MICROSCAN

HS-51/HS-51X Wireless Handheld Reader User Manual

P/N 84-100053 Rev A

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About the HS-51 and HS-51X

The HS-51 Wireless Handheld 2D Reader is a general-purpose 2D reader. Its many features include dual field optics for both High Density and Wide Angle, a ruggedized design, and compact size.

The HS-51X Wireless Handheld DPM Reader is a special-purpose 2D reader for decoding direct part marks. Microscan's X-Mode decode algorithms make the HS-51X an ideal solution for reading difficult marks on many surfaces, including PCBs, electrical components, castings, and sheet metal. Its tough design makes it a good choice for manufacturing and light industrial applications.

Both readers can be configured and tested easily using the intuitive tree controls and user interface of Microscan's **ESP Software**.

Note: The HS-51 and HS-51X Wireless Handheld Readers have unique algorithm licenses, and the HS-51 cannot be field-upgraded to an HS-51X.

About This Manual

This manual provides complete information on setting up, installing, and configuring the HS-51 and HS-51X Wireless Handheld Readers. The chapters are presented in the order in which the reader would be assembled, configured, and optimized.

Highlighting

Cross-references and web addresses are highlighted in **blue bold**.

Bold Initial Caps are used throughout the manual for emphasis.

Statement of Agency Compliance

The HS-51 and HS-51X Wireless Handheld Readers have been tested for compliance with FCC regulations and were found to be compliant with all applicable FCC Rules and Regulations.

IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, this device must not be co-located or operate in conjunction with any other antenna or transmitter.

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The HS-51 and HS-51X Wireless Handheld Readers have been tested for compliance to CE (Conformité Européenne) standards and guidelines and were found to conform to applicable CE standards, specifically the EMC requirements EN 55024, ESD EN 61000-4-2, Radiated RF Immunity EN 61000-4-3, ENV 50204, EFT EN 61000-4-4, Conducted RF Immunity EN 61000-4-6, EN 55022, Class B Radiated Emissions, and Class B Conducted Emissions.

Statement of RoHS Compliance

All Microscan readers with a 'G' suffix in the FIS number are RoHS-Compliant. All compliant readers were converted prior to March 1, 2007. All standard accessories in the Microscan Product Pricing Catalog are RoHS-Compliant except 20-500013-01 and 98-000039-02. These products meet all the requirements of "Directive 2002/95/EC" European Parliament and the Council of the European Union for RoHS compliance. In accordance with the latest requirements, our RoHS-Compliant products and packaging do not contain intentionally added Deca-BDE, Perfluorooctanes (PFOS) or Perfluorooctanic Acid (PFOA) compounds above the maximum trace levels. To view the document stating these requirements, please visit:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0095:EN:HTML

and

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:372:0032:0034:EN:PDF

Please contact your sales manager for a complete list of Microscan's RoHS-Compliant products.

This declaration is based upon information obtained from sources which Microscan believes to be reliable, and from random sample testing; however, the information is provided without any representation of warranty, expressed or implied, regarding accuracy or correctness. Microscan does not specifically run any analysis on our raw materials or end product to measure for these substances.

The information provided in this certification notice is correct to the best of Microscan's knowledge at the date of publication. This notice is not to be considered a warranty or quality specification. Users are responsible for determining the applicability of any RoHS legislation or regulations based on their individual use of the product.

In regards to "RoHS Directive 2011_65_EU" Microscan produces Monitoring and Control Instruments as well as Industrial Monitoring & Control Instruments as defined within the directive. Microscan has developed and is implementing a RoHS2 compliance plan with the intention of bringing all active products listed in our current marketing literature within full compliance as per the directive deadlines.

Key milestones for the transition plan are as follows:

- Complete internal product audit by July 2014.
- Initial "Monitoring and Control Instruments" RoHS2 compliant products available by December 2014
- Initial "Industrial Monitoring & Control Instruments" RoHS2 compliant products available by July 2015
- All new products introduced in 2015 are expected to be WEEE & RoHS2 compliant.

Microscan will mark the products with the 'CE' marking that complies with the RoHS2 process to acquire 'CE' certification per the example given: Example >> Machinery directive + EMC directive + RoHS2 = Declaration of Conformity.

1 Quick Start

Contents

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This section is designed to get your HS-51 Wireless Handheld 2D Reader or HS-51X Wireless Handheld DPM Reader up and running quickly. Detailed setup information for configuring reader parameters can be found in subsequent sections.

Check Hardware

Hardware for Default Configuration

All required hardware for default configuration is included with the reader and does not need to be purchased separately. This includes a battery, a charging base with embedded Bluetooth modem, and a 3-foot USB cable.

- **HS-51 Wireless Handheld 2D or HS-51X Wireless Handheld DPM Reader**

- **Charging Station with Embedded Modem***

*Charging Station without Embedded Modem available as an accessory.

- **USB Cable**

- **Battery**

Install the Battery

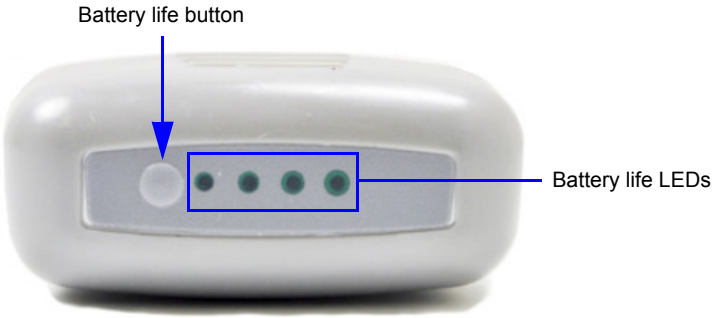
Battery Installation

Install the battery in the reader as shown below. The latch will snap and the battery will lock into place.

To remove the battery, slide the latch to the right and then pull gently on the cartridge.

Battery Life LEDs

Press the battery life button to the left of the LEDs to check the amount of battery life remaining. If the battery has less than 10% capacity, the first LED will flash quickly. If the battery has greater than 25% capacity, the LEDs will illuminate and remain illuminated for four seconds.



This table shows battery life LED behavior for different levels of battery life.

Battery Life				
<10%	Rapid flashing			
<25%	ON			
25-50%	ON	ON		
50-75%	ON	ON	ON	
>75%	ON	ON	ON	ON

Charge the Reader

- Plug the USB charge cable into the Charging Station's USB connector.

- Plug the other end of the USB cable into a USB port on your PC.
- Place the reader into the Charging Station. Be sure that the battery has already been installed in the reader.

Charging Station with Embedded Modem

Charging Station without Embedded Modem (Accessory Only)

Note: Batteries ship with approximately 50% battery life and must be charged to 100% before first use. Approximate time required to charge a depleted battery is four hours via USB cable.

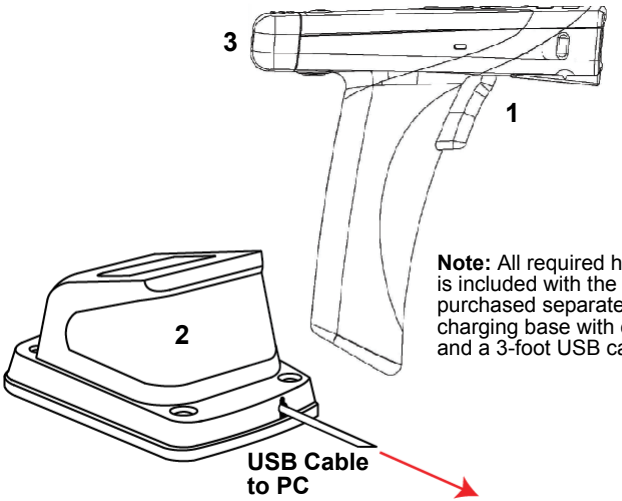
Power-on the reader once it is charged to 100% by pulling and holding the trigger for approximately one second. The reader will beep and vibrate and the LEDs will flash to indicate that it has been powered on.

Note: Pressing and holding the buttons on the top of the reader will also power it on.

Configure Hardware

Item	Description	Part Number
1	HS-51 Wireless Handheld 2D Reader	FIS-HS51-0001G
	HS-51X Wireless Handheld DPM Reader	FIS-HS51X-0002G
2	Charging Station with Embedded Modem	
3	Lithium-Ion Battery	

Charging Station and Handheld Reader



Note: All required hardware for default configuration is included with the reader and does not need to be purchased separately. This includes a battery, a charging base with embedded Bluetooth modem, and a 3-foot USB cable.

Installation

- Connect the **Charging Station with Embedded Modem** to the PC via the **USB Cable**.
- Place the **Battery** in the reader.
- Charge the reader until the battery LEDs show a 100% charge.
- Power-on the reader.
- Decode the **Quick Connect Code** on the Charging Station to establish a Bluetooth connection between the reader and modem.
- Configure the reader for your application in **ESP** before use.
- Save Settings using ESP when reader configuration is complete.

Test Symbol
(ABCDEFGHIJKLMNOP)

Install ESP

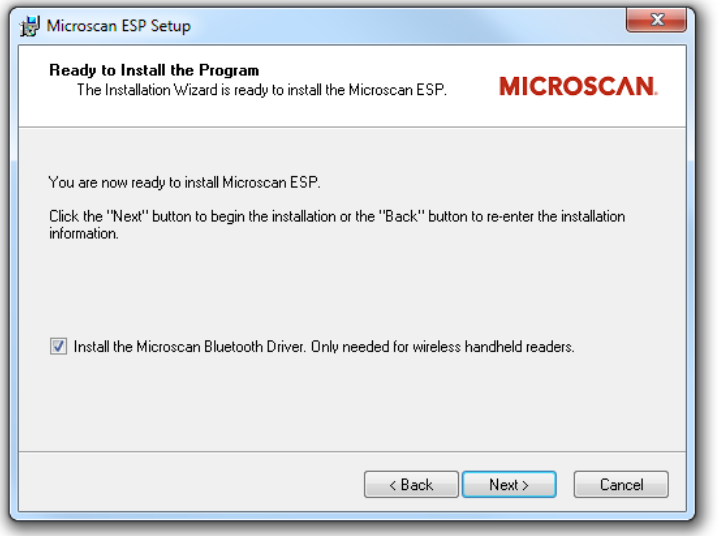
ESP Software is Microscan's configuration and testing software. Use ESP to set up your HS-51 or HS-51X Wireless Handheld Reader.

ESP can be found on the **Microscan Tools Drive** that is shipped with the reader upon request.

1. Follow the prompts to install ESP from the Tools Drive.
2. Click on the ESP icon to run the program.

Note: ESP can also be installed from the **Download Center** at **www.microscan.com**.

Important: If you intend to use the reader's Bluetooth functionality, click the **Install the Microscan Bluetooth Driver** check box when you see this dialog during installation.

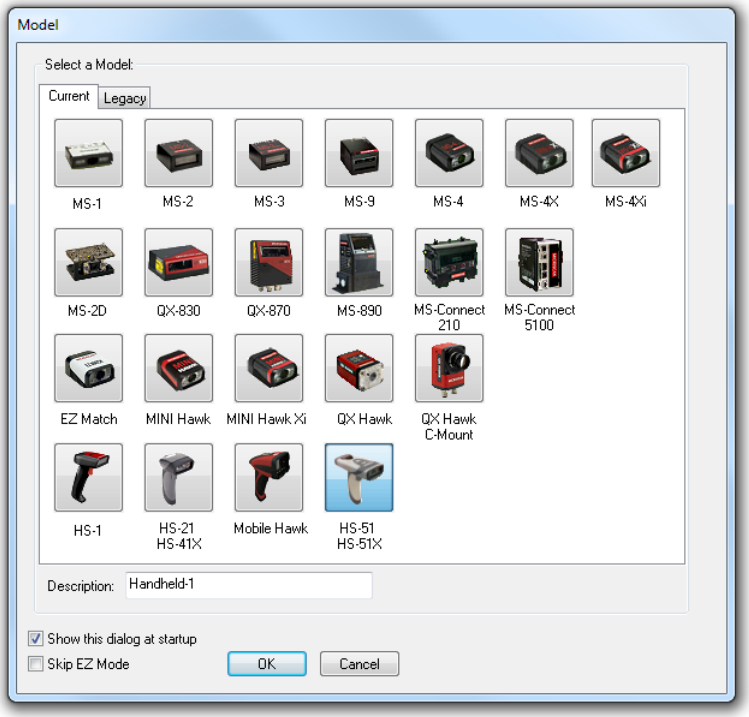


Minimum System Requirements

- 233 MHz Pentium PC
- Windows 8, 7, Vista, or XP operating system (32-bit or 64-bit)
- Internet Explorer 6.0 or higher
- 128 MB RAM or greater
- 160 MB free disk space
- 800 x 600 256 color display (1024 x 768 32-bit color recommended)

Select Model

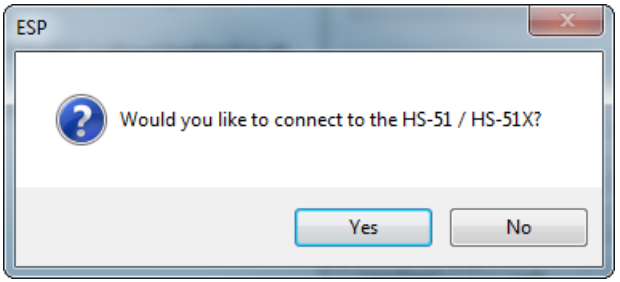
When you start **ESP**, the following menu will appear:



- Click the HS-51/HS-51X button and then click **OK**. If you do not want to make this selection every time you start **ESP**, uncheck “Show this dialog at startup”. If you need to select another model later, click the **Switch Model** button at the top of the screen.

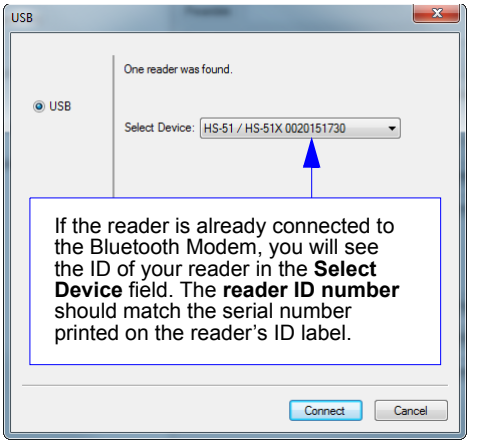
  Note: You can also type a name of your choice in the **Description** text field and click **OK**.

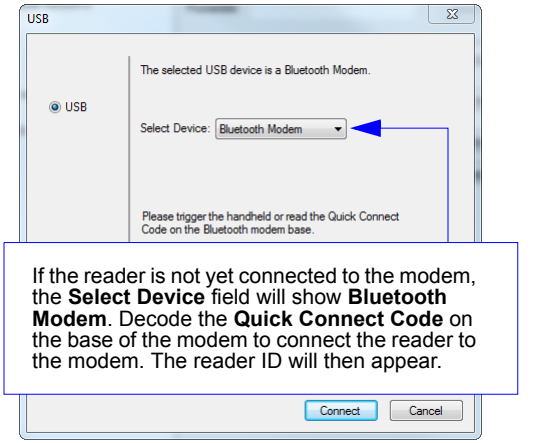
- Click **Yes** when this dialog appears:



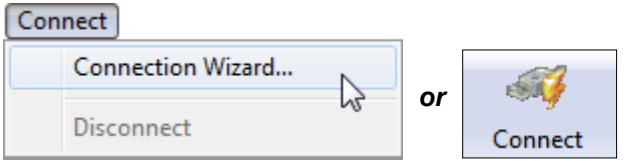
Connect to the Reader

- The **USB** dialog will appear. You will see the device ID in the **Select Device** field. Click **Connect**.





Note: You can also select **Connection Wizard** from the **Connect** dropdown menu or click the **Connect** button to access the USB dialog.



- When you are connected successfully, the **CONNECTED** message will appear in a green box in the status bar at the bottom right of the screen.

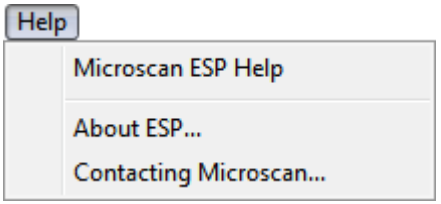
You are now ready to configure your reader using **ESP**. Subsequent sections provide more detailed information about **ESP**'s configuration options.

Configure the Reader

The following modes are accessible by clicking the buttons in the first row of **App Mode** icons:

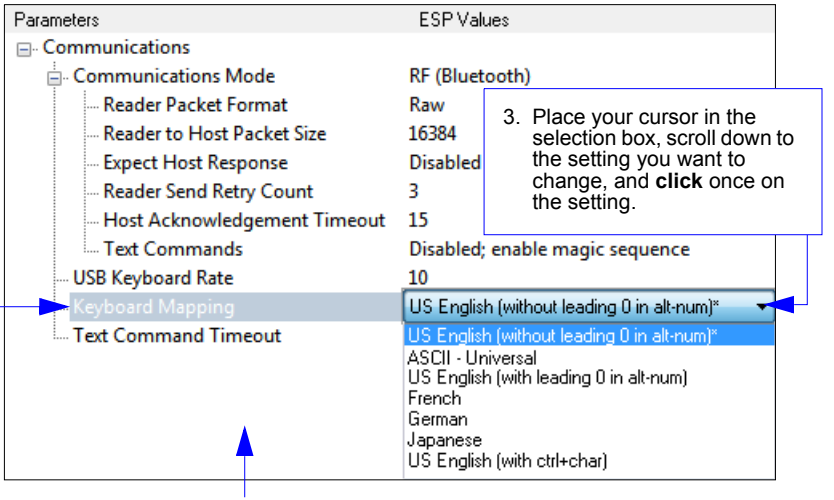
- Click the **Connect** button to establish communication.
- Click the **Send/Recv** button to send or receive commands.
- Click the **Switch Model** button to open the model menu, or to return to a previous model.
- Click the **Parameters** button to show the tabbed tree controls for Communication, Read Cycle, Symbologies, and I/O Parameters.
- Click the **Terminal** button to display decoded symbol data and to send serial commands to the reader using text or macros.
- Click the **Utilities** button to show the tabbed interfaces for Differences from Default, Firmware, Bluetooth, and Advanced settings.

For further details, see **ESP Help** in the dropdown Help menu.



Save Changes in ESP

To make changes to a configuration setting:



1. **Left-click** on the **+** to expand the desired tree.
2. **Double-click** on the desired parameter and click once in the selection box to view options.
3. Place your cursor in the selection box, scroll down to the setting you want to change, and **click** once on the setting.
4. **Left-click** again on the open screen to complete your selection.
5. **Right-click** on the open screen and select **Save to Reader** to implement the command in the reader.

Saving Options

- **Send, No Save**. Changes will be lost when power is re-applied to the reader.
- **Send and Save**. This activates all changes in current memory *and* saves to the reader for power-on.

2 Using ESP

Contents

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This section is designed to help you understand the **ESP** interface.

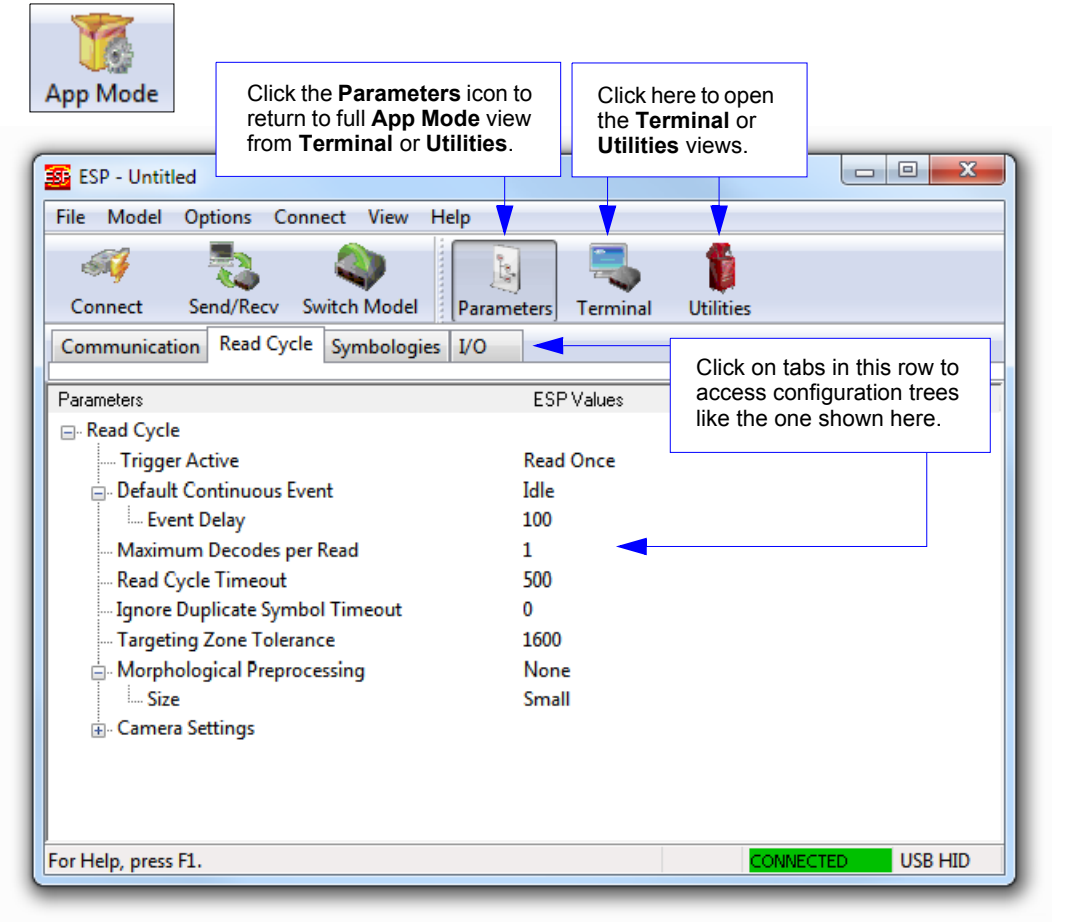
Enter **App Mode** to access **Communications**, **Read Cycle**, **Symbologies**, **I/O Parameters**, a **Terminal** interface, and a **Utilities** interface.

ESP can be used to configure the HS-51 and HS-51X Wireless Handheld Readers in the following ways:

- **Tree Controls:** Each tree control contains a list of all commands that pertain to that specific category of reader operation. For example, the **Communications** menu shows a **Communications Mode** command which contains a dropdown menu showing the available communications modes.
- **Graphic User Interfaces:** Settings can be configured using point-and-click tools – radio buttons, spin boxes, check boxes, and drag-and-drop functions.
- **Terminal: ESP**'s **Terminal** allows you to send configuration and utility commands directly to the reader by typing them in the **Send** text field.

App Mode

Click the **App Mode** button to access specific configuration menus, **Utilities** tools, and a **Terminal** window where serial commands can be entered.



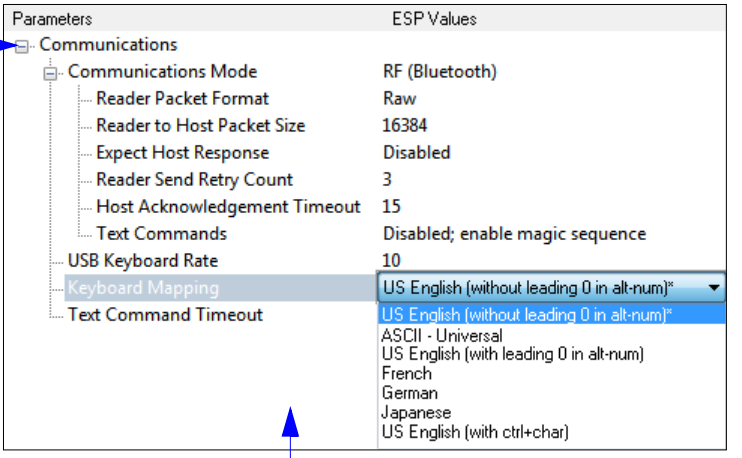
Note: See the corresponding sections of this documentation for specific information on any of the views or modes mentioned above.

