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Trademarks

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Windows® is a registered trademark of Microsoft Corporation.

Brady reserves the right to make changes without further notice to any product or system described herein to improve reliability, function, or design.

Rev B

U.S. & Canada

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Regulatory Statements

Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.
3. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Warning

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

RF Exposure

To comply with FCC RF exposure requirements for mobile transmitting devices, thi transmitter should only be used or installed at locations where there is at least 20cm separation distance between the antenna and all persons

FCC ID

NUC-WPW1356

Brady Warranty

The Brady ***WavePoint*** Portable RFID Reader/Writer is warranted to be free from defects in material and workmanship for a period of 12 months from the date of purchase.

Our products are sold with the understanding that the buyer will test them in actual use and determine for him or herself their adaptability to his/her intended uses. Brady warrants to the buyer that its products are free from defects in material and workmanship, but limits its obligations under this warranty to replacement of the product shown to Brady's satisfaction to have been defective at the time Brady sold it. This warranty does not extend to any persons obtaining the products from the buyer.

THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND OF ANY OTHER OBLIGATIONS OR LIABILITY ON BRADY'S PART. UNDER NO CIRCUMSTANCES WILL BRADY BE LIABLE FOR ANY LOSS, DAMAGE, EXPENSE OR CONSEQUENTIAL DAMAGES OF ANY KIND ARISING IN CONNECTION WITH THE USE OR INABILITY TO USE BRADY'S PRODUCTS.

Technical Support

Brady Corporation provides several Brady WavePoint™ RFID system support options:

- To speak with a Technical Support Representative, call (800) 643-8766; Monday – Friday 7:00 a.m. – 7:00 p.m. (CST), or
- FAX your inquiry to (414) 358-6767, or
- Contact Brady's Technical Support Team on-line at: tech_support@bradycorp.com.

Technical Support / Canada (800) 643-8766

Table of Contents

Chapter 1. GETTING STARTED

This chapter provides an overview of the ***WavePoint™*** Portable RFID Reader/Writer (herein referred to as the *Brady WavePoint Wand* or *wand*), including system requirements and specifications. In addition, this chapter provides instructions on setting up and connecting the wand to a host computer or data collection device. It also provides instructions for installing configuration utility software.

Product Overview

The Brady ***WavePoint™*** RFID system is designed to be an integral part of your asset management and tracking system. The system consists of three components:

1. The *Brady WavePoint Wand*—The wand is a device that reads and writes data from tags/labels.
2. ***WavePoint™*** Configuration Utility—This software allows you to customize wand operation.
3. Brady RFID tags/labels

A wide variety of RFID tag types and multiple reader/writer options are available to suit almost every application.

Brady WavePoint Wand

The *Brady WavePoint Wand* is a portable RFID reader/writer, which interfaces to a host PC or hand-held data collection device through standard RS-232 hardware formats. The reader is typically powered from the host device with +5 VDC to +12 VDC.

NOTE: If an un-powered data port is used, power must be provided to the wand by an external power source. The power supply must be Class 2 rated (U.S. and Canada) or limited power IEC-950 Clause 2.11 rated (Europe). Standards vary widely regarding available power on data ports. Consult your manufacturer for specific information.

The *Brady WavePoint Wand* is specifically designed for use in industrial applications that require rugged and reliable equipment. In environments where visual indicators and audible signals may not be seen or heard, the wand has a unique vibrating feature for indicating reader status to the operator.

System Requirements

The *Brady WavePoint Wand* requires the following hardware and software components:

- Pentium processor-based personal computer running Windows 95, 98, 2000, or NT 4.0 (or later) as the operating system.
- 16 MB of RAM
- CD-ROM drive
- Free Serial Port
- 50 MB of (free) hard drive space

Unpacking

Upon receipt of your *Brady WavePoint Wand* shipment, check your package contents for the items listed below, then fill out and return the enclosed product registration card.

If shortages exist, please contact your local distributor or Brady Corporation immediately.

- The *Brady WavePoint Wand*
- 12V DC Power Adapter
- RS-232 Cable
- ***WavePoint™*** Configuration Utility
- ***WavePoint*** *Portable RFID Reader/Writer User's Guide*
- Product Registration Card

NOTE: Save all packaging materials.

Technical Specifications

Input Voltage	+5 to +12 VDC regulated Nominal

Input Current (max.)

While Activated	250 mA
Standby	10 mA
Frequency of Operation	13.56 MHz
Dimensions	11.00" L x 1.75" W x 0.875" H (27.94 cm L x 4.45 cm W x 2.22 cm H)
Weight	0.5 lb. (0.226 kg)

Temperature

Operating	-22° to +113° F (-30° to +45° C)
Storage	-40° to +149° F (-40° to +65° C)

Data Output Formats

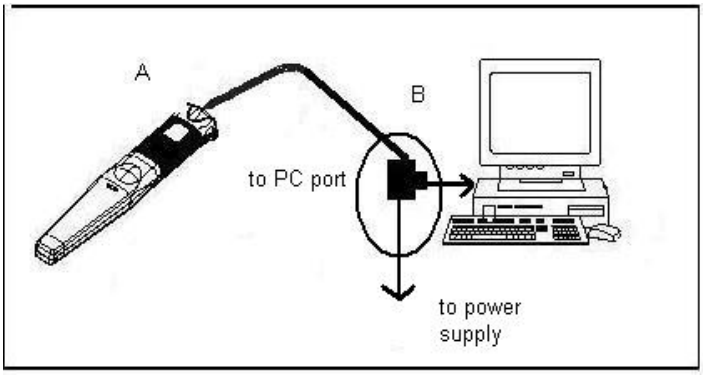
RS-232	9600 baud, 1 stop, 8 data, no parity Flow Control: None

System Setup and Connection

Setting up the *Brady WavePoint Wand* is easy. All you need to do is connect to the serial cable and power, and install the configuration software on your PC. After completing these steps, you are ready to begin reading and encoding labels.

Step 1. Connect to Serial Cable

- Plug one end of the RS-232 cable into the appropriate serial port on your host PC.
- Plug the other end into the connector located at the back end of the wand.



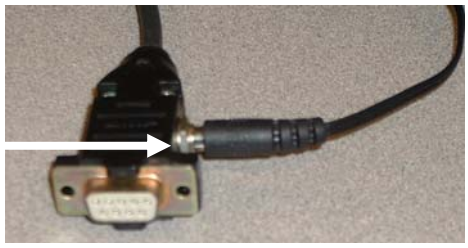


Figure 1. Connect to Cable and Power

A. Connect cable to host PC

B. Connect cable to wand

C. Connect to power

Step 2. Connect to Power

- Plug one end of the 12V DC power adapter into the power port on the side of the RS-232 connector that is plugged into the host PC port. (See Figure 1.)
- Plug the other end of the adapter into an outlet.

CAUTION: Make sure the outlet is **grounded**.

Step 3. Install WavePoint Configuration Software

WavePoint Configuration Software is a Windows® based configuration software that allows you to use a PC to customize the operation of the wand.

NOTE: WavePoint Configuration Software should not be confused with your label design/creation software application.

To install the software,

- Insert the ***WavePoint™*** Configuration Utility CD into your PC's CDROM drive.
- If the CD does not start automatically,
- On your Windows taskbar, click on Start→Run.
- Browse to your CDROM drive.
- Click on Wavepoint.exe, and click Open.
- Follow the prompts on your screen to install the ***WavePoint™*** Configuration Utility.

Chapter 2. OPERATION

This chapter provides information on operating the wand, including operating hints. It also provides details on Brady RFID Tags/labels.

Reading and Writing

The *Brady WavePoint Wand* is portable and easy to operate. To read or write to an RFID tag/label:

Step 1. Press the large activation button located above the handgrip. (See Figure 2.)

When the button is pressed, the reader emits a 13.56 MHz radio frequency field that "searches" for a tag. The red LED will illuminate and remain illuminated for a brief period of time (user configurable) until a valid tags/labels has been detected.

Whenever the red LED is on, it is an indication that the wand is actively searching for a tag/label.

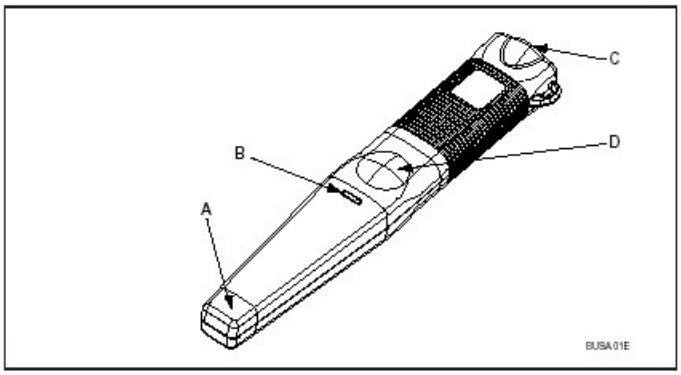


Figure 2. *Brady WavePoint Wand*

A. Antenna Area	B. Red and Green LED
C. Serial Port Connector	D. Activation Button

Step 2. Bring the antenna area in the nose of the wand close to the tags/labels to be read. (See Figure 3.)

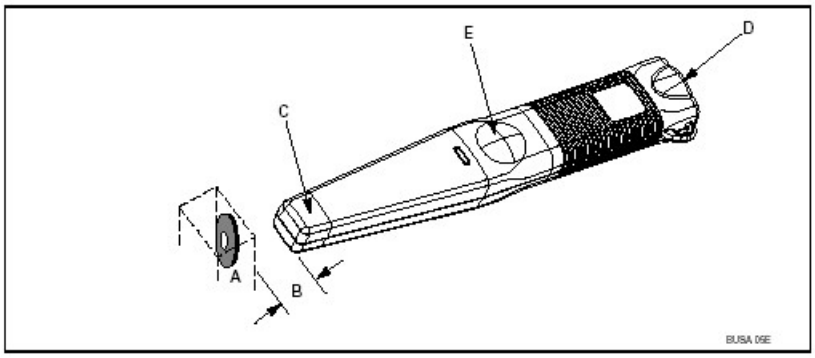


Figure 3. Read/Write

A. RFID Tags/labels

B. Read Distance

C. Antenna Area

D. Serial Port Connector

E. Activation Button

NOTE: Although the wand is designed to read/write from any angle, best results are achieved when the nose of the wand is pointing directly toward the face of the tags/labels. The read range will also vary with the type and size of the tags/labels to be read and the surrounding operating environment.

If a tag is present in the field of the reader antenna, the microchip inside the tag is activated and transmits data to the reader. (See Figure 4.)

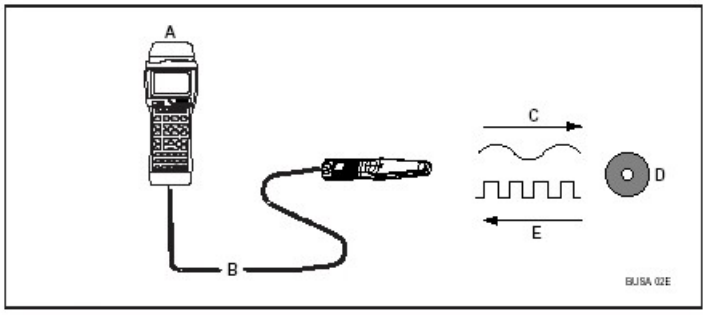


Figure 4. Transmitting Data

A. Remote Terminal or Host Computer

B. Tags/labels Sends Data to Reader

C. Reader Sends Data to Host Terminal

D. Field From Reader Energizes Tags/labels

E. RFID Tags/labels

- The reader receives the data transmission from the tags/labels and converts it to RS- 232 format.
- When a valid tags/labels signal is detected, the green LED will momentarily illuminate. The audio indicator may sound a short “beep” and a slight vibrating sensation may be felt (if these features are activated).
- When a valid tags/labels has been read, the wand converts the received tags/labels data into the configured serial data format (RS-232). When in stand-alone mode, this data is sent—**in ASCII format**—to the host device. For information on ***Stand-Alone Mode***, see page **31** of this manual.

Serial Port Output

Tag Read

Data Format

xTdata{CR}{LF}

Item	Description
x	Number defining the Tag Type if Header is turned on. See Tag Types below.
T	Character ‘T’ used as a delimiter between tag type and data if Header is turned on.
Data	S/N Data: Two hex characters per byte. Therefore, a 40-bit S/N will be sent as 10 hex characters.R/W Data: One byte of data equal to the exact 8-bit character stored. If ASCII data is stored, this will be ASCII.
{CR}	ASCII Carriage Return Character.
{LF}	ASCII Line Feed Character.

Write Read

Data Format

xTOK{CR}{LF}

Item	Description
x	Number defining the Tag Type if Header is turned on. See Tag Types below.
T	Character ‘T’ used as a delimiter between tag type and data if Header is turned on.
OK	Characters ‘OK’ signifying a successful write.
{CR}	ASCII Carriage Return Character.
{LF}	ASCII Line Feed Character.

Customizing Operations

The *Brady WavePoint Wand* can be customized using the ***WavePoint™*** Configuration Utility. See ***Chapter 3, WavePointTM Configuration Utility*** for details. Some of the operations that can be customized include:

Continuous Mode

You may configure the wand to operate in a continuous mode. Continuous mode is useful for reading or writing to numerous tags/labels in one session. Continuous mode can be set with or without a button press requirement.

Signals

You may disable/enable the audible “beep” and vibratory features using the configuration software.

Visual Read/Write

You can display tag/label data read through the wand. You can also enter data and write it to a tag/label using the configuration software.

OPERATING HINTS

Because the Brady RFID System uses radio frequency (RF) energy to communicate between a tags/labels and the wand, there are several important points to keep in mind while setting up and operating the system.

- Metal adversely effects both the wand and tags/labels antennas by reducing the read range of the overall system. To the extent possible, keep tags/labels and the wand reader/writer antenna away from metal components.
- Interference from other electronic sources can reduce the read range of the RFID system. If the interference is strong enough, it may even render the system inoperative. When reading tags/labels, keep the wand and tags/labels as far away as possible from interfering sources.
- When writing data to a tags/labels, the tags/labels should remain stationary and in close proximity to the reader/writer.

Possible sources of interference include, but are not limited to:

- CRTs (Computer Monitor, CCTV Monitor TV's)
- Light dimmer switches
- Brush-type motors
- Motor drives, starters
- Motion control equipment

Make sure that the wand is attached to your PC. Please see ***Step 1, Connect to Serial Cable*** on page **5**.

Make sure to install the configuration utility on your PC. Please see ***Step 3***, ***Install WavePoint Configuration Software*** on page **6**.

Brady RFID Tags/labels

Brady RFID tags are composed of a microchip, coil antenna and packaging. Microchip and packaging options can be combined to fit a wide range of RFID tag applications.

Microchip options include Read Only (RO) and Read/Write (R/W). Several different memory capacities for R/W applications are also available.

RO Tags

RO tags are preprogrammed with a unique 40-bit number (10 HEX characters). Versions of read only tags are also available that can be programmed by the user with a user defined number. Once programmed, the number is unchangeable and permanently stored in the tag. It can be read many times. Therefore, this type of tag is typically referred to as a WORM (Write Once - Read Many).

R/W Tags

R/W tags store both permanent (unchangeable) data and user programmed (changeable) data. The permanent data segment is similar to that of a RO tag. However, the amount of fixed data is usually 32 bits (8 HEX characters). In addition to this permanent data storage, R/W tags also have memory, which can be overwritten. The amount of changeable memory in a R/W tag ranges from 152 bits (19 alphanumeric characters) to 1536 bits (192 alphanumeric characters). Versions of R/W tags are also available with password protection. To prevent the data on a tag from being changed.

Packaging options include a variety of shapes and forms as well as different case materials. The proper choice of material provides a wide range of operating temperatures and chemical resistance.

Chapter 3. WavePoint™ Configuration Utility

This chapter provides information on using the ***WavePoint™*** Configuration Utility.

The ***WavePoint™*** Configuration Utility is a Windows® based application that allows you to use a PC to customize the operation of the wand. The following functions are available:

NOTE: A power source is required to provide +5 to +12 VDC to the wand when a PC is used during configuration.

- Enable/disable vibratory feature
- Enable/disable audible alert
- Visual display of read/write data
- Select a read/write location
- Set continuous or button activated trigger

Default Settings

The default settings are RS-232 with all indicators enabled. ***To reset the wand to the default configuration, hold the button during power up for 10 seconds until three "beeps" are heard.***

Accessing the Configuration Utility Software

1. To access the configuration software, double-click on the *Wavepoint* icon on your Windows® desktop. A window appears requiring port selection:

NOTE: You may also click Start→Programs→WavePoint Configuration Utility on your Windows® taskbar to start the software.

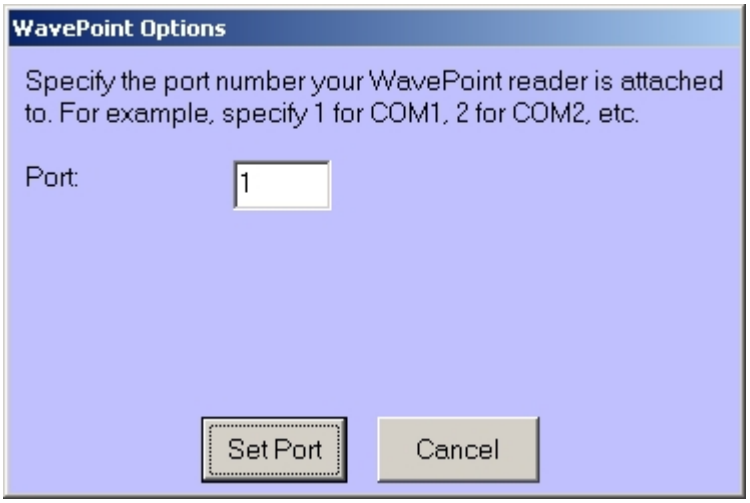


Figure 5. Specify Port

2. Enter an integer equivalent of your COM Port. Use 1 for COM1, 2 for COM2 and so forth.
3. Make sure that your communication port's settings set to the following:

Setting	**Value**
Bits per second	9600
Data bits	8
Parity	None
Stop bits	1
Flow control	Hardware

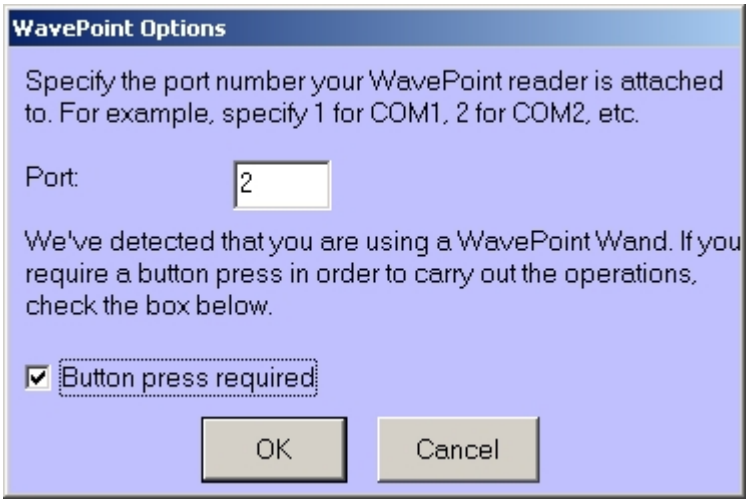
4. Specify a port and click **Set Port**.

Set Button Press Option

After you configure the communication port, this application will determine if you are using the WavePoint Wand. If Wand is detected, you will be

prompted to specify if button press is required in order to carry out the reader's operations.

By checking ***Button press required***, the wand will wait for the button press before it carries out operations.



5. Click **OK**. The utility's main screen appears:

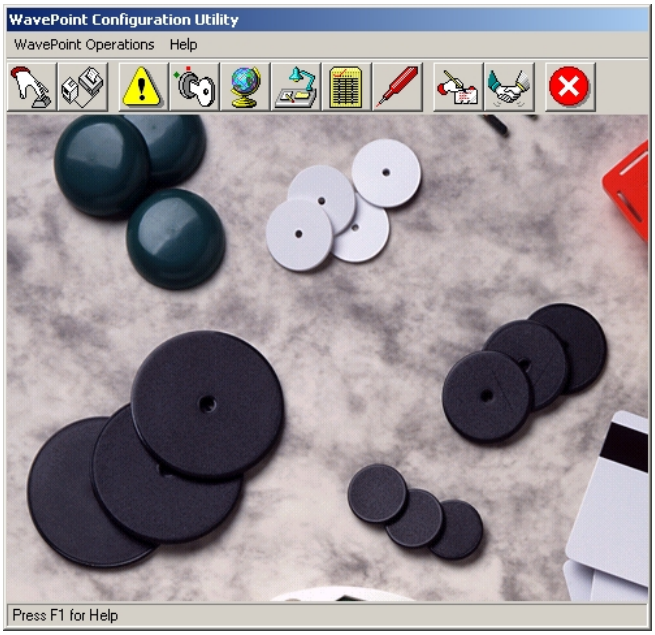


Figure 6. Configuration Utility Main Screen

Using the Menu and Toolbar

You can select a particular operation to be performed from the main menu or use the toolbar buttons.

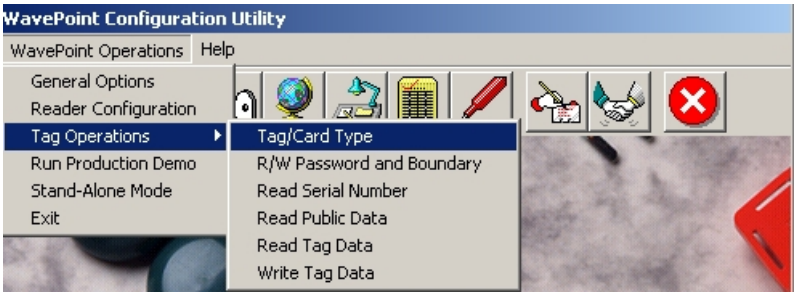


Figure 7. Configuration Utility Main Menu

General Operations

This screen allows you to configure the communication port that your reader is attached to and set the ***Button press required*** option if you are using a WavePoint Wand. See ***Accessing the Configuration*** Utility at the beginning of this chapter for details.

Preferred Tag Type	By default, the WavePoint reader performs auto-discrimination to distinguish between multiple types of supported tags. If you are only using one particular tag and wish to speed up the reader/tag communication, select your preferred tag type. To set a preferred tag type, check the specific type and click **Save Settings.**
Vibratory Feature	Allows users to enable/disable a vibratory feature on the reader. When enabled, the reader will vibrate on a successful operation completion. Check either enable or disable, and click **Save Settings.**
Audible Alert	Allows users to enable/disable an audible alert on the reader. When enabled, the reader will beep on a successful operation completion. Check either enable or disable, and click **Save Settings.**
Reader Duration	Allows users to modify the timeout value used by the reader. Select a time out value the drop-down list box, and click **Save Settings.**

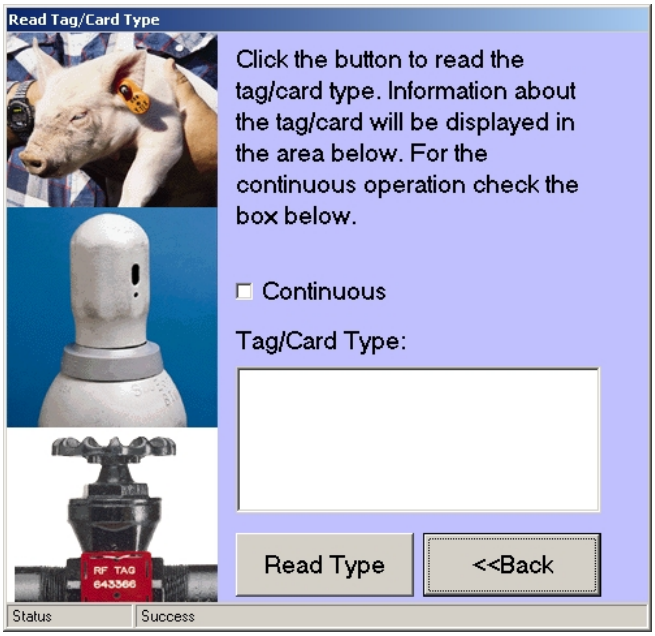
Tag Operations

The following tag operations can be configured:

- Tag/Card Type
- R/W Password and Boundary
- Read Serial Number
- Read Public Data
- Read Tag Data
- Write Tag Data

Tag/Card Type

This screen allows you to test the tag/card types:



- To read the type of the tag or the card, click **Read Type**.
- To place the reader in a mode of continuously performing this operation, check ***Continuous*** and click **Read Type**.

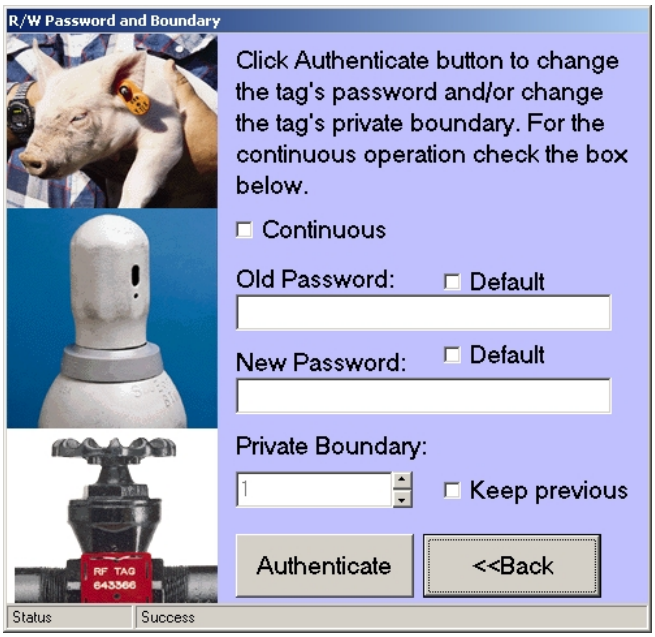
Status of each operation will be displayed on the status bar located at the bottom of the window.

NOTE: If you enabled the *Button press required* **option, remember to press the button on your WavePoint Wand reader in order to carry out the operation.**

R/W Password and Boundary

This screen allows you to change the tag's password and/or change the location of the tag's private boundary.

NOTE: Not all tags allow you to change the password and private boundary. The *Bad Tag Type* message will be displayed on a status bar if the tag type does not allow this.



NOTE: If you enabled the *Button press required* option, remember to press the button on your WavePoint Wand reader in order to carry out the operation.

Option	Description
Password	A password must be 4-characters long.
Private Boundary	Private boundary is a character position that starts the tag's private data. In order to read the tag's private

Option	Description
	data or write into the private data, a password is required. In order to make all of the tag's data publicly accessible, i.e. without a password, it is recommended that you reset the private boundary to the value of 117 and use 'Default' as the value for the password.

The status of each operation will be displayed on the status bar located at the bottom of the window.

To place the reader in a mode of continuously performing this operation, check ***Continuous*** and click **Authenticate**.

Private Boundary

Following illustrates the concept of the private boundary in more detail.

Example 1

Assume that the table below illustrates the memory architecture of the tag.

- The first row displays the character positions.
- The second row displays the data currently stored in the tag's memory.
- Each cell represents a single character stored on a tag starting at position 1.
- The character position displayed in **bold** shows the current position of the private boundary.

1	2	3	4	5	6	7	8	9	10	11	12	**13**	14	15
H	E	L	L	O	,	W	O	R	L	D	!			

If the tag's public data is read, ***HELLO, WORLD!*** will be returned.

Example 2

- The following example moves the private boundary to the position 9 as indicated by the bold lettering.
- Everything starting at position 9 becomes tag's private data and is not accessible without a password.

1	2	3	4	5	6	7	8	**9**	10	11	12	13	14	15
H	E	L	L	O	,	W	O	**R**	L	D	!			

Attempt to read the tag's public data will result in ***HELLO, WO*** being returned. However, if the tag's password is specified, the complete ***HELLO, WORLD!*** sentence will be returned.

Reprogramming New Tags/Labels

If you are reprogramming a newly manufactured tag, check the ***Default*** box for the value of the Old Password and specify a new password. You can either specify the new value for the private boundary or check 'Keep previous' box in order to keep the old value.

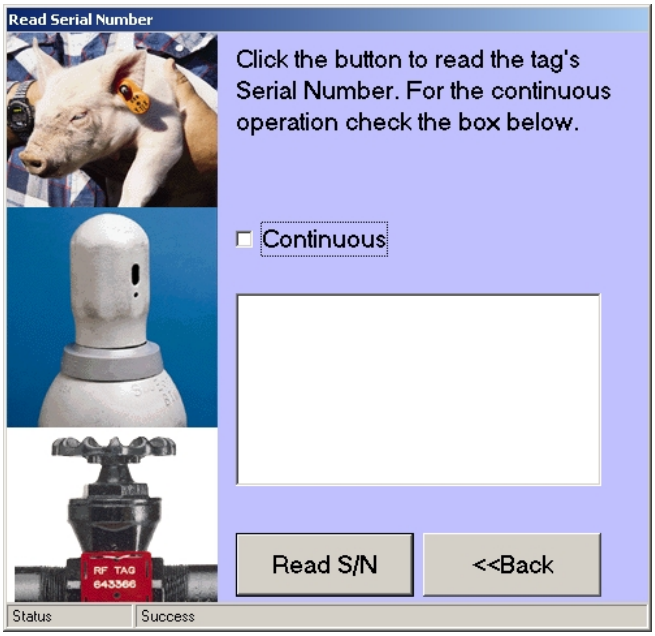
IMPORTANT: You must remember your newly configured password. There is no way to retrieve a forgotten password.

If you are using this screen to temporarily reprogram your tags, it is recommended that you change the password back to its default factory value by specifying your current password in the ***Old Password*** box and checking the ***Default*** to be used for the value of the New Password.

If you have also modified the private boundary, it is recommended that you move it back up by specifying the value of 117.

Read Serial Number

This screen allows you to read the Serial Number of the tag:



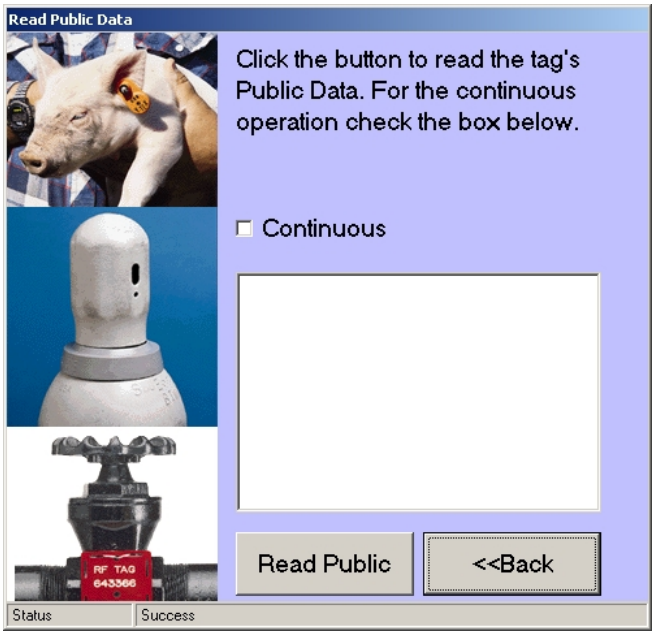
- To perform an operation click **Read S/N.**
- To place the reader in a mode of continuously performing this operation, check ***Continuous*** and click **Read S/N**.

Status of each operation will be displayed on the status bar located at the bottom of the window.

NOTE: If you enabled the *Button press required* **option, remember to press the button on your WavePoint Wand reader in order to carry out the operation.**

Read Public Data

This screen allows you to read a tag's public data:



- To perform an operation click **Read Public**.
- To place the reader in a mode of continuously performing this operation, check ***Continuous*** and click **Read Public**.

Status of each operation will be displayed on the status bar located at the bottom of the window.

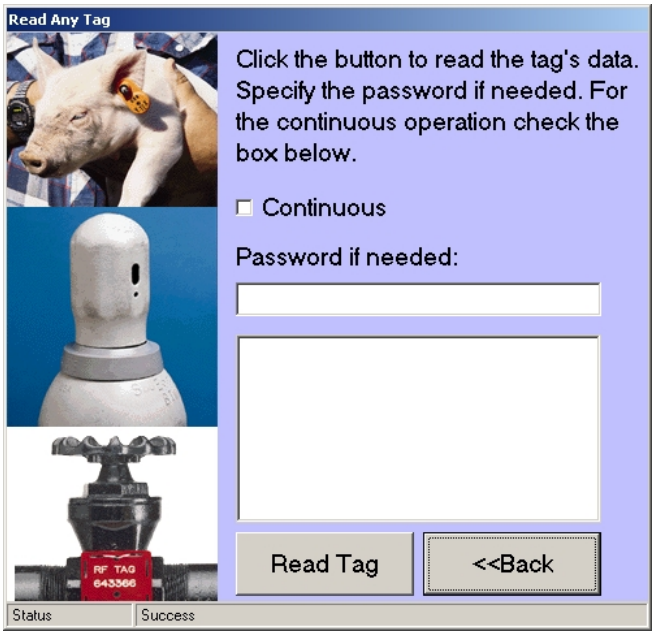
NOTE: If you enabled the *Button press required* **option, remember to press the button on your WavePoint Wand reader in order to carry out the operation.**

- Currently, only Read Only and 1K Read/Write tags support this operation. 'Bad Tag Type' message will be displayed on a status bar if the tag does not support this operation.

- 1Kb Read/Write tags have their private boundary set to position 1 by default, thus making the tag password-protected with the factory default password value. You will need to reset the tag's private boundary in order to be able to access its public data.
- Only public data is read from the tag. It means that if you have changed the tag's private boundary in a 'R/W Password and Boundary ' screen, not all of your data may be read. Use 'Read Tag Data ' screen to read your protected data.

Read Tag Data

This screen allows you to read a tag's data:



- To perform an operation click **Read Tag**.
- To place the reader in a mode of continuously performing this operation, check ***Continuous*** and click **Read Tag**.

Status of each operation will be displayed on the status bar located at the bottom of the window.

NOTE: If you enabled the *Button press required* **option, remember to press the button on your WavePoint Wand reader in order to carry out the operation.**

If you have moved the tag's private boundary using the 'R/W Password and Boundary ' screen, you must specify the valid password in order to access all of the tag's data. This only applies to the 1K Read/Write tag.

Write Tag Data

This screen allows you to write data onto the tag:

- To perform an operation you must enter the valid data and then click **Write Data**. This utility allows you to enter up to 100 characters to be saved onto the tag.
- To place the reader in a mode of continuously performing this operation, check ***Continuous*** and click **Write Data**.

Status of each operation will be displayed on the status bar located at the bottom of the window.

NOTE: If you enabled the *Button press required* **option, remember to press the button on your WavePoint Wand reader in order to carry out the operation.**

- Don’t remove the tag away from the reader until this operation succeeds as indicated by the reader’s indications and/or message on a status bar. If you move the tag away before this operation completes, ‘Incomplete write’ message will be displayed on a status bar.
- If you have moved the tag’s private boundary using the ‘R/W Password and Boundary ’ screen, you must specify the valid password in order to access all of the tag’s memory. This only applies to the 1K Read/Write tag.

Production Demo

This screen shows you how the WavePoint Development Kit can be used in order to save the custom data onto the tag:

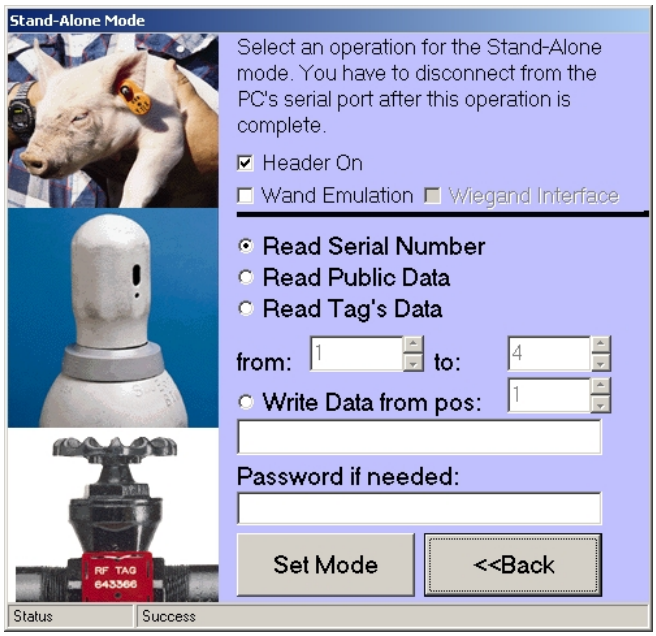
In order to run this demo,

- Select data from the drop-down lists in the five categories below.
- Click **WRITE** to write the data onto a tag/label.
- Click **READ** to read the data.

The status of each operation will be displayed on the status bar located at the bottom of the window. If you enabled the ***Button press required*** option, remember to press the button on your WavePoint Wand reader in order to carry out the operation.

Stand-Alone Mode

- Stand-alone mode allows the WavePoint reader to send data by RS232.
- The RS232 data will be in ASCII format .
- The host must disconnect after this operation succeeds.



This screen allows you to choose which operation the reader will perform in stand-alone mode. The supported operations are:

Operation	Description
Header On	The reader inserts a header to the raw data output indicating the type of the tag/card been read or written to. See *Error! Reference source not found.* on page Error! Bookmark not defined.. You can toggle the header output by deselecting the ***Header On*** box.
Read Serial Number	Reads the serial number on the tag/label.
Read Public Data	Read the public data on the tag/label.
Read Tag's Data	Read the data on the tag/label. You must specify the start (from) and end (to) position of the data to be read from the tag. The first character read would be the one indicated by the start position and the last character read would be the one indicated by the end position.
Write Data	Writes data to the tag/label. You must specify the valid data and the starting position for the tag that will be written to.
Password	If you moved the tag's private boundary using the ***R/W Password and Boundary*** screen, you must specify the valid password in order to access all of the tag's memory. This only applies to the 1K Read/Write tag.

Exit

Click this button in order to terminate WavePoint Configuration Utility.

Chapter 4. SYSTEM MAINTENANCE

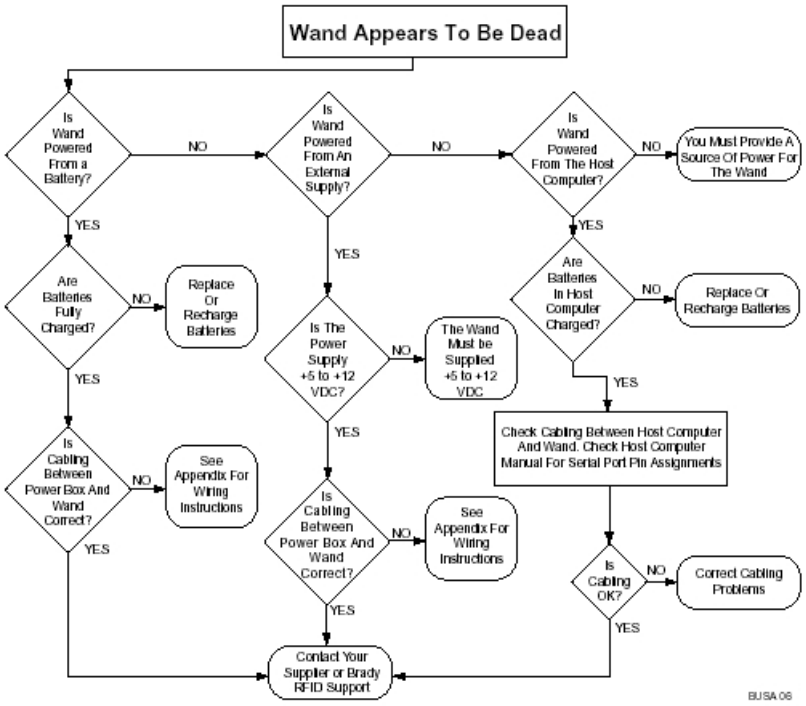
Under normal operating conditions no maintenance is required. Since radio waves pass through most non-metallic surfaces, normal buildup of dirt, oil, paint, etc. will not hamper operation.

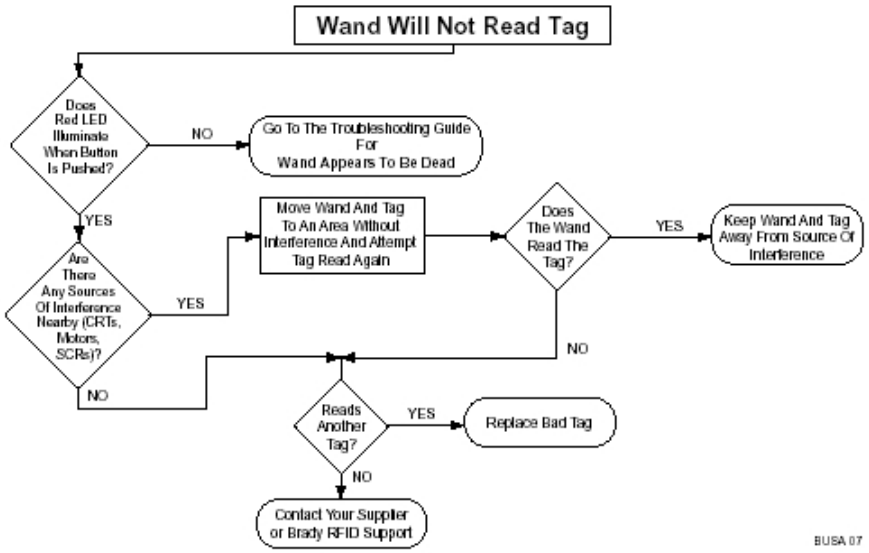
Reasonable care should be exercised to remove oil or other slippery materials to avoid dropping the wand.

Use caution to avoid excessive stressing of cable connection.

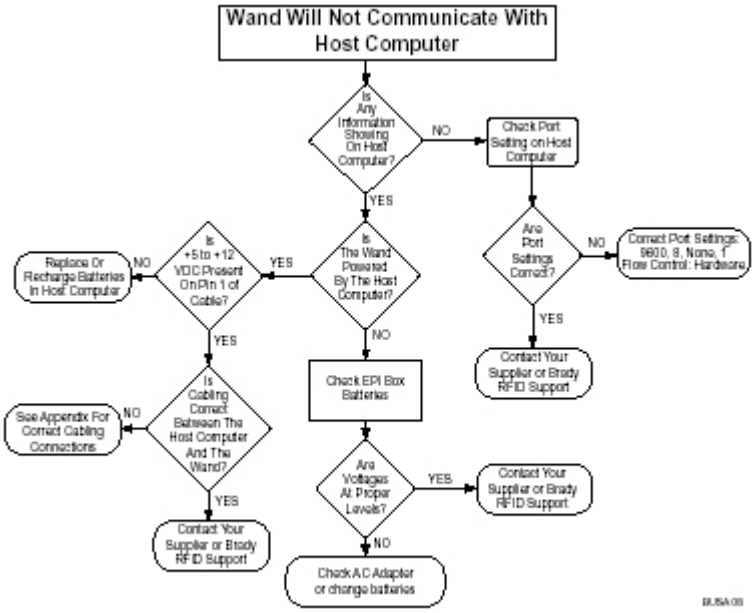
Chapter 5. TROUBLESHOOTING PROCEDURE

If you should experience problems in the normal usage of your *Brady WavePoint Wand* the following troubleshooting procedure may help in determining the cause of, and possible solution to, the problem.





English



English

Chapter 6. APPENDIX A: CABLE PIN-OUT DIAGRAM

Connector on Cable

Pin Number	Lead Color	RS-232
1	Red	5-12 VDC
2 a	Green	RX Data
3 b	White	TX Data
4	Violet	Pwr GND
5	Black	Data GND
6 a	Brown	N/C
7 b	Yellow	N/C
8 b	Orange	N/C

a. RX Data from wand needs to be connected to TX Data from host.

b. TX Data from wand needs to be connected to RX Data from host.