timestamp feature has been enabled.
	ct	AIM code type. For UPC-A/UPC-E codes that do not have a formal AIM code, the scanner sends an E. For more information, see "7.4 AIM Symbol Codes" on page 41.
	bc	Bar code data. Certain characters that appear in some types of bar codes cannot be directly transmitted as ASCII data since these characters are used to define the XML structure or are not printable. For these characters the following

<table>
<tr><th>Tag</th><th>Attribute</th><th>Definition</th></tr>
<tr><td></td><td></td><td>substitutions are made based on quote-printable encoding protocol.
<table>
<tr><th>Character</th><th>Hexadecimal Substitution</th></tr>
<tr><td>< (less than)</td><td>=3C</td></tr>
<tr><td>& (ampersand)</td><td>=26</td></tr>
<tr><td>= (equals)</td><td>=3D</td></tr>
<tr><td>“ (quote)</td><td>=22</td></tr>
<tr><td>Non-printing characters
(ASCII value < 32)</td><td>=bb, where bb is the ASCII code in hexadecimal. For the characters and codes, see “7.6 ASCII Chart” on page 48.</td></tr>
</table>
For example, the string <code>you&I</code> is sent as <code>bc="you=26I"</code>.</td></tr>
<tr><td>chk</td><td></td><td>The checksum is the modulo 256 sum of the characters in the transmission. In the example below the checksum calculation starts with and includes, the v in the first line. It ends with the colon (:) character after the <code>chk</code> in the final line.</td></tr>
</table>

3.2.2 XML Format Features

The XML format uses a handshaking scheme to insure proper communication and data security. The ACK/NAK protocol setting does not affect communications.

After downloading the bar code data, you must explicitly delete the data from the scanner’s memory by sending a Clear command, C. This feature provides additional data security. For more information on the Clear command, see “5.4.8 Clear Bar Code Data Command” on page 30.

The XML mode downloads bar codes using the format shown in the following example:

```
Flic v: 1.2.1<CR><LF>
<?xml version="1.0" encoding="us-ascii" standalone="yes"?><CR><LF>
<upload><CR><LF>
<! -- Microvision Flic Barcode Scanner --><CR><LF>
<device type="Flic" id="00003664" hwv="1.1" fwv="1.2.1" ud=
"0123456789ABCDEF " it= "000000000000 "><CR><LF>
<tag type="bc" dt="15" ct="E" bc="043000103050" /><CR><LF>
<tag type="bc" dt="00" ct="E" bc="063202123252" /><CR><LF>
<tag type="t" dt="4A" /><CR><LF>
<tag type="bc" dt="01" ct="E" bc="083404143454" /><CR><LF>
<tag type="t" dt="01C7" /><CR><LF>
</device><CR><LF>
```

```
</upload><CR><LF>
chk: 89! <CR><LF>
```

4 Configuring the BL 1000

The BL 1000 can be configured using one of two methods: you can use the device control bar codes displayed in "7.5 Bar Codes" on page 43, or you can use the command interface described in this guide. Use the bar codes to:

- Enable or disable scanner features
- Set the delay between bar codes in milliseconds
- Select a symbology
- Set symbology options
- Restore the default settings

Use the command capacity to:

- Retrieve the scanner's configuration information
- Programmatically set the scanner's configuration
- Set an initial time value
- Test the scanner's functionality
- Download the bar code data
- Clear the bar code data from memory
- Restore the default settings

For examples that show how to programmatically set the scanner's configuration, see "6.1 Changing the Scanner's Configuration" on page 32.

5 Communicating with the BL 1000

All communications between the BL 1000 scanner and host are done via USB or the RS-232 serial interface. Once the software for the USB adaptor has been installed, the scanner treats USB as though it was a COM port. You can use the HyperTerminal application to communicate with the scanner, or you can use any other application that communicates via the COM port.

5.1 Setting Up HyperTerminal

When you start HyperTerminal, you must configure its settings to communicate with the BL 1000.

To setup HyperTerminal:

1. Connect the scanner to the computer, if it is not already connected.
2. Open HyperTerminal by selecting: Start > Programs > Accessories > Communications > HyperTerminal. HyperTerminal opens a Connection Description dialog box.

