

## 642NN Select RF Operating Frequency



### Caution

**The authorized bands in the U.S. for CW frequency (i.e., ATA only) is 902.25 to 903.75 MHz and 910.00 to 921.50. The authorized frequency band for modulated frequency is 911.75 to 921.75 MHz.**

**Note:** RF frequency can be set for backward-compatibility using command **#642NN** or for the newer 250-kHz step method using command **#647xxx**.

Command #642NN sets the reader RF frequency from 902 to 928 MHz in 500-kHz steps, where NN is a hexadecimal value from 00 to 34. After the reader's frequency is set, the value is stored in battery-backed RAM (non-volatile RAM, NVRAM). This value is NOT altered by power-down, loading default parameters, or a flash download of new software (there is no default frequency value). It can only be changed by issuing command #642NN.

Additionally, if the NVRAM becomes corrupted, the correct operating frequency cannot be guaranteed. In this circumstance, the RF section will shut down and the reader will send an error message to the host (Error 06). Until the frequency is reset using command #642NN after NVRAM corruption, the unit will display the same error message every time it is powered up or if an attempt is made to enable the RF (by host or by external sensor). The commands to set the RF frequency are listed in [Table 32](#).

**Table 32 RF Frequency Commands**

Command	RF Frequency (MHz)	Approved for Use in the U.S. (ATA only)	Approved for Use in the U.S. (modulated)
64200	902	No	No
64201	902.5	Yes	No
64202	903	Yes	No
64203	903.5	Yes	No
64204	904	No	No
64205	904.5	No	No
64206	905	No	No
64207	905.5	No	No
64208	906	No	No
64209	906.5	No	No
6420A	907	No	No
6420B	907.5	No	No
6420C	908	No	No
6420D	908.5	No	No
6420E	909	No	No

Table 32 RF Frequency Commands

Command	RF Frequency (MHz)	Approved for Use in the U.S. (ATA only)	Approved for Use in the U.S. (modulated)
6420F	909.5	No	No
64210	910	Yes	No
64211	910.5	Yes	No
64212	911	Yes	No
64213	911.5	Yes	No
64214	912	Yes	Yes
64215	912.5	Yes	Yes
64216	913	Yes	Yes
64217	913.5	Yes	Yes
64218	914	Yes	Yes
64219	914.5	Yes	Yes
6421A	915 (factory default)	Yes	Yes
6421B	915.5	Yes	Yes
6421C	916	Yes	Yes
6421D	916.5	Yes	Yes
6421E	917	Yes	Yes
6421F	917.5	Yes	Yes
64220	918	Yes	Yes
64221	918.5	Yes	Yes
64222	919	Yes	Yes
64223	919.5	Yes	Yes
64224	920	Yes	No
64225	920.5	Yes	No
64226	921	Yes	No
64227	921.5	Yes	No
64228	922	No	No
64229	922.5	No	No
6422A	923	No	No
6422B	923.5	No	No

Table 32 RF Frequency Commands

Command	RF Frequency (MHz)	Approved for Use in the U.S. (ATA only)	Approved for Use in the U.S. (modulated)
6422C	924	No	No
6422D	924.5	No	No
6422E	925	No	No
6422F	925.5	No	No
64230	926	No	No
64231	926.5	No	No
64232	927	No	No
64233	927.5	No	No
64234	928	No	No

Reader response:

Done

### 643NN Select ATA Operating Range (Distance)

Command #643NN selects the read range for ATA tags where NN is a hexadecimal value from 00 to 1F; the range increases with increasing NN value. The range can be adjusted for 32 discrete values where 00 is the shortest range and 1F is the longest range. **The default range value is 1F.**

Reader response:

Done

### 644NN Set RF Attenuation

Command #644NN sets the attenuation control for the output RF power where NN is a hexadecimal value from 00 to 0A. Settings for attenuation are 1.0 dB increments over a range of 10dB of attenuation from the maximum power setting of two watts at 0dB attenuation to a minimum power level of 200 milliwatts at 10dB attenuation.

The Set RF Attenuation command NN variables and corresponding attenuation settings are shown in [Table 33](#).

Table 33 RF Attenuation Command Variables

Variable (NN)	Attenuation Setting (dB)
<b>00</b>	<b>0 (factory default)</b>
01	1
02	2
03	3
04	4
05	5
06	6
07	7
08	8
09	9
0A	10

Reader response:

Done

### 645NN Set eGo and eGo Plus Operating Range (Distance)

Command #645NN sets the read range for eGo and eGo Plus Tags where NN is a hexadecimal value from 00 to 1F; the range increases with increasing NN value. The range can be adjusted for 32 discrete values where 00 is the shortest range and 1F is the longest range. **The default range value is 1F.**

Reader response:

Done

### 646NN Set IAG RF Attenuation

Command #646NN sets the IAG attenuation control for the output RF power where NN is a hexadecimal value from 00 to 0F. Setting 00 (0 dB) is the maximum power setting and 0F (15 dB) is the minimum power setting. **The default attenuation value is 04.**

### 647NNN Select RF Operating Frequency

Command #647NNN sets the reader RF from 860 to 930 MHz in 250-kHz steps, where NNN is a hexadecimal value from 000 to 118. After the reader's frequency is set, the value is stored in non-volatile RAM (NVRAM). This value is not altered by power-down.

If the NVRAM becomes corrupted, the correct operating frequency cannot be guaranteed. In this circumstance, the RF section shuts down and the reader sends an `ERROR06` message to the host. Until

the frequency is reset using command #647NNN, the unit displays the same error message every time it is powered up or if an attempt is made to enable the RF by host or by external sensor.

The commands to set the RF operating frequency are presented in [Table 34](#).

**Table 34 Select RF Operating Frequency Commands**

Command	RF Frequency (MHz)
647000	860.00
.	.
6470C8	910.00
.	.
6470CF	911.75
6470D0	912.00
6470D1	912.25
6470D2	912.50
6470D3	912.75
6470D4	913.00
.	.
6740DC	915.00
.	.
6470EA	918.50
6470EB	918.75
6470EC	919.00
6470ED	919.25
6470EE	919.50
6470EF	919.75
.	.
.	.
.	.
657113	928.75
647114	929.00
647115	929.25
647116	929.50
647117	929.75
647118	930.00

Reader response:

Done

**Note:** *Users in all countries should check with the appropriate local authorities for licensing requirements.*

## 648NN Set Synchronization Output Delay Time

Command #648NN sets the time in milliseconds by which the reader is delayed before sending a synchronization pulse on the RS-485 synchronization bus to all other readers connected on the bus.

Entering a value of **#64800 (factory default)** disables this feature. Entering #64801 through #648FF sets the reader countdown time from 1 to 255 milliseconds. If the reader gets a pulse from another reader before its own time period expires, it first executes all of the enabled tag protocols, then restarts its countdown timer. The reader on the bus with the smallest entered value becomes the master and all readers with a larger entered number become slaves. Any reader on the bus can become the master. The master does not necessarily have to be on one of the ends of the synchronization bus, but the installer must exercise caution to ensure that every reader on the bus has a different value.

When the master sends out the synchronization pulse all of the connected readers begin the RF tag protocol transactions that have been enabled. This synchronization feature primarily is designed to overcome some of the system-design RF interference issues in reading IAG tags at locations having a dense population of readers and tags. All readers on the bus require the same enabled tag protocols for synchronization to work. Entering increasing values to all readers on the bus is required so that should a break occur in the bus that is connecting all the readers, the next reader will take over as master for the rest of the readers that are connected, and the system may work reasonably well until the cabling is fixed. Do not set the synchronization times too short, as IAG tags are battery powered and their useful life can be diminished if the typical traffic flow is slow moving, and the tag is activated continuously in the reader pattern. Command #582 displays the synchronization output time.

The synchronization bus is wired by connecting all of the readers' "V" (RS-485 synchronization minus) pins together and all of the readers' "Z" (RS-485 synchronization plus) pins together.

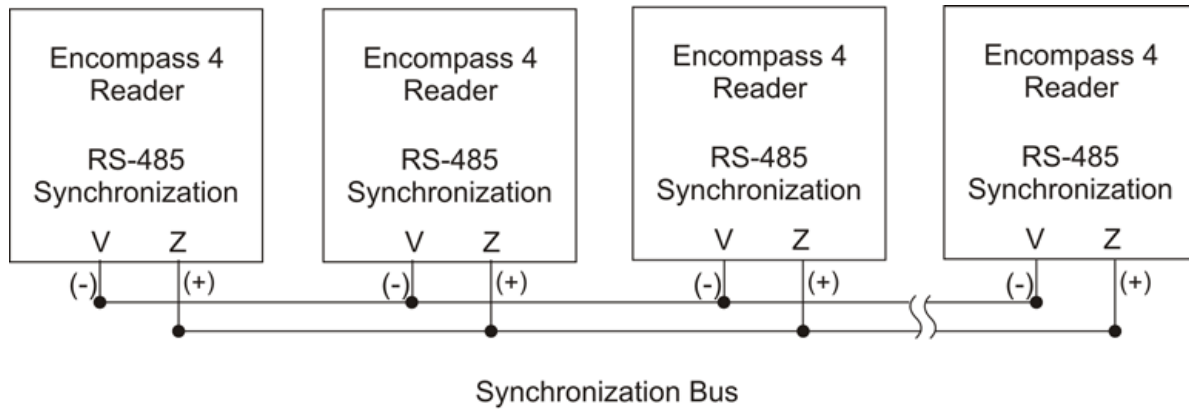


Figure 50 Synchronization Bus Wiring

### 649NN Set Synchronization Hold-Off Time

Command #649NN sets the time in milliseconds that the reader will hold off after getting (or sending if it is the master on the bus) the synchronization pulse before it starts to run its IAG tag sequence. This command is used in close combination with command #648NN. Command #649NN is applicable only if a value other than #64800 is entered for #648NN and is used only when the IAG tag protocol is enabled. Entering a value of **#64900 (factory default)** disables this feature. Entering a value between #64901 and #6490A (hex value of 10 decimal) causes the reader to hold off starting its tag protocol transaction for the time set between 1 and 10 milliseconds. This feature is used to lessen the possibility of a reader reading an IAG tag that is activated by another reader in the site. Because IAG tags are battery powered active transmitters, their read zones can be much harder to control than for beam-powered passive tags. The pattern also will vary greatly among tags depending on the condition of the individual tag battery. If this feature is used, each reader on the bus needs a value of between #64901 and #6490A entered for the feature to work. As with the #648NN command, the reader's physical location on the bus is not critical, but TransCore recommends that the reader numbering follow a logical sequence. Using this command, more than 1 reader on the bus can have the same value, but TransCore recommends using all 10 slots before reusing them. Command #582 displays the Synchronization Hold Off Time.

Table 35 lists an example of a plaza having five Encompass 4 Readers in lanes where multiple readers identifying the same tag would present a system problem. All of the readers are cabled together on a synchronization bus (Figure 50). The example timing for #648NN is appropriate assuming IAG is the only protocol enabled in all readers. The RF for all readers is set to 915.75 (#6470DE) and in this example it is determined that an IAG attenuation setting of 9 dB (#64609) prevents a reader from activating a tag in an adjacent lane.

Table 35 Example of Encompass 4 Reader Plaza Synchronization Bus Settings

Reader Lane	Set Synchronization Output Delay Time (#648NN)	Set Synchronization Hold-Off Time (#649NN)
1 <sup>a</sup>	#64814 = 20 ms synchronization time	#64901 = 1 ms hold off
2	#64816 = 22 ms synchronization time	#64902 = 2 ms hold off
3	#64818 = 24 ms synchronization time	#64903 = 3 ms hold off
4	#6481A = 26 ms synchronization time	#64904 = 4 ms hold off
5	#6481C = 28 ms synchronization time	#64905 = 5 ms hold off

<sup>a</sup> Reader 1 becomes the bus synchronization master.

## 65 Reset Power Fail Bit

Command #65 resets the power fail bit to 0. The bit changes from 0 to 1 when power is restored to the reader. Upon reader power-up, the host transmits either command

#65 or #63 `Reset Reader` to properly initialize this bit. The current state of the power fail bit may be displayed. Refer to “520 Display Power Fail Bit” on page 7–103 for more information.

