EZReader™ HF

& EZTune™ Antennas

Installation & User Guide

ACCU-SORT® SYSTEMS

Lasers • Cameras • RFID • Systems

EZReader™ HF & EZTune™ Antenna Installation & User Guide Revision 1.0

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Document Revision Control

This document is under revision control in accordance with Accu-Sort's Quality System. Any addenda or other documents associated with this manual are under separate revision controls. A revision number is changed by 0.1 whenever technical information is changed or added to a document.

Disclaimer Information

The information contained in this manual is subject to change without notice.

Supplemental information or documentation may be required for certain applications or usage.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Accu-Sort cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Accu-Sort with respect to use of information, circuits, equipment, or software described in this manual.

In no event will ACCU-SORT® SYSTEMS, INC. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

Accu-Sort Systems, Inc. 511 School House Rd. Telford, PA 18969

1-877-ASI-RFID

Table of Contents

Welcome

Welcome to release 1.0 of the EZReader™ HF User Guide from Accu-Sort Systems, Inc. It includes the information you need to effectively integrate the EZReader HF and EZTune Antenna with your application. It contains detailed information about the following:

- Product Specifications
- Installation Requirements
- Modes of Operation
- Troubleshooting
- Setup software features and capabilities,
- Software Installation
- Connecting to an EZReader HF reader directly or via network
- Configuring the EZReader HF for your application using the interface software

This preface explains how this user manual is organized and introduces other sources of information that you will find useful.

Intended Audience

You should have a basic understanding of radio frequency identification (RFID). Equipment installers must be familiar with standard wiring techniques and terminology. Because the EZReader HF Interface software runs in the Microsoft® Windows® environment, you should know how to use a mouse, choose commands, and work with windows and dialog boxes.

This manual contains some terms that may be unfamiliar. Use the glossary at the back of this manual for assistance.

Thank You

Thank you for using EZReader HF, its interface software, and this manual.

We value your comments and feedback. Feel free to let us know what you like or dislike about EZReader HF (or this manual) by sending us an e-mail at info@accusort.com.

You can also mail your comments to our corporate headquarters address or call us directly at 1-800-BAR-CODE™ or (215) 723-0981.

This information is available online.

The EZReader HF User Guide is available online in Adobe Acrobat PDF format. The paper and online versions of this manual have identical content; use whichever format is most convenient.

The EZReader HF Installation Software and Documentation CD contains the latest software, online help, and an Adobe Acrobat version of the EZReader HF User Guide. You can search for information; read it on–screen, and print individual pages, sections, or the entire publication by using this CD. When you print from Adobe Acrobat, the resulting printouts look just like pages from an Accu-Sort hardcopy manual. We supply this CD with every EZReader HF shipment.

NOTE: There may be additional material that was not available when this user manual was printed. To learn if there is a documentation update for this product, go to our web site's downloads page at www.accusort.com.

Other Sources of Information

You can choose from many sources of information, including documentation, training, and support services, to increase your knowledge and understanding of Accu-Sort RFID solutions. If this manual refers you to other Accu-Sort documentation, use only the latest version of those manuals unless we specify otherwise.

Conventions

WARNINGS OR CAUTIONS: This symbol identifies a hazard or procedure that, if incorrectly performed, could cause personal injury or result in equipment damage. It is also used to bring the user's attention to details that are considered IMPORTANT.

USEFUL TIPS OR NOTES: This symbol draws attention to details or procedures that may be useful in improving, maintaining, or enhancing the performance of the hardware or software being discussed.

Customer Service

Training

Accu-Sort Systems offers a complete set of training courses to help you and your staff master EZReader HF RFID solutions. We can help you develop a training plan that provides thorough training for both your project team and your end users. We will work with you to organize courses appropriate to your job or area of responsibility. Training professionals can show you how to plan your training throughout the implementation process so that the right amount of information is delivered to key people when they need it the most. You can attend courses at any our training center or you can arrange for our trainers to teach at your facility. In addition, we can tailor standard courses or develop custom courses to meet your needs.

Support

From on–site support to central support, our team of experienced professionals provides the help and information you need to keep your EZReader HF working for you. This team includes your Account Manager and Accu-Sort's large staff of support specialists with expertise in your business area and managing your hardware and software environment.

NOTE: If you have any problems or questions that require Accu-Sort's help, direct your calls to Customer Service or Technical Support at the following numbers: 1-800-BAR-CODE™ or (215) 723-0981.

General Precautions

All service should be performed so as not to violate any compliance. Use shielded cable with the unit. Before performing any maintenance, turn off power to the unit and disconnect the power cord. Routinely check cabling, if a cable is damaged, replace it immediately. Check mounting structure for tightness and stability. Ensure the power outlet connected to the unit is properly grounded. Do not apply power to the unit until all components are properly cabled and grounded.

Warnings

WARNING: Use of any antenna other then ones supplied with the equipment, or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

WARNING: This device must be installed in a location that is not accessible to the general public. Install the device so that the antenna is at least 25 centimeters from unsuspecting personnel. Failure to install this device as described will result in a failure to comply with FCC rules for RF exposure and is discouraged.

Disclaimer

Operation of any radio transmitting equipment, including this product, may interfere with the functionality of inadequately protected medical devices. Consult a physician or the manufacturer of the medical device if you have any questions. Other electronic equipment may also be subject to interference.

Software Version

This document refers to software version XXXXXXX and later versions. This information may not be valid for earlier versions of the EZReader HF software.

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Approvals: Pending

NOTE: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation Manual, may cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

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

Product Specifications

Physical Features

Enclosure	Aluminum
Dimensions: (LxWxH)	6.77" x 4.66" x 2.31" (172 x 118 x 59mm)
Weight	2.26 lbs.
Storage Temperature	-40°C to +80°C
Cabling	App. Specific (does not contribute to length, height or width)
Mounting	See Mounting Instructions
Visual Diagnostic LEDs	STATUS (Reader Status) = Green/Red PWR (Power) = Green READ (Valid Transponder Communication) = Blue HOST = Yellow LAN Tx/Rx (Active Network Communication) = Yellow LINK = Green
Compliance	FCC Part 15 compliant for intentional radiators (approval pending); UL, cUL (approval pending); CE (approval pending)

Performance Features

Common

Operating Frequency	13.56MHz
Multiprotocol	ISO 15693, ICODE SLI, ICODE I
Supply Voltage	10-30VDC Nom.
Power Consumption	12VDC=1A 18VDC=0.7A 24VDC=0.5A
Ambient Temp. Range	0 to 50°C
Connectors	Turck 5-Pin M Eurofast FSFD 4.5

Transmitter

Transmit Power	.5W or 1W selectable
Transmitter Modulation	ASK (Amplitude Shift Keying)

Receiver

Sensitivity	Typical –50dbm (FSK mode)

Communication Ports

Setup Port	9 pin Female D connector RS232
Host Serial Port	9 Pin Female D connector, RS232 and RS422
Ethernet	Turch 8-pin FK8. Comes with RJ45 adapter cable

Digital I/O

Inputs	2 – Opto-Isolated. Max. 24VDC or Non-Isolated TTL Active Low
Outputs	2 – Form A Relays. Contacts: 30VDC max @ 250ma
Power to I/O	11.5VDC Nom.@ 100ma with ASI supplied Power Supply
Connector	15 pin Female D connector

Performance

Read Rate	90 Single Blocks/second @ 19,200 Baud Rate
Range (typ.)	Up to 8" depending on combination of antenna and tag

EZTune™ Antennas

5x7	13.56MHz Medium Range Antenna (Up to 8 inches (203mm) read range)
	Actual size is 5.2" x 7.4" (132 x 182mm)
5x16	13.56MHz Standard Conveyor Antenna (Up to 8" (203mm) read range)
	Actual size is 5.2" x 16.5" (132 x 419mm)

Wiring and Cable Pin Diagrams

1. Ethernet Port – Turch 8-pin FK8 supplied with RJ45 adapter cable
2. Antenna Port – 9 pin Female D combination connector RF/Comm/Pwr
3. Digital I/O Port – 15 pin Female D connector
4. Setup Serial Port – 9 pin Female D connector RS232
5. Host Serial Port – 9 Pin Female D connector, RS232 and RS422
6. Power – Turck 5-Pin M Eurofast FSFD 4.5

1. Ethernet – Turck 8-pin FK8
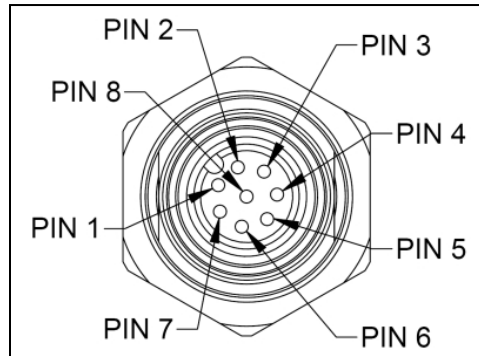
1. White ---------NC
2. Brown ---------NC
3. Green --------- NC
4. Yellow   ---------Reader RX-
5. Gray -----------Reader TX+
6. Pink ------------   Reader RX+
7. Blue ------------   NC
8. Red ------------Reader TX-

With TURCK RJ45 Patch Cable Attached to Reader
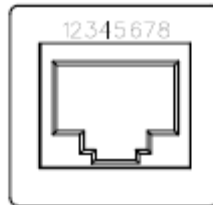
1. Reader RX+
2. Reader RX-
3. Reader TX+
4. NC
5. NC
6. Reader TX-
7. NC
8. NC

2. Antenna Port (Combo "D" 5W1 Type)

1. 485-
2. +VDC
3. 485+
4. GND
A1. RF
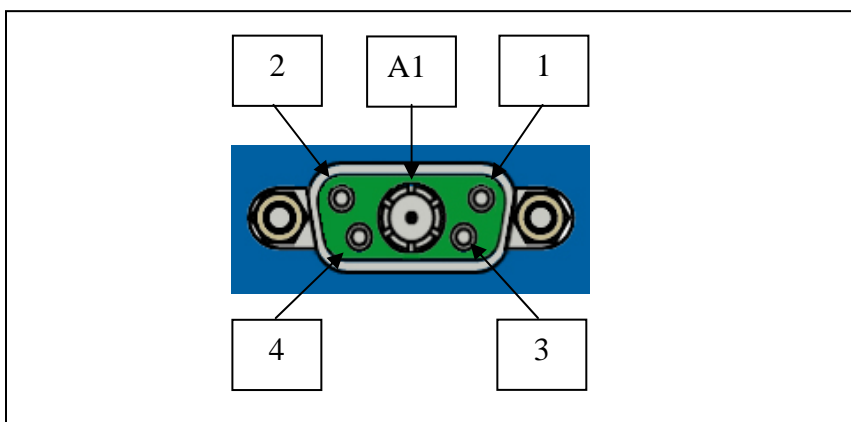
3. Digital I/O Port (15 pin Female "D" connector)

1. Trigger 2 Non-Isolated Input: (Pulled to 5VDC internally)
2. Negative Side of Trigger 1 Isolated Input: (Cathode of Optocoupler)
3. Negative Side of Trigger 2 Isolated Input: (Cathode of Optocoupler)
4. Positve Side of Trigger 2 Isolated Input: (1.2K in Series with Anode of Optocoupler)
5. 12VDC: (100ma max source current pins 5 and 12 combined)
6. GND
7. Solid State Output Relay # 2 Contact 1 (DC Switching Only)
8. Solid State Output Relay #2 Contact 2 (DC Switching Only)
9. Trigger 1 Non-Isolated Input: (Pulled to 5VDC internally)
10. Positve Side of Trigger 1 Isolated Input: (1.2K in Series with Anode of Optocoupler)
11. NC
12. 12VDC
13. GND
14. Solid State Output Relay # 1 Contact 1 (DC Switching Only)
15. Solid State Output Relay # 1 Contact 2 (DC Switching Only)
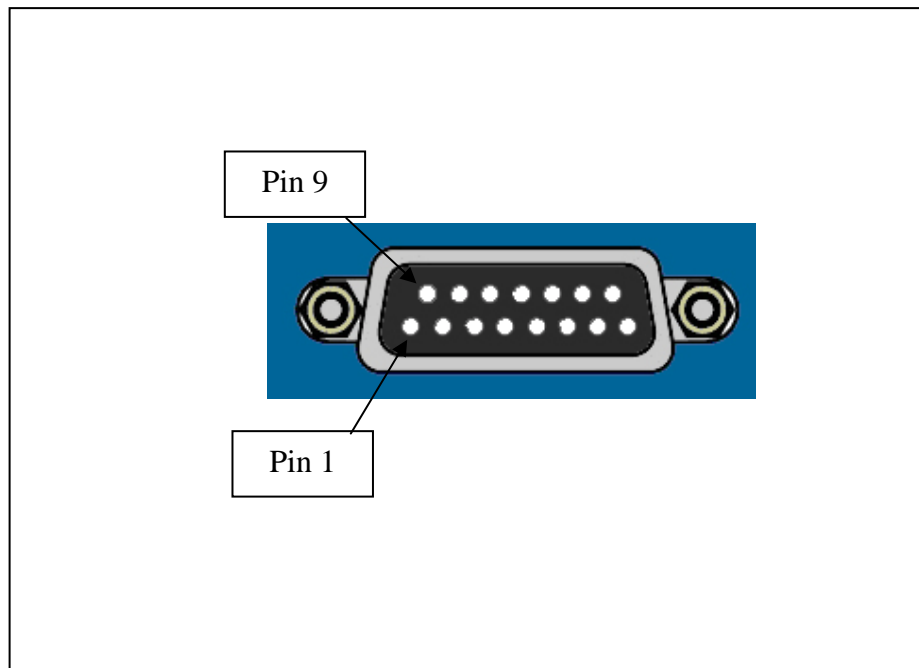
4. Setup (9 Pin Female "D" connector)

1. NC
2. Reader TX (RS232)
3. Reader RX (RS232)
4. NC
5. SIG GND
6. NC
7. NC
8. NC
9. NC

Pin 1

Pin 6
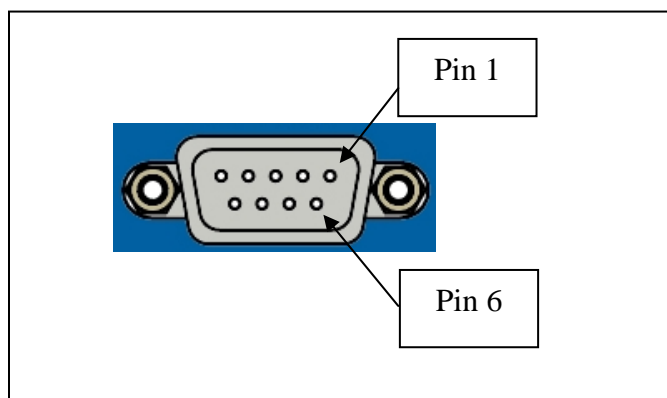
5. HOST (9 Pin Female "D" connector)

1. 422 Isolated GND
2. Reader TX (RS232)
3. Reader RX (RS232)
4. NC
5. SIG GND
6. Reader SD – (422)
7. Reader SD+ (422)
8. Reader RD- (422)
9. Reader RD+ (422)
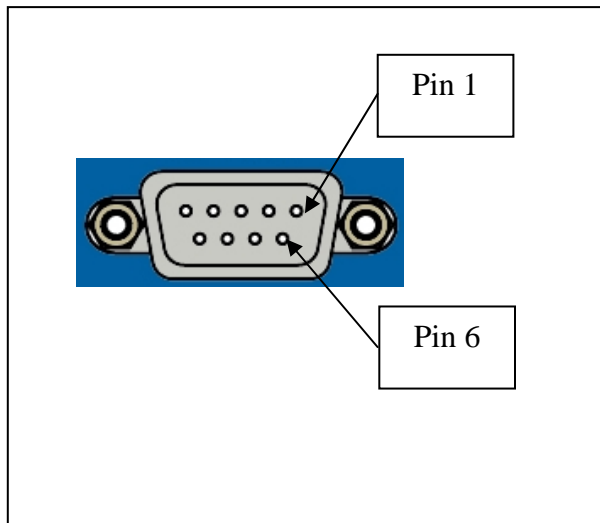
. Power Connector (Turck Eurofast Type WFSD 4.5)

1. VDD+
2. VDD-
3. Safety/Chassis Ground
4. Safety/Chassis Ground
5. Safety/Chassis Ground
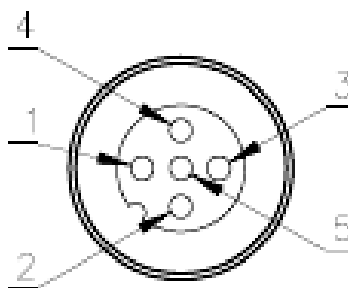
Installation Requirements

Power

The EZReader has a 10 to 30 VDC power input. For best performance it is recommended that the customer use an Accu-Sort Power Supply. Description and part # of supply is shown below.

- 24 Volt 40 W(ASI Part # 0111020001)

For customers using their own power source Accu-Sort provides an flying leaded shielded cable, part # shown below.

NOTE: Safety earth ground must be attached to the reader (Failure to do so will void the warranty), designed for applications where customers are intending to provide their own DC power.

- Accu-Sort Part #:1000052775
- TURCK Part #: RKS 4.4T-2 (2 meter)

Antennas

Use only Accu-Sort provided Auto Tune Antenna with EZTune™ technology. Connecting any other antenna will disable unit from functioning, and could be in violation of FCC part 15 regulations.

Approved Antenna Choices:

Antenna Model #	Part #	Description
Auto Tune HF Antenna 5x7	1000065705	5.2" x 7.4" (132 x 182mm) with 2 meter cable
Auto Tune HF Antenna 5x16	1000065706 (Bottom Exit) 1000066915 (Side Exit)	5.2" x 16.5" (132 x 419mm) with 2 meter cable

Trigger Inputs 1 and 2

Two optically isolated inputs or two non-isolated inputs are available on the I/O Port. These inputs are used when the unit is in Hardware Trigger Mode of operation and allow the unit to operate autonomously. When using isolated inputs user must supply both positive and negative voltage references. When using non isolated inputs user must connect to sink output of trigger device (active low). A current limited (100 ma max combined Trigger 1&2) 12VDC connection is available for purposes of providing power to low current consuming devices such as a photo-eyes. Non isolated inputs are internally pulled to +5VDC through a 2.2k ohm resistor.

NOTE: Avoid sourcing any current into the Non-Isolated Trigger inputs. Failure to do so can damage unit.

Outputs 1 and 2

Two Solid-State Form A Relay Outputs are available on the I/O Port. These outputs can be configured by the user to close on various conditions such as valid or invalid tag reads. The outputs can also be controlled by remotely by the user.

NOTE: Relay Outputs are capable of switching DC voltages(30 VDC max@250 ma) only. Applying AC voltages will damage unit.

Reader Mounting Dimensions

ISOMETRIC VIEW
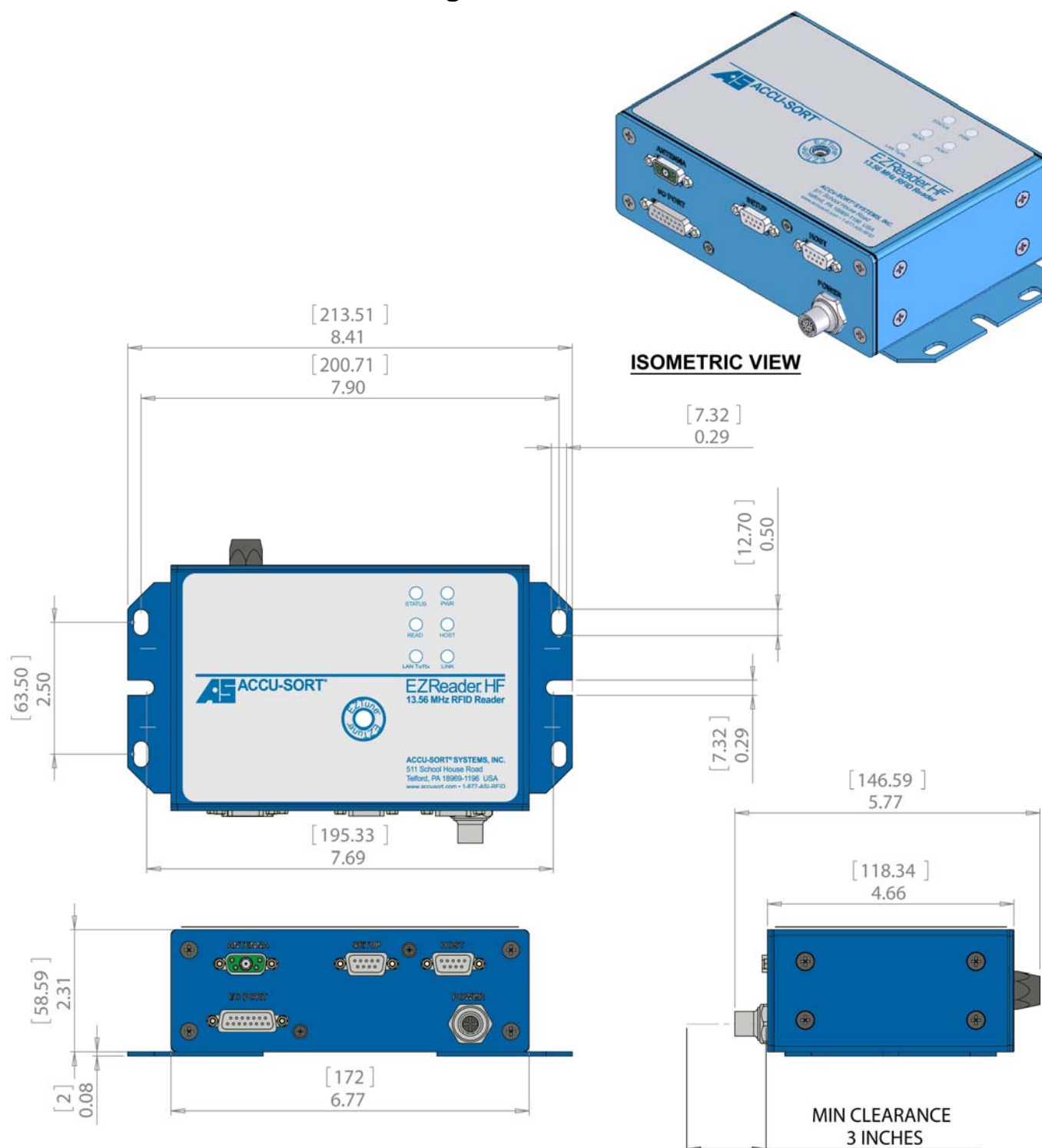
(Extracted from drawing # 111315 REV 01 with modifications)

Antenna Mounting Dimensions

EZTune 5x7

[29.21]
1.15

[241.30]
9.500

[222.50]
8.760

[84.18]
3.314

[133.35]
5.25

[8.33]
.328

[57.15]
2.25

[45.72]
1.80

[30.48]
1.20

[190.50]
7.50
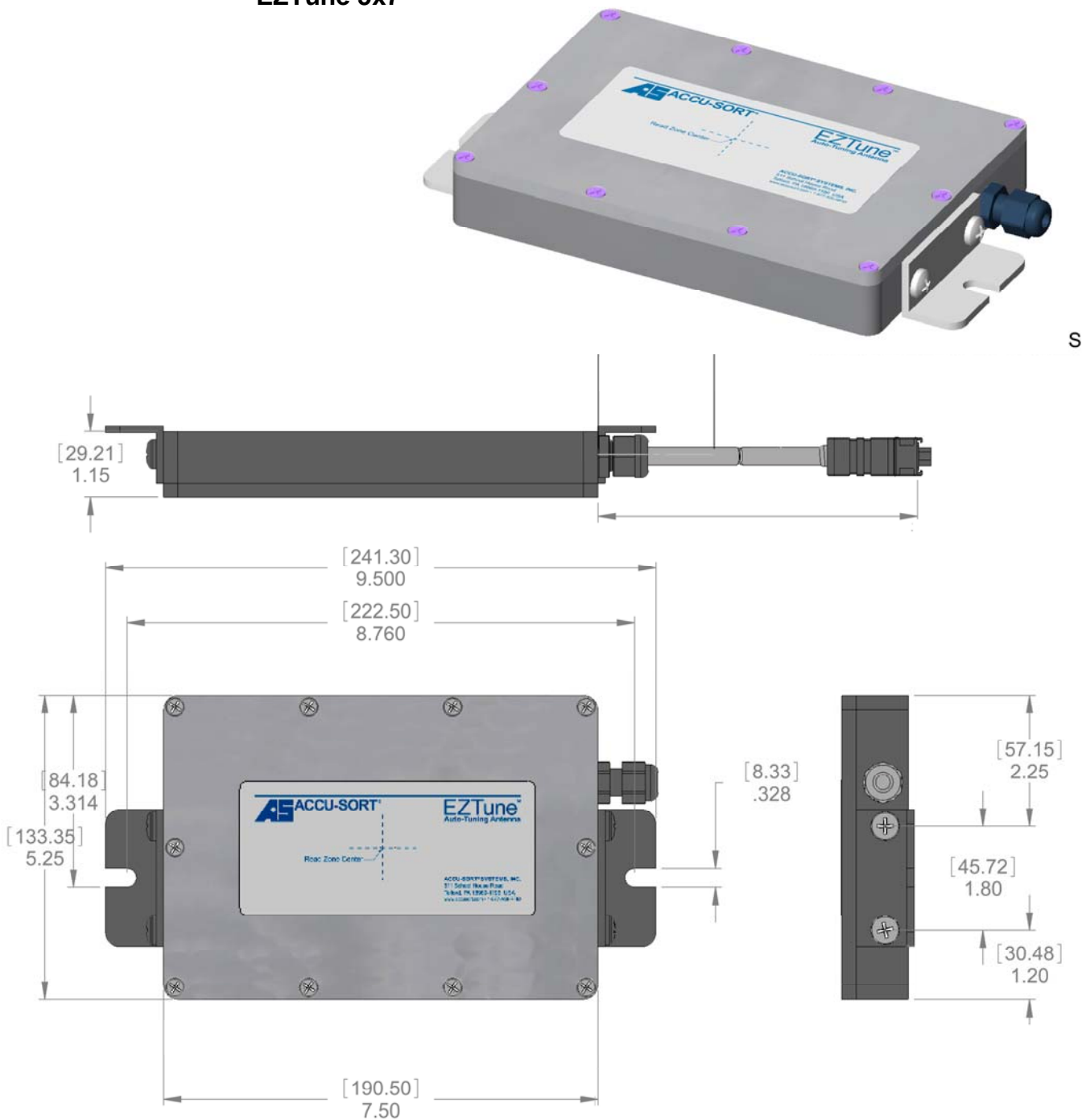
(Extracted and modified from drawing #111264 REV 01)