3. Enter a name for the connection, and select an icon. Click OK. HyperTerminal displays the Connect To dialog box.

4. In the drop-down menu for the Connect using field, select the serial port where you attached the scanner. Click OK. HyperTerminal displays the [Port] Properties dialog box.

5. Set the port settings to the following values:
   - Bits per second: 4800 or 9600, depending on how your scanner is configured
   - Data bits: 8
   - Parity: None
   - Stop bits: 2
   - Flow control: None

5.2 Programming Conventions

All command codes and XML codes transmitted to and from the BL 1000 are case insensitive.

All data transmitted to and from the BL 1000 scanner is sent using ASCII characters. Data values are formatted in hexadecimal. The data is sent using two characters/byte, with each character giving the value of a nibble.

5.3 Sending Commands to the BL 1000

The host initiates all communications to the BL 1000 by sending a command packet. The command packet consists of:

1. Start of header character, <SOH>. In HyperTerminal, you type this code as `Ctrl`+A.
2. Single-character command code. The commands are listed in "Table 10: Command Codes" below. The commands are case-insensitive.
3. Data, if applicable. There is no space between the command code and the data.
4. Terminating carriage return, <CR> or <ETX>. The BL 1000 ignores the line-feed character <LF> if it is sent.

The scanner responds within one second. The scanner sends the data when it recognizes commands that return data. Commands that do not return data, receive an <ACK> character response. Commands that are not recognized receive a <NAK> response. These commands should be retransmitted. When you receive no response, this indicates that the device is not connected, or that it is asleep.

5.3.1 Standby Mode

The BL 1000 automatically returns to standby mode after two seconds of inactivity. This prevents the scanner from waking and staying alert for prolonged periods, and helps to insure a long battery life. Before you can communicate with the scanner you must wake the scanner by:

- Following the wake up communication sequence described below in "5.4.1 Wake Command" on page 26 when you are using the command interface to interact with the scanner.
- Pressing the button when you are scanning bar codes.

5.4 Command Codes

The command codes are not case sensitive. The codes are described in detail below the table.

Table 10: Command Codes

Name	Command Code	Data	Description
Wake	Any single character	None	Send any single character over the interface to wake the unit. Baracoda recommends that you send the <SOH> character, or `Ctrl+A` in HyperTerminal. The scanner does not perform any action in response other than waking up. It will not send an <ACK> or <NAK> code. For more information, see "5.4.1 Wake Command" below.
Who	W	None	Returns the configuration information. For more information, see "5.4.2 Who Command" on page 26.
Signal	T	0 or 1 bytes	Blink LED and/or beep piezo. For more information, see "5.4.3 Signal Command" on page 27.
Set device configuration	S	Varies	Sets the device format and configuration. The format and configuration is stored in non-volatile memory. For more information, see "5.4.4 Set Device Configuration Command" on page 28.
Return to factory settings	F	1 byte	Return device setup to factory default settings. The possible values are: 1 – Reset device configuration to factory default values 2 – Reset to NCR default values. For more information, see "5.4.5 Return to Factory Settings Command" on page 28.
Initialize time reference setting	I	12 bytes	Set the time reference value or use this field for any other custom data storage. For more information, see "5.4.6 Initialize Time Reference Setting Command" on page 29.
Download bar	D	None	Request stored bar code data. For more

Name	Command Code	Data	Description
code data			information, see "5.4.7 Download Bar Code Data Command" on page 30.
Clear bar code data	C	None	Clears entire device bar code data buffer. For more information, see "5.4.8 Clear Bar Code Data Command" on page 30.

5.4.1 Wake Command

The BL 1000 enters standby mode when it is inactive for two seconds. Baracoda has implemented the wake sequence outlined below so that the scanner knows when it needs to pay attention to the messages it receives.

The scanner wakes up when it receives any single character. To keep the scanner awake, and to communicate with the scanner:

1. Send any character. Baracoda recommends that you send the <SOH> character, or `Ctrl`+A in HyperTerminal.
2. Wait at least 0.75 second, but less than 2.0 seconds.
3. Send a Who command by transmitting the `W`<CR> characters.
4. Receive the Who response.