Reader response:

Done

## 66F Load Default Operating Parameters

Command #66F loads all the factory default operating parameters except RF operating frequency. Refer to “456 Enable eGo Plus Tag Initialization During Multi-tag Sort (Factory Default)” on page 7–98.

Reader response:

Done All parameters loaded OK

Error A parameter load failed

## 67N Set Output Pulse Duration

See “526 Display I/O Status” on page 7–105, “620N Set Output Control” on page 7–116, and “621 Select Predefined Output Control (Factory Default)” on page 7–116.

Command #67N sets the output pulse duration for the command #621 `Predefined Output Control`. This command specifies the length of time that output line(s) will be asserted upon receipt of a valid and unique tag ID. The factory default setting is 228 ms. The variable N specifies an output pulse duration of 48 ms to 752 ms.

Uppercase or lowercase characters are allowed for N; for example, hex digits A through F or a through f. The command numbers and corresponding output pulse durations are shown in Table 36.



**Table 36 Output Pulse Duration Commands**

Command	Duration (ms)
670	4
671	8
672	12
673	16
674	20
675	24
676	32
677	40
678	48
679	60
67A	76
67B	152
<b>67C</b>	<b>228 (factory default)</b>
67D	300
67E	376
67F	752

Additional IDs may be acquired during the selected output pulse duration; however, the timing restarts upon each successive ID acquisition. This command should be used with discretion. For example, when the tag acquisition interval is short compared to the selected pulse duration, distinct pulses may not be generated.

Reader response:

Done or Error

### 690N Select Presence Without Tag Report Option

Command #690N enables or disables the presence without tag report option. If the presence without tag reporting option is enabled using command #6901, input reports are transmitted when a tag presence is detected without the subsequent acquisition of a valid tag. The value for N specifies the reports as shown in [Table 37](#).

Table 37 Presence Without Tag Report Commands

Command	Report Option
<b>6900</b>	<b>Disable presence without tag reports (factory default)</b>
6901	Enable presence without tag reports

Reader response:

Done

Refer to “[410N Select Unique ID Code Criteria \(Anti-passback Feature\)](#)” on page 7–81 for message format information.

## 692N Select RF Control Algorithm

Command #692N selects the algorithm for turning off RF power when RF-by-input control is enabled using command #641 Select RF-by-Input Control.

The values for N specify the RF control algorithms as shown in [Table 38](#).

Table 38 RF Control Algorithm Commands

Command	RF Power Off
6920	On timeout only (#529A0)
6921	Timeout or tag ID acquired (#529A1)
<b>6922</b>	<b>Timeout or presence false (#529A2, factory default)</b>

Command #6920 turns off RF power based on the timeout established by command #693N Set RF Timeout Period.

Command #6921 allows RF power to be turned off either after the timeout period or upon acquisition of a valid tag ID, whichever occurs first.

Command #6922 turns off RF power either after the timeout period or upon the presence false condition, whichever occurs first.

Reader response:

Done

## 693N Select RF Timeout Period

Command #693N selects the RF timeout period used by command #692N Select RF Control Algorithm. Values for N range from 0 through F.

Command #693F disables the RF timeout. The reader turns off the RF immediately following the acquisition of a valid tag, whether or not it is unique. This control algorithm may be used in Wiegand mode to ensure that the tag data is transmitted once and only once per presence on both serial and Wiegand ports.

Uppercase or lowercase characters are allowed for N; for example, hex digits A through F or a through f. The commands and corresponding timeouts are shown in [Table 39](#).

Table 39 Timeout Period Values

Command	Timeout (ms)
6930	0 (always expired)
6931	4
6932	8
6933	12
6934	20
6935	24
6936	32
6937	48
6938	60
6939	92
693A	152
693B	300
693C	452
693D	600
693E	752
<b>693F</b>	<b>Infinite (never expires, factory default)</b>

Reader response:

Done or Error

The reader returns an Error message if a valid hexadecimal digit is not substituted for N in command #693N.

### 694N Select Input Inversion Option

Command #694N enables or disables input inversion. When inversion is enabled, an open circuit input is interpreted as a closed circuit, and a closed circuit input is interpreted as an open circuit. This feature allows greater flexibility in the attachment of external equipment to the reader inputs. For example, some proximity sensors indicate presence with an open circuit. In this instance, command #6941 can enable input inversion so that an open circuit input indicates a presence. The values for N represent the two inversion options as shown in [Table 40](#).

Table 40 Input Inversion Options

Command	Option
6940	Disable input inversion (factory default)
6941	Enable input inversion

Reader response:

Done

## 695S...S Set Serial Number

See “505 Display Software Version” on page 7–102.

Command #695 assigns the reader serial number according to the format:

```
695SSSSSS
```

where

SSSSSS is the serial number.

The serial number may contain as many as six uppercase or lowercase ASCII alphanumeric characters.

**Note:** The factory-assigned serial number of the reader contains eight characters. However, to maintain backward compatibility, the reader software allows only six characters to be entered. When setting the serial number, skip the first and fourth character of the seven-character number shown on the reader product label.

**Note:** Once assigned, the serial number is preserved during power-down and the loading of default parameters.

Reader response:

Done

## 696S...S Store Hardware Configuration String

See “506 Display Hardware Configuration Information” on page 7–102.

Command #696S...S stores hardware configuration information into reader memory.

The hardware configuration string is assigned according to the following format:

```
696S...S
```

where

S...S the hardware configuration string that may contain as many as 20 uppercase or lowercase ASCII alphanumeric characters.

**Note:** Once assigned, configuration information is preserved during power-down and the loading of default parameters.

Reader response:

Done

## 697 Set User-Programmable Group Select Equals (GSE) Filter

Refer to “549 Display User-Programmable Group Select Equals (GSE) Filter Data” on page 7–111.

Command #697 assigns the user-programmable GSE filter.

The command string is assigned according to the following format:

```
#697 MM AA DDDDDDDDDDDDDDDDD
```

Where

MM = The tag uses this mask to determine which of the eight Comparison Data bytes are to be compared for the Group Select filter (1-byte field, 2 characters).

For example:

```
#697 30 00 000063B400000000
```

```
MM = 30: 0011 0000
```

In this example, the mask indicates to the tag to compare data in position 02 and 03 after address 00.

AA = This field is used by the tag to determine the start address in the tag memory for the comparison data (1-byte field, 2 characters).

```
#697 30 00 000063B400000000
```

For example, using the SeGo ID E02263B4002C9232 :

E0	22	63	B4	00	2C	92	32	–	SeGo ID
<u>T</u>	<u>T</u>	<u>T</u>	<u>T</u>	<u>T</u>	<u>T</u>	<u>T</u>	<u>T</u>		
00	01	02	03	04	05	06	07	–	Byte locations/addresses starting at 0

DD...DD = Comparison Data: an 8-byte field (16 characters) used by the tag as the comparison data for the Group Select Equals filter. The tag compares the data in this field to data in tag memory beginning at the Start Address to determine if the tag will respond to a reader Group Select request. Only the bytes having the corresponding bit set in the Mask is used for this comparison.

For example, consider two tags with the following SeGo ID:

```
SeGo ID: E02263B4002C9232
```

```
SeGo ID: E02263B4002D8132
```

These two SeGo IDs have the same information in bytes **02** and **03 (63B4)**, so both of these tags will respond to the reader.

The Group Select Equals filter written as follows will cause only tags with 63B4 in bytes 02 and 03 to respond.

```
#697 30 00 000063B400000000
```

The 2-character Address indicates where the Group Select filter starts. Anywhere there is a 1 in the binary representation of the 2-character hexadecimal Mask, the tag

will compare the values for those bytes. If the corresponding characters in the Data matches the data in the tag for those locations, the tag will respond. If not, the tag will not respond, and thus, will not be read or reported by the reader.

Reader response:

Done

## Command Group 8 – Auxiliary Reader Control

Group 8 commands provide control of reader functions, such as the sense input lines.

### 82N Select Input Status Change Report Option

Command #82N selects the input lines to be monitored to report any change in input status. The enabled input lines are monitored for any changes in the logic states. If a change is detected, the reader generates an input status change message and treats it as a tag ID. If the auxiliary information option is enabled, the input status field displays the current input values. The value for *N* specifies the report options as shown in Table 41.

**Table 41 Input Status Change Report Options**

Command	Report Option
<b>820</b>	<b>Disable status change reports (factory default)</b>
821	Report change on input0
822	Report change on input1
823	Report changes on input0 and input1

Reader response:

Done

### 830 Disable Automatic Periodic RF Status Report (Factory Default)

Command #830 is a default set in the factory to disable the automatic periodic RF status report.

Reader response:

Done

### 831 Enable Automatic Periodic RF Status Report

Command #831 enables the automatic periodic RF status report. This function sends out a periodic RF status report if no other message (a tag read) is sent from the reader for a period of time. This message is the same message that would be sent in response to the #527 `Display RF Status` command. Enabling this function is helpful in some sites where there may not be much tag activity, and the user wants an automatic way to ensure the communication channel with the reader is still intact. With this function enabled, the host system will get a message from the reader at least every three minutes.

Reader response:

Done

### **844 Disable Retransmit (Factory Default)**

The function causes tag data to be retransmitted after the retransmit time as defined by “[46NN Set Wiegand Retransmit Interval](#)” on [page 7–98](#), if the tag is in the read zone at that time or afterward. The function is implemented by resetting the tag ID uniqueness filter once the Wiegand retransmit interval time is expired.

RS-232 Retransmit for ATA or eATA data only.

### **845 Enable Retransmit**

Use #46NN for setting time. For example: #4605 = 5 second retransmit time.

This function sends data again, even if the uniqueness is enabled. The uniqueness filter is reset after the retransmit interval.

# Chapter 8 Configuring the Encompass 4 Reader

This chapter provides instructions for configuring the Encompass® 4 Reader, including factory configuration parameter defaults and instructions for using terminal emulation software to check and change the Encompass 4 Reader factory configuration defaults.

## Configuring the Reader

After installing the Encompass 4 Reader, you need to configure its operating parameters. Terminal settings should be initially set at 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control.

### General Configuration Labeling

Each Encompass 4 Reader and its shipping carton are labeled to indicate the unit's ordering configuration. [Table 42](#) contains explanations of the Encompass 4 Reader label fields.

**Table 42 Encompass 4 Reader Configuration Label Fields**

Field	Description
1st	TransCore reader designator
2nd	Model number 40 = 915 MHz frequency band
3rd	Interface xy where x = 0 (integrated antenna); x = 1 (external antenna) y = 2 (RS–232 and Wiegand); y = 4 (RS–422 and Wiegand)
4th	0nn where nn = tag protocol(s). Protocol designators are as follows: 001 = Super eGo® (SeGo) protocol 002 = ATA/SeGo protocols 003 = eGo/SeGo protocols 004 = SeGo/Inter-Agency Group (IAG) protocols 008 = ATA protocol 009 = eGo/ATA protocols 010 = ATA/IAG protocols 019 = IAG protocol



As an example, a label reading 10-4002-004 indicates that this 915-MHz Encompass 4 Reader is configured with an integrated antenna, RS–232 and Wiegand communications, and reads SeGo and IAG protocol tags.

## Default Operating Parameter Settings

**Table 43** contains the factory default configuration settings for the Encompass 4 Reader operating parameters. The default configuration settings may not be the correct operating configuration settings for a specific site. Changes to the configuration settings may have to be made, depending on the site plan, as described in “[Chapter 2 Developing the Site Plan](#)” on page 2–4.

Review the default configurations shown in **Table 43** to determine which parameters, in addition to operating frequency and operating range, need to be adjusted. Refer to “[Chapter 7 Commands](#)” on page 7–86 for a complete list of parameters and the corresponding commands.