Tree Controls

To make changes to configuration settings in the tree control menus:

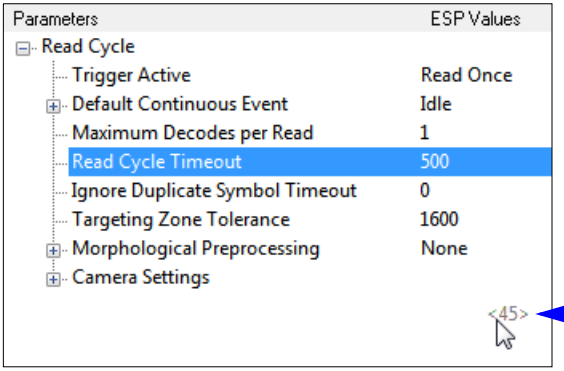
1. **Left click** on the **+/-** to expand or collapse the tree.

2. **Double click** on the parameter and click once in the selection box to view options.
3. Place your cursor in the selection box, scroll down to the setting you want to change and **click once** on the setting.



4. **Left click** again on the open screen to complete the selection.
5. **Right click** on the open screen and select **Save to Reader** to implement the command in the reader.

Hint: To see the underlying serial command that corresponds with each tree control item, click on the item in the tree control and drag the mouse to the open screen. The command will be displayed between angle brackets.

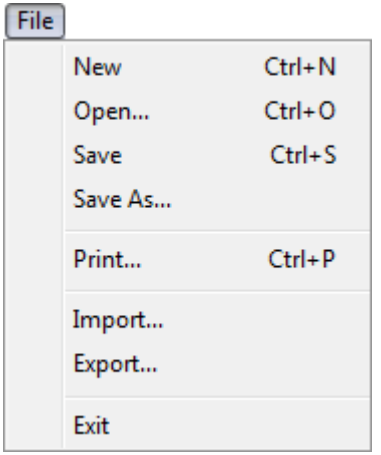


In this example, the command for **Read Cycle Timeout** is shown.

Menu Toolbar

File > New

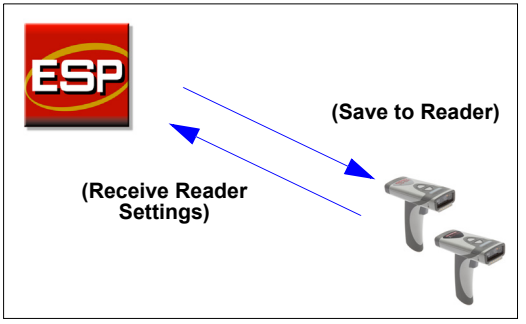
Whenever **New** is selected from the **File** menu, the default configuration of **ESP** is loaded.



Open / Save

When **Save** or **Save As** is selected, the **ESP** configuration is saved to the host computer's hard drive and available whenever the same file is selected under **Open**.

When you save menu changes to your hard drive, these changes are not saved to your reader. The diagram below shows how settings can be saved and received between **ESP** and the reader, and **ESP** and the host hard drive.



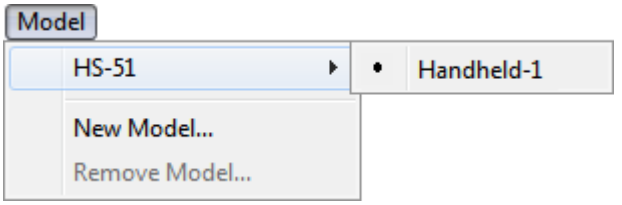
Import / Export

Import converts the ASCII settings from a text file to **ESP** configuration settings.

Export converts the active **ESP** configuration settings to an ASCII text file.

Model

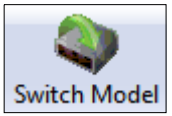
The **Model** menu allows you to select between reader models. When you choose another model, the current connection with your present model will be terminated.



New Model

To connect to another model, select **New Model**, choose the model you want, and click **OK**.

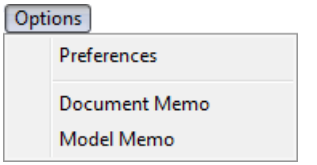
All models you have selected and enabled will continue to appear in the dropdown model menu. The **New Model** option is repeated when you click the **Switch Model** button on the top row of icons.



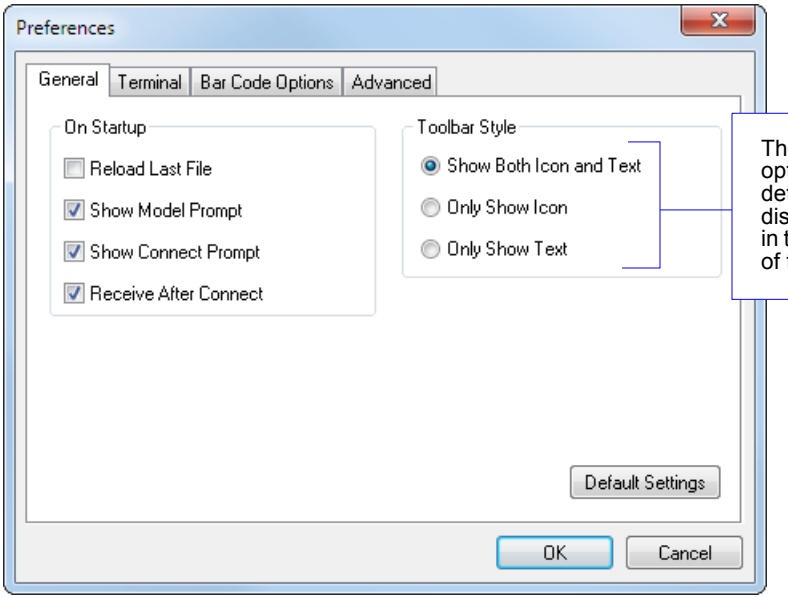
Options

You can use the **Options** menu to save memos and set up **ESP** preferences.

Preferences will be saved and loaded into **ESP** the next time **ESP** is opened, whether or not you save the **ESP** file to the host computer.



Preferences > General Tab



The **Toolbar Style** options allow you to determine how **ESP** will display the mode options in the two rows at the top of the screen.

Reload Last File

At startup, reloads the last file saved to the computer.

Show Model Prompt

At startup, remembers the last connected model and displays it in the **Connecting...** dialog whenever you attempt to connect.

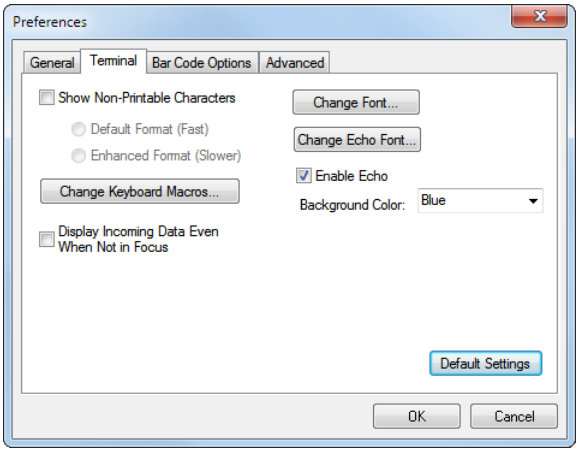
Show Connect Prompt

At startup, displays the **Would you like to connect...** prompt.

Receive After Connect

At startup, loads the reader's settings into **ESP**. (This is not recommended if you want to preserve your **ESP** settings for future use.)

Preferences > Terminal Tab

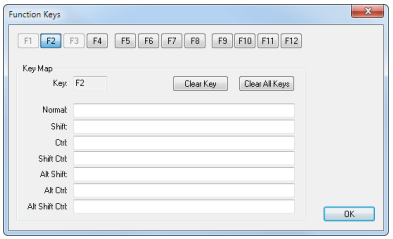


Show Non-Printable Characters

When **Show Non-Printable Characters** is enabled, characters such as “CRLF” will be displayed in the Terminal window. When **Enhanced Format** is checked, the characters are displayed with more detailed formatting.

Change Keyboard Macros

Clicking the **Change Keyboard Macros** button brings up the **Function Keys** dialog. In this dialog you can select the desired function key and then enter your macro keystrokes in the associated key map. For example, to make **Ctrl-F2** the keystroke to send a trigger character, select **F2**, then in the **Ctrl** row, enter **<trigger character>** and click **OK**. Then whenever the **Ctrl-F2** keystroke is pressed, the trigger character will start the read cycle.



Note: The **F1** key is reserved for opening **ESP** Help and the **F3** key is reserved for the **Find Next** function.

Change Font

Allows you to modify the font used for decode data received from the reader on the Terminal screen.

Change Echo Font

Allows you to modify the font used for command characters typed into the Terminal view.

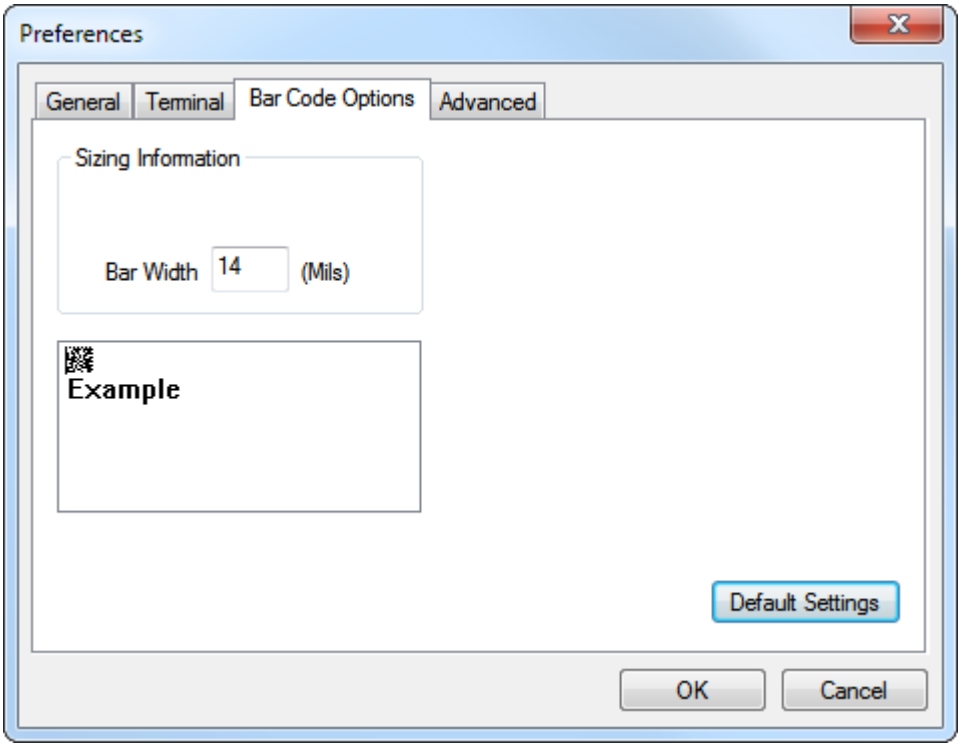
Enable Echo

Allows you to enter command characters in Terminal.

Display Incoming Data Even When Not in Focus

When **Display Incoming Data Even When Not in Focus** is enabled, data from the reader will continue to appear in the Terminal even when **ESP** is not the top window.

Preferences > Bar Code Options Tab



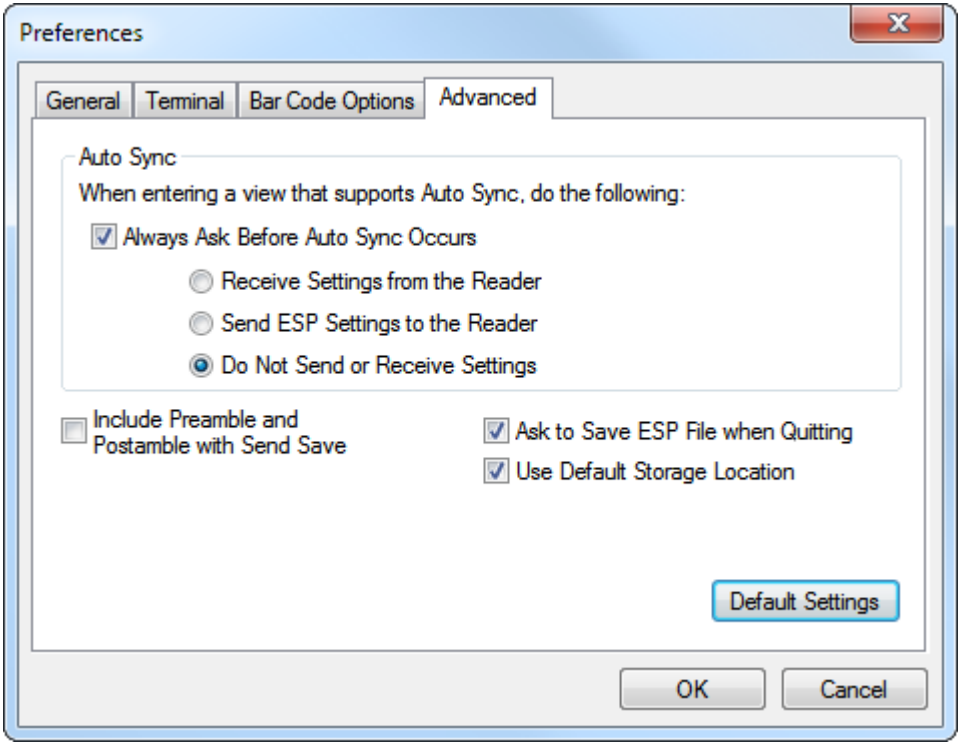
The **Bar Code Options** dialog allows you to set the size of user-created symbols.

Sizing Information

Sets the bar width or module width (in **mils**, or thousandths of an inch) of user-created symbols.

Example: A bar width of 14 is 0.014 inches.

Preferences > Advanced Tab



The **Auto Sync** options at the top of the **Advanced** tab allow the user to determine whether Auto Sync will be enabled automatically in sections of **ESP** where it is used, or if it will ask before it enables Auto Sync functions.

Always Ask Before Auto Sync Occurs

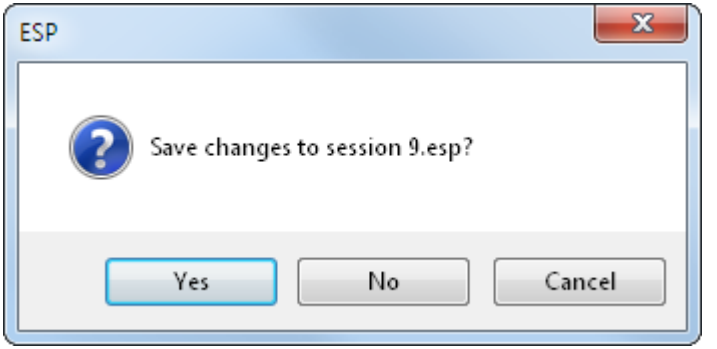
If this option box is checked, specific Auto Sync functions can be enabled. **Receive Settings from the Reader** will automatically send the reader's settings to **ESP** when Auto Sync is enabled. **Send ESP Settings to the Reader** will automatically send all reader configuration settings chosen in **ESP** to the reader. **Do Not Send or Receive Settings** creates a condition in which Auto Sync will not automatically send reader settings to **ESP**, or send **ESP** settings to the reader.

Include Preamble and Postamble with Send Save

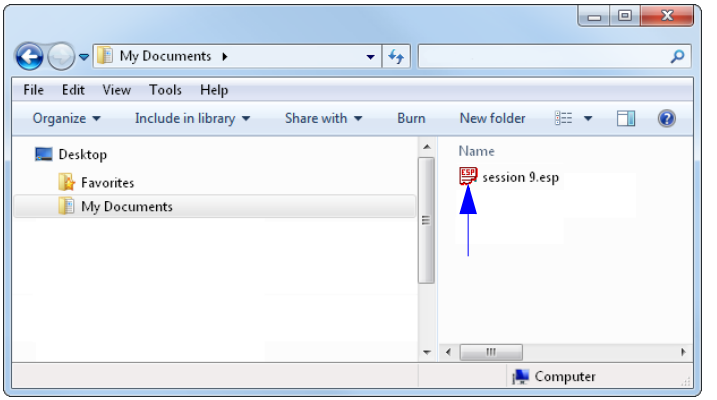
When this option box is checked, the user-configured Preamble and Postamble characters will be sent along with other parameters.

Ask to Save ESP File when Quitting

When enabled, prompts the user to save a **.esp** file when ending a session.



The **.esp** file will be saved in the location of your choice.

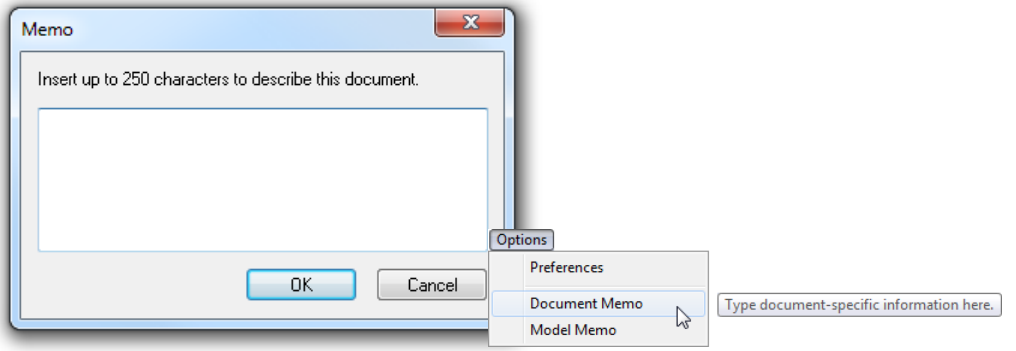


Use Default Storage Location

When enabled, automatically stores data in **ESP**'s Application Data folder.

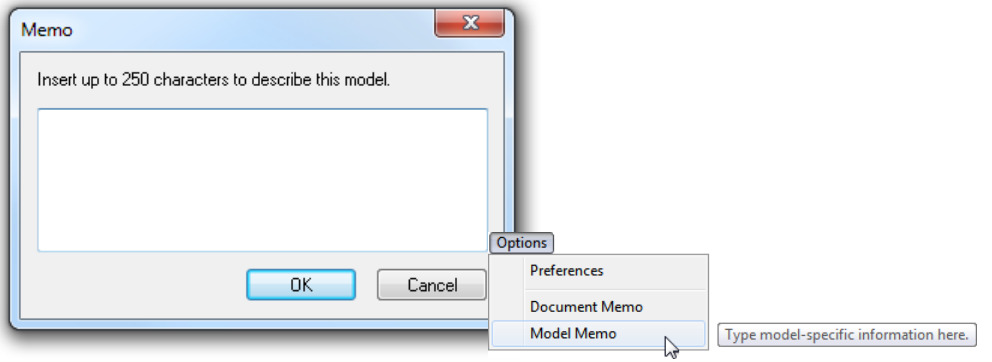
Document Memo

The information you type in the **Document Memo** field will appear in a context-sensitive text box whenever your cursor hovers over the **Document Memo** item on the **Options** menu.



Model Memo

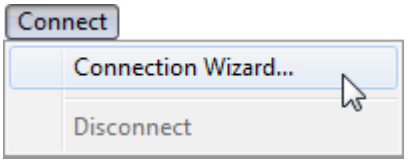
Similar to **Document Memo**, the information you type in the **Model Memo** field will appear in a context-sensitive text box whenever your cursor hovers over the **Model Memo** item on the **Options** menu. Memos created in **Model Memo** are specific to the model enabled when the message was created.



Note: Memos must be saved in a **.esp** file if you want them to available in your next session. If you do not save your current session, any memos that you have entered during the session will be discarded, and will be unavailable in your next session.

Connect

The **Connect** dropdown menu allows you to access the **Connection Wizard**, and also to **Disconnect** ESP from the reader.

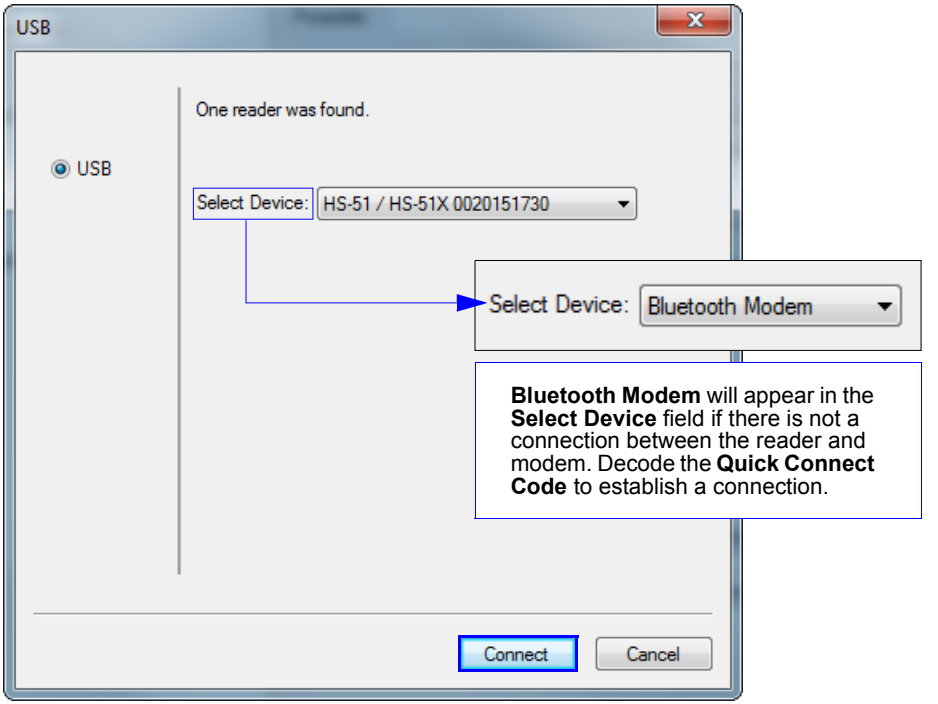


Connection Wizard

To connect using the Connection Wizard:

- Click **Connect** on **ESP**'s menu toolbar, and then select **Connection Wizard**.
- Click **Connect** when you see the reader's name and serial number in the **Select Device** field.

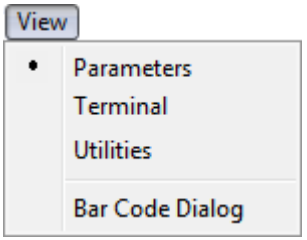
  Note: If the reader is not yet connected to the modem, the **Select Device** field will show **Bluetooth Modem** as the device instead of the reader. Decode the **Quick Connect Code** on the base of the modem to connect the reader to the modem. The reader ID will then appear. Click **Connect** to continue.



- When a connection is established, the green indicator in the status bar at the bottom right of the screen will be visible.