If the scanner does not receive a `W` within the required time window, the device returns to standby mode. If scanner receives a different character before it receives the `W`, you must wait at least 0.75 seconds before sending the `W`. Once the `W` has been received, the scanner is awake, and you can use the full command set in "Table 10: Command Codes," above.

5.4.2 Who Command

The Who command serves two purposes:

1. It confirms to the scanner that the host is communicating and thus it should stay awake.
2. It returns the complete configuration information.

The format for the command is:

<SOH>W<CR>

The scanner provides the configuration information in the following format:

```
Microvision® Flic® Bar Code Scanner, ID: 00003664, FW: 1.8.0<CR><LF>
<SOH>WA123B456C789D012690000000000036640105010800<CR><LF>
```

The data returned in the above example breaks down as follows:

- User ID: A123B456C789D012

- Configuration Setup: 69000000
- Device ID: 00003664
- Hardware version: 0105
- Firmware version: 010800

5.4.3 Signal Command

You can force the scanner to flash the LED and/or emit a tone. The command is:

<SOH>T[n]<CR>

where n is one of the values listed in the table below.

Table 11: T Command Codes Options

n Value	LED	Piezo
(not given)	Current device setting	Current device setting
0	Current device setting	Current device setting
1	Off	Single Beep
2	On for 200 msec	Off
3	On for 200 msec	Single Beep

The device responds with an <ACK> when the test is complete.

5.4.4 Set Device Configuration Command

You can use this command to configure the scanner. The configuration options are listed in "2.6 Device Configuration Data" on page 10. The configuration data that is transmitted to the BL 1000 is automatically stored in internal non-volatile memory. The memory location for the data is given in Table 4: Device Configuration Data on page 10.

The format of the Set command is:

<SOH>SAAD...D<CR>

where:

S The Set command.

AA The address of first byte to set. This value must be between 00 to 0B. It must be two hexadecimal characters long, with a leading 0 if required.

D…D The data. This must be an even number of characters. The data is sent as two ASCII characters per byte. The available values to set are 00 to FF.

The number of bytes you pass is variable. For example, to set the User ID to A123B456C789D012, the command would be

<SOH>S00A123B456C789D012<CR>

Note that you do not have to set the value of the entire field. The device will respond with an <ACK> on a successful write, or a <NAK> when there is an error in the command.

Warning: When switching time stamp modes, the bar codes stored information in the device's memory can be corrupted. Therefore, you should download all data before changing the configuration.

The examples in "6 Examples" on page 32 provide additional information on using this command.

5.4.5 Return to Factory Settings Command

You can use this command to return the device to the default factory configuration, or to set NCR default values. The default values are outlined in "7.3 BaracodaBaracoda and NCR Default Values" on

page 39, and in "2.6.1 Device Configuration Bytes and Bits" on page 11. The User ID and Time Reference values are reset to 0s.

The command format is:

<SOH>F[n]<CR>

where n is one of the values shown in the table below.

Table 12: Default Settings Options

n Value	Description
1	Reset the device's configuration to the factory default values.
2	Reset the device's configuration to the NCR default values.

The device will respond with an <ACK> after performing this operation.

Note: Unlike using the bar codes to reset the default values, The F1 and F2 commands do not change the baud rate. This is so that you do not lose communication with the scanner when you are programmatically interacting with it. The Factory Defaults bar code sets the baud rate to 4800. The NCR Defaults bar code sets the baud rate to 9600.

5.4.6 Initialize Time Reference Setting Command

The BL 1000 stores the time reference value in RAM. This value is reset to zero when the scanner loses power. When the scanner loses power, its internal clock stops, and the scanner cannot insure that any information concerning time is accurate.

You can use the value of this field to determine whether the timestamp data is valid. When you know that you have set a value in this field, and the information transmitted by the scanner tells you that this value is zero, then you know that the Time Reference has been lost, and the timer function was interrupted.