**Note:** *The dual-protocol Encompass 4 Reader internal timing varies depending on the operative tag read mode and the type of tag in the read field.*

**Table 43 Encompass 4 Reader Default Configuration Settings**

Parameter	Setting	Command
Operating mode	Data	00
Baud rate	9600	1005
Stop bits	1	1010
Parity	None	1020
Time and date appended	Enabled	302
Auxiliary information appended	Disabled	310
Unique ID code criteria	Separation of 1 ID	4100
Wiegand mode	Disabled	450
Tag translation mode	Disabled	452
Multi-tag sort	Disabled	454
eGo and eGo Plus tag initialization during multi-tag sort	Enabled	456
Second alternative group select	Disabled	458
Wiegand transmit mode	1 second	4601
Third alternative group select	Disabled	490
Fourth alternative group select	Disabled	492
Fifth alternative group select	Disabled	494
Alternate group select	Disabled	496
Reader ID number	00	6000

**Table 43 Encompass 4 Reader Default Configuration Settings**

Parameter	Setting	Command
Communications protocol	Basic	610
Error correcting protocol (ECP) timeout	12.7 sec	612FE
Flow control	Software (XON/XOFF)	6141
Echo mode	Enabled	6171
Sense output control	Predefined	621
RF-by-input control	Enabled	641
ATA operating range	Maximum	6431F
RF attenuation	Full power	64400
eGo and eGo Plus Tag operating range	Maximum	6451F
IAG attenuation	4 dBm	64604
Set Frequency <sup>a</sup>	915MHz	6470DC
Sense output pulse duration	228 ms	67C
Presence without tag reports	Disabled	6900
RF-off control	Timeout or no presence	6922
RF timeout	Never true	693F
Input inversion	Disabled	6940
Serial number	NNNNNN	695
Store hardware configuration	Hardware configuration not known	696
Input status change reports	Disabled	820
Automatic periodic RF status report	Disabled	830

<sup>a</sup> Local laws apply. The authorized frequency band for the TransCore Encompass 4 Reader in the United States is 911.75 MHz to 919.75 MHz. Contact TransCore if your application requires a frequency outside of this range.

## Configuring Parameters with Terminal Emulation Software

To configure the Encompass 4 Reader using a PC and terminal emulation software to manually enter Encompass 4 Reader host commands, follow the instructions in the section [“Connecting the Encompass 4 Reader to the PC” on page 4-55](#). Then, enter the appropriate configuration commands through the terminal emulation software on your PC.

See [“Chapter 7 Commands” on page 7–86](#) for a detailed description of all available configuration commands.

## Starting the Terminal Emulation Software

You can use a PC and any terminal emulation software to enter the host commands to download flash software, configure reader operating parameters, perform diagnostics, and retrieve tag data. Most terminal emulation applications have a similar sequence for launching.

### To start the terminal emulation software

1. At the command prompt, type your terminal emulation start command. The application displays the **Connection Description** dialog box.
2. Enter a name for the session and click **OK**. The application displays the **Phone Number** dialog box.
3. Choose the **Com 1** option (or whichever com port on the PC to which the RS-232 cable is attached) and click **OK**. The application displays the **COM1 Properties** dialog box.
4. In the pull-down lists on the **COM1 Properties** dialog box, choose the following values:
  - Bits per second: 9600 baud
  - Data bits: 8
  - Parity: None
  - Stop bits: 1
  - Flow control: None

Click **OK**.

The application displays the configparams.

## Verifying Communications

You must verify that the Encompass 4 Reader and the PC or laptop are communicating.

### To verify communications

1. Start the terminal emulation application as described previously in [“Starting the Terminal Emulation Software” on page 8–136](#).

**Note:** When testing the Encompass 4 Reader using a laptop, TransCore recommends that you configure laptop communication parameters to match those of the host computer to which the Encompass 4 Reader will be connected after testing and configuration are completed.

2. Cycle the power on the Encompass 4 Reader.

Upon startup, the Encompass 4 Reader transmits a sign-on message or a boot ROM failure message.

The sign-on message appears as follows:

```
Model [software version] SNYYYYYY [Copyright notice]
```

where

YYYYYY is the serial number assigned to the Encompass 4 Reader skipping the fourth character printed on the reader product label.

Serial number 000000 is the default setting and is not a valid number. If this number appears in the sign-on message, the serial number has never been stored into reader memory. Contact TransCore Technical Support.

If the flash memory checksum is not verifiable, the sign-on message appears as follows:

```
Model [E4 BOOT] Ver 0.00 A
[Copyright notice]
```

If the failure message version number equals 0.00 E and no serial number exists, the flash memory checksum has failed, and the Encompass 4 Reader is operating out of boot ROM. In this case, the Encompass 4 Reader automatically enters download mode and waits for a new program to be loaded into the flash memory. Follow the instructions in [“Program Download” on page 5–69](#).

Communications can also be verified by using the command sequence in [Table 44](#).

**Table 44 Command Sequence to Verify Communications**

Entry	Encompass 4 Reader Response	Notes
#01 <CR>	#Done <CR/LF>	Switches the Encompass 4 Reader to command mode.
#505 <CR>	#Model E4 Series Ver X.XX SN97001P <CR/LF>	Reports the software version and serial number.
#00 <CR>	#Done <CR/LF>	Returns the Encompass 4 Reader to data mode.

3. If a successful sign-on message is not returned, check connections and communications factors and correct any errors.

## To check connections and communications factors

1. Confirm that the Encompass 4 Reader has power.
2. Verify the connections between the PC and the Encompass 4 Reader.
3. Verify the receive (Rx), transmit (Tx), and signal ground (sig gnd) connections.
4. If using handshaking, verify the RTS and CTS connections.
5. Verify the COM port settings for the Encompass 4 Reader using the instructions in [“Serial Port Communications” on page 8–144](#).
6. Repeat the procedures in [“Verifying Communications” on page 8–136](#).

If you still cannot verify the Encompass 4 Reader and PC communications, use the information in [“Chapter 9 Troubleshooting and Maintenance” on page 9–149](#) to contact TransCore.

## Verifying Tag Read Capability

After verifying communications between the Encompass 4 Reader and the PC, verify the capability to read tags.

**Note:** The default tag read mode of the reader is the protocol(s) programmed into the reader.

Table 42 shows how to determine which tag protocol(s) your Encompass 4 reader supports. Use only those test tags programmed with the correct protocol(s) for the reader.

### Caution

**To avoid damage to the Encompass 4 Reader using an external antenna, you must connect the antenna before applying power to the reader.**

## To verify tag read capability

1. Once communications are verified as described in “Verifying Communications” on page 8-8, enter the following sequence of commands to turn on continuous RF:
  - #01
  - #6401
  - #40
  - #00
2. Pass one test tag in front of the unit. If the Encompass 4 Reader reads the tag, the terminal emulation application displays the tag information on the screen. If the tag ID is not displayed, perform the following actions:
  - Verify that the Encompass 4 Reader is in data mode (command #00 Switch to Data Mode).
  - Ensure that the tag you are using is compatible with the Encompass 4 Reader. The Encompass 4 Reader can read tag types that are compatible with the reader model.
  - An Encompass 4 Reader displays the tag read for any tag that is compatible with the reader programming. Table 42 shows how to determine which tag protocol(s) your Encompass 4 reader supports.

**Using the audible circuit tester as described in “Using an Audible Circuit Tester (Buzzer)” on page 4-34, verify that the reader is capable of reading the tag in the read zone. If it is, the problem is probably in the communications between the Encompass 4 Reader and the host.**

3. Pass a different reader-compatible test tag in front of your Encompass 4 Reader.
4. When the Encompass 4 Reader reads the second tag successfully, the terminal emulation application displays that tag’s information in the main screen below the information for the first tag.

If the read is unsuccessful, perform the following actions:

- Ensure the tag you are using is compatible with the Encompass 4 Reader.
- Using the audible circuit tester as described in “Using an Audible Circuit Tester (Buzzer)” on page 4-34, verify that the reader is capable of reading the tag in the read zone. If it is, the problem is probably in the communications between the Encompass 4 Reader and the host computer.

## Configuring Encompass 4 Parameters

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Follow the procedures in this section to configure Encompass 4 parameters using a PC, laptop, or terminal emulator. The PC or laptop must be connected to and communicating with the Encompass 4 Reader, and the terminal emulation application must be configured correctly, as described in the section “Verifying Communications” on page 8–136.

**Note:** *If you are using Wiegand mode, you must connect the PC or laptop to the Encompass 4 Reader using the RS–232 or RS–422 interface before attempting to send commands to the reader. You can leave the Wiegand interface connected during this procedure.*

### To configure parameters

1. Switch to command mode by typing #01 at the prompt on the terminal emulation screen, and pressing **ENTER**.

**Note:** *All Encompass 4 Reader commands are preceded by the start-of-message character (#).*

2. To meet requirements of your site, make changes to default operating parameters as described in the following sections.

The following sections contain procedures to set some of the parameters that are commonly changed to meet the requirements of a specific site. Procedures are listed in alphabetical order by parameter.

## Appended Tag Data

Use this procedure to set appended tag data parameters using the terminal emulation application. See “31N Append Auxiliary Information Selection” on page 7–92 for more information.

### To set appended tag data parameters

1. Ensure that the host computer is in command mode.
2. Enter command #311 to append auxiliary information or command #310 to have no auxiliary information appended (factory default). Press **ENTER**.

## ID Separation

The host can select a unique ID separation of one to four IDs. The reader default operation is for a unique ID separation of one ID and a uniqueness timeout of two minutes. You can disable the uniqueness check using command #40 `Transmit All ID Codes`. In this case, every tag ID received is transmitted without regard to uniqueness. You can reinstate uniqueness checking with commands #4100 through #4103 `Select ID Separation` (Table 45).

<b>Command</b>	<b>Option</b>
#4100	Separation of 1 ID
#4101	Separation of 2 ID
#4102	Separation of 3 ID
#4103	Separation of 4 ID

**Note:** The dual-protocol Encompass 4 Reader internal timing varies depending on the operative tag read mode and the type of tag in the read field.

See section “[610 Select Basic Communication Protocol \(Factory Default\)](#)” on page 7–114 and section “[410N Select Unique ID Code Criteria \(Anti-passback Feature\)](#)” on page 7–94.

### To set ID separation parameters

1. Ensure that the host computer is in command mode.
2. Enter command #4100 to select a separation of one ID; enter command #4101 to select a separation of two IDs. Press **ENTER**.

## Reports

The Encompass 4 Reader can be configured to transmit presence without tag reports and input status change reports. A presence without tag report is transmitted in data mode only, *and only if the system has a presence detector*. This report is sent if a presence is detected without the detection of a valid tag ID. See sections “[529 Display Presence Input Status](#)” on page 7–108 and “[690N Select Presence Without Tag Report Option](#)” on page 7–126.

If configured with command #82N Select Input Status Change Report Option to transmit input status change reports, the reader will transmit a message to the host computer any time the inputs change state. Input status change reports are transmitted in data mode only. Input status change reporting is disabled by default. See sections “[560 Request Sensor Status Change](#)” on page 7–112 and “[82N Select Input Status Change Report Option](#)” on page 7–131. Also refer to “[Chapter 6 Communications Protocols](#)” on page 6–71 for information on message formats.

### To set presence reporting

1. Ensure that the host computer is in command mode.
2. Enter command #529 to display presence input status and press **ENTER**. P0 indicates presence without tag reports disabled (factory default), and P1 indicates presence without tag reports enabled.
3. Enter command #6901 to enable presence without tag reports, or enter command #6900 to disable presence without tag reports (factory default). Press **ENTER**.

### To set input status change reporting

1. Ensure that the host computer is in command mode.
2. Enter command #560 to display input status change report options and press **ENTER**.

- E0 = input status change reports disabled (factory default)
  - E1 = input status change reports enabled
  - M0 = reporting disabled (factory default)
  - M1 = changes on input0 reported
  - M2 = changes on input1 reported
  - M3 = changes on either input reported
3. Enter command
    - #821 to report any change on input0
    - #822 to report any change on input 1
    - #823 to report changes on input0 and input1
    - **#820** to disable status change reports (factory default)

Press **ENTER**.

## Reset Reader

Command #63 Reset Reader resets uniqueness, clears the power fail bit, and transmits the sign-on message. The reader returns to data mode following the completion of this command.

**Note:** This command does **not** reset any of the configuration parameters. See “63 Reset Reader” on page 7–117.

### To reset the reader

1. Ensure that the host computer is in command mode.
2. Enter command #63. Press **ENTER**.

The terminal emulation screen displays the sign-on message.