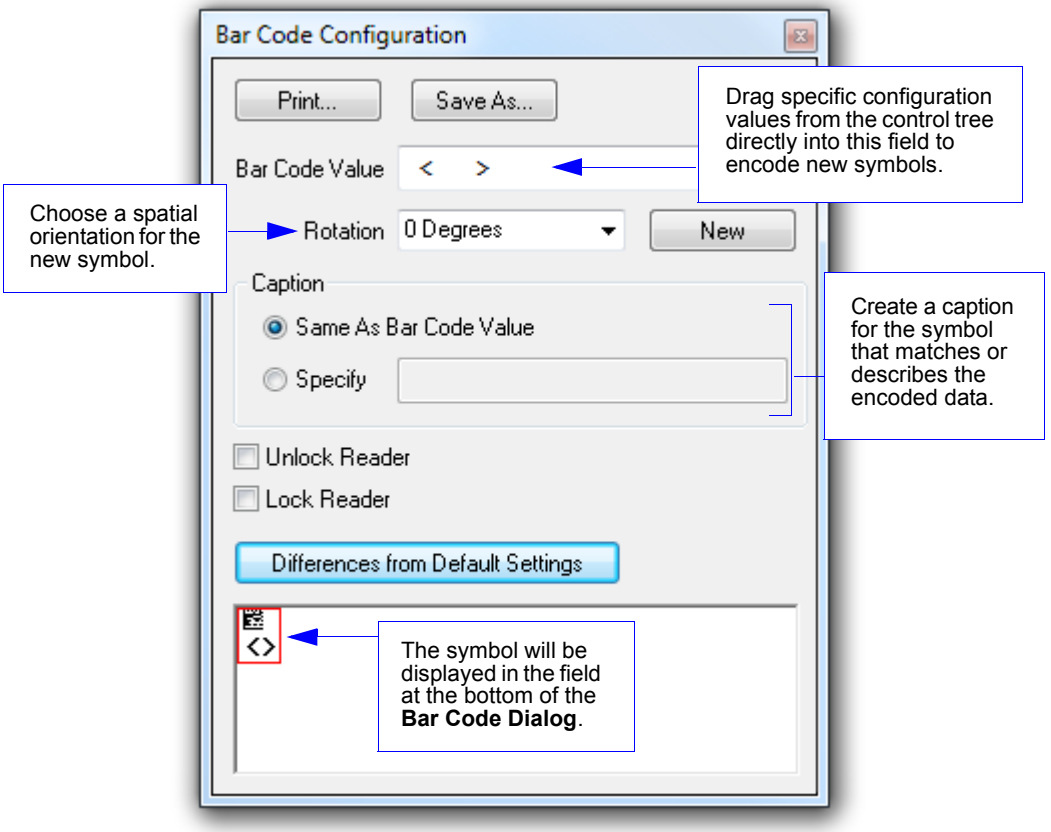
View

The **View** menu allows the user to move quickly between the **Parameters**, **Terminal**, and **Utilities** interfaces without using the icon buttons on the **App Mode** toolbar. It also allows the user to access the **Bar Code Dialog**, shown below.



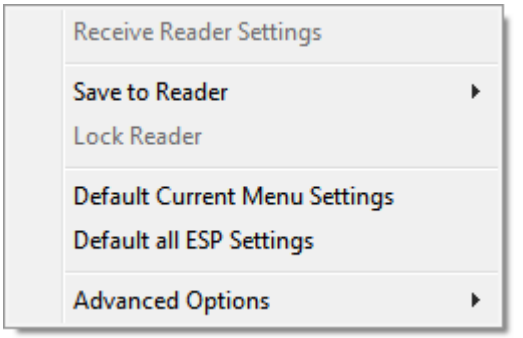
Bar Code Dialog

Symbols can be created in the **Bar Code Dialog** by typing the text to be encoded. This is a useful tool for creating configuration symbols, allowing the user to configure the reader by reading the user-created symbols.



Send/Receive

To access **Receive**, **Save**, **Lock**, **Default**, and **Advanced** options, click the **Send/Recv** button or right-click in the tree control areas.



You can also access these options by right-clicking in any of the configuration views.

Receive Reader Settings

From the **Send/Recv** menu, select **Receive Reader Settings.**

This option is useful if you want to receive the reader's settings and save them as a file for later retrieval. For example, if your reader has settings that you do not want to change, choosing **Receive Reader Settings** will allow you to load those settings to **ESP** and save them as an **ESP** file.

Receiving the reader's settings also assures that you will not subsequently save any unwanted configuration changes previously made in **ESP**.

Select this option if you want to upload the reader's settings to **ESP**. For example, if your **ESP** file has a number of custom settings that you want to maintain and download to the reader, you will lose those **ESP** settings if you choose to receive settings from the reader.

Save to Reader

Send, No Save

This saves **ESP** settings to current memory.

Send and Save

This activates all changes in current memory *and* saves to the reader.

Lock Reader

This locks in the most recently sent and saved configuration to the reader.

Default Current Menu Settings

This option returns the settings in the current tree control to their defaults.

Important: When you select **Default Current Menu Settings** you are *only* defaulting settings in **ESP**. The reader is not affected unless you download new settings.

Default all ESP Settings

This option returns all settings in ESP to their defaults.

Important: When you select **Default all ESP Settings** you are *only* defaulting settings in **ESP**. The reader is not affected unless you download new settings.

Advanced Options

Send Current View

This is the same as **Save to Reader > Send, No Save** except that only the commands in the current tree control are sent.

Send Current Command

This is the same as **Send Current View** except that it only saves the command that is currently selected.

3 Basic Operations

Contents

Practice Targeting 3-2
Dual Optics 3-3
Operational Feedback 3-5

This section explains how to practice targeting and triggering, and also describes the reader's Dual Optics and Operational Feedback behaviors.

Practice Targeting

When first connecting, allow approximately 3 seconds for the reader to initialize.

1. Hold the reader steady and point it at a test symbol.
2. Squeeze and hold the trigger.
3. Move the reader toward or away from the symbol in a fluid motion until the two side-by-side blue bars converge in the middle of the symbol. When the reader is at the optimal distance (about **4 inches** or **10 cm**), it will decode the symbol and will beep and vibrate while emitting a green LED flash to indicate a Good Read. At this optimal distance, the two blue bars should just be touching. Note that the bars overlap as you continue to draw the reader away from the symbol.
4. If no decode occurs, slowly draw away from or move closer to the symbol while holding the blue bars centered steadily on the symbol.

When the reader is closer to the symbol, you will see two separate bars. As you draw the reader away from the symbol, the two bars converge.

Test Symbol

ABCDEFGHIJKLMNOP

Targeting Suggestions

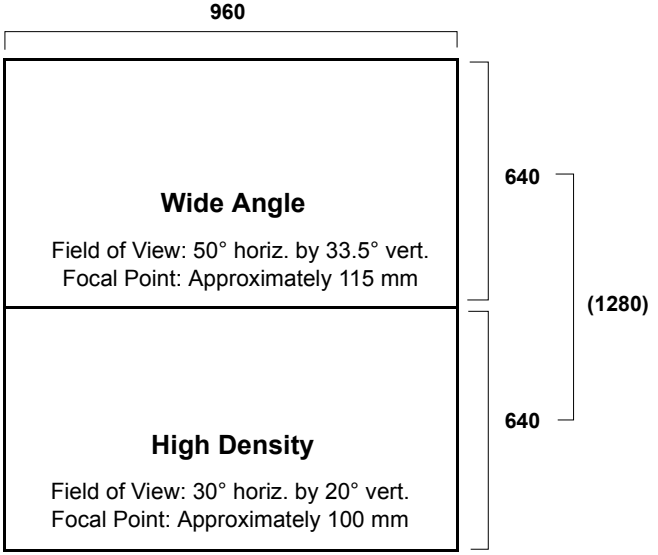
- Typically, you should not hold the reader exactly perpendicular to the symbol. Position the reader at an angle to avoid specular reflection.
- Use smooth, fluid motion when targeting the symbol. Do not wave the reader side-to-side or up-and-down, or attempt to sweep across a symbol, as sudden movements will create blurred images.
- The reader is omnidirectional and can decode symbols in any orientation. When decoding 1D symbols, be sure that the entire symbol falls well within the field of view.

Dual Optics

The reader's dual field optical system can read small 2D symbols as well as larger 1D symbols. An image is captured from each field. The decoder first operates on the image (High Density or Wide Angle) which was successfully decoded on the last cycle. If unsuccessful, the next image is decoded.

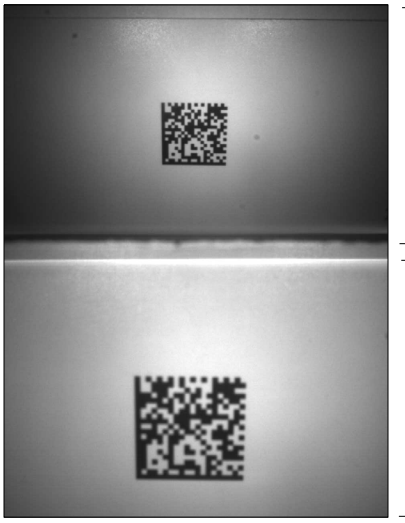
Move the reader closer to decode smaller symbols and farther away to decode larger symbols.

Imaging Area

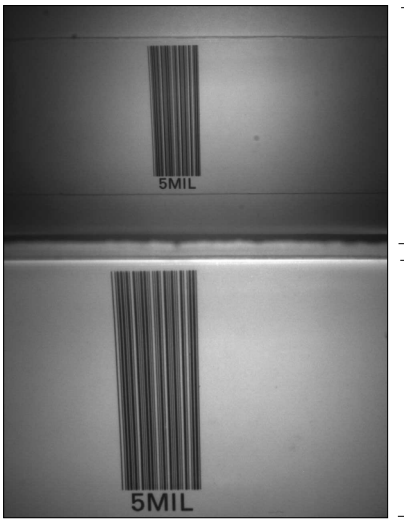


The reader's optics are divided into High Density and Wide Angle decode zones. Each decode zone is 960 x 640 pixels.

Dual Optics Examples



20 mil Data Matrix



5 mil Code 39

Operational Feedback

Condition	Reader LEDs	Sound	Vibration
Successful Power-Up	All LEDs flash	1 Beep	Handle vibrates
Successful Connection to Host	Wireless icon flashes	1 Beep	Handle vibrates
Successful Decode and Data Transfer	Good Read indicator flashes	1 Beep	Handle vibrates
Successful Decode and Processing of Configuration Symbol	Good Read indicator flashes	2 Beeps	Handle vibrates
Batch Mode Enabled, Data Stored	Storage icon flashes	No sound	No vibration
Batch Memory Full	Storage icon flashes 5 times per second	No sound	No vibration
Batch Mode Enabled, No Data Stored	Storage icon off	No sound	No vibration
No Bluetooth Connection	No change	4 Beeps	No vibration
Bluetooth Connection Established – Quick Connect Code Scanned	Wireless icon flashes, then remains illuminated	1 Beep	Handle vibrates
Bluetooth Connection Established – Battery Removed and Replaced, Trigger Pulled	Wireless icon flashes, then remains illuminated	No sound	No vibration
Data Being Stored	Storage icon flashes	No sound	No vibration

4 Communications

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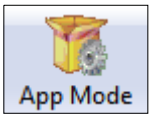
USB Keyboard Rate 4-13
Text Command Timeout 4-14
Other Communications Mode Commands 4-15

This section explains how to set up communications between the reader and a host.

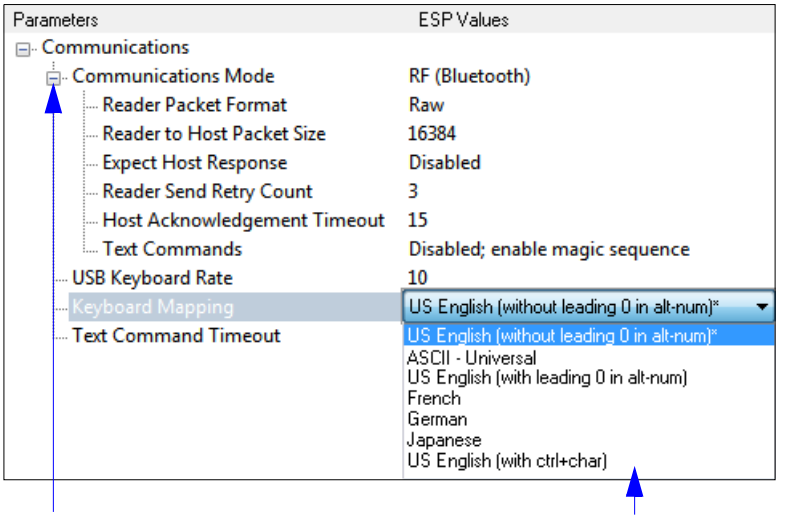
ESP can be used to configure reader parameters and then to send and save those parameters to the reader.

You can also configure reader parameters by decoding the Data Matrix symbols in this section.

Communications by ESP



Click this button to bring up the **App Mode** view, then click the **Communication** tab.



To open nested options, **single-click** the **+**.

To change a setting, **double-click** the setting and use your cursor to scroll through the options.

Communications Overview

The reader's default communications mode is **RF (Bluetooth)**.

RF (Bluetooth)

RF (Bluetooth) enables wireless two-way communication between the reader and the Charging Station with Embedded Modem and allows you to decode symbols. The reader must be in this mode to communicate with ESP.

M10001_02

USB Native (HID)

USB Native (HID) allows the reader to communicate with the PC via a wired connection. You must move the switch on the Charging Station with Embedded Modem to the **OFF** position (to the left, opposite the direction of the arrow on the switch). This mode of communication is useful when the reader is storing decoded symbol data and will send the data to the PC when placed in the Charging Station with Embedded Modem. It is not possible to connect to ESP in this mode.

M10004_02

USB Keyboard

USB Keyboard causes the reader to appear to the PC as a keyboard. You must move the switch on the Charging Station with Embedded Modem to the **OFF** position (to the left, opposite the direction of the arrow on the switch). This mode allows ASCII characters to be transmitted as keyboard sequences. It is not possible to connect to ESP in this mode.

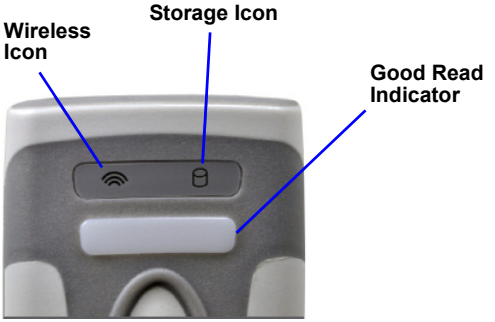
M10200_01

Bluetooth

Decode the Quick Connect Code located on the front of the Charging Station with embedded modem to establish Bluetooth communication.

Important: Slide the communication mode switch on the Charging Station to Bluetooth Mode (the direction of the arrow on the switch) before decoding the Quick Connect Code. Sliding the mode switch in the other direction enables USB cabled and USB Virtual COM 1-Way Mode operation.

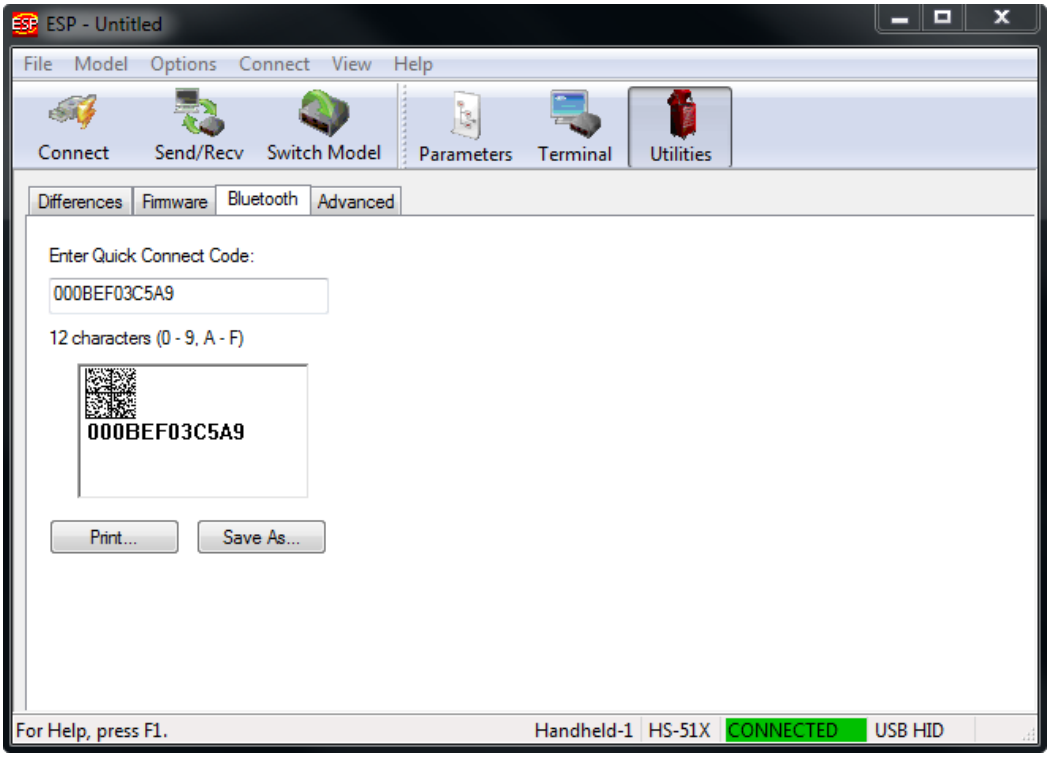
The wireless icon located at the top of the reader will flash as it attempts to make a connection.



The blue LED on the Charging Station will also flash as it attempts to connect. The blue LED will turn on when the connection is established, the reader will beep once, and the wireless icon will turn on and remain illuminated.

Important: If you are using a non-Microscan Bluetooth device:

To connect to a non-Microscan Bluetooth device, you will need the Bluetooth address of that device. The 12-character Bluetooth address can be found on the device near the serial number. Then create a Quick Connect Code in **ESP Utilities** on the **Bluetooth** tab. Decode the new Quick Connect Code to establish a connection with the device.



Batch Mode

The HS-51 and HS-51X can be configured for **Batch Mode**, which allows you to capture, store, and transmit data via standard communication.

Decode the Batch Mode symbol below that best suits your application's data storage needs. Batch Mode is disabled by default.

Batch Mode Enabled – Send and Log

When the reader is configured for **Send and Log**, decoded data is immediately sent to the PC and a copy is saved to the reader.

Batch Mode Enabled – Log Only

When the reader is configured for **Log Only**, decoded data is only stored in reader memory and not sent to the PC. Decode the **Batch Mode – Transfer All Data in Memory** symbol to send all data that has been saved on the reader to the PC.

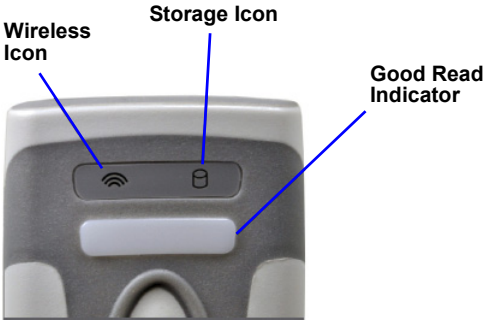
Batch Mode Enabled – Send and Log

Batch Mode Enabled – Log Only

Batch Mode – Transfer All Data in Memory

Batch Mode Disabled (Default)

Batch Mode Indicators



Configuring and Using Batch Mode

Follow the procedure below to set up and use Batch Mode.

- Plug in the Charging Station with Embedded Modem.
- Move the switch on the Charging Station with Embedded Modem to the left (opposite the direction of the arrow on the switch).

- Decode the **Default Reader Settings** symbol.

Default Reader Settings

- Decode the **Clear All Stored Data, Images, and JavaScripts** symbol.

Clear All Stored Data, Images, and JavaScripts

M10138_02

- Decode the **Batch Mode Enabled – Log Only** symbol.

Batch Mode Enabled – Log Only

M10188_01

- Decode the **USB Keyboard Mode** symbol.

USB Keyboard Mode

M10200_01

- Use the reader to capture symbol data and log it to the reader as needed. The Storage Icon on top of the reader will illuminate as symbols are decoded and logged.
- Place the reader in the Charging Station with Embedded Modem's dock to transfer logged data to the PC. A Microsoft Keyboard driver will load and data will then be sent to the PC after approximately 10 seconds.

USB Virtual COM 1-Way Mode (for Serial Emulation)

USB Virtual COM 1-Way Mode (for Serial Emulation) is available for applications in which the reader must function as a virtual serial COM port. This mode requires installation of a USB Virtual COM driver, which is available in the **Download Center** on the Microscan website under the red driver icon shown below. You will see this icon at the end of the HS-51 and HS-51X rows.

DRV

The USB Virtual COM Port Driver is also available on the Microscan Tools Drive from the **Accessories** navigation page:

HS-51 and HS-51X USB-to-Serial Virtual COM Port Driver

▸ HS-51 and HS-51X USB-to-Serial Virtual COM Port Driver

Once the driver is installed, follow the steps below to use this communications mode.

- Switch the **Charging Station with Embedded Modem** from **Bluetooth Mode** to **USB Mode**.

- Scan the **Batch Mode Enabled – Send and Log** configuration symbol below.

M10186_01

Batch Mode Enabled – Send and Log

- Scan the **USB Virtual COM 1-Way Mode (for Serial Emulation)** configuration symbol below.

M10201_01

USB Virtual COM 1-Way Mode (for Serial Emulation)

The reader can now be used as a virtual serial COM port. Symbol data will be sent to the assigned COM port 5 seconds after the reader is placed in the Charging Station dock.

Preamble

A **preamble** is a character that is added to the beginning of a decoded data string.

Set the desired preamble by reading the appropriate symbol below.

Important: Preamble settings are not concatenated when their configuration symbols are decoded in series. For example, if you set **Comma** as your preamble and then set **Space**, the preamble will not be the series Comma and Space – it will simply be Space. The most recently decoded configuration symbol will overwrite the previously decoded configuration symbol.

If you wish to concatenate preamble characters, use **Preamble and Postamble by ESP** on ESP's **Communications** tab.

M10127_01

Comma

M10128_01

Space

M10129_01

Tab

M10126_01

Erase/None (Default)

M10135_01

Erase Preamble and Postamble Data

Postamble

A **postamble** is a character that is added to the end of a decoded data string.

Set the desired postamble by reading the appropriate symbol below.

Important: Postamble settings are not concatenated when their configuration symbols are decoded in series. For example, if you set **Comma** as your postamble and then set **Space**, the postamble will not be the series Comma and Space – it will simply be Space. The most recently decoded configuration symbol will overwrite the previously decoded configuration symbol.

If you wish to concatenate postamble characters, use **Preamble and Postamble by ESP** on ESP's **Communications** tab.

M10131_01

Comma

M10132_01

Space

M10133_01

Tab

M10134_01

Enter

M10126_01

Erase/None (Default)

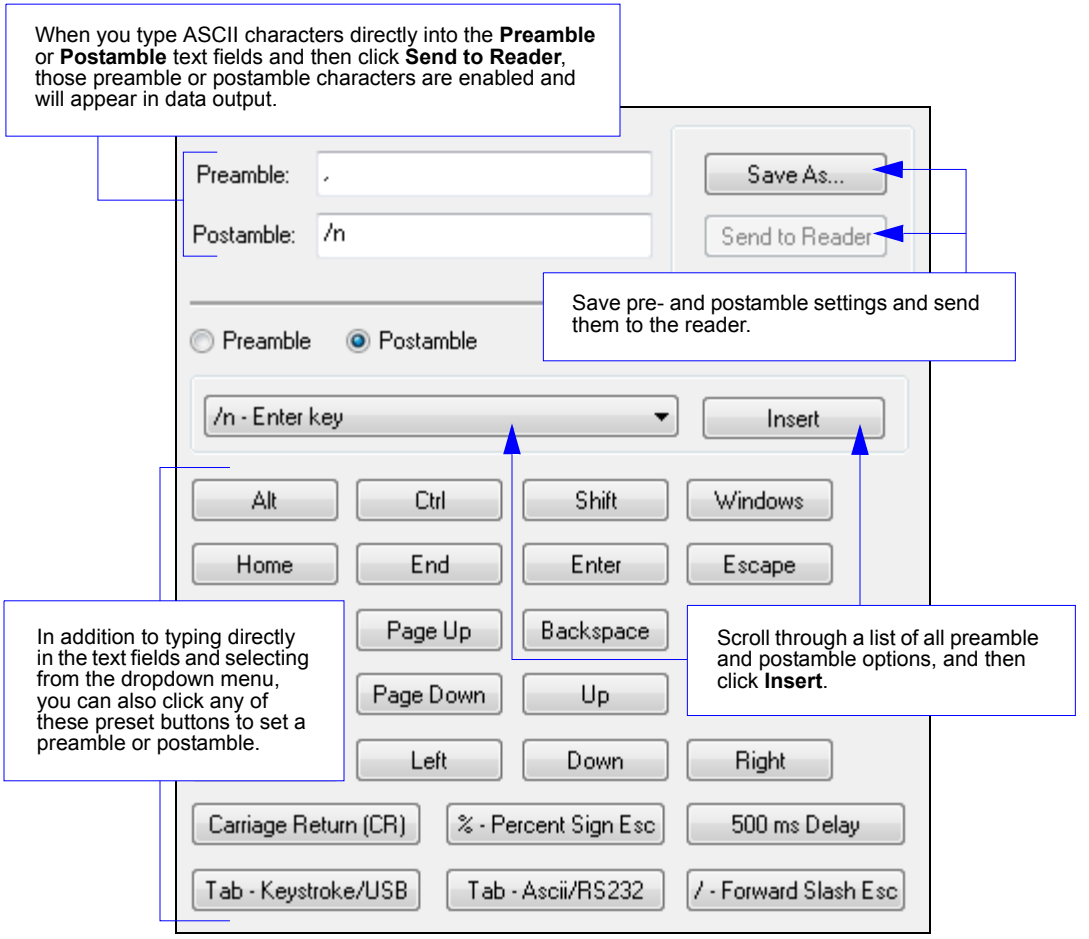
M10135_01

Erase Preamble and Postamble Data

Preamble and Postamble by ESP

Characters can be added to the beginning and end of data strings using **ESP**. There are a few different ways to do this using the interface shown below.