The command is:

<SOH>IYYMMDDHHMMSS<CR>

where

I	The Initialize Time Reference command.
YYMMDDHHMMSS	The date and time. The 12 digits represent 6 bytes of data. All 12 digits must be sent or the command will be ignored. The host has flexibility on the format of the data, but it is recommended that the format be YYMMDDHHMMSS, with the leading YY being implied as the year. For example, March 12, 2002, 8:37:14 pm is set as: <SOH>I020312203714<CR>

The device responds with an <ACK> when the time setting operation is complete. The device sends a <NAK> when the command is incorrect.

This value will be echoed back in an XML download as the IT attribute.

5.4.7 Download Bar Code Data Command

The Download Bar Code Data command tells the scanner to start downloading the decoded bar codes it has saved in memory. You can use this command to retrieve the data when you are operating in batch mode. When the scanner is tethered, the data is always transmitted after a valid scan.

The format for the command is:

<SOH>D<CR>

The device responds with the data.

Note: In Compatible format, when the scanner does not have any bar code data stored, the scanner does not provide any feedback.

Table 13: How Data is Downloaded and Deleted from Memory in Batch Mode

Mode	Automatic Data Download Bit	Description
Compatible	Enabled	Data is automatically downloaded when the cable is plugged into the scanner. The data is deleted from the scanner's memory. Warning: If the host software is not active, the data will be lost. You can enable the ACK/NAK handshaking to prevent this. For more information, see "Table 3: BL 1000 Operation Modes and Data Formats" on page 9.
	Disabled	Data is downloaded when you send the Download Bar Code Data command. The data is deleted from the scanner's memory. Warning: If the host software is not active, the data will be lost. You can enable the ACK/NAK handshaking to prevent this. For more information, see "Table 3: BL 1000 Operation Modes and Data Formats" on page 9.
XML	Enabled	Data is automatically downloaded when the cable is plugged into the scanner. The data remains in the device's bar code memory until you use the Clear command.
	Disabled	Data is downloaded when you use the Download Bar Code Data command. The data remains in the device's bar code memory until you use the Clear command.

5.4.8 Clear Bar Code Data Command

After you download the bar codes in XML mode, the stored bar codes must be deleted from the scanner's memory. The format of this command is:

<SOH>C<CR>

The device will respond with an <ACK> when the clear operation is complete.

6 Examples

6.1 Changing the Scanner's Configuration

To change the scanner's configuration, first you need to convert the values for all the bits in the byte that you want to set to hexadecimal.

For example, you want to set the timestamp to stamp decoded bar codes only. Looking at the tables in section "2.6.1 Device Configuration Bytes and Bits," starting on page 11, you see that the timestamp bits are located at address 08, bits 2 and 1. The enable timestamps for decoded bar codes only value is 01. Looking down the rest of Table 5, you determine that you want to use the factory default values for the rest of the bits. Therefore, you are using the following values:

Bit	7	6	5	4	3	2	1	0
Value	0	1	0	1	1	0	1	1

Filling in the values gives:

Decimal	0	64	0	16	8	0	2	1

Adding these together gives a decimal value of 91, which converts to 5B in hexadecimal.

To set the value of the byte, you call the Set command as follows:

```
<SOH>S085B<CR>
```

Remember that the start address (08) must be two characters long, and the data (5B) must be an even number of characters.

6.2 Changing the Download Data Format to XML

Baracoda has not provided bar codes for changing the download format. Therefore, if you want to change the format, you must do it via the command interface.

The download data format bit is located at address 09, bit 0.

To change the data format to XML, and to use the factory default values, set the bits as follows:

Bit	7	6	5	4	3	2	1	0
Value	0	0	0	0	0	0	0	1

This converts to 0x01, and the command is:

```
<SOH>S0901<CR>
```

6.3 Changing Multiple Consecutive Bytes

You can set multiple consecutive bytes using one set command. For example, we want to combine the two previous examples, and set both the download data format to XML, and the timestamp at the same time. This involves setting both bytes 08 and 09. Byte 08 is the first of the consecutive addresses. From above, the new values for byte 08 is 0x5B, and for byte 09 is 0x01. Combining these gives the following command:

```
<SOH>S085B01<CR>
```

This command will set the values of both bytes.