## Radio Frequency



### Caution

**The authorized continuous wave (CW) frequency band for the Encompass 4 Reader in the U.S. is 902.25 to 903.75 MHz and 910.00 to 921.50 MHz and the authorized modulated frequency band for the Encompass 4 Reader in the U.S. is 911.75 to 919.75 MHz. The RF for each Encompass 4 Reader at the site must be set according to the frequency specified in the FCC site license. Only trained, authorized installation and maintenance personnel are permitted by FCC to set the RF.**

By using the Encompass 4 Reader an authorized person can set the frequency within the range from 902 to 928 MHz in 0.25 MHz steps. You can set the frequency by using a terminal emulation program and issuing the frequency command, as discussed in section “647NNN Select RF Operating Frequency” on page 7–121.

**Note:** For backward compatibility to existing controllers, you can set the RF operating frequency in 500-kHz steps using command #642NN.



## To set the frequency range

1. Ensure that the host computer is in command mode.
2. Enter command #647XXX – where XXX is a hexadecimal value from 000 to 118 – and press **ENTER**. See command “[647NNN Select RF Operating Frequency](#)” on page 7–121 for a complete listing of the hexadecimal values and the corresponding frequencies. For backward compatible frequency selection, see command “[642NN Select RF Operating Frequency](#)” on page 7–118.
3. To verify that the RF has been changed to the proper setting, type in command #527 to see the current frequency setting.



### Caution

**Contact TransCore if your application requires a frequency outside of the authorized frequency range.**

## RF Transmission

The RF transmission can be controlled by one of the following methods:

- Connecting a vehicle detector to the sense input0 circuit
- The host sending software commands to the Encompass 4 Reader

As a factory default, the Encompass 4 Reader is configured to control the RF power with a vehicle detector.

Figure 51 illustrates the methods of controlling RF sense output.

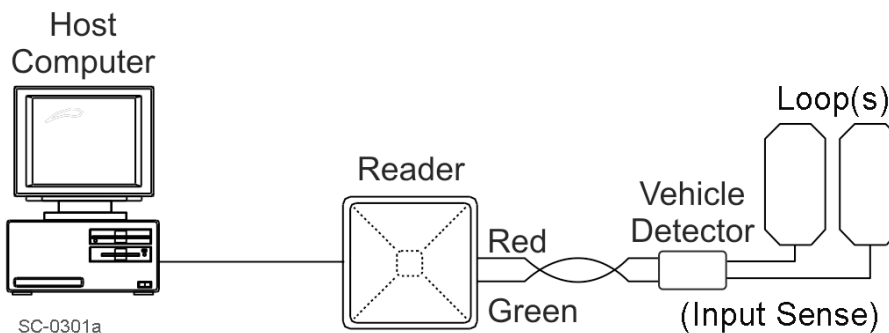


Figure 51 RF ON by Sense Input (641 Factory Default)

## Vehicle Detector Controlling RF Transmission

The vehicle detector can be a loop detector, an infrared sensor, or an ultrasonic detector which can be connected to the sense input0 to turn on the Encompass 4 Reader RF. Figure 51 shows a vehicle detector controlling the RF. This operation is preferred because the RF transmits only when a vehicle is in the read zone. Command #641 Select RF-by-Input Control (factory default) must be enabled.

## Host Controlling RF Transmission

Alternately, RF output can be controlled by commands sent to the reader.

Commands #6400 RF Off and #6401 RF On turn RF on and off.

## Sense Inputs

Both the RS–232 and RS–422 configurations used by the Encompass 4 Reader have two sense inputs — sense input0 and sense input1. The default configuration uses sense input0 as the presence detection device line. RF power is automatically turned on only when the presence detection device (loop detector or other device) detects a presence. Sense input1 is not used directly by the reader; it is used by the host computer to monitor an external device. The Encompass 4 Reader sense inputs are designed to connect to a dry contact closure.

You can configure the Encompass 4 Reader to generate input status change reports, which are transmitted like tag IDs. The host can then respond based on the true/false (closed/open) status of the sense inputs. See the section [“Reports” on page 8–140](#).

The following procedures describe how to set sense inputs using the terminal emulation software. See commands [“526 Display I/O Status” on page 7–105](#), [“694N Select Input Inversion Option” on page 7–128](#), and [“82N Select Input Status Change Report Option” on page 7–131](#) for more information.

### To set sense inputs

1. Ensure that the host computer is in command mode.
2. Enter command #526 to display the current input/output status.
  - C0 = host controls outputs
  - C1 = predefined output mode
  - O0 = both outputs off
  - O1 = output0 on
  - O2 = output1 on
  - O3 = both outputs on
  - I0 = both inputs false
  - I1 = input0 true
  - I2 = input1 true
3. Enter command #6940 to disable input inversion (factory default) or command #6941 to enable input inversion, and press **ENTER**.

## Sense Output Devices

Both the RS–232 and RS–422 configurations used by the Encompass 4 Reader have two sense output circuits – sense output0 and sense output1.

By default, the Encompass 4 Reader operates in predefined output mode where sense output0 and sense output1 are asserted every time a unique valid tag is read. Both sense output devices are asserted by issuing command #621 `Predefined Output Control`. The devices are not asserted when tags are acquired in the transmit all or buffer all ID mode or when the Encompass 4 Reader is operating in Wiegand mode. The sense output pulse duration is variable (command #67N).

The host computer can disable the predefined sense output control by issuing command #6201 to turn sense output0 on or by issuing any of the following commands:

- #6200 Turn Off Both Output Ports
- #6201 Turn Off Output0, On Output1
- #6202 Turn Off Output1, On Output0
- #6203 Turn On Both Output Ports

While under host control, the sense outputs are not automatically asserted when a valid tag is read. The host must issue command #621 Predefined Output Mode to return to the pre-defined mode.

## Serial Port Communications

The Encompass 4 Reader supports one communications port, which can be ordered as either RS–232/Wiegand or RS–422/Wiegand. For the RS–232 and RS–422 communications specifications, the Encompass 4 Reader maintains the following three sets of parameters that affect serial port communications:

- Port configuration parameters (baud rate, data bits, stop bits, parity)
- Communications protocols (basic, error correcting)
- Flow control scheme (none, software, hardware)

The default serial port configuration for each of these three parameters is as follows:

- 9600 baud, 8 data bits, 1 stop bit, no parity
- Basic communications protocol
- Software flow control (XON/XOFF)

You can change these parameters in data mode and command mode operation by issuing commands with the host computer. Use the following procedures to set serial port communications parameters using the terminal emulation program.

## Port Configuration Parameters

Use this procedure to set port configuration parameters using the terminal emulation program. Consult sections “100N Select Baud Rate” on page 7–89 through “00 Switch to Data Mode (Factory Default)” on page 7–88.

### To set baud rate

1. Ensure that the host computer is in command mode.
2. Enter command #100N and press **ENTER**.

### To set stop bits

1. Ensure that the host computer is in command mode.
2. Enter command #101N and press **ENTER**.

## To set parity

1. Ensure that the host computer is in command mode.
2. Enter command #102N and press **ENTER**.

## Communications Protocol

Use the following procedures to set communications protocol. Consult sections “610 Select Basic Communication Protocol (Factory Default)” on page 7–114 through “612NN Select Error Correcting Protocol Timeout” on page 7–114 for more information.



### Caution

**Do not switch to ECP (command #611) unless the host is prepared to acknowledge each reader transmission.**

## To select a communications protocol

1. Ensure that the host computer is in command mode.
2. Enter command #610 to select basic protocol (factory default) or command #611 to select ECP and press **ENTER**.

## Software Flow Control

Two modes of flow control are supported — software (XON/XOFF) and hardware (CTS – clear to send). The host can enable or disable flow control with command #614N Select Flow Control Option.

The host can use software control characters (XON/XOFF) or the hardware CTS handshake line to interrupt reader transmissions. When the reader is configured for software flow control, it stops transmitting if it receives the XOFF character from the host (host software command 13H). It resumes transmitting only when it receives the XON character (host software command 11H) from the host. Likewise, when the reader is configured for hardware flow control, it stops transmitting if it detects that the CTS line is no longer asserted. It resumes transmitting when this line is asserted. If flow control is not needed, the reader should be configured for no flow control (#6140 Disable Flow Control).

**Note:** *TransCore recommends that XON/XOFF flow control be disabled while using the error correcting protocol.*

Use the following procedure to set flow control parameters using the terminal emulation program. See section “614N Select Flow Control Option” on page 7–115.

## To select flow control

1. Ensure that the host computer is in command mode.
2. Enter command #6140 to disable flow control, command #6141 to enable software flow control (factory default), or command #6142 to enable hardware flow control and press **ENTER**.

## Fine-Tuning and Verifying the Read Zone

If the read zone is too wide or too deep for your application, it can be fine-tuned by physically adjusting the Encompass 4 Reader or external antenna mounting orientation, reprogramming the actual RF power output (#644NN Set RF Attenuation), and/ or reprogramming the RF sensitivity range (#643NN Set ATA Operating Range and #645NN Set eGo and eGo Plus Operating Range). The combination of these adjustments allows you to confine the read zone to the area where tagged vehicles pass. This operation also minimizes reading unwanted vehicles in adjacent lanes or parking areas.

See sections “643NN Select ATA Operating Range (Distance)” on page 7–120, “645NN Set eGo and eGo Plus Operating Range (Distance)” on page 7–121, and “644NN Set RF Attenuation” on page 7–120 for more information.

**Note:** As described in “Marking the Read Zone” on page 4-63, marking the read pattern using test tags that are not mounted to vehicles give a general idea of the read pattern but the pattern will vary somewhat when actual vehicles with tags are tested. Final adjustments must be made with tags properly mounted on a variety of vehicles.

## Physically Orienting the Encompass 4 Reader

You can manually adjust the location of the read zone by loosening the Encompass 4 Reader mounting brackets and pointing the reader in the desired direction. The unit should be aligned to point directly at the tag as it enters the desired read zone.

## Physically Orienting the Encompass 4 Reader Antenna

You can manually adjust the location of the read zone by loosening the antenna mounting brackets and pointing the antenna in the desired direction. The unit should be aligned to point directly at the tag as it enters the desired read zone.

## Fine-Tuning the Read Zone by Lowering Output Power

You can make the read zone smaller by adjusting the Encompass 4 Reader RF power output from a maximum of 2 watts to a minimum of 200 milliwatts using command #644NN Set RF Attenuation. Lowering the RF power has the added benefit of reducing RF interference with adjacent lanes.

### To adjust the read zone by lowering output power

1. Ensure that your PC is communicating with the Encompass 4 Reader using a terminal emulation program as described in the section “Verifying Communications” on page 8–136.
2. Mark the current read zone as described in section “Marking the Read Zone” on page 4-63.



#### Caution

**Test tags should be compatible with your Encompass 4 Reader. Test tags can be ATA-protocol, ISO-compliant, or Inter-Agency Group tags affixed to a plastic or wooden yardstick, or eGo or eGo Plus sticker-type tags affixed to a piece of nonmetallic windshield-type glass 0.190 to 0.230 in (4.82 to 5.84 mm) in thickness. The sticker-type tags have a reduced read range when not attached to glass.**

3. Enter command #01 to switch to command mode. You are prompted with #DONE from the reader and can now enter reader commands.
4. Enter in command #64401 to lower the RF power by 1 dB below 2 watts (default). Press **ENTER**.

**Note:** In the command #644NN, NN can be any hexadecimal value from 00 to 0A. Settings for attenuation are 1.0 dB increments over a range of 10 dB of attenuation from the maximum power setting of 2 watts at 0 dB attenuation to a minimum power level of 200 milliwatts at 10 dB attenuation. Increasing the attenuation lowers the output RF power.

5. Switch to data mode by entering command #00 and pressing **ENTER**.
6. Verify that the read zone has decreased by moving the tag through the desired read area. If the read zone is still too large, switch to command mode and enter the command #64402 to lower the output RF power another 1 dB. Continue increasing the NN value until the read zone matches the desired read zone.
7. Follow the steps in [“Marking the Read Zone” on page 4-63](#) to mark the new read zone on the ground with tape or chalk.

When the desired read zone is established, test the read zone with simulated and real traffic by performing the following procedures:

### To test the read zone

1. Ensure that the Encompass 4 Reader is in data mode.
2. With the Encompass 4 Reader running, place one tag behind your back while you hold another tag in the new read zone. If a valid read, the data from the tag held in the read zone displays on the PC screen.
3. Switch tags, placing the other tag behind your back and holding the first tag in the read zone. If a valid read, the data from this tag held in the read zone displays on the PC screen.
4. If both tags are read, you have successfully adjusted the read range. If one or both tags did not read, follow the suggestions in [“Verifying Tag Read Capability” on page 8–137](#).
5. As a last test, attach test tags to vehicles and simulate traffic going through the read zone to verify that the system performs accurately in a live environment.