You will see the Communications tree control on the left, and the Preamble/Postamble interface on the right.



Keyboard Mapping

The **Keyboard Mapping** feature provides alternatives for keyboards that do not conform to U.S. English mapping. It also allows you to send control characters for non-printable ASCII.

Note: Universal keyboard mapping is slightly slower than the other language-specific options, because it maps data by reference to the full set of ASCII characters. The advantage of Universal keyboard mapping is that it allows any language and keyboard layout to be mapped.

Important: Keyboard Mapping is not to be confused with USB Keyboard Mode, which has an entirely different function—namely to enable USB cabled communications.

M10003_01
U.S., No Leading 0 (Default)

M10112_01
U.S. with Leading 0

M10113_01
Keyboard Control Characters for Non-Printable ASCII

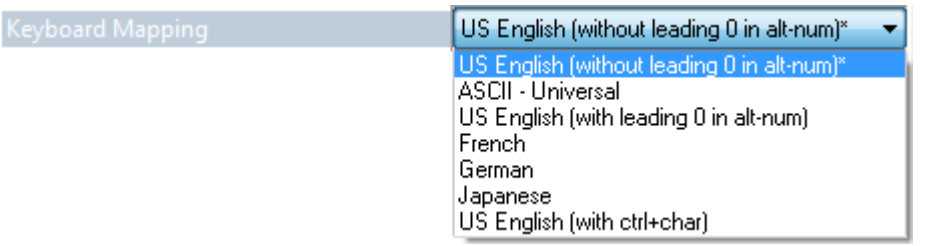
M10117_01
French

M10118_01
German

M10119_01
Japanese

M10114_01
Universal

Keyboard Mapping by ESP



USB Keyboard Rate

Requests that the host polls the USB reader at the rate specified (**1** to **255** ms).

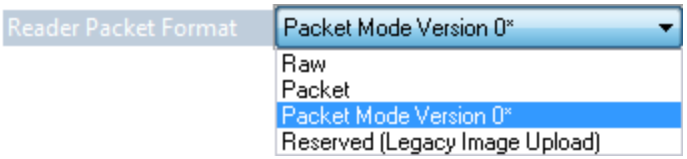
Text Command Timeout

Text Command Timeout allows you to set the maximum time during which a complete text command from the host must be received. Pending text command data is discarded when the timeout is exceeded.

Other Communications Mode Commands

Some **ESP** Communications options are unique to the software, and do not have corresponding programming symbols. These options are explained below.

Reader Packet Format



Data that is sent from the reader to the host in **Raw** format is sent without packet framing or check characters.

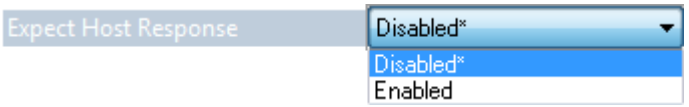
Packet data is sent with framing (a preamble communicating the amount of data to be transmitted, and a postamble containing error detection) and check characters, and a response is expected from the host.

Packet Mode Version 0 is a similar but more streamlined way of sending packetized data.

Reader to Host Packet Size

The **Reader to Host Packet Size** is the amount of data (in bytes) that is sent to the host in packet format. This feature allows you to set the maximum allowable packet size.

Expect Host Response



When **Expect Host Response** is enabled, the reader will re-transmit data if it doesn't receive acknowledgement from the host.

Reader Send Retry Count

Reader Send Retry Count sets the number of times the reader will re-transmit data before abandoning further send attempts. The minimum retry count is **1**, which represents the initial transmission.

Host Acknowledgement Timeout

The **Host Acknowledgement Timeout** is the amount of time (in seconds) that the reader will wait for an acknowledgement from the host before re-sending data.

Text Commands

When the **Text Commands** feature is enabled, the reader can accept text commands via USB Virtual COM modes.

Note: Text Commands are not supported in USB HID Mode.

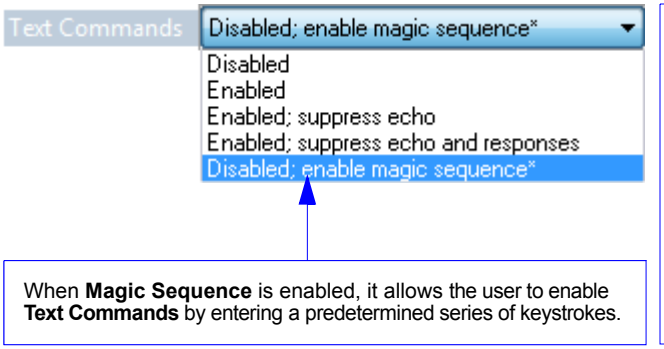
M10137_01

Enable Text Commands

M10136_01

Disable Text Commands (Default)

Text Commands by ESP



When **Magic Sequence** is enabled, it allows the user to enable **Text Commands** by entering a predetermined series of keystrokes.

When **Text Commands** are set to **Enabled; Suppress Echo**, text that a user enters in the Terminal will not be shown. When **Text Commands** are set to **Enabled; Suppress Echo and Responses**, neither user-entered data or reader responses will be shown, and only decoded symbol data will appear in the Terminal.

See **Terminal Right-Click Menu** for a way to change Echo settings directly in the Terminal view.

Entering Magic Sequence

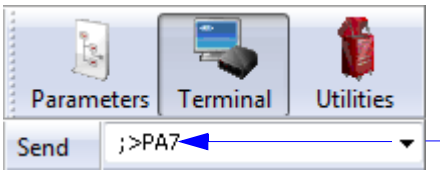
The magic sequence is **;>PA** followed by a numeric value of **1**, **3**, or **7**.

1 = Enable Text Commands

3 = Enabled; Suppress Echo

7 = Enabled; Suppress Echo and Responses

In the example below, the magic sequence entered will Enable Text Commands and Suppress Echo and Responses.



Enter the magic sequence in this text field and click **Send**.

Once the magic sequence has been sent, you can send text commands from the same text field.

5 Read Cycle

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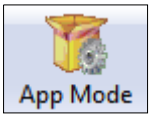
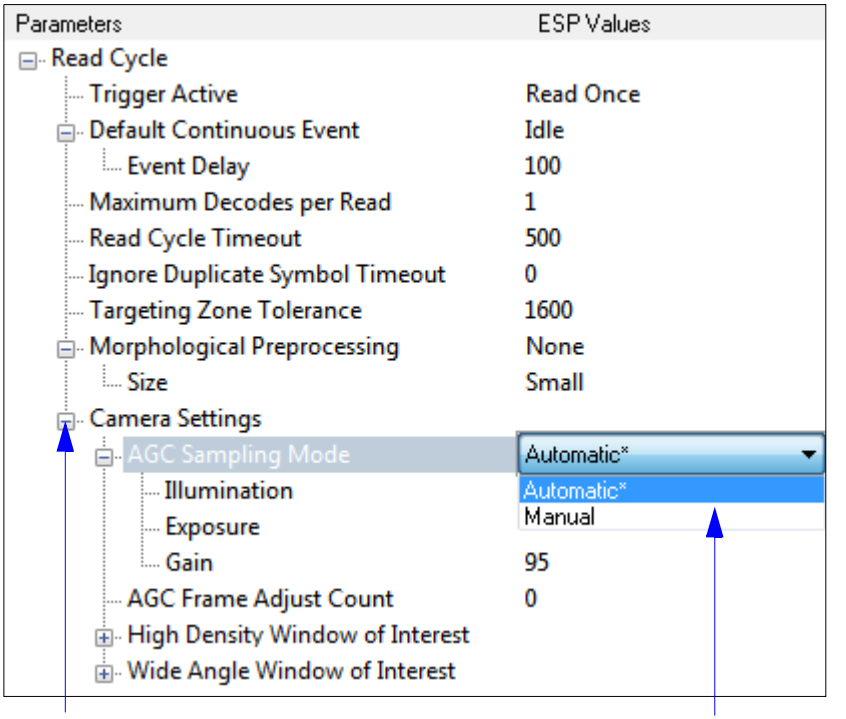
This section explains Read Cycle parameters, which can be configured to optimize reader performance in your application.

ESP can be used to configure reader parameters and then to send and save those parameters to the reader.

Read Cycle by ESP



Click this button to bring up the **App Mode** view, and then click the **Read Cycle** tab.

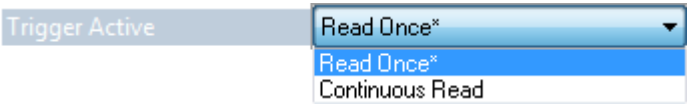


To open nested options, **single-click** the **+**.

To change a setting, **double-click** the setting and use your cursor to scroll through the options.

Trigger Active

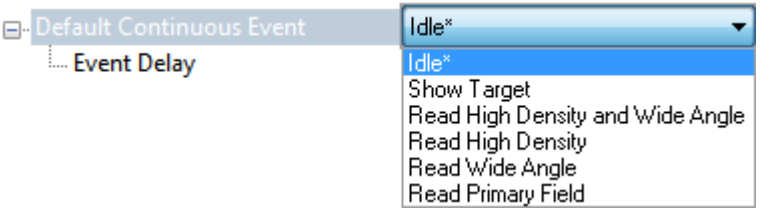
When a trigger is active, the reader will either decode once and stop or decode continuously, depending on how this parameter is set. **Trigger Active** is set to Read Once by default.



Important: **Ignore Duplicate Symbol Timeout** should be set to a value greater than 0 when Trigger Active is set to Continuous Read.

Default Continuous Event

This parameter allows you to determine the default state of the reader.



Idle (Default)

When Default Continuous Event is set to **Idle**, the reader will remain inactive until triggered.

Show Target

When Default Continuous Event is set to **Show Target**, the reader will display the target LEDs but remain inactive until triggered externally.

Read High Density and Wide Angle

Both **High Density** and **Wide Angle** will be continuously activated to capture an image.

Read High Density

High Density will be continuously activated to capture an image.

Read Wide Angle

Wide Angle will be continuously activated to capture an image.

Read Primary Field

When **Read Primary Field** is selected, the most recent field to have produced a Good Read (**High Density** or **Wide Angle**) will be continuously activated to capture an image.

Event Delay

The default Event Delay is 0.100 seconds.

Maximum Decodes per Read

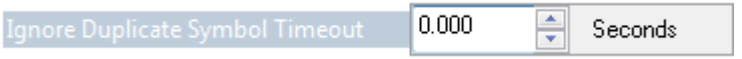
Maximum Decodes per Read allows you to set how many decodes can be performed in a single read cycle.

Read Cycle Timeout

Read Cycle Timeout determines the duration of the read cycle. The default Read Cycle Timeout is 0.500 seconds.

Ignore Duplicate Symbol Timeout

Ignore Duplicate Symbol Timeout sets the reader not to output the same symbol data multiple times within the time period designated.



Targeting Zone Tolerance

Targeting Zone Tolerance is particularly useful in environments where closely spaced symbols of various sizes need to be targeted. It allows the reader to narrow the field of view relative to the size of a symbol, and to determine the distance the target must be from the symbol for a decode event to occur.

See **Window of Interest** for more precise control of the active pixel area.

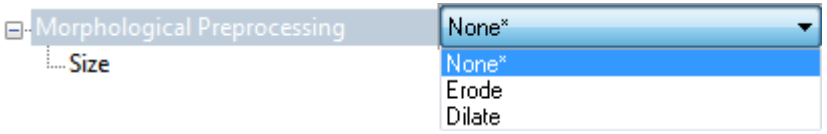
The default Targeting Zone Tolerance is 1600%.

Formula for Calculating Targeting Zone Tolerance:

2 x distance from target to symbol (in pixels) / symbol width or height (in pixels) x 100

Morphological Preprocessing

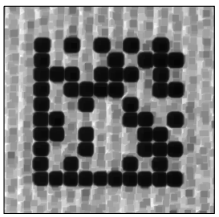
Morphological Preprocessing allows you to select the method for processing captured images, and to choose the operator size for that method. It is set to None by default.



Note: This feature is only available in the HS-51X Wireless Handheld Reader.

Erode

Erode increases the dark cell size of a symbol. Useful for increasing the dark cell size of a dark-on-light Data Matrix symbol.

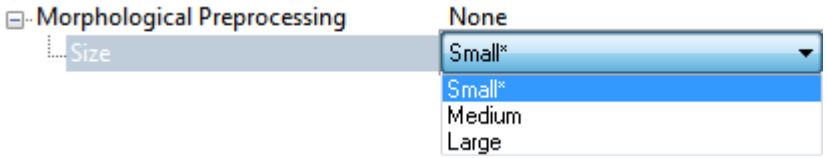


Dilate

Dilate increases the light cell size of a symbol. Useful for increasing the light cell size of a light-on-dark Data Matrix symbol.

Size

Size determines the size of the area or “pixel neighborhood” in which the morphological operation is being performed.

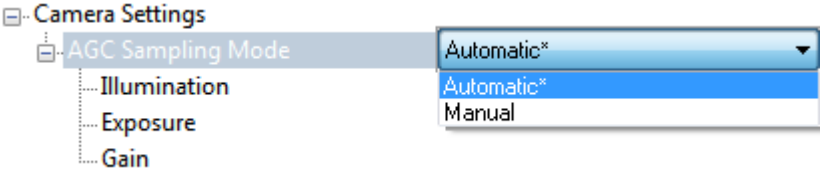


Camera Settings

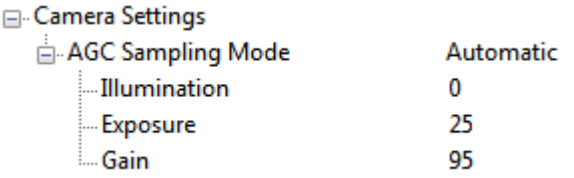
Camera Settings allow you to set AGC Sampling Mode, to set the percentage values for Illumination, Exposure, and Gain, to set the AGC Frame Adjust Count, and also to define Window of Interest dimensions.

AGC Sampling Mode

When **AGC Sampling Mode** is set to Automatic (default), each time a No Read occurs, the reader adjusts the gain and exposure for the next capture to optimize symbol contrast.



The values for **Illumination**, **Exposure**, and **Gain** can be set to any value between 0% and 100%. The default values are shown below.



AGC Frame Adjust Count

Automatic Gain Control (AGC) is a system that controls gain in order to maintain high performance over a range of input levels. Gain is essentially the ratio of output to input. Gain settings affect how the reader decodes symbols and captures images.

AGC Frame Adjust Count sets the number of image frames captured and discarded before the main image capture. This feature gives the gain control time to adjust.

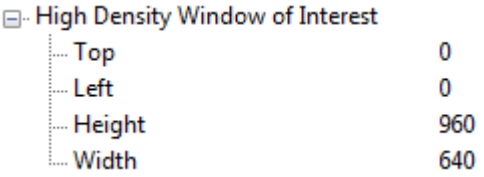
Window of Interest

The active pixel area of the image sensor is called the **Window of Interest** (WOI). The WOI allows the user to select an area of the field of view in which the desired symbol is located.

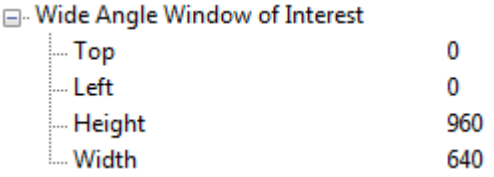
The programmable window of interest increases decode speed, improves threshold, and makes it easy to select specific symbols from among several in the field of view. The user provides the upper-left pixel location and the size of the window to define the Window of Interest.

Note: The Window of Interest can be changed, but captured images cannot be viewed.

High Density Window of Interest



Wide Angle Window of Interest



6 Symbologies

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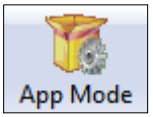
This section describes the various symbologies that can be decoded by the HS-51 and HS-51X Wireless Handheld Readers.

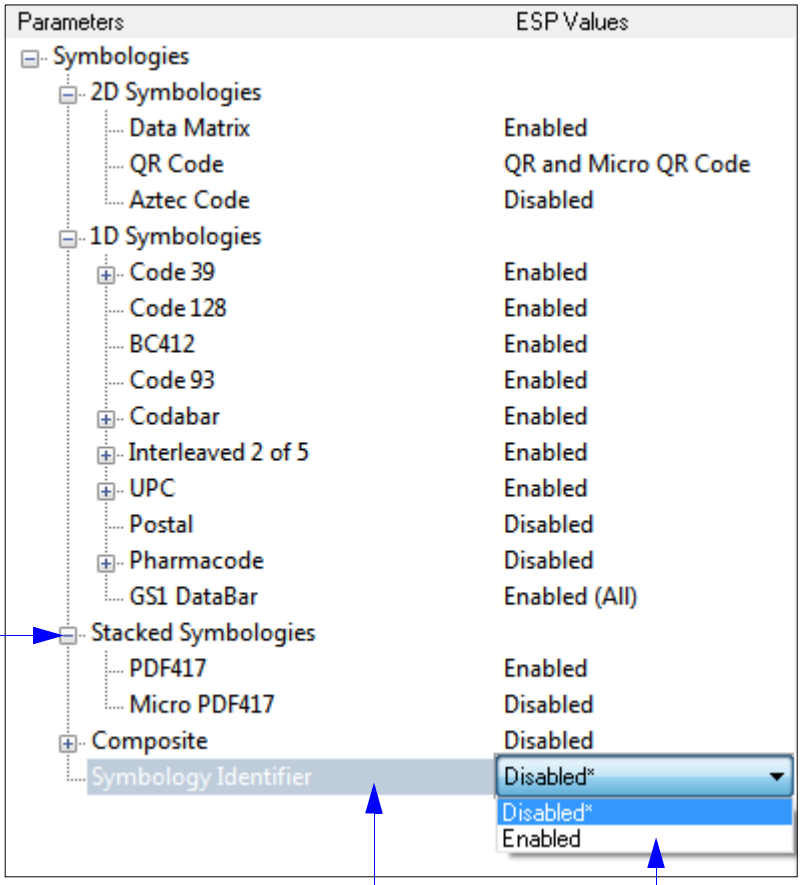
ESP can be used to configure reader parameters and then to send and save those parameters to the reader.

You can also configure reader parameters by decoding the Data Matrix symbols in this section.

Symbologies by ESP



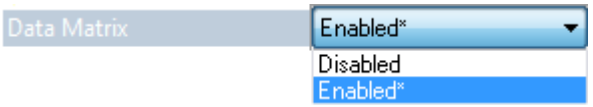
Click this button to bring up the **App Mode** view, and then click the **Symbologies** tab.



To open nested options, **single-click** the **+**.

To change a setting, **double-click** the setting and use your cursor to scroll through the options.

Data Matrix



Data Matrix Enabled (Default)

Q0032_01

Data Matrix Disabled

Q0033_01

Important: If you disable the Data Matrix symbology, programming symbols will not be decodable by the reader and Data Matrix will need to be re-enabled using ESP.

Use the **Data Matrix Disabled** programming symbol with caution.

Data Matrix Inverse Enabled

M10051_01

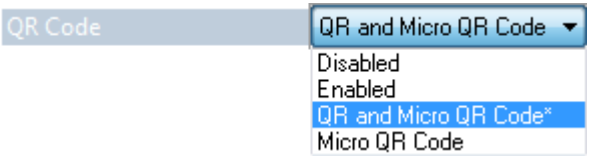
Data Matrix Inverse Disabled (Default)

M10050_01

Sample Data Matrix Symbol

(123456789A)

QR Code



QR Code Enabled (Default)

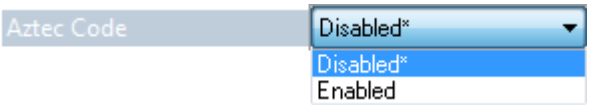
QR Code Disabled

Sample QR Code Symbol

(Microscan QR)

Sample Micro QR Code Symbol

Aztec Code



Aztec Code Enabled (Default)

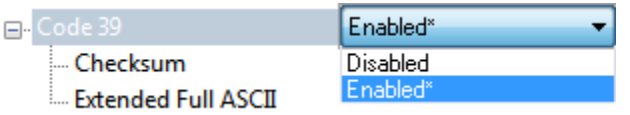
M10018_01

Aztec Code Disabled

M10019_01

Sample Aztec Code Symbol

Code 39



Code 39 Disabled

M10034_01

Code 39 Enabled (Default)

M10033_01

Code 39 Checksum Enabled

M10036_01

Code 39 Checksum Disabled (Default)

M10035_01

Code 39 Checksum Enabled, Strip from Result

M10037_01

Code 39 Extended Full ASCII Enabled

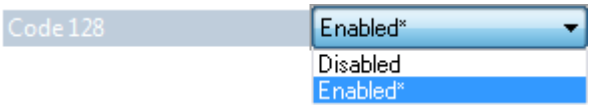
M10039_01

Code 39 Extended Full ASCII Disabled (Default)

M10038_01

Sample Code 39 Symbol

Code 128

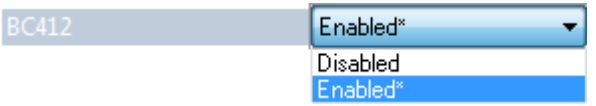


Code 128 Enabled (Default)

Code 128 Disabled

Sample Code 128 Symbol

BC412

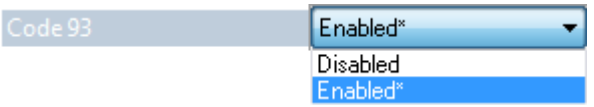


BC412 Enabled (Default)

BC412 Disabled

Sample BC412 Symbol

Code 93



Code 93 Enabled (Default)

M10042_01

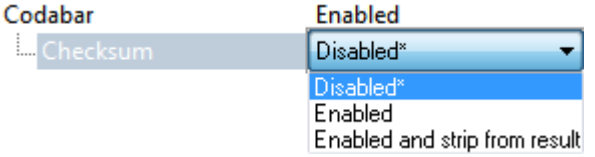
Code 93 Disabled

M10043_01

Sample Code 93 Symbol

123456789A

Codabar



Codabar Enabled (Default)

Codabar Disabled

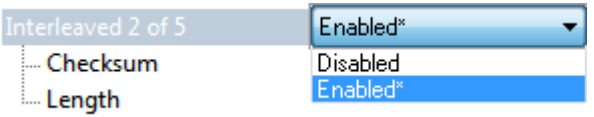
Codabar Checksum Enabled

Codabar Checksum Disabled (Default)

Codabar Checksum Enabled and Stripped from Result

Sample Codabar Symbol

Interleaved 2 of 5



Interleaved 2 of 5 Enabled (Default)

M10060_01

Interleaved 2 of 5 Disabled

M10061_01

Interleaved 2 of 5 Checksum Stripped from Result

M10065_01

Interleaved 2 of 5 Checksum Disabled

Q0014_01

Interleaved 2 of 5 Checksum Enabled

Q0013_01

Interleaved 2 of 5 Checksum Enabled and Stripped from Result

Q0015_02

Interleaved 2 of 5 Two Digits Off

M10062_01

Interleaved 2 of 5 Two Digits On

M10063_01

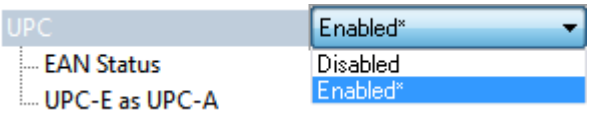
Interleaved 2 of 5 Four Digits On

M10064_01

Sample Interleaved 2 of 5 Symbol

UPC

Note: When **Composite** is enabled, UPC/EAN symbols are processed as Composite symbols. The **symbology identifier** **'e'** (Composite) will be returned instead of **'E'** (UPC/EAN).