6.4 Disabling Automatic Data Download

To disable automatic data download, you need to write a 1 to the 2nd bit of address 0x09 Using the factory defaults for the rest of the bits, this translates to 0x04. Therefore send:

<SOH>S0904<CR>

6.5 Setting NCR Default Values

Use this command to set the scanner to the NCR default values. The command for this is:

<SOH>F2<CR>

This setting turns on the NCR Symbol Identifiers. The NCR default values are listed in "2.6.1 Device Configuration Bytes and Bits" on page 11, and in "7.3 Baracoda and NCR Default Values" on page 39. The User ID and Time Reference values are reset to 0s.

Note: Unlike using the bar codes to reset the default values, The F1 and F2 commands do not change the baud rate. This is so that you do not lose communication with the scanner when you are programmatically interacting with it. The Factory Defaults bar code sets the baud rate to 4800. The NCR Defaults bar code sets the baud rate to 9600.

6.6 Writing a Number to the User ID Field

Before you write a user ID, you should clear the field. To do this, you can set the value of the field to zeros, or you can use the F command to reset the device to the factory default settings. For more information, see "5.4.5 Return to Factory Settings Command" on page 28.

User ID numbers must be less than 18,446,744,073,709,551,615 or FFFFFFFFFFFFFFFFH in hexadecimal. Baracoda recommends that your user ID numbers always have the same number of digits. Therefore, you should add preceding 0s if necessary.

There are two methods of writing a user ID number:

1. If your number is 16 digits or less, use the S command to write the number, starting at address 00.
2. If your number is between 17 and 20 digits long, convert the value to hexadecimal and use the S command to write the hexadecimal number.

For example, you want to store an 8-digit employee number: 68429235. Using the first method, you would send the following commands:

<SOH>S0000000000000000000<CR>

<SOH>S0068429235<CR>

This command will write the number 68429235 starting at address 0. Using the W command to retrieve the data yields:

```
Microvision® Flic® Bar Code Scanner, ID: 4C454406, FW: 1.5.0
<SOH>W6842923500000000590000004C454406062B010500
```

Note that the user ID number has zeros added to give the full 16 digits. These zeros are the values that already existed in memory for the bytes that you did not set. You can add the leading zeros to the User ID to right align the number in the field. In this case, the command will look as follows:

<SOH>S000000000000000000<CR>

<SOH>S000000000068429235<CR>

Using the second method with the same number, 68429235, you would convert 68429235 to the hexadecimal value 041425B3 and write:

<SOH>S000000000000000000<CR>

<SOH>S00041425B3<CR>

Using the W command to retrieve the data yields:

```
Microvision ® Flic ® Bar Code Scanner, ID: 4C454406, FW: 1.5.0
<SOH>W041425B300000000590000004C454406062B010500
```

The retrieved value, 041425B3, can then be converted to the decimal value 68429235.

6.7 Writing an 8-Character String to the User ID Field

The 8-byte User ID field can be used to store an 8-character string. This example shows how to store and retrieve JSMITH.

1. Convert each character to its hexadecimal ASCII equivalent by using the chart shown in "7.6 ASCII Chart" on page 48. From the chart, J = 4A; S = 53; M = 4D; I = 49; T = 54; H = 48.
2. Write:

   ```
   <SOH>S000000000000000000<CR>
   <SOH>S004A534D4954480000<CR>
   ```

3. Read back data using the W command:

   ```
   Microvision® Flic® Bar Code Scanner, ID: 4C454406, FW: 1.5.0
   <SOH>W4A534D4954480000590000004C454406062B010500
   ```

4. Take the 16 characters after the W in the second line and convert them back to ASCII.
   4A = J; 53 = S; 4D = M; 49 = I; 54 = T; 48 = H; 00 = NUL.

6.8 Recovering the Time From a Timestamp

You have a reference time value of March 12, 2002 8:35:14 AM. Given the following section of an XML download:

```
<device type="Flic" id="00003664" hwv="1.1" fwv="1.0.01" ud=
"0123456789ABCDEF " it= "020312083514 "><CR><LF>
<tag type="bc" dt="15" ct="E" bc="043000103050" /><CR><LF>
<tag type="bc" dt="1FC" ct="E" bc="063202123252" /><CR><LF>
<tag type="t" dt="4A" /><CR><LF>
```

The first scan has a dt (delta time) count of 0x15 or 21 seconds. Call this dt1 and the time for this scan T1. Therefore,

T1 = Time Reference + dt1 = 020312082535 = March 12, 2002 8:35:35 AM

The second scan has a dt count of 0x1FC or 508 seconds. Call this dt2 and the time for this scan T2. Therefore,

T2 = Time Reference + dt1 + dt2 = Time Reference + 8 min 45 sec = 020312084359 = March 12, 2002 8:43:59 AM

The next tag is time only tag.