### Fine-tuning the Read Zone by adjusting sensitivity range

The Encompass 4 Reader read zone can be fine-tuned by using command #643NN for ATA tag read mode or #645NN for eGo and eGo Plus tag read mode to reprogram the RF sensitivity range. Sensitivity range adjustments have less impact on the read pattern than RF power adjustment, thus RF power adjustment should be used as the main read pattern adjustment tool. Sensitivity range control may be helpful in stopping some tag reads on the very edges of the read pattern. To produce a noticeable change in the read pattern, you must decrease the range sensitivity by more than one increment.

### To adjust the read zone by adjusting sensitivity range

1. Ensure that your PC is communicating with the Encompass 4 Reader using a terminal emulation program as described in [“Verifying Communications” on page 8–136](#).
2. Mark the current read zone as described in [“Marking the Read Zone” on page 4-63](#). Enter command #01 to switch to command mode. You are prompted with #DONE from the reader and can now enter reader commands.

3. Enter command #64318 or #64518 to decrease the range sensitivity seven increments below the maximum (default). Press **ENTER**.

**Note:** In the command #643NN or #645NN, NN can be any hexadecimal value from 00 to 1F. The reader's receiver becomes less sensitive to tag signals as the value of NN is lowered from the maximum sensitivity of 1F to the minimum sensitivity of 00.

4. Verify that the read zone has decreased by moving the tag through the desired read area. If the read zone is still too large, switch to command mode and enter the command #64317 or #64517 to decrease the range another increment. Continue increasing the NN value until the read zone matches the desired read zone.
5. Follow the steps in section [“Marking the Read Zone” on page 4-63](#) to mark the new read zone on the ground with the tape or chalk.

When the desired read zone is established, test the read zone with simulated and real traffic by performing the following procedures.

# Chapter 9 Troubleshooting and Maintenance

This chapter contains information for troubleshooting an Encompass® 4 Reader and performing minimal maintenance checks. It also includes information for returning products for repair, obtaining support, and contact information for providing feedback and suggestions to TransCore.

## Error Messages

The Encompass 4 Reader transmits an error message if a command received from the host is not a recognized command or if information supplied with the command is not correct. The reader sends this message to diagnostic commands if the reader fails the specified test.

Table 46 contains a list of error messages.

**Table 46 Error Messages**

Error Message	Description	Corrective Action
Error06	NVRAM parameters have been lost. The Encompass 4 Reader will not function properly because the RF section is shut off until the frequency is reset.	Reset the frequency using command #647XXX.
Error07	The RF phase locked loop (PLL) has lost lock and is unable to operate at its intended frequency. RF output is disabled while the Encompass 4 Reader attempts to reset the PLL.	Reset the RF frequency. Refer to <a href="#">“Radio Frequency” on page 8-15</a> for instructions.
Error08	The RF PLL has successfully regained lock and has been reset to its proper operating frequency. The RF section is returned to its state prior to losing lock (enabled/disabled). Error08 will only be issued after Error07 has been issued.	No action necessary; the previous error has been corrected.
Error11	The operator is attempting to use an Intellitag-based tag in Wiegand mode while the Encompass 4 Reader is in ID-only mode, thus Wiegand compatibility issues.	Enable eATA mode using command #489 if Wiegand operation is needed and the tags are programmed with Wiegand data.



Table 46 Error Messages

Error Message	Description	Corrective Action
ErrorRF1	Warning message that the RF board did not return an update acknowledge signal	If the reader indicates a single ErrorRF1 event and recovers from the error, no corrective action is required. You may want to track this error message if it should occur again. If the reader indicates repeated ErrorRF1 warning messages then return the reader to the factory.
ErrorRF2	Warning message that the RF module did not return an INIT DONE signal	If the reader indicates a single ErrorRF2 event and recovers from the error, no corrective action is required. You may want to track this error message if it should occur again. If the reader indicates repeated ErrorRF2 warning messages then return the reader to the factory.
ErrorRF3	Warning message of unexpected status read, including status byte, from RF module	If the reader indicates a single ErrorRF3 event and recovers from the error, no corrective action is required. You may want to track this error message if it should occur again. If the reader indicates repeated ErrorRF3 warning messages then return the reader to the factory.

## Troubleshooting

You can use the following table for troubleshooting. Should problems continue, contact TransCore for return and replacement procedures. If you contact Technical Support, use the symptom number in [Table 47](#) to reference the problem that you are having with the Encompass 4 Reader.

Table 47 Symptoms and Remedies

Symptom Number <sup>a</sup>	Symptom	Remedy
1	When performing a quick test of the Encompass 4 Reader, the buzz box does not buzz.	<p>Check all your wiring connections and antenna connections (if using external antenna), and ensure that your buzz box is functioning.</p> <p>The wires from the Encompass 4 Reader are grouped in pairs. You could find more than one red wire, more than one black wire, and so on. You must connect the correct red and white wire pair to the leads from the battery.</p> <p>Verify that RF is on as described in <a href="#">“Bench Testing the Encompass 4 Reader Before Installation” on page 4-39</a>. Using a terminal emulation program, you may switch to command mode and issue command #527 to determine RF status. Refer to <a href="#">“527 Display RF Status” on page 7-107</a> for more information.</p>
2	The baud rate is selected correctly but nothing happens.	The Encompass 4 Reader is not communicating with your PC. Check the power supply to your PC, and check the connections between the PC and the Encompass 4 Reader. Try reversing the receive and transmit connections.
3	When testing the Encompass 4 Reader, all the wires are connected correctly but the unit does not respond.	<p>The Encompass 4 Reader may not have the software loaded inside the unit. Contact Technical Support. If you are using a terminal emulation program, check that the terminal emulation setting on the Encompass 4 Reader is VT100.</p> <p>Check that the Encompass 4 communication cable is connected to the correct COM port.</p> <p>Verify that the external antenna is connected correctly.</p>
4	Strange signal responses come from the Encompass 4 Reader when tested with the PC.	<p>Ensure that the reader is in the correct interface mode for the test tag, i.e., Wiegand mode for a Wiegand tag.</p> <p>Check the system defaults using a terminal emulation program. Both PC and reader should be set to 9600 baud, 8 bits, 1 stop bit, and no parity.</p>
5	When a tag is moved in front of the reader or external antenna, a clicking sound comes from the Encompass 4 Reader.	The Encompass 4 Reader works. The sound is the relay inside the Encompass 4 Reader that is controlled by a lock signal. The relay is actuated when a tag is in the read zone.

**Table 47 Symptoms and Remedies**

Symptom Number <sup>a</sup>	Symptom	Remedy
6	Nothing happens when the test tag is passed in front of the Encompass 4 Reader or external antenna.	<p>Ensure that the Encompass 4 Reader is powered on and is in predefined output mode. (#621)</p> <p>Verify that the reader is set to RF ON (#6401).</p> <p>Verify that the external antenna is connected correctly.</p> <p>Verify that the reader mode matches the test tag.</p>
7	The Encompass 4 Reader came from another site and does not work the way the factory defaults indicate that it should.	<p>Different commands were probably used to support the other site's specific configuration. You can restore the factory defaults by using a terminal emulation program to switch to command mode and issuing command #66F. Refer to <a href="#">“66F Load Default Operating Parameters” on page 7–125</a>. All factory defaults except RF frequency will be restored.</p>
8	<p>When connected to a PC that is running terminal communications software, a just-powered up Encompass 4 Reader displays one of the following messages:</p> <pre>#Model E4 Series VER X.XX SNYYYYYY #[Copyright notice]</pre>	<p>The Encompass 4 Reader works. The software is now loaded. YYYYYY is the TransCore-assigned serial number for this Encompass 4 Reader. However, if YYYYYY = 000000, a serial number has never been assigned. If a serial number has not been assigned to your Encompass 4 Reader, contact TransCore Technical Support.</p>
9	The read zone is too small, even before the RF power and range control have been adjusted.	<p>If another Encompass 4 Reader is in the same area, ensure that it is operating on another frequency that is at least 2 MHz different.</p> <p>Check for possible interference from another nearby RF source: fluorescent lights, neon signs, high voltage power lines, nearby cellular telephone, or radio stations. Lights will need to be removed or shielded. Point the Encompass 4 Reader or external antenna in a different direction to see if interference comes from only one direction. You may require a different Encompass 4 Reader that uses another frequency.</p> <p>Verify that the RF power is set to an appropriate value.</p> <p>Verify that the range adjustment is set to the maximum.</p> <p>Verify that the reader is getting at least 16V.</p>

Table 47 Symptoms and Remedies

Symptom Number <sup>a</sup>	Symptom	Remedy
10	The perimeter of the read zone has been defined, but there is a “hollow” spot in the center of the zone that does not read tags.	The angle of the Encompass 4 Reader or external antenna may need adjustment. Slightly tilt the Encompass 4 Reader or external antenna to a different angle to change either the length or width of the read zone. Check the range control adjustment. Refer to <a href="#">“Radio Frequency” on page 8–141</a> .
11	The Encompass 4 Reader is reading tags out of the desired read zone, or cross lane reads are occurring.	Some interference from other RF or electrical sources may be occurring. Refer to <a href="#">“Reflection, Refraction, and Diffraction of RF Signals” on page 2–14</a> . Verify that the read zone has been properly set up. Refer to <a href="#">“Fine-Tuning and Verifying the Read Zone” on page 8–145</a> .
12	The Encompass 4 Reader is not providing any output to the Wiegand interface.	Ensure that the Encompass 4 Reader is in Wiegand mode (#451). The default is either RS–232 or RS–422 mode. Refer to <a href="#">“Wiegand Interface” on page 4–58</a> . Ensure the tags are properly programmed with Wiegand data.

<sup>a</sup> Use this number to reference the problem you are having with the Encompass 4 Reader if you contact TransCore for Technical Support.

## Encompass 4 Reader Repair

The Encompass 4 Reader is designed for whole-unit replacement and is manufactured with surface-mounted components. It requires sophisticated testing and repair equipment. All testing and repairs are performed at TransCore’s factory. Please contact TransCore to obtain a Return Materials Authorization (RMA) for returning the reader.

## Technical Support

Authorized dealers and distributors are responsible for the direct support of all customers. Authorized dealers and distributors needing support can contact Technical Support. Please be prepared to answer a series of questions that are designed to direct you to the best TransCore support resource available. These questions will relate to symptoms, configuration, model, and tags used.

**Note:** End users and facility operators contacting Technical Support will be referred to the dealer responsible for the system sale.

# Appendix A Glossary

## A

AAR	Association of American Railroads
AC	alternating current
ACK	acknowledge (data valid)
ANSI	American National Standards Institute
antenna	passive device that converts RF energy into magnetic energy (RF signal)
ASCII	American Standard Code for Information Interchange
ASIC	application-specific integrated circuit
ATA	American Trucking Association
aux	auxiliary
AWG	AWG (American Wire Gauge) is a U.S. standard set of non-ferrous wire conductor sizes

## B

backscatter	portion of an RF signal that is modulated by a tag and radiated back to the reader
baud	measure of number of bits per second of a digital signal; for example, 9600 baud = 9600 bits per second
BCKS	boot checksum
BCM	buffer control mode
bps	bits per second
byte	a binary character; for example, one 8-bit ASCII character

## C

cmd	command
comm	communications

command	data set that is recognized by the receiving device as intending to elicit a specific response
conduit	flexible steel pipe used for electrical wiring
cps	characters per second
CR	carriage return
CRC	cyclic redundancy check
CTRL	control
CTS	clear to send

## D

data	information that is processed by a computing device
DC	direct current
DIAG	diagnostic

## E

ECP	error correcting protocol
ECPS	error correcting protocol status
eGo	proprietary name for ANS INCITS 256-2001 compliant TransCore tag products. A registered trademark of TCP IP, Ltd.
eGo Plus	proprietary name for ANS INCITS 256-2001 and ISO 18000-6B compliant TransCore tag products. Super eGo is a superset of the eGo protocol. A registered trademark of TCP IP, Ltd.
Encompass	proprietary name for ANS INCITS 256-2001 compliant TransCore reader products. A trademark of TransCore, LP.
eol	end of line
eom	end of message
EPROM	erasable programmable read-only memory

**F**

field	physical area/space in which a tag can be read by the reader; also, an element of a data record/frame. For example, division within a tag's data frame.
frames	consecutive bits of data in memory that are read and written as a group
frequency bands	a range of RF frequencies assigned for transmission by an RF device

**H**

hex	hexadecimal
hexadecimal	base 16 numbering system that uses the characters 0 through 9 and A through F to represent the digits 0 through 16
host	device, generally a computer, that is connected to the Encompass 4 Reader through the communications port

**I**

I/O or IO circuits	input/output circuits
ID	identification; encoded information unique to a particular tag
INCITS	American National Standards Institute International Committee for Information Technology standards
Intellitag	Proprietary name for ANS INCITS 256-2001 compliant Intermecc products. A registered trademark of Intermecc Technologies Corporation, a UNOVA Company.
interface	connection point for communication with another device
IOST	I/O status
ISO	International Standardization Organization

**L**

LF	line feed
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**M**

m	meter
MHz	megahertz

mode method of operation

ms milliseconds

## N

NAK negative acknowledgment (data not valid)

NVRAM non-volatile memory. To save user parameter changes to NVRAM, you must send command #00 before powering down the reader.

## P

passback used to refer to a tag ID that is not passed on to the tag buffer

PC personal computer

PCKS EPROM flash checksum

protocol specified convention for the format of data messages communicated between devices

PRST presence status

PWRB power fail bit

## R

RAM random access memory

RDID reader ID

read process of acquiring data from a device; for example, from a tag or from computer memory

reader controlled interrogating device capable of acquiring data from a device; for example, acquiring and interrupting data from a tag

read zone the physical area in which a tag can be read by the reader

RF radio frequency

RFID radio frequency identification

RFST RF status

ROM read-only memory



RTC	real-time clock
RTS	request-to-send

**S**

SeGo	Super eGo (SeGo) is a superset of the eGo protocol
SN	serial number
som	start of message
SSTC	input status change reporting options

**T**

tag	small self-contained device acting as an identifying transponder
Tau	timeout delay
TT	tag translation

**V**

V	volts
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Ver	version (software)
-----	--------------------

**W**

Wiegand	the trade name for a technology used in card readers and sensors, particularly for access control applications. Wiegand devices were originally developed by HID Corporation.
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write	process of recording data; for example, writing to computer memory or to a tag's memory. Writing writes over (erases) previous data stored at the specified memory locations.
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WTI	Wiegand retransmit interval
-----	-----------------------------

**X**

XON/XOFF	protocol for controlling the flow of data between computers and other devices on an asynchronous serial connection. XON and XOFF are signals to turn a transmitter on or off. The actual signal for XON is the same bit configuration as the ASCII Ctrl-Q keyboard combination (11 hexadecimal). The XOFF signal is the Ctrl-S character (13 hexadecimal).
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# Appendix B Technical Specifications

## Reader Specifications

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### Communications

Frequency Selection	860 to 930 MHz capable
Reading Range	Read performance varies depending on tag, reader, and external antenna (if required) configuration and environment. Optimum read range using the eGo® Plus Sticker Tag is 24.3 ft (7.4 m) <sup>a</sup> . Typical read range should be 12 to 17 ft (3.7 to 5.2 m) <sup>a</sup> .

### Hardware Features

Integrated System and/or integrated system with connector for external antenna.	RF module, tag decoder, external antenna (if required), power supply, I/O ports, and serial communications interface all housed in a single package
Case	Weatherproof enclosure. The system is sealed in a tamper-proof, polycarbonate housing.

### Power Requirements

Input Voltage	16 to 20V AC, 47 to 63 Hz or 16 to 28V DC
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### Physical Attributes

Size	15.5 x 15.5 x 3.25 in (39.4 x 39.4 x 8.25 cm)
Weight	9.5 lb (4.3 kg)

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<sup>a</sup> Reading range depends on reader or external antenna configuration, tag type, tag read mode, and operating environment

## Environmental Parameters

Operating Temperature	-40°F to +131°F (-40°C to +55°C)
Humidity	100% noncondensing
Vibration Tolerance	0.5 Grms, 10 to 500 Hz

## Options

Communications Interface	RS–232 and Wiegand or RS–422 and Wiegand
Cable Accessory Kits	58-1620-001: Connector with 5 ft (1.5 m) cable 58-1620-002: Connector with 20 ft (6.1 m) cable 58-1620-006: Connector with 35 ft (10.7 m) cable 58-1620-007: Connector with 45 ft (13.7 m) cable
Wall Mount Bracket	Allows adjustment in all planes when used to install the Encompass 4 Reader on a flat surface. Include the part number 54-1620-001 when ordering.
Transformer	A Class C transformer is available to allow 110V AC to 18V AC conversion. Include the part number 76-1620-005 when ordering. A Class C transformer (part number 76-1620-008) to allow 220V AC to 18V AC conversion is available by special request.

## Appendix C Wiring Tables

This appendix contains tables that shows alternate wiring connections used to test and install the Encompass® 4 Reader.

### Cable Supplied with the Encompass 4 Reader

The Encompass 4 Reader is delivered with a multi-wire cable (ordered as a separate accessory), which is a 13-pair pigtail. An alternate 15-pair pigtail may be substituted. The 13-pair pigtail is a colored-wire pair cable, with different colors denoting the individual pairs, one pair of which is red/black. The alternate 15-pair pigtail is a red/black wire pair cable, with numbers on the pairs to denote the individual pairs. Two pairs of the 15-pair pigtail, numbers 14 and 15, are not used.

The following tables show the alternate wire pair (15-pair) assignments for the various interfaces, power, and input/output connections.

#### RS–232 Interface

Table 48 shows the RS–232 assignments for alternate wire (15-pair) cable. To see the wire assignments for the 13-pair cable, refer to “Table 11 RS–232 Interface Signal Wiring for Colored-Wire 13-Pair Cable” on page 4-56.

**Table 48 RS–232 Interface Signal Wiring for Alternate Wire 15-Pair Cable**

Signal from Encompass 4 Reader	Alternate Wire Cable		Connect Wire to Host DB9 Pin	Connect Wire to Host DB25 Pin
	Pairing	Color		
TxD — Encompass 4 Reader output	Pair 1	Black	Pin 2	Pin 3
RxD — Encompass 4 Reader input		Red	Pin 3	Pin 2
Signal ground	Pair 5	Black or Red	Pin 5	Pin 7
<b>Optional for hardware handshaking</b>				
RTS — Encompass 4 Reader output	Pair 11	Black	Pin 8	Pin 5
CTS — Encompass 4 Reader input		Red	Pin 7	Pin 4

## RS-422 Interface

Table 49 shows the RS-422 assignments for alternate wire (15-pair) cable. To see the wire assignments for the 13-pair cable, refer to “Table 12 RS-422 Interface Signal Wiring for Colored-Wire 13-Pair Cable” on page 4-57.

**Table 49 RS-422 Interface Signal Wiring for Alternate Wire 15-Pair Cable**

Signal from Encompass 4 Reader	Alternate Wire Cable		Connect to Signal from Host
	Pairing	Color	
RS-422 Transmit positive	Pair 11	Black	Receive (+)
RS-422 Transmit negative		Red	Receive (-)
RS-422 Receive positive	Pair 1	Black	Transmit (+)
RS-422 Receive negative		Red	Transmit (-)

## Wiegand Interface

Table 50 shows the Wiegand assignments for alternate wire (15-pair) cable. To see the wire assignments for the 13-pair cable, refer to “Table 13 Wiegand Interface Signal Wiring for Colored-Wire 13-Pair Cable” on page 4-58.

**Table 50 Wiegand Interface Signal Wiring for Alternate Wire 15-Pair Cable**

Signal from Encompass 4 Reader	Alternate Wire Cable		Connect to Signal from Host
	Pairing	Color	
Wiegand Zero output	Pair 10	Black	Data0
Wiegand One output		Red	Data1
Signal Ground	Pair 5	Black or Red	Ground

## Power Supply Connections

### AC Power

Table 51 shows the alternate wire (15-pair) assignments for connection to a low-voltage AC power supply. To see the wire assignments for the 13-pair cable, refer to “Table 8 AC Transformer Connections for Colored-Wire 13-Pair Cable” on page 4-37.

**Table 51 AC Transformer Connections for Alternate Wire 15-Pair Cable**

Signal from Encompass 4 Reader	Alternate Wire Cable		Connect to Transformer Terminal Strip
	Pairing	Color	
Main power input	Pair 12 and Pair 13	Black/Black	L1: 6-20V AC
Main power return		Red/Red	L2: 16-20V AC

### Low-Voltage DC Power

Table 52 shows the alternate wire (15-pair) assignments for connection to a low-voltage DC power supply. To see the wire assignments for the 13-pair cable, refer to “Table 9 Low Voltage DC Cable Connections for the Colored-Wire 13-Pair Cable” on page 4-37.

**Table 52 Low Voltage DC Cable Connections for Alternate Wire 15-Pair Cable**

Signal from Encompass 4 Reader	Alternate Wire Cable		Connection Use
	Pairing	Color	
Main power input	Pair 12 and Pair 13	Black and Black	16 to 28V DC + terminal
Main power return		Red and Red	16 to 28V DC – terminal

## Input/Output Cabling Assignments

Table 53 shows the sense input/output assignments for alternate wire (15-pair) cable. To see the wire assignments for the 13-pair cable, refer to “Table 14 Sense Input/Output Cabling 13-Pair Assignments” on page 4-61.

**Table 53 Sense Input/Output Cabling Assignments for Alternate Wire 15-Pair Cable**

Alternate Wire Cable			Signal	Description	Typical Function
Pairing	Pin	Color			
Pair 10	E	Black	WGND0	Wiegand data0	Parking/access control applications
	F	Red	WGND1	Wiegand data1	Parking/access control applications
Pair 8	L	Black	Lock	Tag lock sense output, active-closed	Testing maintenance
	M	Red	Lock_RTN	Tag lock return	Testing maintenance
Pair 9	N	Black	Sense Input0	Sense Input0 (loop), active-closed	Loop and presence detection
	P	Red	Sense Input0_RTN	Sense Input0 return; not isolated from signal ground	Loop and presence detection
Pair 4	R	Black	Sense Input1	Sense Input1, active-closed	General-purpose sense input, not used to detect presence
	S	Red	Sense Input1_RTN	Sense Input1 return; not isolated from signal ground	General-purpose sense input, not used to detect presence
Pair 6	T	Black	Sense Output0_COM	Sense Output0 (tag detect), common terminal	Switched sense output to control gate
	U	Red	Sense Output0_NO	Sense Output0, normally open terminal	Switched sense output to control gate
Pair 7 or	V	Black	Sense Output0_COM	Sense Output0 (tag detect output), common terminal	Switched sense output for any external control (light, gate, buzzer, etc.)
	V**	Black	Sync_485_N	RS-485 bus negative	Used to connect Encompass 4 Readers with IAG capability on a synchronization bus
	W	Red	Sense Output0_NC	Sense Output0, normally closed terminal	Switched sense output for any external control (light, gate, buzzer, etc.)

Table 53 Sense Input/Output Cabling Assignments for Alternate Wire 15-Pair Cable

Alternate Wire Cable			Signal	Description	Typical Function
Pairing	Pin	Color			
Pair 3	X	Black	Sense Output1_COM	Sense Output1, common terminal	Switched sense output
	Y	Red	Sense Output1_NO	Sense Output1, normally open terminal	Switched sense output
Pair 2 or	Z	Black	Sense Output1_COM	Sense Output1, common terminal	Switched sense output
	Z**	Black	Sync_485_P	RS-485 bus positive	Used to connect Encompass 4 Readers with IAG capability on a synchronization bus
	a	Red	Sense Output1_NO	Sense Output1, normally closed terminal	Switched sense output
Pair 5	b	Black	GND	logic ground	Signal ground (used with RS-232 and Wiegand communications)
	c	Red	GND	logic ground	Signal ground (used with RS-232 and Wiegand communications)

\*\*Use this synchronization pin designation if installing an Encompass 4 Reader that reads IAG protocol tags. The part numbers for these readers are as follows:  
 10-4002-004; 10-4002-010; 10-4002-019; 10-4004-004; 10-4004-010; 10-4004-019;  
 10-4012-004; 10-4012-010; 10-4012-019; 10-4014-004; 10-4014-010; 10-4014-019



## Summary Table

Table 54 shows all assignments for both colored-wire pair (13-pair) and alternate wire (15-pair) cables.