UPC Enabled (Default)

UPC Disabled

EAN Status Enabled (Default)

EAN Status Disabled

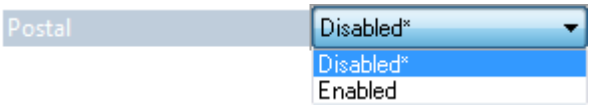
UPC-E as UPC-A Enabled

UPC-E as UPC-A Disabled (Default)

Sample UPC-E Symbol

Sample UPC-A Symbol

Postal



Postal Enabled

Postal Disabled (Default)

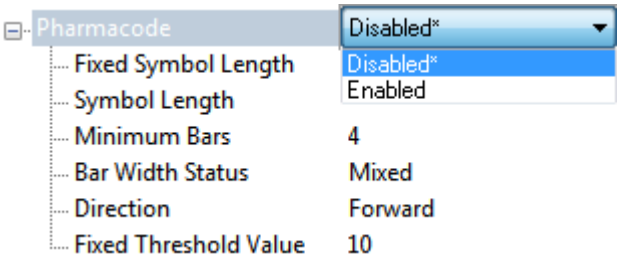
Supported Postal Symbologies

- USPS OneCode (4CB)
- POSTNET
- PLANET
- Japanese Post
- Australian Post
- Royal Mail
- KIX Code

Sample Postnet Symbol

Sample Royal Mail Symbol

Pharmacode



Pharmacode Enabled

Q0020_01

Pharmacode Disabled (Default)

Q0021_01

Fixed Symbol Length Enabled

Q0022_01

Fixed Symbol Length Disabled (Default)

Q0023_01

Bar Width Status: Mixed (Default)

Q0024_01

Bar Width Status: All Narrow

Q0025_01

Bar Width Status: All Wide

Q0026_01

Bar Width Status: Fixed Threshold

Q0027_01

Decode Direction: Forward (Default)

Q0028_01

Decode Direction: Reverse

Q0029_01

Fixed Symbol Length Status

When enabled, the reader will check the symbol length against the symbol length field. If disabled, any length will be considered valid.

Symbol Length

Specifies the exact number of bars that must be present for the reader to recognize and decode the Pharmacode symbol.

Minimum Bars

Sets the minimum number of bars that a Pharmacode symbol must have to be considered valid.

Bar Width Status

If set to **Mixed**, the reader will autodiscriminate between narrow bars and wide bars. If set to **All Narrow**, all bars will be considered as narrow bars. If set to **All Wide**, all bars will be considered as wide bars. If set to **Fixed Threshold**, it will use the fixed threshold value to determine whether the bars are narrow or wide. The **Bar Width Status** setting will be ignored when the reader is able to tell the difference between the narrow and the wide bars.

Direction

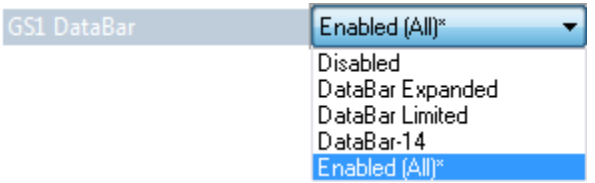
Specifies the direction in which a symbol can be read.

Fixed Threshold Value

Used when **Bar Width Status** is set to **Fixed Threshold**. Defines the minimum difference in pixels that will distinguish a narrow bar from a wide bar.

Sample Pharmacode Symbol

GS1 DataBar



All GS1 DataBar Enabled (Default)

M10054_01

All GS1 DataBar Disabled

M10055_01

GS1 DataBar Expanded Enabled

M10059_01

GS1 DataBar Limited Enabled

M10056_01

GS1 DataBar-14 Enabled

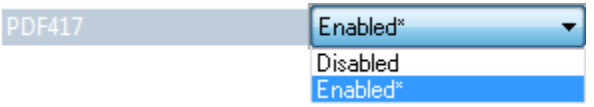
M10057_01

Sample DataBar-14 Limited Symbol

Sample DataBar Expanded Symbol

Sample DataBar-14 Symbol

PDF417



PDF417 Enabled (Default)

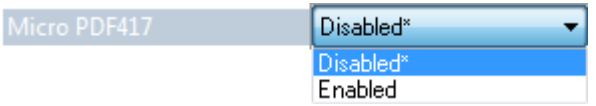
M10070_01

PDF417 Disabled

M10071_01

Sample PDF417 Symbol

MicroPDF417



MicroPDF417 Disabled (Default)

M10072_01

MicroPDF417 Enabled

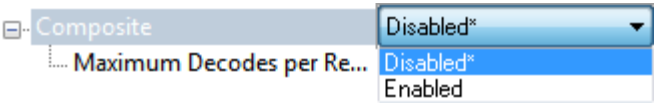
M10073_01

Sample MicroPDF417 Symbol

Composite

Composite consists of a 1D component associated with an adjacent 2D component. A successful decode is required for both the 1D and 2D components before the reader outputs a result. When Composite is enabled, the unit decodes the 1D component first.

Note: When Composite is enabled, **UPC/EAN** symbols are processed as Composite symbols. The **symbology identifier** **'e'** (Composite) will be returned instead of **'E'** (UPC/EAN).



Maximum Decodes per Read

Maximum Decodes per Read represents the maximum number of candidate symbols in the field of view (1 - 100) that can be decoded during a read cycle. Note that decode speed will decrease as the Maximum Decodes per Read value is increased.

Composite Disabled (Default)

Composite Enabled

Sample Composite Symbol

Symbology Identifier

When **Symbology Identifier** is enabled, an AIM (Association for Automatic Identification and Mobility) preamble is added to decoded data output (see the **AIM Symbology Identifiers** list). This preamble identifies what kind of symbology has been decoded.

AIM Symbology Identifiers

A	Code 39
C	Code 128
d	Data Matrix
e	GS1 DataBar / Composite
E	UPC/EAN
F	Codabar
G	Code 93
I	Interleaved 2 of 5
L	PDF417 / MicroPDF417
Q	QR Code / Micro QR Code
X	Other (Pharmacode)
z	Aztec Code

7 I/O Parameters

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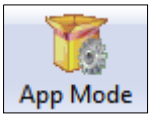
Data Validation 7-10

This section describes how to optimize triggering, and also how to configure the reader's beep, vibrate, and LED behavior.

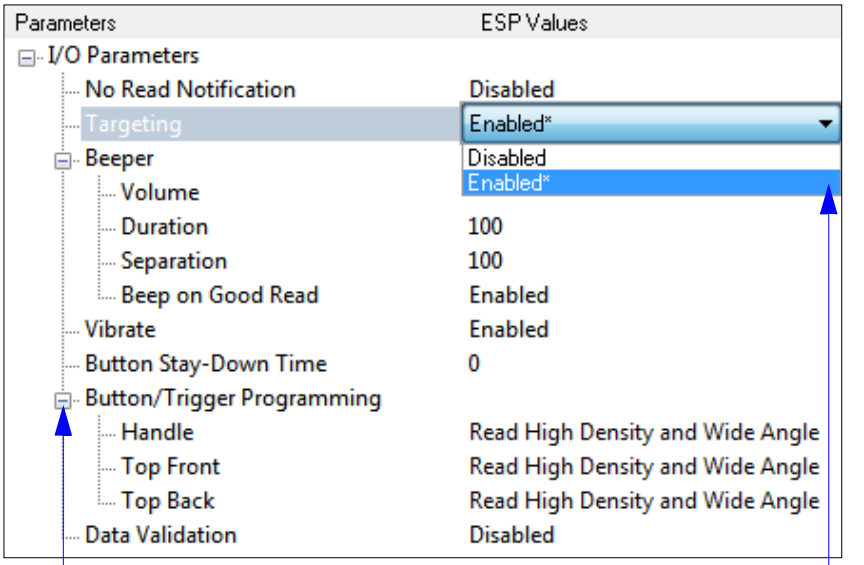
ESP can be used to configure reader parameters and then to send and save those parameters to the reader.

You can also configure reader parameters by decoding the Data Matrix symbols in this section.

I/O Parameters by ESP



Click this button to bring up the **App Mode** view, and then click the **Read Cycle** tab.



To open nested options, **single-click** the **+**.

To change a setting, **double-click** the setting and use your cursor to scroll through the options.

No Read Notification

No Read Notification allows you to enable or disable user feedback alerting you when a symbol is not decoded successfully.

The No Read message output is **ap/r**, indicating that the reader did not decode the symbol.

Targeting

The **Targeting** parameter allows you to turn the targeting LEDs on or off. They are on by default.

Read the configuration symbols below to enable or disable **Targeting**.

M10153_01

Targeting On (Default)

M10154_01

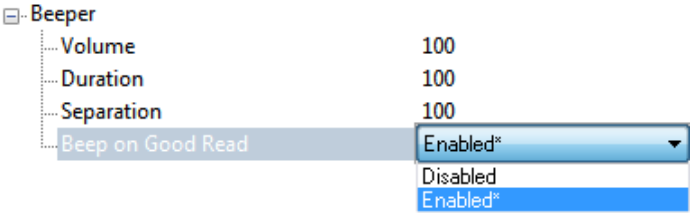
Targeting Off

Beep and Vibrate

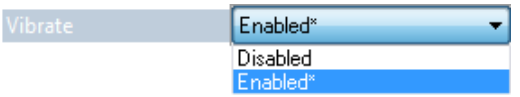
The **Beep** and **Vibrate** parameters allow you to configure the beep and vibrate behavior of the reader.

Beep and Vibrate are enabled by default. Beep volume is 100% by default.

Beep Parameters in ESP



Vibrate Parameters in ESP



Read the configuration symbols below to configure Beep and Vibrate.

M10140_01

Beep On, Vibrate On (Default)

M10141_01

Beep Off, Vibrate On

M10142_01

Beep On, Vibrate Off

M10143_01

Beep Off, Vibrate Off

M10194_01

Beep Volume 0%

M10195_01

Beep Volume 33%

M10196_01

Beep Volume 67%

M10197_01

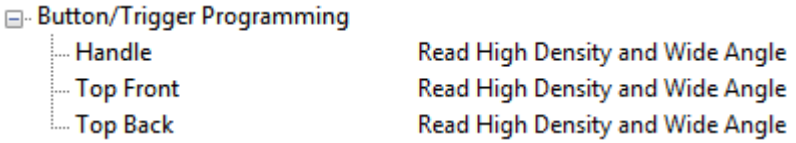
Beep Volume 100% (Default)

Button Stay-Down Time

Button Stay-Down Time sets the amount of time (in seconds) that the reader will continue to process the current “decode symbol” event. The reader will behave as if the trigger is being activated for this specified amount of time.

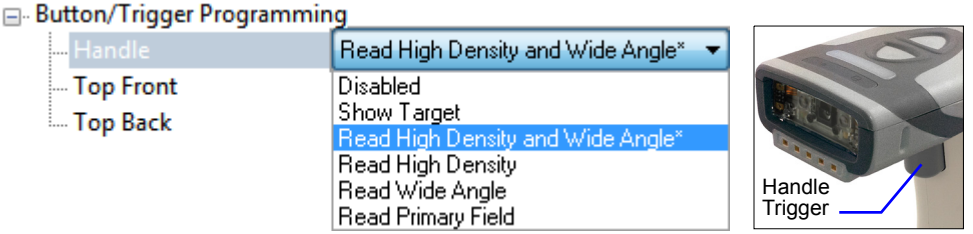
Button/Trigger Programming

Button/Trigger Programming allows you to determine the reader's behavior when the **Handle Trigger**, **Top Front Button**, or **Top Back Button** are held down.



Handle

The **Handle Trigger** can be configured as **Disabled**, or to **Show Target**, **Read High Density and Wide Angle** (Default), **Read High Density**, **Read Wide Angle**, or **Read Primary Field**.



Disabled

Handle Trigger functionality will be disabled.

Show Target

The target LEDs will illuminate when the Handle Trigger is held down.

Read High Density and Wide Angle (Default)

Both **High Density** and **Wide Angle** will be activated to capture an image when the Handle Trigger is held down.

Rear High Density

High Density will be activated to capture an image when the Handle Trigger is held down.

Read Wide Angle

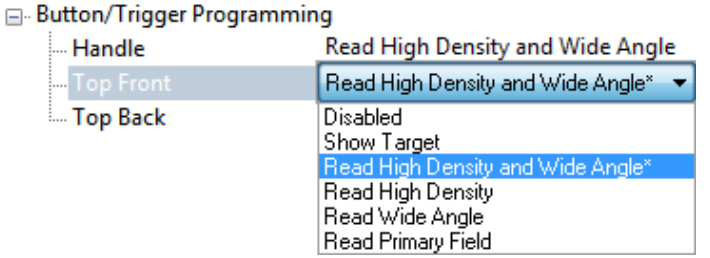
Wide Angle will be activated to capture an image when the Handle Trigger is held down.

Read Primary Field

The most recent field (**High Density** or **Wide Angle**) to have produced a Good Read will be activated to capture an image when the Handle Trigger is held down.

Top Front

The **Top Front Button** can be configured as **Disabled**, or to **Show Target**, **Read High Density and Wide Angle** (Default), **Read High Density**, **Read Wide Angle**, or **Read Primary Field**.



Disabled

Top Front Button functionality will be disabled.

Show Target

The target LEDs will illuminate when the Top Front Button is held down.

Read High Density and Wide Angle (Default)

Both **High Density** and **Wide Angle** will be activated to capture an image when the Top Front Button is held down.

Rear High Density

High Density will be activated to capture an image when the Top Front Button is held down.

Read Wide Angle

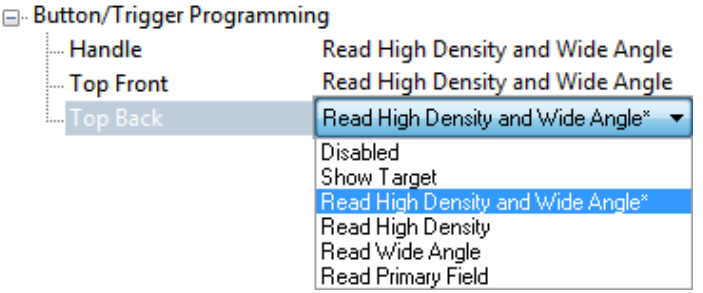
Wide Angle will be activated to capture an image when the Top Front Button is held down.

Read Primary Field

The most recent field (**High Density** or **Wide Angle**) to have produced a Good Read will be activated to capture an image when the Top Front Button is held down.

Top Back

The **Top Back Button** can be configured as **Disabled**, or to **Show Target**, **Read High Density and Wide Angle** (default), **Read High Density**, **Read Wide Angle**, or **Read Primary Field**.



Disabled

Top Back Button functionality will be disabled.

Show Target

The target LEDs will illuminate when the Top Back Button is held down.

Read High Density and Wide Angle (Default)

Both **High Density** and **Wide Angle** will be activated to capture an image when the Top Back Button is held down.

Rear High Density

High Density will be activated to capture an image when the Top Back Button is held down.

Read Wide Angle

Wide Angle will be activated to capture an image when the Top Back Button is held down.

Read Primary Field

The most recent field (**High Density** or **Wide Angle**) to have produced a Good Read will be activated to capture an image when the Top Back Button is held down.

Data Validation

Data Validation is used to confirm that a decoded string from the imager has complied with a particular company, industry, or ISO standard. HS-51/HS-51X Data Validation is compliant with Department of Defense Unique Identification and ISO/IEC 15434 (Information Technology – Transfer Syntax for High-Capacity ADC Media) requirements.

Unique Identification

Unique Identification is a mandatory Department of Defense (DoD) requirement on all solicitations issued January 1, 2004 or later. This policy mandates the use of Unique Item Identifiers (UIIs) encoded within Data Matrix symbols on equipment and parts procured by DoD. The HS-51/HS-51X complies with Department of Defense Standard Practice Identification (MIL-STD-130).

Once the imager decodes the Data Matrix symbol, and if Unique Item Identifier (UII), Current Part Number (CPN), and Lot/Batch Number (LBN) are turned on, the HS-51/HS-51X checks the ISO/IEC 15434 syntax with ISO/IEC 15418 (ANSI MH10.8.2 – AI and DI) and ISO/IEC 21849 (ATA – TEI) semantics to construct the UII, CPN, and LBN.

Unique Identification Features

The following data output options are applicable to Data Matrix ECC 200 symbols only and have no effect on other symbologies.

UII Enabled	Allows the imager to read only message streams encoded in Data Matrix ECC 200 symbols, then to construct and output a UII string. The message streams include validation of Unique Item Identifier (UII), Current Part Number (CPN), and Lot/Batch Number (LBN) strings. When the imager decodes a symbol but the symbol data does not compy with UII format, it will stop capturing images and the green LED will illuminate without beeping, vibrating, or outputing the string.
UII Enabled with Pass Through	Allows the imager to read UII messages in Data Matrix ECC 200 symbols and non-UII messages in any type of symbols. The imager's behavior is the same as with UII Enabled.
UII Enabled with Error Messages	Allows the imager to read UII messages in Data Matrix ECC 200 symbols and output detailed information such as construction type, data components, or error messages. The imager's behavior is the same as with UII Enabled.
Data Validation Disabled	Disables both UII and ISO/IEC 15434 data validation.

Unique Identification Output Examples

UII Enabled

UII:UN123456789ABCDEFG
CPN:87654321
LBN:87654321
UII:12345678 CPN:87654321
UII:12345678 LBN:87654321

UII Enabled with Pass Through

UII:UN123456789ABCDEFG
CPN:87654321
LBN:87654321
UII:12345678 CPN:87654321
UII:12345678 LBN:87654321
DATA:Microscan Precision Data Acquisition and Control Solutions

UII Enabled with Error Messages

UII:UN123456789ABCDEFG;Construct_1;25SUN123456789ABCDEFG;;;;;;
CPN:87654321;PNR;PNR 87654321;;;;;;
LBN:87654321;30T;30T87654321;;;;;;
UII:12345678 CPN:87654321;Construct_1_2/PNR;UID 12345678;PNR 87654321;;;;;
UII:12345678 LBN:87654321;Construct_1/30T;25S12345678;30T87654321;;;;;
(15434 ERROR: HEADER - 1ST POSITION);Microscan Precision Data Acquisition and Control Solutions;;;;;;;

Data Validation Disabled

The imager will return to normal output behavior without performing data validation.

ISO/IEC 15434

ISO/IEC 15434 specifies a transfer structure, syntax, and coding of messages and data formats when using high capacity automatic data capture (ADC) technologies.

The following ISO/IEC 15434 data output options are applicable to Data Matrix ECC 200 symbols only and have no effect on other symbologies.

ISO/IEC 15434 Enabled	Allows the imager to read only ISO/IEC 15434-compliant message streams in Data Matrix ECC 200 symbols then output the ISO/IEC 15434 string. This implementation only checks the header/trailer format and proper format indicator (00-99 and DD). The output string has a prefix, a format indicator, and data components.
ISO/IEC 15434 Enabled with Error Messages	Allows the imager to read only ISO/IEC 15434-compliant messages in Data Matrix ECC 200 symbols and output detailed information such as prefix, format indicator, data components, or error messages.
Data Validation Disabled	Disables both UII and ISO/IEC 15434 data validation.

ISO/IEC 15434 Output Examples

ISO/IEC 15434 Enabled

(15434);05;0100061414199999;211A0B9C3D6;;;;;

(15434);06;7L0A1B3C;1P4202435;S10936;;;;

(15434);06;17V0A1B2;1P4202435;S10936;;;;

ISO/IEC 15434 Enabled with Error Messages

(15434);05;0100061414199999;211A0B9C3D6;;;;;

(15434);06;7L0A1B3C;1P4202435;S10936;;;;

(15434);06;17V0A1B2;1P4202435;S10936;;;;

(15434 ERROR: HEADER - 3RD POSITION);[)<▲DD↔CAG 12345↔SER 67890123▲♦;;;;;;;

(15434 ERROR: TRAILER - END OF TRANSMISSION);[)>▲12↔CAG 12345↔SER 67890123▲♣;;;;;;;

(15434 ERROR: HEADER - GROUP SEPARATOR);[)>▲12▲CAG 12345♦029SER 67890123▲♦;;;;;;;

Data Validation Disabled

The imager will return to normal output behavior without performing data validation.

Data Validation Settings

The following symbols control Data Validation functions:

Q048_01

UII Enabled

Q049_01

UII Enabled with Pass Through

Q050_01

UII Enabled with Error Messages

Q051_01

ISO/IEC 15434 Enabled

Q052_01

ISO/IEC 15434 Enabled with Error Messages

Q053_01

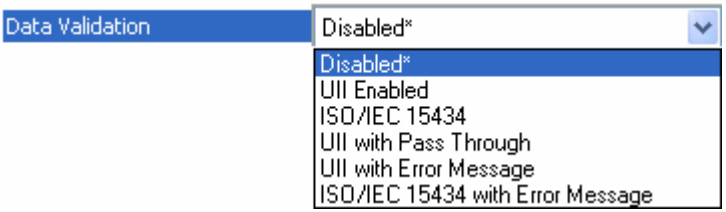
Data Validation Disabled (Default)

M10159_01

Save Settings

Data Validation by ESP

Each of the **Data Validation Settings** can also be enabled in **ESP**'s **I/O Parameters** tree control.



Detailed Output Format

The table below describes data validation output in detail.

Note: UII Enabled with Pass Through will add the prefix **DATA** to non-UII output for all symbologies.

Note: UII Enabled with Error Messages will output the following format: **UII/CPN/LBN; DF0; DF1; DF2; DF3; DF4; DF5; DF6; DF7**.

Note: When **ISO/IEC 15434** output is in compliance with the standard, the format is **(15434); DF0; DF1; DF2; DF3; DF4; DF5; DF6; DF7**. When it is not in compliance with the standard, the output is **(15434 ERROR: xxxx);;;;;;;;** where DF0 is the format indicator showing which type of data qualifier is in use.

UII Enabled		
Content of Decoded Data Matrix Symbol	**UII/CPN/LBN**	
Valid UII	*UII:*UII_data *Example:* UII:12345678	
Valid CPN Valid LBN	*CPN:*CPN_data *Example:* CPN:87654321 *LBN:*LBN_data *Example:* LBN:87654321	
Valid UII and CPN Valid UII and LBN	*UII:*UII_data CPN:CPN_data *Example:* UII:12345678 CPN:87654321 *UII:*UII_data LBN:LBN_data *Example:* UII:12345678 LBN:87654321	
Valid UII and Invalid CPN Valid UII and Invalid LBN	*UII:*UII_data (CPN ERROR) *Example:* UII:12345678 (CPN ERROR) *UII:*UII_data (LBN ERROR) *Example:* UII:12345678 (LBN ERROR)	
Invalid UII and Valid CPN Invalid UII and Valid LBN	*(UII ERROR) CPN:*CPN_data *Example:* (UII ERROR) CPN:87654321 *(UII ERROR) LBN:*LBN_data *Example:* (UII ERROR) LBN:87654321	
None of the above (Invalid UII; Invalid CPN; Invalid LBN; Invalid UII and Invalid CPN; Invalid UII and Invalid LBN)	No output data	
UII Enabled with Error Messages		
Content of Decoded Data Matrix Symbol	**UII/CPN/LBN**	**DFO**
Valid UII	*UII:*UII_data *Example:* UII:12345678	Constructed UII type *Example:* Contruct_1

Valid CPN Valid LBN	*CPN:*CPN_data *Example:* CPN:87654321 *LBN:*LBN_data *Example:* LBN:87654321	Constructed CPN type *Example:* PNR Constructed LBN type *Example:* 30T
Valid UII and CPN Valid UII and LBN	*UII:*UII_data CPN:CPN_data *Example:* UII:12345678 *CPN:*87654321 *UII:*UII_data LBN:LBN_data *Example:* UII:12345678 *LBN:*87654321	Constructed UII/CPN type *Example:* Construct_1/PNR Constructed UII/LBN type *Example:* Construct_1/30T
Valid UII and Invalid CPN Valid UII and Invalid LBN	*UII:*UII_data (30P ERROR: xxxx) *UII:*UII_data (PNR ERROR: xxxx) *UII:*UII_data (240 ERROR: xxxx) *UII:*UII_data (30T ERROR: xxxx)	Constructed UII type *Example:* Construct_1
Invalid UII and Valid CPN Invalid UII and Valid LBN	(UII ERROR: xxxx) CPN:CPN_data (UII ERROR: xxxx) LBN:LBN_data	Constructed CPN type: 30P, PNR, 240 Constructed LBN type: 30T
Invalid UII	(UII ERROR: xxxx) (15434 ERROR: xxxx) *Example:* (UII ERROR: DATA ELEMENT CHARACTER)	Original decoded data
Invalid CPN Invalid LBN	(30P ERROR:xxxx) (PNR ERROR:xxxx) (240 ERROR:xxxx) (30T ERROR:xxxx) (15434 ERROR: xxxx)	Original decoded data
Invalid UII and Invalid CPN Invalid UII and Invalid LBN	(UII ERROR: xxxx) (30P ERROR: xxxx) (UII ERROR: xxxx) (PNR ERROR: xxxx) (UII ERROR: xxxx) (240 ERROR: xxxx) (UII ERROR: xxxx) (30T ERROR: xxxx)	Original decoded data

Error Messages

The following is a list of potential error messages.

15434 ERROR: DATA ELEMENT SEPARATOR
15434 ERROR: DOUBLE TRAILER
15434 ERROR: FORMAT INDICATOR
15434 ERROR: HEADER - 1ST POSITION
15434 ERROR: HEADER - 2ND POSITION
15434 ERROR: HEADER - 3RD POSITION
15434 ERROR: HEADER - 4TH POSITION
15434 ERROR: HEADER - GROUP SEPARATOR
15434 ERROR: TRAILER - END OF TRANSMISSION
15434 ERROR: TRAILER - RECORD SEPARATOR
PNR ERROR: TOO LONG
PNR ERROR: TOO SHORT
PNR ERROR: CHARACTER
30P ERROR: TOO LONG
30P ERROR: TOO SHORT
30P ERROR: CHARACTER
240 ERROR: TOO LONG
240 ERROR: TOO SHORT
240 ERROR: CHARACTER
UII ERROR: DATA ELEMENT CHARACTER
UII ERROR: DATA ELEMENT TOO LONG
UII ERROR: DATA ELEMENT TOO SHORT
UII ERROR: LOWER CASE CHARACTER
UII ERROR: NEED UII ELEMENT FIRST
UII ERROR: SPACE AFTER TEI DATA QUALIFIER
UII ERROR: TEI DATA QUALIFIER
UII ERROR: UII ELEMENT INCOMPLETE
UII ERROR: WRONG FORMAT INDICATOR
UII ERROR: UII STRING TOO LONG

Additional Notes

- DF1 – DF7: If the UII/CPN field is “(15434 ERROR: xxxx)”, DF1 – DF7 are filled in with an empty string. Otherwise, the fields are used to display data elements. If there are fewer than seven data elements, an empty string is filled in at the end. If there are more than seven elements, only the first seven elements are displayed.
- There is a space between UII and CPN in both tables (UII:12345678 CPN:87654321).
- The constructed UII type can be Contruct_1, Contruct_2, Construct_1_2, or IUID_EQUIVALENT.
- The constructed CPN type can be PNR, 30P, or 240. The constructed LBN type can be 30T.

8 Advanced Operations

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Cell Phone Reading Enhancement 8-15

This section describes settings that can be configured to speed up processing or to improve symbol readability in various circumstances. You will also find information about how to pair a Bluetooth Keyboard with operating systems and wireless devices.

ESP can be used to configure reader parameters and then to send and save those parameters to the reader.

You can also configure reader parameters by decoding the Data Matrix symbols in this section.

Continuous Read

Read the following symbols to enable or disable **Continuous Read**.

M10012_01

Continuous Read On

M10011_01

Continuous Read Off (Default)

Mirroring

Mirroring allows the reader to decode symbols that are reversed. When Mirroring is enabled, all other decode functionality is disabled.

Note: Once the reader has been set to **Mirroring On**, it can only return to its default mode by reading the **Mirroring Off** symbol below.

M10125_01

Mirroring On

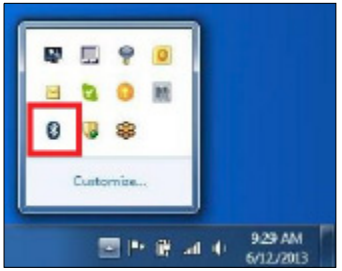
M10124_01

Mirroring Off (Default)

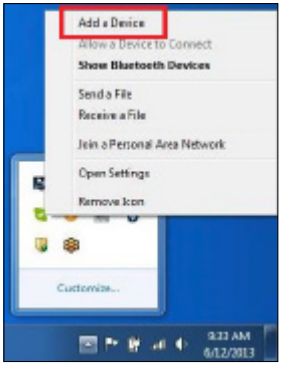
Bluetooth® Keyboard-to-Windows 7 Pairing

This section describes how to pair a Bluetooth Keyboard with the Windows 7 operating system. A Bluetooth USB hardware key may be needed if Bluetooth is not built into the host device.

1. Find and select the Bluetooth icon in the notification tray at the lower right of your screen.



2. Right-click on Bluetooth icon. Select **Add a Device** from the list of options.



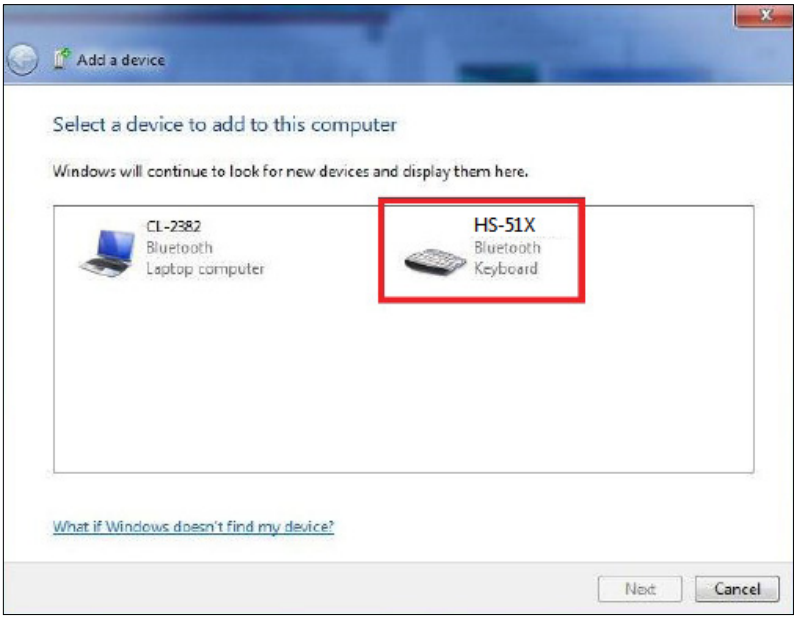
3. Scan the symbol below to enable your HS-51/HS-51X to be discoverable by Windows 7.

   Note: Once the reader is in discoverable mode, it will beep twice. You will have 30 seconds to initiate a connection to the host device. If 30 seconds elapses without connecting to the host device, repeat steps 1 through 3.

M10257_01

Bluetooth Keyboard Discoverable Mode

4. You will see the HS-51/HS-51X as a device option in the **Add a Device** window. Select the HS-51/HS-51X.



5. Once the HS-51/HS-51X has been selected, a screen will appear containing a PIN.

6. When the reader beeps twice, it is ready for the entry of the PIN. Using the **Bluetooth Keyboard-to-Windows 7 Pin Reference Codes**, scan each of the PIN digits with your HS-51/HS-51X. You will have 30 seconds to enter the PIN. Scan the **Submit PIN** symbol after the pin sequence has been entered.

   Note: Failure to complete PIN entry in the allotted 30 seconds will result in the appearance of a **Try Again** button. Click the **Try Again** button and repeat steps 3 through 6.
7. Once the installation of the HS-51/HS-51X driver is completed, and if the pin was entered correctly, a **This device has been successfully added to this computer** window will appear.

8. The reader will beep once and the wireless icon LED will remain solid when the reader is successfully connected.
9. To test the connection, open WIndows 7 Notepad and scan a series of symbols. If data appears in Notepad after each scan, you have successfully connected to Windows 7. If Notepad is not showing scanned data, remove the Bluetooth device from the Bluetooth device screen and repeat steps 1 through 7.

Bluetooth Keyboard-to-Windows 7 Pin Reference Codes

1 M10262_01	**2** M10263_01	**3** M10264_01
4 M10265_01	**5** M10266_01	**6** M10267_01
7 M10268_01	**8** M10269_01	**9** M10270_01
Submit Pin M10272_01	**0** M10271_01	

Bluetooth® Keyboard-to-Tablet Pairing

This section describes how to pair a Bluetooth Keyboard with a tablet device. The HS-51/HS-51X is compatible with most tablets.

1. In your tablet device's list of applications, select the **Settings** icon.
2. Select the **Bluetooth** setting.
3. Scan the following symbol to enable the HS-51/HS-51X to be discoverable by the tablet.

M10257_01

Bluetooth Keyboard Discoverable Mode

4. Once the reader is in discoverable mode, it will beep twice. You will have 30 seconds to initiate a connection to the host device. If 30 seconds elapses without connecting to the host device, scan the discoverable mode symbol again.
5. The HS-51/HS-51X will appear on the list of Bluetooth devices on the tablet. Select the reader to initiate connection.
6. A window with a PIN will appear on the tablet.
7. Once the reader beeps twice, it is ready for you to enter the PIN. Using the **Bluetooth Keyboard-to-Tablet Pin Reference Codes**, scan each of the PIN digits with your reader. You will have 30 seconds to enter the PIN. Scan the **Submit PIN** symbol when the pin sequence has been entered.
8. The tablet will show a positive connection indicator when the connection is completed. The HS-51/HS-51X will beep once when connected and the wireless icon LED will remain solid.

Bluetooth Keyboard-to-Tablet Pin Reference Codes

1 M10262_01	**2** M10263_01	**3** M10264_01
4 M10265_01	**5** M10266_01	**6** M10267_01
7 M10268_01	**8** M10269_01	**9** M10270_01
Submit Pin M10272_01	**0** M10271_01	

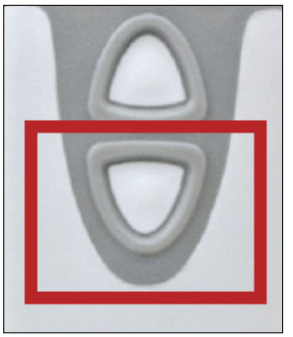
Keyboard Display Options or Apple iOS

Important: Keyboard Display Options are only compatible with Apple iOS.

To configure the bottom button on the reader to toggle the host device's on-screen keyboard, scan the following symbol:

M10259_01

Keyboard Display Options On



To reset the bottom button to the default setting, scan the following symbol:

M10260_01

Keyboard Display Options Off

Re-connect to Other Bluetooth Devices

To re-establish connection to another host device already paired with the reader, scan the following symbol:

M10258_01

Switch Host Device

The reader will appear in the list of devices in the Bluetooth menu. Select the reader to initiate the connection.

Note: If the reader's battery has been removed, the reader is out of range (beyond the working range of 10 meters/30 feet), or the reader is powered off while in default connection settings, the reader will initiate connection to the most recent host device when back in service.

Clear Connection History

Decode the **Clear Bluetooth Connections** symbol below to clear previous Bluetooth addresses from the reader's memory. Then decode the **Reboot Reader** symbol.

Note: This command does not automatically remove the reader from the list of devices in the Bluetooth menu. You must delete the reader from the list.

To clear connection information fom all Bluetooth Keyboard hosts, scan the following symbol:

M10261_01

Clear Bluetooth Connection

Reboot Reader

Note: To re-establish a connection once the connection history has been cleared, repeat steps 1 through 8.

Bluetooth® Keyboard-to-Mobile Phone Pairing

This section describes how to pair a Bluetooth Keyboard with a mobile phone. The HS-51/HS-51X is able to decode symbols on mobile phones by turning off the reader's LED illumination, capturing two images of the symbol, comparing those two images, and then choosing the best image. If the reader is unable to decode the best of the two images, the reader's gain is automatically adjusted and the cycle is repeated.

The HS-51/HS-51X is compatible with most Bluetooth-keyboard-supported smart phones.

1. In your mobile phone's list of applications, select the **Settings** icon.
2. Select the **Bluetooth** setting.
3. Scan the following symbol to enable the HS-51/HS-51X to be discoverable by the phone.

M10257_01

Bluetooth Keyboard Discoverable Mode

4. Once the reader is in discoverable mode, it will beep twice. You will have 30 seconds to initiate a connection to the host device. If 30 seconds elapses without connecting to the host device, scan the discoverable mode symbol again.
5. The HS-51/HS-51X will appear on the list of Bluetooth devices on the phone. Select the reader to initiate connection. Some smart phones require you to refresh the list of devices before the reader will appear for connection initialization.
6. A window with a PIN will appear on the phone.
7. Once the reader beeps twice, it is ready for you to enter the PIN. Using the **Bluetooth Keyboard-to-Mobile Phone Pin Reference Codes**, scan each of the PIN digits with your reader. You will have 30 seconds to enter the PIN. Scan the **Submit PIN** symbol when the pin sequence has been entered.
8. The phone will show a positive connection indicator when the connection is completed. The HS-51/HS-51X will beep once when connected and the wireless icon LED will remain solid.

Bluetooth Keyboard-to-Mobile Phone Pin Reference Codes

1 M10262_01	**2** M10263_01	**3** M10264_01
4 M10265_01	**5** M10266_01	**6** M10267_01
7 M10268_01	**8** M10269_01	**9** M10270_01
Submit Pin M10272_01	**0** M10271_01	

Reader Paging

Reader Paging allows you to locate the reader if it has been misplaced. To page the reader, push the button above the Quick Connect Code on the Charging Station. The reader will beep once every few seconds and the wireless icon and storage icon on the top of the reader will illuminate and remain illuminated until you exit paging mode.

Pull the reader's trigger to exit paging mode.

The wireless icon and storage icon on the top of the reader will illuminate and remain illuminated until you exit paging mode.

Bluetooth® Out-of-Range Notification

Bluetooth Out-of-Range Notification indicates when the reader is out of range and no longer communicating with the modem. The typical working range is 10 meters (30 feet).

The configuration symbols below allow you to configure the reader's out-of-range indicators. The wireless LED will flash by default when the reader is out-of-range.

M10173_01

Bluetooth Out-of-Range Beep Only – On

M10174_01

Bluetooth Out-of-Range Vibrate Only – On

M10175_01

Bluetooth Out-of-Range Beep and Vibrate – On

M10176_01

Bluetooth Out-of-Range Beep and Vibrate – Off

Cell Phone Reading Enhancement

Cell Phone Reading Enhancement improves the reader's ability to decode symbols on smart phone and tablet screens as well as most PC monitors.

When the reader is in this mode, LED illumination is turned off, two images are captured and compared, and the symbol in the better of the two images is decoded. If the better of the two images results in a No Read, the reader automatically adjusts gain settings and the cycle is repeated.

M10163_01

Cell Phone Reading Enhancement On

M10162_01

Cell Phone Reading Enhancement Off

9 Terminal

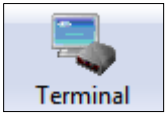
Contents

Terminal View....9-2
Find....9-3
Send....9-4
Macros....9-5
Terminal Right-Click Menu....9-6
Terminal Dropdown Menu....9-7

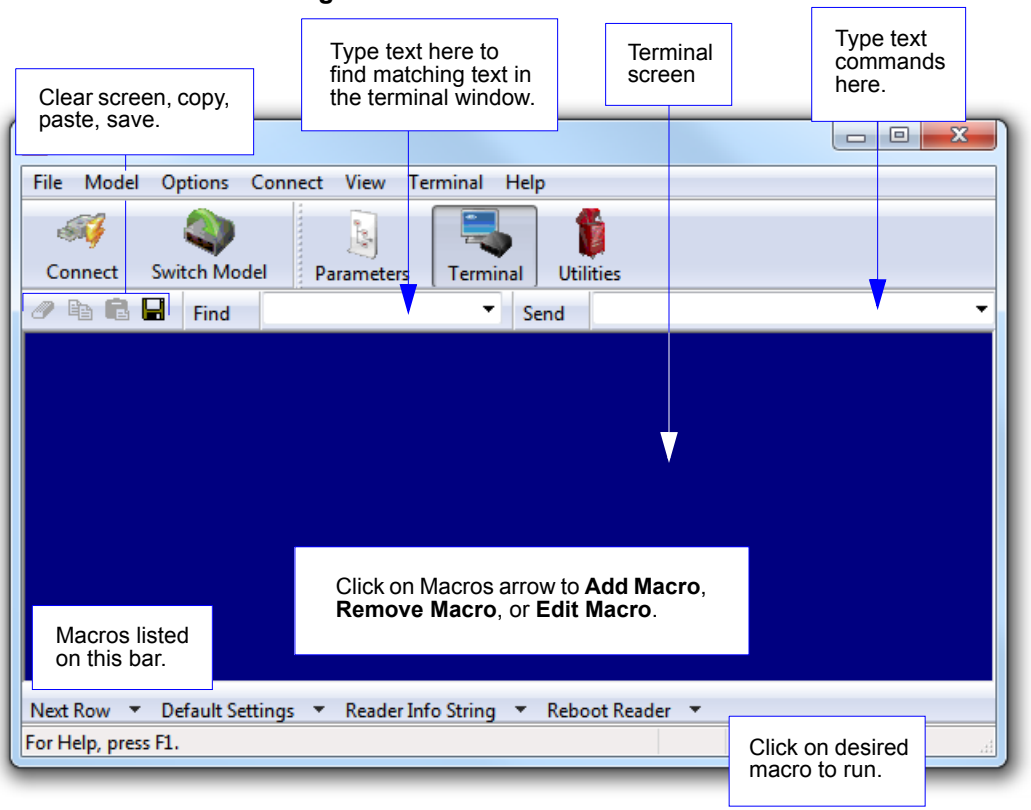
This section describes the **Terminal** interface and macro functions in **ESP**.

Terminal View

Click the **Terminal** button.



You will see the following view:



The Terminal interface allows you to send commands to the reader by using macros, by copying and pasting, or by typing commands in the **Send** text field.

The Terminal view also displays symbol data or information from the reader.

You can also right click on the Terminal screen to bring up a menu of further options.

Find

The **Find** function allows you to enter text strings to be searched for in the terminal window. For example, suppose a series of symbols have been scanned into the terminal view and you want to determine if a particular symbol whose data begins with “ABC” has been read.

1. Type “ABC” into the **Find** box.

2. Press **Enter**.

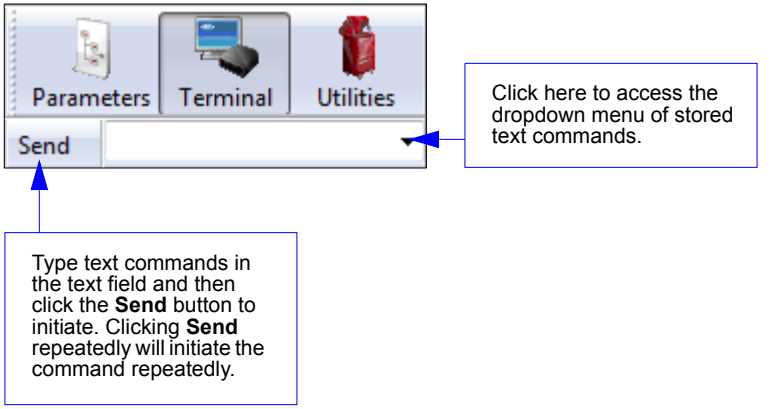
   The first instance of “ABC” will be highlighted in the terminal window.

3. Click the **Find** button to the left of the text field to locate additional instances of “ABC”.

Send

The **Send** function allows you to enter text commands and then send them to the reader. (See **Text Commands**.)

For example, suppose you want to disable the vibrate function in the reader. To disable vibrate using a text command, you would enter “P%A10” (the command that disables vibrate) in the text field and click **Send**.

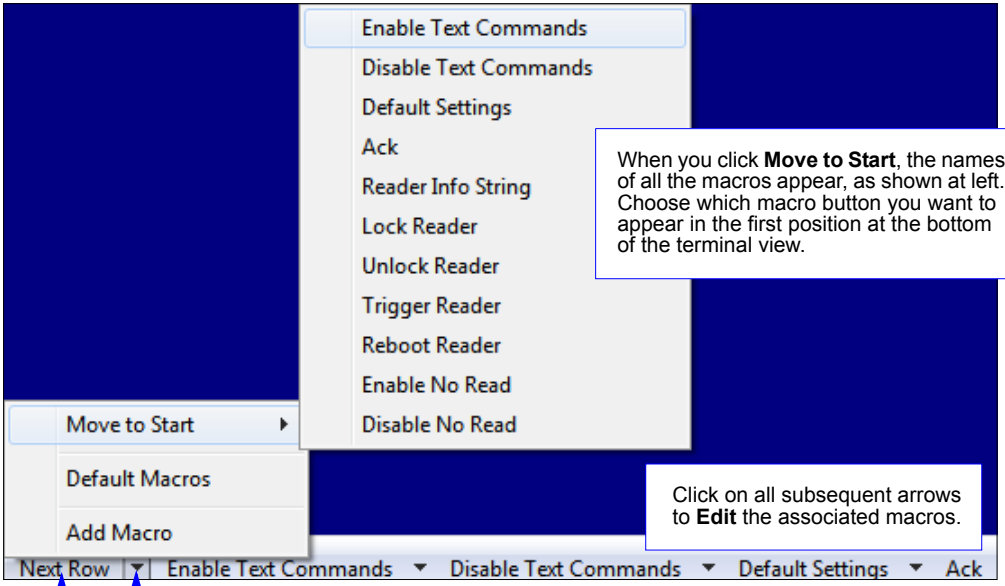


Once text commands are initiated, they are saved in a dropdown menu that can be accessed by clicking the arrow to the right of the text field.

You can also send the current command repeatedly by clicking the **Send** button repeatedly.

Macros

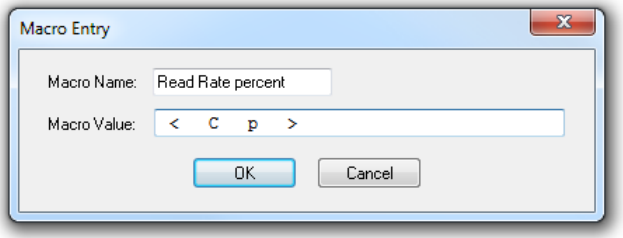
Macros can be stored in a macro selection bar, edited in a separate window, and executed by clicking on the macro name.



Clicking on a macro button executes the related command. The command is also sent to the reader at the same time it is displayed.