T3 = Time Reference + dt1 + dt2 +dt3

The last time tag in any XML data record gives the delta time from the last scan to the time the data is downloaded. This final delta time can be used to calculate what the current time should be. The resulting value can be synchronized with the host to verify accuracy.

6.9 Transmitting Supplemental Bar Codes

The format of supplemental bar codes depends on three parameter settings: AIM Code, NCR Identifier and Combined Bar Codes. Since AIM Codes take precedence over Combined Bar Codes and NCR Identifiers require supplemental data to be combined with the main bar code, there are five distinct cases.

1. AIM Codes off, NCR Identifiers off, and Combined Bar Codes off. This is the simplest case. The main bar code is transmitted first with the active post-amble characters (<CR>, <CR><LF>, or <ETX>), followed by the supplemental bar code and the post-amble characters. For example, `9781576104903+53999` (EAN-13 + 5) is transmitted as:

   ```
   9781576104903<CR><LF>
   53999<CR><LF>
   ```

2. AIM Codes on, NCR Identifiers off/on, and Combined Bar Codes off. The AIM codes for the main bar code remain the same. There are separate and distinct AIM codes for the supplemental bar code. The main bar code is transmitted first with the post-amble characters, followed by the supplemental bar code and the post-amble characters. For example, `9781576104903+53999` is transmitted as:

   ```
   ]E09781576104903<CR><LF>
   ]E253999<CR><LF>
   ```

3. AIM Codes off, NCR Identifiers on, and Combined Bar Codes off/on. NCR identifiers, by definition, require that supplemental data be combined with the main bar code. Thus, the combined bar code option has no effect. For example, `9781576104903+53999` is transmitted as:

   ```
   F978157610490353999<CR>
   ```

4. AIM Codes off, NCR Identifiers off, and Combined Bar Codes on. This case is very similar to the case above. The supplemental data is merely appended to the end of the main bar code. For example, 9781576104903+53999 is transmitted as:

   97815761049035399<CR><LF>

5. AIM Codes on, NCR Identifiers off/on, and Combined Bar Codes on. This is the most complex case, since each symbology is handled differently. The AIM code for combined bar codes is different. For example, 9781576104903+53999 is transmitted as:

   ]E397815761049035399<CR><LF>

The AIM specification for combined bar codes states that 13 digits must be used for EAN-13, UPC-A and UPC-E data. Thus, UPC-E data will always be expanded to the full UPC-A form, and a zero will precede the UPC-A data. For example, the UPC-A 000123456784+45322 and the UPC-E 3424607+89 is transmitted as:

```
]E300001234567845322<CR><LF>
]E3003400000246789<CR><LF>
```

The combined bar code AIM modifier does not apply to EAN-8 data. Instead, the same modifier is used regardless of whether a supplemental bar code is present. For example, the EAN8 + 2-digit add-on symbol data of 12345670+12 is transmitted as:

```
]E41234567012<CR><LF>
```

The XML mode also provides some variations based on the selected options. If the supplemental data is transmitted on a separate line (combined bar code and NCR Identifier options disabled), the time stamp field is not output since it always will be zero. Also, if the combined bar code and AIM codes options are selected, UPC-A and UPC-E bar code data is expanded to 13 digits before the supplemental bar code is written.