EZTune 5x16
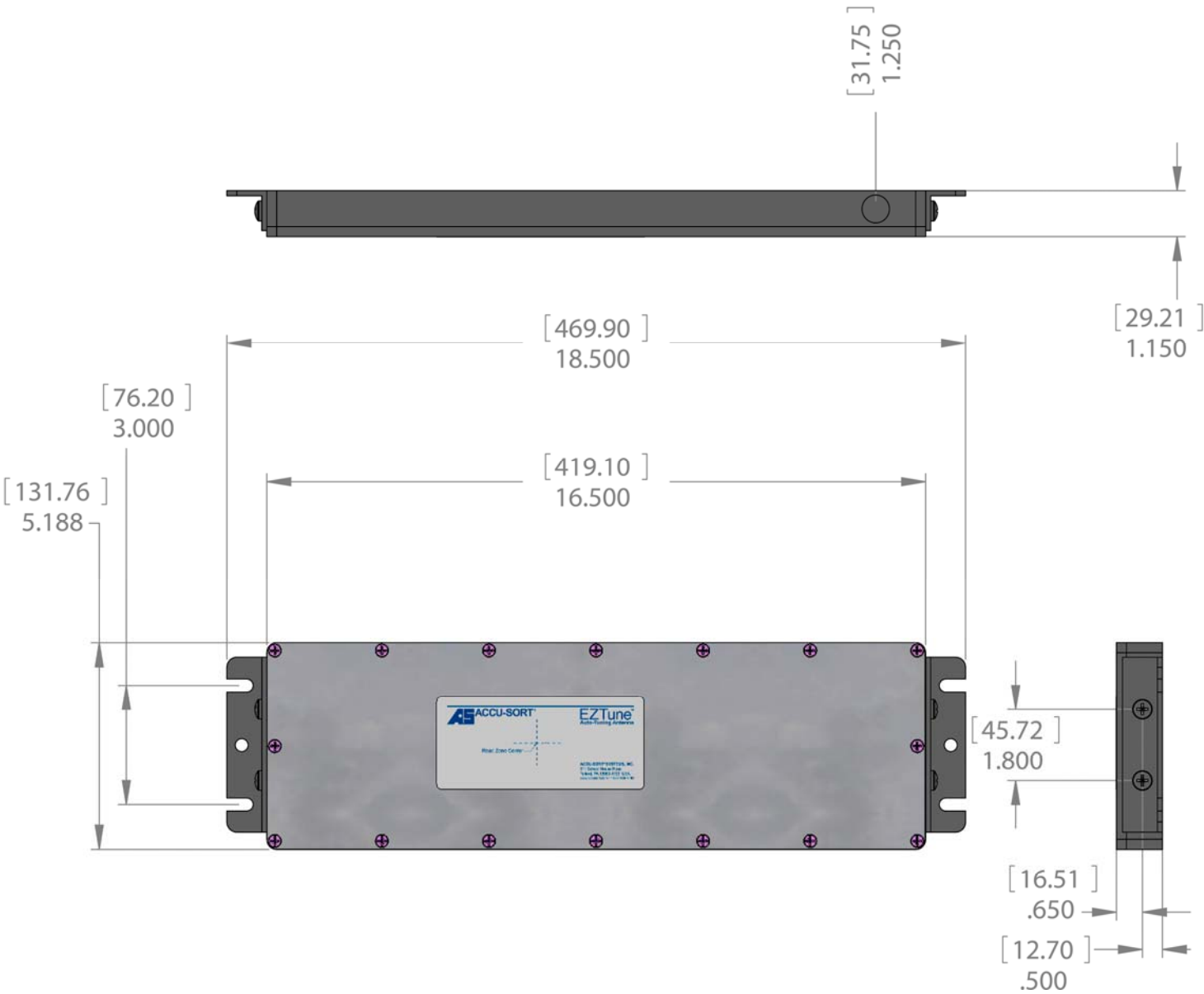
(Extracted and modified from drawing #111265 REV 01)

Antenna Mounting

General Guidelines

To achieve optimum performance from the EZReader HF, the antenna should be mounted as far from metal objects as possible. The RF energy generated by the Reader/Antenna combination to communicate with the RFID tags is called the near field. The near field is the magnetic portion of the RF field and can be influenced by surrounding metallic objects. These metallic objects if located close enough to the antennae and are of the right shape and position can create eddy currents, which diminish and in some instances can totally cancel out the reading ability of the antenna. These metallic objects also will detune the antennae which in turn will cut down on the power transfer between reader and antenna leading to less then optimum performance.

To cover all possible antenna mounting possibilities is beyond the intent of this document, but an example of one way to help reduce the influence of metallic objects on the antenna is shown below. The 5" x 16" antenna is shown in this example being mounted in a roller conveyor.

Antenna Mounting Example
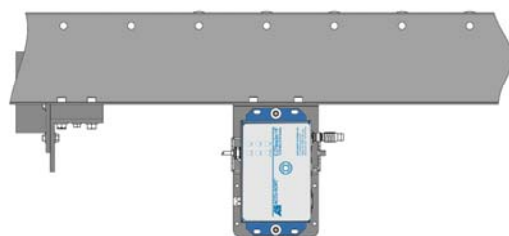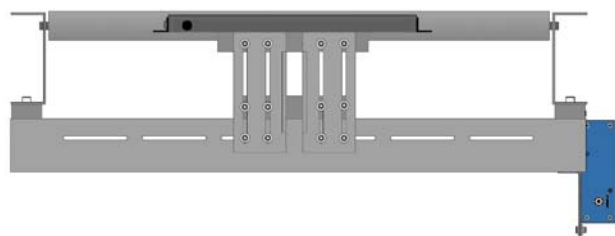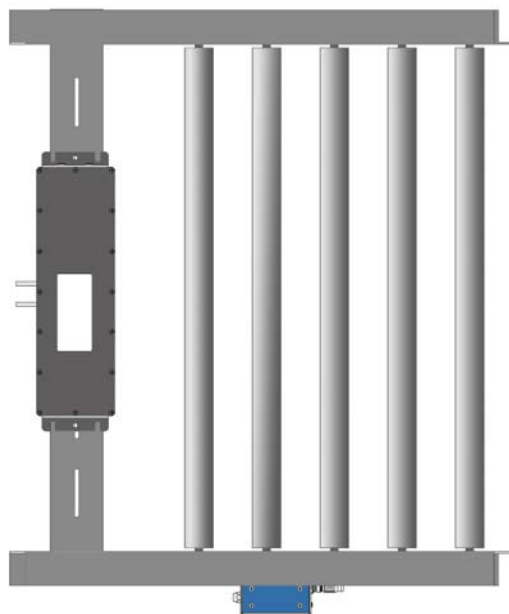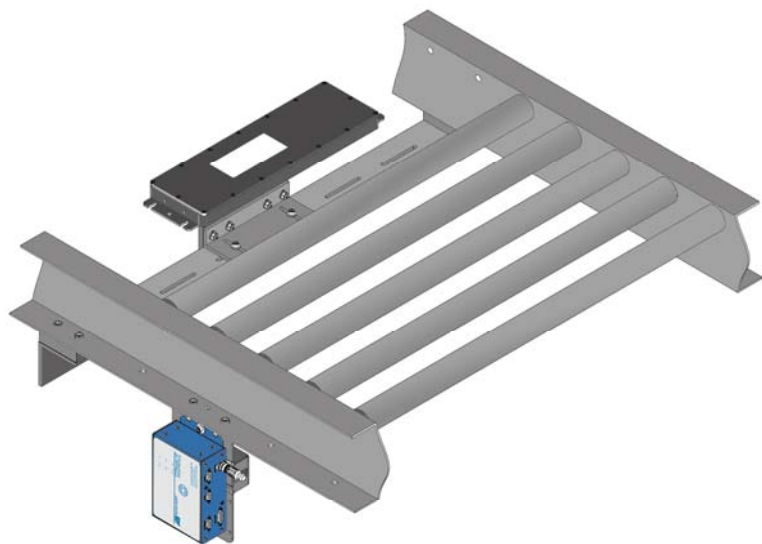
Notes:

Modes of Operation

The EZReader HF modes of operation can be divided into three categories. The reader can be in Setup mode where the user can change parameters, or it can be in HardwareTrigger mode where the unit acts only on trigger inputs, or it can be in Host Control mode where the unit functions based on commands it receives from a Host. See following sections for in depth details on each mode.

Setup Mode

All of the user changeable parameters can be configured in setup mode. These settings will be stored in non-volatile memory only if they are saved after changing. Due to the vast number of user defined parameters and their interaction Accu-Sort recommends using the EZReader HF Interface GUI for configuring the reader. See GUI section.

Entering Setup Mode

Setup mode can be entered by using the GUI and either connecting a 1 to 1 Serial Cable (included with the EZReader HF Accu-Sort Part # 0111343001) between your PC and the Reader or thru a Ethernet connection. It is recommended to use the Serial connection the first time as you do not need to know any of the units Network settings to connect.

When choosing to use the Network Setup connection you will need to configure your LAN settings to be compatible with the unit's settings. The default Network settings are as follows:

IP Address: 192.168.178.252
Net Mask: 255.255.255.0
Gateway: 192.168.178.252

The Serial SETUP Port settings are fixed as follows:
        57600, N81

The data format of this port is also fixed and is as follows:
        <STX><Message><ETX>

Message Format

Output Message Format

Messages from the EZReader will include TRHDR and/or TXTRL (if they are enabled), ISO Flag byte, and requested data. The general format (with all fields) is:

Response Format with Valid Tag Data Being Read

	TXHDR	ISO Flags	Data	TXTRL
Parameter Dependent	Yes	No	No	Yes
Parameters that will cause data to be included in response from unit.	TXHDRx = anything other than Null (0x00)	Always sent see ISO Flag Byte below for definition	Always sent	TXTRLx = anything other than Null (0x00)

Response Format Error Messages

NOTE: Not all commands will send a error message, commands that do not will be so noted.

	TXHDR	ISO Flags	Data	TXTRL
Parameter Dependent	Yes	No	N0	Yes
Parameters that will cause data to be included in response from unit.	TXHDRx = anything other than Null (0x00)	Not Sent	See paragraph below for possible error messages	TXTRLx = anything other than Null (0x00)

The error messages from the RFR-02 are:

These messages will be in the format:

<TXHDR><antenna><MESSAGE><TXTRL>

NO TAG	No tag was read or it could be in "Quiet" mode
NO ANT	An Accu-Sort antenna was not detected. Check your antenna connection.
COLL	More than one tag responded.
MISREAD	The data returned from the tag was garbled.

ISO Flag Byte Definition

The ISO Flags (if not 0x00) will indicate an error occurred. Flags will correspond to the specific error (Taken from ISO 15693-3) as listed below.

0x00	No Error
0x01	Command is not supported
0x02	Command is not recognized
0x03	Command option is not supported
0x0F	Error with no information (error code not supported)
0x10	Block is not available (doesn't exist)
0x11	Block is already locked
0x12	Block is locked so its content cannot be changed
0x13	Block was not successfully programmed
0x14	Block was not successfully locked
All others	Reserved for Future Use (RFU)

Hardware Trigger Mode

In this mode the EZReader will operates autonomously. It will only perform Tag Read functions and send data to the Host when its Triggers are activated. The unit can use one or two triggers depending on the application.

When using a single Trigger the Trigger1 input must be used and the unit will read based on a timeout set by the user.

When using two triggers, Trigger1 will start the Tag Read cycle and Trigger2 will end it.

In both cases the number of Tag memory blocks to be read is programmable.

In Trigger Mode, all commands sent by the Host (Serial or Ethernet) are ignored by the EZReader HF, it will only send data on these ports. The only port that will respond to queries is the Setup Port.

NOTE: A trigger signal must be active for a minimum of 10ms to be accepted.

Trigger Mode Examples

The following examples will be based upon the tag data shown in the screen capture shown below.

The Tag UID is: Hex E0 07 81 26 AD 83 5D 67 (unless otherwise noted)

Read Block 0 of Tag using Trigger Input 1 with 500msec timeout, with a Transmit Header set to 5B hex (ASCII '[') and a Transmit Trailer set to 5D hex (ASCII ']'). The Screen shot below shows how the Trigger page of the GUI would appear.
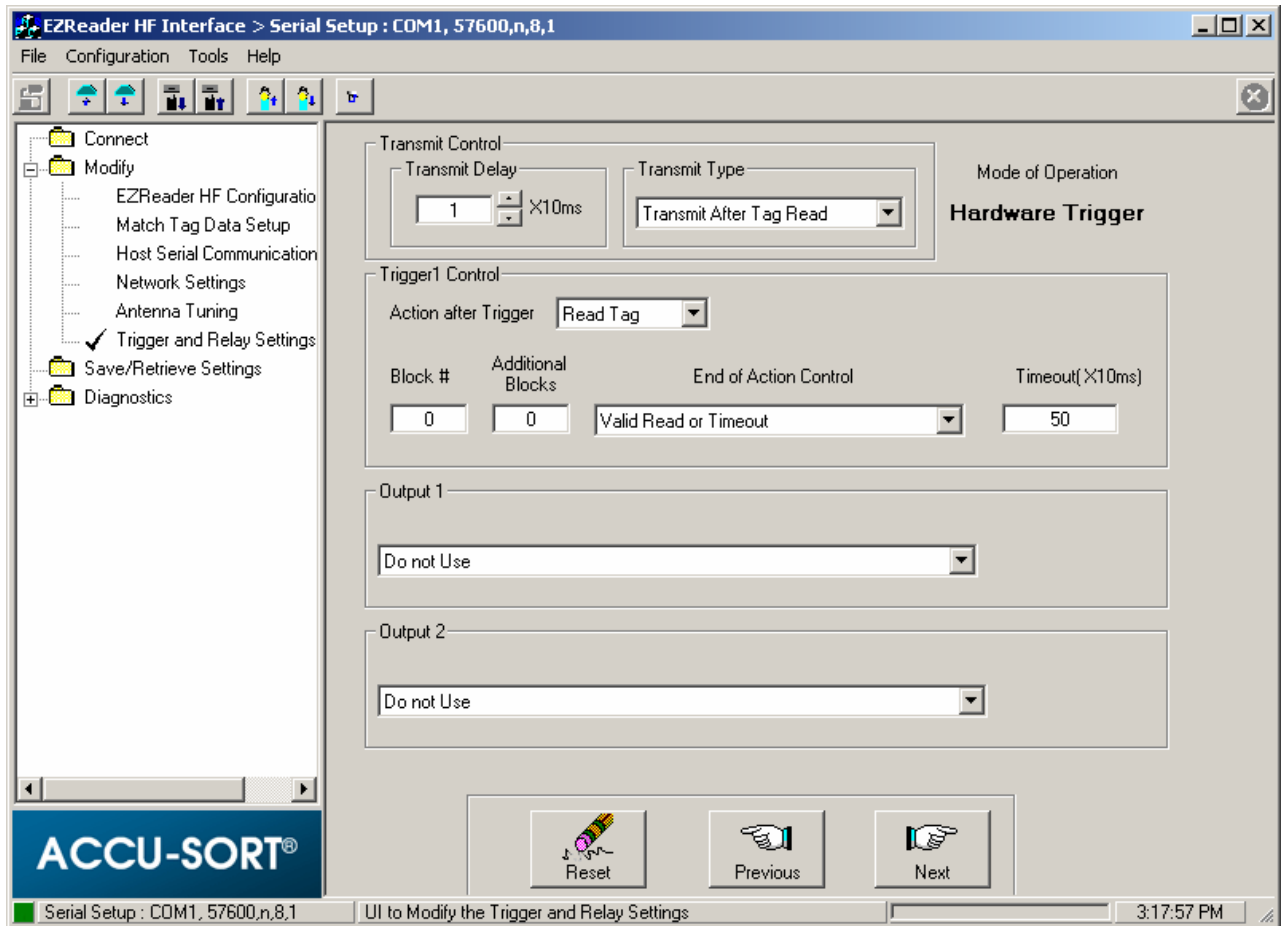
Response with Valid Tag Data Read

NOTE: Commas are shown for clarity purposes and are not part of data.

- NP stands for Non Printable character.
- NA stands for Not Applicable so no character will be sent.

When TRIGGER1 is asserted, the output data string will be:

Example	TXHDR	ISO Flag	Tag Data	TXTRL
ASCII	[	NUL	0,0,0,0	]
Hex	5B	00	30,30,30,30	5D

Response with No Tag Data Read

When TRIGGER1 is asserted, the output data string will be:

Example	TXHDR	ISO Flag	Tag Data	TXTRL
ASCII	[	NA	NO TAG	]
Hex	5B	NA	4E,4F,20,54,41,47	5D

Read Blocks 0 Thru 4 of Tag using Trigger Input 1 as the start event and Trigger 2 as the end event, data transmitted to Host on Trigger 2 active. Transmit Header set to 5B hex (ASCII '[') and a Transmit Trailer set to 5D hex (ASCII ']').

The screen shot below shows how the Trigger page of the GUI would appear.
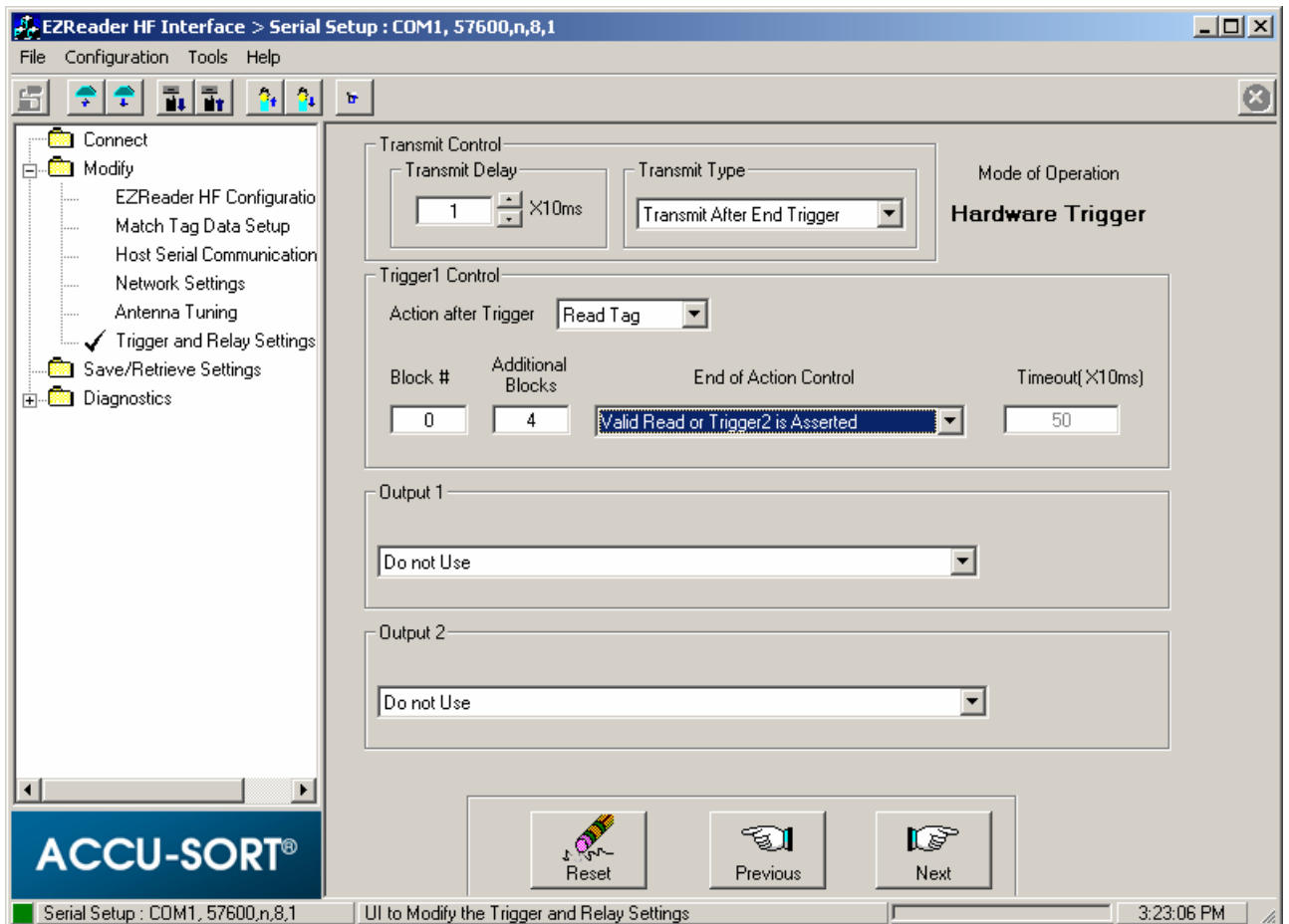
Response with Valid Tag Data Read

When TRIGGER1 is asserted, the output data string will be:

Example	TXHDR	Antenna	ISO Flag	Tag Data	TXTRL
ASCII	[	1	NUL	0,0,0,0,1,1,1,1,2,2, 2,2,3,3,3,3,4,4,4,4,	]
Hex	5B	31	00	30,30,30,30,31,31,31, 31,32,32,32,33,33, 33,33,…….,34	5D

Response with No Tag Data Read

When TRIGGER1 is asserted, the output data string will be:

Example	TXHDR	Antenna	ISO Flag	Tag Data	TXTRL
ASCII	[	1	NA	NO TAG	]
Hex	5B	31	NA	4E,4F,20,54,41,47	5D

Inventory Tag UID Using Trigger Input 1 and Trigger Input 2. Transmit Header set to 5B hex (ASCII '[') and a Transmit Trailer set to 5D hex (ASCII ']').