**Table 54 All Cabling Assignments for Colored-Wire Pair Cable or Alternate Wire Cable**

Colored-Wire Pair Cable			Alternate Wire Cable		Signal	Description	Typical Function
Pair	Pin	Color	Pair	Color			
Red/ Black	A	Black	Pair 1	Black	TX232, RX422+, IF485-	RS-232 transmit, RS- 422 receive positive, RS-485 negative	Encompass 4 Reader output, host input
	B	Red		Red	RX232, RX422-, IF485+	RS-232 receive, RS-422 receive negative, RS- 485 positive	Encompass 4 Reader input, host output
Yellow/ Red	C	Yellow	Pair 11	Black	RTS232, TX422	RS-232 request to send or RS- 422 transmit positive	Encompass 4 Reader output, host input for hardware handshaking
	D	Red		Red	CTS232, TX422	RS-232 clear to send or RS-422 transmit negative	Encompass 4 Reader input, host output for hardware handshaking
Blue/ Red	E	Blue	Pair 10	Black	WGND0	Wiegand data0	Parking/ access control applications
	F	Red		Red	WGND1	Wiegand data1	Parking/ access control applications
Orange/ Red	G	Orange	Pair 13	Black	18V	Main power input	
	H	Red		Red	18V_RTN	Main power return	
Brown/ Red	J	Brown	Pair 12	Black	18V	Main power input	
	K	Red		Red	18V_RTN	Main power return	

Table 54 All Cabling Assignments for Colored-Wire Pair Cable or Alternate Wire Cable

Colored-Wire Pair Cable			Alternate Wire Cable		Signal	Description	Typical Function
Pair	Pin	Color	Pair	Color			
White/ Red	L	White	Pair 8	Black	Lock	Tag lock sense output, active-closed	Testing maintenance
	M	Red		Red	Lock_RTN	Tag lock return	Testing maintenance
Green/ Red	N	Green	Pair 9	Black	Sense Input0	Sense input0 (loop), active-closed	Loop and presence detect
	P	Red		Red	Sense Input0_RTN	Sense input0 return; not isolated from signal ground	Loop and presence detect
Blue/ Black	R	Blue	Pair 4	Black	Sense Input1	Sense input1, active-closed	General-purpose sense input, not used to detect presence.
	S	Black		Red	Sense Input1_RTN	Sense input1 return; not isolated from signal ground	General-purpose sense input, not used to detect presence.
Brown/ Black	T	Black	Pair 6	Black	Sense Output0_COM	Sense output0 (tag detect), common terminal	Switched sense output to control gate
	U	Brown		Red	Sense Output0_NO	Sense output0, normally open terminal	Switched sense output to control gate

**Table 54 All Cabling Assignments for Colored-Wire Pair Cable or Alternate Wire Cable**

Colored-Wire Pair Cable			Alternate Wire Cable		Signal	Description	Typical Function
Pair	Pin	Color	Pair	Color			
Orange /Black	V	Black	Pair 7	Black	Sense Output0_COM	Sense output0 (tag detect output), common terminal	Switched sense output for any external control (light, gate, buzzer, etc.)
	V**	Black		Black	Sync_485_N	RS-485 bus negative	Used to connect Encompass 4 Readers with IAG capability on a synchronization bus
	W	Orange		Red	Sense Output0_NC	Sense output0, normally closed terminal	Switched sense output for any external control (light, gate, buzzer, etc.)
Green/ Black	X	Black	Pair 3	Black	Sense Output1_COM	Sense output1, common terminal	Switched sense output.
	Y	Green		Red	Sense Output1_NO	Sense output1, normally open terminal	Switched sense output
White/ Black	Z	Black	Pair 2	Black	Sense Output1_COM	Sense output1, common terminal	Switched sense output
	Z**	Black		Black	Sync_485_P	RS-485 bus positive	Used to connect Encompass 4 Readers with IAG capability on a synchronization bus
	a	White		Red	Sense Output1_NC	Sense output1, normally closed terminal	Switched sense output

Table 54 All Cabling Assignments for Colored-Wire Pair Cable or Alternate Wire Cable

Colored-Wire Pair Cable			Alternate Wire Cable		Signal	Description	Typical Function
Pair	Pin	Color	Pair	Color			
Yellow/ Black	b	Yellow	Pair 5	Black	GND	logic ground	Signal ground (used with RS- 232 and Wiegand communications)
	c	Black		Red	GND	logic ground	Signal ground (used with RS- 232 and Wiegand communications)

\*\*Use this synchronization pin designation if installing an Encompass 4 Reader that reads IAG protocol tags. The part numbers for these readers are as follows:

10-4002-004; 10-4002-010; 10-4002-019; 10-4004-004; 10-4004-010; 10-4004-019;  
10-4012-004; 10-4012-010; 10-4012-019; 10-4014-004; 10-4014-010; 10-4014-019

## Appendix D Command Quick Reference

This appendix lists the default configuration settings for the Encompass® 4 Reader and its commands. Commands are listed both numerically and alphabetically.

### Command Syntax

The command numbers consist of from 2 to 4 hex digits. The letters N or S may follow a command number. The letter N indicates that part of the command number is variable. The letter S indicates the requirement for an alphanumeric data string that is to be included immediately following the command number. Hex digits (0–9, A–F) in either uppercase or lowercase characters may be used in data strings and for hex digits A–F. For more information see “[Chapter 5 General Software Information](#)” on page 5–67.

[Table 55](#) lists factory default settings. [Table 56](#) lists, in numerical order, all of the commands available to users. [Table 57](#) lists the same commands by command name.

### Factory Default Settings

**Note:** [Table 55](#) lists the factory default settings for the Encompass 4 Reader.

**Table 55 Encompass 4 Reader Default Configuration Settings**

Parameter	Setting	Command
Switch to data mode	Data	00
Baud rate	9600	1005
Stop bits	1	1010
Disable parity	None	1020
Time and date appended	Enabled	302
No auxiliary information appended	Disabled	310
EAC page append	Disabled	320
Unique ID code criteria	Separation of 1 ID	4100
Valid ID code criteria	Acquisition of 1 ID	4200
Uniqueness timeout	2 minutes	441
Wiegand mode	Disabled	450
Tag translation mode	Disabled	452
Multi-tag sort	Disabled	454
eGo Plus tag initialization during multi-tag sort	Enabled	456
Second alternate group select	Disabled	458

**Table 55 Encompass 4 Reader Default Configuration Settings**

Parameter	Setting	Command
Wiegand transmit mode	1 second	4601
Third alternate group select	Disabled	490
Fourth alternate group select	Disabled	492
Fifth alternate group select	Disabled	494
Alternate group select	Disabled	496
Set reader ID number	00	6000
Select basic communications protocol	Basic	610
Error correcting protocol (ECP) timeout	12.7 sec	612FE
Software flow control	Software (XON/XOFF)	6141
Echo mode	Enabled	6171
Set output control	Turn off both outputs	6200
Select predefined output control	Predefined	621
RF-by-input control	Enabled	641
ATA operating range	Maximum	6431F
RF attenuation	Full power	64400
eGo or eGo Plus operating range	Maximum	6451F
Synchronization output delay time	Disabled	64800
Synchronization hold off time	Disabled	64900
Sense output pulse duration	228 ms	67C
Presence without tag reports	Disabled	6900
RF-off control	Timeout or no presence	6922
RF timeout	Never true	693F
Input inversion	Disabled	6940
Input status change reports	Disabled	820
Automatic periodic RF status report	Disabled	830

## Numerical Command List

The following conventions are used in [Table 56](#):

- Items in ***bold italics*** identify factory default settings.
- Only the command-related data portion of the reader message is shown.

Refer to “[Chapter 7 Commands](#)” on page 7–86 for the complete syntax of commands and messages.

**Table 56 Encompass 4 Reader Commands Listed Numerically**

Number	Command Name	Reader Message
<b>00</b>	<b><i>Switch to data mode (default)</i></b>	<b><i>Done</i></b>
01	Switch to command mode	Done
100N	Select Baud Rate	Done
1002	Set baud rate = 1200 baud	Done
1003	Set baud rate = 2400 baud	Done
1004	Set baud rate = 4800 baud	Done
<b>1005</b>	<b><i>Set baud rate = 9600 baud (default)</i></b>	<b><i>Done</i></b>
1006	Set baud rate = 19.2 K baud	Done
1007	Set baud rate = 38.4 K baud	Done
101N	Select Stop Bits	Done
<b>1010</b>	<b><i>Use one stop bit (default)</i></b>	<b><i>Done</i></b>
1011	Use two stop bits	Done
102N	Select Parity	Done
<b>1020</b>	<b><i>Disable parity (default)</i></b>	<b><i>Done</i></b>
1021	Select even parity	Done
1022	Select odd parity	Done
20	Set time	Done
21	Set date	Done
22	Display time and date	Time and date
30N	Append time and date selection	Done
300	No time and date appended	Done
<b>302</b>	<b><i>Time and date appended (default)</i></b>	<b><i>Done</i></b>
31N	Append Auxiliary Information Selection	Done
<b>310</b>	<b><i>No auxiliary information appended (default)</i></b>	<b><i>Done</i></b>

**Table 56 Encompass 4 Reader Commands Listed Numerically**

Number	Command Name	Reader Message
311	Auxiliary information appended	Done
<b>320</b>	<b><i>Disable EAC page append (default)</i></b>	<b>Done</b>
321	Enable EAC page append	Done
40	Transmit all IDs	Done
410N	Select unique ID code criteria	Done
<b>4100</b>	<b><i>Select one ID separation (default)</i></b>	<b>Done</b>
4101	Select two ID separation	Done
4102	Select three ID separation	Done
4103	Select four ID separation	Done
420N	Select valid ID code criteria	Done
<b>4200</b>	<b><i>Select 1 valid ID code (default)</i></b>	<b>Done</b>
4201	Select 2 valid ID codes	Done
4202	Select 3 valid ID codes	Done
4203	Select 4 valid ID codes	Done
44N	Set uniqueness timeout	Done
440	Reset uniqueness	Done
<b>441</b>	<b><i>Set uniqueness timeout to 2 minutes (default)</i></b>	<b>Done</b>
442	Set uniqueness timeout to 15 seconds	Done
443	Set uniqueness timeout to 30 seconds	Done
<b>450</b>	<b><i>Disable Wiegand mode (default)</i></b>	<b>Done</b>
451	Enable Wiegand mode	Done
<b>452</b>	<b><i>Disable tag translation mode (default)</i></b>	<b>Done</b>
453	Enable tag translation mode	Done
454	Enable multi-tag sort	Done
<b>455</b>	<b><i>Disable multi-tag sort (default)</i></b>	<b>Done</b>
<b>456</b>	<b><i>Enable eGo Plus Tag initialization during multi-tag sort (default)</i></b>	<b>Done</b>
457	Disable eGo Plus Tag initialization during multi-tag sort	Done
<b>458</b>	<b><i>Disable second alternate group select (default)</i></b>	<b>Done</b>
459	Enable second alternate group select	Done
46NN	Set Wiegand retransmit interval	Done



Table 56 Encompass 4 Reader Commands Listed Numerically

Number	Command Name	Reader Message
<b>4601</b>	<b><i>Set Wiegand retransmit interval to 1 second (default)</i></b>	<b><i>Done</i></b>
480	Disable ATA	Done
481	Enable ATA	Done if tag protocol supported/Error if tag protocol is unsupported
482	Disable eGo	Done
483	Enable eGo	Done if tag protocol supported/Error if tag protocol is unsupported
484	Disable SeGo	Done
485	Enable SeGo	Done if tag protocol supported/Error if tag protocol is unsupported
486	Disable IAG	Done
487	Enable IAG	Done if tag protocol supported/Error if tag protocol is unsupported
488	Disable eATA	Done
489	Enable eATA	Done
<b>490</b>	<b><i>Disable third alternate group select (default)</i></b>	<b><i>Done</i></b>
491	Enable third alternate group select	Done
<b>492</b>	<b><i>Disable fourth alternate group select (default)</i></b>	<b><i>Done</i></b>
493	Enable fourth alternate group select	Done
<b>494</b>	<b><i>Disable fifth alternate group select (default)</i></b>	<b><i>Done</i></b>
495	Enable fifth alternate group select	Done
<b>496</b>	<b><i>Disable alternate group select (default)</i></b>	<b><i>Done</i></b>
497	Enable alternate group select	Done
505	Display version	Model E4 Series Ver X.XX SNSSSSSS
506	Display hardware configuration information	1-20 character ASCII string
510	Display RF transceiver FPGA version	RF FPGA VER = XX.XX
511	Display RF transceiver I filter chip version	FIL IC I VER = XX.XX
512	Display RF transceiver Q filter chip version	FIL IC Q VER = XX.XX
513	Display DSP board Actel version	DSP FPGA VER = XX.XX

**Table 56 Encompass 4 Reader Commands Listed Numerically**

Number	Command Name	Reader Message
520	Display power fail bit	PWRB P<0 to 1> R0
521	Display reader ID number	RDID xx
522	Display comm port parameters	MAIN B<2 to 7> S<0 to 1> P<0 to 2> D0
524	Display appended info status	IDAP T<0> D<0> X<0 to 1>
525	Display comm protocol	ECPS P<0 to 2> T<01 to FF> X<0 to 2> S0
526	Display I/O status	C<0 to 1> O<0 to 3> I<0 to 3> D<0 to F>
527	Display RF status	RFST C<0 to 1> O<0 to 1> T<1 to 3> Fxxx Rxx Gxx Axx Ixx
529	Display presence input status	PRST P<0 to 1> D0 A<0 to 2> T<0 to F> I<0 to 1>
530	Display RF0 filter status	RF0S U<0 to 4> V<0 to 3>
532	Display Wiegand mode status	TOF <0 to 1>
533	Display Wiegand retransmit interval	WTI <01 to FF>
534	Display tag translation mode status	TT <0 to 1>
537	Display echo status	ECHO <0 to 1>
540	Display flash checksum	PCKS I0000 Exxxx
543	Display boot checksum	BCKS xxxx
549	Display user-programmable group select equals (GSE) filter data	The response data is formatted similar to the data in the configuration command.
560	Display input status change	SSTC E<0 to 1>M<0 to 3>
570	Display tag protocols	ATA:<E, D> eGo:<I, F, D> SeGo:<I, F, D> IAG:<E, D> Sort:<E, D> TMM0
577	Report buffered handshakes	XX = number of handshakes
582	Display synchronization values	SYNC T<00 to FF> H<00 to 0A>

Table 56 Encompass 4 Reader Commands Listed Numerically

Number	Command Name	Reader Message
60NN	Set reader ID number NN = 00 to FF	Done
<b>6000</b>	<b>Set reader ID number to 00 (default)</b>	<b>Done</b>
<b>610</b>	<b>Select basic protocol (default)</b>	<b>Done</b>
611	Select ECP protocol	Done
612NN	Select ECP Timeout	Done
<b>612FE</b>	<b>Set ECP timeout = 12.7 sec (default)</b>	<b>Done</b>
612FF	Disable ECP timeout	Done
613	Enable data inquiry protocol	Done
614N	Select Flow Control Option	Done
6140	Disable flow control	Done
<b>6141</b>	<b>Enable software flow control (default)</b>	<b>Done</b>
6142	Enable hardware flow control	Done
6170	Disable echo mode	Done
<b>6171</b>	<b>Enable echo mode (default)</b>	<b>Done</b>
620N	Set output control	Done
<b>6200</b>	<b>Turn off both output ports (default)</b>	<b>Done</b>
6201	Turn off output1, turn on output0	Done
6202	Turn off output 0, turn on output1	Done
6203	Turn on both output ports	Done
<b>621</b>	<b>Select predefined output mode (default)</b>	<b>Done</b>
63	Reset reader	Model E4 Series Ver X.XX SNSSSSSS Copyright 2008 TransCore
640N	RF Control	Done
6400	Turn off RF	Done
6401	Turn on RF	Done
<b>641</b>	<b>Select RF-by-input control (default)</b>	<b>Done</b>
642NN	Select RF operating frequency	Done
643NN	Set ATA operating range (Distance)	Done
<b>6431F</b>	<b>Set ATA operating range to longest range (default)</b>	<b>Done</b>

**Table 56 Encompass 4 Reader Commands Listed Numerically**

Number	Command Name	Reader Message
644NN	Set RF attenuation NN = 00 to 0A	Done
<b>64400</b>	<b>Set RF attenuation to 0 dB (full power) (default)</b>	<b>Done</b>
645NN	Set eGo or eGo Plus operating range	Done
<b>6451F</b>	<b>Set eGo or eGo Plus operating range to longest range (default)</b>	<b>Done</b>
646NN	Set IAG RF attenuation	Done
<b>64604</b>	<b>Set IAG RF attenuation (default)</b>	<b>Done</b>
647NNN	Select RF operating frequency	Done
648NN	Set synchronization output delay time	Done
<b>64800</b>	<b>Disable synchronization output delay (default)</b>	<b>Done</b>
649NN	Set synchronization hold-off time	Done
<b>64900</b>	<b>Disable synchronization hold-off time (default)</b>	<b>Done</b>
65	Reset power fail bit	Done
66F	Load default operating parameters	Done
67N	Set output pulse duration	Done or Error
<b>67C</b>	<b>Output pulse duration set to 228 ms (default)</b>	<b>Done</b>
690N	Select presence without tag report option	Done
<b>6900</b>	<b>Disable presence without tag reports (default)</b>	<b>Done</b>
6901	Enable presence without tag reports	Done
692N	Select RF Control Algorithm	Done
6920	Turn RF off on timeout	Done
6921	Turn RF off on timeout/tag	Done
<b>6922</b>	<b>Timeout or presence false (#529A2, default)</b>	<b>Done</b>
693N	Set RF timeout period	Done
<b>693F</b>	<b>Set RF timeout to infinite (default)</b>	<b>Done</b>
694N	Select Input Inversion Option	Done
<b>6940</b>	<b>Disable input inversion (default)</b>	<b>Done</b>
6941	Enable input inversion	Done
695S...S	Set serial number S...S = ASCII string (maximum length of 6 characters)	Done
696S...S	Store hardware configuration string S...S = ASCII string (maximum length of 20 characters)	Done

Table 56 Encompass 4 Reader Commands Listed Numerically

Number	Command Name	Reader Message
697	Set user-programmable group select equals (GSE) filter	Done
82N	Select Input Status Change Report Option	Done
<b>820</b>	<b>Disable status change reports (default)</b>	<b>Done</b>
821	Report change on input0	Done
822	Report change on input1	Done
823	Report changes on input0 and input1	Done
<b>830</b>	<b>Disable automatic periodic RF status report (default)</b>	<b>Done</b>
831	Enable automatic periodic RF status report	Done
<b>844</b>	<b>Disable Retransmit (default)</b>	
845	Enable Retransmit	

# Alphabetical Command List

The following conventions are used in [Table 57](#):

- Items in ***bold italics*** identify factory default settings.
- Only the command-related data portion of the reader message is shown.

Refer to “[Chapter 7 Commands](#)” on page 7–86 for the complete syntax of commands and messages.

**Table 57 Encompass 4 Reader Commands Listed Alphabetically**

Command Name	Number	Reader Message
Append Auxiliary Information Selection	31N	Done
Append time and date selection	30N	Done
Auxiliary information appended	311	Done
<b><i>Disable alternate group select (default)</i></b>	<b>496</b>	<b>Done</b>
Disable ATA	480	Done
<b><i>Disable automatic periodic RF status report (default)</i></b>	<b>830</b>	<b>Done</b>
<b><i>Disable EAC page append (default)</i></b>	<b>320</b>	<b>Done</b>
Disable eATA	488	Done
Disable echo mode	6170	Done
Disable ECP timeout	612FF	Done
Disable eGo	482	Done
Disable eGo Plus Tag initialization during multi-tag sort	457	Done
<b><i>Disable fifth alternate group select (default)</i></b>	<b>494</b>	<b>Done</b>
Disable flow control	6140	Done
<b><i>Disable fourth alternate group select (default)</i></b>	<b>492</b>	<b>Done</b>
Disable IAG	486	Done
<b><i>Disable input inversion (default)</i></b>	<b>6940</b>	<b>Done</b>
<b><i>Disable multi-tag sort (default)</i></b>	<b>455</b>	<b>Done</b>
<b><i>Disable parity (default)</i></b>	<b>1020</b>	<b>Done</b>
<b><i>Disable presence without tag reports (default)</i></b>	<b>6900</b>	<b>Done</b>
<b><i>Disable Retransmit (default)</i></b>	<b>844</b>	
<b><i>Disable second alternate group select (default)</i></b>	<b>458</b>	<b>Done</b>

Table 57 Encompass 4 Reader Commands Listed Alphabetically

Command Name	Number	Reader Message
Disable SeGo	484	Done
<i>Disable status change reports (default)</i>	<b>820</b>	<b>Done</b>
<i>Disable synchronization hold-off time (default)</i>	<b>64900</b>	<b>Done</b>
<i>Disable synchronization output delay (default)</i>	<b>64800</b>	<b>Done</b>
<i>Disable tag translation mode (default)</i>	<b>452</b>	<b>Done</b>
<i>Disable third alternate group select (default)</i>	<b>490</b>	<b>Done</b>
<i>Disable Wiegand mode (default)</i>	<b>450</b>	<b>Done</b>
Display appended info status	524	IDAP T<0> D<0> X<0 to 1>
Display boot checksum	543	BCKS xxxx
Display comm port parameters	522	MAIN B<2 to 7> S<0 to 1> P<0 to 2> D0
Display comm protocol	525	ECPS P<0 to 2> T<01 to FF> X<0 to 2> S0
Display DSP board Actel version	513	DSP FPGA VER = XX.XX
Display echo status	537	ECHO <0 to 1>
Display flash checksum	540	PCKS I0000 Exxxx
Display hardware configuration information	506	1-20 character ASCII string
Display I/O status	526	C<0 to 1> O<0 to 3> I<0 to 3> D<0 to F>
Display input status change	560	SSTC E<0 to 1>M<0 to 3>
Display power fail bit	520	PWRB P <0 to 1> R0
Display presence input status	529	PRST P<0 to 1> D0 A<0 to 2> T<0 to F> I<0 to 1>
Display reader ID number	521	RDID xx
Display RF status	527	RFST C<0 to 1> O<0 to 1> T<1 to 3> Fxxx Rxx Gxx Axx lxx
Display RF transceiver FPGA version	510	RF FPGA VER = XX.XX
Display RF transceiver I filter chip version	511	FIL IC I VER = XX.XX
Display RF transceiver Q filter chip version	512	FIL IC Q VER = XX.XX

**Table 57 Encompass 4 Reader Commands Listed Alphabetically**

Command Name	Number	Reader Message
Display RF0 filter status	530	RF0S U<0 to 4> V<0 to 3>
Display synchronization values	582	SYNC T<00 to FF> H<00 to 0A>
Display tag protocols	570	ATA:<E, D> eGo:<I, F, D> SeGo:<I, F, D> IAG:<E, D> Sort:<E, D> TMM0
Display tag translation mode status	534	TT <0 to 1>
Display time and date	22	Time and date
Display user-programmable group select equals (GSE) filter data	549	The response data is formatted similar to the data in the configuration command.
Display version	505	Model E4 Series Ver X.XX SNSSSSSS
Display Wiegand mode status	532	TOF <0 to 1>
Display Wiegand retransmit interval	533	WTI <01 to FF>
Enable alternate group select	497	Done
Enable ATA	481	Done if tag protocol supported/Error if tag protocol is unsupported
Enable automatic periodic RF status report	831	Done
Enable data inquiry protocol	613	Done
Enable EAC page append	321	Done
Enable eATA	489	Done
<b>Enable echo mode (default)</b>	<b>6171</b>	<b>Done</b>
Enable eGo	483	Done if tag protocol supported/Error if tag protocol is unsupported
<b>Enable eGo Plus Tag initialization during multi-tag sort (default)</b>	<b>456</b>	<b>Done</b>
Enable fifth alternate group select	495	Done
Enable fourth alternate group select	493	Done
Enable hardware flow control	6142	Done