7 Appendices

7.1 Cable Pin Out

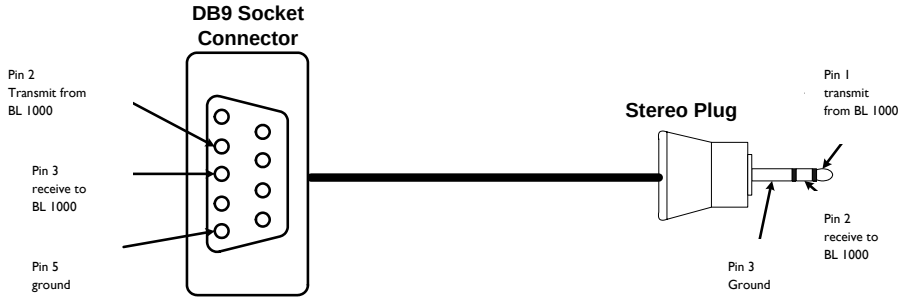


Figure 1: Cable Pin Out

7.2 COM Port Settings

All communications between the BL 1000 and host are done via USB or the RS-232 serial interface. Once the software for the USB adaptor has been installed, the scanner treats USB as though it was a COM port. Use the following settings:

Baud Rate:	4800 or 9600, depending on your scanner's configuration
Data Bits:	8
Parity:	None
Stop bits:	2
Flow Control:	None
Duplex:	Half duplex

7.3 Baracoda and NCR Default Values

Setting	Baracoda Default Value	NCR Default Value
Acknowledgment protocol	Off	Off
AIM code	Off	Off
Automatic data download	Enabled	Enabled
Baud rate	4800	9600
Beep	On	On
Code 128 symbology	Enabled	Enabled
Code 39 checksum	Off	Off
Code 39 strip check character	Off	Off
Code 39 symbology	Enabled	Enabled
Combined bar codes	Off	Off
Convert UPC-A bar codes to EAN-13 format (FWV 1.8.0)	Off	Off
Delay between bar code transmissions (FWV 1.6.0)	No delay	1100ms
Standard vs. aggressive scanning (FWV 1.8.0)	Standard	Standard
Download format	Compatible	Compatible
EAN-8 symbology	Enabled	Enabled
ETX enable	Off	Off
Expand UPC-E codes	Do not expand	Do not expand
LED	On	On
Linefeed	On	Off
NCR symbol identifiers	Off	On
STX	On	Off
Supplemental bar codes	Auto-detect	Ignore
Timestamp	Off	Off
UPC-A/EAN-13 symbology	Enabled	Enabled
UPC-E symbology	Enabled	Enabled

7.4 AIM Symbol Codes

The AIM symbol code is a three character string in the format]cm, where

] ASCII 5D hex

c AIM code

m AIM code modifier.

Table 14: AIM Code

Code	Definition
A	Code 39
C	Code 128
E	EAN/UPC

7.4.1 AIM Code Modifiers

UPC-A and UPC-E symbols do not have an AIM symbol code unless they are combined with supplemental data.

Table 15: Code 39 Modifiers

Code	Definition
0	No check character
1	Reader has performed check
3	Reader has performed check and stripped check character

Table 16: Code 128 Modifiers

Code	Definition
0	Standard
1	FC1 in first symbol character position
2	FC2 in second symbol character position

Table 17: UPC/EAN Modifiers

Code	Definition
0	Standard 13-digit EAN
1	Two-digit supplemental data only
2	Five-digit supplemental data only
3	Combined Bar Code Data

4	EAN-8

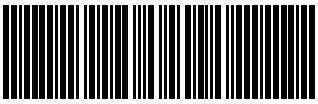
7.5 Bar Codes

To use these bar codes to configure your BL 1000, print the appropriate page. Then use your scanner to read the appropriate bar code.