The screen shot below shows how the Trigger page of the GUI would appear.
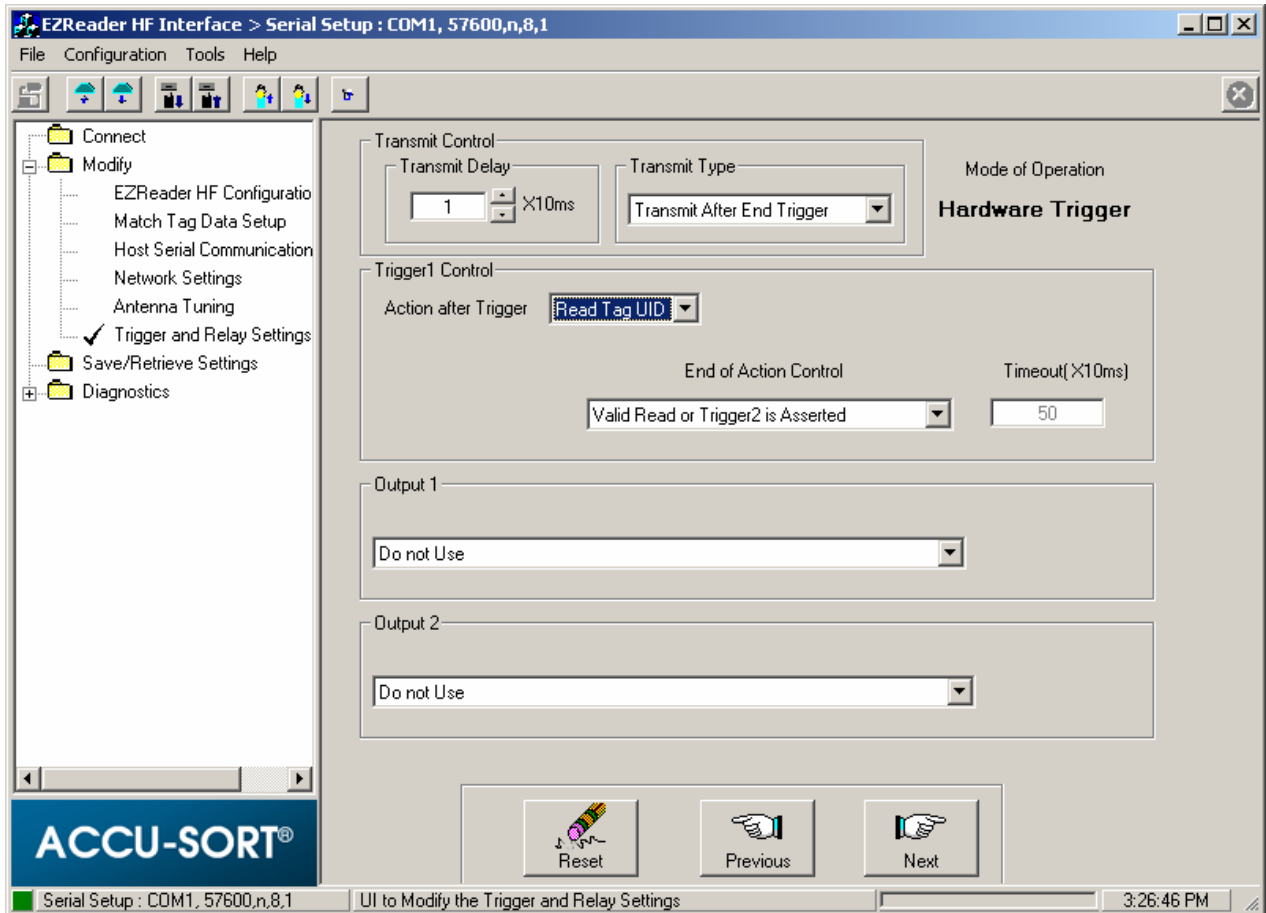
Response With Valid Tag UID Read and Trigger 1 asserted for the 1st time

When TRIGGER1 is asserted for the 1st time, the output data string will be:

Example	TXHDR	Antenna	ISO Flag	Tag Data	TXTRL
ASCII	[	1	NA	Not shown due to many Non printable characters	]
Hex	5B	31	NA	67,5D,83,AD,26,81,07,E0 (UID sent reverse order)	5D

Response with Valid Tag UID Read and Trigger 1 and 2 asserted for the 2nd time wihout removing Tag from antenna field.

When TRIGGER1 &2 are asserted for the 2nd time and Tag has not been removed from antenna's field, the output data string will be:

Example	TXHDR	Antenna	ISO Flag	Tag Data	TXTRL
ASCII	[	1	NA	NO TAG	]
Hex	5B	31	NA	4E,4F,20,54,41,47	5D

NOTE: The Tag did not send its UID the second time because the 1st inventory command left the tag in "Quiet mode", if tag is removed from the antenna's field and then placed back in field it will again respond with its UID.

Host Control Mode

When in Host Control Mode, the EZREADER-HF will only respond to requests received on its Host serial or Ethernett ports. All activity on the Trigger inputs will be ignored.

All commands regardless of which port they are received on require a Receive Header and Trailer. "STX" is the default Receiver Header and "ETX" is the default Receive Trailer. **The Header and Trailer cannot be the same if changed.**

Messages from the EZREADER-HF will include TRHDR and/or TXTRL (if they are enabled, "STX and "ETX" are again the defaults), as well as the requested data. The general format (with all fields) is:

<TXHDR><ISO Flags><data><TXTRL>

Host Control Mode Response Format with Valid Tag data being Read

	TXHDR	ISO Flags	Data	TXTRL
Parameter Dependent	Yes	No	No	Yes
Parameters that will cause data to be included in response from unit.	TXHDRx = anything other than Null (0x00)	See ISO Flag Byte below for definition. Normally 0x00	Always sent	TXTRLx = anything other than Null (0x00)

Host Control Mode Response Format with Error Message

	TXHDR	ISO Flags	Data	TXTRL
Parameter Dependent	Yes	No	N0	Yes
Parameters that will cause data to be included in response from unit.	TXHDRx = anything other than Null (0x00)	Not Sent	See paragraph below for possible error messages	TXTRLx = anything other than Null (0x00)

The error messages from the EZReader-HF are:

These messages will be in the format:

<TXHDR><MESSAGE><TXTRL>

NO TAG–No tag was read or it could be in "Quiet" mode

COLL– More than one tag responded.

MISREAD–The data returned from the tag was garbled.

The ISO Flags (if not 0x00) will indicate an error occurred, and the next byte after the Flags will correspond to the specific errors which are shown below (Taken from ISO 15693-3).

0x00	No Error
0x01	Command is not supported
0x02	Command is not recognized
0x03	Command option is not supported
0x0F	Error with no information (error code not supported)
0x10	Block is not available (doesn't exist)
0x11	Block is already locked
0x12	Block is locked so its content cannot be changed
0x13	Block was not successfully programmed
0x14	Block was not successfully locked
All others	Reserved for Future Use (RFU)

Host Control Mode Command Format

	RXHDR	Serial Command	RXTRL
Parameter Dependent	Yes	No	Yes
Parameters that will cause data to be included in command to unit.	RXHDRx = anything other than Null (0x00)	See specifics of each serial command	RXTRLx = anything other than Null (0x00)

Host Control Mode Commands

Note for all examples shown assume that the unit has its setup parameters at their default values. Receive Header and Trailer are as follows:

Receive Header: "STX" (02 hex)

Receive Trailer: "EXT" (03 hex)

Transmit Header: "STX" (02 hex)

Transmit Trailer: "ETX" (03 hex)

"E" End current continuous reading commands

The "E" command is sent to end commands that have put the EZREADER-HF in a continuous read condition. Commands that require the "E" to end them are "I" (Inventory) and the continuous read commands; R04, R05, R06, R07. **The EZReader will echo the "E" command back to the Host when received.**

NOTE: Commas are shown for clarity purposes and are not part of data.
- NP stands for Non Printable character.
- NA stands for Not Applicable so no character will be sent.

Example	ASCII	HEX
Command	STX,E,ETX	02,45,03
Response	STX,E,ETX	02,45,03

"I" Do an inventory of tags.

Report the UIDs of tags in proximity to the antenna. Once the UID of the tag has been read, it will be in "Quiet" mode until the tag leaves the field of the antenna.

Note that the bytes of the UID are output in reverse order (the same order that the EZREADER-HF expects the UID in a command).

Example	ASCII	HEX
Command	STX,I,ETX	02,49,03
Response	[Many NP characters]	02,67,5D,83,AD,26,81,07,E0,03

Tag will be in "Quiet" mode until the tag leaves the field of the antenna. **To stop the inventory, type "E" (RXHDR and RXTRL is necessary).**

"L" Lock blocks.

There are two available options available:

- **L00bb**

Locking a block prevents writing data to the specified block. This is a permanent irreversible change to the tag.

If the lock is successful, the response will be TXHDR (if any), "YL" (Yes Lock), and TXTRL (if any).

The example below is locking block 30 of a tag that is in the antenna's field.

Example	ASCII	HEX
Command	STX,L,0,0,3,0,ETX	02,4C,30,30,33,30,03
Response	STX,YL,ETX	02,59,4C,5D,03

An unsuccessful lock can reply with any of the following errors:

NO TAG

NO ANT

COLL

MISREAD

NL<ISO flags>

The first four are normal EZREADER-HF error messages, the fifth is based on the ISO error flag byte, and probably represents trying to lock a previously locked block.

The example below is locking block 30 without a tag in the antenna's field.

Example	ASCII	HEX
Command	STX,L,0,0,3,0,ETX	02,4C,30,30,33,30,03
Response	STX,NO TAG,ETX	02,4E,4F,20,54,41,47,03

- **L02bbuuuuuuuu**

Lock block bb of tag with UID uuuuuuuu

Note that, since the UID is specified, an ISO15693 tag will respond even if it is in Quiet mode.

Locking a block prevents writing data to the specified block. This is a permanent irreversible change to the tag.

If the lock is successful, the response will be TXHDR (if any), "YL" (Yes Lock), and TXTRL (if any).

The example below is locking block 40 of a Tag with a UID of E0,07,00,00,06 A6,B8,0B

Example	ASCII	HEX
Command	STX,L,0,2,4,0,ETX(Tag UID omitted due to many ASCII NP characters)	02,30,32,34,30,0B,B8,A6,06,00,00,07,E0,03
Response	STX,YL,ETX	02,59,4C,03

An unsuccessful lock can reply with any of the following errors:

NO TAG

NO ANT

COLL

MISREAD

NL<ISO flags>

The first four are the normal EZREADER-HF error messages; the fifth is based on the ISO error Flag Byte, and probably represents trying to lock a previously locked block.

The example below is locking block 40 of a Tag with a UID of E0,07,00,00,06 A6,B8,0B, the tag is not in the antenna's field

Example	ASCII	HEX
Command	L,0,2,4,0,(Tag UID omitted due to many ASCII NP characters)	4C,30,32,34,30,0B,B8,A6,06,00,00,07,E0
Response	[NO TAG]	5B,4E,4F,20,54,41,47,5D

"O" Fire output via serial command.

There are two subcommands available.

- **O01**

  Close output 1 for the time specified by the "Output Closure Time" setup GUI parameter located on the Trigger and Relay Settings page.

- **O02**

  Close output 2 for the time specified by the "Output Closure Time" setup GUI parameter located on the Trigger and Realy Settings page.

The example below will close Output 1 for the time specified by setup GUI parameter. No response is expected with this command.

Example	ASCII	HEX
Command	STX,O,0,1,ETX	STX,4F,30,31,ETX
Response	NA	NA

"Qauuuuuuuu" Put tag with UID uuuuuuuu into Quiet mode.

In Quiet mode, a tag will not respond to requests until it leaves the field of the antenna (Quiet mode does not persist when the tag leaves the antenna's field).

The example below is putting the Tag with a UID of E0,07,00,00,06,A6,B8,0B, into Quiet mode. No response is expected with this command.

Example	ASCII	HEX
Command	STX,Q,ETX (Tag UID omitted due to many ASCII NP characters)	02,51,0B,B8,A6,06,00,00,07,E0,03
Response	NA	NA

NOTE: For the following examples of Read commands assume that tag data contents are as pictured in below figure, Receive and Transmit Header = "STX" (hex 02) and the Receive and Transmit Trailer = "ETX" (hex 03).

"R" Read Tag

Read tag. There are eight available read commands:

- **R00bb**

  Read block "bb" a single time.

The example below will read block 05 of the tag in antenna's field.

Example	ASCII	HEX
Command	STX,R0005,ETX	02,52,30,30,30,35,03
Response	STX,NUL5555ETX	02,00,35,35,35,35,03

Note the null character ISO error flag of (0x00) is sent first after the transmit header and indicates that no errors occurred.

Response from above command when no tag is being read is shown below.

Example	ASCII	HEX
Command	STX,R0005,ETX	02,52,30,30,30,35,03
Response	STX,NO TAG,ETX	02,4E,4F,20,54,41,47,03

- **R01bbnn**

Read block bb and nn additional blocks a single time.

The example below will start reading at block 00 of the tag and also read 4 additional blocks of data starting from the first block after 00.

Example	ASCII	HEX
Command	STX,R010004,ETX	02,52,30,31,30,30,30,34,03
Response	STX,NUL,0000111122233334444,ETX	02,00,30,30,30,30,31,31,31,31,32,32..............34,03

Response from above command when no tag is being read is shown below.

Example	ASCII	HEX
Command	STX,R010004,ETX	02,52,30,31,30,30,30,34,03
Response	STX,NO TAG,ETX	02,4E,4F,20,54,41,47,03

- **R02bbuuuuuuuu**

Read block bb from tag with UID uuuuuuuu a single time.

Note that, since the UID is specified, an ISO15693 tag will respond even if it is in Quiet mode.

The example below will read block 05 from a tag with the UID of E0,07,00,00,06,A6,B8,0B,.

Example	ASCII	HEX
Command	STX,R0205,ETX (Tag UID omitted due to many ASCII NP characters)	02,30,32,30,35,0B,B8,A6,06,00,00,07,E0,03
Response	STX,NUL5555ETX	02,00,35,35,35,35,03

Response from above command when no tag is being read is shown below.

Example	ASCII	HEX
Command	STX,R0205ETX (Tag UID omitted due to many ASCII NP characters)	02,30,32,30,35,0B,B8,A6,06,00,00,07,03
Response	STX,NO TAG,ETX	02,4E,4F,20,54,41,47,03

- **R03bbnnuuuuuuuu**

Read block bb and nn additional blocks from tag with UID uuuuuuuu a single time.

Note that, since the UID is specified, the tag will respond even if it is in Quiet mode.

The example below will start reading at block 00 of the tag with the UID of E0,07,00,00,06,A6,B8,0B, and will also read 4 additional blocks of data starting from the first block after 00.

Example	ASCII	HEX
Command	STX,R030004,ETX (Tag UID omitted due to many ASCII NP characters)	02,30,33,30,30,30,34,0B,B8,A6,06,00,00,07,E0,03
Response	STX,NUL000011112222233334444, ETX	02,00,30,30,30,30,31,31,31,31,32,32...............34,03

Response from above command when no tag is being read is shown below.

Example	ASCII	HEX
Command	STX,R030004,ETX (Tag UID omitted due to many ASCII NP characters)	02,30,33,30,30,30,34,0B,B8,A6,06,00,00,07,E0,03
Response	STX,NO TAG,ETX	5B,4E,4F,20,54,41,47,5D

- **R04bb**

Continuous read and transmit of block bb.

Block bb is read continually from whatever tag is in the antenna field **until the EZREADER-HF receives an "E"** end continuous command (no RXHDR or RXTRL is required). This is most useful for a stream of tags passing a fixed antenna. Note that this command will continually send data if a tag is read, care should be taken by the end user to appropriately manage the host system receive buffers. If no Tag is read there will be no data sent

The example below will continually read and transmit block 01 of the tag that is in antenna's field.

Example	ASCII	HEX
Command	STX,R0401,ETX	02,52,30,34,30,31,03
Response	STX,NUL1111,ETX	02,00,31,31,31,31,03

Response from above command when no tag is being read is shown below.

Note if no tag is in the antenna field there will be no data sent by the EZREADER-HF, this helps reduce the amount of data that the host system needs to handle.

Example	ASCII	HEX
Command	STX,R0401,ETX	02,52,30,34,30,31,03
Response	NA	NA

- **R05bbnn**

Continuous read and transmit of block bb and following nn blocks.

Block bb and the subsequent nn blocks are read continually from whatever tag is in the antenna field **until the EZREADER-HF receives an "E"** (RXHDR and RXTRL is required). This is most useful for a stream of tags passing a fixed antenna. Note that this command will continually send data if a tag is read, care should be taken by the end user to appropriately manage the host system receive buffers. If no Tag is read there will be no data sent

The example below will start reading at block 00 and will also read 4 additional blocks of data starting from the first block after 00, while continually transmitting data.

Example	ASCII	HEX
Command	STX,R050004,ETX	02,52,30,35,30,30,30,34,03
Response	STX,NUL00001111222233334444,ETX	02,00,30,30,30,30,31,31,31,31,32,32……………34, 03

Response from above command when no tag is being read is shown below.

Note if no tag is in the antenna field there will be no data sent by the EZREADER-HF, this helps reduce the amount of data that the host system needs to handle.

Example	ASCII	HEX
Command	STX,R050004,ETX	02,52,30,34,30,31,03
Response	NA	NA

- **R06bb**

Continuous read of block bb, **transmit only once**.

Block bb is read continuously from whatever tag is in the field, **until the EZREADER-HF receives an "E"** (RXHDR and RXTRL is required). However, unlike the 04 option, the data is only transmitted once.

To re-initialize the reader to read the next tag, the "E" command must be sent after a successful tag read or no tag condition. This Sequence would look like this:

Asset present

R06bb → Tag read and transmitted/ no tag → E

Asset gone

Asset present

R06bb → Tag read and transmitted/ no tag → E

Asset gone

Etc.

The example below will continually read but transmit only once block 01 of the tag that is in the antenna's field.

Example	ASCII	HEX
Command	STX,R0601,ETX	02,52,30,36,30,31,03
Response	STX,NUL1111,ETX	02,00,31,31,31,31,03

Response from above command when no tag is being read is shown below.

Note if no tag is in the antenna field there will be no data sent by the EZREADER-HF, this helps reduce the amount of data that the host system needs to handle.

Example	ASCII	HEX
Command	STX,R0601,ETX	02,52,30,36,30,31,03
Response	NA	NA

- **R07bbnn**

Continuous read of block bb and next nn blocks, transmit only once.

Block bb and the next nn blocks are read continuously from whatever tag is in the field, until the EZREADER-HF receives an "E" (RXHDR and RXTRL is required). However, unlike the 05 option, the data is only transmitted once.

To re-initialize the reader to read the next tag, the "E" command must be sent after a successful tag read or no tag condition. This Sequence would look like this:

Asset present

R07bbnn → Tag read and transmitted or No Tag Read (No Data) → E

Asset gone

Asset present

R07bbnn → Tag read and transmitted or No tag Read → E

Asset gone

Etc.

NOTE: There is a limit of 20 characters (a total of 5 blocks) in the data read from the tag for this command.

The example below will start reading at block 00 and will also read 4 additional blocks of data starting from the first block after 00, but will transmit the data only one time.

Example	ASCII	HEX
Command	STX,R070004,ETX	02,52,30,37,30,30,30,34,03
Response	STX,NUL00001111222233334444,ETX	02,00,30,30,30,30,31,31,31,31,32,32…………..34,03

Response from above command when no tag is being read is shown below.

Note if no tag is in the antenna field there will be no data sent by the EZREADER-HF, this helps reduce the amount of data that the host system needs to handle.

Example	ASCII	HEX
Command	STX,R070004,ETX	02,52,30,37,30,30,30,34,03
Response	NA	NA

"S" Carrier Off (silence).

Response shown below from above command.

Example	ASCII	HEX
Command	STX,S,ETX	02,53,03
Response	NA	NA

This turns off the RF carrier (unit's transmitter turned off).

This can be useful after an Inventory command, since turning off the carrier will clear the "Quiet" mode of the tag.

"W" Write to tag.

There are three available options: writing a single block (W00), writing multiple blocks (W01) and writing a single block using the Tag UID (W02). Commands W00 and W01 will be used in almost every application.

- **W00bbdddd**

Write data dddd to block bb.

Note that the data dddd is 4 binary bytes (each byte can have any value, 0x00 to 0xFF). While the examples in this document use ASCII characters for clarity, this is not a requirement.

If the write is successful, the response will be TXHDR (if any), "YW" (Yes Write), and TXTRL (if any).

An unsuccessful write can reply with any of the following errors:

   NO TAG

   NO ANT

   COLL

   MISREAD

   NW<ISO flags>

The first four are normal EZREADER-HF error messages, the fifth is based on the ISO Flag Byte, and probably represents trying to write to a locked block.

The example below will successfully write "ABCD" to block 05 of the tag.

Example	ASCII	HEX
Command	STX,W0005ABCD,ETX	02,57,30,30,30,35,41,42,43,44,03
Response	STX,YW,ETX	02,59,57,03

The example below will try and write "ABCD" to block 05 of the tag, but no tag will be present in the antenna's field.

Example	ASCII	HEX
Command	STX,W0005ABCD,ETX	02,57,30,30,30,35,41,42,43,44,03
Response	STX,NO TAG,ETX	02,4E,4F,20,54,41,47,03

The example below will try and write "ABCD" to block 05 of the tag, but this block will be locked. Note the character "^R" (0x12) is the ISO Flag Byte and in this instance tells you that the block has been locked, so it's memory contents cannot be changed.

Example	ASCII	HEX
Command	STX,W0005ABCD,ETX	02,57,30,30,30,35,41,42,43,44,03
Response	STX,NW,DC2(Non Printable),ETX	5B,4E,57,**12**,5D

- **W01bbnndddd…..etc**

Write data dddd starting at block bb thru nn additional blocks. This is the multiple block write command, when using the amount of data sent **must exactly match the number of blocks to write**.

Note that the data dddd is 4 binary bytes (each byte can have any value, 0x00 to 0xFF). While the examples in this document use ASCII characters for clarity, this is not a requirement.

If the write is successful, the response will be TXHDR (if any), "YW" (Yes Write), and TXTRL (if any).

An unsuccessful write can reply with any of the following errors:

    NO TAG

    NO ANT

    COLL

    MISREAD

    NW<ISO flags>

The first four are normal EZREADER-HF error messages, the fifth is based on the ISO Flag Byte, and probably represents trying to write to a locked block.

The example below will successfully write "555566667777" to blocks 05 thru 07 (12 total bytes) of the tag.

Example	ASCII	HEX
Command	STX,W01050255556666677 77,ETX	02,57,30,31,30,35,30,32,35,35,35,35,36,36,36,36, 37,37,37,37,03
Response	STX,YW,ETX	02,59,57,03

The example below will successfully write "555566667777" to blocks 05 thru 07 (12 total bytes) of the tag.

Example	ASCII	HEX
Command	STX,W010502555566667777 ,ETX	02,57,30,30,30,35,41,42,43,44,03
Response	STX,NO TAG,ETX	02,4E,4F,20,54,41,47,03

The example below will try and write "ABCD" to block 05 of the tag, but this block will be locked. Note the character "^R" (0x12) is the ISO Flag Byte and in this instance tells you that the block has been locked, so its memory contents cannot be changed.

Example	ASCII	HEX
Command	STX,W0005ABCD,ETX	02,57,30,31,30,35,30,32,35,35,35,35,36,36,36,36,37,3 7,37,37,03
Response	STX,NW,DC2(Non Printable),ETX	5B,4E,57,12,5D

- **W02bbuuuuuuuudddd**

Write data bytes dddd to block bb of tag with UID uuuuuuuu.

Note that the data dddd is 4 binary bytes (each byte can have any value, 0x00 to 0xFF). While the examples in this document use ASCII characters for clarity, this is not a requirement.

Note that, since the UID is specified, the tag will respond even if it is in Quiet mode.

If the write is successful, the response will be TXHDR (if any), "YW" (Yes Write), and TXTRL (if any).

An unsuccessful write can reply with any of the following errors:

NO TAG

NO ANT

COLL

MISREAD

NW<ISO flags>

The first four are normal EZREADER-HF error messages, the fifth is based on the ISO flagbyte, and probably represents trying to write to a locked block.

The example below will successfully write "ABCD" to block 05 of a tag with a UID of E0,07,00,00,06.A6,B8,0B. Note tag UID sent in reverse.

Example	ASCII	HEX
Command	STX,W0205,(Tag UID omitted due to many ASCII NP characters),ABCD,ETX	02,30,32,30,35,0B,B8,A6,06,00,00,07,E0,41,42,43,44,03
Response	STX,YW,ETX	02,59,57,03

The example below will try and write "ABCD" to block 05 of a tag with a UID of E0,07,00,00,06.A6,B8,0B, but no tag will be present in the antenna's field. Note tag UID sent in reverse.

Example	ASCII	HEX
Command	STX,W0205,(Tag UID omitted due to many ASCII NP characters),ABCD,ETX	02,30,32,30,35,0B,B8,A6,06,00,00,07,E0,41,42,43,44,03
Response	STX,NO TAG,ETX	02,4E,4F,20,54,41,47,03

The example below will try and write "ABCD" to block 05 of a tag with a UID of E0,07,00,00,06.A6,B8,0B, but this block will be locked. Note tag UID sent in reverse.

Example	ASCII	HEX
Command	STX,W0205,(Tag UID omitted due to many ASCII NP characters),ABCD,ETX	57,30,32,30,35,0B,B8,A6,06,00,00,07,E0,41, 42,43,44
Response	STX,NW,DC2(Non Printable),ETX	02,4E,57,12,03

Host Control Mode Read Rate Diagnostic Commands

- **R96bbnn**

Read rate test.

This read rate test reads block bb and the next nn blocks 100 times, and counts the number of successful and unsuccessful reads.

The example below will start reading at block 00 and will also read 9 additional blocks of data starting from the first block after 00.Each block will be read 100 times. The number of successful and unsuccessful reads if any will be displayed.

Example	ASCII	HEX
Command	STX,R960009,ETX	02,52,39,36,30,30,30,39,03
Response	STX,VALID,SP,READS:SP,100/100,SP(100.0%)SP,SP CR,LF,ETX	02,56,41,4C,49,44,2052,45,41,44,53,3A,20,31,30,3 0,2F,31,30,30,20,28,31,30,30,2E,30,25,29,20,20,O D,OA,03

Response from above command with no tag being read is shown below.

Example	ASCII	HEX
Command	STX,R960009,ETX	02,52,39,36,30,30,30,39,03
Response	STX,VALID,SP,READS:SP,0/100,SP,(0.0%)SP,S P 100,SP,NOTAGS,SP,SP,CR,LF,ETX	02,56,41,4C,49,44,20,52,45,41,44,53,3A,20,30,2F,31,3 0 30,20,28,30,2E,30,25,29,20,20,31,30,30,20,4E,4F,54,4 1 47,53,20,20,OD,OA,03

Note SP is shown in the ASCII response to show where spaces are inserted within the response message; also note the CR and LF before the TXTRL.

If there are read errors, they will be reported along with the valid read information. For example,

R960009

Might return

STX,VALID READS: 85/100 (85.0%) 4 NOTAGS 5 MISREADS 6 COLLISIONS

ETX

Note that Ra960000 does the same test as Ra99 with extended result reporting.

- **R97bb**

Read rate test. This read rate test reads blocks 0 to bb 100 times each, and counts the number of successful and unsuccessful reads.

The example below will read block 00 thru 09 100 times per each block with a tag in the antenna's field. The number of successful and unsuccessful reads of the entire 1000 reads will be displayed.

Example	ASCII	HEX
Command	STX,R9709,ETX	02,52,39,37,30,39,03
Response	STX,VALID,SP,READS:SP,1000/1000,SP(100.0%)SP, SP CR,LF,ETX	02,56,41,4C,49,44,2052,45,41,44,53,3A,20,31,30 30,2F,31,30,30,30,,20,28,31,30,30,2E,30,25,29, 20,20,OD,OA,03

Response from above command with no tag being read is shown below.

Example	ASCII	HEX
Command	STX,R9709,ETX	02,52,39,37,30,39,03
Response	STX,VALID,SP,READS:SP,0/1000,SP,(0.0%)SP, SP 1000,SP,NOTAGS,SP,SP,CR,LF ,ETX	02,56,41,4C,49,44,20,52,45,41,44,53,3A,20,30,2F,31, 30 30,30,20,28,30,2E,30,25,29,20,20,31,30,30,30,20,4E, 4F, 54,41,47,53,20,20,OD,OA,03

Note the CR/LF before the TXTRL.

If there are read errors, they will be reported along with the valid read information.

Note that R9700 does the same testing as R99 with extended result reporting.

- **R98bb**

Read rate test. This read rate test reads block bb 100 times and counts the number of successful and unsuccessful reads.

The example below will read block 09 100 times with a tag in the antenna's field. The number of successful and unsuccessful reads will be displayed.

Example	ASCII	HEX
Command	STX,R9809,ETX	02,52,39,38,30,39,03
Response	STX,VALID,SP,READS:SP,100/100,SP(100.0%)SP,S P CR,LF,ETX	02,56,41,4C,49,44,20,52,45,41,44,53,3A,20,31,30 30,2F,31,30,30,20,28,31,30,30,2E,30,25,29,20,20, OD,OA,03

Response from above command with no tag being read is shown below.

Example	ASCII	HEX
Command	STX,R9809,ETX	52,39,38,30,39
Response	STX,VALID,SP,READS:SP,0/1000,SP,(0.0%)SP, SP 100,SP,NOTAGS,SP,SP,CR,LF ETX,	02,56,41,4C,49,44,20,52,45,41,44,53,3A,20,30,2F,31, 30 30,20,28,30,2E,30,25,29,20,20,31,30,30,20,4E,4F,54, 41, 47,53,20,20,OD,OA,03

Note the CR/LF before the TXTRL.

R9809

Might also return

STX,VALID READS: 88/100 (88.0%) 3 NOTAGS 4 MISREADS 5 COLLISIONS

ETX

Note that R9800 does the same testing as R99 with extended result reporting.

R99

Read rate test. This read rate test reads block 0 100 times and counts the number of successful reads.

The example below will read block 00 100 times with a tag in the antenna's field. The number of successful reads will be displayed.

Example	ASCII	HEX
Command	STX,R99,ETX	02,52,39,39,03
Response	STX,VALID,SP,READS:SP,100/100,CR,LF,ETX	02,56,41,4C,49,44,20,52,45,41,44,53,3A,20,31,30 30,2F,31,30,0D,0A,03

Response from above command with no tag being read is shown below.

Example	ASCII	HEX
Command	STX,R99,ETX	02,52,39,39,03
Response	STX,VALID,SP,READS:SP,0/100,CR,LF,ETX	02,56,41,4C,49,44,20,52,45,41,44,53,3A,20,30,2F,31,30, 30,0D,0A,03

Note the CR/LF but before the TXTRL.

If there are read errors, they are not reported.

Quick Reference Command Chart

Command	Option	Block #	Additional Block	UID	Data
R	00	bb			
	01	bb	nn		
	02	bb		uuuuuuuu	
	03	bb	nn	uuuuuuuu	
	04	bb			
	05	bb	nn		
	06	bb			
	07	bb	nn (max 20 bytes)		
	96	bb	nn		
	97	bb			
	98	bb			
	99				
E					
L	00	bb			
	02	bb		uuuuuuuu	
W	00	bb			dddd
	01	bb	nn		Matches number of blocks being written.
	02	bb		uuuuuuuu	dddd
Q				uuuuuuuu	
I					
O	01				
	02				
S					

Troubleshooting

Reader not responding to serial commands:

6. Verify the power indicator is lit, if not apply power to the unit.

7. Verify the serial communications indicator flashes when a byte is sent

8. Check communications cabling.

9. Make sure unit is configured to work on the port and baud rate that you are using.

10. Verify you are using the correct headers and trailers and both Trigger settings are (0).

> **NOTE:** See Setup mode of operation for further details on configuring unit.

Unable to read a Tag present in the field (Tag Comm indicator does not light):

11. Check antenna cabling.

12. Ensure the antenna is not near any metal surfaces or sources of EMI.

13. Check antenna indicator ensuring that it matches port connected to antenna.

14. Make sure protocol is correct for the tag type being used.

15. If using a terminal emulation program ensure that printable characters are programmed into tag.

16. Ensure that antenna is tuned properly. Perform EZTune

17. Ensure that tag is not being detuned by article that it is attached to. Items such as metal and conductive plastics that contain carbon will detune tag and reduce its performance. Items that are carried within article that tag is attached to may also lead to detuning of tag.

Reader does not respond to a trigger

1. Verify Trigger cabling is correct.

2. If using Non-Isolated inputs, be aware the trigger is active low and should be connected to an open collector type drive circuit. If using isolated inputs you must provide both positive and negative voltage connections.

3. Verify that the Trigger you are using is set up properly.

4. Verify Trigger signal is asserted for more than 10ms to overcome internal debounce.

EZReader HF Interface Software

Getting Started

The EZReader™ HF and EZTune™ Antennas are designed for ease-of-setup, allowing you to program the RFID reader and antenna to fit your application seamlessly.

The EZReader HF Interface, functioning under the familiar Windows® operating system on your computer, is the tool you will use to easily configure, fine-tune, and monitor your EZReader HF's operations.

The setup software provides ease-of-use for any operator level. A beginner operator follows basic setup procedures for a standard configuration. More experienced operators may use the advanced setup features that allow access to more complex options. In either case, the user-friendly Setup Wizard efficiently guides you through a sequence of screens until the EZReader HF and its antenna is configured to fit your application.

Installing the EZReader HF Interface

Insert the EZReader HF Interface CD in your CD drive.

Click the Install EZReader HF icon.

Follow the prompts to install the EZReader HF Interface on your computer.

Starting the EZReader HF Interface

To start the EZReader HF Interface in the Windows environment
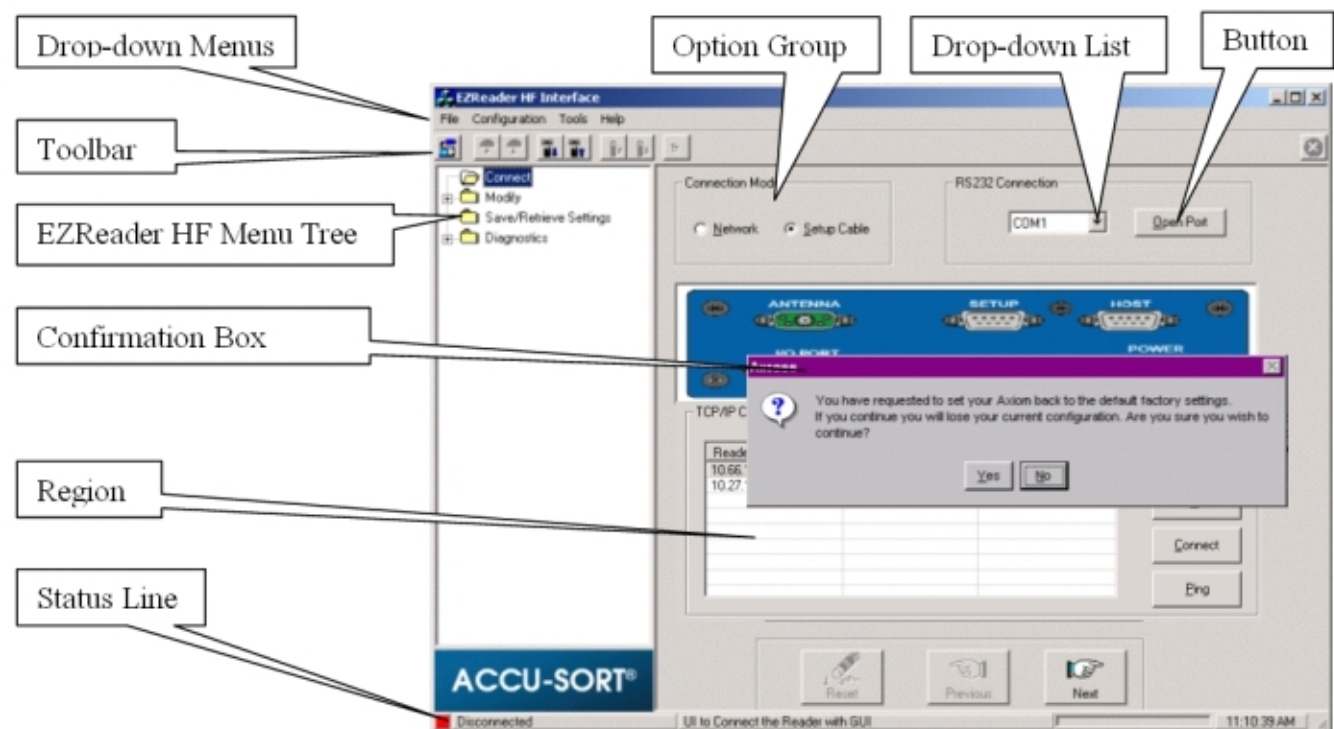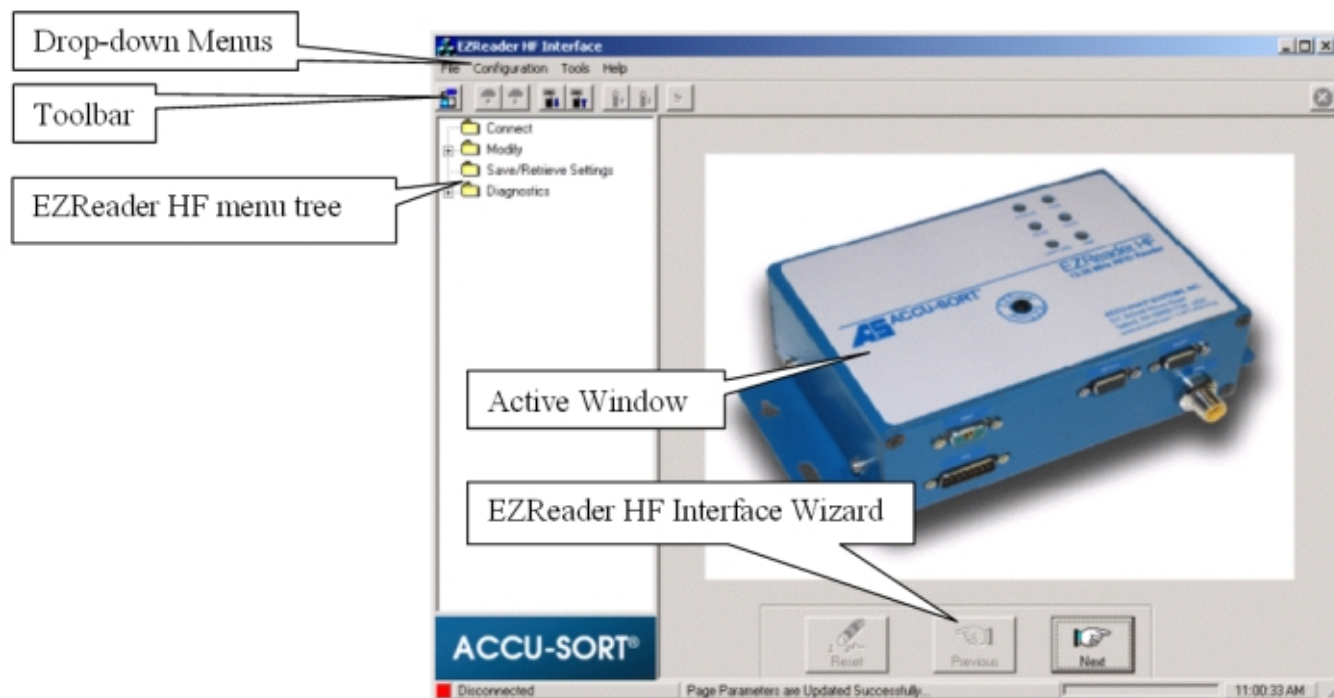
5. Locate the EZReader HF Interface icon on your computer.

6. Double-click the icon to launch.

7. After starting the EZReader HF Interface, the first window you see is the Main window, as shown in Figure 2-1.

EZReader HF Interface Basics

The following information introduces you to the EZReader HF Interface and teaches you a few simple concepts and functions you need to start working with EZReader HF. Specifically, this chapter describes how to:

- Use EZReader HF Wizard's step-by-step approach to configuring a reader.
- Navigate around the application using the EZReader HF Interface menu tree.

To use the EZReader HF Interface effectively, you need to understand its user interface. The figures in this chapter show EZReader HF Interface running in a Window environment, displaying windows typically seen when using Windows 98-XP. The table following the figures helps illustrate the meaning of the terms shown.

Drop-down Menus

Toolbar

EZReader HF menu tree

Active Window

EZReader HF Interface Wizard

Drop-down Menus

Option Group

Drop-down List

Button

Toolbar

EZReader HF Menu Tree

Confirmation Box

Region

Status Line

Term	Definition
Screen	Represents the information display area of your computer monitor. Also referred to as a desktop.
Window	A window is a box around a set of related information on your screen. Many windows can appear on your screen simultaneously and can overlap, appear adjacent to, or on top of each other. You can move a window to a different location on your screen.
EZReader HF Interface Window Title	Each window title is identified by the highlighted folder or check-marked selection in EZReader HF menu tree. Window titles may also appear at the top of new windows that appear on-screen.
EZReader HF Interface Setup Window	Whenever you launch EZReader HF Interface, the EZReader HF Interface window appears on your screen. This window displays the drop-down menu bar, toolbar, EZReader HF Interface Wizard and EZReader HF menu tree.
EZReader HF Interface Wizard	Use the EZReader HF Interface Wizard's 3 buttons (previous, next, and reset) to logically step through the process of completely configuring an EZReader HF and its antenna. Recommended for first-time/novice users.
EZReader HF Menu Tree	Use the EZReader HF Menu Tree's navigation list when you need to modify specific setup parameters, save/retrieve settings, or access reader diagnostics.
Confirmation Box	Certain actions you perform in EZReader HF Interface may cause a modal window to display. A confirmation box requires you to act on its contents before you can continue, usually by choosing OK or Cancel.
Block	Every EZREADER HF INTERFACE window consists of one or more blocks containing information on specific setup parameter. All required fields in a block must be completed before you can move to the next block or setup window. The first or only block in a window assumes the name of the window. Otherwise, block names appear across the top of the block. A horizontal line marks the beginning of the block.
Region	A region is a collection of logically–related fields set apart from other fields by a rectangular box. Each block can optionally contain one or more regions. Regions help to organize the information within a block. A scrollable region is a region whose contents are not entirely visible in a window. A scrollable region contains a horizontal or vertical scroll bar so that you can scroll horizontally or vertically to view additional fields hidden in the region. In addition, if a field is partially hidden you can scroll the region to fully display the field by clicking on the partially hidden field.
Field	Each block contains fields you use to enter, view, update, or delete information. A field prompt describes each field by telling you what kind of information appears in the field or what kind of information you should enter in the field. Fields that allow you to enter data are white and display a beveled border. Fields that are display–only are white and do not have a beveled border. If a field is disabled, it is dimmed. The term field generally refers to a text field, an area in a window that either displays data or allows you to enter data.
Check box	You can indicate an on/off or yes/no state for a value by checking or unchecking its check box.

Term	Definition
Option Group	An option group is a set of option buttons. You can choose only one option button in an option group at a time, and the option group takes on that button's value after you choose it.
Status Line	The status line, located along the bottom of the EZReader HF Interface window, displays helpful hints or status messages during reader setup and diagnostics. May also be referred to as the message line.
Drop-down Menu	These menus (File, Configuration, Tools, and Help) are across the top left corner of the EZReader HF Interface window, just below the window title.
Drop-Down List	A drop-down list, or poplist, lets you choose a single value from a short list. To choose a value, click the drop-down list down-arrow to display the list choices, then drag your mouse through the list to the desired value. Release your mouse button to choose the highlighted value and display it in the drop-down list field.
Toolbar	The Toolbar is a collection of iconic buttons that each perform a specific action when you choose it. Each button replicates a commonly–used function also found in the drop-down menus and Menu Tree. Use your mouse to move the arrow cursor over the toolbar to display the functional names of the buttons.
Button	You choose a button to initiate a predefined action. A button is usually labeled with text to describe its action or it can be an icon whose image illustrates its action. Depending on the context of a field or window, a button can be enabled or disabled.

Navigating the EZReader™ HF Interface

Once you proceed to the next screen and begin reader setup, the Main window is not accessible again until you exit and restart the EZReader™ HF Interface.

Click **Next** to continue to the Modify window.
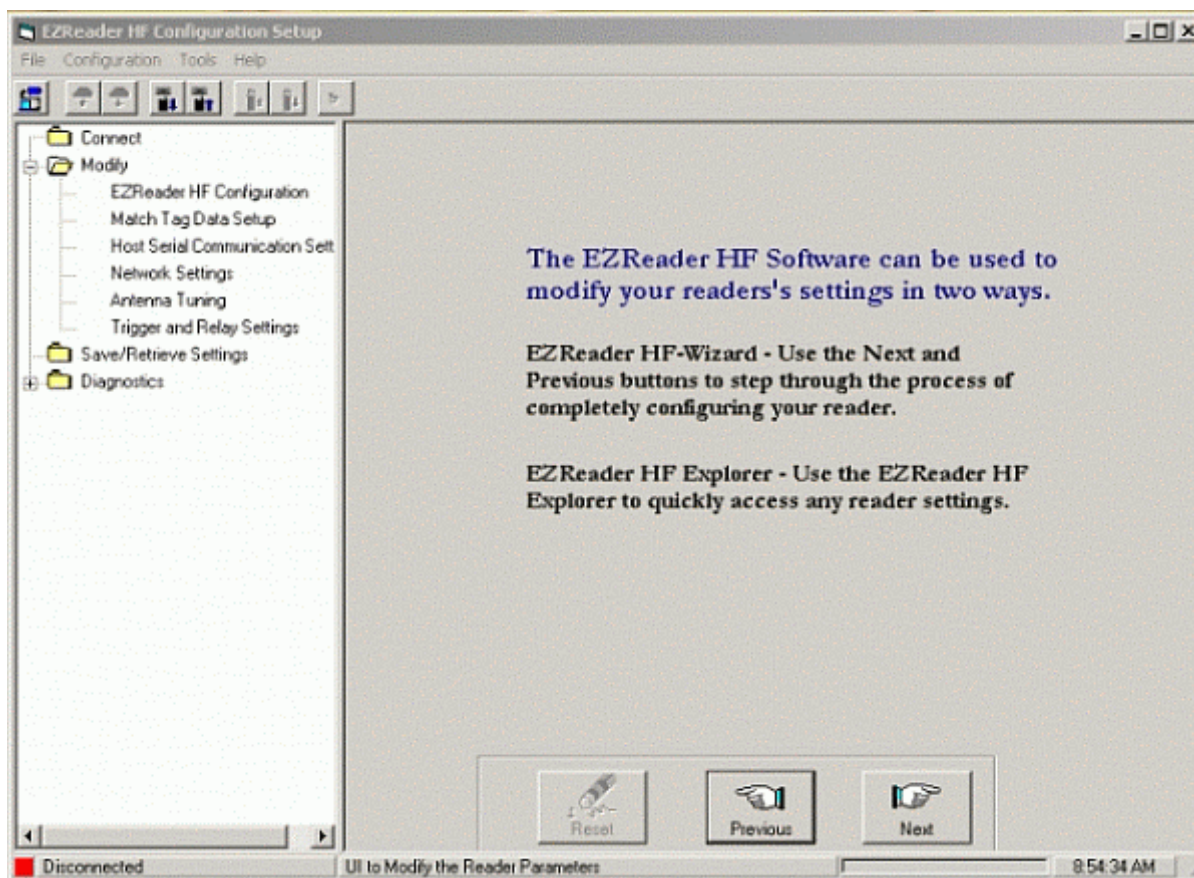
The Modify window introduces you to EZReader™ HF Interface Wizard and menu tree. The menu tree, the frame on the left side of every window, allows easy navigation through the setup windows. This frame is a dynamic interface: Depending on the selection of certain options, and the configuration of your reader, access to specific windows becomes available.

You can navigate through the EZReader™ HF Interface using any of three methods:

- Menu Bar
- Menu Tree
- EZReader™ HF Interface Wizard

Menu Bar

The main menu bar includes the following pull–down menus:

- File
- Configuration
- Tools
- Help

You use these menus to navigate quickly to specific EZReader™ HF Interface functions, to save, edit or retrieve data, or to perform various actions.

Tool Bar

The toolbar includes the following buttons:
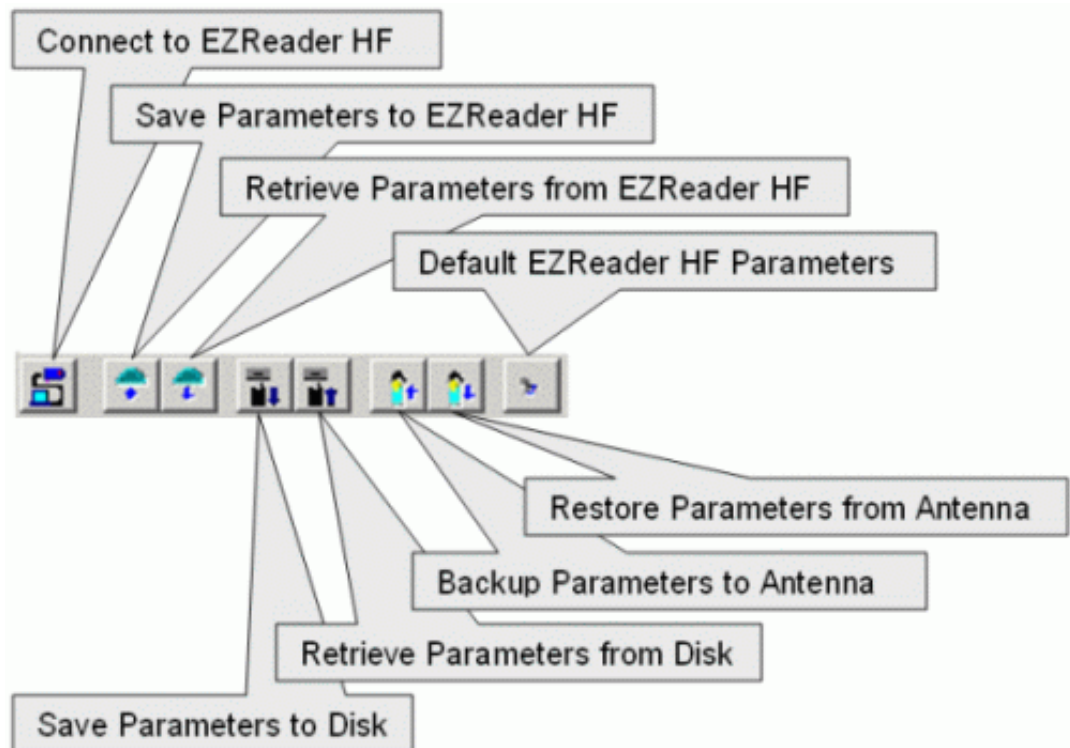
Click on the buttons to complete the named tasks.

Menu Tree

The functions that you can select are displayed in a navigation list on the left–hand side of the EZReader™ HF Interface frame. The function list is organized much like the hierarchy of a file system, where you can expand items that begin with a plus sign (+) to further sub–levels until you find a function of interest.

Sub–levels appear indented below the items from which they are expanded. Items that are expanded are preceded by a minus sign (–). You can expand no further when an item displays neither a plus or minus sign.

The Menu Tree list appears with no items expanded. Click the folders to display the active window for the setup function and/or expand the folders to view any additional setup features.

EZReader™ HF Interface Wizard Buttons

The reset, previous, and next buttons are part of the EZReader™ HF Interface Wizard. The wizard allows you to proceed easily through a predefined sequence of screens in the reader setup. Each screen must be completed before you can proceed to the next screen.

Button	Function
Reset	Quickly reverts all the values on any actively displayed screen to the configured default values.
Previous	Steps to the previously displayed screen. Use this button to step back through one or more screens.
Next	Steps to the next available EZREADER HF INTERFACE screen. Typically, you will need to complete the current screen before going to the next screen.

Getting Help

The EZReader™ HF Interface provides complete online help. Whenever you need assistance, simply choose an item from the Help Index to pinpoint the information you want.

To display help for a current window:

Choose Help Index from the Help drop-down menu or press the F1 key. A help window appears, providing you with information and an index of topics associated with the current application window.

Click a topic of interest to display more detailed information.

You can use the menus or buttons in the help window to navigate to other topics of interest, or from the File menu in the help window, you can choose Exit to quit from Help.

USEFUL TIP: Pressing F1 will bring up Help for the current EZReader™ HF Interface window.

Connecting to EZReader HF

Use Connect functions to connect to a reader in order to modify, send, or retrieve any parameters. Upon startup, your EZReader HF remains disconnected until you activate the command to connect.
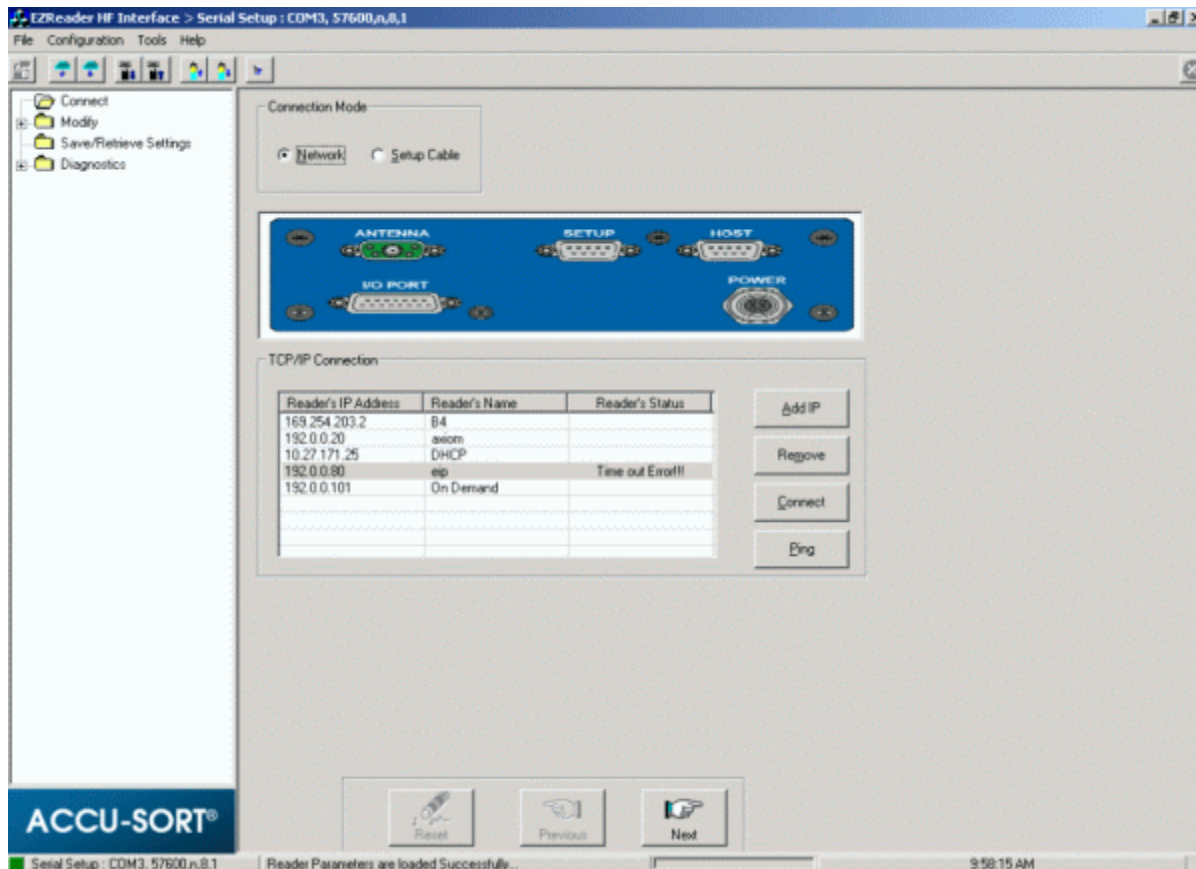
There are two ways to make a connection to EZReader HF:

- EZReader HF Setup Programming Cable (standard) or
- Through a connection with your Network (typically Ethernet)

Power

To power up the reader:

1. Connect the power supply to EZReader HF and to a power outlet. As the unit boots up, its top four LEDs will light up (STATUS, PWR, READ, HOST). If the boot process is successful, the STATUS, READ, and HOST LEDs blink three times, and then the STATUS LED stays on solid green.

Connecting with a Setup Cable

**To connect to your EZReader HF reader via the setup cable:**

1. Connect the programming cable to the setup connector located on the front of the EZReader HF.
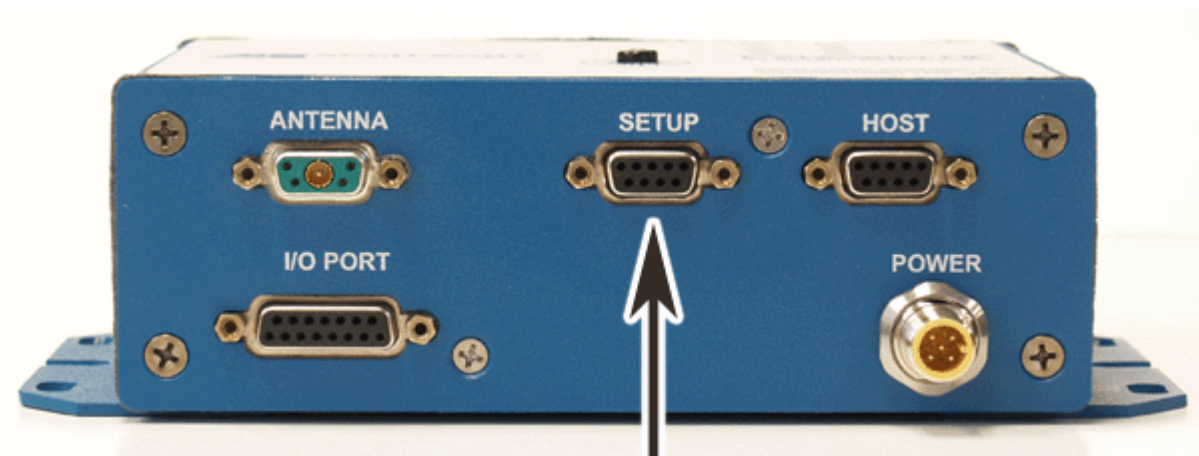
2. Connect the other end of the programming cable to your PC. Be sure to note which COM port you are connected to on your PC.

3. Click the EZReader HF Interface Wizard's Next button (You can also use the menu tree Connect function, the Connect button on the button menu or Connect to EZReader HF from the Configuration drop-down menu.) The Connect window opens.
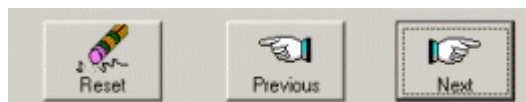

4. The type of connection chosen, setup cable or network, determines which options will be displayed. In the Connection Mode options group, click **Setup Cable**. (The EZReader HF Interface is preset to default to the Network mode.)
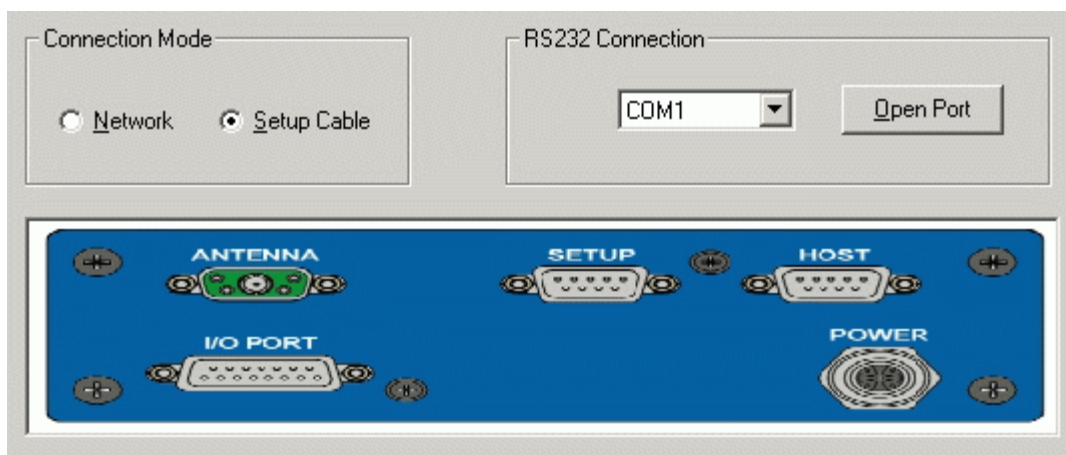
5. Select the correct COM port from the RS232 Connection drop-down list.

To open a communication port:

6. Click **Open Port**.

7. Once the reader connection is complete, the status bar displays a green square and connection information.

8. Serial Setup : COM3, 57600,n,8,1

9. If a connection is not made, an error message is displayed.
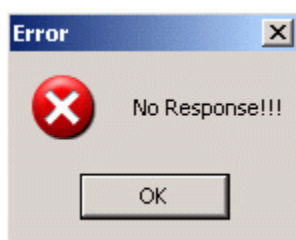
10. Check the cable connection between the reader and computer to assure proper connection, and then click Open Port.

Connecting with a Network Cable

In order to connect the reader to the network it must have a valid IP address.

To find the IP address for the reader:

1. Connect the supplied serial cable from your PC to the Setup port on the EZReader HF.

2. Once connected, click Modify/Network Settings on the interface menu tree. The Network Settings form opens.

3. If the Enable DHCP (Dynamic Host Configuration Protocol) is checked, the IP Address should be shown in the **IP information for EZReader HF reader field**. Write down the IP address shown for future reference.
   **IP:** _____ _____ _____ _____

4. If the Enable DHCP check box is not checked, you can type the IP in the text fields (if you already know the valid IP address for the reader.) Reboot the unit to update the settings.

To connect to your EZReader HF reader via network:

1. Connect the EZReader HF to your Ethernet network with the supplied adapter cable.

2. Find or assign a valid IP address for the EZReader HF.

3. In the Connection Mode options group, click **Network**.

4. If this is the first time you are using this EZReader HF unit, click A**dd IP**. The Add/Edit IP Address popup window appears.
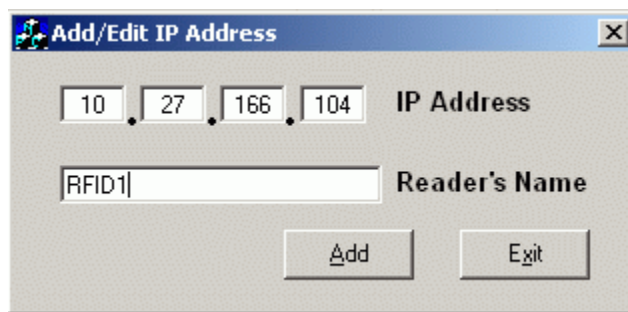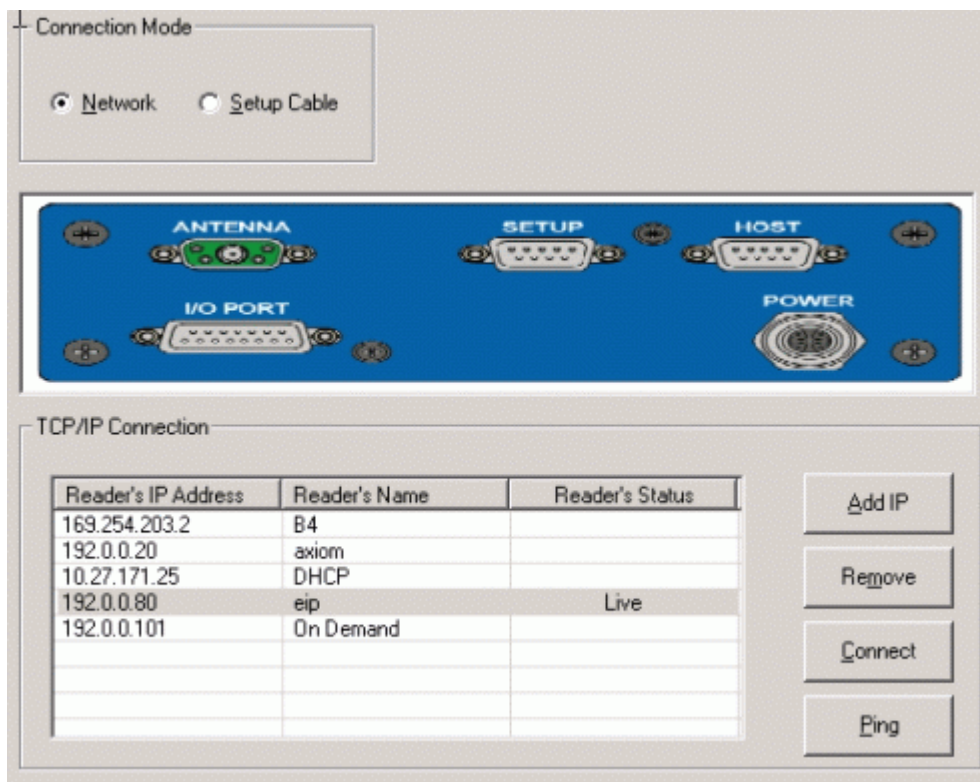

5. Type EZReader HF unit's IP Address in the **IP Address** field, and type a name for the reader in the **Reader's Name** field.

6. Click **Add**.

> **NOTE:** Repeat steps 4, 5 and 6 in the Add/Edit IP Address popup window to enter as many readers as necessary for your application.

7. Select the reader's IP address from the Reader's IP Address list.

Connection Mode

• Network   C Setup Cable

TCP/IP Connection

Reader's IP Address	Reader's Name	Reader's Status
169.254.203.2	B4	
192.0.0.20	axiom	
10.27.171.25	DHCP	
192.0.0.80	eip	Live
192.0.0.101	On Demand	

Add IP

Remove

Connect

Ping

8. To verify the EZReader HF can be accessed on the network, click **Ping**. The status will be returned in the Reader's Status column on the Connection window as "Live."
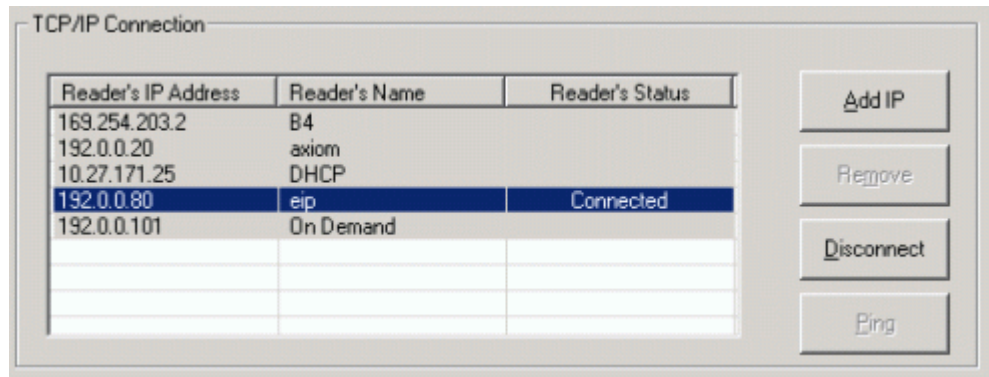
> **NOTE:** The Subnet Mask for used by the reader must match that of the network, and the IP Address should be in the same range.

To check this from your PC:

1. Click **Start/Settings/Control Panel**.
2. From the Control Panel, open **Network Connections/Local Area Connection**.
3. Choose the General tab and click **Properties**.
4. Select Internet Protocol (TCP/IP) from the list and click **Properties.**
5. The Internet Protocol (TCP/IP) Properties box should list the IP address and Subnet mask. If it is not shown, contact your network administrator for the information.

9. To connect to the EZReader HF over the network, click **Connect**. The reader's status should change to "Connected," and the status line at the bottom of the screen should display a green square and the network IP address.

NETWORK IP:192.0.0.80

TCP/IP Connection

Reader's IP Address	Reader's Name	Reader's Status	
169.254.203.2	B4		Add IP
192.0.0.20	axiom		
10.27.171.25	DHCP		Remove
192.0.0.80	eip	Connected	
192.0.0.101	On Demand		Disconnect
			Ping

Modify

Use Modify functions to set all operational parameters for EZReader HF to fit your application.

The parameters are divided into the following categories:

- EZReader HF Configuration
- Match Tag Data Setup
- Host Serial Communication
- Network Settings
- Antenna Tuning
- Trigger and Relay Settings

The following Modify menu items only appear if another function is enabled:

- Message Definition Host Serial Port (User Defined Message selected)
- Message Definition – Net #1 (User Defined Message selected)
- Message Definition – Net #2 (User Defined Message selected)
- Modbus Settings (Modbus TCP enabled)
- Ethernet/IP Settings (Ethernet/IP selected)
- Modbus Settings (Modbus selected)
- EZReader HF Input/Output Objects Settings (Ethernet/IP or Modbus selected)
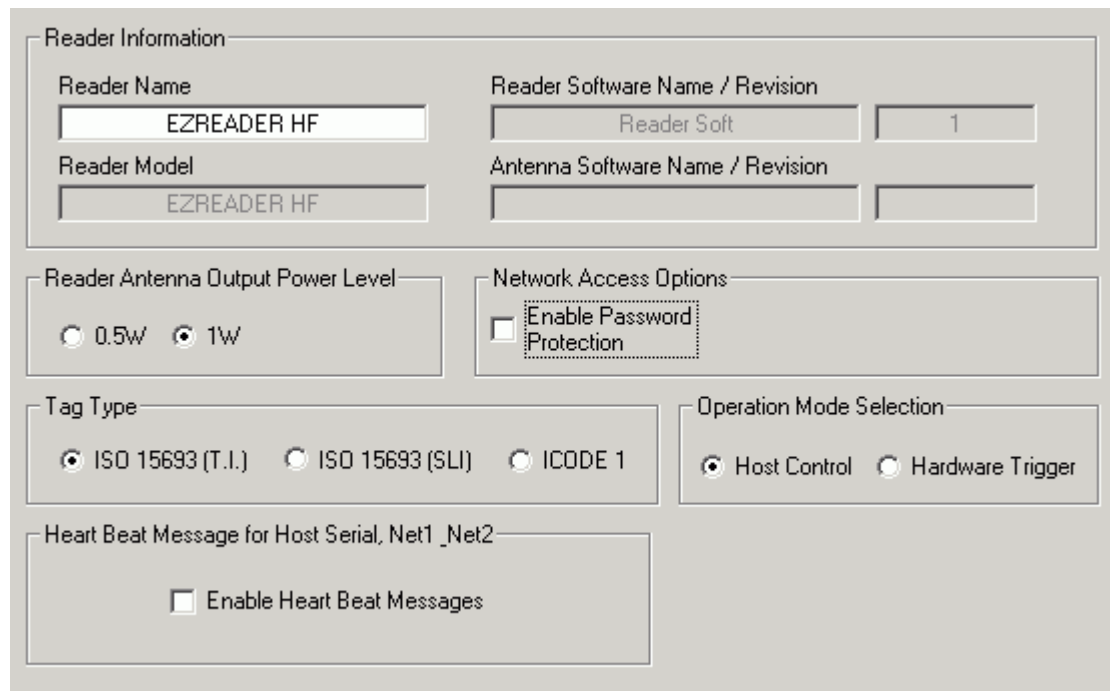
EZReader HF Configuration

Use the EZReader HF Configuration functions to identify and define the reader name and related software names, revisions, antenna output, network password, tag type, host or trigger modes and heart beat.

To Open EZReader HF Configuration:

1. Click **Modify/EZReader HF Configuration** in the tree menu.

2. The EZReader HF Configuration form opens.

To Configure the Reader:

1. In the tree menu, click Modify/EZReader HF Configuration. The EZReader HF Configuration form opens.
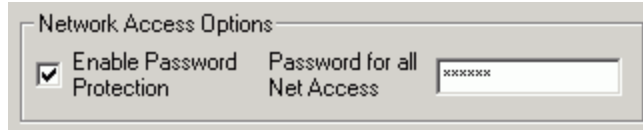

NOTE: You can also use the EZReader HF Interface Wizard to move logically through the reader setup. Click **Next** or **Previous** to move through the interface.

2. Enter a custom name for the reader in the **Reader Name** field. The reader model, reader software name, antenna software name, and revisions fill in automatically when the interface software connects to the EZReader HF.

3. Click an option under Reader Antenna Output Power Level. The default is 1w. Lower wattage decreases the read range of the reader.

4. Check **Enable Password Protection** to input a network password if needed.

Network Access Options
☑ Enable Password Protection   Password for all Net Access   ××××××
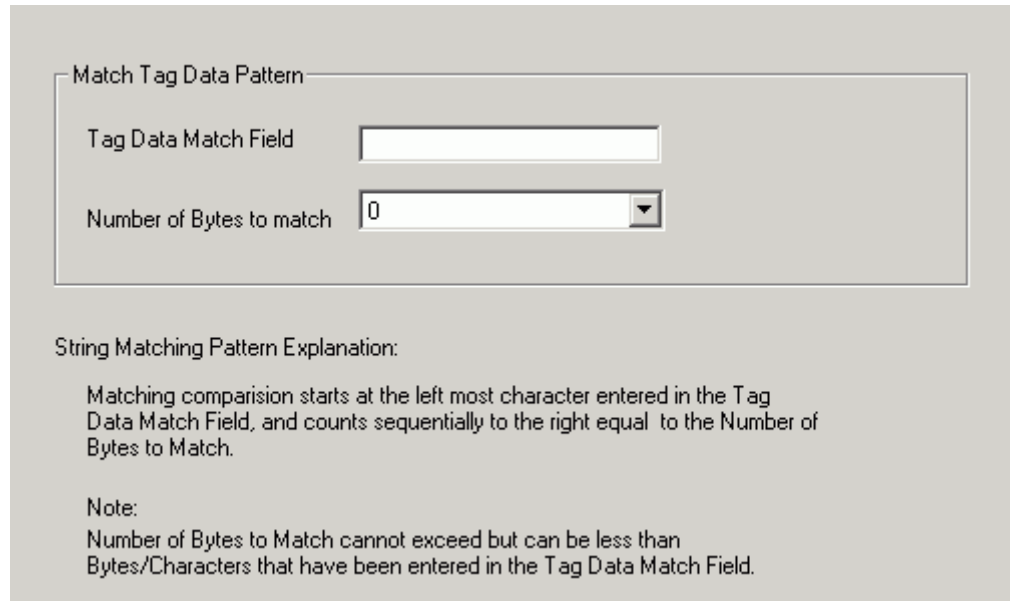
5. Type the password in the **Password for all Net Access** text field.

6. Click an option under **Tag Type** to select the type of tag used in your application. The default is ISO 15693 (T.I.)

7. Click an option under **Operation Mode Selection**. If your application uses one or more photoeyes, choose **Hardware Trigger** (autonomous mode) otherwise choose **Host Control**.

8. Check **Enable Heart Beat Message** to send heart beat messages to the host.

9. Click the Save Parameters to EZReader HF icon in the toolbar to save any changes.

Match Tag Data Setup

Use the Match Tag Data Setup function to define a set of characters that must be found in tags that are read. The Matching comparison starts at the left most character entered in the Tag Data Match Field, and counts sequentially to the right equal to the Number of Bytes to Match.

Match Tag Data Pattern

Tag Data Match Field [   ]

Number of Bytes to match [0   ▼]

String Matching Pattern Explanation:

Matching comparision starts at the left most character entered in the Tag Data Match Field, and counts sequentially to the right equal to the Number of Bytes to Match.

Note:
Number of Bytes to Match cannot exceed but can be less than Bytes/Characters that have been entered in the Tag Data Match Field.

To Open Match Tag Data Setup:

1. Click **Modify/Match Tag Data Setup** in the tree menu.

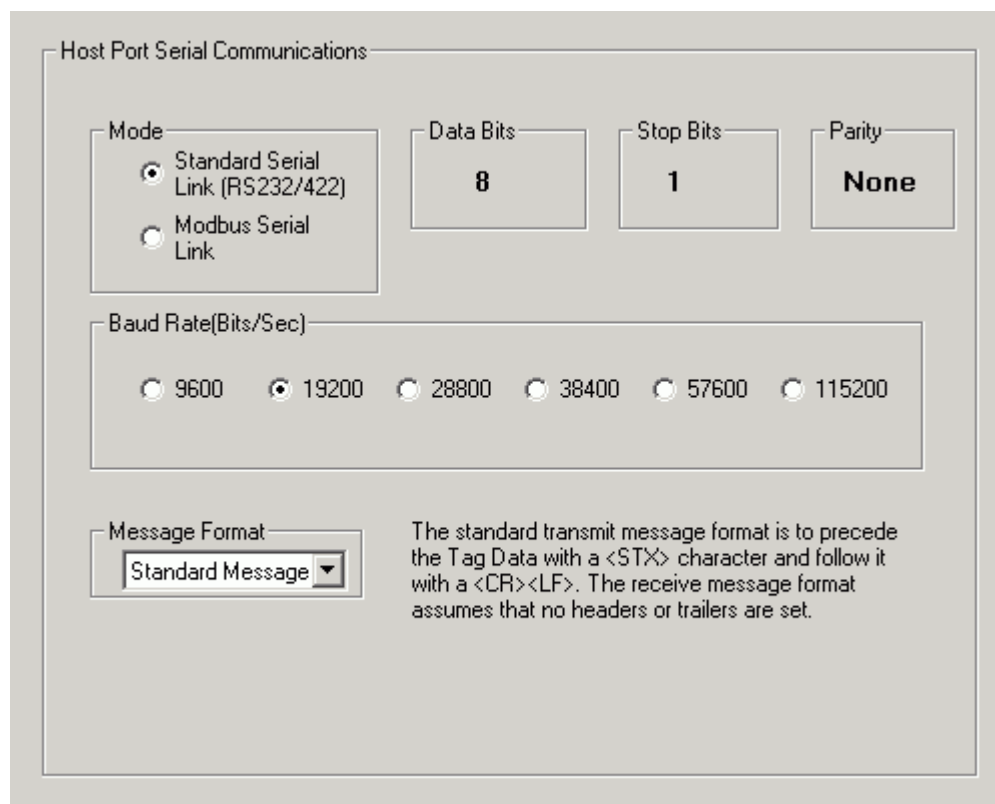2. The Match Tag Data Setup form opens.

To Enter Match Tag Data:

1. Click on Modify/Match Tag Data Setup from the menu tree. The Match Tag Data Setup form opens.

2. Choose the number of bytes (characters) you wish to enter from the **Number of Bytes to Match** drop-down list. You can choose from 0-16 bytes.

3. Type the character string you wish to match in the **Tag Data Match Field**. The number of characters entered cannot exceed the number of bytes chosen in the **Number of Bytes to Match** drop-down list.

4. Click the Save Parameters to EZReader HF icon in the toolbar to save any changes.

Host Serial Communication Settings

Use the Host Serial Communications Settings function to set up communications between EZReader HF and the host computer. The form displays the number of data bits used, number of stop bits used, and parity, and allows user input for Mode, Baud Rate, and Message Format.

```
┌─ Host Port Serial Communications ──────────────────────────────────────┐
│                                                                         │
│  ┌─ Mode ──────────────┐  ┌─ Data Bits ─┐ ┌─ Stop Bits ─┐ ┌─ Parity ─┐ │
│  │  ⦿ Standard Serial  │  │      8      │ │      1      │ │   None   │ │
│  │     Link (RS232/422)│  │             │ │             │ │          │ │
│  │  ○ Modbus Serial    │  └─────────────┘ └─────────────┘ └──────────┘ │
│  │     Link            │                                                │
│  └─────────────────────┘                                               │
│                                                                         │
│  ┌─ Baud Rate(Bits/Sec) ──────────────────────────────────────────────┐│
│  │                                                                     ││
│  │  ○ 9600   ⦿ 19200   ○ 28800   ○ 38400   ○ 57600   ○ 115200         ││
│  │                                                                     ││
│  └─────────────────────────────────────────────────────────────────────┘│
│                                                                         │
│  ┌─ Message Format ────┐   The standard transmit message format is to precede │
│  │ Standard Message ▼  │   the Tag Data with a <STX> character and follow it  │
│  └─────────────────────┘   with a <CR><LF>. The receive message format        │
│                            assumes that no headers or trailers are set.       │
│                                                                         │
└─────────────────────────────────────────────────────────────────────────┘
```

To Open Host Serial Communication Settings:

1. Click **Modify/Host Serial Communication Settings** in the tree menu.

2. The Host Serial Communication Settings form opens.

To Choose the Communication Mode:

1. Click either the **Standard Serial Link (RS232/422)** or **Modbus Serial Link** options in the **Mode** portion of the form.

    > **NOTE:** If Modbus is chosen, Modbus Settings and EZReader HF Input/Output Objects Settings form links are added to the menu tree.

2. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

To Choose the Communication Baud Rate:

1. Click one of the baud rate options in the **Baud Rate (Bits/Sec)** portion of the form. Baud rate choices include:

    -   9600
    -   19200
    -   28800
    -   38400
    -   57600 (default)
    -   115200

2. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

To Choose the Communication Message Format:

1. Choose **Standard Message** or **User Defined Message** from the **Message Format** drop-down list.

Mode	Definition
Standard Message	Tag data is preceded by a <STX> character and followed by <ETX>. The receive message format assumes that no headers or trailers are set.
User Defined	The message must be defined in the Message Definition Host Serial Port.

NOTE: If User Defined Message is chosen, the Message Definition Host Serial Port form link is added to the menu tree.

2. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

Network Settings

Use the Network Settings function to input IP Address for EZReader HF, Net Mask, and the Gateway; input remote connect Telnet and Setup Port numbers; setup Net Host ports 1 and 2; and enable FAST Monitor and DHCP. The Ethernet link speed and type is also displayed.

To Open Network Settings:

1. Click **Modify/Network Settings** in the tree menu.

2. The Network Settings form opens.

IP Addresses

To find the IP address for the EZReader HF:

1. Connect a serial cable from your PC to the Setup port on the EZReader HF.

2. If the Enable DHCP (Dynamic Host Configuration Protocol) is checked, the IP Address should be shown in the **IP information for EZReader HF reader field**. Write down the IP address shown for future reference.

3. If the Enable DHCP check box is not checked, you can type the IP in the text fields (if you already know the valid IP address for the reader.)

To Input IP Addresses for the Net Mask and Gateway:

1. Get the Net Mask and Gateway IP Addresses from the network administrator.

2. Type the IP Addresses in the text fields provided.

3. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

Remote Connection

To Connect Remotely to Telnet or other TCP-IP Client Software:

1. Enter a Telnet port number in the Telnet Port # field.

Defaults Shown

2. Enter a setup port number in the Setup Port # field.

Defaults Shown

3. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

Net Host Port Setup

To Set Up Net Host Ports 1 and 2:

1. Choose the type of connection you are using from the Connection Type drop-down list. Depending on the connection type chosen, additional port number, messaging speed, or IP Address information may be required. Additional fields are made available for your input as required. Available connection types and additional information required (if required) include:

2. TCP/IP Server: Port # required

3. TCP/IP Client: Port #, reconnection time, and remote IP address required

4. UDP Messaging: Port # and remote IP address required

5. Ethernet/IP

> **NOTE:** If Ehternet/IP is chosen, the Ethernet/IP Settings and EZReader HF InputOutput Objects Settings form links are added to the menu tree.

- Modbus TCP

> **NOTE:** If Modbus TCP is chosen, the Modbus Settings and EZReader HF InputOutput Objects Settings form links are added to the menu tree.

6. Choose either **Standard Messaging** or **User Defined Message** from the **Message Format** drop-down list.

> **NOTE:** If User Defined Message is chosen, the Message Definition – Net #n form link is added to the menu tree.

7. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

Antenna Tuning

Use the Antenna Tuning function to tune your EZTune™ Antenna. You can choose auto or manual tuning methods and whether to tune through EZReader HF or directly from your PC.

To Open Antenna Tuning:
1. Click **Modify/Antenna Tuning** in the tree menu.
2. The Antenna Tuning form opens.

To Choose a Tuning Method:

1. In the Tuning Options/Tuning Method portion of the form, click
    either the **Manual Tuning** or **EZ-Tune™**(auto tune) option. If
    Manual Tuning is chosen, the Values portion of the screen
    displays match and frequency up and down arrow buttons. If **EZ-
    Tune™** is chosen, the Values portion of the screen displays an
    auto tuning **Start** and **Revert Back** buttons.

Auto Tuning

    Start   Revert Back

Manual Tuning

    ↑   ↑
    Match   Freq1
    ↓   ↓
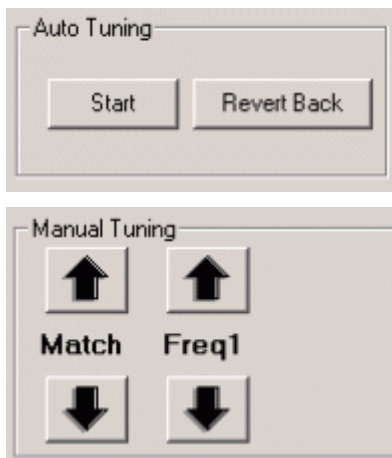
2. In the Tuning Options/Antenna Connection portion of the form,
    click either the **Direct Tuning through PC's Serial Port (RS232
    to RS485 Converter is required)** or **Through EZReader HF**
    (default) option. Choose **Direct Tuning through PC's Serial Port**
    only if an EZReader HF unit is not available when you are tuning
    the antenna.

    NOTE: Direct tuning through your PC requires a
    special serial adapter cable and should only be
    performed in consultation with an Accu-Sort
    technician. Call 1-800-227-2633 for assistance.

3. Click **Get Antenna Info**. Updated antenna model information and
   pick up voltage will be displayed on the form.

To Tune the Antenna Manually:

> **NOTE:** Manual tuning is not recommended and may not produce the desired results. Auto tuning is recommended for the best results with nearly every application, however, If manual tuning is required for your application, contact Accu-Sort for assistance at 1-800 227-2633.

> **NOTE:** At present, Match Tuning is not required and will have no effect.

1. Adjust the frequency upward by clicking the **Freq1** up arrow button.
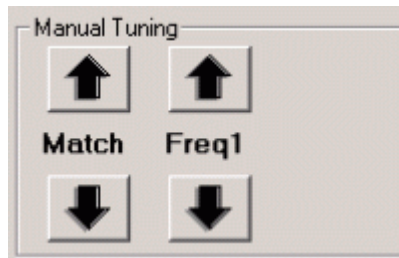
2. Repeat steps 3 and 4 until the pick up voltage maximizes and begins to fall.

3. Click the **Freq1** up and down arrow buttons until the maximum voltage is displayed.
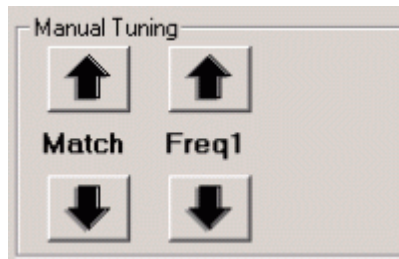
4. Place a tag within your antenna's read zone and click **Read Rate**. The goal of tuning is to bring the read rate as close to 100/100 as possible.

5. Click **Save**.

To Tune the Antenna Automatically:

1. Place an RFID tag in proximity to the EZTune antenna as it will be used in your application.

2. With the **EZ-Tune™** option chosen, click **Start** in the Auto Tuning portion of the form. A progress bar is displayed at the bottom of the form.
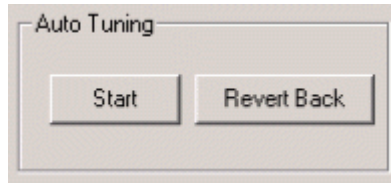

3. Place a tag within your antenna's read zone and click **Read Rate**. The goal of tuning is to bring the read rate as close to 100/100 as possible.

4. Click **Save**.

> **NOTE:** Click Revert Back in the Auto Tuning portion of the form to revert to the previous saved settings, if available.

Trigger and Relay Settings

Use the **Trigger and Relay Settings** form to set up trigger transmit control, trigger control, and output. The controls available depend on whether you are using a hardware trigger (photoeye) or host control. No controls are available if in host control.

Before using this form, you need to choose either Hardware Trigger or Host Control in the Modify/EZReader HF Configuration form.

To Open Trigger and Relay Settings:

1. Click **Modify/Trigger and Relay Settings** in the tree menu.

2. The Trigger and Relay Settings form opens.

Hardware Trigger

The setup of the hardware trigger depends on whether you are using one trigger (start trigger) or two triggers (start trigger/end trigger). The **Trigger and Relay Settings** form when in hardware trigger mode is broken into Transmit Control, Trigger1 Control, and Output 1 and 2. The available settings are defined below:

Selection	Definition
Transmit Delay (x10ms)	This defines additional time added to end trigger. If Transmit Delay is set to zero, the code will be transmitted once all RFID data has been processed. Otherwise, the reader will not transmit the code until the transmit delay period (timeout) is over depending on whether one or two triggers are used.
Transmit Type	Defines when the tag data should be transmitted. **Transmit After Tag Read** - Tag data will be transmitted as soon as it is decoded. **Transmit after End Trigger** - No tag data will be transmitted until after the end of the end trigger signal (when two triggers are used).
Action after Trigger	Determines the action after the trigger is activated. **Read Tag** - Tag data will be read completely as defined on this form. **Read Tag UID** - The tag's Unique Identification (UID) is read.
Block #	Defines the starting block of the tag's memory. Available only when **Read Tag** is chosen.
Additional Blocks	Defines how many additional blocks to read. Available only when **Read Tag** is

chosen.

End of Action Control	Determines the action after the tag data has been read and transmitted.
	Valid Read or Timeout - Ends the current read period when a valid read message is returned or the indicated timeout is reached. Select when an end trigger is not used.
	Valid Read or Trigger2 is Asserted (end trigger) - Ends the current read period when a valid read message is returned or the end trigger is activated based on transmit type.
Timeout (x10ms)	This defines a period of time after which trigger will be automatically terminated. If set to zero, automatic termination of trigger is not performed.
Output 1 and 2	Determines final output action.
	Do not Use - Disable
	Close on Valid Read of Tag - Action is closed when valid tag data is read.
	Close on Invalid Read of Tag - Action is closed when an invalid read message is returned (this includes No Read, Misread, or Tag Collision)
	Close on Valid Read and Match Parameters are met - Action is closed when a valid read message is returned and when match characters are verified.
	Close on Valid Read and Match Parameters are not met -Action is closed when a valid read message is returned but match characters are not verified.
Output Closure Time	This defines a period of time allotted for the close action.

To Set Up Transmit Control:

1. Click the up and down arrows to choose a transmit delay.

2. Choose a transmit type from the Transmit Type drop-down list.

3. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

To Set Up Trigger 1 Control:

1. Choose the action after trigger from the **Action after Trigger** drop-down list.

2. If **Read Tag** was chosen, type a value in the **Block #** text field.

3. If **Read Tag** was chosen, type a value in the **Additional Blocks** text field if needed.

4. Choose an end of action from the **End of Action Control** drop-down list.

5. Type a timeout value in the **Timeout** text field (required when one trigger is used).

6. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

To Set Up Output 1 and 2:

1. Choose an output (close) action from the **Output** drop-down list.

2. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

Host Control

The **Trigger and Relay Settings** form when in host control mode is broken into Transmit Control and Output 1 and 2. The available settings are defined below:

Selection	Definition
Output 1 and 2	Determines final output action.
	Do not Use - Disable
	Close on Valid Read of Tag - Action is closed when a valid read message is returned.
	Close on Invalid Read of Tag - Action is closed when an invalid read message is returned (this includes No Read, Misread, or Tag Collision)
	Close on Valid Read and Match Parameters are met - Action is closed when a valid read message is returned and when match characters are verified.
	Close on Valid Read and Match Parameters are not met -Action is closed when a valid read message is returned but match characters are not verified.
	Set Output Closure Time for Host - Defines a period of time allotted for the host close action.
Output Closure Time	This defines a period of time allotted for the close action.

To Set Up Transmit Control:

1. Click the up and down arrows to choose a transmit delay.

2. Choose a transmit type from the Transmit Type drop-down list.

3. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

To Set Up Output 1 and 2:

1. Choose an output (close) action from the **Output** drop-down list.

2. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

Message Definition Host Serial Port

Use the Message Definition Host Serial Port form to set up transmit and receive headers and trailers and serial port messages. The form is divided into two section, Host Serial Port Framing and Serial Port Messages. This form is available only if User Defined Messages is chosen in the Message Format sections of the Host Serial Communication Settings form.

To Open Message Definition Host Serial Port:

1. Click **Modify/Message Definition Host Serial Port** in the tree menu.

2. The Message Definition Host Serial Port form opens.

To Set Up Transmit (TX) and Receive (RX) Headers and Trailers and Connect Message:

1. In the Host Serial Port Framing portion of the form, type a **TX Header**, **RX Header**, **TX Trailer**, and **RX Trailer** in the text fields provided.

2. Type a user defined **Power Up/Connect Message** in the text field provided.

3. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

To Set Up Serial Port and Heartbeat Messages:

1. In the **Serial Port Messages** portion of the screen, choose an option from the drop-down lists for each of the possible serial messages. Available options are defined below.

Selection	Definition
No Message	No message is transmitted.
Send Tag	Tag data is transmitted. Available for Read, Match, and No Match only.
User Defined Msg.	A message of your choosing is transmitted.

2. If the heartbeat is enabled in the EZReader HF Configuration, type a heartbeat message in the text field provided.

3. Type a **Heart Beat Timeout** in the text field provided.

4. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

Message Definition – Net #1 and #2

Use the Message Message Definition – Net 1 and 2 forms to set up transmit and receive headers and trailers and net port messages. The form is divided into two section, Net Port #n Framing and Net Port #n Messages. This form is available only if User Defined Messages is chosen in the Net Host Port sections of the Network Settings form.

```
┌─ Net Port #2 Framing ───────────────────────────────────────┐
│  TX Header        [ \02 ]        RX Header        [ \02 ]    │
│                                                              │
│  TX Trailer       [ \03 ]        RX Trailer       [ \03 ]    │
│                                                              │
│  Power Up/Connect Message    [ Net 2 Power UP Message ]      │
└──────────────────────────────────────────────────────────────┘

┌─ Net Port #2 Messages ──────────────────────────────────────┐
│  Read             [ Send Tag       ▼]                        │
│  No Read          [ User Defined M ▼]  [ No Read          ]  │
│  Match            [ No Message     ▼]                        │
│  No Match         [ No Message     ▼]                        │
│  Write Acknowledge [ No Message    ▼]                        │
│  Lock Acknowledge  [ No Message    ▼]                        │
│  Heart beat Message          [ Net 2 Heart Beat Message  ]   │
│  Heart Beat Time Out (100-3000) × 10ms    [  500  ]          │
└──────────────────────────────────────────────────────────────┘
```

To Open Message Definition – Net #1 or #2:
1. Click **Modify/Open Message Definition – Net #1 or #2** in the tree menu.
2. The Message Definition – Net #1 or #2 form opens.

To Set Up Transmit (TX) and Receive (RX) Headers and Trailers and Connect Message:
1. In the Net Port #n Framing portion of the form, type a **TX Header**, **RX Header**, **TX Trailer**, and **RX Trailer** in the text fields provided.
2. Type a user defined **Power Up/Connect Message** in the text field provided.
3. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

To Set Up Net Port and Heartbeat Messages:

1. In the **Net Port #n Messages** portion of the screen, choose an option from the drop-down lists for each of the possible serial messages. Available options are defined below.
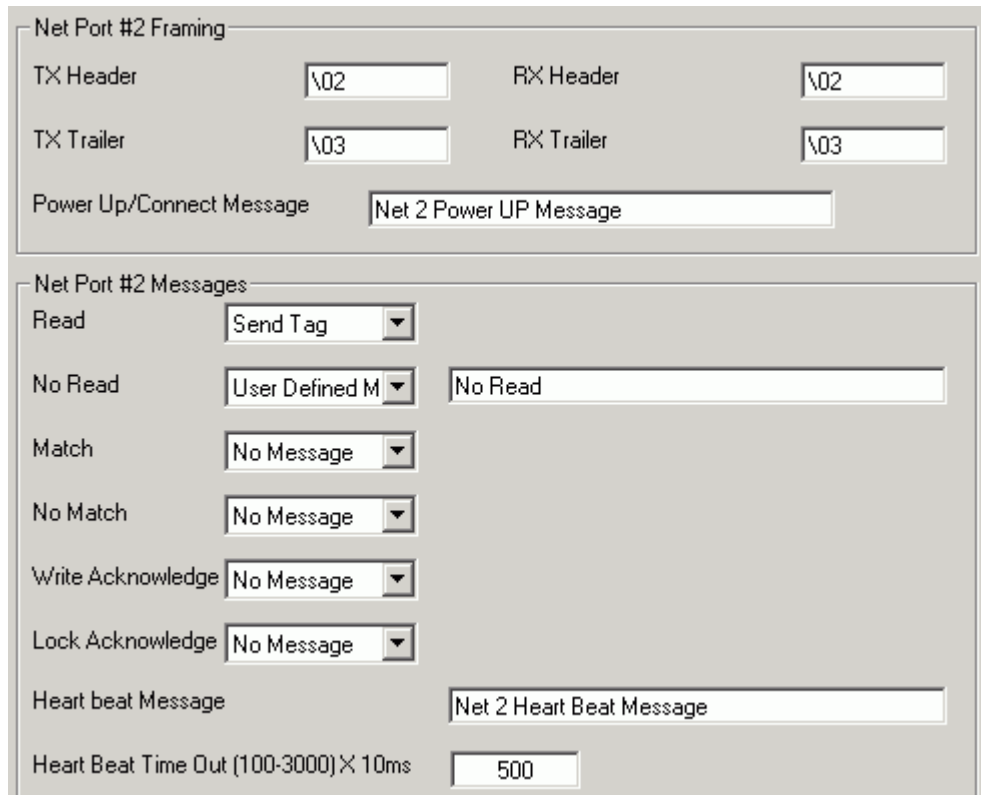
Selection	Definition
No Message	No message is transmitted.
Send Tag	Tag data is transmitted. Available for Read, Match, and No Match only.
User Defined Msg.	A message of your choosing is transmitted.

2. If the heartbeat is enabled in the EZReader HF Configuration, type a heartbeat message in the text field provided.

3. Type a **Heart Beat Time Out** in the text field provided.

4. Click the Save Parameters to EZReader HF icon in the toolbar to save your selection.

Modbus Settings

Use the Modbus Settings form to set up the slave ID, register starting address, coil starting address, and discrete input starting address, and to view related Modbus settings. This form is available only if ModBus TCP is chosen in the Net Host Port sections of the Network Settings form.

Slave ID	1

Input and Holding Register

Register Starting Address 4000

Tag Data	Tag Data	Register Address (both Input and Holding Register)
UID 8th Byte	UID 7th Byte	4000
UID 6th Byte	UID 5th Byte	4001
UID 4th Byte	UID 3rd Byte	4002
UID 2nd Byte	UID 1st Byte	4003
Block 0 4th byte	Block 0 3rd byte	4004

Coil Address

RFR Terminals	Coil Address
Trigger1 Input	8000
Trigger2 Input	8001
Relay Output#1	8002
Relay Output#2	8003

Coil Starting Address 8000

Discrete Input Address

Discrete Input Starting Address 9000

RFR02 Outputs	Discrete Input Address
Output 1	9000
Output 2	9001
Output 3	9002
Output 4	9003

Reset   Previous   Next

To Open Modbus Settings:

1. Click **Modify/Modbus Settings** in the tree menu.

2. The Modbus Settings form opens.

To Modify Modbus Settings:

1. Type a slave ID in the **Slave ID** text field.

2. Type a starting address for the register in the **Register Starting Address** text field. The Register Address in the table immediately updates.

3. Type a starting address for the coil in the **Coil Starting Address** text field. The Coil Address in the table immediately updates.

4. Type a starting address for discrete input in the **Discrete Input Starting Address** text field. The Discrete Input Address in the table immediately updates.

5. Click the Save Parameters to EZReader HF icon in the toolbar to save your changes.

Modbus Settings Table Definitions

Input and Holding Register

Column Head	Description
Tag Data	Indicates UID (Unique Identifier) and Block position affected.
Register Address	Indicates incremental register address associated with each byte pair.

Coil Address

Column Head	Description
RFR Terminal	Indicates EZReader trigger inputs and relay outputs affected.
Coil Address	Indicates incremental coil address associated with named trigger inputs and relay outputs.

Discreet Input Address

Column Head	Description
RFR02 Outputs	Indicates EZReader numbered outputs affected.
Discreet Input Address	Indicates discreet input address associated with each numbered output.

EZReader HF Input/Output Objects Settings

Use the EZReader HF Input/Output Objects Settings form to set up EZReader HF outputs and enable trigger inputs.

EZReader HF Outputs		Duration (msec)
Output 1	Disabled ▼	100
Output 2	Life Light ▼	100
Output 3	Trigger1 Output ▼	100
Output 4	Trigger2 Output ▼	100
Output 5	Error Light ▼	100
Output 6	Good Read Output ▼	100
Output 7	No Read Output ▼	100
Output 8	Match Output ▼	100
Output 9	No Match Output ▼	100
Output 10	Write OK Output ▼	100
Output 11	Write Fail Output ▼	100
Output 12	Antenna Status Output ▼	100
Output 13	Collision ▼	100

EZReader HF Inputs
☐ Enable Trigger1 Input
☐ Enable Trigger2 Input

Control of EZReader HF Relays
☐ Output #1
☐ Output #2

To Open EZReader HF Input/Output Objects Settings:

1. Click **Modify/EZReader HF Input/Output Objects Settings** in the tree menu.

2. The EZReader HF Input/Output Objects Settings form opens.

To Set Up EZReader HF Outputs:

1. Choose an action for each available output from EZReader HF Outputs drop-down lists. Each numbered output has the same selections available. The available selections for output action are:

   - Disabled
   - Life Light
   - Trigger1 Output
   - Trigger2 Output
   - Error Light
   - Good Read Output
   - No Read Output
   - Match Output
   - No Match Output

- Write OK Output
- Write Fail Output
- Antenna Status Output
- Collision

2. Click the Save Parameters to EZReader HF icon in the toolbar to save your selections.

To Enable EZReader HF Inputs:

1. Check **Enable Trigger1 Input** and/or **Enable Trigger2 Input** to activate those trigger inputs.

2. Click the Save Parameters to EZReader HF icon in the toolbar to save your selections.

To Enable Control of EZReader HF Relays:

1. Check **Output #1** and/or **Output #2** to activate those relay outputs.

2. Click the Save Parameters to EZReader HF icon in the toolbar to save your selections.

Save and Retrieve Settings

Use the Save and Retrieve Settings form to save (backup) and retrieve (restore) your EZReader HF settings, or to default the reader to its original factory settings.

To Open Save and Retrieve Settings:

1. Click **Save and Retrieve Settings** in the tree menu.

2. The Save and Retrieve Settings form opens.

To Save or Retrieve Settings To or From Your EZReader HF Unit:

- Click **Save to EZReader HF** to save your current settings to the EZReader HF.
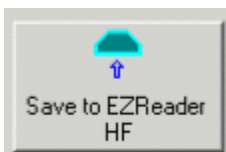
- Click **Retrieve from EZReader HF** to retrieve the most recently saved settings from the EZReader HF.
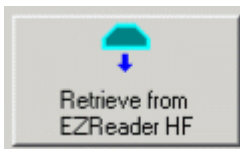
To Save or Retrieve Settings To or From a Disk:

- Click **Save to Disk** to save your current settings to disk.

- Click **Retrieve from Disk** to retrieve a saved configuration from disk.

To Return EZReader HF Settings to Factory Defaults:

- Click **Default EZReader HF**.

To Backup or Restore Settings To or From the EZTune Antenna:

- Click **Backup to Antenna** to save your current settings the antenna.

- Click **Restore from Antenna** to restore the most recent backup configuration from the antenna.

Diagnostics

EZReader HF Monitor

Use the EZReader HF Monitor to view EZReader and discreet I/O status and diagnostic and host messages.

To Open EZReader HF Monitor:

1. Click **Diagnostics/EZReader HF Monitor** in the tree menu.

2. The EZReader HF Monitor form opens.

Status LEDs

Host Serial Comm.	Red/Green (Not Connected/Connected)
Tag READ	Red/Green (No Tag Present/Tag Present)
Status	Red/Green (Reader Detected/Not Detected)

Discreet I/O Monitor

Trigger 1	Red/Green (Not Connected/Connected)
Trigger 2	Red/Green (Not Connected/Connected)
Output 1	Red/Green (Not Connected/Connected)
Output 2	Red/Green (Not Connected/Connected)

To View and Control Diagnostic Messages:

1. Right click in the Diagnostic Monitor window. A pop up action box appears.

> Clear
> Start
> Stop
> Start Logging
> Stop Logging
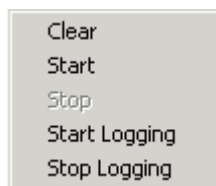
2. Click **Clear** to erase the current data on the screen.

3. Click **Start** to view real-time data in the Diagnostic Messages window.

4. Click **Stop** to freeze the current data in the window.

5. Click **Start Logging** to begin saving the data to a log.

6. Click **Stop Logging** to stop saving the data to a log.

To View and Control Messages from the Host:

1. Choose a viewing option from the bottom of the Host Message Monitor window. Options include:

2. None

3. Host Serial Comm.

4. Net Host #1

5. Net Host #2

6. Right click in the Host Message Monitor window. A pop up action box appears.

> Clear
> Start
> Stop
> Start Logging
> Stop Logging
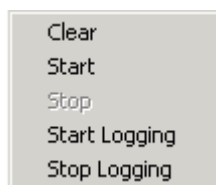
7. Click **Clear** to erase the current data on the screen.

8. Click **Start** to view real-time data in the Diagnostic Messages window.

9. Click **Stop** to freeze the current data in the window.

10. Click **Start Logging** to begin saving the data to a log.

11. Click **Stop Logging** to stop saving the data to a log.

Log Viewer

Use the Log View form to review the performance logs saved by the EZReader HF. The log view field remains empty until you select one of the three most common logs (Read Rate, System Counters, or Message Log) via the buttons or enter a log request in the Command field.

```
EZReader HF Log Viewer

 Log View                                               ▲
 01 :Status LED ON
 02 :Tag Comm LED OFF
 04 :Serial Host Comm LED OFF
 07 :PowerLED ON
 08 :Trigger1 Not Active
 0A :Trigger2 Not Active
 0D :Output1 Active
 0F :Output2 Active
 11 :External RAM self test PASS
 13 :External flash self test PASS           ▼
 ◄                                               ►


   [ Read Rate ]   [ System Counters ]   [ Message Log ]   [ Clear ]


 Command

 [                                              ]   [ Send ]

 Use this field to Enter and Send Commands (example: DISPCTRS)
```

To Open Log Viewer:

1.   Click **Diagnostics/Log Viewer** in the tree menu.

2.   The Log Viewer form opens.

Log Viewer Commands

There are several commands that you can use to display EZReader HF parameters and diagnostic information. Commands can be sent from the Command field on the log viewer. Commands may also be sent from a terminal interface, such as a TELNET connection to the EZReader HF.

Display Commands	Description
DISPCOUNTERS	Display the System Counter log view.
DISPENET	Display the Ethernet interface status including MAC address.
DISPMSGLOG	Display the Message log view.
DISPREADRATE	Display the Read Rate log view.
CLEARALL	Clears all information from the Message Monitor.
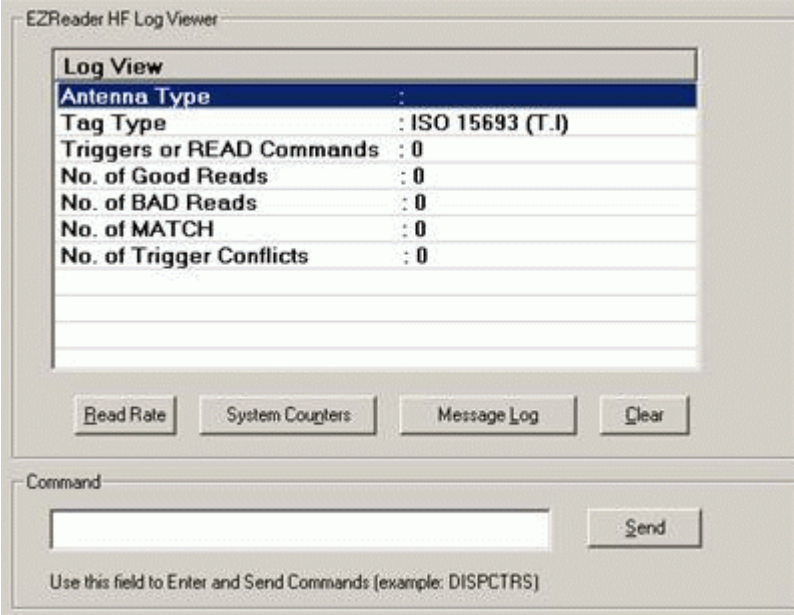
USEFUL TIP: Right-click on log view provides two options: **Save LogView to File** (also available from Tools) and **Copy to Clipboard**.

Read Rate Log View

For a summary of the EZReader HF's overall performance, click **Read Rate**. You can also enter DISPREADRATE in the command field and click **Send**.

System Counters Log View

You can display a number of values and counters that indicate whether the EZReader HF is configured and operating properly by clicking **System Counters**. You can also enter DISPCOUNTERS in the command field and click **Send**.

USEFUL TIP: Use the Tools > Save LogView to File menu selection to save the on-screen log view information to a file on your PC. This is useful if you need to archive or review the log information at a later time.

Update Firmware

Type topic text here.

To Open Log Viewer:

1. Click **Diagnostics/Update Firmware** in the tree menu.

2. The Update Firmware form opens.

Tools

Compare Parameters

Use the Compare Parameters tool to compare two different parameter sets in order to:

Index	Param. Name (A)	Param. Value (A)	Param. Name (B)	Param. Value (B)
1	ANTENNATYPE	5*16 Antenna	ANTENNATYPE	5*16 Antenna
2	ANTENNASOFTNAME	Antenna Soft	ANTENNASOFTNAME	Antenna Soft
3	ANTENNASOFTREV	1	ANTENNASOFTREV	1
4	MATCH	00	MATCH	00
5	FREQ1	00	FREQ1	00
6	FREQ2	00	FREQ2	00
7	READERMODEL	EZREADER HF	READERMODEL	EZREADER HF
8	READERSOFTNAME	Reader Soft	READERSOFTNAME	Reader Soft
9	READERSOFTREV	1	READERSOFTREV	1
10	READERNAME	EZREADER HF	READERNAME	EZREADER HF
11	ANTENNAOPPOWER	1	ANTENNAOPPOWER	1
12	TAGTYPE	2	TAGTYPE	2
13	ENABLEPASSPROT	0	ENABLEPASSPROT	0
14	NETPASS	\oknol	NETPASS	\oknol

- find and return the reader to a previous set of parameters saved on disk
- determine which parameter set offers optimal system performance, or to
- make changes to improve system performance.

To Open Compare Parameters:

3. Click **Tools/Compare Parameters** from the drop-down menu.

4. The Compare Parameters tool opens.

To Load Two Sets of Parameters:

1. Choose **Current RFR-02 Configuration** or **Configuration File** option in the **Compare (A)** portion of the form.

2. If you choose **Current RFR-02 Configuration**, the parameter table (A) will be filled in with the EZReader HFs current configuration settings.

3. If you choose **Configuration File**, click **Browse** to navigate to a saved parameter file (.pam). Click **Open** in the browser window to choose the parameter file.

4. In the **To (B)** portion of the form, click **Browse** to navigate to a saved parameter file (.pam). Click **Open** in the browser window to choose the parameter file.

5. Click **Compare**. The **Comparison Results** table is filled in.

> **NOTE:** Parameters that match are displayed in black text, while those that do not match are displayed in colored text.

To Compare the Parameters:

1. Compare the parameters names and values in the (A) columns to those in the (B) columns.

2. Check **Remove Identical Parameters from the List** to display only those rows that contain differences between names and values in the (A) columns and (B) columns.

3. Click **Save to Note Pad** to export the information to Windows Note Pad as a text file.

4. Click **Exit** to close the Compare Parameters tool.

Tag Read/Write

Use the Tag Read/Write Utility tool to view the contents of a tag or write information to a tag without having to do any programming. The tool can help you understand tag operations and memory structure.
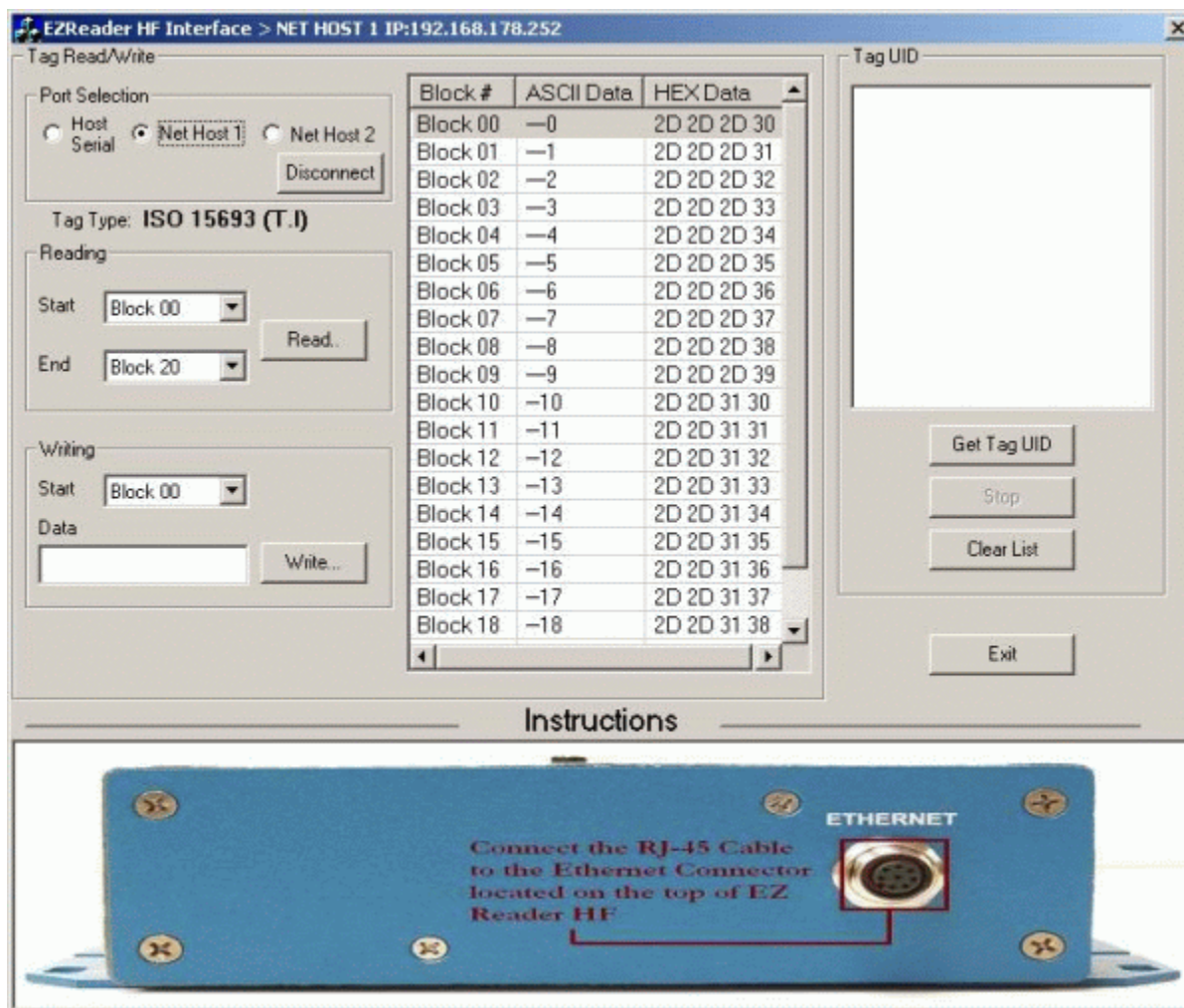
To Open Tag Read/Write Utility:

1. Click **Tools/Tag Read/Write Utility** from the drop-down menu.

2. The Tag Read/Write Utility opens.

Select a Port:

If you choose either **Net Host 1** or **Net Host 2** to connect, the EZReader HF Interface will break the setup connection to the reader and establish a connection through the selected Net Host Port.

If you choose the Serial Setup Port (**Host Serial**) you will be prompted to move the serial cable from the Setup port to the Host port. This is necessary because any setup port, either Serial or Etherent, cannot recognize the Tag Read and Write commands.

Visual Keyboard

Use the Visual Keyboard tool to save keystrokes while creating messages that use non-printable ASCII characters (e.g.: STX, CR, LF). Rather than entering the "\" followed by the hexidecimal value of the character (e.g.: \02 for a STX character), just use visual keyboard to create your message then copy and paste it into the appropriate text box.
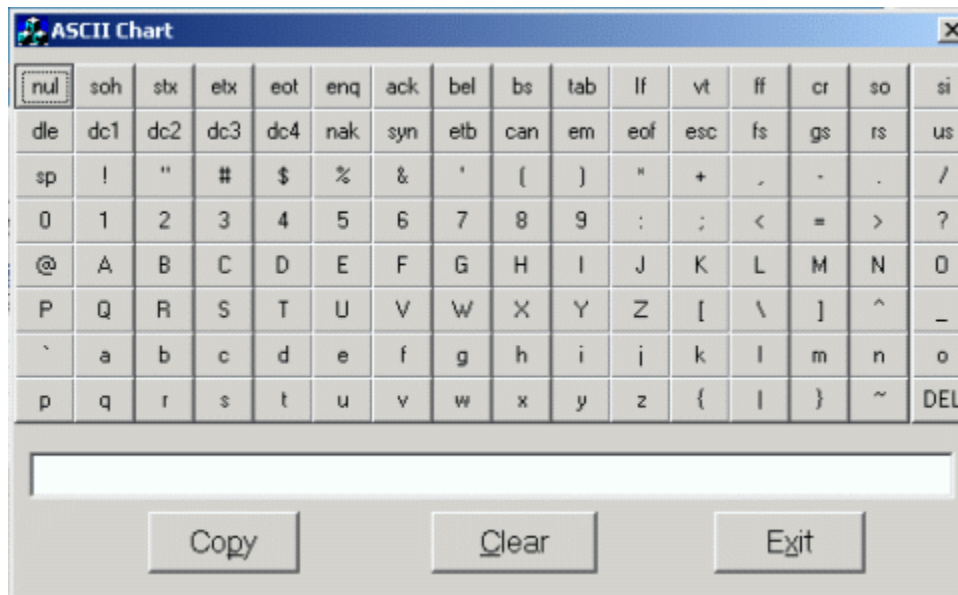
To Open Visual Keyboard:

1. Click **Tools/Visual Keyboard** from the drop-down menu.

2. The Visual Keyboard tool opens.

To Copy ASCII Text:

1. Click an ASCII character in the visual keyboard to cause it to appear in the text field. Continue adding characters until your message has been created.

2. **Example:** Clicking on the STX, CR, LF buttons of the visual keyboard causes \02\0D\0A to appear in the text field.

3. Click **Copy**.

4. Click **Exit**.

5. Click in a text field where you want to place your message, then right-click and choose **PASTE**.

6. Click **Clear** in the visual keyboard to delete any text in the text field.

Glossary

ACK - A control character sent to acknowledge that a transmission block has been received.

active/passive device - In 20mA current loop communications, a device capable of providing the current for the loop (active) and a device that draws the current from the equipment it is connected to (passive).

Active tag- An RFID tag that has a transmitter to send back information, rather than reflecting back a signal from the reader, as a passive tag does. Active tags generally use a battery to transmit a signal to a reader. However, some tags can gather energy from other sources.

address - A unique designation for the location of data or the identity of a smart device; allows each device on a single communications line to respond to its own message.

alphanumeric - The character set which contains letters, digits and other characters such as punctuation marks.

Amplitude- The maximum absolute value of a periodic curve measured along its vertical axis (the height of a wave, in layman's terms).

Amplitude modulation-. Changing the amplitude of a radio wave. A higher wave is interpreted as a 1 and a normal wave is interpreted as a zero. By changing the wave, the RFID tag can communicate a string of binary digits to the reader.

ANSI (American National Standards Institute) - The principle standards development group in the U.S. A non-profit, non-governmental group supported by over 1000 trade organizations, professional societies, and companies. Member body to the ISO (International Standards Organization).

Antenna- An RFID tag antenna is the conductive element that enables the tag to send and receive data. Passive, low- (135 kHz) and high-frequency (13.56 MHz) tags usually have a coiled antenna that couples with the coiled antenna of the reader to form a magnetic field. UHF tag antennas can be a variety of shapes. Readers also have antennas which are used to emit radio waves. The RF energy from the reader antenna is "harvested" by the antenna and used to power up the microchip, which then changes the electrical load on the antenna to reflect back its own signals.

Antenna gain- In technical terms, the gain is the ratio of the power required at the input of a loss-free reference antenna to the power supplied to the input of the given antenna to produce, in a given direction, the same field strength at the same distance. Antenna gain is usually expressed in decibels and the higher the gain the more powerful the energy output. Antennas with higher gain will be able to read tags from farther away.

ASCII (American Standard Code for Information Interchange) - Pronounced ask-ee. A seven bit plus parity code established by ANSI to achieve compatibility between data services.

asynchronous transmission - Transmission in which the time intervals between transmitted characters may be of unequal length. Transmission is controlled by start and stop bits at the beginning and end of each character.

baud rate - A unit used to measure communications speed or data transfer rate; represents the number of discrete conditions or events per second.

BCC (Block Check Character) - Used to check transmission accuracy, a character transmitted by the sender after each message block and compared with a block check character computed by the receiver.

bed width - The width of the conveyor bed measured in inches.

BEL - A control character that is used when there is a need to call for attention; it may control alarm or attention devices.

belt width - The width of the conveyor belt measured in inches.

bit (binary digit) - The contraction of binary digit, the smallest unit of information in the binary system; a one or zero condition.

bottom read - When the antenna or scanner is mounted under the conveyor to read codes on the bottom of the boxes or on the front or back of the boxes. If used there is not enough clearance for a standard front or back read.

BPS (Bits per Second) - Unit of data transmission rate. See baud rate.

bridge - An interface between links in a communication network that routes messages from one link to another when a station on one link addresses a message to a station on another link.

buffer - A temporary storage device used to compensate for a difference in data rate and data flow between two devices (typically M).

bus - An internal pathway along which electronic signals travel between the components of an electronic device.

button - A graphic user interface component that allows users to select a given software function. Instead of physically pressing a button, the user simply clicks on the desired button to access a menu, tab screen, or function.

byte - A binary element string functioning as a unit, usually shorter than a computer "word." Eight-bit bytes are most common. Also called a "character."

capture count - The number of consecutive identical valid decodes that result in a valid read.

cart - A signal, typically provided by a photoeye or proximity switch, that informs the scan head of the presence of an object within its reading zone. Also called trigger.

communications protocol - The rules governing exchange of information between devices connected together on the same communications line.

configuration - The arrangement and interconnection of hardware components within a system, and the hardware (switch and jumper) and software selections that determine the operating characteristics of the system.

configuration file - The set of attributes which belongs to and defines the operation of a single physical device.

conveyor speed - The speed that the conveyor is moving measured in feet per minute. Conveyor speed directly impacts the time that the code is in front of the scanner; therefore, it affects the number of reads that are possible.

CR (Carriage Return) - An ASCII or EBCDIC control character that moves the cursor or print mechanism to the left margin.

CTS (Clear to Send) - The modem interface signal that indicates to the DTE device to begin transmission.

current loop - Method of interconnecting terminals and transmitting signals, whereby a mark (binary 1) is represented by current on the line and a space (binary 0) is represented by the absence of current.

decoder - As part of an reading system, the electronic package which receives the signals from the reader, performs the algorithm to interpret the signals into meaningful data and provides the interface to other devices.

decoder logic - The electronic package that receives signals from the reader, interprets the signals into useful data, and provides the interface to other devices.

default(s) - Original parameters as programmed by Accu-Sort at the factory.

depth of field - The distance between the maximum and minimum plane in which a tag can be read.

DIP switches - Switches that are the approximate size of an integrated circuit.

downloading - The process of sending configuration parameters, operating software or related data from a central source to remote stations.

drop-down list, menu - A graphical user interface component that allows the user to select from a list of options that are displayed when a specific function has been selected. This options list drops down from the selected function.

DSR (Data Set Ready) - An RS232 modem interface control signal which indicates that the terminal is ready for transmission.

DTR (Data Terminal Ready) - Modem interface signal which alerts the modem that the DTE device is ready for transmission.

duplex transmission - See full and half duplex.

EDI (Electronic Data Interchange) - A method by which data is electronically transmitted from one point to another.

EIA-232 - Interface between data terminal equipment and data communication equipment employing serial binary data interchange.

EIA-422 - Electrical characteristics of balanced-voltage digital interface circuits.

EIA-485 - The recommended standard of the Electronic Industry Association that specifies the electrical characters of generators and receivers for use in balanced digital multi-point systems.

ENQ (Enquiry) - A transmission control character used as a request for a response from a remote station. (^E)

error - A discrepancy between a computed, observed or measured value or condition and the true, specified or theoretically correct value or condition.

ESC (Escape) - A control character which is used to provide additional control functions. It alters the meaning of a limited number of continuously following bit combinations. (^[)

ETX (End of Text) - A transmission control character that terminates a text.

even parity - A data verification method in which each character must have an even number of on bits.

expansion bus - Allows the microprocessor to communicate with controllers for peripheral devices, such as a network card or an internal modem.

far distance - The distance (in inches) from the face of the scanner to the farthest point at which a code can be successfully read.

feet per minute (FPM) - Typically used to define the speed of a conveyor. Conveyor speed may also be defined in meters per second.

flying lead - A lead that exits the back of the connector hood on the outside of the cable jacket. It is normally attached to the drain wire or shield and connected to the chassis of the switch, modem, etc. It can also be a hardware control lead.

Frequency- The number of times a signal executes a complete cycle through its maximum and minimum values and returns to the same value.

full duplex (FDX) - Simultaneous, two-way, independent transmission in both directions.

gateway - A device used to connect networks using different protocols so that information can be passed from one system or network to the other(s).

gateway address - Like all other devices on a network, the device serving as the gateway must also have an IP address so that devices wishing to communicate with devices outside its own network can fine the gateway which will forward its data. Like all other addresses, it is displayed in the dotted-decimal format.

half duplex (HDX) - Transmission in either direction, but not simultaneous.

handshaking - Exchange of predetermined signals between two devices establishing a connection. Usually part of a communications protocol.

hardware cart - This is an electrical signal from a relay, photoeye, or proximity switch indicating that an object is passing by the scanner.

Harvesting- A term sometimes used to describe the way passive tags gather energy from an RFID reader's antenna.

header - A means of identifying the beginning of a message to be sent to the host. One example is <STX> or Start of Text.

hexadecimal - A base-16 numbering system that uses the symbols 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F.

High-frequency- From 3 MHz to 30 MHz. High-frequency RFID tags typically operate at 13.56 MHz and can be read from less than 3 feet away and transmit data faster than low-frequency tags. But they consume more power than low-frequency tags.

host - 1) A central controlling computer in a network system. 2) Any device on a network system that provides a controlling function to another device on the network. 3) Any intelligent device for which another device is providing a communication interface to a network.

induct photoeye - The cart cycle begins when the start of cart photoeye is blocked and continues until the cart photoeye is unblocked. Blocking the induct photoeye causes relay decisions and data communication. For this placement the distance between the cart and induct photoeyes must be less than the minimum box size plus the minimum box spacing.

Inlay- An RFID microchip attached to an antenna and mounted on a substrate. Inlays are essentially unfinished RFID labels.

input/output modules - Since many readers are operating in environments that have electrical noise problems, it is helpful to have equipment electrically isolated from other equipment. The standard method for isolating inputs and outputs is through the use of optically isolated input/output modules. These flexible modules allow the reader to control high voltage outputs that are susceptible to noise. Since they are isolated from each other the noise is not picked up in the scanner. The modules come in both input and output versions. The output versions are controlled by a 5VDC input. The output of the modules can range from 24VAC - 140VAC or 3VDC - 200VDC. Foreign voltage ranges are available. The maximum current that the modules can supply is limited by the output voltage and the module type. The input versions are controlled by either a DC or AC input ranging from 3VDC - 32VDC or 90VAC - 140VAC. Foreign voltage ranges are available. The output of the modules is a 5VDC level. The maximum current is limited by the input modules. These output modules are commonly used to control diverters, alarms, external relays, etc. The input modules can be used for photoeye inputs.

interface - A shared boundary defined by common physical interconnection characteristics, signal characteristics and meanings of interchanged signals.

I/O - The abbreviation for input/output. The keyboard and a printer, are examples of I/O devices. I/O activity is different from computational activity. When a program sends a document to the printer, it is engaging in I/O activity; when the program sorts a list of terms, it is engaging in computational activity.

IP (internet protocol) address - IP address is the numeric address given to a network card which enables other devices on a network to find it. For readability, this number is displayed in dotted-decimal format (e.g. 127.0.0.1) as opposed to the binary equivalent (e.g. 01111111000000000000000000000001).

jumper - A wire that connects a number of pins on one end of a cable only, such as looping back Request to Send from Clear to Send pins 4 and 5.

LAN - The acronym for local area network. A LAN system is usually confined to the same building or a few nearby buildings, with all equipment linked by wiring dedicated specifically to the LAN.

LCD (Liquid Crystal Display) - A low-power display often used for notebook computers. An LCD consists of a liquid crystal solution between two sheets of polarizing material. An electric current causes each crystal to act like a shutter that can open to allow light past or close to block the light.

LED (Light Emitting Diode) - A semiconductor generally made from gallium arsenide, that can serve as a visible or near infrared light source when voltage is applied continuously or in pulses. LEDs have extremely long lifetimes when properly operated.

LF (Line Feed) - An ASCII control character that moves the cursor or print mechanism to the next line. (^J)

light curtain - A sensing device connected to a system that uses a series of transmitters and receivers to create a curtain of light that is both 90 degrees and perpendicular to the conveyors direction of travel. This device is used by the system to detect either the presence and/or the height of packages as they enter the cameras scanning area.

Low-frequency- From 30 kHz to 300 kHz. Low-frequency RFID tags typical operate at 125 kHz or 134 kHz. The main disadvantages of low-frequency tags are they have to be read from within three feet and the rate of data transfer is slow.

mA - The abbreviation for milliampere(s).

match - A condition in which decoded data matches data in the match entry.

match entry - An output condition in which decoded data matches and the data in a match entry configuration.

memory - A computer can contain several different forms of memory, such as RAM, ROM, and video memory. The term memory is generally used to define RAM. When a computer has 512 MB of memory, it actually has 512 MB of RAM.

memory address - A specific location, usually expressed as a hexadecimal number, in the computers RAM.

message - 1) A meaningful combination of alphanumeric characters that establishes the content and format of a report. 2) In a communication network, the unit of exchange at the application layer.

message buffer - Storage register for the temporary storage of data that allows decoding to continue while the host is retrieving data from the serial port.

message buffer warning - An output condition that occurs when the message buffer has used a defined amount of the message buffer.

MHz - The abbreviation for megahertz.

microprocessor - The primary computational chip inside the computer, referred to as the "brain." The microprocessor contains an arithmetic processing unit and a control unit. Software written for one microprocessor must usually be revised to run on another microprocessor.

mil - One thousandth of an inch (0.001 inch). Bars and spaces of codes are commonly referred to as being a certain number of mils wide.

modulo check digit or character - A calculated character within a data field used for error detection. The calculated character is determined by a modulus calculation on the sum or the weighted sum of the data field contents.

mouse - A pointing device that controls the movement of the cursor on a screen. Mouse-aware software allows the user to activate commands by clicking a mouse button while pointing at objects displayed on the screen.

MTBF - The abbreviation for mean time between failures.

multidrop line - A single communications circuit that interconnects many stations, each of which contains terminal devices. See EIA-485.

NAK (Negative Acknowledgment) - A control character used to indicate that the previous transmission block was in error and the receiver is ready to accept retransmissions.

NCDRH (National Center for Devices and Radiological Health) - This organization (a service of the Food and Drug Administration) is responsible for the safety regulations governing acceptable limitations on electronic radiation from laser devices. Accu-Sort is in compliance with the NCDRH regulations.

NEMA - In order to rate the quality of an enclosure the National Electrical Manufacturers Association (NEMA) has developed a system for rating all enclosures. A partial list of the NEMA enclosures is shown below along with what particles it is designed to restrict.

Ratings

> 3 - Enclosures are intended for indoor or outdoor use primarily to provide protection against windblown dust, rain, and sleet, and is undamaged by the formation of ice on the enclosure.
>
> 4 - Enclosures are intended for indoor or outdoor use primarily to provide protection against windblown dust and rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure.
>
> 4X - Enclosures are intended for indoor or outdoor use primarily to provide protection against corrosion windblown dust and rain, splashing water, and hose directed water; undamaged by the formation of ice on the enclosure.
>
> 6 - Enclosures are intended for use indoors or outdoors where occasional submersion is encountered.
>
> 12 - Enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping noncorrosive liquids.
>
> 13 - Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, noncorrosive coolant.

net mask - A numeric value that is used by devices to determine whether the device it wishes to communicate with is on the same network. If not, the data must be forwarded via a gateway. May also be referred to as subnet mask.

network - A series of stations (nodes) connected by some type of communication medium. A network may be made up of a single link or multiple links.

node - The connection point at which media access is provided.

noise- Unwanted electrical signals or electromagnetic energy found in the operating environment of RFID equipment. Noise can be caused by other RF devices, electric motors and other machines.

no-match - An output condition in which decoded data does not match an entry in the match code table.

no-read - When the reader is unable to capture a code as it passes through the scan zone.

non-read - The absence of data at the scanner or camera output after an attempted scan due to no code, defective code, scanner failure or operator error.

NVC - The acronym for non-valid code. Defines the condition that occurs when an object has been scanned and no bar code could be decoded. Usually, this indicates that either no code was on the object or the code was badly damaged and could not be decoded.

odd parity - A data verification method in which each character must have an odd number of on bits.

optimum reading distance - Typically, the center of the depth of field.

output counter - A counter that is associated with each output condition. The counter increments by 1 each time the condition occurs.

trigger or cart - The standard abbreviation for a signal indicating that an object is passing by the reader is called cart. This signal indicates to the reader to start or stop reading.

trigger or cart cycle - The time during which the reader is attempting to read the bar code.

hardware cart - This is an electrical signal from a relay, photoeye, or proximity switch indicating that an object is passing by the scanner.

start and end of cart photoeyes - The cart cycle begins when the start of cart photoeye is blocked and continues until the end of cart photoeye is unblocked. Relay decisions and data communication take place after the end of cart photoeye is unbroken.

induct photoeyes - The cart cycle begins when the start of cart photoeye is blocked and continues until the cart photoeye is unblocked. Blocking the induct photoeye causes relay decisions and data

communication. For this placement the distance between the cart and induct photoeyes must be less than the minimum box size plus the minimum box spacing.

software cart - A serial message from an external device that controls the cart cycle.

self cart - This form of cart requires no input signal. The scanner is continuously attempting to decode bar codes. When a scanner is in self cart, there is no way of determining if there is a package present or a no-read.

package spacing - This is the spacing between items on a conveyor. Package spacing is measured one of two ways: Leading edge of one box to leading edge of the next or trailing edge of one box to trailing edge of the next. Package spacing is critical to system operations.

parameter - A value or opinion that the user specifies to a program. A parameter is sometimes called a switch or an argument.

parity bit - A bit that is set at "0" or "1" in a character to ensure that the total number of 1 bits in the data field is even or odd.

percent good reads - The number of successful reads per refresh period. This is valid only when the refresh period is set to 0.

peripheral device - An internal or external device, such as a printer, a disk drive, or a keyboard, connected to a computer.

photoeye - Used as a presence detector to identify objects in the scanners reading zone. The photoeye emits a beam and is used with a reflector to create a photoelectric circuit. When the beam is blocked by an object, breaking the circuit, a signal called CART is sent to the scanner.

polling - A means of controlling devices on a multipoint line.

Programming a tag- Writing data to an RFID tag.

protocol - A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.

pulses per inch (PPI) - Defines the number of pulses per inch of transport travel as provided by the tachometer.

pulse width - A change from the leading edge of a bar or space to the trailing edge of a bar or space over time. Pulse width is also referred to as a transition.

queue - A buffer used to hold data in order until it is used or transmitted.

radio frequency (RF) - Non-optical automatic identification devices that use radio waves to transmit data.

Radio Frequency Identification (RFID)- A method of identifying unique items using radio waves. Typically, a reader communicates with a tag, which holds digital information in a microchip.

reader- A device used to communicate with RFID tags. The reader has one or more antennas, which emit radio waves and receive signals back from the tag.

reader field- The area of coverage. Tags outside the reader field do not receive radio waves and can't be read.

read-only - A read-only file is one that users are prohibited from editing or deleting. A file can have read-only status if:

> Its read-only attribute is enabled.

> It resides on a physically write-protected diskette.

> It is located on a network in a directory to which the system administrator has assigned read-only rights to the user.

read range- The distance from which a reader can communicate with a tag.

read rate- The number of tags that can be read within a given period.

relay - Relays are simply electrical switches that are typically used to control external diverts, alarms, etc. Relay types available are FORM A and FORM C. FORM C type relays have both normally open and normally closed contacts available while FORM A type relays have only normally open contacts available.

relay output duration - This is the time (in seconds) after the relay is energized that it should be turned off.

relay output delay - The time lapse between an event and the energizing of the relay.

resolution - The narrowest element dimension which can be distinguished by a particular reading device or printed with a particular device or method.

response time - The elapsed time between the generation of the last character of a message at a terminal and the receipt of the first character of the reply. It includes terminal delay and network delay.

RFID tag- A microchip attached to an antenna that is packaged in a way that it can be applied to an object. The tag picks up signals from and sends signals to a reader. The tag contains a unique serial number, but may have other information, such as a customers' account number.

ROM - The acronym for read-only memory. The computer contains programs essential to its operation in ROM. A ROM chip retains its contents even after the computer is turned off.

RPM - The abbreviation for revolutions per minute.

RS232 - Interface between data terminal equipment and data communication equipment employing serial binary data interchange.

RS422 - The Electronic Industries Association standard that specifies the electrical characteristics of balanced voltage digital interface circuits.

RS485 - The Electronic Industries Association standard that specifies the electrical characters of generators and receivers for use in balanced digital multipoint systems.

RTS (Request To Send) - An RS232 modem interface signal which indicates that the DTE has data to transmit.

SCSI - The acronym for small computer system interface. An I/O but interface with faster data transmission rates than standard ports. Up to seven devices can be connected to one SCSI interface.

self cart - This form of cart requires no input signal. The scanner is continuously attempting to decode bar codes. When a scanner is in self cart, there is no way of determining if there is a package present or a no-read.

sensor - A device that detects or measures something and generates a corresponding electrical signal to an input circuit of a controller.

serial port - An I/O port used most often to connect a modem or a mouse to your computer, identifiable by its 9-pin connector.

serial transmission - The most common transmission mode; serial, information bits are sent sequentially on a single data channel.

serial asynchronous transmission of data - The following are common communications interfaces: RS232, RS422, RS485, 20mA current loop and RS423.

When data is transmitted serially from a communications port, the information is transferred between the two devices one data bit at a time. The data flow can follow one of three different communications modes: simplex, half duplex, or full duplex. Each character of data within the data flow is transported in a binary bit frame called the asynchronous data frame.

The start bit begins each frame. A low voltage signal on the data communications line marks the beginning of the start bit, at which point the receiving device begins looking for binary zeros and ones (0s and 1s). The following five to eight data bits (the number depends on the format used) comprise the binary character. For error detection, an optional parity bit can define whether the total number of zeros or ones was even or odd.

There are five different parity selections:

- ODD - last data bit is a logical 0 if the total number of logical 1s in the first seven data bits is odd.
- EVEN - last data bit is a logical 0 if the total number of logical 1s in the first seven data bits is even.
- MARK - last data bit is always a logical 1 (i.e.: high/mark).
- SPACE> - last data bit is always a logical 0 (i.e.: low/space).
- OFF (NONE) - last data bit is not present.

The method used to catch errors by using parity bits is as follows: When the transmitter frames a character, it tallies the number of 0s and 1s within the frame and attaches a parity bit. (The parity bit varies according to whether the total is even or odd.) The receiving end then counts the 0s and 1s and compares the total to the odd or even recorded by the parity bit. If a discrepancy is noticed by the receiving end, it can flag the error and request a retransmission of the data.

A stop bit is used to signal the end of the character. Stop bits are typically one or two bits in length. The slower the transmission speed, the more stop bits required for recognition of the end of the data frame.

In addition to the direction of data flow and the data framing, there are other considerations to insure uniform transmissions. Certain operating parameters must be followed to prevent the loss of valuable data.

The first consideration is the speed of transmission, known as baud rate. Serial data transmission is measured in bits per second (BPS). The baud rate selections available for the 6000 are: 110, 300, 1200, 2400, 4800, 9600 and 19200. To enable two devices to interact, they must both be transmitting/receiving data at the same baud rate. If it is not possible to do this, there must be a buffer (typically additional storage memory) that accommodates the differences in communications speed.

Many serial communications links also use a flow control system to handle data transmission in addition to memory buffers.

X-ON/X-OFF Protocol

A common type of flow control is the X-ON/X-OFF protocol. When a receive buffer nears its memory capacity, the receiving device sends an ASCII X-OFF signal to the transmitting device, telling it to stop sending data. When the memory buffer has enough space to handle more data, the X-ON signal is sent to the transmitting device, telling it to start sending data again.

ACK/NAK Protocol device transmits a message to the host, the host responds with either an ACK (06H) or a NAK (15H). If the host transmits an ACK to the device, the device deletes its transmit message and the communication sequence is complete. If the host transmits a NAK, the device will retransmit. The device resends data a maximum of three times. Optionally this may be changed to 1, 2, 3, or infinite retransmits by the user. If the device receives a fourth NAK, it will delete the data in its transmit buffer and display "MAX REXMITS."

A transmitting device ignores ACK and NAK characters received during data transmission. If, for example, a device receives a NAK during a data transmission, it will not resend the data at the completion of the transmission.

The device also has a retransmit timer. This timer is activated each time the device transmits data to the host. If the timer runs for two seconds (this is also changeable) and the device does not receive an ACK or NAK from the host, a timeout occurs and the device retransmits its data. Each time the device retransmits because of a timeout, it treats the timeout the same as receiving a NAK from the host computer. If the device does not receive an ACK before the end of the fourth timeout, it will delete the data in its transmit buffer and display "MAX REXMITS."

The device deletes data in its transmit buffer and displays the error message when any combination of four timeouts and NAKs from the host occurs.

When the device receives a message from the host, it calculates the BCC for the message and compares the calculated BCC to the received BCC. If the two values match, the device transmits an ACK, ending the communication. If the values do not match, the device transmits a NAK to the host and waits for the host to retransmit the message. The host, like the device, should retransmit a maximum of three times.

The sequence number starts at zero (30H) and is incremented each time a device transmits a new message. When the sequence number reaches nine (39H), it wraps around to one (31H). If the sequence number skips a number, the receiving device knows that a message was lost. If the same sequence number is received on two sequential messages, the second message is responded to with an ACK or NAK (as appropriate) and ignored.

shielding - Protective covering that eliminates electromagnetic and radio frequency interference.

side read - The scanner/antenna is mounted to read the side of a box as it passes by the head.

signal - An impulse or fluctuating electrical quantity (i.e.: a voltage or current) the variations of which represent changes in information.

Singulation- A means by which an RFID reader identifies a tag with a specific serial number from a number of tags in its field.

slider bar - A graphical user interface that enables the user to select an ascending/descending value for a definable parameter by clicking on the slider bar and then sliding (via the mouse) until the desired value is shown.

software cart - A serial message from an external device that controls the cart cycle.

spot - The undesirable presence of an area of low reflectance in a space. start and stop characters

start and end of cart photoeyes - The cart cycle begins when the start of cart photoeye is blocked and continues until the end of cart photoeye is unblocked. Relay decisions and data communication take place after the end of cart photoeye is unbroken.

start bit - In asynchronous transmission, the first bit or element in each character, normally a space, that prepares the receiving equipment for the reception and registration of the character.

stop bit - The last bit in an asynchronous transmission, used to indicate the end of a character, normally a mark condition, that serves to return the line to its idle or rest state.

STX (Start of Text) - A transmission control character that precedes a text and is used to terminate a heading. (^B)

syntax - The rules that dictate how the user must type a command or instruction so that the computer will understand it.

system.ini file - When the user starts Windows, it consults the system.ini file to determine a variety of options for the Windows operating environment. Among other things, the system.ini file records which video, mouse, and keyboard drivers are installed for Windows. Running the Control Panel or Windows Setup program may change options in the system.ini file.

tachometer (tach) - Hardware device used to provide conveyor speed information to the scanner or camera in x pulses per inch.

tag - A collection of information associated with a single variable or I/O point.

tap(s) - Taps (or channels) refer to the number of data paths out of the linear CCD sensor. A linear CCD sensor consists of a line of light-sensitive areas. The charge collected in all these areas is shifted to a parallel array of non-light sensitive holding areas all at once. The charges are then shifted along the second set of areas in a bucket brigade fashion with the last areas charge being shifted off the sensor entirely (for further processing). This holding area does not have to all be shifted out of a single port the holding line may be broken into several sections, each with its own exit from the sensor. Each exit is called a tap or channel. Generally, the more taps the more quickly the image data may be shifted

out of the sensor. Current camera configurations offer either 2 or 4 taps. Tap Frequency (MHz) is the clock rate at which pixels are shifted out of the CCD sensor.

TCP/IP - An industry standard suite of protocols providing communications in a heterogeneous network environment. TCP/IP stands for Transport Control Protocol/Internet Protocol.

terminal program - Computer software that sends, receives, and displays serial data.

tracking - Process of keeping track of packages as they travel through the scanning area. Tracking can be done based on the leading edge or trailing edge of packages. Belt speed (as monitored via the tachometer signal) and camera mounting also figure into the tracking process.

trailer - A means of identifying the end of a message sent to the host. One example is <ETX> or End of Text.

transceiver- A device that both transmits and receives radio waves.

transmit point - The time it takes to transmit the decoded results from the time the object is first sensed (by photoeye or light curtain) until the completion of transmission to the host. Transmit point is shorter (faster) for cameras because it is not required to accommodate a scanning pattern length.

Transponder- A radio transmitter-receiver that is activated when it receives a predetermined signal.

trigger - A signal, typically provided by a photoeye or proximity switch, that informs the scan head of the presence of an object within its reading zone. Also called cart.

trigger or cart cycle - The time during which the scanner is attempting to read the bar code.

ultra-high frequency (UHF)- From 300 MHz to 3 Ghz. Typically, RFID tags that operate between 866 MHz to 960 MHz.

Uniform Code Council (UCC)- The nonprofit organization that overseas the Uniform Product Code, the barcode standard used in North America.

Unique Identifier (UID)- A serial number that identifies the transponder. The U.S. Department of Defense has also developed an identification scheme called UID.

UPS - The abbreviation for uninterruptible power supply. A battery-powered unit that automatically supplies power to your computer in the event of an electrical failure.

utility - A program used to manage system resources including memory, disk drives, and printers.

wedge - A device that plugs in between a keyboard and a terminal. It allows data to be entered either by keyboard or by various types of scanners.

word - A unit of data which contains two bytes (16 bits).

write-protected - Read-only files are said to be write-protected. The user can write-protect a 3.5-inch diskette by sliding its write-protect tab to the open position and a 5.25-inch diskette by placing an adhesive label over its write-protect notch.

XON - A control character sent by the receiving device to signal the transmitting device to begin sending data.

XOFF - A control character sent by the receiving device to signal the transmitting device to stop sending data.

Appendix A: ASCII Chart

HEXADECIMAL & DECIMAL CHARACTER ASCII TABLE

DEC	HEX	ASCII		DEC	HEX	ASCII	DEC	HEX	ASCII	DEC	HEX	ASCII
000	00	^@	NUL	032	20	SPC	064	40	@	096	60	'
001	01	^A	SOH	033	21	!	065	41	A	097	61	a
002	02	^B	STX	034	22	"	066	42	B	098	62	b
003	03	^C	ETX	035	23	#	067	43	C	099	63	c
004	04	^D	EOT	036	24	$	068	44	D	100	64	d
005	05	^E	ENQ	037	25	%	069	45	E	101	65	e
006	06	^F	ACK	038	26	&	070	46	F	102	66	f
007	07	^G	BEL	039	27	'	071	47	G	103	67	g
008	08	^H	BS	040	28	(	072	48	H	104	68	h
009	09	^I	HT	041	29	)	073	49	I	105	69	I
010	0A	^J	LF	042	2A	*	074	4A	J	106	6A	j
011	0B	^K	VT	043	2B	+	075	4B	K	107	6B	k
012	0C	^L	FF	044	2C	,	076	4C	L	108	6C	l
013	0D	^M	CR	045	2D	-	077	4D	M	109	6D	m
014	0E	^N	SO	046	2E	.	078	4E	N	110	6E	n
015	0F	^O	SI	047	2F	/	079	4F	O	111	6F	o
016	10	^P	DLE	048	30	0	080	50	P	112	70	p
017	11	^Q	DC1 XON	049	31	1	081	51	Q	113	71	q
018	12	^R	DC2	050	32	2	082	52	R	114	72	r
019	13	^S	DC3 XOFF	051	33	3	083	53	S	115	73	s
020	14	^T	DC4	052	34	4	084	54	T	116	74	t
021	15	^U	NAK	053	35	5	085	55	U	117	75	u
022	16	^V	SYN	054	36	6	086	56	V	118	76	v
023	17	^W	ETB	055	37	7	087	57	W	119	77	w
024	18	^X	CAN	056	38	8	088	58	X	120	78	x
025	19	^Y	EM	057	39	9	089	59	Y	121	79	y
026	1A	^Z	SUB	058	3A	:	090	5A	Z	122	7A	z
027	1B	^[	ESC	059	3B	;	091	5B	[	123	7B	{
028	1C	^\	FS	060	3C	<	092	5C	\	124	7C		

DEC	HEX	ASCII		DEC	HEX	ASCII	DEC	HEX	ASCII	DEC	HEX	ASCII
029	1D	^]	GS	061	3D	=	093	5D	]	125	7D	}
030	1E	^^	RS	062	3E	>	094	5E	^	126	7E	~
031	1F	^-	US	063	3F	?	095	5F	_	127	7F	DEL

Revision History

This document is under revision control. The revision number is increased whenever technical information is changed or added. Any document with a revision number less than 1.0 is preliminary. Any document with a revision number of 1.0 or greater has been approved and, if it is a standard document, released by Accu-Sort Systems ECO process.

Document Revision Number	ECO Number	Date	Changes Made
0.1	N/A	08/15/07	Document submitted for review
0.2	N/A	12/03/07	Revisions and Corrections