Editing a Macro

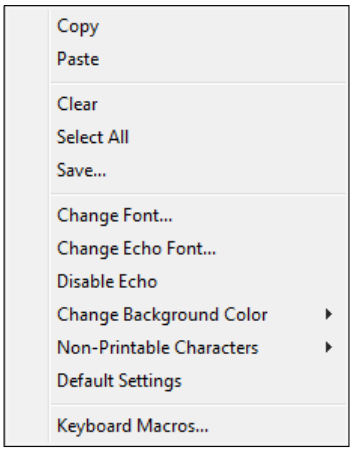
When you click the arrow next to any macro and select **Edit**, the following dialog appears:



You can edit an existing macro or type in the **Macro Name** text field and define it in the **Macro Value** text field.

Terminal Right-Click Menu

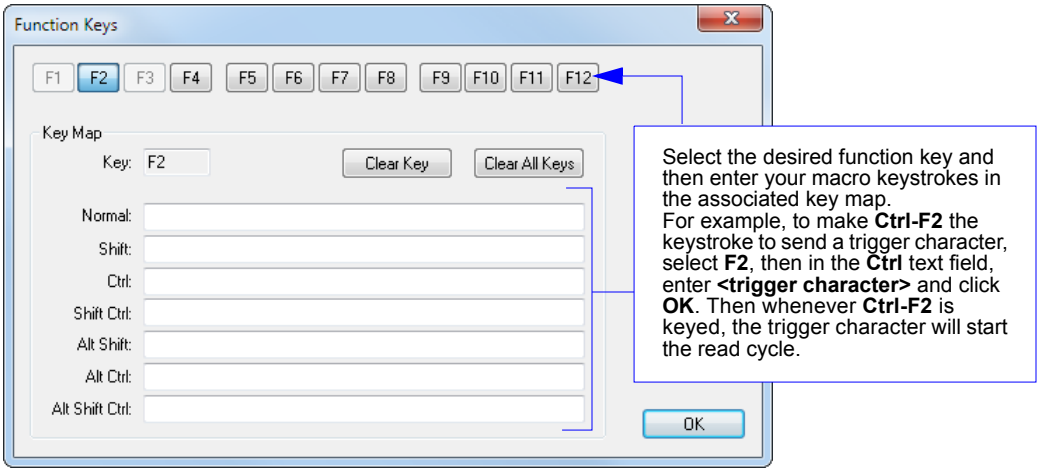
Right click in the terminal window to display the following menu:



- **Copy** selected text to clipboard.
- **Paste** from terminal or other text.
- **Clear** all text in terminal window.
- **Select All** text in the terminal window.
- **Save...** incoming and outgoing data into a text file.
- **Change Font...** of data received from the reader.
- **Change Echo Font...** to change the appearance of user-entered data.
- **Disable Echo** to hide user-entered data.
- **Change Background Color** of the terminal window.
- **Non-Printable Characters** can be shown or hidden in the terminal view in **Standard** or **Enhanced** format.
- **Default Settings** to return all of the above to original settings.
- **Keyboard Macros** brings up the **Function Keys** dialog, which allows you to create customized macro functions.

Function Keys

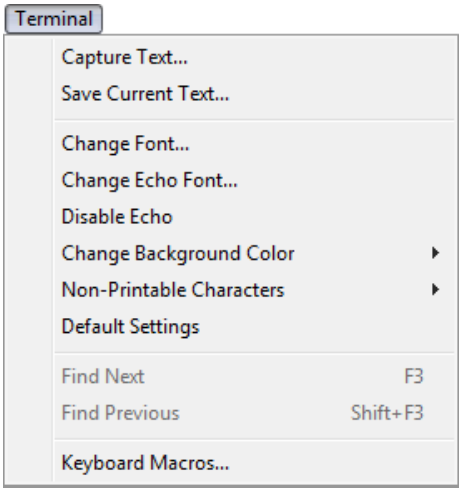
The **Function Keys** dialog allows you to assign commands to specific function keys on a standard keyboard. Note that the **F1** key is reserved for opening **ESP** Help, and the **F3** key is reserved for the **Find Next** function.



Note: This feature is also available from the **Terminal Dropdown Menu** and the **Terminal** tab of the **Preferences** dialog.

Terminal Dropdown Menu

The terminal dropdown menu allows you to capture and save current text, and it also includes the functions defined for the **Terminal Right-Click Menu**.



- **Capture Text...** lets you append data in real time to a text file of your choice. While in operation, the text file cannot be opened. You can select **Pause** to interrupt the capture flow or **Stop** to end the flow and open the file.
- **Save Current Text...** saves all text in the terminal window to a text file of your choice.
- **Find Next** locates the next instance of the specified data string in the terminal. This function can also be activated by pressing **F3**.
- **Find Previous** locates the most recently occurring instance of the specified data string in the terminal.
- **Keyboard Macros** brings up the **Function Keys** dialog, which allows you to create customized macro functions.

10 Utilities

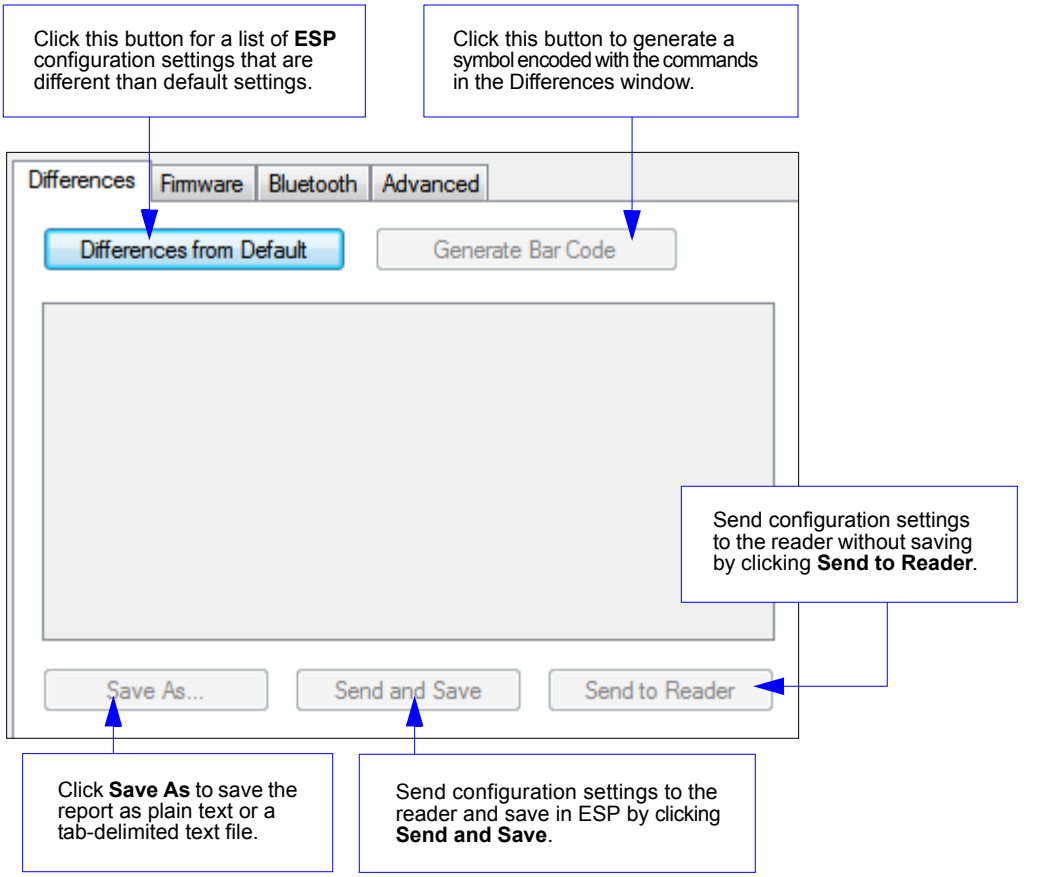
Contents

Differences from Default 10-2
Firmware 10-3
Bluetooth 10-5
Advanced 10-6

This section explains **ESP**'s **Utilities** features. These include **Differences from Default**, which shows all currently enabled reader settings that are not default settings; **Firmware**, where you can update and verify your reader's firmware; **Bluetooth**, which allows you to create custom Quick Connect Codes; and **Advanced**, which allows you to collect batch files for customized reader configuration and optimization.

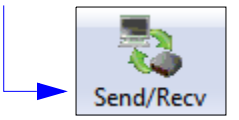
Differences from Default

Clicking the **Differences from Default** button will cause **ESP** to check all stored configuration settings and compare them to default settings. All settings that are different than default will appear in the left column (shown below), and descriptions of those settings will appear in the right column.



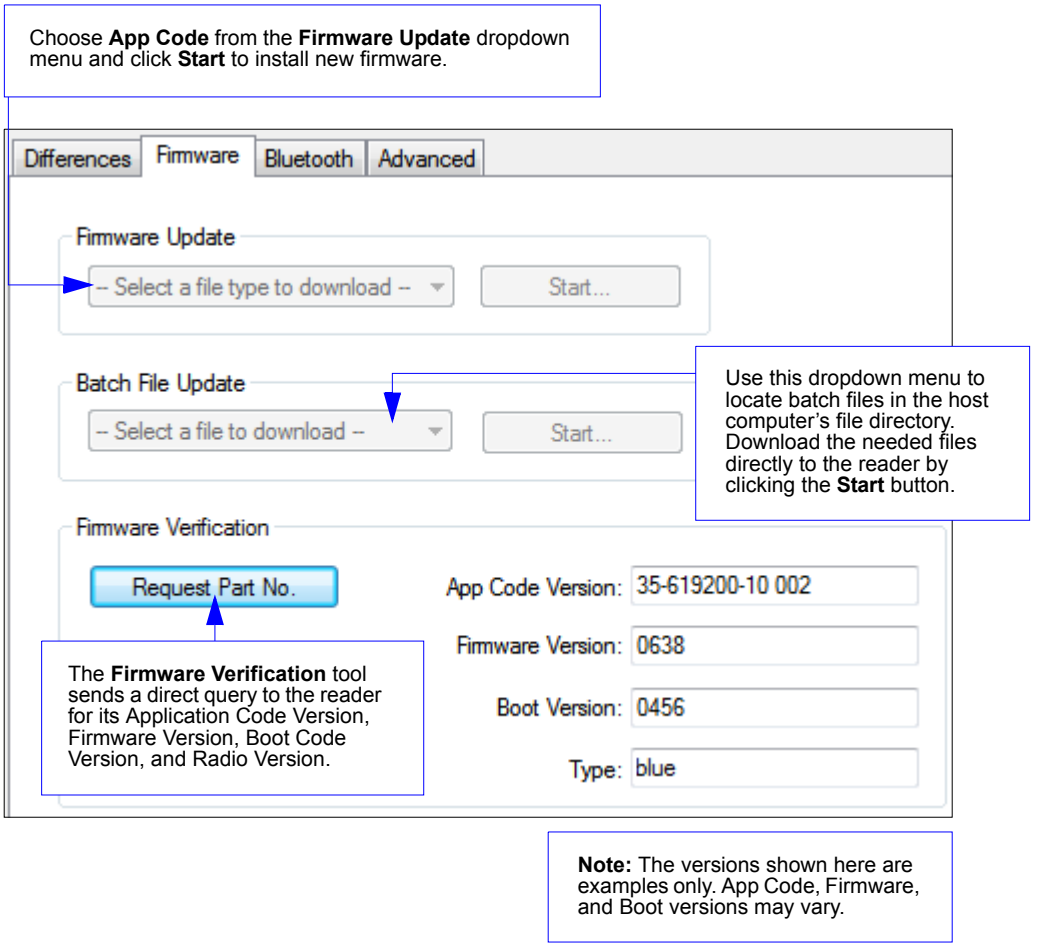
- To save the **Differences from Default** report, either as plain text or as a tab-delimited text file, click **Save As**.
- Click **Send and Save** to send the settings to the reader and save them, or **Send to Reader** to send the settings without saving them.

Important: The use the **Differences from Default** feature, you must connect to the reader and **Receive Reader Settings** via the **Send/Recv** button on the toolbar.



Firmware

The **Firmware** view in ESP Utilities is a simple way to update and verify your reader's firmware and to update batch files.



ID and Firmware Version

Another way to query the reader for its identifying information is by reading the following symbol:

M10157_01

ID and Firmware Version

The host's text program will output a data string containing the device's identifying information in the format shown below.

Example:

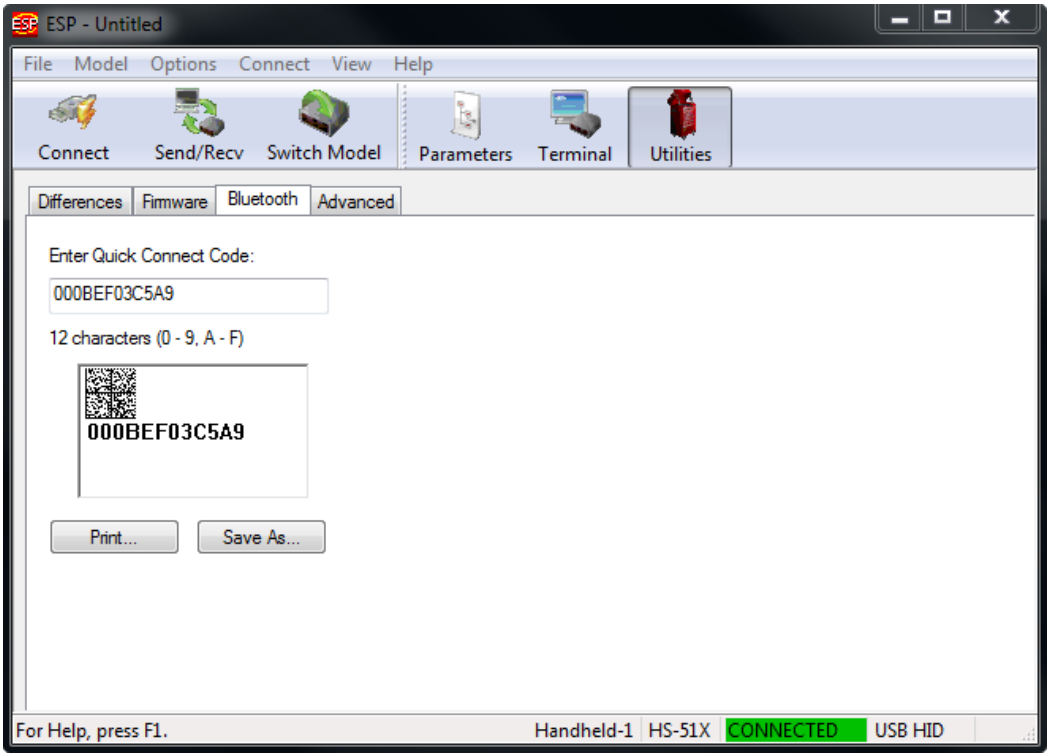
i06380456blue0020019795A06000000600080014004900002<TAB>35-619200-10 002

i	'I' string output
0638	Application firmware version number
0456	Bootloader firmware version number
blue	Type
0020019795	Reader serial number
A	A = Running application
06	N/A
0	N/A
0000	N/A
06	Hardware revision
0008	Hardware type identifier
0014	Boot application version
0049	Operating system kernel version
0002	Root file system version
<TAB>	ASCII TAB character
35-619200-10 002	Decoder version

Bluetooth

The **Bluetooth** tab allows you to create your own Quick Connect Code to establish wireless communications. This is particularly useful if you are communicating with a non-Microscan Bluetooth device.

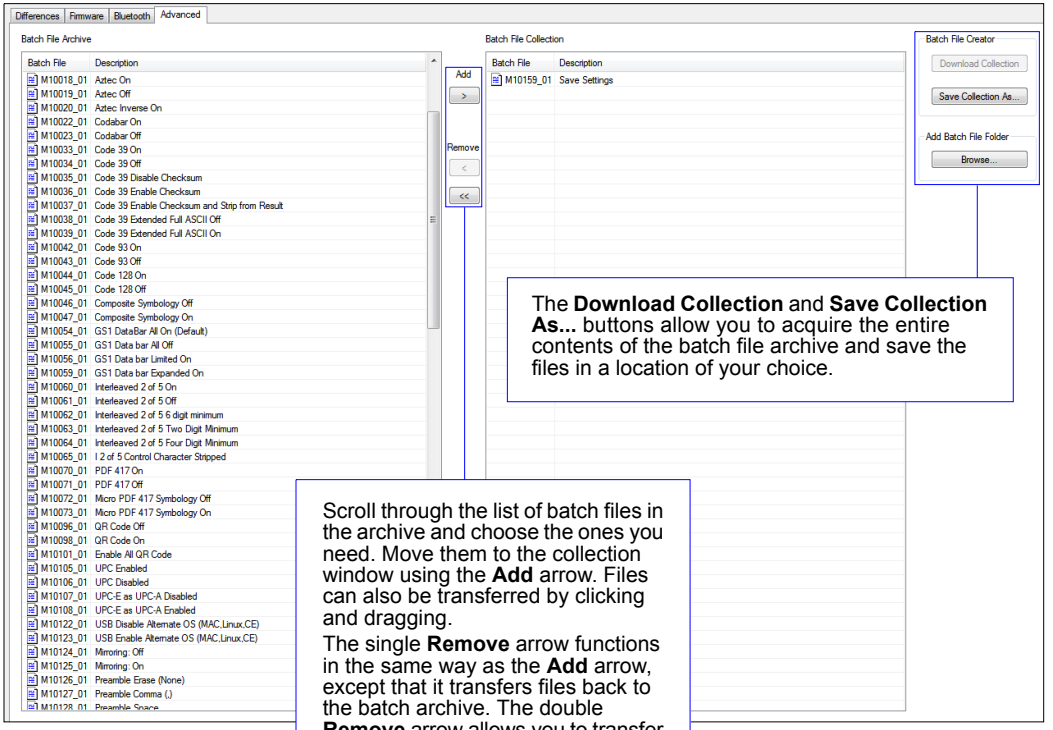
To connect to a non-Microscan Bluetooth device, you will need the Bluetooth address of that device. The 12-character Bluetooth address can typically be found on the device near the serial number. Create a Quick Connect Code on the **Bluetooth** tab shown below. Decode the new Quick Connect Code to establish a connection with the device.



Advanced

The **Advanced** tab in **Utilities** features an archive of all batch files containing reader configuration commands. Each batch file's extension is .crb, and each file contains the fundamental code for programming the reader. Notice that the names of the batch files correspond with the numbers beneath all the Data Matrix configuration symbols.

This tool allows you to use the batch file data to create your own symbols, or to collect only the files that you use frequently to configure the reader for your application.



Appendices

Contents

Appendix A General Specifications A-2
Appendix B Electrical Specifications A-5
Appendix C Configuration Symbols A-6
Appendix D Communications Protocol A-18
Appendix E ASCII Table A-19
Appendix F Maintenance A-20
Appendix G Glossary of Terms A-21

Appendix A — General Specifications

Mechanical

Height:	5.3” (135 mm)
Width:	2.0” (51 mm)
Depth:	5.1” (130 mm)
Weight:	6.0 oz. (170 g)

Environmental

Enclosure: IP54 rated
Operating temperature: –20° to 55° C (–4° to 131° F)
Storage temperature: –30° to 65° C (–22° to 150° F)
Humidity: 5 to 95% (non-condensing)
Shock: Withstands multiple drops of 6’ (1.8 meters) to concrete

CE Standards

Immunity: EN 55024
ESD: EN 61000-4-2
Radiated RF: EN 61000-4-3
Keyed Carrier: ENV50204
EFT: EN 61000-4-4
Conducted RF: EN 61000-4-6
Emissions: EN 55022, Class B Radiated, Class B Conducted
EN 60950-1:2006/A11:2009/A1:2010
IEC 60825-1: 2007
EN 62471:2008

Symbologies

2D Symbologies: Data Matrix, QR Code, Micro QR Code, Aztec Code
Stacked 1D Symbologies: PDF417, MicroPDF417, GS1 Composite
1D Symbologies: UPC, Code 39, Code 93, Code 128, Interleaved 2 of 5, Codabar, GS1 DataBar, Postal, Pharmacode, BC412

Light Collection Options

Sensor: CMOS 1.2 Megapixel grayscale
Sensor Array: 1280 by 960
Field Selection: High Density or Wide Angle
Field of View: High Density: 30° horizontal by 20° vertical; Wide Angle: 50° horizontal by 33.5° vertical
Focal Point: Approximately 100 mm
Optical Resolution: High Density: 960 x 640; Wide Angle: 960 x 640

Communication Protocols

Interfaces: USB 2.0 (USB Native HID, USB Keyboard), Bluetooth (Class II) with working range of 10 meters (30 feet), Virtual COM (Batch Mode Only)

Read Parameters

Pitch: ±60° (front to back)
Skew: ±60° (from plane parallel to symbol, side-to-side)
Rotational Tolerance: ±180°
Print contrast Resolution: 25% (1D symbologies); 35% (2D symbologies); absolute dark/light reflectance differential measured at 650 nm
Ambient Light Immunity: Sunlight: Up to 9,000 ft.-candles / 96,890 lux
Target Beam: Two bars; one bar when focused (approx. 4” from symbol)

Indicators

Status Indicators: Beep, Vibrate, LEDs

Memory Capacity

128MB Flash ROM, 32MB RAM

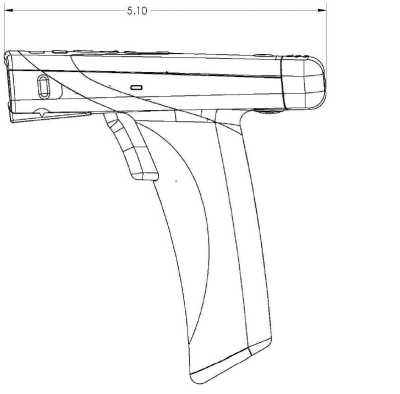
Data Editing

JavaScript (Additional License Required)

Electrical

Power Requirements:
Reader @ 4.2VDC (mA): Typical and Peak: 362 mA; Idle: 80 mA; Sleep: 20 mA.
Charging Station with Embedded Modem @ 5VDC (mA): USB Max Charge Rate: 555 mA; USB Trickle Charge Rate: 165 mA

Dimensions



Note: Nominal dimensions shown. Typical tolerances apply.

Read Ranges

STANDARD DENSITY	
Narrow Bar	**Read Range**
1D	
.0050” (.127 mm)	3.7 to 5.0” (94 to 127 mm)
.0075” (.191 mm)	2.2 to 6.5” (56 to 165 mm)
.010” (.254 mm)	1.5 to 8.0” (38 to 203 mm)
.020 (.508 mm)	2.3 to 15.5” (58 to 394 mm)
2D	
.0050” (.127 mm)	3.7 to 4.6” (94 to 117 mm)
.0075” (.191 mm)	1.5 to 6.0” (38 to 152 mm)
.010” (.254 mm)	1.6 to 7.7” (41 to 196 mm)
.020 (.508 mm)	1.6 to 9.4” (41 to 239 mm)

FISes and Accessories

HS-51/HS-51X Wireless Handheld Readers	
HS-51 Wireless Handheld 2D Reader	FIS-HS51-0001G
HS-51X Wireless Handheld DPM Reader	FIS-HS51X-0002G
Charging Station without Embedded Modem, with USB Cable	98-9000007-01
Lithium-Ion Battery	98-9000008-01
Charger, 4 Bay	98-9000009-01
Power Supply, Wall Mount, U.S.	20-000335-02
Power Supply, Wall Mount, EU	20-000336-02
Power Supply, Wall Mount, UK	20-000337-02
Microscan Tools Drive: Software, Documentation, Links to Microscan Website	37-000010-01

Safety Certifications

FCC, CE, RoHS/WEEE, REACH

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All rights reserved. Specifications subject to change.
Product specifications are given for typical performance at 25°C (77°F) using grade A symbols. Performance characteristics may vary at high temperatures or other environmental extremes. Five Year Limited Warranty on parts and labor.

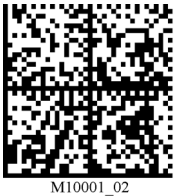
Appendix B — Electrical Specifications

Power Requirements

Reader @ 4.2VDC (mA):
Typical and Peak: 362 mA;
Idle: 80 mA;
Sleep: 20 mA

Charging Station with Embedded Modem @ 5VDC (mA):
USB Max Charge Rate: 555 mA;
USB Trickle Charge Rate: 165 mA

Appendix C — Configuration Symbols

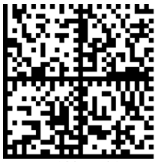
A1  M10001_02 Reset to RF Defaults	**A2** M10004_02 USB Native (HID)	**A3** M10011_01 Continuous Read Off	**A4** M10012_01 Continuous Read On
B1 M10018_01 Aztec Code On	**B2** M10019_01 Aztec Code Off		**B4** M10022_01 Codabar On
C1 M10023_01 Codabar Off	**C2** M10033_01 Code 39 On	**C3** M10034_01 Code 39 Off	**C4** M10035_01 Code 39 Disable Checksum
D1 M10036_01 Code 39 Enable Checksum	**D2** M10037_01 Code 39 Enable Checksum and Strip from Result	**D3** M10038_01 Code 39 Extended Full ASCII Off	**D4** M10039_01 Code 39 Extended Full ASCII On
E1 M10042_01 Code 93 On	**E2** M10043_01 Code 93 Off	**E3** M10044_01 Code 128 On	**E4** M10045_01 Code 128 Off

A1 M10046_01 Composite Off	**A2** M10047_01 Composite On	**A3** M10054_01 All GS1 DataBar On	**A4** M10055_01 All GS1 DataBar Off
B1 M10056_01 GS1 DataBar Limited On	**B2** M10059_01 GS1 DataBar Expanded On	**B3** M10060_01 Interleaved 2 of 5 On	**B4** M10061_01 Interleaved 2 of 5 Off
C1 M10062_01 Interleaved 2 of 5 Two Digits Off	**C2** M10063_01 Interleaved 2 of 5 Two Digits On	**C3** M10064_01 Interleaved 2 of 5 Four Digits On	**C4** M10065_01 Interleaved 2 of 5 Checksum Stripped from Result
D1 M10070_01 PDF417 On	**D2** M10071_01 PDF417 Off	**D3** M10072_01 MicroPDF417 Off	**D4** M10073_01 MicroPDF417 On
E1 M10096_01 QR Code Off	**E2** M10098_01 QR Code On	**E3** M10101_01 Enable All QR Code	**E4** M10105_01 UPC On

A1 M10106_01 UPC Off	**A2** Q0019_01 UPC-E as UPC-A Disabled (Default)	**A3** Q0018_01 UPC-E as UPC-A Enabled	
	B2 M10124_01 Mirroring Off	**B3** M10125_01 Mirroring On	**B4** M10126_01 Preamble Erase/None
C1 M10127_01 Preamble Comma	**C2** M10128_01 Preamble Space	**C3** M10129_01 Preamble Tab	**C4** M10130_01 Postamble Erase/None
D1 M10131_01 Postamble Comma	**D2** M10132_01 Postamble Space	**D3** M10133_01 Postamble Tab	**D4** M10134_01 Postamble Enter
E1 M10135_01 Clear Preamble and Postamble	**E2** M10138_02 Clear All Stored Data, Images, and JavaScripts	**E3** M10140_01 Beep On, Vibrate On	**E4** M10141_01 Beep Off, Vibrate On

A1 M10142_01 Beep On, Vibrate Off	**A2** M10143_01 Beep Off, Vibrate Off	**A3** M10144_01 Ignore Duplicate Symbol Timeout	**A4** M10145_01 Ignore Duplicate Symbol Timeout Delay 1 Second
B1 M10146_01 Ignore Duplicate Symbol Timeout Delay 2 Seconds	**B2** M10147_01 Ignore Duplicate Symbol Timeout Delay 3 Seconds	**B3** M10148_01 Ignore Duplicate Symbol Timeout Delay 5 Seconds	**B4** M10149_01 Ignore Duplicate Symbol Timeout Delay 10 Seconds
C1 M10150_01 Ignore Duplicate Symbol Timeout Delay 30 Seconds	**C2** M10151_01 Ignore Duplicate Symbol Timeout Delay 1 Hour	**C3** M10152_01 Ignore Duplicate Symbol Timeout Delay 1 Day	**C4** M10153_01 Targeting On
D1 M10154_01 Targeting Off	**D2** Default Reader Settings	**D3** M10159_01 Save Settings	**D4** M10160_01 High Speed USB 2.0
E1 M10161_01 Full Speed USB 2.0	**E2** M10173_01 Bluetooth Radio Out of Range Beep Only - On	**E3** M10174_01 Bluetooth Radio Out of Range Vibrate Only - On	**E4** M10175_01 Bluetooth Radio Out of Range Beep and Vibrate - On

A1 M10176_01 Bluetooth Radio Out of Range Beep and Vibrate - Off	**A2** M10177_01 Bluetooth Radio Disconnect	**A3** Reboot Reader	**A4** M10200_01 USB Keyboard Mode
B1 M10186_01 Batch Mode Enabled - Send and Log	**B2** M10187_01 Batch Mode Disabled	**B3** M10188_01 Batch Mode Enabled - Log Only	**B4** M10297_01 Batch Mode - Transfer All Data in Memory
	C2 M10201_01 USB Virtual COM 1-Way Mode	**C3** M10194_01 Beep Volume 0	**C4** M10195_01 Beep Volume 33%
D1 M10196_01 Beep Volume 67%	**D2** M10197_01 Beep Volume 100%	**D3** M10158_01 Modem ID and Firmware Version	**D4** M10157_01 Reader ID and Firmware Version
E1 M10232_01 Symbology Identifier On	**E2** M10233_01 Symbology Identifier Off	**E3** Q0014_01 Interleaved 2 of 5 Checksum Disabled	**E4** Q0013_01 Interleaved 2 of 5 Checksum Enabled

A1  M10257_01 Bluetooth Keyboard Mode - Prepare to Connect to New Host	**A2** M10258_01 Bluetooth Keyboard Mode - Prepare to Switch Hosts	**A3** M10259_01 Toggle Onscreen Keyboard with Bottom Button (Button 1)	**A4** M10260_01 Disable Bottom Button Keyboard Toggle
B1 M10261_01 Clear All Trusted Bluetooth Connections	**B2** M10262_01 Bluetooth Pin Set Digit 1	**B3** M10263_01 Bluetooth Pin Set Digit 2	**B4** M10264_01 Bluetooth Pin Set Digit 3
C1 M10265_01 Bluetooth Pin Set Digit 4	**C2** M10266_01 Bluetooth Pin Set Digit 5	**C3** M10267_01 Bluetooth Pin Set Digit 6	**C4** M10268_01 Bluetooth Pin Set Digit 7
D1 M10269_01 Bluetooth Pin Set Digit 8	**D2** M10270_01 Bluetooth Pin Set Digit 9	**D3** M10271_01 Bluetooth Pin Set Digit 0	**D4** M10272_01 Bluetooth Set Pin Complete
E1 M10163_01 Enable Cell Phone Reading Enhancement	**E2** M10162_01 Disable Cell Phone Reading Enhancement	**E3** M10113_01 Keyboard Control Characters for Non-Printable ASCII	**E4** M10051_01 Data Matrix Inverse On

A1 M10050_01 Data Matrix Inverse Off	**A2** M10098_01 QR Code Inverse and Standard On	**A3** M10097_01 QR Code Inverse On	**A4** M10110_01 UPC Supplemental On
B1 M10109_01 UPC Supplemental Off	**B2** M10057_01 GS1 DataBar-14 On		**B4** Q0009_01 BC412 On (Default)
C1 Q0010_01 BC412 Off	**C2** Q0011_01 Codabar Checksum Enabled	**C3** Q0012_01 Codabar Checksum Disabled (Default)	**C4** Q0015_01 Interleaved 2 of 5 Enabled and Stripped from Result
D1 Q0016_01 EAN Status Enabled (Default)	**D2** Q0017_01 EAN Status Disabled	**D3** Q0020_01 Pharmacode Enabled	**D4** Q0021_01 Pharmacode Disabled (Default)
E1 Q0022_01 Pharmacode Fixed Symbol Length Enabled	**E2** Q0023_01 Pharmacode Fixed Symbol Length Disabled (Default)	**E3** Q0024_01 Pharmacode Bar Width Status Mixed (Default)	**E4** Q0025_01 Pharmacode Bar Width Status All Narrow

A1 Q0026_01 Pharmacode Bar Width Status All Wide	**A2** Q0027_01 Pharmacode Bar Width Status Fixed Threshold	**A3** Q0028_01 Pharmacode Decode Direction Forward (Default)	**A4** Q0029_01 Pharmacode Decode Direction Reverse
B1 Q0030_01 Codabar Checksum Enabled and Stripped from Result	**B2** Q0031_01 Postal Enabled	**B3** Q0034_01 Postal Disabled (Default)	**B4** Q0032_01 Data Matrix Enabled (Default)
C1 Q0033_01 Data Matrix Disabled	**Important:** If you disable the Data Matrix symbology, programming symbols will not be decodable by the reader and Data Matrix will need to be re-enabled using ESP. Use the **Data Matrix Disabled** programming symbol with caution.		

Configuration Symbol Reference

Batch Mode
Batch Mode Enabled - Send and Log A-10 (B1)
Batch Mode Disabled (Default) A-10 (B2)
Batch Mode Enabled - Log Only A-10 (B3)
Batch Mode - Transfer All Data in Memory A-10 (B4)

Bluetooth
Bluetooth Radio Out of Range Beep Only - On A-9 (E2)
Bluetooth Radio Out of Range Vibrate Only - On A-9 (E3)
Bluetooth Radio Out of Range Beep and Vibrate - On A-9 (E4)
Bluetooth Radio Out of Range Beep and Vibrate - Off (Default) A-10 (A1)
Bluetooth Radio Disconnect (Reconnect via Quick Connect Code) A-10 (A2)
Bluetooth Keyboard Mode - Prepare to Connect to New Host A-11 (A1)
Bluetooth Keyboard Mode - Prepare to Switch Hosts A-11 (A2)
Toggle Onscreen Keyboard with Bottom Button (Button 1) A-11 (A3)
Disable Bottom Button Keyboard Toggle A-11 (A4)
Clear All Trusted Bluetooth Connections A-11 (B1)
Bluetooth Pin Set Digit 1 ..... A-11 (B2)
Bluetooth Pin Set Digit 2 ..... A-11 (B3)
Bluetooth Pin Set Digit 3 ..... A-11 (B4)
Bluetooth Pin Set Digit 4 ..... A-11 (C1)
Bluetooth Pin Set Digit 5 ..... A-11 (C2)
Bluetooth Pin Set Digit 6 ..... A-11 (C3)
Bluetooth Pin Set Digit 7 ..... A-11 (C4)
Bluetooth Pin Set Digit 8 ..... A-11 (D1)
Bluetooth Pin Set Digit 9 ..... A-11 (D2)
Bluetooth Pin Set Digit 0 ..... A-11 (D3)
Bluetooth Set Pin Complete A-11 (D4)

Cell Phone
Enable Cell Phone Reading Enhancement A-11 (E1)
Disable Cell Phone Reading Enhancement A-11 (E2)

Communications
USB Native (HID) A-6 (A2)
USB Virtual COM 1-Way Mode A-10 (C2)
USB Keyboard Mode A-10 (A4)
High Speed USB 2.0 (Default) A-9 (D4)
Full Speed USB 2.0 ..... A-9 (E1)
Keyboard Control Characters for Non-Printable ASCII A-11 (E3)

Continuous Read
Continuous Read On A-6 (A4)
Continuous Read Off (Default) A-6 (A3)

Feedback
Beep On Vibrate On (Default) A-8 (E3)
Beep Off Vibrate On A-8 (E4)
Beep On Vibrate Off A-9 (A1)

Beep Off Vibrate Off....A-9 (A2)
Beep Volume 0% A-11 (A1)
Beep Volume 33% A-11 (A2)
Beep Volume 67% A-11 (A3)
Beep Volume 100% (Default) A-11 (A4)

ID and Firmware Version
Modem ID and Firmware Version A-10 (D3)
Reader ID and Firmware Version A-10 (D4)

Ignore Duplicate Symbol Timeout
Ignore Duplicate Symbol Timeout....A-9 (A3)
Ignore Duplicate Symbol Timeout Delay 1 Second A-9 (A4)
Ignore Duplicate Symbol Timeout Delay 2 Seconds....A-9 (B1)
Ignore Duplicate Symbol Timeout Delay 3 Seconds....A-9 (B2)
Ignore Duplicate Symbol Timeout Delay 5 Seconds....A-9 (B3)
Ignore Duplicate Symbol Timeout Delay 10 Seconds....A-9 (B4)
Ignore Duplicate Symbol Timeout Delay 30 Seconds.... A-9 (C1)
Ignore Duplicate Symbol Timeout Delay 1 Hour.... A-9 (C2)
Ignore Duplicate Symbol Timeout Delay 1 Day A-9 (C3)

Mirroring
Mirroring Off (Default) A-8 (B2)
Mirroring On A-8 (B3)

Preamble/Postamble
Preamble - Erase/None (Default)....A-8 (B4)
Preamble - Comma.... A-8 (C1)
Preamble - Space A-8 (C2)
Preamble - Tab A-8 (C3)
Postamble - Erase/None (Default).... A-8 (C4)
Postamble - Comma A-8 (D1)
Postamble - Space.... A-8 (D2)
Postamble - Tab.... A-8 (D3)
Postamble - Enter A-8 (D4)
Clear Preamble and Postamble A-8 (E1)

Reset, Reboot, Clear, Default, and Save
Reset Reader to RF Factory Defaults....A-6 (A1)
Reboot Reader....A-10 (A3)
Clear All Stored Data, Images, and JavaScripts....A-8 (E2)
Default Reader Settings.... A-9 (D2)
Save Settings.... A-9 (D3)

Symbologies
Aztec Code On (Default)....A-6 (B1)
Aztec Code Off....A-6 (B2)
BC412 On (Default) A-12 (B4)
BC412 Off A-12 (C1)
Codabar On (Default)....A-6 (B4)
Codabar Off A-6 (C1)
Codabar Checksum Enabled A-12 (C2)

Codabar Checksum Disabled (Default) A-12 (C3)
Codabar Checksum Enabled and Stripped from Result A-13 (B1)
Code 39 On (Default) A-6 (C2)
Code 39 Off A-6 (C3)
Code 39 Enable Checksum A-6 (D1)
Code 39 Disable Checksum (Default) A-6 (C4)
Code 39 Enable Checksum and Strip from Result A-6 (D2)
Code 39 Extended Full ASCII Off (Default) A-6 (D3)
Code 39 Extended Full ASCII On A-6 (D4)
Code 93 On (Default) A-6 (E1)
Code 93 Off A-6 (E2)
Code 128 On (Default) A-6 (E3)
Code 128 Off A-6 (E4)
Composite On A-7 (A2)
Composite Off (Default) A-7 (A1)
Data Matrix Inverse On A-11 (E4)
Data Matrix Inverse Off (Default) A-12 (A1)
All GS1 DataBar On (Default) A-7 (A3)
All GS1 DataBar Off A-7 (A4)
GS1 DataBar Limited On A-7 (B1)
GS1 DataBar Expanded On A-7 (B2)
GS1 DataBar-14 On A-12 (B2)
Interleaved 2 of 5 On (Default) A-7 (B3)
Interleaved 2 of 5 Off A-7 (B4)
Interleaved 2 of 5 Two Digits Off A-7 (C1)
Interleaved 2 of 5 Two Digits On A-7 (C2)
Interleaved 2 of 5 Four Digits On A-7 (C3)
Interleaved 2 of 5 Checksum Stripped from Result A-7 (C4)
Interleaved 2 of 5 Checksum Enabled A-10 (E4)
Interleaved 2 of 5 Checksum Disabled A-10 (E3)
Interleaved 2 of 5 Enabled and Stripped from Result A-12 (C4)
PDF417 On (Default) A-7 (D1)
PDF417 Off A-7 (D2)
Pharmacode Enabled A-12 (D3)
Pharmacode Disabled (Default) A-12 (D4)
Pharmacode Fixed Symbol Length Enabled A-12 (E1)
Pharmacode Fixed Symbol Length Disabled (Default) A-12 (E2)
Pharmacode Bar Width Status Mixed (Default) A-12 (E3)
Pharmacode Bar Width Status All Narrow A-12 (E4)
Pharmacode Bar Width Status All Wide A-13 (A1)
Pharmacode Bar Width Status Fixed Threshold A-13 (A2)
Pharmacode Decode Direction Forward (Default) A-13 (A3)
Pharmacode Decode Direction Reverse A-13 (A4)
Postal Enabled A-13 (B2)
Postal Disabled (Default) A-13 (B3)
MicroPDF417 Off (Default) A-7 (D3)
MicroPDF417 On A-7 (D4)
QR Code On (Default) A-7 (E2)
QR Code Off A-7 (E1)

Enable All QR Code A-7 (E3)
QR Code Inverse and Standard On A-12 (A2)
QR Code Inverse On A-12 (A3)
UPC On (Default) A-7 (E4)
UPC Off A-8 (A1)
UPC-E as UPC-A Enabled A-8 (A3)
UPC-E as UPC-A Disabled (Default) A-8 (A2)
UPC Supplemental On A-12 (A4)
UPC Supplemental Off (Default) A-12 (B1)
EAN Status Enabled (Default) A-12 (D1)
EAN Status Disabled A-12 (D2)
Symbology Identifier On A-10 (E1)
Symbology Identifier Off (Default) A-10 (E2)

Targeting
Targeting On (Default) A-9 (C4)
Targeting Off A-9 (D1)

Appendix D — Communications Protocol

Communications Protocol Command Table

Protocol Command (Mnemonic displayed on menu)	Control Characters (Entered in menu or serial command)	Hex Value	Effect of Command
RES	^D	04	Reset
REQ	^E	05	Request
EOT	^D	04	Reset
STX	^B	02	Start of Text
ETX	^C	03	End of Text
ACK	^F	06	Acknowledge
NAK	^U	15	Negative Acknowledge
XON	^Q	11	Begin Transmission
XOFF	^S	13	Stop Transmission

Appendix E — ASCII Table

Dec	Hex	Mne	Ctrl
00	00	NUL	^@
01	01	SOH	^A
02	02	STX	^B
03	03	ETX	^C
04	04	EOT	^D
05	05	ENQ	^E
06	06	ACK	^F
07	07	BEL	^G
08	08	BS	^H
09	09	HT	^I
10	0A	LF	^J
11	0B	VT	^K
12	0C	FF	^L
13	0D	CR	^M
14	0E	SO	^N
15	0F	SI	^O
16	10	DLE	^P
17	11	DC1	^Q
18	12	DC2	^R
19	13	DC3	^S
20	14	DC4	^T
21	15	NAK	^U
22	16	SYN	^V
23	17	ETB	^W
24	18	CAN	^X
25	19	EM	^Y
26	1A	SUB	^Z
27	1B	ESC	^[
28	1C	FS	^\
29	1D	GS	^]
30	1E	RS	^^
31	1F	US	^_

Dec	Hex	Ch
32	20	SP
33	21	!
34	22	“
35	23	#
36	24	$
37	25	%
38	26	&
39	27	'
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	-
46	2E	.
47	2F	/
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7
56	38	8
57	39	9
58	3A	:
59	3B	;
60	3C	<
61	3D	=
62	3E	>
63	3F	?

Dec	Hex	Ch
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	^
95	5F	_

Dec	Hex	Ch
96	60	`
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	D

Appendix F — Maintenance

The HS-51 and HS-51X Wireless Handheld Readers require only a minimum of maintenance to operate.

Cleaning the HS-51 and HS-51X Wireless Handheld Readers

The following substances are approved for cleaning of the HS-51 and HS-51X.

Product	Chemical Content
Alcohol Wipes	Isopropyl Alcohol
CaviWipes® Disinfecting Towelettes and CaviCide®	Isopropyl Alcohol, Ethylene Glycol Monobutyl Ether
Clorox® Disinfecting Wipes	Isopropyl Alcohol, n-Alkyl Dimethyl-benzyl Ammonium Chloride, n-Alkyl Dimethyl Ethylbenzyl Ammonium Chloride, Alkyl Polyglucoside, Propylene Glycol Propyl Ether
Clorox® Bleach Solution (10% Clorox bleach, 90% tap water)	Sodium Hypochlorite, Sodium Chloride, Sodium Carbonate, Sodium Hydroxide, Sodium Polyacrylate
Formula 409® Glass and Surface Cleaner	n-Alkyl Dimethyl Benzyl Ammonium Chloride, n-Propoxypropanol
Sani-Cloth® HB, Super Sani-Cloth® Germicidal, Sani-Cloth® Plus Germicidal Disposable Wipes	Quaternary Ammonium Compounds/Chlorides
Virex® II Disinfectant Cleaner	n-Alkyl Dimethyl Benzyl Ammonium Chloride, Didecyl Dimethyl Ammonium Chloride
Gentle dish soap and water	

Appendix G — Glossary of Terms

AGC — See **Automatic Gain Control**.

Ambient Light — Light which is present in the environment of the front end of a reader and generated from outside sources. This light, unless used for actual illumination, will be treated as background noise by the reader.

Automatic Gain Control (AGC) — Adjustment to signal strength that seeks to maintain a constant level regardless of the distance between a reader and symbol.

Baud Rate — The number of discrete signal events per second; bits per second.

Check Character — A Modulus 43 or Modulus 10 character that is added to encoded symbol data for additional data integrity.

Connector — A plug or socket on a device or cable providing in/out connectivity for various circuits and pins.

Decode — A **Good Read**. The successful interpretation and output of the information encoded in a symbol.

Default — Restores **ROM** or flash settings and initializes serial commands.

Delimited — A delimited command or field is bracketed by predefined characters.

Decode Rate — The number of good reads per second ahieved by a reader.

Depth-of-Field — The in-focus range of a reader. Measured from the distance behind an object to the distance in front of the object with all objects appearing in focus.

End of Read Cycle — The time or condition at which the reader stops expecting symbol information to decode.

Firmware — Software hard-coded in non-volatile memory (**ROM**), and closely tied to specific pieces of hardware.

Fixed Symbol Length — Increases data integrity by ensuring that only a symbol length will be accepted.

Focal Distance — In optics, the distance from the lens to the focal plane.

Focal Plane — Usually found at the image sensor, it is a plane perpendicular to the lens axis at the point of focus (–).

Focus — Any given point in an image at which light converges; the focal point.

Good Read — A decode. The successful scanning and decoding of the information encoded in a bar code symbol.

Host — A computer or other device that is used to execute commands and process data and discrete signals.

Image Sensor — A device that converts a visual image to an electrical signal; a CMOS, for example.

Initialize — Implement serial configuration commands into the reader's active memory.

Input — A channel or communications line. Decoded data or a discrete signal that is received by a device.

LED (Light-Emitting Diode) — A device that emits light when conducting current.

Lens — A transparent piece of material with curved surfaces which either converge or diverge light rays.

Object Plane — An imaginary plane in the field of view, focused by a reader's optical system at the corresponding image plane on the sensor.

Output — A channel or communications line. Data or discrete signals that are transmitted or displayed by a device.

Parity — An error detection routine in which one data bit in each character is set to **1** or **0** so that the total number of **1** bits in the data field is even or odd.

Port — Logical circuit for data entry and exit. (One or more ports may be included within a single connector.)

Random Access Memory (RAM) — A data storage system used in computers, composed of integrated circuits that allow access to stored data in any sequence without movement of physical parts.

Read Cycle — A programmed period of time or condition during which a reader will accept symbol input.

Read-Only Memory (ROM) — A data storage medium used in computers and other electronics, primarily used to distribute firmware.

Substrate — The surface upon which a symbol is printed, stamped, or etched.

Symbol Transitions — The transition of bars and spaces on a symbol, used to detect the presence of a symbol on an object.

Symbology — A symbol type, such as Data Matrix or Code 39, with special rules to define the widths and positions of bars and spaces to represent specific numeric or alphanumeric information.