7.5.1 Device Option Control Bar Codes

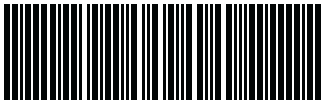
Return to Factory Default Settings

Return to NCR Default Settings



4800 Baud* (FWV 1.7.0)

9600 Baud# (FWV 1.7.0)



ACK/NAK Protocol

Enable

Disable*#

Auto Download Data

Enable*#

Disable

Beep Control

Enable*#

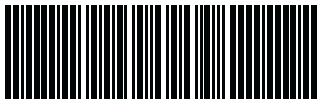
Disable

Delay Between Bar Codes

None*

500ms

1100ms#



1600ms

* Factory Default Setting

NCR Factory Default Setting

ETX Suffix Character

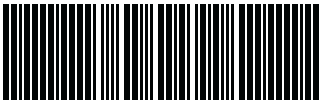
Enable

Disable*#

LED Control

Enable*#

Disable



Line Feed Suffix Character

Enable*

Disable#

STX Prefix Character

Enable*

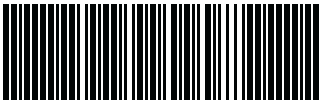
Disable#

* Factory Default Setting

NCR Factory Default Setting

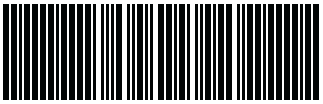
7.5.2 Symbology Selection Control Bar Codes

Enable All Symbologies

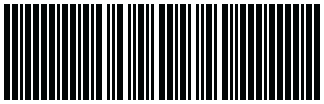


Code 39

Enable*#

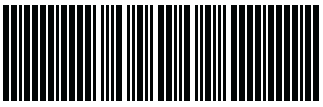


Disable

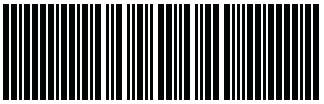


Code 128

Enable*#



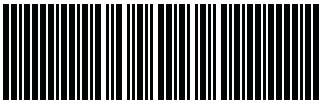
Disable



EAN-8

Enable*#

Disable



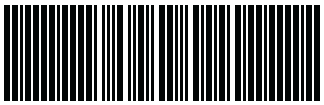
UPC-A/EAN-13

Enable*#

Disable

UPC-E

Enable*#



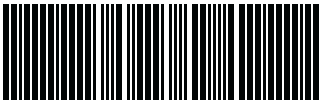
Disable

* Factory Default Setting

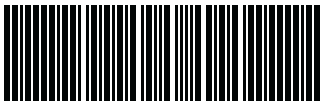
NCR Factory Default Setting

7.5.3 Supplemental Bar Codes

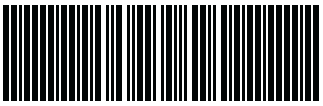
Auto-Detect Supplemental Codes*



Require Supplemental codes



Disable Supplemental Codes#



AIM Symbol Identifiers

Enable

Disable*#

Combine Bar Codes (FWV 1.7.0)

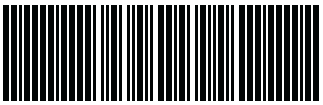
Enable

Disable*

NCR Symbol Identifiers

Enable#

Disable*



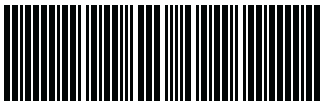
* Factory Default Setting

NCR Factory Default Setting

7.5.4 Symbology Options Control Bar Codes

Code 39 Options

Code39 Checksum Enable



Code39 Checksum Disable*#

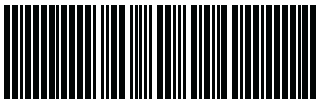
(Disables both Code 39 Checksum options)

Code39 Stripped Checksum Enable

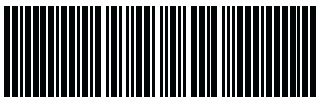
UPC/EAN Options

Convert UPC-A codes to EAN-13 codes (FWV 1.8.0)

Do Not Convert UPC-A codes*# (FWV 1.8.0)

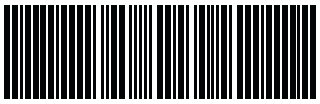


Expand UPC-E codes to UPC-A codes



Do Not Expand UPC-E codes*#

Standard Scanning*# (FWV 1.8.0)



Aggressive Scanning (FWV 1.8.0)

7.5.5 Command Control Bar Codes

Clear Device Bar Code Memory

* Factory Default Setting

\# NCR Factory Default Setting

7.6 ASCII Chart

Use this ASCII chart to convert characters to hexadecimal, and hexadecimal values to characters. For example, the ampersand (&) is represented as 0x26, or as &#038 in ASCII.

The hexadecimal values can appear in the bar code data. Additionally, you can use the hexadecimal number to write a name to the User ID field.

Note: Non-printable characters are provided for reference in the first and second rows, and in the 7F character.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2	SP	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL